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Design the Framework for Detecting Malicious Mobile Web-Pages in Real Time

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ABSTRACT

Mobile specific web pages differ significantly from their desktop counterparts in content, layout and functionality. Accordingly, existing techniques to detect malicious websites are unlikely to work for such web pages. The disclosed technology includes techniques for identifying malicious mobile electronic documents, e.g. web pages or emails, based on static document features. In this paper, we design and implement kAYO, a mechanism that distinguishes between malicious and benign mobile web pages. kAYO makes this determination based on static features of a webpage ranging from the number of iframes to the presence of known fraudulent phone numbers. We then apply kAYO to a dataset of over 350,000 known benign and malicious mobile web pages and demonstrate 90% accuracy in classification. Moreover, we discover, characterize and report a number of web pages missed by Google Safe Browsing and Virus Total, but detected by kAYO.

I. INTRODUCTION

Internet connected mobile devices are going to outnumber humans [2]. Moreover, global mobile data traffic is expected to increase 13-fold between 2012 and 2017. Both platform specific applications ("native apps") and browser-based applications ("web apps") enable mobile device users to perform security sensitive operations such as online purchases, bank transactions and accessing social networks. The distinction between native apps and web apps on mobile devices is increasingly being blurred. HTML5 becomes universally deployed and mobile web apps directly take advantage of device features such as the camera, microphone and relocation, the difference between native and web apps will vanish almost entirely. A recent study of Smartphone usage shows that more people browse the Web than use native apps on their phone. The trend and the increasing use of web browsers on modern mobile phones warrant characterizing existing and emerging threats to mobile web browsing. Although a range of studies have focused on the security of native apps on mobile devices, efforts in characterizing the security of web transactions originating at mobile browsers are limited. Mobile web browsers have long underperformed their Desktop counterparts. However, recent improvements in processing power and bandwidth have spurred significant changes in the ways users experience the mobile web. Modern mobile browsers provide rich functionality equivalent to their desktop counterparts using web technologies such as HTML, JavaScript, and CSS. Furthermore, browsers on mobile platforms now build on the same or similarly capable rendering engines used by many desktop browsers. Mobile users are three times more likely to access phishing websites than desktop users [3]. Mobile devices are increasingly being used to access the web [1]. However, in spite of significant advances in processor power and bandwidth, the browsing experience on mobile devices is considerably different. These differences can largely be attributed to the dramatic reduction of screen size, which impacts the content, functionality and layout of mobile web pages. Identify the malicious URLs based

on dynamically extracted lexical patterns from URLs. They developed a new method to mine their URL patterns, which are not assembled using any pre-defined items and thus cannot be mined using any existing frequent pattern mining methods. It can provide new flexibility and capability malicious URLs algorithmically generated by malicious programs. Content, functionality and layout have regularly been used to perform static analysis to determine maliciousness in the desktop space. Features such as the frequency of iframes and the number of redirections have traditionally served as strong indicators of malicious intent. Due to the significant changes made to accommodate mobile devices, such assertions may no longer be true. For example, whereas such behavior would be flagged as suspicious in the desktop setting, many popular benign mobile web pages require multiple redirections before users gain access to content. Previous techniques also fail to consider mobile specific webpage elements such as calls to mobile APIs.. Static features of mobile webpages derived from their HTML and JavaScript content, URL and advanced mobile specific capabilities. Our design detects a number of malicious mobile webpages not precisely detected by existing techniques such as Virus Total and Google Safe Browsing. Finally, we discuss the existing tools to detect mobile malicious webpages and phishing attack and build a browser extension.

II. MOTIVATION

Static analysis techniques to detect malicious websites often use features of a webpage such as HTML, JavaScript and characteristics of the URL. Usually, these features are fed to machine learning techniques to classify benign and malicious web pages. These techniques are predicated on the assumption that the features are distributed differently across benign and malicious web pages. Accordingly, any changes in the distribution of static features in benign and/or malicious web pages impacts successful, these static analysis techniques have been used exclusively for desktop web pages. Mobile websites are significantly different from their desktop counterparts in content, functionality and layout. Consequently, existing tools using static features to detect malicious desktop web pages are unlikely to work for mobile web pages.

III. PROPOSED WORK

Proposed work includes the following –

- The proposed method focus on mobile specific threats. Proposed method work on the mobile specific web pages. Existing technique to detect malicious websites are unable to work on mobile. Here determination is based on the static as well as dynamic features.

- The proposed method is outlined in figure this system use URL to get malicious content.

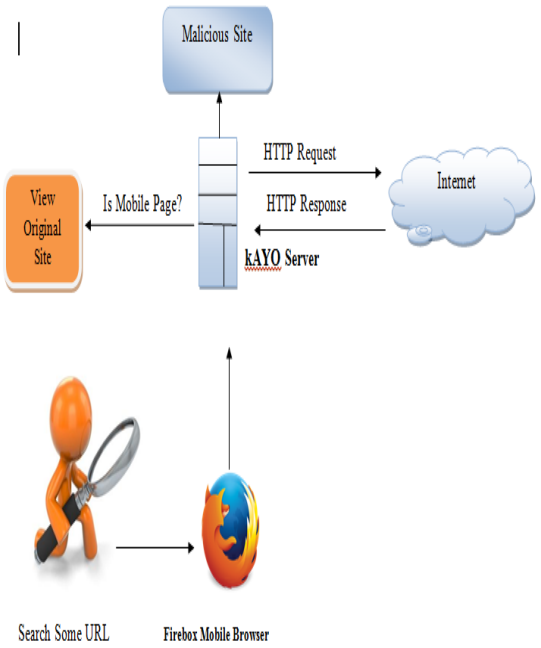

Figure 1. proposed methodology

- Our application is use to check the malicious function. Here OCR (optical character recognition) technique is also introduced. OCR is technique that convert image into text to detect valuable phishing attack.
- User enters the URL he wants to visit in the extension toolbar. The extension then sends the URL backend server over HTTPS.
- If the URL is not malicious and free from phishing attack according to our app, then it will open webpage in the browser automatically.

- Otherwise, a warning message is shown to the user recommending them not to visit the URL or visit on their own risk.

- If application identifies that the pages are malicious then the proposed method will generate an output i.e it detect a malicious webpages or phishing site.

IV. CONCLUSION

In this way, we study the framework for detecting malicious mobile webpages in real time. Mobile webpages are significantly different than their desktop counterparts in content, functionality and layout. Therefore, existing techniques using static features of desktop webpages to detect malicious behavior for mobile specific pages. We designed and developed a fast and reliable static analysis technique that detects mobile malicious webpages and also detect phishing sites. Our application provides greater accuracy in classification, and detects a number of malicious mobile webpages in the wild that are not detected by existing techniques such as Cantina. Finally, we build a browser extension that provides real-time feedback to users. We proposed an application for mobile platforms. Our application resolves this issue by using OCR, which can accurately extract text from the screenshot of the login interface so that the claimed identity of phishing attacker can be verified. We conclude that our application detects new mobile specific threats such as websites hosting and takes the first step towards identifying new security challenges in the modern mobile web.

V. ACKNOWLEDGEMENT

I take his opportunity to express my hearty thanks to my guide Dr. K. THIPPESWAMY Professor and Chairman, Department of studies in CS&E VTU regional Office, Mysuru for his guidance and sharing his findings for technical guidance and direction. Suggestions given by him were always helpful in this work to succeed. His leadership has been greatly valuable for me to work on this project and come with best out of it.

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Maximize Profit with Satisfaction of Customer in Cloud Computing Via Optimal Multiserver Configuration

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ABSTRACT

Now a day's cloud computing is an emerging technology of business computing. An understanding the economics of cloud computing becomes critically important. To maximize the profit for cloud service provider, how to configure their cloud service platform under given market demand. A service provider must understand both quality of service charges and business price. Nevertheless, few existing works single resource-renting scheme cannot guarantee. Service Providers set the higher cost because they want to a more profit. So in these decreases the customer satisfaction. Solve these problems, in this paper establish the configuration of multiserver system, double quality resource guarantee renting scheme, its increase the customer satisfaction and maximize profit for service providers. Finally, taking the service-level agreement (SLA), a low quality of service, the price of energy consumption and service provider's profit. A using M/M/m Queuing model is tasks are important role for profit maximizations in cloud computing.

I. INTRODUCTION

Today's cloud computing is briskly becoming an effective and efficient way of cloud computing is delivery of resource and cloud computing services. Cloud computing is web based computing whether virtual shared servers provide a software as a service (SaaS), Infrastructure as a service (IaaS), Platform as a service (PaaS).

Cloud Computing is use of computing resource are hardware and software that as delivery of services over typically internet. Cloud Computing entrusts far away services with a user's data, computation and software.

The aim of cloud computing finding an effective resolution for the resource management. A pricing model in cloud computing includes many consideration, such as the requirement of a service, the size and speed of multiserver system. The service level agreement, the satisfaction of a customer, expected service time, the task waiting time and the task response time, distribution of is low quality service, the cost of renting, the energy consumptions and service provider's brim and profit.

The Cloud Computing uses the internet of large set of service typically running lower price buyer pc technology.

A service provider must understand both quality of service charges and business price. How they are resolute by the characteristics of the applications and the designing of multiserver system.

II. RELATED WORKS

In these papers, introduce multiserver system. Today's cloud servers are not provides storage for

every customers requests because they have only one server. So establish multiserver, these server role is customer send the storage requests to cloud. Existing servers is not have any storages.

The services providers provide the storage to customers using multiserver system. Sometimes customers waiting a lot for receiving a storage because servers don't have any external storage in these decreases the customer satisfactions and minimize the profits of service providers that's situations service providers using multiserver system provides storage to customers. Increase the both satisfaction of customer as well as profit maximization of service providers.

Designing a multiserver system using M/M/m queuing model. These queuing model acts like First Come First Serve techniques.

III. PROBLEMS DEFINITION

Service provider's does want to set a higher retail price to get a higher profit circumference. However, doing this decreases the customer satisfaction. Therefore, selecting a rational pricing strategy is more important for service providers.

We use M/M/m queuing model for optimal multiserver system configuration, quality of all service requests and reduce the wastage of resource.

IV. SYSTEM ANALYSIS

A. Existing System

A service provider can build and designing a multiserver system with many servers of high expedition. Many existing they only taking the energy consumption price. The single resource-renting scheme cannot guarantee the waiting time and response time.

The customer satisfaction calculated as actual QOS level and expected QOS level.

A higher service price and larger response time is decreased the customer satisfaction and cannot change service level agreement.

Thus, users waiting time requests of service too long, its decreases the satisfaction of cloud users.

B. Proposed System

The designing the multiserver system for profit maximization in cloud computing. Figure 1, Represents the designing three tier structure of cloud computing.

Clouds computing mainly using three Tier cloud structures are cloud customers, Business service provider (BSP), Infrastructure service provider (ISP).

A benefit of proposed system is using multiserver systems the waiting time requests of service too very short. Analyse the interrelationship between customer satisfaction and profit, and build a profit optimization model considering customer satisfaction.

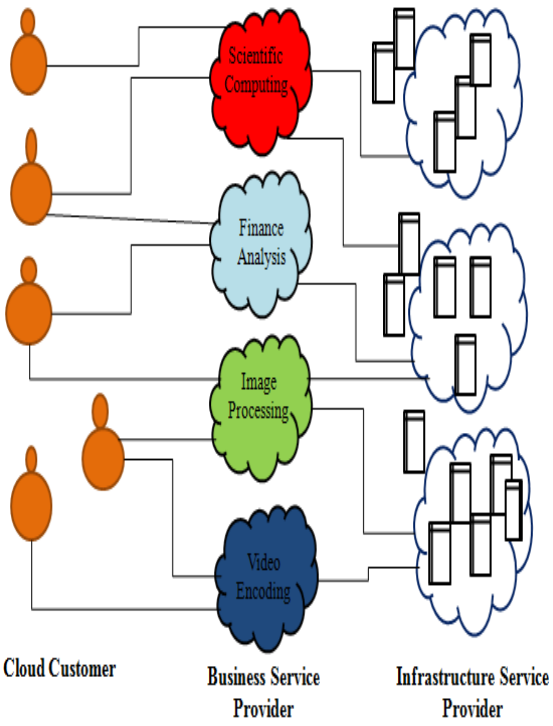

Figure 1. Three-tier cloud structure

There is implementing four components are-

Cloud Service Provider

In this components, First customer have to register their details and after registering the account activation mail will be send to the customer mail id. Then customer can login into the their cartridge and he/she will select the cloud server according to the storage limit and plan then the request will send to

the Business Service Provider after request granted customer can upload files in the allocated storage.

Cloud service provider receives the results from the business service providers along with requirement of a service, Quality of service and Service level agreement (SLA) and then uploads the file to obtained server.

Business Service Provider

Business service providers (BSP) tasks a is proceeds infrastructure provider for dealing their physical resources is gain. A Service provider the charges from customers for process of their service request is price. The gap between gain and price is become a profit.

During these service distributors through of a cloud intercessor because of they are going to role in an important between cloud customers and infrastructure distributors.

In these components, Business Service Provider will view all the customer requests details and activate their accounts then the account activation mail will send to the customer. Business Service Provider also can view the server storage details allocated to the customer.

Infrastructure Service Provider

Infrastructure service provider (ISP) a task is distributes the fundamental hardware and software facilities. A Business service provider proceeds rents for resources to infrastructure providers and then infrastructure service providers provide the cloud storage to business service providers and prepare a set of services in the form of virtual machine (VM).
Infrastructure service provider is a view the file details and storage server details of cloud service providers.

Service-Level Agreement

A service level agreement (SLA) is a condense between a service provider either internal or external and the end user that defines the level of service expected from the service provider. SLAs are output-based in that their purpose is specifically to define what the customer will receive. SLAs do not define how the service itself is provided or delivered. The SLA an Internet Service Provider (ISP) will provide its customers is a basic example of an SLA from an external service provider.

V. SYSTEM ARCHITECTURE

Cloud computing customers that server is busy then customer has to wait until the present user complete the job, which leads to more queue length and increased of waiting time. Overcome these problems using M/M/m queuing model.

Customer submit requests that the incoming service requests cannot immediately processed after they arrived, firstly requests placed in the queue then it handled by available server. Queuing model follows First-Come-First-Servers (FCFS) techniques.

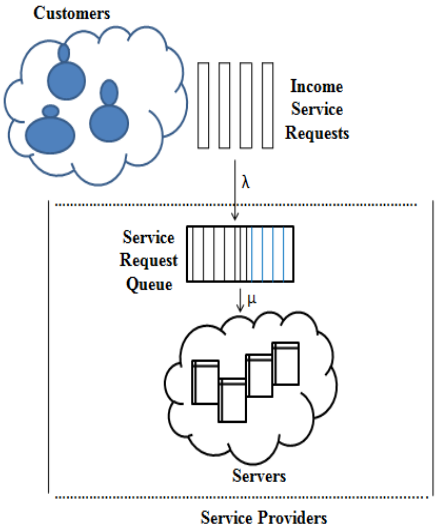

Figure 2. The multiserver system model (M/M/m queuing model).

What are Steps following working of queuing model are:-

Step 1: The multiserver queuing system running is server and waiting for the requests.
Step 2: Initially queue is empty.

Step 3: when service requests arrive and first server checks which server is available free then assign the services that server.

Step 4: if server is not available then hold the service requests to end of the queue and keeping the waiting time.

Step 5: when server become idle and queue is empty waiting for new service requests.

Step 6: if in case queue is empty take the initial requests and then assign the tasks to idle server.

Step 7: when a request is completed deadline requests are proved and rent a temporary server execute the sever requests and release the server.

VI. CONCLUSION

In these paper accordingly using M/M/m Queuing model the drawback of cloud server configuration and minimizations of price in cloud computing. It is environment can be proved.

Optimal multiserver configurations is mainly designing on double quality renting scheme, service level agreement (SLA), price of power consumption service providers profit maximizations and increases the customer satisfaction. Moreover, a group of calculations are conducted to compare the profit and optimal configuration of two situations with and without considering the affection of customer satisfaction on customer demand. The results show that when considering customer satisfaction, our model performs better in overall.

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Online Data Sharing Using Secure Key Aggregate Cryptosystem on Cloud

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ABSTRACT

Sharing of data in cloud is widely used now a day. Cloud is used for storing data and applications on servers and accessing them through internet. Online data sharing for improved productivity and efficiency is one of the primary requirements today for any organization. In cloud, data is stored on single machine and this stored data shared among multiple users by different machines. To store and for sharing data securely cryptosystem is used. The data owner encrypt the data before it is upload to the cloud and then data decryption is done when user want to access it. In the existing system owner needs to generate individual key to the individual user. To overcome this problem in proposed system we generate an aggregate key and broadcast.

Keywords: Cloud, cryptosystem, encrypt, internet, decryption

I. INTRODUCTION

Outsourcing of data is increasingly demanded in enterprise settings. In outsourcing of data, there are chances of stolen data from virtual machine. On separate virtual machine is used to access the data of cloud stored on single physical machine. Proposed system supports KAC scheme, which contains various security levels. In availability of files, there are a series of cryptographic schemes which go as far as allowing a third-party auditor to check the availability of files on behalf of the data owner. When the user is not perfectly happy with trusting the security of the virtual machine. The shared data in cloud servers, however usually contains user's sensitive information such as personal profile, financial data health records etc…and needs to be well protected. Data cryptography mainly is the scrambling of the content of the data, such as text, image, audio, video and so forth to make the data unreadable, invisible or meaningless during transmission or storage is termed encryption. The main aim of cryptography is to take care of data secure from attacker. Cloud storage is gaining popularity recently. In enterprise settings, we see the rise in demand for data outsourcing, which assists in the strategic management of corporate data. It is also used as a core technology behind many online services for personal applications. Nowadays, it is easy to apply for free accounts for email, photo album, file sharing and/or remote access, with storage size more than 25GB (or a few dollars for more than 1TB).Together with the current wireless technology, users can access almost all of their files and emails by a mobile phone in any corner of the world.

II. RELATED WORKS

2.1 Spice–simple privacy-preserving identity-management for cloud environment:

According to Sherman SM Chow, Yi-Jun He Identity security and privacy have been regarded as one of

the top seven cloud security threats. There are a few identity management solutions proposed recently trying to tackle these problems. However, none of these can satisfy all desirable properties. In particular, unlinkability ensures that none of the cloud service providers (CSPs), even if they collude, can link the transactions of the same user. On the other hand, delegatable authentication is unique to the cloud platform, in which several CSPs may join together to provide a packaged service, with one of them being the source provider which interacts with the clients and performs authentication while the others will be transparent to the clients. Note that CSPs may have different authentication mechanisms that rely on different attributes. Moreover, each CSP is limited to see only the attributes that it concerns. This paper presents SPICE – the first digital identity management system that can satisfy these properties in addition to other desirable properties.

2.2 Dynamic secure cloud storage with provenance:

According to Sherman SM Chow, Cheng-Kang Chu One concern in using cloud storage is that the sensitive data should be confidential to the servers which are outside the trust domain of data owners. Another issue is that the user may want to preserve his/her anonymity in the sharing or accessing of the data (such as in Web 2.0 applications). To fully enjoy the benefits of cloud storage, we need a confidential data sharing mechanism which is fine-grained (one can specify who can access which classes of his/her encrypted files), dynamic (the total number of users is not fixed in the setup, and any new user can decrypt previously encrypted messages), scalable (space requirement does not depend on the number of decryptors), accountable (anonymity can be revoked if necessary) and secure (trust level is minimized).This paper addresses the problem of building a secure cloud storage system which supports dynamic users and data provenance. Previous system is based on specific constructions and does not offer all of the aforementioned desirable properties. Most importantly, dynamic user is not supported. We study the various features offered by cryptographic anonymous authentication and encryption mechanisms; and instantiate our design with verifier-local revocable group signature and identity-based broadcast encryption with constant size cipher texts and private keys.

III. PROBLEMS DEFINITION

In a shared-tenancy cloud-computing environment, things become even worse. Data from different clients can be hosted on separate virtual machines (VMs) but reside on a single physical machine. Data in a target VM could be stolen by instantiating another VM coresident with the target one. Regarding availability of files, there are a series of cryptographic schemes, which go as far as allowing a third-party auditor to check the availability of files on behalf of the data owner without leaking anything about the data, or without compromising the data anonymity.

IV. SYSTEM ANALYSIS

A. Existing System

Current technology for secure online data sharing comes in two major flavors - trusting a third party auditor, or using the user's own key to encrypt her data while preserving anonymity. This system is popularly known as the key-aggregate cryptosystem (KAC), and derives its roots from the seminal work on broadcast encryption by Boneh et.al.. KAC may essentially be considered as a dual notion of broadcast encryption. In broadcast encryption, a single cipher text is broadcast among multiple users, each of whom may decrypt the same using their own individual private keys. In KAC, a single aggregate key is distributed among multiple users and may be used to decrypt cipher texts encrypted with respect to different classes.

B. Proposed System

In this paper, we attempt to build precisely such a data sharing framework that is provably secure and at the same time, efficiently implementable. In this

paper, we propose an efficiently implementable version of the basic key-aggregate cryptosystem (KAC) using asymmetric bilinear pairings. We propose a CCA-secure fully collusion resistant construction for the basic KAC scheme with low overhead cipher texts and aggregate keys. We demonstrate how the basic KAC framework may be efficiently extended and combined with broadcast encryption schemes for distributing the aggregate key among an arbitrary number of data users in a real-life data-sharing environment. The extension has a secure channel requirement of O (m + m0) for m data users and m0 data owners. In addition, the extended construction continues to have the same overhead for the public parameters, cipher texts and aggregate keys, and does not require any secure storage for the aggregate keys, which are publicly broadcast.

V. SYSTEM ARCHITECTURE

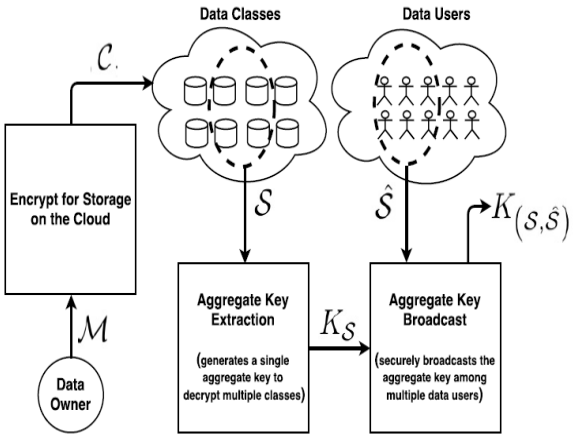

Figure 1. System Architecture

Data owner:

1.First the Data owners register with the respective Registration form.

2. Data owner can login only using secrete key sent by cloud.

3. Data owner upload their files with cloud in an encrypted format.

Data User:

1. Data users also register with the respective registration form.

2. Data users also can login only using secrete key sent by cloud.

3. Data users can search uploaded files by using file key or file name.

4. Users can download requested files from cloud by using third party generated private key and aggregate keys.

Cloud:

1. Cloud can view the owner and user details.

2. Cloud can also view user's file request.

3. It request third party to send corresponding file to the user.

TPA:

1. It will send private and aggregate keys to user's mail id.

2. It shows all file details.

VI. CONCLUSION

In this paper, we addressed an important issue of secure data sharing on untrusted storage. We have proposed an efficiently implementable version of the basic key aggregate cryptosystem in with low overhead cipher texts and aggregate keys using asymmetric bilinear pairings. We have proved our construction to be fully collusion resistant and semantically secure against a non-adaptive adversary under appropriate security assumptions. We have then demonstrated how this construction may be modified to achieve CCA-secure construction, which is, to the best of our knowledge, the first CCA secure KAC construction in the cryptographic literature. We have further demonstrated how the basic KAC framework may be efficiently extended and generalized for securely broadcasting the aggregate key among multiple data users in a real-life data-sharing environment.

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Detection of Object Using Rangefinder

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ABSTRACT

A rangefinder is a device that measures the separation from target to the observer, for the reasons of surveying, finding the focus in photography, or precisely pointing a weapon, it makes basic radar utilizing the ultrasonic sensor. This radar works by measuring a range from 3cm to 40 cm as non-contact distance, with angle range between 15˚ and 165˚ .The development of the sensor is controlled by utilizing a little servo motor. Data got from the sensor will be utilized by "processing Development Environment" software to delineate the outcome on a PC screen.

Keywords: Processing Software, Servo motor, Ultrasonic Sensor.

I. INTRODUCTION

Radar is an object identification framework that uses electromagnetic waves to recognize run, height, heading, or speed of both moving and settled protests, for example, flying machine, ships, vehicles, climate developments, and landscape. When we utilize ultrasonic waves rather than electromagnetic waves, we call it ultrasonic radar. The fundamental parts in any ultrasonic radar are the ultrasonic Sensors. Ultrasonic sensors chip away at a standard like radar or sonar which assesses traits of an objective by translating the echoes from radio or sound waves separately. Radar's data will show up in various ways. Essential and old radar station utilized sound alert or LED, present day radar utilizes LCD show to demonstrate nitty gritty data of the focused on question. We utilize Computer screen to demonstrate the data (separation and edge).

II. LITERATURE SURVEY

Vladimir I. Koshelev[1]. Titled "Detection and recognition of radar objects at sounding by high-power ultrawide band pulses"ultrawideband (UWB) radiation sources with megavolt efficient potential have been created. This is technical basis for development of UWB radars for remote object sounding. The paper gives special attention to analysis of investigation results of methods for detection and recognition of remote radar objects at sounding by high-power UWB pulses. To detect UWB signals at the noise and interference background, an approach based on the joint use of matched filtering and inter-period correlation processing is suggested. A genetic function method and parametric methods were developed for object recognition. Compression of the data bank is of importance in the latter methods.A I. Baskakov; A. A. Komarov; M. S. Mikhailov; V. A. Permyakov[2]. Titled ".Influence of the ionosphere and the troposphere on the propagation of radio waves in the detection of space debris objects using multi-position radar system". The work is devoted to the analysis of the influence of the ionosphere and the troposphere on the propagation of radio waves in the detection of space debris objects using multi-position radar system. To analyze the problem, we used a method of geometric optics that made it possible to

estimate signal distortions that affect the noise immunity of multi-position radar.

Taehwan Kim; Sungho Kim; Eunryung Lee; Miryong Park[3].Titled " Comparative analysis of RADAR-IR sensor fusion methods for objectdetection".The Radar and IR sensor fusion method for objection detection. The infrared camera parameter calibration with Levenberg-Marquardt (LM) optimization method is proposed based on the Radar ranging data represented by Cartesian coordinate compared with 6 fusion methods. The proposed method firstly performs the estimation of the intrinsic parameter matrix of infrared camera with some optical trick. Then the method searches the extrinsic parameters using the generative approach. The initial angle and translation of the extrinsic parameters are optimized by the LM method with the geometrical cost function. In the experiments, the performance of proposed method outperforms by a maximum 13 times the performance of the other baseline methods on the averaged Euclidian distance error. In future work, the angular noise of the Radar information will be improved and the proposed method will provide the effective proposals for the deep neural network.

III. DESIGN METHODOLOGY

The piece outline of short range radar framework is as appeared in Figure 1 Using IO trigger for no less than 10us abnormal state flag, The Module naturally sends eight 40 kHz and identify whether there is a heartbeat motion back.

On the off chance that the flag back, through abnormal state, time of high yield IO term is the time from sending ultrasonic to returning.

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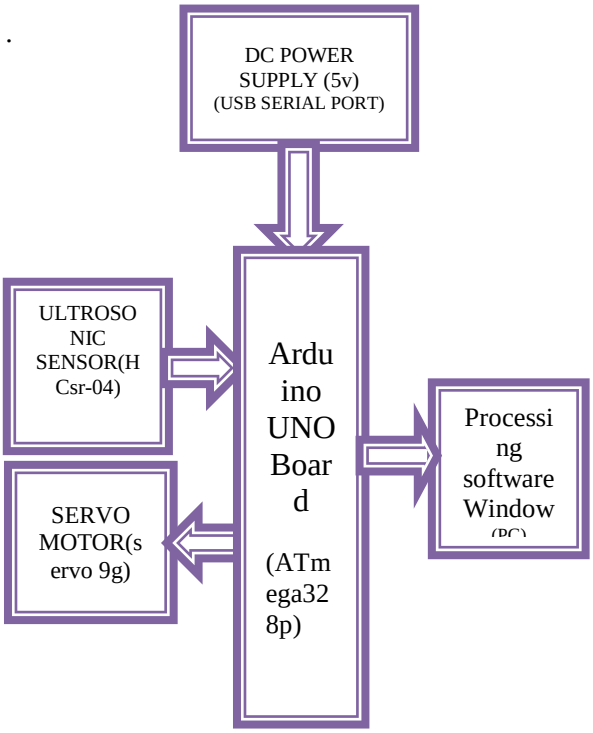

Figure 1. Block Diagram of short range Radar Framework

3.1 Arduino UNO Board

Arduino is an equipment and programming organization, undertaking, and client group that plans and fabricates PC open-source equipment, open-source programming, and microcontroller-based packs for building computerized gadgets and intuitive articles that can detect and control physical gadgets. The task depends on microcontroller board outlines. The board gives sets of advanced and simple Input/Output (I/O) sticks that would interface be able to different Expansion sheets (named shields) and different circuits.

Figure 2. Arduino UNO board

The sheets highlight serial correspondence interfaces, including Universal Serial Bus (USB) on UNO show, for stacking programs from individual computers.For programming the microcontrollers, the Arduino venture gives a coordinated improvement condition (IDE) makes it simple to compose code and transfer it to the board. It keeps running on Windows, Mac OS X, and Linux. The earth is composed in Java and in view of Processing and other open-source programming. This product can be utilized with any Arduino board. Arduinouno is as shown in the Figure 2. The Arduino Uno has 14 computerized input/yield pins (of which 6 can be utilized as PWM yields), 6 simple data sources, a 16 MHz precious stone oscillator, a USB association, a power jack, an ICSP header, and a reset catch.

3.2 Ultrasonic Sensors

Ultrasonic going module HC - SR04 gives 2cm - 400cm non-contact estimation work, the going exactness can reach to 3mm. The modules incorporate ultrasonic transmitters, collector, and control circuit, inside estimating point 15 degrees Product highlights: Ultrasonic going module HC - SR04 gives 2cm - 400cm non-contact estimation work, the going exactness can reach to 3mm.

The modules incorporates ultrasonic transmitters, beneficiary and control circuit. The fundamental guideline of work. Using IO trigger for no less than 10us abnormal state flag, The Module consequently sends eight 40 kHz and distinguish whether there is a heartbeat flag back. IF the flag back, through abnormal state , time of high yield IO term is the time from sending ultrasonic to returning. Total distance = (high level time×velocity of sound (340M/S)/2. Working principle of ultrasonic sensor is as shown in the Figure 3.

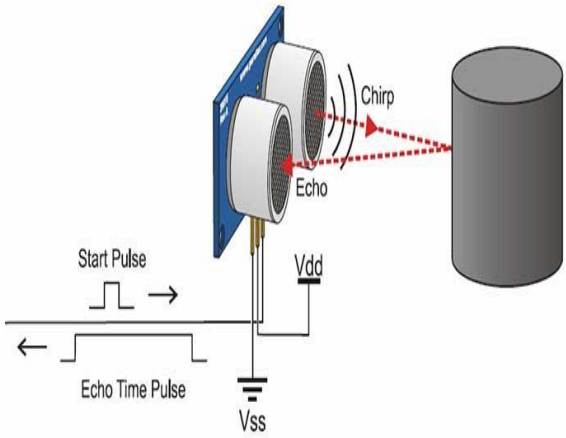

Figure 3. working of ultrasonic sensor

Wire connecting direct as following:

1. 5V Supply
2. Trigger Pulse Input
3. Echo Pulse Output
4. 0V Ground

Table 1. Specifications of ultrasonic sensors

Electric Parameter Working Voltage	DC 5 V
Working Current	15mA
Working Frequency	40Hz
Max Range	40cm
Min Range	2cm
Measuring Angle	15 degree
Trigger Input Signal	10uS TTL pulse Echo
Echo Output Signal	Input TTL lever signal and the range in proportion

3.3 Servo Motor

Small and lightweight with high yield control. The servo can turn Approximately 180 degrees (90 toward every path), and works simply like the standard sorts yet littler you can utilize any servo code, equipment or library to control these servos.

Figure 4. Servo motor

Specifications:

1. Weight: 9 g
2. Dimension: 22.2 x 11.8 x 31 mm approx.
3. Stall torque: 1.8 kgf·cm
4. Operating speed: 0.1 s/60 degree
5. Operating voltage: 4.8 V (~5V)
6. Dead band width: 10 µs
7. Temperature range: 0 ºC – 55 ºC

3.4 Processing Software

Handling is an open-source PC programming dialect and coordinated advancement condition worked for the electronic expressions, new media workmanship, and visual outline groups with the motivation behind showing non-software engineers the basics of PC programming in a visual setting. The Processing dialect expands on the Java dialect, yet utilizes an improved punctuation and illustrations UI.

Preparing incorporates a sketchbook, an insignificant other option to a coordinated advancement condition (IDE) for sorting out ventures. Each Processing sketch is really a subclass of the PApplet Java class which executes the greater part of the Processing dialect's highlights.

When programming in Processing, every one of extra classes characterized will be dealt with as inward classes when the code is converted into unadulterated Java before ordering. This implies the utilization of static factors and strategies in classes is precluded unless Processing is unequivocally advised to code in unadulterated Java mode.

Preparing additionally takes into consideration clients to make their own particular classes inside the PApplet draw. This takes into account complex information composes that can incorporate any number of contentions and maintains a strategic distance from the confinements of exclusively utilizing standard information writes, for example, int (whole number), singe (character), skim (genuine number), and shading (RGB, RGBA, hex).

3.5 Working Principle

The working principle of object identification is as shown in the flowchartshown below in Figure 5.

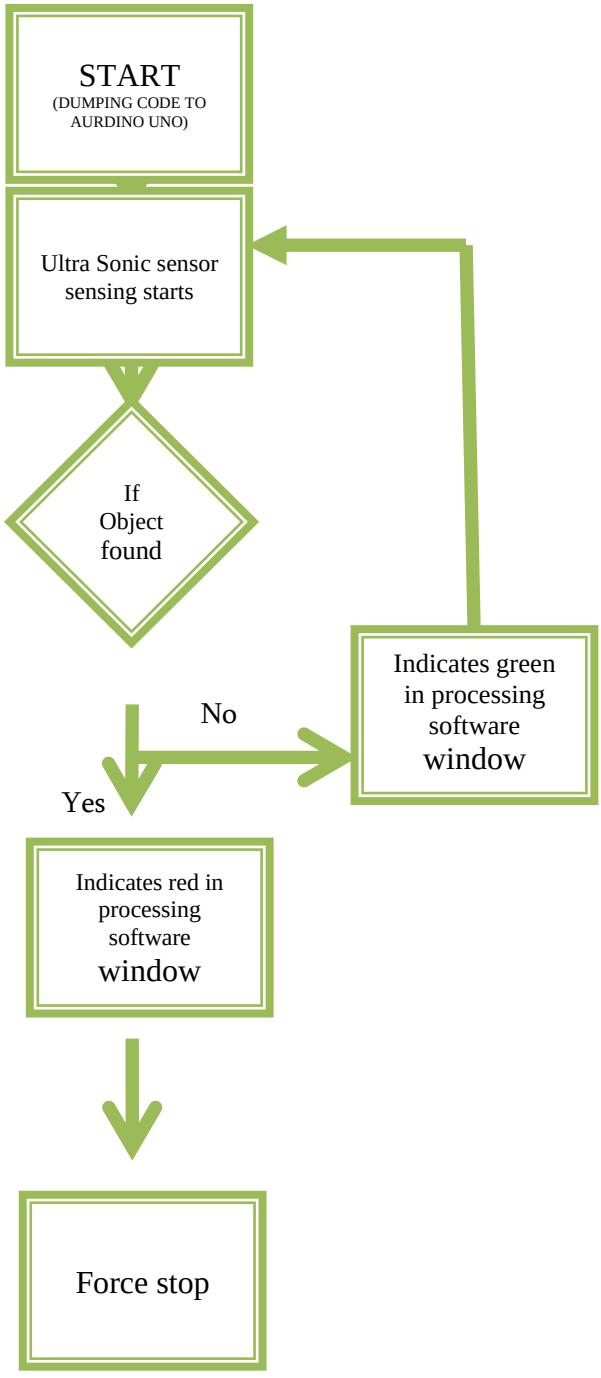

Figure 5. Flowchart for object detection

As soon as the code written Embedded C in arduinosoftware is flashed into ArduinoUNO board through USB cable and processing code is run, the short rangefinder starts sensing 1800 to find the object within the range of 40cm. Servomotors are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through

the control wire. When any object is found then it is indicated as red on the processing development window. The green area in the processing window indicates it's a free area with no objects or obstacles present. The sensing continues unless it is forced stop through the code.

IV. RESULT

The resulting graphical window of processing software is shown in Figure 4. The red area in the graphical window indicates the object identified up to the range of 40cm with angle coverage of 180^0. The green area indicates that no object being detected in the range of 40cm.

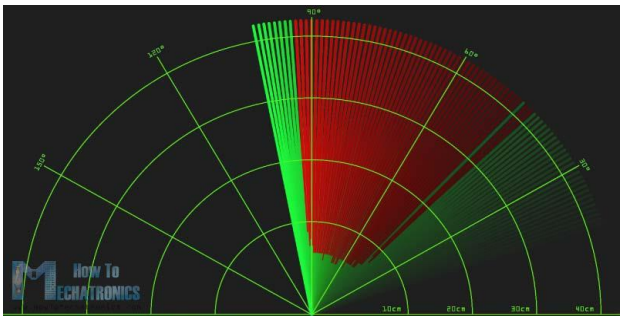

Figure 4. Graphical representation of object identification on Processing Software window

V. CONCLUSION

Radar is normally used to determine velocity, range, and position of an object. In this project, the distance and angles of detected objects in order to convert these data into visual information. The performance of project is so good. It works smoothly to detect objects within the designed range. The screen shows the information clearly with enough delay for the user to read it. This project could be helpful for object avoidance/ detection applications. This project could easily be extended and could be used in any systems may need it.

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Smart Water Monitoring System Using Cloud Service

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ABSTRACT

Water is the basic need for survival. Hence, the wastage of it is not tolerable. Water scarcity is the lack of sufficient available water resources to meet water needs within a region. Its effects are spread all over the world and around 2.8 billion people are affected by it. More than 1.2 billion people lack access to clean drinking water. Therefore, water monitoring has become an important subject of matter.

The project Water Monitoring System for Smart Village using cloud service, as the name says it is all about monitoring of water right from small villages, townships to entire urban infrastructure. The project deals with the efficient monitoring of water using Internet of Things (IoT) technology enabled by sensors. The sensor network can be flexible expanded and shrunk according to the requirements of setup. It is used for remotely controlling the water flow, cutting the water supply, monitoring and analyzing the water usage across the nodes, with the help of cloud connectivity. Further, more statistical data can be gathered and can be used by govt. authorities for defining policies, strategies and billing calculations. So ultimately, this will help to conserve and efficiently utilize the natural resource. Using IoT takes into account of waste wastage right from small village to large scale. It can also control the water usage in a precise way. Usually the water flow to each village is not measured, but this product enables the measure of water to each village so that water monitoring is easy. If there is inappropriate usage of water from tank is detected monitor of that village can be notified.

I. INTRODUCTION

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Internet, a revolutionary invention, is always transforming into some new kind of hardware and software making it unavoidable for anyone. The form of communication that we see now is either human-human or human-device, but the Internet of Things (IoT) promises a great future for the internet where the type of communication is machine-machine (M2M).

The basic idea of IoT is to allow autonomous exchange of useful information between invisibly embedded different uniquely identifiable real world devices around us, fueled by the leading technologies like Radio-Frequency Identification (RFID) and Wireless Sensor Networks (WSNs) [2] which are sensed by the sensor devices and further processed for decision making, on the basis of which an automated action is performed [1]. IoT projects are under way that promise to improve distribution of the world's resources to those who need them most and help us

understand our planet so we can be more proactive and less reactive.

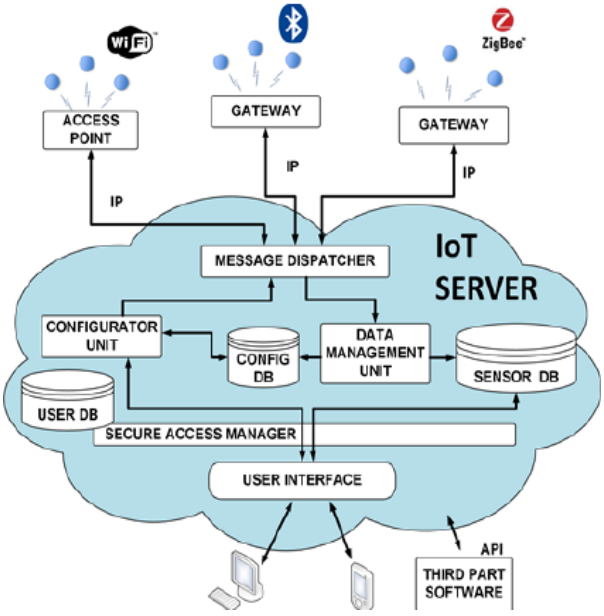

Figure 1

II. PROBLEM STATEMENT

The project aims at automating the process of water monitoring in each village and thereby cause regulated usage of the same using cloud service.Water is one of the important substances used in crop production. It must be saved to avoid water shortage in future. One such way to save water is to monitor and study its usage and accordingly its utilization should be managed. Monitoring water level of a water source, such as water tank plays a key role in water management. Keeping track of water level in a water source can be used to preserve water and to study the water usage. Thus monitoring water level is an important task in agricultural.

Villages in India will soon be transforming to smart villages as Government of India brings Smart Village initiative to the country. The smart village initiative will promote Digital inclusion which will enable the enhanced access to services through Information Technology (IT) enabled platforms. Thus the Internet of Things (IoT) has a major role to play in Smart Village in India. In IoT enabled Smart Village every physical object, a thing, will be connected to the Internet and enable users to keep track of its status and to control it remotely. This will help users to access to services provided by such objects as and when required.Water is a limited resource and is essential for agriculture, industry and for creature's existence on earth including human beings. Lots of people don't realize the true importance of drinking enough water every day. More water is wasted by many uncontrolled way. This problem is quietly related to poor water allocation, inefficient use, and lack of adequate and integrated water management. Therefore, efficient use and water monitoring are potential constraint for village water management system.

III. EXISTING SYSTEM

Over the years, several methods have come up for efficient management of water. Basically In each different method a more advanced water meter is installed to improve the accuracy of water measurement. The water meter calculates the amount of water own through the main pipe and takes a reading. Every month, the concerned authority from the water department takes the reading from each house/building. A standard water meter uses two common types of registers - straight and circular - to read the flow of water in cubic feet or inches. The registers can be observed on the surface of the meter. The straight registers can be read like an odometer in a car. On some larger meters, a multiplier will be present on the register face, which can be noted as 10X, 100X, or 1000X based on the size of the meter. Circular registers, on the other hand, are more complex to calculate water usage. They employ a series of dials marked with divisions of ten. How a water meter works depends on the style, purpose, and size of the meter[3].Some of the drawbacks of the current methods are It involves a lot of manual work, the amount of water used for a particular instant cannot be determined, the present water meters cannot determine any leakages[5] and It can't detect pollutants[6].

IV. METHODS AND MATERIALS

1. SENSORS USED

G ½ water flow sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal. The working voltage is 5v-24v.The maximum current that can flow through is 15mA (DC 5v).The external diameter of this flow sensor is 20mm and its weight is 43g.It can be stored in the temperature range of 25°C～+80°C.

Figure 2. G 1/2 Water Flow sensor

pH meter:

pH meter,electric device used to measure hydrogen-ion activity (acidity or alkalinity) in solution. Fundamentally, a pH meter consists of a voltmeter attached to a pH-responsive electrode and a reference (unvarying) electrode. The pH-responsive electrode is usually glass, and the reference is usually a mercury–mercurous chloride (calomel) electrode, although a silver–silver chloride electrode is sometimes used. When the two electrodes are immersed in a solution, they act as a battery. The glass electrode develops an electric potential (charge) that is directly related to the hydrogen-ion activity in the solution (59.2 millivolts per pH unit at 25 °C [77 °F]), and the voltmeter measures the potential difference between the glass and reference electrodes.The figure is as shown below:

Figure 3. pH meter

PIR sensor:

PIR stands for Passive InfraRed. PIR sensors are often used in the construction of PIR-based motion detectors. These sensors measure infrared radiation emanating from objects in the field of view. All objects emits what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose. The term passive in this instance means that the PIR device does not emit an infrared beam but merely passively accepts incoming infrared radiation.

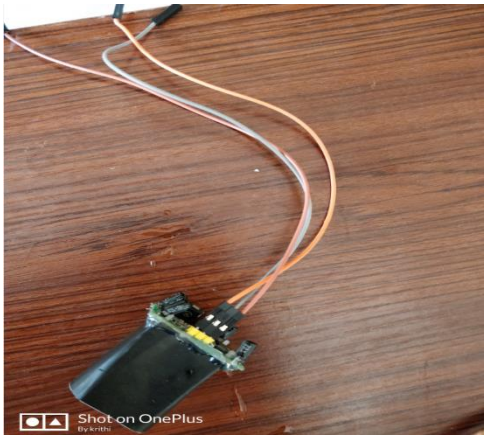

Figure 4. PIR sensor

2. HARDWARE

RENESAS MICROCONTROLLER BOARD

Renesas microcontroller surpasses its predecessor i.e. 8051 family of microcontrollers, with various in-built features as mentioned below:

- ✓ Renesas is a 16-bit microcontroller.
- ✓ Minimum instruction time can be changed from ultra-low speed (30.5us) to high speed (0.03125us).
- ✓ 16 to 512KB of ROM and 2 to 32KB of RAM are available depending upon the series and number of pins.

- ✓ On-chip high-speed (32 MHz to 1 MHz) as well a low-speed (15 KHz) oscillator is present.
- ✓ 10-bit resolution A/D converter (6 to 26 channels depending upon the series) is present.
- ✓ Totally 3 UART for Serial Interface is available.
- ✓ Totally 0-7 channels for timer is available.

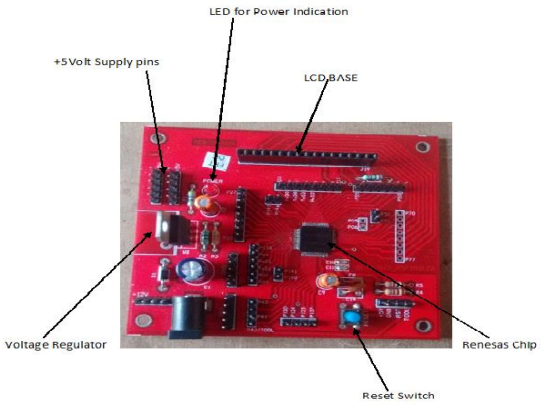

Figure 5. 64 pin Renesas Microcontroller board

GSM (Global System for Mobile communications) :

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls and data transfer speeds of up to 9.6 kbps, together with the transmission of SMS (Short Message Service). GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. GSM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response.

Figure 6. Global system for mobile communication (GSM)

GENERAL PACKET RADIO SERVICES (GPRS)

General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

In order to set up a GPRS connection for wireless modem, a user must specify an APN, optionally a user name and password, and very rarely an IP address provided by the network operator.

LIQUID CRYSTAL DISPLAY

The liquid-crystal display has the distinct advantage of having a low power consumption than the LED. It is typically of the order of microwatts for the display in comparison to some order of milliwatts for LEDs. Low power consumption requirement has made it compatible with MOS integrated logic circuit. Its other advantages are its low cost, and good contrast.

Basic structure of an LCD A liquid crystal cell consists of a thin layer (about 10 u m) of a liquid crystal sandwiched between two glass sheets with transparent electrodes deposited on their inside faces.

3. SOFTWARE

The Integrated Development Environment (IDE), Cube Suite is used to generate the embedded code for the hardware mentioned. It offers the ultimate in simplicity, usability, and security for the repetitive editing, building and debugging of codes.

CubeSuite+ bundles all the basic software necessary for Renesas MCU software development in one convenient package, ready to use immediately after initial installation. CubeSuite+ is also compatible with Renesas hardware tools, such as on-chip debugging emulator E1, facilitating advanced debugging.

V. RESULTS AND DISCUSSION

METERING AND ALERTING SYSTEM FOR RESOURCE CONSUMPTION

This project aims at monitoring one's energy consumption and warns consumer if he/she is expected to increase beyond him/her pre-fixed energy units. This monitoring is done on a regular basis, so that if consumer is at the brink of exceeding his/her specified consumption limits, they will be warned. This is implemented using WSN technology, In WSNsensors are equipped with wireless interfaces with which they can communicate with one another to form a network. It has sensor nodes working together to monitor a region to obtain data about the environment. According to David Culler, Estrin and Mani Srivastava WSNs offer an alternative approach: performing Local processing at each device and transporting the data continuously to master node [2].

By fixing one's consumption below a fixed slab rate category and continuously checking that the consumption has not exceeded this limit for a time lapse, we can cut down the consumer's bill as well as the load on the system, if we succeed in limiting the consumption below the slab rate. This project constantly alerts consumer if their consumption has reached beyond the preplanned units on a regular basis [6], so that the consumer is aware of his consumption and voluntarily controls his consumption.

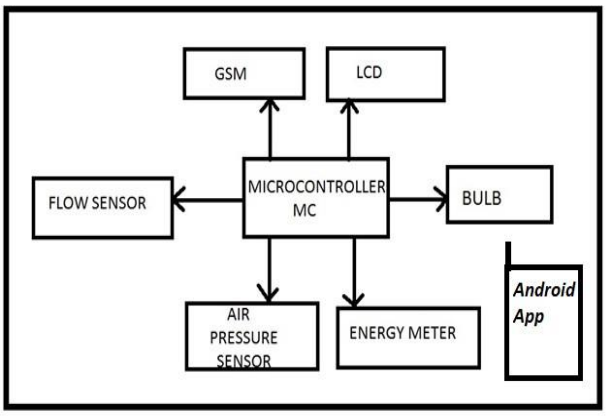

Figure 7. Representation of metering system

In this project we use respective sensors to measure the amount of usage of water, electricity and LPG in home. Electric meter can be configured to measure electricity consumption of a load [7].This information is stored in the database [3]. Whenever the consumption will exceed the threshold, the user will be notified the amount of usage in that time span. This application is not only for common people but also for the higher authorities. The user and admin have their respective accounts. The user can only view his/her usage and the admin can view usage on locality basis.

VI. CONCLUSION

The proposed system is used to acquire water level and other details of a water source in real time from any location, any device connected to Internet. These information which is stored in cloud(Aws) can be used for various purposes for better monitoring of water source. Monitoring water tank from remote location may be very useful when it is not possible to visit location physically every time.By using the monitoring system we can easily control the usage of water and the **water will be saved to our future generations.**

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Study of Machine Learning Techniques using Apache Spark

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ABSTRACT

The challenges in the field of big data analysis is growing due to the huge volume of data collected on daily basis by social media, weather forecast, mobile data etc. In this survey paper, there is a look on different aspects of usage of Apache spark, be it, the framework, the libraries, the spark technologies etc. The spark platform provides various algorithms to analyse machine learning techniques and implement them on other virtualization platforms such as VMware vSphere. Further, Spark is used on different platforms to achieve high performance, overcome latency and achieve efficiency. The papers, studied here, have drawn parallelism between the Hadoop and the Spark and the latter has proved to be the best platform as it is hundred times faster and more efficient.

Keywords: weather forecast, virtualization, Hadoop, Spark, latency

I. INTRODUCTION

Big data analytics is the biggest challenge from past few decades because of the huge amount of data that is generated every day. There are many open-source technologies which are used to handle massive data volumes. One such technology is Apache Spark. Apache Spark is a lightning-fast cluster computing technology, designed for fast computation. It is based on Hadoop Map Reduce and it extends the Map Reduce model to efficiently use it for more types of computations which include interactive queries and stream processing. Some of the most popular companies that are using Apache Spark are Uber, Pinterest, conviva,data etc. The basic components used in Apache Spark are Spark Streaming, Spark SQL,Spark MLlib,GraphX,prediction with logistic regression. Spark is used for some of the prominent applications such as machine learning, fog computing,interactive analysis,event detection etc. This section provides a brief introduction of big data and spark platform.

II. BASICS OF SPARK

Spark is referred to as distributed framework which is based on Hadoop MapReduce algorithms.In (1) Spark's features include Memory Computing which helps in storing the intermediate and the output results of spark jobs in the memory which is an advantage over Hadoop MapReduce. Memory Computing improves the efficiency of computing. So, the Spark can be used for iterative applications such as machine learning and data mining. Spark provides Resilient distributed dataset which provides rich set of operations to manipulate the data. The API in Spark is available in JAVA, Python, R and Scala languages. The processing speed of the spark is said to be 100x faster than Hadoop MapReduce.

A. Framework

The framework method for the management and analysis of qualitative data has been used since the 1980s.The method originated in large-scale social

policy research but is becoming an increasingly popular approach in medical and health research.In this paper(2) we are using the popular concept called cascade learning for the advanced machine learning architecture of multilayer perception(MLP) and distributive computational abilities of apache sparks combined together in a framework. Spark is mainly used to handle the large magnitude of data efficiently. Framework and artificial intelligence are used to solve the real world problems usingBig data analytics. The problem in real world data is time and space constraints. To overcome these challenges, themachine learning, cascading, big data analysis and deep learning combined ideas have been used.To solve traditional machine learning the novel framework is used. Using the novel framework, traditional machine learning tools will improve the accuracy and speed of the system. The main reasons choosing the novel frame work is to enhance future set, compute time, continue learning and improve.

B. Spark MLlib

The changing and improving trends in big data analysis is by far a big concern in the field of machine learning which is why the big data machine learning platforms such as Apache Spark MLlib have been developed. In paper(3), there is some light cast on the libraries of Apache Spark.One of the major libraries of Apache Spark, Spark MLlib is the most prominent platform available for big data analysis to carry out various techniques. It consists of more than 55 algorithms that support data and process parallelization. It also provides APIs in different languages to evaluate machine learning methods. It surpassed the performance of Hadoop in terms of running time when the same algorithm was run on Weka library components used in Hadoop and spark MLlib on Apache Spark. Spark MLlib offers fast, flexible and scalable implementation of a variety of machine learning components. It offers options for distributed processing by parallel processing. It decreases the processing time required and, at the same time, increases time to interpret analytic results.

III. SPARK FRAMEWORK USED IN VARIOUS FIELDS.

Intrusion detection systems monitor network or systems for policy violation or malicious activity.In(4)the advantage of iterative algorithms on Spark is mentioned. For example,the intrusion detection algorithm is highly time consuming and occupies large amount of memory. In order to solve this problem, the usage of a parallel Principal Component Analysis (PCA) combined with support vector machine (SVM) algorithm based on Spark platform is proposed (SP-PCA-SVM). Principal component analysis is used for training and predicting the data and fusion of bagging integration strategy and SVM algorithm is used on the spark distributed framework. Spark platform is considered because it reduces the training time and improves model learning efficiency. In paper [2] Parallel SVM algorithm is used to effectively deal with large scale datasets. Parallel SVM is based on the iterative map reduce provided by the Spark environment. The applications like improving the efficiency of iterative algorithms using Spark platform highlights the parallel computing feature of Spark.

A. Spark Streaming

Tocope with streaming data, various stream-processing-based frameworks have been proposed, such as Storm, Flink and Spark Streaming. In (5) ,one of the spark machine learning libraries Spark Streaming is discussed to process online flow of data. The major task is to handle the explosive growth of internet traffic. The need for spark streaming came into picture when traditional network analysis methods were no longer suitable for processing huge traffic of data on single machine due to poor processing ability. The application, Spark streaming is used in internet traffic monitoring system. The system involves 3 components, the collector, managing systems and stream processor. The collector collects and stores the data packets, the stream processor processes the data collected in the

collector and the managing system behaves as abridge between the former two. The in- memory computing feature of spark uses RDD and spark streaming processes and analyses the data.

B. Enterprise Big Data

Big data is data that is too large to process using traditional methods. Enterprises have large amounts of data and this data has to be safe and secured.In this paper,(6)Enterprises give strong controls and strategies to prevent cyber-attacks and the data is not leaked. It is confidential. Employees and data scientists have access to analyse and derive insights from the data but there are insufficient controls and employees are usually permitted access to all information about the customers of the enterprise including sensitive and private information.

In this paper, author speaks about Shade. Shade is a system that allows a spark cluster which contains sensitive data which can be accessed in different manners.The framework Shade includes two mechanisms Spark LAP and Spark SAM.The Enterprises analyse the data to understand their users and know their behaviour and requirements so that better customization can be provided. Spark can be used for a wide variety of data analysis tasks such as statistical querying or machine learning.

C. Spark BDD

Spark-BDD is a pioneer platform which provides and allows programmers to exercise on BDD interactive debugging capabilities to set break points or trace through a program for execution.In this paper(7),Spark BDD commences as a support to debug analytic programs. Debugging toolkits on Spark provides an interactive query interface which focuses on bringing interactive capabilities to the spark platform. It supports all the features through a 3 key mechanism; 1)data lineage information 2)incremental dataflow computation 3)runtime level profiling. It also enables function hot swapping and replay. It is an ultimate application of using debugging in use case applications and features supported by different distributed debugger.

D. Spark-SIFT

Apache Spark is an open-source cluster-computing framework. In this paper, (8) author speaks about SIFT (Scale, Invariant, Feature, and Transform) image feature extraction algorithm is implemented in Spark- SIFT framework. Image processing has an important phase that is, feature extraction.

Spark is a memory based data processing framework with faster speed.The framework contains three part, the base interface of image processing,the sift algorithm in the spark, and the sequence of images. Many problems arise .One of them is load unbalance. This happens when size of images to deal have wide difference. In this paper, the solution to this problem is the segmentation of image feature extraction algorithm in spark. Feature extraction takes a long time in processing, especially in large-scale image retrieved systems. The feature of spark are running faster, spark owns DAG execution engine, which support the iterative calculation of data in the memory, scala is the program language supported in the spark. Scala is effective, extensible and can deal with a job in simple code.Good generality, spark BSDA includes spark core, spark SQL, Spark Streaming, MLlib and GraphX components.

E. Extreme Learning Machine Algorithms Based on Spark

The non-iterative ELM algorithm helps in generating weights of hidden layers and determines the output layer weights by analysing. In paper(9), the method discussed brings in convenience to many time sensitive applications by reducing learning time. The VMware vSphere virtualisation platform to analyse and manage architecture based services, application services, complex data centre etc. it brings in more flexibility, serviceability and effectiveness through virtualised and distributed basic architecture services; monitors the availability and accessibility of resources. The Feed Forward neural network parallel

algorithm is based on spark platform and the establishment of VMware vSphere ,here, helps to perform experiments as an experiment platform. Again, here, the spark highlights its advantages on using in memory processing and distributed processing based on spark. Spark serves as a cluster computing platform and supports task scheduling process at every phase by processing RDD objects in generating non-acyclic graphs. The new ELM,neural network algorithm has fats training speed, less artificial interference and strong data generalisation ability.

IV. REAL WORLD APPLICATION OF APACHE SPARK

A. Weather Data Analysis

Weather data is used to predict the atmospheric changes. The real time data is analysed(10)In this paper, weather is of most concern. Weather forecasting is a challenge in human civilization. There are many methods and algorithms that have been developed to predict weather forecasting. Big data is the key concept used to manage large amounts of data. Hadoop is a platform designed to run in situations where analytics are used that are deep, extensive like clustering. Real time analytics with spark streaming is designed to analyse the real time data. There is a robust and an efficient technique for analysing the weather data set using spark. The weather data is collected from sensors and power stations. Spark overcomes the drawbacks of Hadoop in terms of processing speed.

B. Agricultural Information System

Agricultural information is vast and the data collected here is in big amounts. Big data technology plays an important role in spatial analytics by which decision making is enhanced. In this paper(11),Agricultural domain consumes huge volume of data. In this paper, the author proposes a spark based information management system for agriculture. Big data analytics supports the development and delivery of agricultural information and services to make farming economical and sustainable. Spatial data is very important in agricultural domain. This data is important in agricultural domain. This data is important to develop flexible and includes all types of function. This paper deals with spark based agricultural information system on big data by developing analytical and visualization services.

C. Target Prediction in Drug Discovery

Initially,the machine learning predictors programs was written in C and C++. These programs would take too long to run in parallel because we do not use the multiple nodes.In(12)it is prediction of drug discovery we uses apache spark to enable existing program single node into the multiple node cluster pipeline , using apache spark we can speed up to 8 nodes in a system.Here spark is mainly uses to evaluate the intermediate storage into various forms. Apache spark has two categories one is runtime system to schedule work units on a cluster pipeline in the form of graph. Second is creating dependency graph using programming model.In programming model we mainly concentrated on resilient distributed data (RDD). Spark has control on programming over intermediate RRDs storage, using different combination of RDD. Spark programs will express more algorithms. Because of all these RDD is split up and created one task per partition.

D. Study on forecast of shared Bicycle

Now-a-days, shared bicycle projects have developed continuously, the problem is that of storing the vast amount of information about the usage of bicycles. In(13),they are using spark MLlib for shared bicycle to form three different prediction models. The three different prediction models are multiple linear regression, decision tree, random forests. In shared bicycle proposal we have enormous data, to segregate them using spark machine learning framework. Apache Spark is fastest and used to handle huge data processing. Data processing and MySQL databases are used to store the information in the form of data tables. Data processing will retrieve the data set and make website, each action of data is stored in a CSV

file using available information and then information is stored in some format. SQL processing we consider CSV file, if CSV file generated more than 36 million GB data then we uses spark SQL to manage data processing. To read the original CSV file uses spark streaming.

E. Road Traffic Event Detection

In real time,twitter has become a very famous and a trending social network. Twitter is a powerful source of information used to detect the traffic in a particular area because it has the information about real time event happening in the surrounding. People tweet on whatever they see or feel like in their day to day life. In(14) ,they have considered the real world application to Detection of the road traffic using spark based on the twitter datasets. In twitter per year 200billion tweets means 6000 tweets are generated per seconds using classification techniques to assigning class labels to the systems. Based on the tweet data the system will fetch the information tweets related to the traffic. We invoke the logistic regression and support vector machine (SVM) classifier for classification of dataset in the tweets.Other than above techniques we undergo some more techniques to extract the useful information from the tweet dataset. Techniques are: statistics, natural language processing and machine learning. Spark is mainly used for scalability of data in tweet. Using spark we can execute many analysis and pattern classification techniques. But SVM supports only for binary classification where logistic supports both binary and multiclass classification.

F. Mobile Big Data

Mobile big data is a concept that describes a massive amount of mobile data that cannot be processed using a single machine. In this paper (15),MBD analytics is currently a high focus topic aimed at extracting meaningful information and patterns from mobile data. Deep learning is a solid tool in MBD analytics. The framework used in this is Apache Spark,which provides an open source cluster computing platform . This enables distributed learning using many computing cores on a cluster where continuously accessed data is cached to running memory, thus speeding up the learning of deep models several fold. The learning time of deep models is decreased as a result of the parallel Spark based implementation. Paper contains the challenges of MBD such as 1) Large scale and high speed mobile networks 2) portability 3) crowdsourcing. The definition of deep learning is mentioned like this, Deep Learning is a new branch of machine learning that can solve broad set of complex problems in MBD analytics. The advantages of DeepLearning in MBD analytics are mentioned. 1) Deep learning scores highly accurate results which are a top priority for growing mobile systems. 2) Deep learning generates intrinsic feature that are required in MBD analytics. 3) Deep learning can learn from unlabelled mobile data, which minimizes the data labelling effort. The authors then mentioned the importance of spark in deep learning models of MBD analytics. The parallelization using spark of deep model is performed by slicing the MBDinto many partitions. Each partition is contained in a resilient distributed dataset that provides an abstraction for data distribution from the spark engine. The author mainly concentrates on Spark platform because it tackles the problem of volume, velocity, and volatility aspects of MBD. Volume aspect by parallelizing the learning task into many tasks, Velocity by its streaming extensions, Volatility aspect is addressed by significantly speeding up the training of deep models. Author implements a deep learning model by considering the mobile activity dataset using spark environment.

V. SURVEY PAPER

Survey on high performance analytics of big data with Apache Spark

The main components of the spark which is also called ecosystem of the spark are presented in detail

in (16). To work with structured data spark contains Spark SQL package. This enables users to query using SQL. Spark does not provide normal SQL interface, instead of that Spark SQL allows programmers to merge different SQL queries with programmatic manipulations that are supported by RDDs in Scala, Python, R and Java. Machine learning functions like regression,collaborative filtering ,classification and clustering are provided by spark with the help of MLlib package. Data Analysis or Machine learning techniques on data can be applied effectively using this package. Spark Streaming component of the spark permits the processing of live streams of data. To perform parallel computations and manipulate graphs Spark provides library called GraphX. Spark core includes different components for memory management, interacting with storage system, fault recovery, task scheduling and many more. Apart from these Spark also includes HDFS, web interface, parallel library etc.

VI. CONCLUSION

Spark being one of the best open-source platforms from data cleansing to any data mining technique. It is a cluster computing framework which works upon fault tolerance and data parallelism. It uses in-memory processing by which it overtakes Hadoop and other memory management issues such as serialization etc. RDD is a fundamental data structure of spark which is a distributed collection of objects which process data in parallel. It results in faster and efficient processing of data. It uses various libraries to handle to different data sets and techniques by implementation of suitable algorithms such as SIFT algorithms, intrusion detection algorithm etc.Hence, spark is a widely used platform for big data analysis for continuously growing and changing trends in technology

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Labview Based Liquid Level Control System

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ABSTRACT

Most of the traditional measuring systems were designed and implemented by complicated circuitry which made the product expensive, with low functionality. Using this LabVIEW based liquid level control system, the cheaper and more versatile measurement system can be developed. This paper demonstrates an innovative approach for industrial low cost liquid level monitoring based on virtual instrumentation. With virtual measurement technology, more of the instrument can be substituted by software. The development of virtual and open architecture monitoring systems shift the focus of automation from being hardware centric to software centric, providing further flexibility

Keywords: LabVIEW, level measurement

I. INTRODUCTION

Many industrial and scientific processes require knowledge of the quantity of content of tanks and other containers. In many instances it is not possible or not practical to directly view the interior. The more obvious industrial applications include: tank level gauging of milk, beer or wine in food and beverage industry; level gauging of acid, oil and solvent vessels in chemical plants; level monitoring of water in reservoirs. Level measurement for liquids can be accomplished with over 20 different technologies being offered on the market today. With the wide variety of approaches identifying the right one for specific application can be very difficult. Many applications require a single tank to process multiple environments with different densities or they have a media that changes density with temperature. This is very common in the food and beverage industry where different ingredients are blended and mixed in the same tanks. An accurate liquid level measurement in these conditions utilizing a gage type instrument mounted in the base of the tank is impossible. Continuous liquid level measurement and the detection of both density and temperature of liquids with dissimilar properties are classical topics in level sensor research. Several solutions have been developed that rely on a variety of working principles.

II. LITERATURE SURVEY

Praseed Kumar, Shamim S Pathan and Bipin Mashilkar [1] has demonstrated a prototype of a liquid level monitoring system based on float sensors, electromagnetic valve, Matlab and LabVIEW environment is developed for measuring liquid level accurately and accordingly maintaining the level of liquid close to the reference level. Georgi NIKOLOV and Boyanka NIKOLOVA[2] developed a prototype

of a liquid level monitoring system based on integrated differential pressure sensors, multifunction data acquisition board and LabVIEW environment. Also discussed an appropriate method for liquid level monitoring based on comparative analysis of more popular technologies. The method for obtaining both liquid density and liquid level with two differential pressure sensors are considered.

James D. Wagoner and N. F. Macia [3] designed a liquid level control system to control the level of a liquid in a water tank that had a randomly varying inlet. Control of the water level was accomplished by adjusting a gate valve in the drainpipe located at the bottom of the tank. A solenoid actuator, operated in a continuous mode, controlled the gate valve opening and a pressure sensor provided liquid level feedback to the controller.The liquid level control system was implemented with a PC running National Instruments LabVIEW software.

III. METHODOLOGY

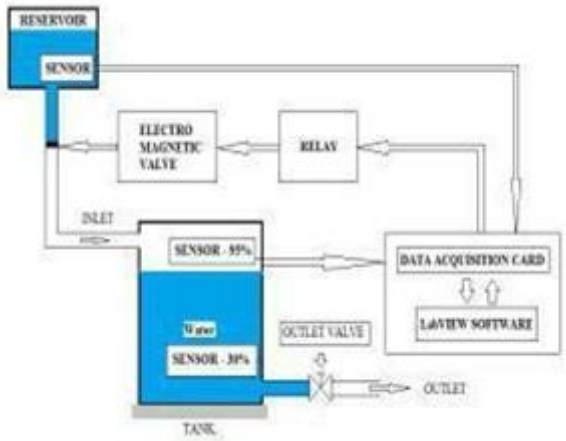

Figure 1. Block diagram of LabVIEW based liquid level control system

The setup consists of a water tank which receives water from a reservoir under a suitable head. A water pump is located at the inlet of the tank. A float sensor (5V) located at a suitable height in the tank is used to sense the level of water. The float sensor senses the water level and sends a signal to the NI DAQ 6008/6009 (input module) in the form of voltage. The DAQ card is used to interface with the hardware. The LabVIEW software will process the data and sends a voltage of 5V as a signal to the output module, i.e. NI DAQ 6008/6009. This voltage actuates water pump via relay. This will turn on or off the water pump depending upon the signal from DAQ 6008/6009.

IV. HARDWARE IMPLEMENTATION

A. POWER SUPPLY:

A DC power supply system, which maintains constant voltage irrespective of fluctuations in the main supply or variation in the load, is known as Regulated Power Supply.

1. A step down transformer converts the 220 ac voltage to the lower ac voltage and gives alternating current at output.

2. The process of conversion of ac to dc is known as rectification. Here a bridge rectifier made up of p-n junction diodes is used to perform this operation.

3. The output of the rectifier contains some ripples or distortion so filtering is carried out.

4. By using a voltage regulator IC LM 7809, 9V dc output is generated. The power supply of 9V is used to run the water pump to pump water from sump to tank.

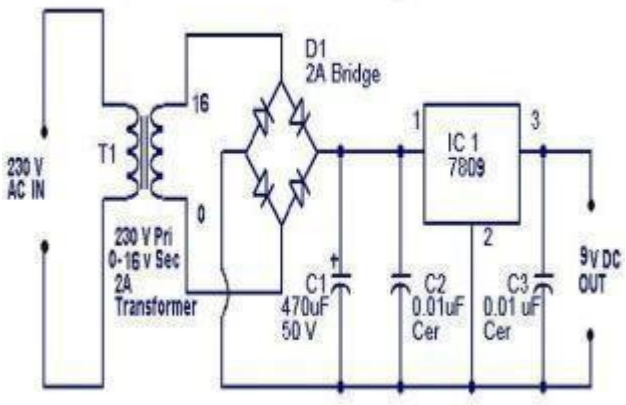

Figure 2. 9V DC regulator using 7809

B. FLOAT SENSOR:

Properly used, float switches can deliver millions of on/off cycles, for years of dependable operation. Failures are normally due to overloading, frequently caused by spiking voltage. The project consists of three float sensors, one is placed at the bottom of the sump and other two are placed at minimum (30%) and maximum (95%) position of the tank. The floating sensor placed in the sump indicates the presence of minimum water required to turn ON the water pump when there is a request from DAQ 6008/6009 card. When the level of liquid goes below the minimum position of the tank, the float sensor placed at 30% of the tank sends a signal to turn ON the water pump to fill it. When it reaches maximum position, the float sensor placed at 95% of the tank sends a signal to turn OFF the water pump.

V. SOFTWARE IMPLEMENTATION

A. FLOW CHART

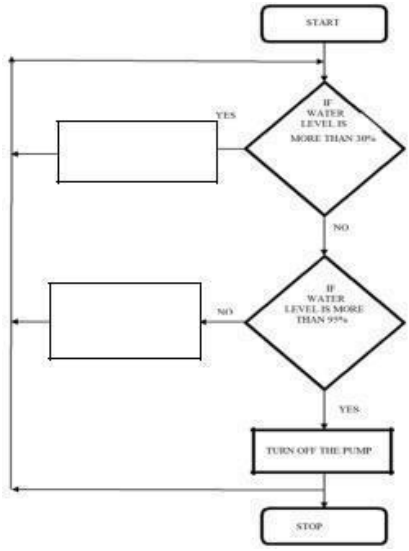

Figure 3. Flowchart for monitoring and controlling of liquid system

B. LabVIEW Program for Monitoring and Controlling of Liquid Level System

Initially a task is created and virtual channels are selected depending on the input and output i.e. analog or digital and add them to task. Later task is started and it reads the data from three sensors located at sump and tank. The sensors in the tank are located at 30% (minimum level) and 95% (maximum level).

1. If the water level in the tank is below 30% (both sensors are at false condition) signal is sent from DAQ card to turn ON the water pump. Water is pumped till it reaches 95% of the tank and turned OFF.
2. If the water level in the tank is above 30% and below 95% it sends feedback value, i.e., while incrementing motor is turned on and while decrementing motor is turned off.
3. If both the sensors are at true condition, the signal is send to turn off the water pump.
4. The sump will pump water only if the sensor placed in it is at true condition, else pump won't turn on.

An additional option is provided for manually controlling the system which will grave out in case of automatic conditions. The signal from the DAQ card writes the data as output and stops the task and clears it for next cycle.

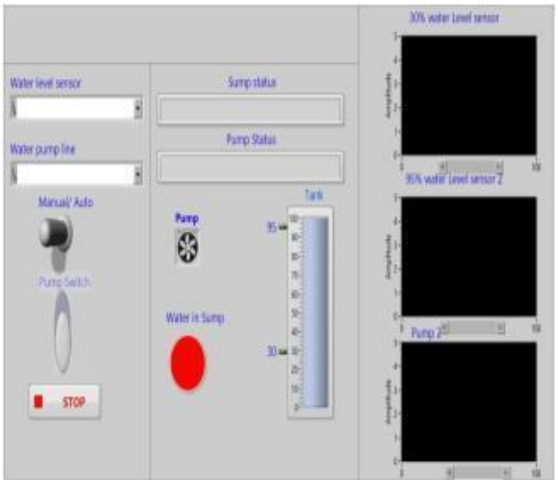

Figure 4. VI Front panel of the LabVIEW program for monitoring and controlling of liquid system

VI. RESULTS AND DISCUSSIONS

When the float sensor is in the ON condition, the relay completes the circuit where the water pump is connected and turns it on. When the water rises to the desired level the float sensor turns off and this in turns off the water pump.

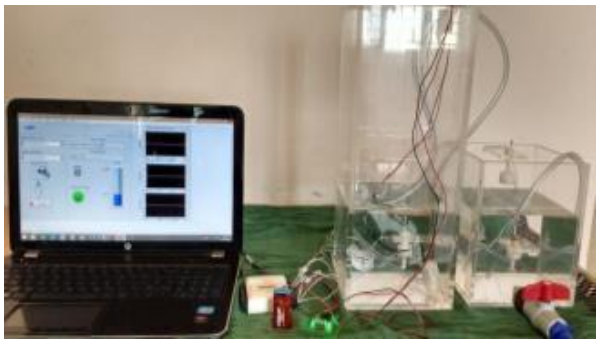

Figure 5. Prototype of a LabVIEW based liquid level control system

Random filling of the tank represents a real life unpredictable disturbance to the system. Automatic control is accomplished with the use of a personal computer operated with LabVIEW software and also by sensing the water level and then controlling the position of a gate valve that releases water from the tank. An option of manual control is also provided.

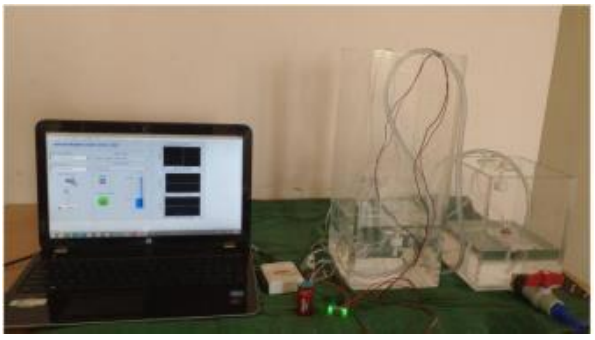

Figure 6. Image of the prototype when the level of liquid is at minimum position in the tank

When the level of liquid in the tank goes below minimum position (30%), it is sensed by the float sensor which in turn sends signal to DAQ 6008/6009 to turn ON the pump to fill the tank. Above figure shows the image of pumping the water from sump to fill the tank.

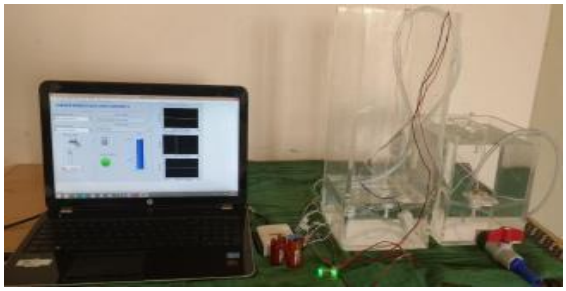

Figure 7. Image of the prototype when the level of liquid is at maximum position in the tank

When the level of liquid reaches maximum (95%) position of the tank, the float sensor sends a signal to turn OFF the pump through DAQ 6008/6009 card. Above figure shows that the liquid level in the tank has reached maximum position (95%).

VII. CONCLUSION

Detection of liquid level by float sensor and corresponding ON/OFF switching of water pump is achieved. The open loop control system is modeled in LabVIEW. This set up will further be used for testing and implementing an Ultrasonic sensor. This will enable to control the level of liquid at any height directly from LabVIEW. The implementation of virtual measurement technology for continuous liquid level is presented. This system design concept may be used to develop a various low cost liquid level measurement and monitoring systems. Interfacing of hardware components with LabVIEW software through NI hardware is carried out successfully. This will create a new era in the field of process automation.

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Mobile Theft Detector

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ABSTRACT

while smart phones allow for more flexible and convenient business as well as personal operations, they are susceptible of thefts. When a mobile device is in the thief's hand, it cam compromise the data on the phone in addition to the loss of the phone. To prevent mobile phone thefts, we designed an application for android smart phones to retrieve the location and information of the thief through the smart phone's in-built features.

Keywords: Serial Unique ID, GPS Network, SIM Change detection, Camera trap/Snapshots, Profile modes-SMS Control.

I. INTRODUCTION

Smart phones are changing the way we live our lives and have become a very important part of our day-to-day lives. It changes the ways of communication using phones. Its functionality isn't just to call contacts but includes storage of personal documents, contacts, information etc of an end user. Due to the smart phone's attractive features and modernized usage, people around the world likely tend to always have their phone with them. If their device is missing or stolen at any situation ,it means that their personal information is going to be in wrong hands. In this paper, we develop an android application through which the thief, who steals any android mobile is caught through installation of this application, and the user can obtain the location through last SIM change. This application uses the technology like SMS, GPS through which the current location of the thief, snapshots, SIM changed will be caught by the application. It gives the exact details about the theft and his/her last location and an SMS and email will e sent to the registered email-ID and phone number.

II. RELATED WORKS

Standardization of Mobile phone positioning for 3G systems :

Finding the location of the mobile phone is one of the important features of the 3G mobile communication system. Many valuable location based services can be enabled by this new feature. Telecommunication managers and engineers are often puzzled by location terminologies and techniques as well as how to implement them, since location systems are not natural evolution from past generations of telecommunication systems. In this paper, we discuss briefly why locating mobile phone becomes a hot topic and what technologies are being studied. We then describe and clarify the latest standards issues surrounding the positioning methods specified for 3G systems. These include cell-ID-based, assisted GPS, and TDOA based methods, such as OTDOA, E-OTD, and A-FLT. There are three most commonly used location technologies: standalone, satellite-based, and terrestrial-radio-based [2]. As examples, a typical standalone technology is dead reckoning; a typical satellite-based technology is GPS; and a typical terrestrial radio-based technology is the "C" configuration of the Long Range Navigation (LORAN-C) system. For wireless E911, E112, and many other applications, radio-based (satellite and terrestrial)

technologies are most popular. Cellular networks are terrestrial-based communications systems. It is natural to utilize the signals of the network to determine the mobile phone location or assist in location determination. The AOA system determines the mobile phone position based on triangulation.

Design of Location Areas for Cellular Mobile Radio Networks :

In order to track the location of a mobile terminal in a cellular mobile network, the radio coverage area of a network is partitioned into clusters of Base Stations, called Location Areas. As mobile terminals cross the boundaries of Location Areas, a significant overhead location-updating traffic is injected into the controlling signal network. The intent of this paper was to solve the problem of designing Location Areas for a given network such that the load of location-update-signal traffic on the signal network is minimized in the context that the intra-cluster communication is less expensive than the inter-cluster communications. In order to solve the problem, a two-phase matrix-decomposition based recursive algorithm is presented in the present paper. The proposed algorithm partitions a cellular network into required number of Location Areas in a hierarchical fashion, and is capable of generating optimal or near optimal solution in very short times. By considering a range of network problems, it is demonstrated that the proposed algorithm can be applied to solve large-scale Location area design problems.

III. DESCRIPTION AND WORKING

Smart phone theft has been on the rise for a while, and numerous measures including phone tracking and kill switches are floating around as possible disincentives for thieves. More than 1 million smart phones are stolen each year, and 34% of smart phone owners still don't turn on any security controls. It is hard to determine the flow of stolen goods once they leave the owner's hands, or the characteristics of the thief.

Bringing up the security features of mobile phones is one of the best things a manufacturer can provide for its loyal customers. Not only is such a strategy to gain more following, but also that could mean a proof of its goodwill to the faithful ones.

Nowadays, suppose a person's phone has been stolen, we don't have an optimum way to track it. So far, to find the phone we will have to register a complaint in the police station and even after that there's no guarantee of getting our phone back.

In this application, we concentrate on finding our lost phone by its location and identify the thief in case the phone is stolen. This can be achieved using SIM Serial Unique ID which will be initially saved in the database when the user first registers. Once the SIM is changed, the application gets triggered and by the help of GPS, it will get the current location of the thief according to the latitudinal and longitudinal lines and automatically capture snaps without the notice of the thief and emails both the snaps and location to the predefined email-id and number.

This will happen each time the thief uses the phone and the thief will be totally unaware of this because the application performs all these activities in the background.

The advantages of our application is that there are more possibilities of locating our lost device if it is stolen. Most of the operation will happen in the background so the thief will be unaware of this operation. The major advantage of this application is that profile modes can also be switched over with the help of another mobile phone and no special indication is required.

IV. CONCLUSIONS

This paper presents a novel Mobile-theft Detection application for android based devices. The application deploys a solution that meets users immediate and long term requirements by providing the images and location of the thief, which makes it easy for the user to identify the thief and get him/her and arrested. We are enhancing this application by providing the information about the location of the android based smart phone with the
help of text messages. With the advent of time, technology is evolving every day. Our application will further be developed and improved. Currently this application is available for android based mobile phones.

V. ACKNOWLEDGEMENT

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An approach to Elliptical Curve Cryptography to implement Multilevel Access Control in Defence

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ABSTRACT

Currently, mobile phones are not only used for formal communication but, also for sending and receiving sensitive information. Sending a message is easy, quick and inexpensive. However, protecting the messages from known attacks like man-in-the-middle attack, reply attack and non-repudiation attack is very difficult. Government and Military Organization have also started using messaging for quick and fast actions. The defence messaging system takes a message and forwards it to the intended recipients or parties based on the message criteria for critical action. This system should provide security assistance and should be manageable by Central Administration Authority. The primary goal of this research is to develop a Multilevel Access Control for Defence Messaging System using Elliptical Curve Cryptography. The system developed is secure, multisite and allows for Global communication using the inherent properties of Elliptical Curve Cryptography It provides a greater security with less bit size and it is fast when compared to other schemes. The implementation suggests that it is a secure system which occupies fewer bits and can be used for low power devices.

Keywords: Defense messaging system, Elliptic Curve cryptography, Global communication, Secure system.

I. INTRODUCTION

In a multilevel access control system, users have access to multiple data streams. Defence messaging System is developed to enable the top defence personnel to issue commands using messages to guard the country against threats of terrorists, anti-socials and Intruders. To protect the content from dissemination to unauthorized entities the data streams are encrypted and separate keys are maintained for the purpose. As a multilevel access control system, the system developed has the following features: 1.Communication happens among members of a class 2.Communications taking place among lower classes will be relayed to higher class users 3.Server sends messages to classes when required 4.Authentication of receivers 5.Dynamics at message level, class level and user level. The best schemes for providing multilevel access control is to allow the ancestor nodes to derive the keys of the descendent nodes by some manipulations. Our scheme uses Elliptic curve cryptography to enable secure and efficient multilevel access control. The scheme also supports full dynamics at both user level and class level and permits any random access hierarchies. The main advantage of ECC compared to other schemes is that it offers equal security with a smaller key size and thus reduces processing overhead The rest of the paper is as follows.

II. METHODS AND MATERIAL

A. Overview of ECC Multi level Access Control Protocol:

The goal of this paper is to propose a communication and computation efficient key establishment protocol for defence messaging system. For example, in the Indian Military System the following hierarchy exists. In such a type of system, messages sent to a lower class should be known to the active members of lower class and also to all active members of the higher class.

Chief of army
Army commander
Lieutenant general
Major general
Brigadier
Colonel
Lieutenant colonel
Major
Captain
Lieutenant

Figure 1. Military hierarchy

It is not only essential to maintain the access control but the data should be hidden as well. There are many messages to be sent to different parties. The server inserts new data streams according to the classification. The messages are encrypted using ECC according to the access allowed for each user and the data is sent. Consider the following set of message.

Table 1. Example Showing Message classifications

Class	Category of Data Streams			
	Confi d- ential	Field Messag es	Terror Message s	Climate Warnin g
Troops	×	√	×	×
Air Wing	×	×	×	√
NSGS	×	×	√	×
Lieutenan ts	√	√	×	×

All the users of defence messaging system need to register themselves and get authenticated by the server. Only authenticated users are able to view the message content as the message remains unintelligible to people who don't belong to that elliptic curve. Different Elliptic curves identify different class of users.

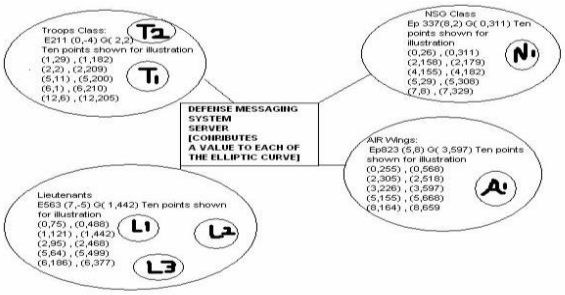

Figure 2. System Overview

B. The Proposed Scheme

The idea is to divide the user classes into several classes according to their hierarchy, let each class have its own subclass key shared by all members of the subclass. Each subclass has subclass controller node and a Gateway node, in which Subclass controller node is the controller of subclass and a Gateway node is controller of subclass controllers.

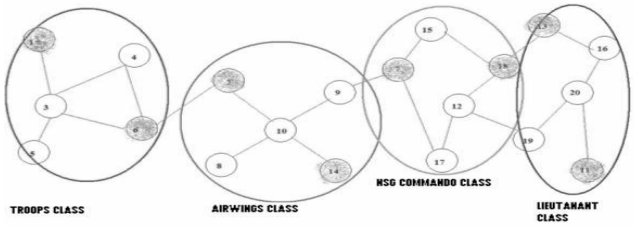

Figure 3. Members of class are divided into subclasses

For example, in Figure.3, all member nodes are divided into number of subclasses and all subclasses are linked in a tree structure as shown in Figure.4

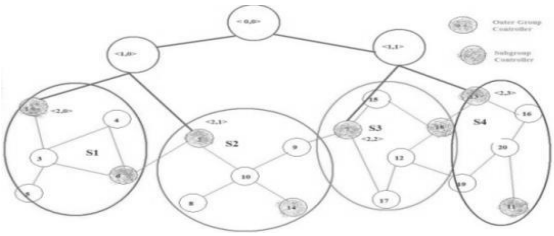

Figure 4. Subclasses link in a Tree Structure

The layout of the network is as shown in below Figure.5.

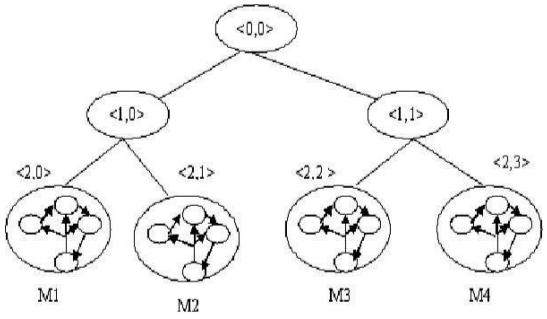

Figure 5. Arrangement of classes

C. Algorithms and Design of ECC Multi level Access Control Protocol:

Assume that there are totally N members in the group Class Communication. After sub classing process (Algorithm 1), there are S subclasses M_1, M_2… M_s with n_1, n_2, n_s members.

Algorithm 1. Multilevel Access Key Agreement

1. The Subclass Formation: The number of members in each subclass is **N / S < 100.**Where, N – is the class size and S is the number of subclasses. Assuming that each subclass has the same number of members.

2.The Contributory Key Agreement protocol is implemented among the class members. It consists of three stages.

a. To find the Subgroup Controller for each subgroups

b. ECGDH protocol is used to generate one common key for each subgroup headed by the subgroup controller.

c. Each subgroup gateway member contributes partial keys to generate a one common backbone key (i.e. Outer group Key (KG)) headed by the Outer Group Controller using ECTGDH protocol.

3. Each Group Controller (Sub /Outer) distributes the computed public key to all of its members. Each member performs rekeying to get the corresponding shared key..

A Regional key KR is used for communication between a subgroup controller and the members in the same region. The Regional key KR is rekeyed every time whenever there is a membership change event, sub group join / leave and member failure. The Outer Group key KG is rekeyed whenever there is a join/ leave gateway controllers and member failure to preserve secrecy. The members within a subgroup use Elliptic Curve Group Diffie-Hellman Contributory Key Agreement (ECGDH). Each member within a subgroup contributes his share in arriving at the subgroup key. Whenever membership changes occur, the subgroup controller or previous member initiates the rekeying operation.

Algorithm 2. Multilevel Access Control Using ECC

1. **Member Join**

When a new member joins, it initiates communication with the subgroup controller. After initialization, the subgroup controller changes its contribution and sends public key to this new member. The new member receives the public key and acts as a group controller by initiating the rekeying operations for generating a new key for the subgroup. The rekeying operation is as follows.

New node — Join request → Subgroup Controller

Subgroup Controller — change its contribution and send public key to NewNode → Acts as → New Subgroup Controller

puts its contribution to all the public key value &
Multicast this public key value to → the entire member in the subgroup

New Subgroup Controller

Each Member put is contribution to the public value & Compute →New Subgroup Key

2. Member Leave:

a) When a Subgroup member Leaves

When a member leaves subgroup to which it belongs the subgroup key must be changed to preserve the forward secrecy. The leaving member informs the subgroup controller. The subgroup controller changes its private key value, computes the public value and broadcasts the public value to all the remaining members. Each member performs rekeying by putting its contribution to public value and computes the new Subgroup Key. The rekeying operation is as follows.

Leaving Node Controller — Leaving Message →Subgroup Controller

changes its private key value, compute the public key value and
Multicast the public key value to → All the remaining Member

Subgroup Controller

Performs Rekeying and Compute → New Subgroup Key

Each Member

b) When Subgroup Controller Leaves:

When the subgroup Controller leaves, the subgroup key used for communication among the subgroup controllers needs to be changed. This Subgroup Controller informs the previous Subgroup Controller about its desire to leave the subgroup which initiates the rekeying procedure. The previous subgroup controller now acts as a Subgroup controller. This Subgroup controller changes its private contribution value and computes all the public key values and broadcasts to all the remaining members of the group. All subgroup members perform the rekeying operation and compute the new subgroup key. The rekeying operation is as follows.

Leaving Subgroup Controller — Leaving Message → Old Subgroup Controller

change its private value,compute the all public key value and
Multicast → Remaining Member in the group

Old Subgroup Controller

Subgroup Member Perform Rekeying and Compute→ New Subgroup Key

c) When Outer Group Controller Leaves:

When an Outer group Controller leaves, the Outer group key used for communication among the Outer groups needs to be changed. This Outer group Controller informs the previous Outer group Controller about its desire to leave the Outer group which initiates the rekeying procedure. The previous Outer Group controller now becomes the New Outer group controller. This Outer group controller changes its private contribution value and computes the public key value and broadcast to the entire remaining member in the group. All Outer group members perform the rekeying operation and compute the new Outer group key. The rekeying operation is as follows.

Leaving Outer group Controller — Leaving Message → Old Outer group Controller

change its private value,compute the all

Old Outer group Controller → public key value and Multicast → Remaing Member in the Outer group

Outer group Member $\xrightarrow{\text{Perform Rekeying and Compute}}$ New Outer group Key

d) When Gateway member leaves

When a gateway member leaves the subgroup, it delegates the role of the gateway to the adjacent member having high processing power, memory, and Battery power and the adjacent member acts as a new gateway member. Whenever the gateway member leaves, all the two keys should be changed. These are

i. Outer group key among the subgroups.
ii. Subgroup key within the subgroup.

In this case, the subgroup controller and outer group controller perform the rekeying operation. Both the Controllers leave the member and a new gateway member is selected in the subgroup, performs rekeying in the subgroup. After that, it joins in the outer group. The procedure is same as member join in the outer group

e) Communication Protocol:

The members within the subgroup have communication using subgroup key. The communication among the subgroup members takes place through the inner class controller.

1. Communication within the Subgroup:

The sender member encrypts the message with the subgroup key (KR) and multicasts it to all members in the subgroup. The subgroup members receive the encrypted message, perform the decryption using the subgroup key (KR) and get the original message. The communication operation is as follows.

Source Member $^{E}KR^{[Message]\ \&\ Multicast}$ Destination Member $^{D}KR^{[EKR[Message]]}$ → Original Message

2. Communication among the Subgroup:

The sender member encrypts the message with the subgroup key (KR) and multicasts it to all members in the subgroup. One of the members in the subgroup acts as a gate way member. This gateway member decrypts the message with subgroup key and encrypts with the outer group key (KG) and multicasts to the entire gateway member among the subgroup. The destination gateway member first decrypts the message with outer group key and then encrypts with subgroup key multicasts it to all members in the subgroup. Each member in the subgroup receives the encrypted message and performs the decryption using subgroup key and gets the original message. In this way the region-based group key agreement protocol performs the communication. The communication operation is as follows.

Source Member $^{E}KR^{[Message]\&Multicast}$ → Gateway Member

Gateway Member $^{D}KR[^{E}KR^{[Message]}]$ → Original

***f)* Users joining the Troop class is shown below**

The Troop User1Joins

User Id: Troop User1 Private Key (nA) = 47568

Public key (A) = g^{nA} = (nA mod p) G = (47568 mod 241) G

- 91 G = (206,121)

Troop User2 Joins

User Id: TUser2 Private Key (nB) = 13525

Public key (B) = g^{nB} = (nB mod p) G = (13525 mod 241) G= 29 G = (29,139)

Finding the Group key after Troop user1 and Troop User2 joined the group

TroopUser1 Calculates the Group key

Tuser1 will get g^{nB} from TUser2 i.e. (29,139) yields 29 Shared key = g^{nAnB}

1.((47568*29)mod 241) G

2. 229 G

3.(155,115)

Troop User2 Calculates the Group key

TUser2 will get g^{nA} from TUser1 i.e. (206,121) yields 91 Shared key = g^{nAnB}

1. ((13525*91)mod 241) G

2.229 G

2. (155,115)

Troop User3 Joins the Group

User Id: TUser3 Private Key (nC) =82910

Public key (C) = g^{nC} = (nC mod p) G = (82910 mod 241) G= 6 G = (125,152)

Finding the Group key after the Third Troop User joined the Group

The new TUser3 act as a Group controller.

TUser3 computes g^{nBnC} , g^{nAnC}

g^{nA} = (206,121) yields 91

g^{nAnC} = (91*82910 mod 241) G = 64 G = (147,97)

g^{nB} = (29,139) yields 29

g^{nBnC} = (29*82910 mod 241) G = 174 G = (131,84)

Sends the g^{nBnC} Value to Tuser1 and g^{nAnC} Value to TUser2.

Finding the Group key after three users joined the group

Tuser1 Calculates the Group key

Tuser1 will get g^{nBnC} from TUser3 (GC) i.e. (131,84) yields 174

Shared key = g^{nAnBnC}

= ((47568*174)mod 241) G

= 169 G

= (120,31)

TUser2 Calculates the Group key

TUser2 will get g^{nAnC} from TUser3 (GC) i.e. (147,97) yields64.

Shared key = g^{nAnBnC}

= ((13525*64)mod 241) G

= 169 G

= (120,31)

TUser3 Calculates the Group key g^{nAnB} i.e. (155,115) yields 229 Shared key = g^{nAnBnC}

= ((82910*229)mod 241) G

= 169 G

= (120,31)

User Leave from the Group

Let the TUser3 be leave. Then the user sends message to all users that it is leaving. All the users remove the leaving user from the user list. The group controller changes its key value and computes the new group key.

Group controller New Private Key = 43297.

The group controller recalculates the following values:

g^{nAnB}= (155,115) yields 229. Sends the g^{nB} Value to TUser1, g^{nA} Value to TUser2. Using the shares the Group keys are calculated

g) Tree-based Group Diffie-Hellman Protocol

In the proposed protocol (Fig.8), Tree-based group Diffie-Hellman (TGDH), a binary tree is used to organize group members. The nodes are denoted as < l, v >, where 0 <= v <= 2^l – 1 since each level l hosts at most 2^l nodes. Each node < l, v > is associated with the key K<l,v> and the blinded key BK<l,v> = F(K<l,v>) where the function f (.) is modular exponentiation in prime order groups, that is, $f(k) = \alpha^k \bmod p$ (equivalent to the Diffie–Hellman protocol. Assuming a leaf node < l, v > hosts the member Mi, the node < l, v > has M_i's session random key K<l,v>. Furthermore, the member Mi at node < l. v > knows

every key in the key-path from < l, v > to < 0, 0 >. Every key K<l,v> is computed recursively as follows:

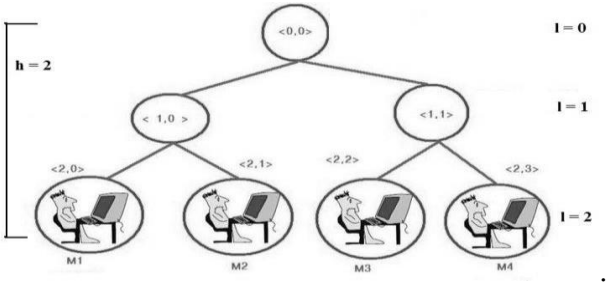

Figure 6. Key Tree

$K<l,v>=K<l+1,2v>^{BK}<l+1,2v+1>^{modp}$

$=K<l+1,2v+1>^{BK}<l+1,2v>^{modp}$

$=K<l+1,2v>^{K}<l+1,2v+1>^{modp}$

$=F(K<l+1,2v>^{K}<l+1,2v+1>)$

It is not necessary for the blind key BK<l,v> of each node to be reversible. Thus, simply use the x-coordinate of K<l,v> as the blind key. The group session key can be derived from K<0,0>. Each time when there is member join/leave, the outer group controller node calculates the group session key first and then broadcasts the new blind keys to the entire group and finally the remaining group members can generate the group session key.

1. PM+KASK = (160,203)

PM = (160,203) - KASK = (160,203) -21

= 126– 21 = 105 G => (185,199)i

(2) PM+KASK = (77,145)

PM = (77,145) - KASK = (77,145) -21

= 135 – 21 = 114 G => (172,50) r

(3) PM+KASK = (156,10)

= (156,10) -

PM = (156,10) - KASK 21

= 122 – 21 = 101 G => (1,182)e

a..Elliptic Curves used

Troops Class: $y^2 = x^3 - 4 \bmod 211$ at G(2,2)

NSG Class: $y^2 = x^3 + 8x - 2 \bmod 337$ at G(0,311)

Lieutenants: $y^2 = x^3 + 7x + 5 \bmod 563$ at G(1,442)

AIR Wings: $y^2 = x^3 + 5x - 8 \bmod 823$ at G(3,597)

b .Example Message:

Sent....3:Leutanats:TerroristInformation:440:400:487
:137:493:111:355:172:325:238:54:289:325:238:493:11
1:215:36
0:16:73:505:466:505:466:538:236:505:466:293:20:560
:14

8:478:249:

III. RESULTS AND DISCUSSION

The system was developed in Java net beans and run on a network. Some sample output screens are shown in Figure 6 through Figure 10.

Figure 7. Class Join

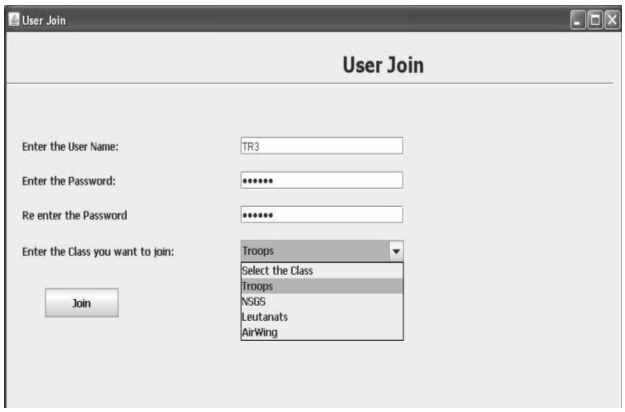

Figure 7: User Join

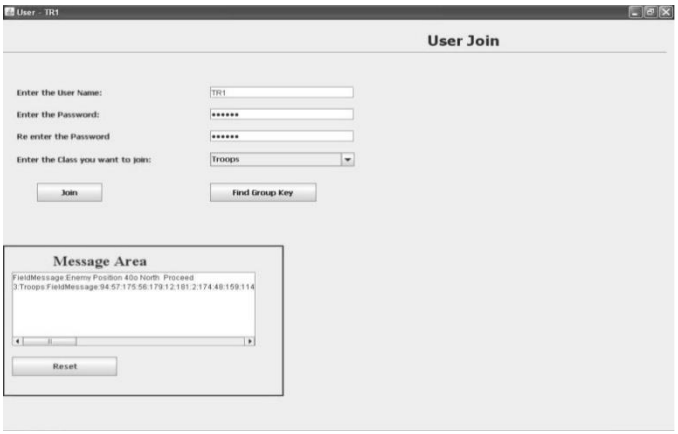

Figure 8. Troop User receives message

Figure 9: Air wing User receives message

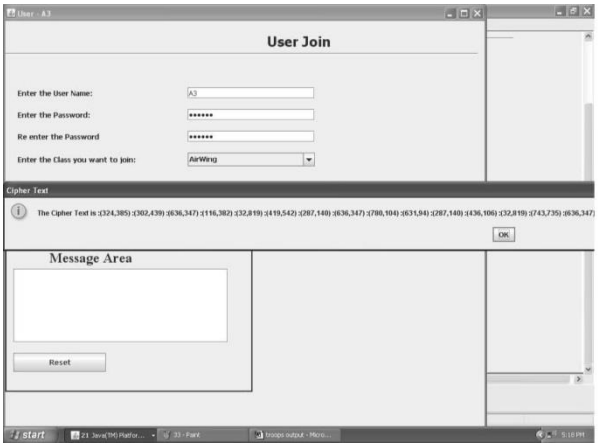

Figure 10: Message gets decrypted

IV. CONCLUSION

We have implemented a Defence Messaging System which is based on Multilevel Access Control Model using Elliptic curve cryptography. We have successfully implemented by selecting different elliptic curves. A single elliptic curve can be used and by changing the generator points we can perform different encryption. The forward and backward secrecy is maintained here. As future implementation, agent based methods can be studied. Thus the members in a particular class are able to receive the messages securely.

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IoT based Metering and Alerting System for residential resource consumption

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ABSTRACT

Resources play a vital role in human life and in achieving desired economic growth. The entire fabric of developmental goals is webbed around a successful energy strategy. One of the major problem that prevails is depletion of the resources. Even though renewable resources can be replenished in a short period of time, it cannot be taken for granted. Henceforth resourceconservation promises to fill the gap between supply and demand.

Presently there is no exact way to track the daily consumption of our basic resources .

This project aims at tracking the usage of resources like water, electricity and LPG by individual houses on a per day basis.Sensed data is stored in the cloud.Along with this, user through a smartphone application will be alerted about the amount of resources they consume. It creates awareness among the users about the resource consumption by which each individual can plan and minimize resource utilization. Resource consumption of a locality can be kept in track which can be viewed by higher authority. This way of tracking resources and alerting users will lead to awareness about resource utilization and leads to global resource conservation.

I. INTRODUCTION

INTERNET OF THINGS(IOT):

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Internet, a revolutionary invention, is always transforming into some new kind of hardware and software making it unavoidable for anyone.

The form of communication that we see now is either human-human or human-device, but the Internet of Things (IoT) promises a great future for the internet where the type of communication is machine-machine (M2M).

The basic idea of IoT is to allow autonomous exchange of useful information between invisibly embedded different uniquely identifiable real world devices around us, fueled by the leading technologies like Radio-Frequency Identification (RFID) and Wireless Sensor Networks (WSNs) [2] which are sensed by the sensor devices and further processed for decision making, on the basis of which an automated action is performed [1].

IoT projects are under way that promise to improve distribution of the world's resources to those who need them most and help us understand our planet so we can be more proactive and less reactive.

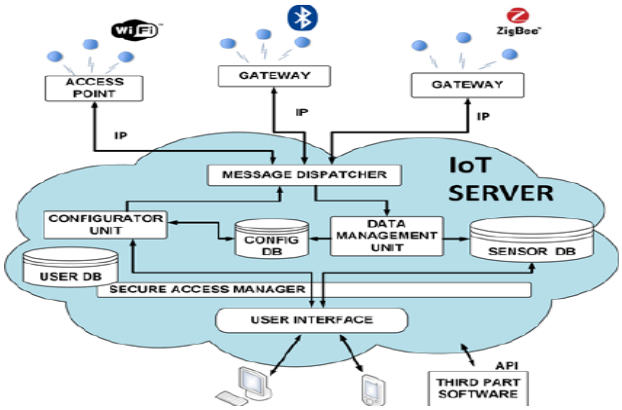

Figure 1

II. PROBLEM STATEMENT

The per capita consumption in any country is an index of the standard of living of the people in that country. Energy demand has been rapidly increasing with raising standard of living of people. Nowadays, we are overusing the natural resources of the planet. Being aware of exhausting resources people are unable to utilize the resources efficiently because there is no measure to track it. The problem is also getting worse as population and consumption keep growing faster than technology.

The focus of our project is to track daily usage of power, water and LPG and alerting the user about his usage. The sensors used track the consumption and alert the user. All that the consumer require is a smartphone application that provides him the notification. Data of the resource consumption of a locality is also available to the administrator who can view the requirement and consumption of a locality. The higher authority or municipal procures the usage information of the locality which helps to obtain the statistical data.

The consumer who obtains his usage information can plan his usage according to his budget. Only the resources that are required will be used which to an extent reduces wastage [4] of resources.

III. EXISTING SYSTEM

The resources we obtain are being used without any proper planning which is leading to a huge wastage. In fact, the world's demand for power is rising faster than the demand can be met. Consequently, industries, homes, and businesses are already taking power saving measures to save money and to become more environmentally friendly. Power saving techniques seems to have a small impact to each individual, but as the price and demand for resources [5] rises, the collective power saving actions of everyone will make a significant difference. Water is an essential resource for all life on the planet. Due to the small percentage of water remaining, optimizing the fresh water we have left from natural resources has been a continuous difficulty in several locations worldwide. In the existing situation, in some parts of the country there is no system to measure water consumption. In contrast, in the metropolitan cities the water usage is billed on a monthly basis. In other cities of the country water bill is not based on the consumption rate instead it is to be paid on a yearly basis.

The next mostly used resource is LPG. Cylinders are supplied on a monthly basis and are refilled every month. The consumers are unable to track consumption which many times lead to shortage of cylinders. In all above scenarios there is no way to determine the per day usage of the resources. And there is no proper method to determine the actual requirement of the resources for a single person.

This per day usage data that will be provided by implementation of this project provides the consumer and the administrator of a locality knowledge about the resources being consumed. It also provides us the responsibility to utilize only the amount of resources we actually require and reduce unnecessary wastage.

IV. METHODS AND MATERIALS

1. SENSORS USED

G ½ water flow sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse Signal. The working voltage is 5v-24v.The maximum current that can flow through is 15mA (DC 5v).The external diameter of this flow sensor is 20mm and its weight is 43g.It can be stored in the temperature range of 25℃～+80℃.

Figure 2. G 1/2 Water Flow sensor

DIP Air Pressure Sensor (DIP-6, 0-40KPa):

DIP Air Pressure Sensor is used to sense the LPG pressure from which its consumption can be calculated. The specifications are as follows:

Measuring medium: Air

Measuring range : 0-40kPa

Operating temperature: -40 ℃ ~ + 125 ℃

Storage temperature: -40 ℃ ~ + 150 ℃

The figure is as shown below:

Figure 3. DIP Air Pressure Sensor (DIP-6, 0-40KPa)

Energy meter:

The meter which is used for measuring the energy utilises by the electric load is known as the energy meter. The energy is the total power consumed and utilized by a load at a particular interval of time. It is used in domestic and industrial Ac circuit for measuring the

Power consumption.

Figure 4. Energy Meter

Energy meters measure the rapid voltage and currents, calculate their product and give instantaneous power. Electricity meters are typically calibrated in billing units, the most common one being the kilowatt hour. Periodic readings of electric meters establishes billing cycles and energy used during a cycle.

2. HARDWARE

RENESAS MICROCONTROLLER BOARD

Renesas microcontroller surpasses its predecessor i.e. 8051 family of microcontrollers, with various in-built features as mentioned below:

- ✓ Renesas is a 16-bit microcontroller.
- ✓ Minimum instruction time can be changed from ultra-low speed (30.5us) to high speed (0.03125us).
- ✓ 16 to 512KB of ROM and 2 to 32KB of RAM are available depending upon the series and number of pins.
- ✓ On-chip high-speed (32 MHz to 1 MHz) as well a low-speed (15 KHz) oscillator is present.
- ✓ 10-bit resolution A/D converter (6 to 26 channels depending upon the series) is present.
- ✓ Totally 3 UART for Serial Interface is available.
- ✓ Totally 0-7 channels for timer is available.

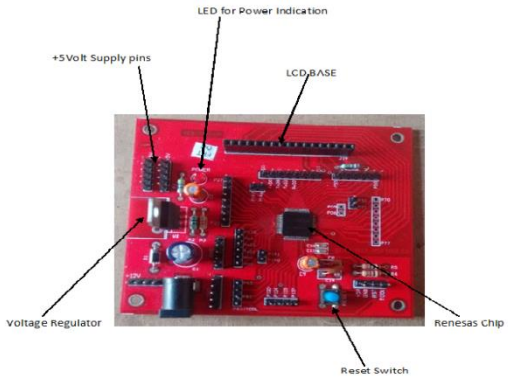

Figure 5. 64 pin Renesas Microcontroller board

GSM (Global System for Mobile communications) :

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls and data transfer speeds of up to 9.6 kbps, together with the transmission of SMS (Short Message Service). GSM is a cellular network, which means that cell phones connect to it by searching for cells in the immediate vicinity. GSM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response.

Figure 6. Global system for mobile communication (GSM)

GENERAL PACKET RADIO SERVICES (GPRS)

General Packet Radio Services (GPRS) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users.

In order to set up a GPRS connection for wireless modem, a user must specify an APN, optionally a user name and password, and very rarely an IP address provided by the network operator.

LIQUID CRYSTAL DISPLAY

The liquid-crystal display has the distinct advantage of having a low power consumption than the LED. It is typically of the order of microwatts for the display in comparison to some order of milliwatts for LEDs. Low power consumption requirement has made it compatible with MOS integrated logic circuit. Its other advantages are its low cost, and good contrast.

Basic structure of an LCD A liquid crystal cell consists of a thin layer (about 10 u m) of a liquid crystal sandwiched between two glass sheets with transparent electrodes deposited on their inside faces.

3. SOFTWARE

The Integrated Development Environment (IDE), Cube Suite is used to generate the embedded code for the hardware mentioned. It offers the ultimate in simplicity, usability, and security for the repetitive editing, building and debugging of codes.

CubeSuite+ bundles all the basic software necessary for Renesas MCU software development in one convenient package, ready to use immediately after initial installation. CubeSuite+ is also compatible with Renesas hardware tools, such as on-chip debugging emulator E1, facilitating advanced debugging.

V. RESULTS AND DISCUSSION

METERING AND ALERTING SYSTEM FOR RESOURCE CONSUMPTION

This project aims at monitoring one's energy consumption and warns consumer if he/she is expected to increase beyond him/her pre-fixed energy units. This monitoring is done on a regular basis, so that if consumer is at the brink of exceeding his/her specified consumption limits, they will be warned. This is implemented using WSN technology, In WSNsensors are equipped with wireless interfaces with which they can communicate with one another to form a network. It has sensor nodes working together to monitor a region to obtain data about the

environment. According to David Culler, Estrin and Mani Srivastava WSNs offer an alternative approach: performing Local processing at each device and transporting the data continuously to master node [2].

By fixing one's consumption below a fixed slab rate category and continuously checking that the consumption has not exceeded this limit for a time lapse, we can cut down the consumer's bill as well as the load on the system, if we succeed in limiting the consumption below the slab rate. This project constantly alerts consumer if their consumption has reached beyond the preplanned units on a regular basis [6], so that the consumer is aware of his consumption and voluntarily controls his consumption.

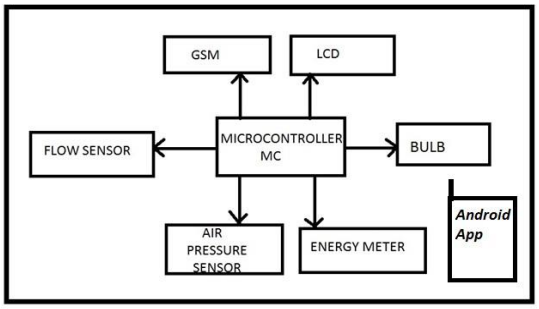

Figure 7. Representation of metering system

In this project we use respective sensors to measure the amount of usage of water, electricity and LPG in home. Electric meter can be configured to measure electricity consumption of a load [7].This information is stored in the database [3]. Whenever the consumption will exceed the threshold, the user will be notified the amount of usage in that time span. This application is not only for common people but also for the higher authorities. The user and admin have their respective accounts. The user can only view his/her usage and the admin can view usage on locality basis.

VI. CONCLUSION

The implementation of this project provides awareness of daily usage by which we can use the resources effectively. The penalty is imposed for aggrandize usage of resources. By this people will be conscious about the resource usage.

Energy conservation is the only route that can get better mileage out of the available resources. These problems can be tackled with the implementation of this project by measuring and alerting the users. Since the usage of the resources is kept track of and monitored to ensure the safety of the future generation.

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pPath: Path Presumption in Wireless Sensor Networks

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ABSTRACT

Recent wireless sensor networks (WSNs) are becoming increasingly complex with the growing network scale and the dynamic nature of wireless communications. Many measurement and diagnostic approaches depend on per-packet routing paths for accurate and fine-grained analysis of the complex network behaviors. The basic idea of iPath is to exploit high path similarity to iteratively infer long paths from short ones. A novel path inference approach to reconstructing the routing path for each received packet. IPath exploits the path similarity and uses the iterative boosting algorithm to reconstruct the routing path effectively.

Keywords: Measurement, path reconstruction, wireless sensor networks.

I. INTRODUCTION

A novel path inference approach to reconstructing the per-packet routing paths in dynamic and large-scale networks. The basic idea of iPath is to exploit high path similarity to iteratively infer long paths from short ones. iPath starts with an initial known set of paths and performs path inference iteratively. IPath includes a novel design of a lightweight hash function for verification of the inferred paths. In order to further improve the inference capability as well as the execution efficiency, iPath includes a fast bootstrapping algorithm to reconstruct the initial set of paths. We also implement iPath and evaluate its performance using traces from large-scale WSN deployments as well as extensive simulations. Results show that iPath achieves much higher reconstruction ratios under different network settings compared to other state-of-the-art approaches.

A. Aim and objectives:

- ✓ To reconstruct path the per-packet routing path in dynamic and large scale networks on the sink side.
- ✓ Reconstruct the routing path effectively.
- ✓ Analyze performance of iPath and evaluate the performance using simulation.

II. ARCHITECTURE

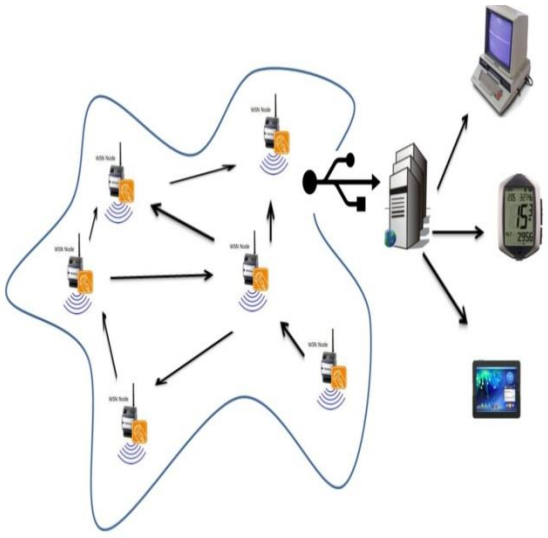

Figure 1. Wireless Sensor Network

A. Methodology:

Network Model: In the first module, we design the Network Model Module. We assume a multi-hop WSN with a number of sensor nodes.

- ✓ Each node generates and forwards data packets to a single sink. In multi-sink scenarios, there exist multiple routing topologies.
- ✓ The path reconstruction can be accomplished separately based on the packets collected at each sink. In each packet , there are several data fields related to iPath.
- ✓ The first two hops of the routing path, origin and parent. Including the parent information in each packet is common best practice in many real applications for different purposes like network topology generation or passive neighbor discovery.
- ✓ The path length. It is included in the packet header in many protocols like CTP. With the path length, iPath is able to filter out many irrelevant packets during the iterative boosting.

Iterative Boosting: iPath reconstructs unknown long paths from known short paths iteratively. By comparing the *recorded hash value* and the *calculated hash value*, the sink can verify whether a long path and a short path share the same path after the short path's original node.

- ✓ When the sink finds a match, the long path can be reconstructed by combining its original node and the short path.
- ✓ There are two procedures, the *Iterative-Boosting* procedure and the *Recover* procedure. The *Iterative-Boosting* procedure includes the main logic of the algorithm that tries to reconstruct as many as possible packets iteratively.
- ✓ The input is an initial set of packets whose paths have been reconstructed and a set of other packets. During each iteration, is a set of newly reconstructed packet paths. The algorithm tries to use each packet in to reconstruct each packet's path. The procedure ends when no new paths can be reconstructed.
- ✓ The *Recover* procedure tries to reconstruct a long path with the help of a short path. Based on the high path similarity observation, the following cases describe how to reconstruct a long path.

PSP- Hashing: The PSPHashing (i.e., path similarity preserving) plays a key role to make the sink be able to verify whether a short path is similar with another long path.

- ✓ The hash function should be lightweight and efficient enough since it needs to be run on resource-constrained sensor nodes.
- ✓ The hash function should be order-sensitive. That is, hash(A, B) and hash(B, A) should not be the same.
- ✓ The collision probability should be sufficiently low to increase the reconstruction accuracy.
- ✓ Traditional hash functions like SHA-1 are order-sensitive. However, they are not desirable due to their high computational and memory overhead. We propose PSP-Hashing, a lightweight path similarity preserving hash function to hash the routing path of each packet.

Performance Analysis: The fast bootstrapping algorithm reconstructs the routing path of a packet hop by hop. When the sink reconstructs the path of a packet to a forwarder, it can reconstruct the next-hop only when the packet is in one of stable periods.

The probability of a successful reconstruction by multiplying the probabilities there exists at least one shorter helper path at several hops.

III. CONCLUSIONS

a novel path inference approach to reconstructing the routing path for each received packet. iPath exploits the path similarity and uses the iterative

boosting algorithm to reconstruct the routing path effectively. Furthermore, the fast bootstrapping algorithm provides an initial set of paths for the iterative algorithm. Formally analyze the reconstruction performance of iPath as well as two related approaches. The analysis results show that iPath achieves higher reconstruction ratio when the network setting varies. iPath implement and evaluate its performance by a trace-driven study and extensive simulations. Compared to states of the art, iPath achieves much higher reconstruction ratio under different network settings.

IV. ACKNOWLEDGEMENT

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Data Mining Techniques Used To Predict Chronic Kidney Disease

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ABSTRACT

Chronic kidney disease is a global health issue and area of concern, associated with an increased risk of cardio vascular diseases and chronic renal failure[1]. It is a symptom where kidney fails to filter toxic wastes from the body, which results in decomposition of wastes in human body and leads to dangerous results. The two main causes of this disease are diabetes and high blood pressure, which are responsible for up to two-third of cause[5]. The healthcare sector has huge medical data but the main difficulty is how to cultivate the existing information into useful practices[3]. To unfold this hurdle the concept of data mining is best suited. The main objective of this paper is to use data mining technique such as random forest, RBF, K-means clustering and Naïve Bayes for the prediction of chronic kidney disease and to summarize the efficiency of Naïve Bayes method by generating suitable results.

Keywords: Data mining, Classification, Chronic Kidney disease, Random forest, RBF, K-means clustering.

I. INTRODUCTION

Data mining is a practice of examining large pre-existing databases in order to generate new information[10]. Data mining is gaining popularity in disparate research fields due to its application and approaches to mine the data in an appropriate manner which improves prediction and reduces cost[9]. Hence we are using this technique to predict chronic kidney disease.

Chronic kidney disease which is also called as renal failure is slow continuous loss of kidneys functionality over a time of several years[1]. CKD has become a major public health problem[2]. The disease comprises circumstances that harm kidney and reduce its ability to keep us healthy[5].

The National Kidney foundation determines the different stages of chronic kidney disease based on the presence of kidney damage and glomerular filtration rate (GFR), which measures a level of kidney function prediction beginning with the identification of symptoms in patients and then identifying patients who are suffering from CKD among huge patient's record[5]. Thus, the prime objective of this paper is to organize the data from CKD dataset using classification techniques to predict class accurately in each case.

II. METHODOLOGY

Data Mining is one of the most significant stages of the Knowledge Data Discovery process[15]. The process involves data collection from various sources with preprocessing of the chosen data. The data is then transformed into suitable format for further processing. Various data Mining technique are applied on the data to extract valuable information and evaluation is done at the end[15]. Some of the techniques are discussed below:

1.Random forest Algorithm

The random forests algorithm for prediction or classification task can be explained as follows:

i. Using original samples data draw n tree bootstrap.
ii. For each of the bootstrap sample, produce an unpruned classification tree, by following modification:
    At each node, instead of choosing the best split among all predictors, arbitrarily sample m try of the predictors and select the best split among those variables.
iii. Predict new data by aggregating the predictions of the ntree trees using majority votes for classification.

An estimation of the error rate can be found, based on the training data, by the following steps:

i. At every bootstrap iteration, predict the data not in the bootstrap sample (what Breiman calls "out-of bag", or OOB, data) by considering the tree developed with the bootstrap sample.
ii. Cumulate the OOB predictions. (On the average, every data point would be out-of-bag around 36% of the times, so cumulate these predictions.) Calculate the error rate, and call it the OOB estimate of error rate

2. K-Means Algorithm

In K-Means choose k cluster centers in the input space. Mark each training point as "captured" by the cluster to which it is closest. Move each cluster center to the mean of the points it captured. Repeat until convergence[18].

The k-Means clustering algorithm picks up the number of k centres randomly assigning the data points {x^p} to k subsets. It then uses a simple re-estimation procedure to end up with a partition of the data points into k disjoint sub-sets or clusters S_j containing N_j data points that minimizes the sum squared clustering function[18].

$$J=\sum_{J=1}^{k} \sum_{p€sj} ||x^p-\mu j||^2$$

Where, μj is the mean/centroid of the data points in set S_j given by

$$\mu j=1/Nj \sum_{p€s} x^p$$

It does that by iteratively finding the nearest mean μ_j to each data point x^P reassigning the data points to the associated clusters S_j, and then recomputing the cluster means μ_j.

The clustering process terminates when no more data point switch from one cluster to another. Multiple runs can be carried out to find the local minimum with lowest *J*.

3. RBF Algorithm

The Radial basis function network is an artificial neural network that uses radial basis function as activation functions[6]. Radial basis function network have many uses including system control classification.In the following we will assume that the choice of the radial basis function e(z) has already been made[13]. In order to have already been made in order to find the minimum of the cost function a learning algorithms must accomplish the following steps:

i. Select a search space (i.e. a subset of the parameter space);
ii. Select a starting point in the space (initialization);
iii. Search for the minimum(refining).

An RBFN is completely specified by choosing the following parameters:

i. The number n of radial basis functions;
ii. The centres ci and the distances k : ki, i.e. the matrixes Qi (i=1…n);
iii. The weights wi.

The number n of radial functions is a critical choice and depending on the approach can be made prior or determined incrementally. In fact, both the dimensions of the parameter space and consequently, the size of the family of approximations depend on the value of n.

4. Naive Bayes Algorithm

While looking for a way to classify short texts into several categories a simple but probably efficient method seems to be "Naive Bayes". An advantage of naive bayes is that it only requires a small number of training data to estimate the parameters necessary for classification[5]. This classifier is based on the Bayes rule of conditional probability. It makes use of the data, and analyses them individually as they are independent of all the attributes contained. This section introduces some of the basic facts about learning process:

A. Data Set

Total 400 instances of the dataset is used for the training to prediction algorithms, out of which 250 has label chronic kidney disease (CKD) and 150 has label non chronic kidney disease (NCKD). The clinical data of 400 records considered for analysis has been taken from UCI Machine Learning Repository. It has 25 attributes, 11 numeric and 14 nominal.

The below are the steps involved in this algorithm

Step 1: Scan the dataset

Step 2: Calculate the probability

Step 3: Apply the formulae

$$P=(n\_c + mp)/(n+m)$$

Where:

- n = the number of training examples v = vj
- n_c = number of examples for which v = vj and a = ai
- p = a prior estimate for P.
- m = the equivalent sample size

Step 4: Multiply the probabilities by p.

Step 5: Compare the values and classify the attribute values to one of the predefined set of class.

The above steps describes the working of the naïve bayes used to predict chronic kidney disease.

Although it's relatively simple idea, Navie Bayes can often outperform other more sophisticated algorithms and is extremely useful in common applications like spam detection and document classification.

III. RESULTS AND ANALYSIS

The experimental comparison of Naive Bayes and RF are done based on the performance vectors. It is statistical performance evaluation of classification tasks and contains list of performance criteria values.

Kappa statistic measures interrater eliability .Interrater reliability or precision happens when your data raters give the same score to the same data item.

The Kappa statistic differ from 0 to 1,where

- 0=agreement equivalent to chance.
- 0.1-0.20=slight agreement.
- 0.21-0.40=fair agreement.
- 0.41-0.60=moderate agreement.
- 0.61-0.80=substantial agreement.
- 0.81-0.99=near perfect agreement.
- 1=perfect agreement.

A. Performance Analysis (Naive Bayes vs RF)

Performance Vector:
Accuracy: 100.00%
Classification_error: 0.00%
Kappa: 1.000
Confusion Matrix:
Weighted_mean_recall: 100.00%, weights: 1, 1
Spearman_rho: 1.000
Kendall_tau: 1.000
Absolute_error: 0.000 +/- 0.000
Relative_error: 0.00% +/- 0.00%
Relative_error_lenient: 0.00% +/- 0.00%
Relative_error_strict: 0.00% +/- 0.00%
Normalized_absolute_error: 0.000
Root_mean_squared_error: 0.000 +/- 0.000
Root_relative_squared_error: 0.000
Squared_error: 0.000 +/- 0.000

Figure 1. Performance Vector for Naive Bayes

Figure 1. shows performance vector containing list of performance criteria values. Accuracy refers to number of correct predictions or how precise the dataset is being classified. Kappa takes into account the correct predictions occurring by chance. It gives a quantitative measure of the magnitude of agreement between observers. It lies in the range -1 to 1, where 1 is perfect agreement, 0 is chance agreement, and negative values indicate agreement less than chance i.e
disagreement between observers. The accuracy of Naive Bayes obtained is 100% and kappa value is 1 which indicates perfect agreement.

Performance Vector:
Accuracy: 87.3%
Kappa: 0.746
Spearman_rho: 0.542
Kendall_tau: 0.542
Absolute_error: 0.246 +/- 0.388
Relative_error: 24.63% +/- 38.75%
Relative_error_lenient: 24.63% +/- 38.75%
Relative_error_strict: 646.39% +/- 1,799.03%
Normalized_absolute_error: 0.493
Root_mean_squared_error: 0.459 +/- 0.000
Root_relative_squared_error: 0.918
Squared_error: 0.211 +/- 0.363

Figure 2. Performance Vector for RF

Figure 2 shows performance of RF with accuracy obtained as 87.3% and kappa value as 0.746 showing substantial agreement range.

IV.CONCLUSION

The experimental results of our proposed method have demonstrated that Naive Bayes has produced superior prediction performance in terms of classification accuracy for our considered dataset. As enhancement to the work done, further analyses can be carried to predict the current state of CKD using algorithms such as C4.5.

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Assure Deduplication of Encrypted Data in Cloud Using Attribute Based Storage System

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ABSTRACT

In cloud computing where a data providers deploy his/her encrypted data to the cloud service providers using an attribute based encryption(ABE), and shares data with the users or client with a specific attribute or credentials. But the ABE does not support the secure deduplication, which leads to critical for eliminating the same data in order to save the storage space and network bandwidth. In this paper we proposed an attribute based storage system with a assured deduplicaton in a hybrid cloud, in this the public cloud manages the storage system, where the private cloud is responsible for duplicate detection. Compare with existing system this system has two advantages. Firstly, rather then sharing the decryption keys, it uses specific access policies to confidentially share data with users. Secondly it access data confidentiality by using standard notation of semantic security, whereas existing system only achieved by using weak security notations, In addition, we put forth a methodology to change a ciphertext over one access policy into ciphertexts of the same plaintext but under other access policies without disclose the underlying plaintext

Keywords: ABE, Storage, Encryptions, ciphertext, plaintext.

I. INTRODUCTION

Cloud computing extremely facilitates data providers who want to deploy their data to the cloud without disclosing their sensitive data to external parties and would like users with certain credentials to be able to access the data. This requires data to be stored in encrypted forms with access control policies such that no one except users with attributes [1],[2],[3] (or credentials) of specific forms can decrypt the encrypted data. An encryption technique that meets this requirement is called attribute-based encryption (ABE)[4]. where a user's private key is associated with an attribute set, a message is encrypted under an access policy (or access structure) over a set of attributes, and a user can decrypt a ciphertext with his/her private key if his/her set of attributes satisfies the access policy associated with this ciphertext. However, the standard ABE system fails to achieve secure deduplication [5], which is a technique to save storage space and network bandwidth by eliminating redundant copies of the encrypted data stored in the cloud. On the other hand, to the best of our knowledge, existing constructions [6] for secure deduplication are not built on attribute-based encryption. Nevertheless, since ABE and secure deduplication have been widely applied in cloud computing, it would be desirable to design a cloud storage system possessing both properties.

We consider the following framework in the design of an attribute storage system supporting deduplication of data in cloud ,in this the cloud doesn't store a file or data more then once even

though it receives the multiple copies of same data which is encrypted using different access policies. A data provider, Ali, intends to upload a file X to the cloud, and share X with users having certain credentials. In order to do so, Ali encrypts X under an access policy P over a set of attributes, and uploads the corresponding ciphertext to the cloud, such that only users whose sets of attributes satisfying the access policy can decrypt the ciphertext. Later, another data provider, Arun, uploads a ciphertext for the same underlying file X but credit to a different access policy P0. Since the file is uploaded in an encrypted form, the cloud is not able to discern that the plaintext corresponding to Arun's ciphertext is the same as that corresponding to Ali's, and will store X twice. Obviously, such duplicated storage wastes storage space and communication bandwidth. To solve this problem we present an attribute storage system which enroll ciphertext-policy attribute-based encryption(CP-ABE) and comforts assure deduplication.

II. RELATED WORKS

Cloud forensics: State-of-the-art and future directions: According to K. R. Choo, M. HermanCloud log forensics (CLF) mitigates the investigation process by identifying the malicious behavior of attackers through profound cloud log analysis. However, the accessibility attributes of cloud logs obstruct accomplishment of the goal to investigate cloud logs for various susceptibilities. Accessibility involves the issues of cloud log access, selection of proper cloud log file, cloud log data integrity, and trustworthiness of cloud logs. Therefore, forensic investigators of cloud log files are dependent on cloud service providers (CSPs) to get access of different cloud logs. Accessing cloud logs from outside the cloud without depending on the CSP is a challenging research area, whereas the increase in cloud attacks has increased the need for CLF to investigate the malicious activities of attackers. This paper reviews the state of the art of CLF and highlights different challenges and issues involved in investigating cloud log data. The logging mode, the importance of CLF, and cloud log-as-a-service are introduced. Moreover, case studies related to CLF are explained to highlight the practical implementation of cloud log investigation for analyzing malicious behaviors. The CLF security requirements, vulnerability points, and challenges are identified to tolerate different cloud logsusceptibilities. We identify and introduce challenges and futuredirections tohighlight open research areas of CLF for motivating investigators, academicians, and researchers to investigate them.

Google drive: Forensic analysis of data remnants: According to Quick and K. R. ChooCloud storage is an emerging challenge to digital forensic examiners. The services are increasingly used by consumers, business, and government, and can potentially store large amounts of data. The retrieval of digital evidence from cloud storage services (particularly from offshore providers) can be a challenge in a digital forensic investigation, due to virtualization, lack of knowledge on location of digital evidence, privacy issues, and legal or jurisdictional boundaries. Google Drive is a popular service, providing users a cost-effective, and in some cases free, ability to access, store, collaborate, and disseminate data. Using Google Drive as a case study, artifacts were identified that are likely to remain after the use of cloud storage, in the context of the experiments, on a computer hard drive and Apple iPhone3G, and the potential access point(s) for digital forensics examiners to secure evidence.

Fuzzy identity-based encryption: According to A. Sahai and B. Waters

We introduce a new type of Identity-Based Encryption (IBE) scheme that we call Fuzzy Identity-Based Encryption. In Fuzzy IBE we view an identity as set of descriptive attributes. A Fuzzy IBE scheme allows for a private key for an identity, ω, to decrypt a ciphertext encrypted with an identity, ω', if and only if the identities ω and ω' are close to

each other as measured by the "set overlap" distance metric. A Fuzzy IBE scheme can be applied to enable encryption using biometric inputs as identities; the error-tolerance property of a Fuzzy IBE scheme is precisely what allows for the use of biometric identities, which inherently will have some noise each time they are sampled. Additionally, we show that Fuzzy-IBE can be used for a type of application that we term "attribute-based encryption".In this paper we present two constructions of Fuzzy IBE schemes. Our constructions can be viewed as an Identity-Based Encryption of a message under several attributes that compose a (fuzzy) identity. Our IBE schemes are both error-tolerant and secure against collusion attacks. Additionally, our basic construction does not use random oracles. We prove the security of our schemes under the Selective-ID security model.

Avoiding the disk bottleneck in the data domain

segments and may be forced to access an on-disk index for every input segment. This paper describes three techniques employed in the production Data Domain deduplication file system to relieve the disk bottleneck. These techniques include: (1) the Summary Vector, a compact in-memory data structure for identifying new segments; (2) Stream-Informed Segment Layout, a data layout method to improve on-disk locality for sequentially accessed segments; and (3) Locality Preserved Caching, which maintains the locality of the fingerprints of duplicate segments to achieve high cache hit ratios. Together, they can remove 99% of the disk accesses for deduplication of real world workloads. These techniques enable a modern two-socket dual-core system to run at 90% CPU utilization with only one shelf of 15 disks and achieve 100 MB/sec forsingle-streamthroughput and 210 MB/sec for multi-stream throughput.

Message-locked encryption and secure deduplication:

According to M. Bellare, S. KeelveedhiWe formalize a new cryptographic primitive that we call Message-Locked Encryption (MLE), where the key under which encryption and decryption are performed is itself derived from the message. MLE provides a way to achieve secure deduplication (space-efficient secure outsourced storage), a goal currently targeted by numerous cloud storage providers. We provide definitions both for privacy and for a form of integrity that we call tag consistency. Based on this foundation, we make both practical and theoretical contributions. On the practical side, we provide ROM security analyses of a natural family of MLE schemes that includes deployed schemes. On the theoretical side the challenge is standard model solutions, and we make connections with deterministic encryption, hash functions secure on correlated inputs and the sample-then-extract paradigm to deliver schemes under different assumptions and for different classes of message sources. Our work shows that MLE is a primitive of both practical and theoretical interest.

III. PROPOSED SYSTEM

In this paper, we present an attribute-based storage system which employs ciphertext-policy attribute-based encryption (CP-ABE) and supports secure deduplication. Our main contributions can be summarized as follows.

- ✓ Firstly, by using hybrid cloud architecture, the system is first to achieve the standard notation of semantic security for data privacy in attribute based deduplication.
- ✓ Secondly, we modified a cipher text over one access policy into ciphertexts of same plain text but by using some other access policies without disclosing the underlying plaintext by using forth a methodology.
- ✓ This technology might be having independent interest in addition to the approach in the proposed storage system.
- ✓ Thirdly, to achieve data consistency in the system, we proceeded towards two cryptographic primitives, such as zero knowledge proof of knowledge and a commitment scheme.

A. ADVANTAGES OF PROPOSED SYSTEM:

- ✓ We bring in our system a hybrid cloud architecture, which consists of a private cloud responsible for tag checking and ciphertext regeneration and a public cloud storing the ciphertexts.
- ✓ Our approach of producing such a proof makes use of the randomness reuse technique in the generation of the tag and the ciphertext with an additional zero-knowledge proof of knowledge (PoK) on the shared random coin in the tag and the ciphertext. Therefore, it is impossible for an adversary to perform duplicate faking attacks unless the adversary casually obtains the content of the plaintext hidden in the ciphertext.

B. MODULS OF DECRIPTIONS

Data Provider: In this module, the data provider uploads their report in the cloud server. For the security purpose the data provider encrypts the data file and then store in the cloud. The data provider can change the access policy over data files by attribute based access. The Data provider can have capable of update the encrypted data file. The data provider can set the access privilege to the encrypted data file.

User: In this module, the user can only access the report by access policy and then file access request send to the attribute authority. The encrypted key if the user has the privilege to access the file. For the user level, all the privileges are given by the Attribute authority and the users are controlled by the Attribute Authority only.

Attribute Authority (AA): In this module, the attribute authority view details of data provider and user and then activates his/her account and generate attribute access key. The AA issues every user a decryption key associated with his/her set of attributes. Each user can download an item, and decrypt the ciphertext with the attribute-based private key generated by the AA if this user's attribute set satisfies the access structure.

IND-CPA Security: Attribute-based storage system with secure de-duplication Π. The definition of selective
IND-CPA security with respect to the public cloud in Π, where we restrain algorithm A to issuing queries to the key generation oracle on attribute sets satisfying the access structures A0 and A1.

An attribute-based storage system with secure deduplication Π is IND-CPA secure if the advantage function referring to the security game Game

$$\mathbf{Adv}^{\mathrm{IND}}_{\Pi,\mathcal{A}}(\lambda) \stackrel{\mathrm{def}}{=} \Pr[b' = b]$$

is negligible in the security parameter λ for any probabilistic polynomial-time (PPT) adversary algorithm A.

PRV-CDA Security: Based on the definition of PRV-CDA given the definition of PRV-CDA for Π, Where the adversary is given an additional trapdoor key for the challenge ciphertext but is not given access to any attribute-based private keys (as the private cloud is not allowed to collude with users).
An attribute-based storage system with secure deduplication Π is PRV-CDA secure if the advantage function referring to the security game Game

$$\mathbf{Adv}^{\mathrm{PRV\text{-}CDA}}_{\Pi,\mathcal{A}}(\lambda) \stackrel{\mathrm{def}}{=} \Pr[b' = b]$$

is negligible in the security parameter λ for any PPT adversary algorithm

C. ARCHITECTURE

The architecture of our attribute-based storage system with secure deduplication is shown in Figure in which four entities are involved: data providers, attribute authority (AA), cloud and users. A data provider wants to outsource his/her data to the cloud and share it with users possessing certain credentials. The AA issues every user a decryption key associated with his/her set of attributes. The cloud consists of a

public cloud which is in charge of data storage and a private cloud which performs certain computation such as tag checking.

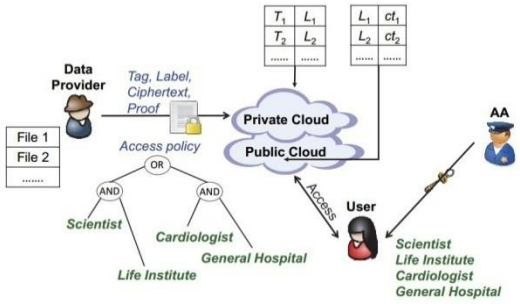

Figure 1

D. FRAMEWORK

- Setup(1) ! (pars ,msk). Taking input as security parameters, the setup algorithm outputs the public parameter pars and master private key msk for the system. This algorithem is run by AA.
- KeyGen(pars,msk,A) ! skA. For an attribute set A, the master private key msk and an credential set A as input, this attribute based private key generation algorithm generates an attribute based private key skA, taking the public parameter pars. The algorithm is run by AA.
- Encrypt(pars, M, A) ! (skT , CT). Taking the publicparameter pars, we take input as a message M and an accessstructure A over the universe of attributes , this encryption algorithm outputs a trapdoorkey skTand a tuple CT = (T, L, ct, pf), where Land Tare the lable and the tag associated with Mrespectively, ct is the ciphertext which includes theencryption of M as well as the access structure A,and pf is a proof on the relationship of tag T, label Land ciphertext ct.This algorithm is operated by the data provider. Both skTand CT are forwarded to the private cloud. Note thatskTcannot be shown to any third party, so it mustbe sent to the private cloud in a secure manner.
- Validity-Test(pars, CT) ! 1=0. Taking the publicparameter pars and a tuple CT as the input, this validity testing algorithm parses CT as (T, L, ct, pf),and outputs 1 if pfis a valid proof for (T, L, ct) or 0otherwise. This algorithm is run by the private cloud.
- Equality-Test(pars, (T1, L1, ct1), (T2,L2,ct2))!1=0. Taking the public parameter pars and two tuples(T1, L1, ct1) and (T2, L2, ct2) as the input,this equality testing algorithm outputs 1 if both (T1,L1, ct1), (T2, L2, ct2) are generated from the sameunderlying message or 0 otherwise.This algorithm is run by the private cloud.
- Re-encrypt(pars, skT , (L, ct), A0) ! (L, ct0). Takingthe public parameter pars, the trapdoor key skT , atag and ciphertext pair (L, ct) and an access structureA0 as the input, this re encryption algorithm outputs a new ciphertext ct0 associated with A0 sharing the same label L of the ciphertext ct0.This algorithm is run by the private cloud.
- Decrypt(pars, (L; ct), **A**, sk**A**) ! M=?. Taking thepublic parameter pars, a label and ciphertext pair(L; ct) and an attribute-based private key sk**A**associatedto an attribute set **A** as the input, this decryption algorithm outputs either the message M when theprivate key sk**A**satisfies the access structure of theciphertext ct and the label L is consistent with M (tobe defined later), or a symbol ?indicating the failureof the decryption. This algorithm is run by the user.

IV. CONCLUSION

Data providers sends their encrypted data to cloud by users possessing specified attributes attribute based encryption used in cloud computing. The deduplication is an important technique to save storage and network bandwidth, which eliminates identical data, but it does not support secure deduplication. In this paper, we present novel approach of attribute based storage system. Our storage system is built under hybrid cloud architecture; where public cloud manages storage and private cloud manipulate the computation. The private cloud provides the trapdoor key associated with corresponding ciphertext, after receiving request, the private cloud checks the validity of attached proof. If proof matches, the private cloud runs tag matching algorithm. The proposed storage system mainly has two advantages. Firstly, it can be used to privacy share data with other users by

particular access policy rather than sharing decryption keys. Secondly, it achieves the standard notation of semantic security while existing deduplication schemes only achieves it by using weaker security notations.

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Reality of Aerial Solution

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ABSTRACT

With no doubt robotics are providing the biggest technology leap from past years and will bring changes in every business practices and everyday life. Small unmanned aircraft systems (drone) are rapidly developed for various applications. A potential helping application is live streaming. The aim is to use drones and virtual reality to provide remarkable visual experience. This paper proposes a system to integrate virtual reality (VR) with a low cost unmanned semi-autonomous quad copter for live streaming with the help of Wi-Fi. It presents the software component that is the streamer used for streaming video. The proposed system enable the user to move the quad copter to remote areas with video streaming to required PC/Mobile with effective visualization using virtual reality (VR).Raspberry pi model is used in building the system which is most appropriate as a portable device. Open source Linux based operating system is used in this project to keep the cost low. The system is very practical and portable in the actual operating environment.

Keywords : Drone, Raspberry Pi, Streamer, Virtual Reality

I. INTRODUCTION

With the continuous development of the internet technology and network bandwidth, real time streaming media transmission technology has become a trending research topic in recent years. The popularity of Wi-Fi technology and the rapid increase of mobile handheld device performance promote mobility of the real time streaming. Streaming media technology is the product of internet technology developed. Transmission of streaming media requires appropriate protocol such as Real time streaming protocol (RTSP) .On the other hand Radio controlled (RC) flying devices have an explosive expansion in the past few years [1]. An Aerial Surveillance System is a flying machine that can be controlled remotely with capabilities to transmit real time data to PC/Mobile.

Raspberry Pi a series of small single-board computers along with a camera module is easily portable, lightweight and easy to mount. So, it makes sense that this can be used for streaming the video. A Linux based open source operating system is used. This paper explores the potential to develop a VR enabled drone that will be an assistive technology to support social engagement for people. The block diagram is shown in figure 1.0.

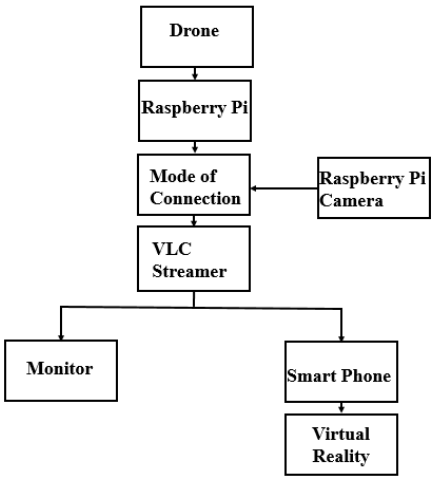


Figure 1. Block diagram

II. SYSTEM MODULES

The system is divided into two subsystems each divided into several functional modules. Subsystems include sender and receiver [1]. The structure of the system module is as shown in the figure 2.0 Firstly the sender, drone mounted with raspberry pi and its camera module acts as the video data collection module. Encoding technique used here is H264 encoding technique. Real time transmission occurs with the help of streaming protocol RTSP. The playback client of the system is PC/Mobile that uses streaming media player VLC.

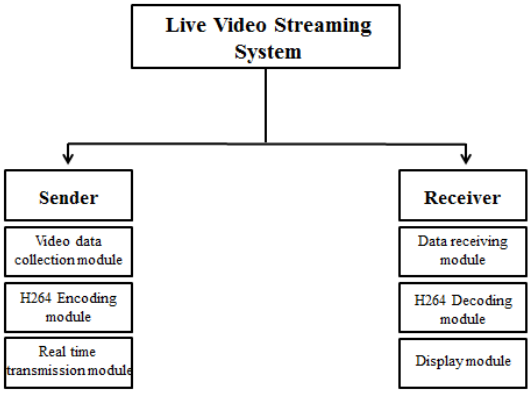


Figure 2. Structure of the system module

A. Drone

As drones continue to grow in popularity, the amount of innovative drone projects being created continue to soar. Drones are being used for film and photographic purposes.

A. Construction of the drone

The drone is build using a kit model that is controlled remotely with an RC controller. There are essentially two configurations for a Quad-copter "+ "frame and the "X" frame. Here we have chosen an "X" frame so that onboard camera can have a clear forward view. And is shown in figure 2.1.0.

- The electronic speed controller is used to deliver the power to the motor with the information's of KK2.0.
- Battery is required to supply power to the motors.
- Power distribution board is used to connect ESC's to the battery.
- Because the motors create lot of vibrations mounting pad is used to reduce them.
- Four motors are required for construction a Quad-copter.
- A Quad-copter with some motors but without propellers isn't a Quad-copter .Hence propellers have to be chosen according to the frame. Propellers has to be clockwise and Anti-clockwise on equal numbers and alternatively.
- KK2.0 multi-rotor control board is used for flight control [8].

Figure 3. Drone

B. KK2.0 microcontroller Setup steps

- Factory reset – to set default values.
- Acc calibration – calibration of Gyro.
- Mode setting- converting self-level to AUX (switch).
- Load motor layout – to see motor direction.
- Receiver test- check direction of each channel.
- PI editor- set the values for gains and limits.
- Self-level settings- set the gain values.
- Esc throttle calibration-make sure all motors start at same time.

B. Raspberry Pi

The proposed system uses raspberry pi 3 model B. It is cost effective, credit card sized computer that connects to a computer monitor or a TV and uses a

standard mouse and keyboard. Raspberry pi 3 is the third generation Raspberry pi which replaced raspberry pi to model B [9].

Features offered by it includes:

- Broadcom BCM2837 64bit ARMv8 quad core processor
- 1.2 GHz speed
- BCN4314 WIFI with IEEE 802.11 b/c \n support.
- Bluetooth
- RAM 1 GB
- 40 pin extended GPIO.

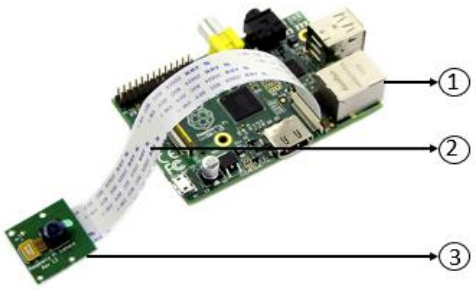
Raspberry Pi is initially plugged onto the monitor for the first boot and then its IP address is configured, which is later used for establishing connection. Raspberry Pi runs on Raspbian OS.

A. Interfacing *the camera module with Raspberry-Pi*

Raspberry pi Noir camera v2 module is used for video broadcasting. It is connected to the Raspberry Pi's camera port through a CSI bus which is the camera serial interface. And is shown in the figure 2.2.1.

Its features includes:

- Fixed focus lens for high quality imaging.
- 8mp native resolution.
- Sensor capable of 3280x2464 pixel static images.
- Supports 1080p 30, 720p 60 and 640X480p 90.
- Video the Pi camera is connected to the Raspberry Pi 3 board and power up. It is then enabled on Raspberry Pi GUI.



1. Raspberry Pi 3 Model B
2. CSI bus
3. Raspberry pi Noir camera v2

Figure 4. Noir camera module mounted on Raspberry Pi

C. Streamer

Live video streaming is to transmit or receive real time audio or video coverage over the internet. There are various streamers available like Gstreamer (connects sequence of processing elements through a pipeline). The proposed system uses VLC media player, it serves as a source or medium for live streaming from the Raspberry Pi. A code is written using bash script for broadcasting live video stream on the VLC media player on the host machine. Raspberry Pi's IP address is fed into VLC's network stream bar to initiate the stream.

RTSP (Real Time Streaming Protocol) is used. This protocol is mainly used for establishing and controlling media sessions between end points. RTSP is very similar in structure and syntax to HTTP. Both use same URL structure to describe an object.

D. Virtual Reality

Virtual reality is an artificial environment that is created with software. On computer/mobile virtual reality is primarily experienced through two of the five senses site and sound. Scientific and engineering data visualization has benefited for years from virtual reality through recent innovation in display technology has generated interest in everything from molecular visualization to architecture to weather models [14].

This paper explore potential to develop a system including drone and VR that will be an assistive technology to support people. VR is most widely adopted technology in the field of entertainment and gaming communities where physical presence in real or imagined worlds can be simulated.

III. WORKING

The proposed system uses Raspberry Pi 3 board along with its camera v2 module. Raspberry Pi uses Raspbian operating system and is programmed using bash scripting language. The process begins by initially booting up the Raspberry Pi. A 16 GB micro SD card is given a proper format using SD formatter and setup with latest Raspbian OS. To do so, the Raspbian OS is downloaded from Raspberry Pi's official website in zip file format. The downloaded file are then extracted to the micro SD card, after which it is inserted to the SD card slot of Raspberry Pi. The Raspberry Pi is plugged into a monitor via HDMI adaptor cable. Once the Raspbian OS is installed, the initial boot completes. The Raspberry Pi is then connected to the internet and Pi's IP address is fetched. Now, VLC media player which is the streaming medium for the live video broadcasted over the network. The host device can be any PC or smart phone connected to the same network on which Raspberry Pi is connected. For the camera to start the live streaming and broadcast it over the network on a VLC media player, the equivalent code needs to be run on the Pi. The code for design execution is implemented in bash script and this script is added to the bootstrap file of Raspbian OS so that it starts automatically and need not be connected to monitor instead LCD display can be used for this purpose [4]. The code run on the terminal of Raspbian OS is as shown in the figure 3.0.

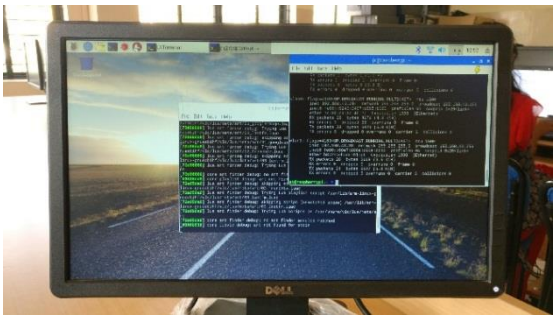


Figure 5. Code running on the terminal of Raspberry Pi

On the other hand in VLC media player user has to provide the details in the format rtsp://192.168.43.38:8554/ in the open network stream which initializes the video.

To get better visualization system employs virtual reality box. In case of smart phones, capturing image or recording video in VLC media player is not possible. Hence android app like Touchshot can be used for this purpose, and is adaptable to functions of virtual reality remote. Functional flow chart is represented in the figure 3.1.

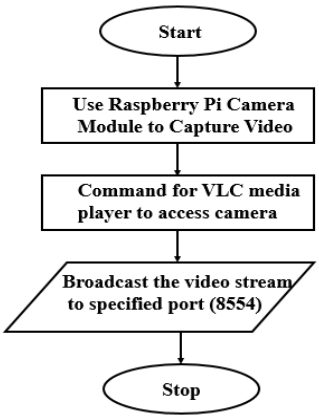


Figure 6. Functional flow chart

IV. RESULT

The raspberry pi board is interfaced with the camera module, powered up using a battery pack is set in the location for remote surveillance over Wi-Fi. The code required to initiate the camera is run on raspberry pi side. Once the code is run, Raspberry Pi's 'vid' command start the camera for video capture, following which the captured image is flipped

vertically with a width of 800 pixels with 20fps i.e. 20 consecutive images are captured per second. Then the output is sent to the VLC media player commanding it to start streaming the data coming in, into the port specified on Raspberry Pi's IP address. Encoding is done in H264, which is a format used for high definition video files.

VLC media player is opened on the host device and the raspberry pi's IP address along with rtsp protocol is fed into the network stream bar; then hitting play starts the live stream. The streaming is shown in the figure 7.

Figure 7. Video streaming in PC and Mobile

To increase the visual participation virtual reality is used and is controlled using hardware controller and in mobile using android app like Touchshot for capturing image and recording video [4].

V. APPLICATIONS AND FUTURE SCOPE

The proposed system includes various technologies brought together under a common platform. The system can be deployed in various departments (applications) like:

- Physically challenged
  Drones for live streaming of visuals for people with limited mobility to have realistic view.
- Disaster Management
  Fire accidents or natural calamities, to know the extent of disaster occurred in various locations where human intervention is difficult.
- Tourism and photography
  To explore the place and capture picture with realistic experience using VR and discovering more places.
- Military
  To patrol unsafe areas.
- Wildlife
  For animal population census.

This system can be future improved by,

- Include sensory abilities to drone like sensing the weather conditions so that virtual environment similar to the reality can be created using sensory smart IOT devices to desired location to enhance the experience.
- Adding gyroscopic features to both camera module and VR box along with rotations.
- Include professional camera feature and stabilization for camera module.
- Developing a specific streamer having features that can be compatible with microcontrollers, ability to capture image and video and which is adaptable to VR controller.
- Development of Boomerang drones.
- Drone adaptability towards obstacles.

VI. CONCLUSION

This paper illustrates the design and implementation of simple yet powerful aerial system that deploys modules from various technologies like Raspberry Pi along with its camera module which acts as the primary module for capturing and broadcasting the video, drone an unmanned vehicle as a medium on which Raspberry pi and camera module is mounted, bash scripting for programming which is efficient and virtual reality for increasing the visual experience. Bringing together various technological components under common platform led to the development of this system, improving this system can lead to a product that can have reverberation in the market.

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FACE TRANSITION: Obtaining Neighbour Node Anonymity in Mobile Opportunistic Social Networks

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ABSTRACT

In mobile opportunistic social networks (MOSNs), mobile devices carried by people communicate with each other directly when they meet for proximity-based MOSN services (e.g., file sharing) without the support of infrastructures. In current methods, when nodes meet, they simply communicate with their real IDs, which leads to privacy and security concerns. Anonymizing real IDs among neighbor nodes solves such concerns. However, this prevents nodes from collecting real ID-based encountering information, which is needed to support MOSN services. In Face Change, each node continually changes its pseudonyms and parameters when communicating with neighbors nodes to hide its real ID

Keywords: Mobile opportunistic social networks, anonymity, encountering information.

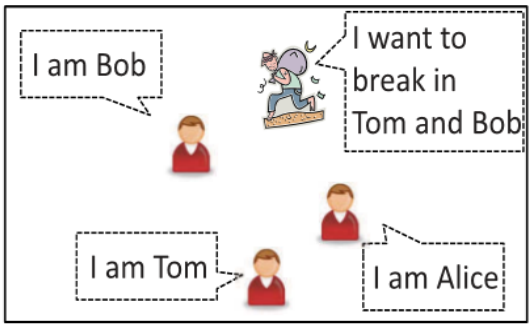
I. INTRODUCTION

Face Change that can support both anonymizing real IDs among neighbor nodes and collecting real ID-based encountering information. For node anonymity, two encountering nodes communicate anonymously. Only when the two nodes disconnect with each other, each node forwards an encrypted encountering evidence to the encountered node to enable encountering information collection. A set of novel schemes are designed to ensure the confidentiality and uniqueness of encountering evidences. FaceChange also supports fine-grained control over what information is shared with the encountered node based on attribute similarity (i.e., trust), which is calculated without disclosing attributes. Advanced extensions for sharing real IDs between mutually trusted nodes and more efficient encountering evidence collection are also proposed. Extensive analysis and experiments show the effectiveness of FaceChange on protecting node privacy and meanwhile supporting the encountering information collection in MOSNs. Implementation on smart phones also demonstrates its energy efficiency.

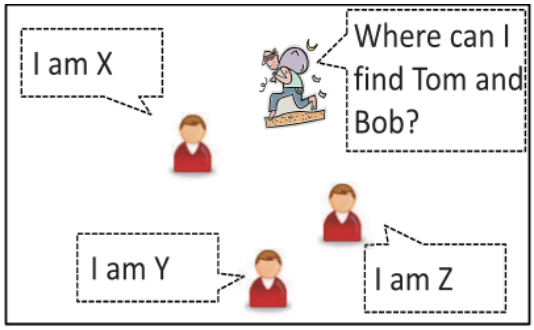
A. Aims and Objectives

- ✓ In Face Change, each node continually changes its pseudonyms and parameters when communicating with neighbours nodes to hide its real ID.
- ✓ Face Change prevents two encountering nodes from disclosing the real IDs during the encountering, so malicious nodes cannot identify targets from neighbours for attack.
- ✓ Packet routing can be conducted correctly and efficiently in Face Change.

II. ARCHITECTURE



(a)



(b)

Figure 1. Demonstration of a privacy issue and a possible solution in MOSNs.
(a) Possible privacy issue.
(b) Solution: neighbor Anonymity.

Figure 1(a), When neighbor nodes communicate with real IDs, a malicious node can easily identify attack targets from neighbors and launch attacks to degrade the system performance or steal important documents. Further, without protection, malicious nodes can also easily sense the encountering between nodes for attacks. Therefore, neighbor node anonymity is needed to prevent the disclosure of real IDs to neighbors. Clearly, a permanent pseudonym cannot achieve such a goal since it can be linked to a node, which can still enable malicious nodes to recognize targets from neighbor nodes. Thus, an intuitive method to realize the neighbor node anonymity is to let each node continuously change its pseudonym used in the communication with neighbors, as shown in Figure 1(b). However, when neighbor node anonymity is enforced, nodes cannot collect the real ID based encountering information (i.e., cannot know whom they have met), which disables a aforementioned MOSN services.

III. METHODOLOGY

Modules

- ❖ Preventing Nodes
- ❖ Encountering Evidence Relaying Scheme
- ❖ Trust authority (TA)
- ❖ Packet Routing Process

Modules description:

Preventing Nodes: FaceChange can prevent malicious nodes from acquiring meaningful private information by overhearing the encountering evidences and packets transmitted between two nodes. Firstly the encountering evidence is encrypted by a key originated from two randomly generated numbers from the two encountering nodes, which are not disclosed in the network. Then, the eavesdropper cannot understand the content in the transmitted encountering evidences. Secondly in MOSN routing, the receiver of a packet is not necessary the destination of the packet. As a result, the eavesdropper cannot determine the ID of a node based on packets it receives

Encountering Evidence Relaying Scheme: In this scheme, during the encountering, the recipient node specifies a relay node and encrypts its real ID with the public key of the relay node. It then forwards such information to the creator. Later, after the two nodes separate, the creator routes the encountering evidence to the relay node, which decrypts the ID of the recipient node and further routes the evidence to the recipient node, thereby delivering the encountering evidence. A trusted node refers to the node that is believed to keep its private key secure (i.e., does not share it with any other nodes). Otherwise, neighbor anonymity may be broken during the encountering. This is because, when two nodes meet, each node encrypts its real ID with the public key of the relay node and sends that to the encountered node. Then, if the relay node's private key is disclosed, the real ID is no longer safe.

Trust authority (TA) The trust authority (TA), for the corresponding service. Since those services are

built upon node encountering, nodes need to collect real ID based encountering information. For example, nodes need to know whom they have met to identify proximity based social community/relationships. In packet routing, nodes need to collect the encountering information to deduce their future meeting probabilities with others. Then, a packet can always be forwarded to the appropriate forwarder Trust Authority (TA) in the system responsible for some system management functions such as system parameters and certificates distribution and attribute validation(e.g., reputation, affiliation, and ID), both of which can be conducted off-line.

Packet Routing Process: In traditional MOSN packet routing, two encountering nodes first delivers packets destined for the other node. They then compare routing utilities and forward the other node packets that the other node has a higher routing utility for their destinations. In FaceChange, neighbor node anonymity blocks the first step by preventing nodes from recognizing the destinations of their packets even when meeting them. To solve this problem, we let each node claim to have higher routing utility for itself to fetch packets for it.

IV. CONCLUSIONS

Face Change, a system that supports both neighbor anonymity and real ID based encountering information collection in MOSNs. In Face Change, each node continually changes its pseudonyms and parameters when communicating with neighbors nodes to hide its real ID. Encountering evidences are then created to enable nodes to collect the real ID based encountering information. After two encountering nodes disconnect, the encountering evidence is relayed to the encountered node through a selected relay node. Practical techniques are adopted in these steps to ensure the security and efficiency of the encountering evidence collection. Trust based control over what information can be included in the encountering evidence is supported in Face Change .Advanced extensions have also been proposed to support the "white list" feature and enhance the encountering evidence relaying efficiency. Extensive analysis and experiments are conducted to prove the effectiveness and energy efficiency of Face Change in protecting node privacy and supporting he encountering information collection in MOSNs. In the future, we plan to investigate how to generalize the process of adapting applications in mobile opportunistic social networks to Face Change seamlessly.

V. ACKNOWLEDGEMENT

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Robust and Auditable Access Control with Multiple Attribute Authorities for Public Cloud Storage

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ABSTRACT

Data access control is a challenging issue in public cloud storage systems. Ciphertext-Policy Attribute-Based Encryption (CP-ABE) has been adopted as a promising technique to provide flexible, fine-grained and secure data access control for cloud storage with honest-but-curious cloud servers. However, in the existing CP-ABE schemes, the single attribute authority must execute the time-consuming user legitimacy verification and secret key distribution, and hence it results in a single-point performance bottleneck when a CP-ABE scheme is adopted in a large-scale cloud storage system. Users may be stuck in the waiting queue for a long period to obtain their secret keys, thereby resulting in low-efficiency of the system. In this paper, we propose a novel heterogeneous framework to remove the problem of single-point performance bottleneck and provide a more efficient access control scheme with an auditing mechanism. Our framework employs multiple attribute authorities to share the load of user legitimacy verification. Meanwhile, in our scheme, a *CA* (Central Authority) is introduced to generate secret keys for legitimacy verified users. To enhance security, we also propose an auditing mechanism to detect which *AA* (Attribute Authority) has incorrectly or maliciously performed the legitimacy verification procedure. Analysis shows that our system not only guarantees the security requirements but also makes great performance improvement on key generation.

Keywords: Cloud storage, access control, CP-ABE.

I. INTRODUCTION

Cloud storage is the important service provided by the cloud computing. There are various benefits of the cloud storage system some of them include, better accessibility, greater reliability, continuous deployment and stronger protection and many more to name. Though the cloud storage contains many benefits it faces some issues in the access control which is a critical issue. The traditional access control methods are not suitable in cloud storage hence it has become a challenging issue.

Few schemes have been proposed to solve the issue of the data access in the cloud storage like, Ciphertext- policy Attribute- based Encryption (CP-ABE) which is more promising. This technique grants the direct control for data owners for flexible, fine grained and secure access control in cloud storage. CP-ABE have been divided into two categories single authority scenario and multi authority scenario. The existing single authority is neither efficient nor robust in key generation. Since it is a single authority system it is time consuming for the verification these results in the performance bottleneck. Single point performance bottleneck affects the efficiency of secret key generation and degrades the utility of the existing schemes to to conduct access control in large cloud storage system.

The main process to avoid the single point bottleneck is to introduce multiple authorities to

jointly manage the whole attribute set. By including multiple authorities the single point bottleneck can be reduced to some extent. Since there are various authorities performing the same operation it is difficult to identify the particular attribute which commits any malicious mistake. This work is inspired by the heterogenous architecture with single certificate authority (CA) and multiple registration authorities (RAs). There are multiple authorities (AAs) which are in charge of the whole attribute set which conducts user legitimacy verification. There is only one single global authority to generate secret key for the user on the basis of received intermediate key.

II. RELATED WORK

Towards efficient content-aware search over encrypted outsourced data in cloud

AUTHORS: Z. Fu, X. Sun

With the increasing adoption of cloud computing, a growing number of users outsource their datasets into cloud. The datasets usually are encrypted before outsourcing to preserve the privacy. However, the common practice of encryption makes the effective utilization difficult; for example, search the given keywords in the encrypted datasets. Many schemes are proposed to make encrypted data searchable based on keywords. However, keyword-based search schemes ignore the semantic representation information of user's retrieval, and cannot completely meet with users search intention. Therefore, how to design a content-based search scheme and make semantic search more effective and context-aware is a difficult challenge. In this paper, we proposed an innovative semantic search scheme based on the concept hierarchy and the semantic relationship between concepts in the encrypted datasets. More specifically, our scheme first indexes the documents and builds trapdoor based on the concept hierarchy. To further improve the search efficiency, we utilize a tree-based index structure to organize all the document index vectors. Our experiment results based on the real world datasets show the scheme is more efficient than previous scheme. We also study the threat model of our approach and prove it does not introduce any security risk.

A dynamic secure group sharing framework in public cloud computing

AUTHORS: K. Xue and P. Hong

With the popularity of group data sharing in public cloud computing, the privacy and security of group sharing data have become two major issues. The cloud provider cannot be treated as a trusted third party because of its semi-trust nature, and thus the traditional security models cannot be straightforwardly generalized into cloud based group sharing frameworks. In this paper, we propose a novel secure group sharing framework for public cloud, which can effectively take advantage of the cloud servers' help but have no sensitive data being exposed to attackers and the cloud provider. The framework combines proxy signature, enhanced TGDH and proxy re-encryption together into a protocol. By applying the proxy signature technique, the group leader can effectively grant the privilege of group management to one or more chosen group members. The enhanced TGDH scheme enables the group to negotiate and update the group key pairs with the help of cloud servers, which does not require all of the group members been online all the time. By adopting proxy re-encryption, most computationally intensive operations can be delegated to cloud servers without disclosing any private information. Extensive security and performance analysis shows that our proposed scheme is highly efficient and satisfies the security requirements for public cloud based secure group sharing.

Attribute-based access to scalable media in cloud-assisted content sharing

AUTHORS: Y. Wu, Z. Wei

This paper presents a novel Multi-message Ciphertext Policy Attribute-Based Encryption (MCP-ABE) technique, and employs the MCP-ABE to design an access control scheme for sharing scalable media based on data consumers' attributes (e.g., age, nationality, or gender) rather than an explicit list of the consumers' names. The scheme is efficient and flexible because MCP-ABE allows a content provider to specify an access policy and encrypt multiple messages within one ciphertext such that only the users whose attributes satisfy the access policy can decrypt the ciphertext. Moreover, the paper shows how to support resource-limited mobile devices by offloading computational intensive operations to cloud servers while without compromising data privacy.

III. METHODOLOGY

3.1 **System model:** the model for this proposal mainly includes five entities Central Authority (CA), multiple attribute authorities (AAs), many data owners (Owners), many Data consumers (Users) and a cloud service provider with multiple cloud servers.

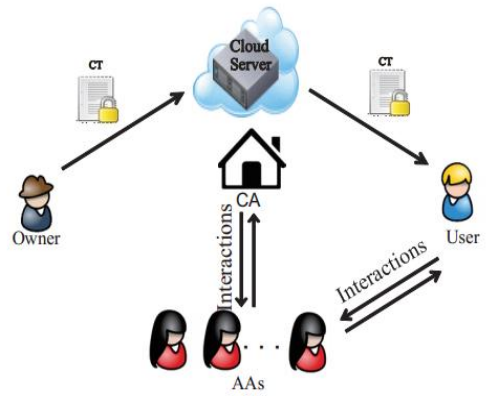

Figure 1

- The Central authority: It is the administrator of the entire system. It is responsible for setting up the system parameters and generating public key for each attribute of the universal attribute set. It is also responsible for generating secret keys for the user on the basis of the received intermediate key associated with the user's legitimate attribute verified by an AA.
- The attribute authorities (AAs): It performs the user legitimacy verification and generates intermediate key for verified users. This involves multiple authorities to share the responsibility of user legitimacy verification and each AA can perform this process independently for any user. Intermediate key is a new concept to assist CA to generate keys.
- The data owner (owner): Owner defines the access policy about who can access the each file and encrypts the file under defined policy. Each owner encrypts data with symmetric encryption algorithm. The owner formulates access policy over an attribute set and encrypts the symmetric key under the policy obtained from CA.
- The data consumer (User): A global user Id is assigned by CA. the user possesses a set of attributes and equipped with a secret key associated with attribute set. The user can get any encrypted data from the cloud server only if the user satisfies the access policy.
- The Cloud server: It is a public platform for owners to share their encrypted data. The cloud server does not allow controlling the data access. The encrypted data from the cloud server can be accessed by any user.

3.2 Security Requirements: the following security requirements need to be fulfilled for the guaranteed secure access control in public cloud storage.

- Data Privacy: the contents of the data must be kept private to unauthorized users as well as the cloud server.
- Resistance to Collusion: Unverified users colluding with each other would not be able to

combine their attributes to decrypt a ciphertext which each of them cannot decrypt alone.

- Accountability of AA: An auditing mechanism is devised to ensure that the misbehavior of the AA can be detected to prevent AAs' abusing their power without being detected.
- No ultra vires for any AA: An AA should not be assigned an unauthorized power to generate secret keys for users. These security requirements are proposed based on the hierarchical framework.

IV. IMPLEMENTATION

The proposed scheme consists of five phases, namely System Initialization, Encryption, Key Generation, Decryption, and auditing and tracing.

A hierarchical framework with single central authority (CA) and multiple attribute authorities (AAs) to achieve robust and efficient access control for public cloud storage and remove the single point bottle neck and enhance the system efficiency. In the proposed RAAC system key generation is divided into two subgroups 1) verifying legitimacy of users 2) the process of secret key generation and distribution. The user legitimacy verification is performed by multiple Attribute authorities and they are able to verify attributes independently. Intermediate key is generated by the attribute authority after the successful verification and sent to the Central authority. The process of secret key generation and distribution is performed by the central authority that generates secret key associated with user's attribute set without any further verification.

The details of the proposed RAAC scheme are as explained as follows.

1) System Initialization: The central authority generates public key for each attribute and master secret key which implicitly exists in the system and doesn't need to be obtained by any other entity. The other task of the CA in this operation is handling attribute authorities' and users' registrations. The central authority generates a pair of keys to sign and verify which attribute is publicly known by each entity in the system.

   Each attribute authority sends a registration request to CA during system initialization. For each legal attribute authority CA assigns a unique identity and randomly chooses private key. The Central authority generates certificate which include the public key and sends it with the corresponding private key to the attribute authority with its ID. Each user also receives its private key and the certificate Id from the central authority.
2) Encryption: The process of encryption is carried out by data owner. The owner chooses a random number as a symmetric key and encrypts the plain text with symmetric encryption algorithm. The owner encrypts the symmetric key using Ciphertext policy Attribute Based Encryption (CP-ABE) under the access policy defined by the user.
3) Key Generation: The process is different from existing CP-ABE schemes. It involves selected AA and CA. The key generation procedure is divided into 4 steps

   Step 1: U -→ AA A user with the authenticated Id requests the secret key to the selected AA and shows the certificate Id for the validation.

   Step 2: AA → CA The AA verifies the user legitimacy by CA. After the successful verification the AA receives the timestamp value from CA and generates intermediate key. The AA finally receives the attribute set which include the User IDs and sends the secure message to the CA.

   Step 3&4: CA →AA → U after receiving message from AA the CA checks whether the transmission delay is within the allowed time. The CA makes sure that the request from AA is

not used by the same user. This prevents AAs collusion attack. CA Continues to generate secret keys for users using Master secret key. With the relay of AA, CA securely sends secret keys to the user.

4) Decryption: This procedure is performed by the user. User can freely query and download any encrypted data from the public cloud storage. User cannot decrypt unless attribute set satisfies the access structure embedded in the ciphertext. If the access structure is satisfied it computes to obtain symmetric key which helps in decryption.
5) Auditing and Tracing: Auditing and tracing is periodically performed or event triggered by CA to ask the suspected users to submit certificate Id. In order to obtain the data the users have to cooperate to perform the process correctly. To implement the effective tracing CA must confirm the received key components belong to the given user.

The tracing process is executed in following two sub groups.

Secret key ownership confirming

CA randomly selects suspected attribute and asks to securely submit secret key components.

AA Tracing

Executed to trace and confirm which AA has generated the suspected user's secret key. CA uses Master secret key to recover public key associated with AA.

IV.CONCLUSIONS

In this paper, we proposed a new framework, named RAAC, to eliminate the single-point performance bottleneck of the existing CP-ABE schemes. By effectively reformulating CPABE cryptographic technique into our novel framework, our proposed scheme provides a fine-grained, robust and efficient access control with one-*CA*/multi-*AA*s for public cloud storage. Our scheme employs multiple *AA*s to share the load of the time-consuming legitimacy verification and standby for serving new arrivals of users' requests. We also proposed an auditing method to trace an attribute authority's potential misbehavior. We conducted detailed security and performance analysis to verify that our scheme is secure and efficient. The security analysis shows that our scheme could effectively resist to individual and colluded malicious users, as well as the honest-but-curious cloud servers. Besides, with the proposed auditing & tracing scheme, no *AA* could deny its misbehaved key distribution. Further performance analysis based on queuing theory showed the superiority of our scheme over the traditional CP-ABE based access control schemes for public cloud storage.

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Remote Voting System for Mobile Device Using Android Based voting

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ABSTRACT

The project deals with the development of a Remote Voting System with an effective secure and fear free voting model. The voting model provides a new voting system which fulfill the security requirements of voting process. A voter may need to register only once for a particular election and that does all, voter need to cast his/her vote without actually being present at the voting cell. The system gives facility to voter to vote from any location through their cell phone. Voting for any social issue is essential for modern democratic societies nowadays. The main goal of the application based is to eliminate overhead related with remote components handling.

Keywords: Android, Security, Voting, Web Server.

I. INTRODUCTION

Voting for any social issue is essential for modern democratic societies now a day. So it is becoming very important to make the voting process more easy and efficient. In other hand the rapid development in operating system of the mobile phones gives rise to the application development on the large scale. The main reason behind the tremendous development in android application is that the android is an open source operating system. It means that the software developers can have customization rights. The process of integration tasks, functions and responsibilities of the various elements into one is called centralization. It is the result of several factors in particular those associated with the availability, reliability, efficiency etc. Such convergence of applications is characteristic also for smart mobile devices. As well as the software development kit provides tools to build and run Android applications. This system gives facility to voter to vote from any location through their cell phone. The main goal of the application based is to eliminate overhead related with remote components handling. Also authentication and security is maintained for any external attacks on the system.

The system gives facility to voter to vote from any location through their cell phone. Voting for any social issue is essential for modern democratic societies nowadays. So it is becoming very important to make the voting process more easy and efficient. On other hand the rapid development in operating system of the mobile phones gives rise to the application development on the large scale. The main goal of the application based is to eliminate overhead related with remote components handling. Also authentication and security is maintained for any external attacks on the system. The administration of the voting system as a whole is highly inefficient, slow and time consuming, and is highly prone to human error.

1.1 Problem statement:

The problem is to design an Application for specific platform of a mobile device. The application as a whole is aimed at being compatible with devices from many manufacturers and running on different versions of the operating system. An integration approach can certainly prove to be a better and efficient solution.

1.2 Existing system:

The voting system currently being used by the student union is a paper based system, in which the voter simply picks up ballots sheets, tick off who they would like to vote for, and then cast their votes by merely handling over the ballot sheet back to official. The officials gather all the votes being caste into ballot box. At the end of the elections, the official converge and count the votes cast for each candidate and determine the winner of each election category.

In the present system there is no such application level system provisions to carry out the voting and procedure as a whole. Also in the present status, there is no such application in use for automated system for voting according to the voting structure. All the step by step procedures are carried out by the authorized authorities according to the jobs assigned by the ECI. The fact is all the procedures are carried out manually, starting from the registration process to result publishing.

The government to do this process manually wastes a lot of time and money. Thus the present system proves itself to be an inefficient one. The existing system is not web based. The user or person must want to go to the polling station for casting their votes.

Some of the disadvantages that which we identified in our survey are as follows.

1. Expensive and Time consuming: The process of collecting data and entering this data into the database takes too much time and is expensive to conduct.

2. Too much paper work: The process involves too much paper work and paper storage which is difficult as papers become bulky with the population size.

3. Errors during data entry: Errors are part of all human beings; it is very unlikely for humans to be 100 percent efficient in data entry.

4. Loss of registration forms: Some times, registration forms get lost after being filled in with voters‟ details, in most cases these are difficult to follow-up and therefore many remain unregistered even though they are voting age nationals and interested in exercising their right to vote.

5. Short time provided to view the voter register: This is a very big problem since not all people have free time during the given short period of time to check and update the voter register.

6. Above all, a number of voters end up being locked out from voting. Hence there is great desire to reduce official procedure in the current voter registration process if the general electoral process is to improve.

This current system in use today, has a number of problems, our proposed system would aim to correct. This current system is highly insecure and prone to election malpractice. Due to the fact that any student can come and fill out a ballot sheet without prior authentication to determine who he/she says they are, is a major concern. The administration of the voting system as a whole is highly inefficient, slow and time consuming, and is highly prone to human error .

1.3 Proposed system:

Based on the analysis of exiting systems and principles our system will represent the aspect of the respondent's quick and easy one-time-use interface. The architecture is shown in below figure. There

were two possible solutions arising from the specification and analysis.

- Solution based on an application for specific platform of a mobile device
- So called web based solution

Application for specific platform of a mobile device should be designed as a client-server application. The client part doesn't need to be implemented for web based solution. It will be provided by Internet browser. The common element in both alternative solutions is to use the same technology in communication between the mobile devices and the server. Server will coordinate the activity of the voting devices and collect the processing data.

An efficient and reliable system is essential for the trustworthy and successful implementation of any technology. Based on the analysis of exiting systems and principles our system will represent the aspect of the respondent's quick and easy one-time-use interface. The key features of our proposed Mobile Phone Voting System are:

1. Eligibility: only authorized voter can cast their vote.

2. Uniqueness: Each user can cast their vote only once.

3. Integrity: Valid vote should not be modified or deleted.

4. Fairness: The election result should not be accessible before the official time ended.

5. Cost-effectiveness: Election system should be efficient and affordable.

Proposed system consists of following phases:

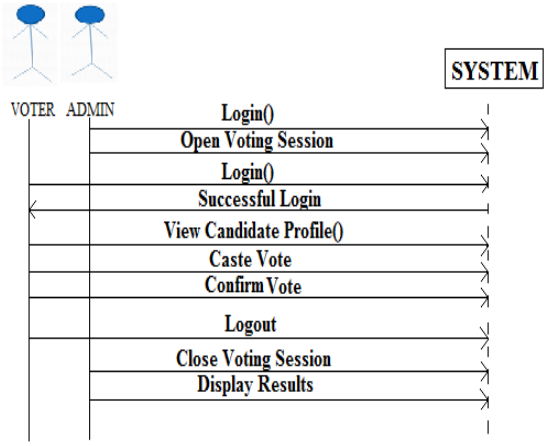

Figure 1. Sequence diagram

A. Downloading of Mobile Application:

B. Registration Phase:

The users have to SIGN IN into the application and fill its whole information like name, phone number, mail-id, age including a unique username and password. After pressing submit button, the whole information will be encrypted and sent over server to the concerned authority's database. A one-time password (OTP) will be sent to the given mail id after entering the otp the user will be registered.

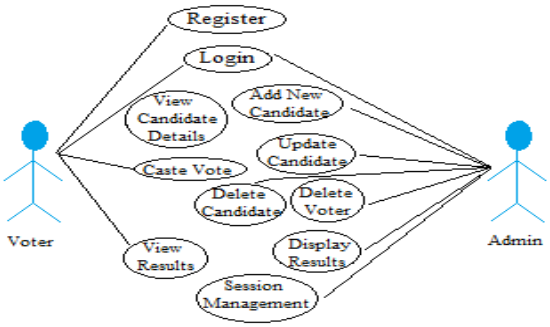

Figure: use case diagram

C. Voting Phase:

In this phase the voter will login to the application using his\her username, password. Further the information will be compared with the details stored in the server and allow access to the voter. This prevents unauthorized voter to cast a vote. The voter will be provided with a candidate list on voting day. The voter will select their candidate from the list. The voter can only vote when the admin opens the voting session, votes will not be accepted after time ends. The encrypted information will be forwarded to the authority's server and stored in database.

D. Vote Collecting and Result Phase:

All the votes will be in encrypted form until the official time of the election ends. Implementing this restriction on the server, the decryption of the votes will be started after the end of the election time. The third party will not see the result before the official time ends, thus it prevents to seeing of the election

results. After ending of voting phase, votes will be decrypted and counted and results will be officially displayed.

Security is provided to our proposed system by using public-key cryptography. Working with a public-key encryption system has mainly three phases:

1. Key Generation: Whoever wants to receive secret messages create a public key (which is published) and a private key (kept secret). The keys are generated in a way that conceals their construction and makes it difficult to find the private key by only knowing the public key.

2. Encryption: A secret message to any person can be encrypted by his\her public key.

3. Decryption: Only the person being addressed can easily decrypt the secret message using the private key.

Our goal is to design an efficient and effective system that allows the voters to instantly cast a vote without the limit of time and place.

II. METHODOLOGY

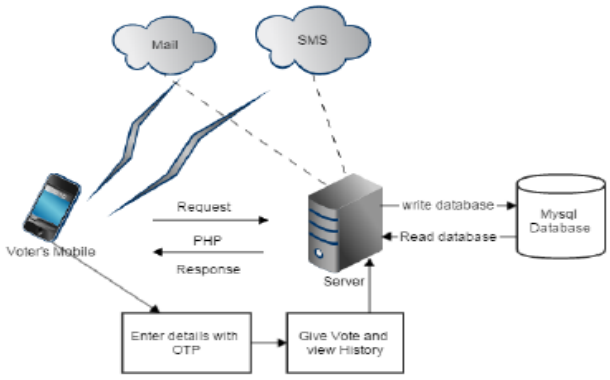

Figure: Architecture.

Steps to be followed:

- Step 1: Get the android application.
- Step 2: Register by providing all the details and request for OTP using Email.
- Step 3: Enter the received OTP and get registered.
- Step 4: Voter can login to the android application using username and password and can view the election info and candidate details in the application.
- Step 6: Voter will be allowed to enter the voting page and cast their vote only on the election day.
- Step 7: Admin should login to the web application and will be authorized to register candidate details and also modify voters as well as candidate's details.
- Step 8: Once the Admin opens the voting session, voter can cast their vote and will be logged out from the voting page.
- Step 9: Votes will be encrypted and will be stored until the result day.
- Step 10: On the result day the votes will be decrypted and displayed.

III. CONCLUSION

The Remote Voting System will manage the voter's information by which voter can login and use his voting rights. The voter should register only once and can vote from anywhere using his android phone. There is a database which is maintained by the Admin in which all information of voter as well as candidate is stored. By online voting system, percentage of voting increases. It decreases the cost and time of voting process. It is very easy to use and it is very less time consuming. Considering the drawbacks of present system by some issues like security, efficiency, robustness, flexibility, and data integrity this system overcomes all the cons.

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NSF: A Novel Secure Framework for Protecting Route and Data in Mobile Ad-hoc Network

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ABSTRACT

The adaptability and versatility of Mobile Ad hoc Networks (MANETs) have made them expanding prominently in a wide scope of utilization cases. To ensure the security, secure routing protocols have been designed to secure the routing paths and application information. In any case, these routing protocols just ensure route security or communication security, not both. Both secure routing and communication security routing protocols must be implemented to give full assurance to the network. To address these above issues, a secure framework, named NSF is proposed. The system is intended to permit existing system and routing protocols to play out their capacities, while giving node authentication, access control, and communication system security. This paper exhibits a security structure for MANETs. Comparison comes about looking at NSF with IPsec which is given to exhibit the proposed structures' appropriateness for communication security.
Keywords: access control, authentication, communication system security, mobile ad hoc networks.

I. INTRODUCTION

MANETs are dynamic, self-configuring, and infrastructure-less groups of mobile devices. They are usually created for a specific purpose. Each device within a MANET is known as a node and must take the role of a client and a router. Experts point out that the MANET, now a topic of commercial research, was originally used in military projects, including in tactical networks and Defense Advanced Research Projects Agency (DARPA) projects. Some use 4G networks and other wireless systems as examples of a potential topology for a MANET, while others refer to a vehicular ad-hoc network (VANET), where the free network nodes are installed in cars and other vehicles.

Those assessing the potential for MANET face various challenges, including signal protection and the reliability of mobile or otherwise dynamic nodes. There's also the issue of limited processing power, and even of providing an adequate power supply for the large number of devices typically included within a MANET. Still, the flexibility of a MANET makes this an interesting alternative to traditional networks structures. This paper proposes a novel security protocol, Novel Secure Framework for Protecting Route and Data in MANETs(NSF). The protocol is designed to address authentication of a node, network access control, and secure communication for MANETs using existing routing protocols. NSF combines routing and communication security at the network layer. This is in contrast to existing approaches, which provide only routing or communication security, requiring multiple protocols to protect the network. The Framework is designed to allow existing network and protocols to perform their function

whilst providing node authentication, access control, and communication security mechanisms.

The remainder of this paper is organized as follows: Section 2 analyses the problem in the context of previously published work. Section 3 introduces NSF, providing a technical discussion of the protocol. Section 4 outlines the characteristics chosen for modelling, and the results of simulating NSF compared against selected securerouting and data security protocols. Section 5 draws conclusions from the research findings.

II. RELATED WORK AND PROBLEM ANALYSIS

Ad hoc On-demand Distance Vector routing protocol: MANETs depend on intermediate the way in which packets are steered to their goals, MANET routing protocols rather make utilization of routing tables on each node in the system, containing either full or fractional topology data. Reactive protocols, for example, Ad hoc On-request Distance Vector (AODV) arrange routes when messages should be sent, surveying close-by nodes trying to locate the nearest route to the destination node.

Optimized link state routing protocol: In this paper we propose and discuss an optimized link state routing protocol, named OLSR, for mobile wireless networks. The protocol is based on the link state algorithm and it is proactive (or table driven) in nature. It employs periodic exchange of messages to maintain topology information of the network at each node. OLSR is an optimization over a pure link state protocol as it compacts the size of information sent in the messages, and furthermore, reduces the number of retransmissions to flood these messages in an entire network. For this purpose

MANET Routing Security: To handle the issues that accepted authenticity can bring about, secure MANET directing conventions have been proposed. Secure Ad hoc On-request Distance Vector (SAODV) and Secure Optimized Link State Routing (SOLSR) are secure usage of AODV and OLSR separately. SAODV secures the directing system by incorporating irregular numbers in Route Request bundles (RREQs). On the off chance that a steering bundle arrives that re-utilizes an old parcel number, that bundle is invalid. Hubs watched sending re played bundles might be hailed as malevolent. SAODV requires that no less than two Secure RREQs (SRREQs) touch base at the goal hub by various courses with indistinguishable irregular numbers to distinguish the source hub. Security Communication: Securing courses is just a single part of a full security arrangement. X.805 highlights numerous security dangers including personality, information control, debasement and robbery. There are three prerequisites to securing correspondence; confirmation, classification and respectability. X.509 sets the standard for endorsement based ways to deal with security. Authentications give a suite of information that can be utilized to speak to the character of a given hub, and its association with a confided in specialist.

Summary: NSF, the convention proposed in this paper, addresses the issue of bound together MANET correspondence security. It executes a Virtual Closed Network design to ensure both system and application information. This is conversely with the methodologies proposed in past work, which concentrate on ensuring particular correspondence based administrations.

III. THE NSF FRAMEWORK

The protocol, NSF is designed to work in network layer. The packets from transport layer is forwarded to data link layer through NSF. The main functions of network layer are to identify the nodes and create routing tables. NSF is designed to provide authentication in the network layer end to end i.e., source to destination nodes.

A. NSF Framework Overview

The routing table maintains the route information, source id, destination ID, etc. The routing header extracts all the routing table information. NSF is also designed to provide authentication in the network layer point to point i.e., intermediate nodes and end to end i.e., between source and destination. For this purpose, a security table is maintained which contains the key information Once the authentication is done the message is forwarded to the data link layer. It is designed to provide a fully secured communication framework for MANET's, without requiring modification of the routing protocol. Figure 1 shows the flow of data from transport, through the network layer (including NSF) to data link layer. MANET routing protocols require broadcast capabilities.

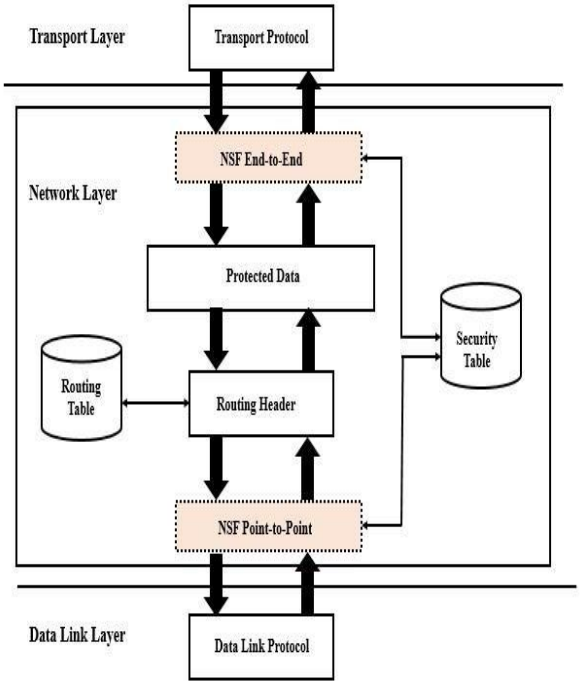

Figure 1. Diagram illustrating the NSF confidentiality, integrity and authentication services for data packets.

B. MODULES

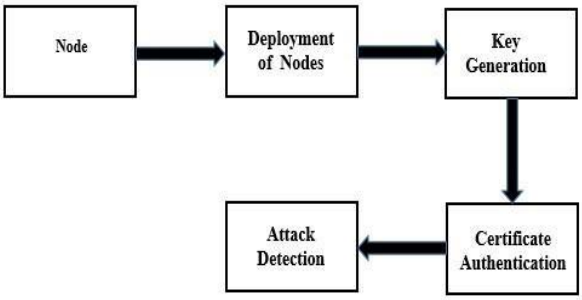

Figure 2

Deployment of Nodes

The nodes are deployed based on a particular topology and specifying x axis and y axis values. Also node id is specified. Node id of the nodes changes as and when the application restarts.

Key Generation

To Provide Secure communication NSF relies on the dynamic generation of keys.

Key generation is an important part where we have to generate both public key and private key. The sender will be encrypting the message with receiver's public key and the receiver will decrypt its private key. The key generated will be stored in a security table maintained at each node.

Secure Keys

Secure key(SKe) are used to secure source and destination with one SKe key generated per node. Secure Key(SKp) are shared between two nodes used to authenticate traffic as it moves along the network.

Symmetric Broadcast Key

A Symmetric broadcast key will be generated at the initialization of the network when first node to be contacted about joining to the network.

Symmetric broadcast key has two derived forms Symmetric broadcast end-to-end (SKbe) key and Symmetric point-to-point key(SKbp), In end-to-end broadcast communication SKbe provides confidentiality. In point-to-point broadcast

communication packet integrity by generating tags using hash function.

Certificate Authentication

NSF uses a certificate based approach to authenticate new node and allow them to become member of the network if they appropriate credentials. Once authenticated with the network a node will begin to form secure links, by associating itself with other member nodes on-demand.

NSF node must exchange a key share with other nodes receiving this in response and performing key exchange to generate appropriate keys for end-to-end and point-to-point cryptographic functions. The nodes are verified for validity. If the nodes are valid then the packet will be transmitted. If the nodes are invalid, then no packets are transmitted. NSF will only begin routing once node have been authenticated with the network (i.e,. receiving broadcast keys in the process).

Attack Detection

The certificate authority is going to verify the RREP AND RREQ packets. If the sequence number are not matching, then attack is detected otherwise no attack is detected.

IV. SUMMARY

MANET routing protocols require broadcast capabilities. Both OLSR and AODV require broadcast communication for routes discovery. NSF provides broadcast communication security services to allow it to service the specific needs of MANET routing protocols. NSF addresses the eight security dimensions detailed by X.805 by providing a closed-MANET, with end-to-end and point-to-point security features. The eight security dimensions are addressed as follows.

- **Access control** is provided by NSF network joining method.
- **Authentication** is provided by certificates.
- **Non-repudiation** is provided by timestamps.
- **Confidentiality** is provided end-to-end by payload encryption using AEAD.
- **Communication** security is maintained by encrypting and performing source authentication end-to-end, and checking authenticity and integrity at each hop.
- **Availability** is maintained using each nodes security table, which stores valid authentication credentials.
- **Privacy** is provided by end-to-end encryption, with keys that are specific to the link between two nodes or a node and the network.

V. CONCLUSION

NSF is a security framework that protects the network and communication in MANETs. The primary focus is to secure access to a virtually closed network (VCN) that allows expedient, reliable communication with confidentiality, integrity and authenticity services. NSF addresses each of the eight security measurements plot in x.805. In this manner, NSF can be said to actualize a full suite of security administrations for self-sufficient simulation has been attempted and the outcomes are accounted for and investigated to decide the relative cost of security. NSF has been shown to provide lower-cost security than SAODV for their routing protocols by stablishing a secure, closed network; one can assume a certain level of trust within that network. This reduces the need for costly secure routing behaviors designed to mitigate the effects of an untrusted environment (and untrusted nodes) on the routing process. By preventing the entry of potentially untrustworthy nodes to the network, and thus the routing process, a MANET may be protected from subversion of its routing services at a lower cost, as malicious nodes are barred from the process entirely.

VI. FUTURE WORK

Future work includes the implementation of NSF on a simple mobile node platform to allow experimental observation and profiling of its performance. The

proposal of network bridging solutions capable of providing NSF services between two closed networks over an insecure intermediate network, and investigating the effects of variable network topology on NSF to better understand the role of the credential referral mechanism on overhead mitigation in networks.

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Insights on Algorithmic and Non-algorithmic Cost Estimation Approaches Used by Current Software Industries across India

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ABSTRACT

The survey comprises excellent effort on cost estimation of algorithmic and non-algorithmic approaches of current software industries. Current industry datasets are gathered and investigation is done from the current datasets. The data gathered from the industries, which are located in Indian cities like Bangalore, Chennai, Hyderabad and Pune. Objective of this paper was to identify the cost estimation practices used in the current software industries.

Keywords: Cost Estimation, Data sets, Cost Drivers.

I. INTRODUCTION

Online survey was conducted on cost estimation used in the software industries mainly in Bangalore Mysore Chennai Hyderabad Pune etc. contacted more than 143 companies. We use several techniques used to approach such that phone calls emails and through friends reference in that mainly contacted industries through our friends who is working in software industries. We sent a mail with the Google form containing 10 questionnaires. The decision was made Limited number of question are used in initial stage in order to engage participation from as many companies as possible, the response questionnaires had the contact number of research, mail ID ,University such that they can contact back if they have difficulties in understanding the questionnaires from this exercise got reply from 72 companies in that 43 companies were willing to participate in the further rounds of interviews the main reason low participation were that they were too busy or they were not interested . Next round of the interviews was open discussion with industries was on cost estimation methodology.

II. METHODS AND MATERIAL

The response was large/medium/ small scale industries with the number of employees. In our survey 27 companies were in to start-up or small scale industries , 12 medium scale industries and 4 large scale industries participated the literature contains excellent work what cost estimation on soft match up the research work do not study all current industry data only on existing data set in our paper we try to communicate with the industries which are located in India, our main objective of this paper was to identify the cost estimation practices in the software industry the survey was carried out in India, mainly Bangalore Chennai Hyderabad Pune etcetera. This survey helps identify the differences between cost estimation techniques in the literature and currently used by the software industries .

we sent a mail with the Google form containing 10 questionnaires, the decision was made limited number of questions are used in initial stage in order to engage participation from as many companies as possible. Response had the contact number of research, mail ID ,University such that they can contact if they any have difficulties in understanding the questionnaires from this exercise, we got reply from 72 companies in that 43 companies were willing to participate in the further rounds of interviews the main reason low participation were that they were too busy or they were not interested. Next round of the interviews was open discussion with industries was on cost estimation methodology [1] .

III. RESULTS AND DISCUSSION

Type of the application developed by the organization are E-Commerce application and the website. Typical size of the team involved in developing a software or application may be four to five.

So many researchers are did survey on the different approaches which they used to find out the estimation of software cost [1][3][4]. The below figure.1 shows the different approaches towards the cost estimation methods [1].

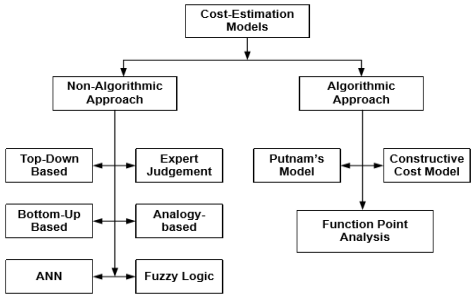

Figure 1. Different approaches of cost estimation

Figure 1 gives an idea about the classification of cost estimation models and it different approaches. After the interaction done from the current industries across the India, we came with a clear picture that what approaches is used currently by the industries. Most of the companies they said that they are using non algorithmic approaches, in that majority of the organization said that they are using expert judgement. In algorithmic approaches they are using Functional point analysis.

The analysis of finding out the estimation methods used by the different scale of the industries is given one answer that they are following the expert suggestions[2].

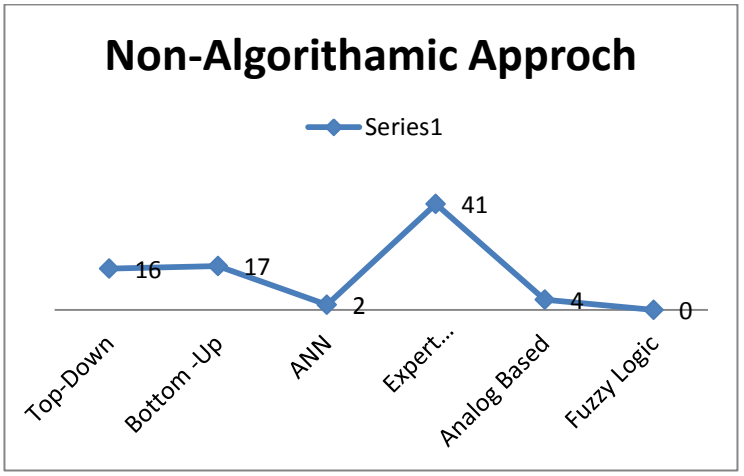

Figure 2. Non-Algorithmic Cost Estimation Approaches

Figure 2 gives the clear picture of the non-algorithmic approaches used by the current industries.Figure 3 gives the clear idea about the algorithmic approaches.

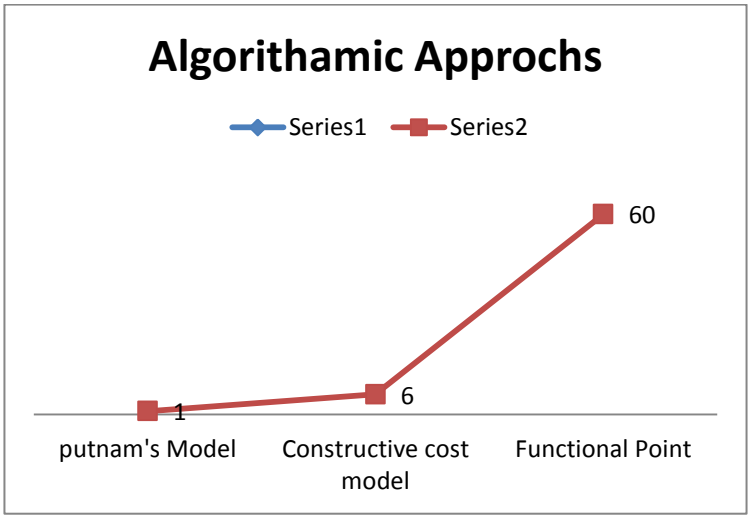

Figure 3. Algorithmic Cost Estimation Approaches.

When we asked about the stages of the estimation most of the organization they said that the estimation will be done in the initial stage of the plan, some industries reply that after getting all the requirements of the project, and other companies said that in all the stages of the software life cycle.

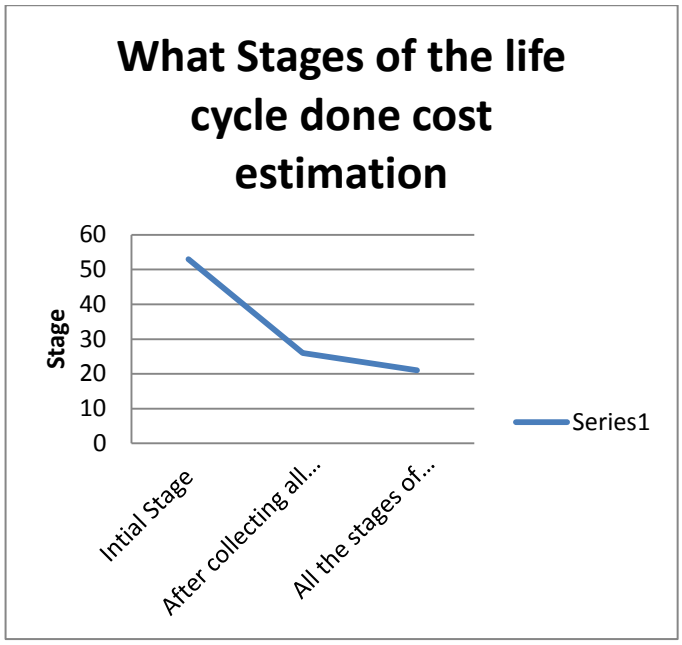

Figure 4. Cost estimation done at the stage of the life cycle.

Cost drivers used for the estimation:

In survey even concentrated on cost drivers [2] used by the software industries. Its totally defending on what type of software or application developed by the software industries. Cost drivers like employee experience in domain ,technology and number of team members involved in the project[5][6] etc., duration of the project like long term project or short term project, total efforts made by the team etc.

IV. CONCLUSION

The analysis are projected that software industries which is participated in the survey is most of the startup companies, in start-up companies cost estimation decision made by director , large scale companies project manager will be involved in cost estimation. From the analysis we found that most of the organization will follow the expert judgment cost estimation and few of the companies were using the tools and they says that compare to manual method tools give accurate cost estimation.

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Resolving Accident Detection Using Vehicletracking Information System

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ABSTRACT

Recently due to technological and population development, the usage of vehicles are rapidly increasing and at the same time the occurrence of accident have increased. Hence, the value of human life is ignored. The improvement of science and technology has led to many changes in the way of life. When an individual riding his/her vehicle, meets with an accident at remote place and especially during night hours, there is a chance that the individual may suffer from a serious injury and there is no one around to help him. In this regard, we have attempted to design an embedded application, which takes the responsibility of detecting the accident by using various sensors and informs to the authority/friend/family members about the incident. The system acts as an accident identification system that gathers and sends the vehicle information that met with an accident, and conveys it to the nearest control room.Road accidents constitute the major part of the accident .The purpose of the project is to find the vehicle where it is and locate the vehicle by means of sending a message using a system which is placed inside of vehicle system.Therefore, GPS has become an integral part of vehicle system. This proposal shows how to utilize the capability of a GPS receiver to monitor speed of a vehicle and detect accident based on send accident location to an Alert Service Centre.

Keywords: GPS(Global positioning System), GSM(Global System Mobile)

I. INTRODUCTION

In this Era, we generally communicate with different persons situated in other parts of universe, within no time with leading technology known as cellular technology. The usage of mobiles nowadays increasing in such a manner where every individual carry their own mobile handset, thus proposed work is based on GSM technology which provides safety system in the form of accident detection.

Present world there is a dynamic increase in the world of vehicles. It seems to be like usage of vehicles increased more compared to past years, so there is high demand in purchasing of vehicles, which relatively increases the traffic hazards and road accidents.Thus increase in count of automobile leads to unexpected things (accident) so every individual life is under risk which then results in loss of human life mean time, if any accident happened and if there is unavailability of immediate safety facilities/measures an individual can avail then no problem but if not solved to resolve the same we have come up with an idea to overcome accident prevention and after accident also how to communicate to the nearest location like police control or hospitals. Therefore, at that situation the consequences can be concentrated. Our Proposed system makes an effort to provide the emergency facilities to the victims over a period. In huge organizations, drivers make illegal use of the vehicles, which may result in financial, time loss of the organisation. Apart from these purposes,

thisconceptcanbe preferred for tracking of stolen vehicles and vehicular sales etc.

II. LITERATURE SURVEY

N. Watthanawisuth et al [1] has designed a system using accelerometer and GPS tracking system to monitor the accidents. The components include an accelerometer, microcontroller unit, GPS device and GSM module. As accident occurs, the wireless device will send mobile phone short message indicating the position of vehicle by GPS system to family member, emergency medical service (EMS) and nearest hospital.

Hoang Dat Pham et al [2] presented GPS and GSM systems to track down the vehicle more effectively. The vehicle location can be obtained in form of Coordinates, which can be transmitted using GSM modem to the relevant person's mobile phones.

According to the research done by Rashida Nazir[3] et al described the use of SONAR to prevent accident. GPS module helps us to locate the 99accident locations in terms of latitude and longitude and GSM module is used to send the message on mobile.

In present situation, in remote areas, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals. In their work GPS and has insisted for tracking the position of the vehicle, GSM is used for sending the message and the ARM controller is used for saving the mobile number in the EEPROM and sends the message to it when an accident has been detected. Hence, with this project implementation, detecting the position of the vehicle where the accident has occurred is easy, so that we can provide the first aid as early as possible.

S. Sonika et al [4] has expressed suggested the possible shortest path thereby reducing the chances of getting the ambulance stuck in the traffic. This reduces the time lag by making use of RF technologies that controls the traffic signals. At present criteria, in remote areas, we cannot detect where the accident has occurred and hence no information related to it, leading to the death of an individual. The research work is going on for tracking the position of the vehicle even in dark clumsy areas where there is no network for receiving the signals

Sri Krishna Chaitanya Varma et al [5] explained that if an accident happens, the impacted side of the vehicle is found by the impact sensors. After collecting all information which is stored in internal memory, controller sends this data to base or surveillance unit via SMS using GSM modem.

III. IMPLEMENTATION

Our accident detection and vehicle tracking information unit consists of different sensors like vibration sensor, accelerometer and modules like GPS, GSM, SMPS, LCD, Arduino Uno, relay control unit etc. to perform various operations of the project. All the interconnections between different modules and sensors, whichhave been done according to the circuit diagram. The circuit requires 3.3V, 5V and 12V for the operation of different modules.

Control unit consists of a transistor switch who isinON and OFF condition depends on the binary combination outputted from microcontroller. In normal condition, microcontroller will send a 0 (low) on the control line, which will switch off the transistor and the relay connected with the collector circuit will be in the non-excited condition. When any one of the abnormal condition occurs, microcontroller sends 1 (high) on control line which switches on the transistor and excites the relay coil. In this condition, the buzzer or any equivalent device can be turned off or on depending on the

requirements of the project by connecting either to NC or NO.

Microcontroller Atmega328A is the heart of our system, which is a single chip microcomputer with I/O ports, timer, clock generator, data memory, program memory, stack, ADC and serial ports etc. It is a 28 pin DIP IC which can be used for many control application like cameras, motor speed control, waveform generation, musical tone generation, printers, monitors, UPS, etc. The software of the project is written in (high-level language) embedded C and code is uploaded into chip using open source software Arduino IDE 1.8.5.

A 16 x 2 LCD display is utilized to display the status of operation, data values, names of parameter etc. It requires less hardware and consumes less power when compared to LED display. It is used to display the location and status of operation etc. Buffer is used to increase the current capacity. In our project, we have constructed this driver unit by using an NPN low power transistor BC547. The output of micro controller is connected to input pin of buffer IC. A relay is a simple **electromechanical switch** made up of an electromagnet and a set of contacts. Relays are amazingly simple devices.

Accelerometer is used to check the tilt condition. We are using ADXL 345 in our application it has three outputs X Y Z which are given to analog input pins of Arduino to convert analog into digital. The digital values are stored in memory and then compared with reference values to take correct decision. GSM is global communication unit, whichis used to send information to the authority during the accident. We use AT commands to send the short message to the authority. It works with 3.3. V supply and send ASCII data using serial communication. MAX 232 chip is used to convert RS232 to TTL logic voltages and vice versa. GPS unit is used to identify the location using altitude and works with serial data transmission at 9600-baud rate.

IV.BLOCK DIAGRAM

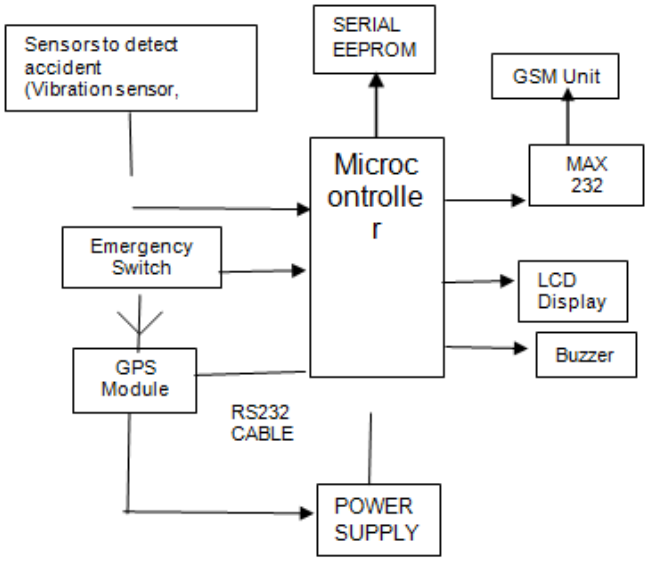

Figure 1

V. RESULTS

Thus, by implementing all the modules we achieved the results as the coordinates (latitude and longitude)of the accident victim using the unit based on our implementation as shown below.

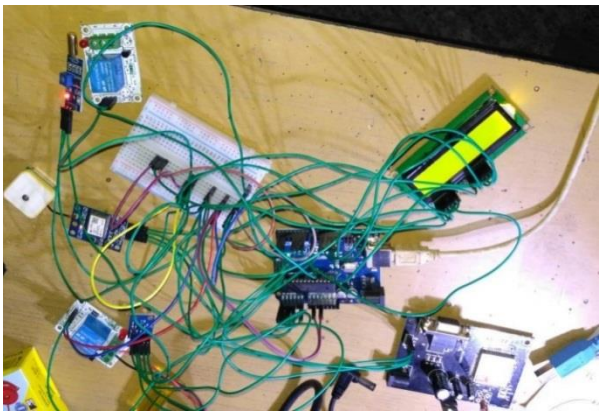

Figure 2. Final System model

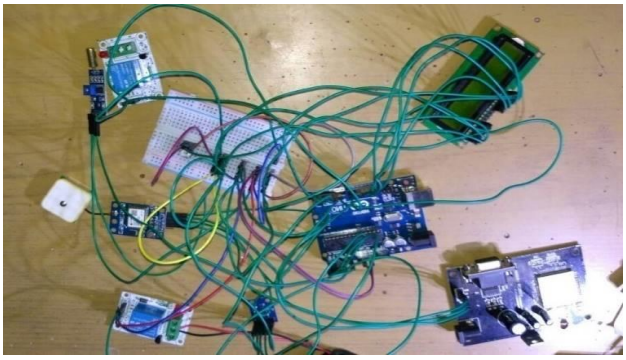

Figure 3. Interfacing of GSM and GPS with Arduino

Proposed system is better than other existing system as it gives the exact location of the accident happened and it sends theaccident's information to the required authorities and family.

VI.CONCLUSION

The designed vehicle for accident detection and tracking system by using GSM and GPS. When accident occurs, it senses by sensors. The coordinate of location of accident obtained by GPS, are sent via GSM network to the authorities. It is the fact that implementation of system will increase cost of vehicle but it is better to have some percent safety rather than having no percent of safety. This method is verified to be highly beneficial for the automotive industry. The proposed system can also be used for traffic estimation and accidents survey in the country by health department with slight modification. Hence, this concept can be extended to other automobileSectors. As well, it can also be implemented in trains.

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Simply Do: An Android Application to Create Shopping List and to Manage Them

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ABSTRACT

The Simply_Do is an Android application is to eliminate all and everything to keep track of in mind. Because of other jobs, the person might forget to do things at the right time when he needed them. And another intention is to eliminate all the manual work that is performed on a sheet in the form of small pawns. The chances of getting lost may be possible very often. As soon as the user goes to the mall, he can use this application to purchase the items he added first in the list, so the chance of losing items will be gradually reduced and things will not be forgotten. The main agenda for developing this application is to store the items in the form of lists that will be useful to the public.

Keywords: Android applications, Lists, Items, Statistics.

I. INTRODUCTION

A shopping list is a list of items that must be purchased by a buyer. Consumers often compile a grocery shopping list to purchase at the next visit to the grocery store. The list can be completed immediately before the shopping trip or incrementally depending on the shopping needs during the week. The shopping list can be a piece of paper or something more elaborate. There are pads with magnets to keep an incremental list at home, usually on the refrigerator. To obtain the same result you can use any magnetic clip with scraps of paper. There is a device that dispenses a strip of paper from a roll for use in a shopping list. Some shopping carts come with a small block for grocery items.

Home computers allow users to print their own custom list so that the articles are simply checked instead of written, or they can manage the list completely on the computer with custom purchase list software. PDAs completely eliminate the need for a paper list and can be used to facilitate comparative purchases. There is online software to manage shopping lists from mobile phones and from the web. E-commerce sites typically provide a list of online shopping for repeat buyers on the site.

So overall, shopping in today's world has become a daily activity essential for most people. And because of their busy life program they will forget one or the other thing whenever they need it and even the person cannot remember his total spending that he spent throughout the month.

To overcome all these problems, a fully functional Android application called Simply_DOwas developed. This application allows the user to create the list and can add items to that particular list with its price and its quantity. The user can give high priority or low priority to each list he has created. In addition, the user can set the rest for the particular

list, so that the application can understand the user by increasing the notification.

II. BACKGROUND

A. Purpose

The purpose of developing Simply_Do is an android application is to eliminate each and everything to keep track in mind. Due to some other work the person may forget to do the things at the right time when he needed. And another intension is to eliminate all the manual work which is carried out on a paper in the form of small chits. And the chances of getting lost may possible on very often. As soon as the user go to the shopping mall he can use this application to purchase the items which he added in the list earlier, so the possibility of missing the items will gradually reduce and the things will not be forgotten. The main agenda to develop this application because there is no such good android application is developed to store the items in the form of list is introduced in the market.

B. Android Operating System

Android is a mobile operating system (SO) currently developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. The Android user interface is mainly based on direct manipulation, using tactile gestures that correspond generally to real-world actions, such as scrolling, touch and pinching, manipulation of objects on the screen and a virtual keyboard for entering text.

Android applications run in a sandbox, an isolated area of the system that does not have access to the rest of the system's resources, unless the access permissions are explicitly granted by the user when the application is installed. Before installing an application, Play Store displays all the necessary permissions: a game may have to enable vibration or save data to an SD card, for example, but it should not be necessary to read SMS messages or access the phonebook.

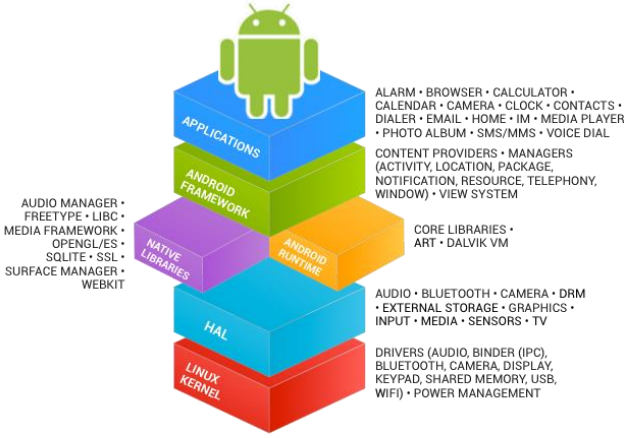


Figure 1. Core android application

C. Existing Solutions

In the present existing system there is no other android application to store the items name in the form of list, and also the remainder cannot be set to that particular list. Everything is done through paper and it is a tedious task to maintain records, also it will be a hectic job for keeping track of everything on mind. Present manual work is time consuming and it takes lot of man power to complete the work. In this age of advanced technology, doing all the work manually and with use of paper leads to decline in productivity. Difficulties in maintaining the records and it will be less secure. These typical processes have a lot of disadvantages which are mentioned below.

- ✓ Manual Work
- ✓ Time Consuming
- ✓ Chances of human error
- ✓ Report Maintenance
- ✓ Wastage of paper
- ✓ Possibility of record destruction
- ✓ Contingency planning.

III. PROPOSED SOLUTIONS

The main purpose of this android application is to create and manages the list of items. It helps the user to keep track about the things which he needs in his day to day life. Also he can set the remainder and can be intimated at the right time whenever he needed. The overall money spent for that particular

week or that month can be visualized through a bar chart. It reduces the time consumption and workload that exists in the current system It also helps to store various lists for the user to access the records. The proposed system makes the searching of the records easier than the existing system.

A. Objective of the Proposed Solutions

The main objective of this application is to efficiently store the items in the form of lists and it will be available for the user whenever he needs it. This application is fully automated that not only saves a lot of time but also gives the fast results. It is cost effective, the user just needs to create the list with its name and go on adding the items to the lists with its names and its quantity. Also he can add extra notes if he needs to refer for later access. With this proposed system it is easy to maintain record. It will be an easier process and less time consuming.

B. Benefits of the Proposed Solutions

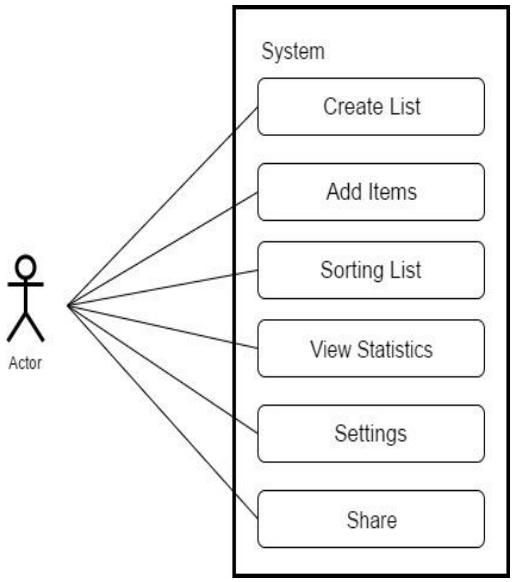
- ✓ Reduces the human effort
- ✓ Reduces the human errors
- ✓ Reduces paperwork and saves paper.
- ✓ Reduces the time for scheduling invigilation duties

C. Feasibility Study

Feasibility is a measure of how beneficial the development of the information system will be to an organization. This is done by investigating the existing system in the area under investigation or generally ideas about a new system. It is a test of a system proposal according to its workability, impact on the organization, ability to meet user needs, and effective use of resources. The simply_do android application will be more helpful for all users who are shopping addict in their day to day activity. While creating the list first they need to make sure that the list which is not existed in the current available list names. Each list will be of with its unique names so that while identifying the items is much easier.

D. Use case diagram

The diagram shown in Fig. 2 is the use case diagram of the application. The purpose of this diagram is to help visualize the scope of the application. It also represents the list of functionalities and depicts the base interactions that might occur between the system and the actors on the application.



Figuer 2. System use case diagram

- Primary Actor: User
- Main Success Scenario (Basic Flow):
  - ✓ User will create the list with the list name, remainder and the priority to set the list to be viewed.
  - ✓ User need to add the items which is purticular to that list.
  - ✓ User can sort the list with its name in alphabetical order, date and time, quantity, price, category.
  - ✓ User can view the statistics which is to be viwed for the day, or else can be viewd for the whole month and a year.
  - ✓ User can share the list via third party applications which are available in his mobile device.

- Extensions (Alternative Flow): *a. at any time system fails: Restart the application.
- Requirements:
    - Android device
    - File sharing app on device

E. System architecture

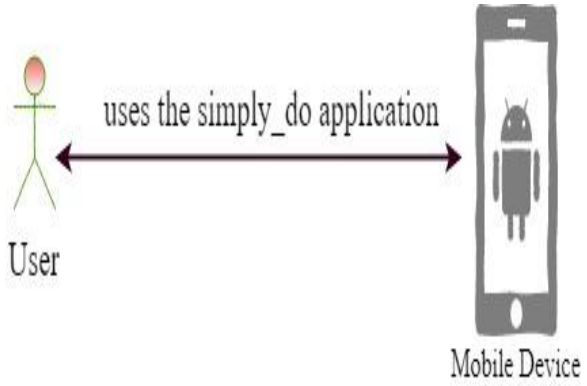


Figure 3. System Architecture

Figure 3 shows a schematic diagram of the overall system. The user going to open an application in an android device and he use the same application. While using the application first he needs to open and he need to create the list. After creating the list, then all the items need to be added particular to that list and need to be sorted based on ascending or descending order. Then overall statistics can be viewed for the day, month or for the whole year where the user had spent.

F. Features

- Prioritization of the list regarding importance of items.
- Setup of deadlines and reminders. The reminder will appear as a notification.
- Visualizing of shopping activities through a bar diagram.
- Adding of categories, stores the additional notes to products. AndPossibility to add a product picture.
- Sharing of lists and products as text without the requirement of special system permissions.

IV. SYSTEM MODULES

A. Creating the list

In this module the user need to create the list with its name, setting the priority to that particular list and setting the deadline for that list which is created.

- **List name**
  There is unique name for each list which is created in this application. There should not be any duplicate names used for the list as the constraints mismatch may happen in the application. The list name should be related to the items in which the user is adding to that particular list.
- **Setting the priority**
  There are two priorities given for each list which is created one is high priority and another one is normal priority. If the user chooses the high priority for the list then the list will appears at the top of all other lists which is available in the application. And if the user chooses normal priority then the list will get stored randomly with the other list.
- **Setting up deadline**
  While creating the list if user checks the deadline option then he need to select appropriate date with time for the prior announcement of the list which is getting expired. So that the user will not get forget about the list and its items.

The deadline notification will be raised in the mobile like a alarm and will be at the top of all other notification.

B. Adding products to the lists

This module will add the items or the products to the particular list which is created earlier. The user needs to set the quantity with its price for each items which he created. Also the user can add additional notes particular to that item.

- **Product name**
  There is unique name for each product which is created within the list. There should not be

any duplicate names used for the product as the constraints mismatch may happen in the application. The product name should be related to the items in which the user is adding to that particular list.

- **Quantity and Price**
  The user has to set the quantity for each product which he add to the list and price for the particular product will be added. The price can be in terms of Rupees or Dollars in which the user has chooses at first while opening the application.

C. Sorting a list

After creating the list with followed by its items then the user can sort out the list which he created based on the different options available in the application. The user can sort the list based on the alphabetical order either in ascending or by descending of the list. The user can also sort the list based on its price, quantity, date and time.

D. Stastics

After all the items purchased the user needs to mark or check all the items with its quantity and its total. The user in this module need to select the date range in which the price vs month or quantity vs month should display in the application. The user can group the products based on month, week and day or by category, the store name in which he bought and by product wise. At last the total expenditure of the particular group which is chosen will be displayed in this module.

V. BENEFITS

- Simply_Do is an android application whichcompletely relinquishes the advertisement.
- Sharing of list or product data without access of the phone contacts.
- All saved data in the statistics can be deleted permanently with just a few clicks. All this data lives only inside Privacy Friendly Shopping List and cannot be accessed from outside.
- Only the camera permission is needed, so you can take a picture for a particular product.
- All other features will be at your disposition.

VI. CONCLUSION

Simply_Do is an android mobile application which helps the people to keep track of their shopping list with created date and time. This application is easy to use, robust and offers the ability to track your shopping list. The main purpose of this android application is to create and manages the list of items. This application helps the user to keep track of each things which comes in day to day life. Also he can set the remainder and can be intimated at the right time whenever he needed. The overall money spent for that particular week or that month can be visualized through a bar chart. It reduces the time consumption and workload that exists in the current system it also helps to store various lists for the user to access the records. The proposed system makes the searching of the records easier than the existing system. In the next stage of development, using Cordova this application will be moved for IOS, windows phones and Blackberry using cross platform development.

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Locating the Trajectory Community for the Multi-source Scattered Modeling Based on the User Recommendation

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ABSTRACT

Data mining is an enactment of inspecting the enormous preceding databases in order to produce new information. In this paper we will be detecting communities from trajectories. In existing algorithm trajectory clustering is performed based on a single information source such as location data, regrettably additional information are ignored, due to these discovering the communities in trajectory data sets are not trustfully. To overcome these we proposed trajectory community for the multi-source scattered modelling based on the user recommendation. It combines additional information with raw trajectory data and fabricate the scattered process on multiple similitude metrics. Based on these scattered modelling we will be constructing the multi-modal scattered process and optimizing the heat kernel to learn the ordered kernel. Then compact sub-graph detection is used to discover the set of diverse communities. At last based on this information, we proposed a novel model for user recommendation.

Keywords: Trajectory, clustering, community, scattering.

I. INTRODUCTION

Now a day's everyone needs a social media to gather the information. When peoples are staying in different regions then getting or sharing the information about the social recommendation will be difficult, hence to overcome these, community are made, which helps to bring the people together and support each other in the fight to overcome those problems. Early days communities are detected by a social connection and by a graph division, but due to this privacy become the main problem and it is very difficult to capture connection in human society. To overcome these we started to capture human moments through Wi-Fi and GPS devices. Then the question arises that how we can detect communities? In this paper we will be going to detect the communities from trajectories (it refer to the moving objects). The community detection is usually achieved by clustering. The objective of trajectory clustering is to identify cluster from a set of trajectory of moving objects [1][2]. Some of the examples of trajectory data are human behaviour tracking, animal movements, vehicle positions and many more. We are inspired by some of real time use cases such as:

Social Recommendation: When a group of people visits a mall or browsing canter they will recommend a new products or sites for their purchase and they will be inform about the new offers.

Online and offline behaviour analysis: By merging knowledge of the people who communicate with their social media with the people who

communicate physically, by using these knowledge social scientists will be able to create adaptable methodologies of human social interaction.

In this paper we will be going to identify group of objects from trajectory based on some behaviour and movements. The main difference between clustering and community is, clustering contains group of objects and communities is the collection of clustering.

II. RELATED WORKS

Multifeature object trajectory clustering for video analysis: In these paper based on the behaviour of the peoples we will calculate the sample patterns. It mainly consists of three steps namely: in the first step we will extract the trajectory features spaces; in next step we will extract the adjacent clusters and in the last step based on these details we apply the merging procedure which helps to merge the common adjacent clusters. This algorithm is evaluated based on the standard data sets and compared with state of art techniques. By using this method we can discover the common pattern in videos.

Making recommendations from multiple domains: Now a day the large amount of data has been available in the World Wide Web, a recommender system is being used to filter the important information that would help the users. Traditional systems suggest based on the single domain such as movie and book domain. Current work has tested the interrelations in different domains and designed models that exploit the user preferences. However, these methods are based on matrix factorization and can only be applied to two-dimensional data. Transferring high dimensional data from one domain to another requires decomposing the high dimensional data to binary relations which results in information loss.

The effect of context aware recommendations on customer purchasing behaviour and trust: In particular, we did live controlled experiments with real customers of a major commercial Italian retailer in which we compared the customers' purchasing behaviour and measured their trust in the provided recommendations across the contextual, content-based and random recommendations. As a part of this study, we have investigated the role of accuracy and diversity of recommendations on customers' behaviour and their trust in the provided recommendations for the three types of RSes. We have demonstrated that the context-aware RS outperformed the other two RSes in terms of accuracy, trust and other economics-based performance metrics across most of our experimental settings.

III. SYSTEM ANALYSIS

A. Existing System

These are some of the drawbacks in the existing system:

Previously trajectory clustering is completely based on a single information source such as user location data [3] [2]; due to these community relationship and real world relationship will be missing and results will be false identified. And due to these multiple information sources will be not considered.

Communities are usually identified over a link based graph which captures only pair wise communication [4] [5] [6]. Such communication details are not promising and such details has technical limitation and identification of communities are misleading.

We can able to measure the edges in the pair wise connection but measuring the communities within that connection will be difficult and it is difficult to categorize the incorporate additional similarity metrics.

B. Proposed System

In this paper, we will discover communities from trajectories, which main intension is to identify group of objects from the trajectory data set. Our main approach is to measure the behaviour of multi-source scattered process and combining the different dimensions into a single multi-attribute weighted combination. In early approach we will be forming a community based on single information source, such as location data, but here we will be considering the multi-information source and then we will form a community. The peoples who are present within this community can be able to share and gather the information related to social recommendation and online/offline behaviour analysis.

Our project mainly consists of user, admin phase, general recommendation and recommendation.

Admin: Administrator has the responsibility of ensuring that the administrative activities within an organization run efficiently, by providing structure to other employees throughout the organization. These activities can range from being responsible for the management of human resources, budgets and records, to undertaking the role of supervising other customer. These responsibilities can vary depending on the customer and level of education. His main role is to control the overall operations. Whenever a new person wants to join for community then he will send the request to the admin by filling up the registration form. Based on these personal details admin will add him to the community and he will post some of the information which helps the user.

User: A user is a person who uses a computer or network service. Users generally use a system or a software product without the technical expertise required to fully understand it. Power users use advanced features of programs, though they are not necessarily capable of computer programming and system administration. When users are authenticated from the admin, based on the username and password they can able to login, and will be allowed to communicate with each others. The users are allowed to post the information to the other users. If he is interested in others, he can able to send the request to them. Mainly when he wants some suggestions from the others, then he can be able to obtain the details. Examples: If the user wants to purchase any dresses, but he don't have any idea about where to buy them and in which shop the discounts are there and then based on the user trajectory data he can able to get the information's easily.

Recommendation: In this module, we develop the estimation of query resolution probabilities. So far we have assumed that resolution probabilities for queries of different types are known. In practice they can be easily estimated. In order to ensure unbiased estimates can be obtained at each node, suppose a small fraction of all queries is marked 'RW', forwarded via the random walk policy with a large TTL, and given scheduling priority over other queries.

General Recommendation: In this general recommendation, a group of customers stay longer, visit more stores and spend more money than a single customer, and while the mixed groups (male and female together) stay for a shorter duration, they spend more money and visit more stores. Clearly, these preliminary results provide evidence that mobile advertisements should be carefully targeted to differentiate between individuals and groups (and different group types).

C. System Architecture

Figure 1.1 shows the system architecture which consists of mainly three distinct phases:

- In the first phase based on the trajectory data we will calculate four distinct dimensions, namely:

Semantic kernel: It contains the information about the sequential sites within the trajectory. Consider the example that, if we have N distinct site, then the

each trajectory can be specified by site transition sequence with corresponding sensual intervals.

Example: If the user is moving from source A to destination D, then he needs to pass through the different sites and he may pass in different directions(A->B->C->D or A->C->B->D), these all information will be monitored and based on these results the group will be formed and will represented as K1 .

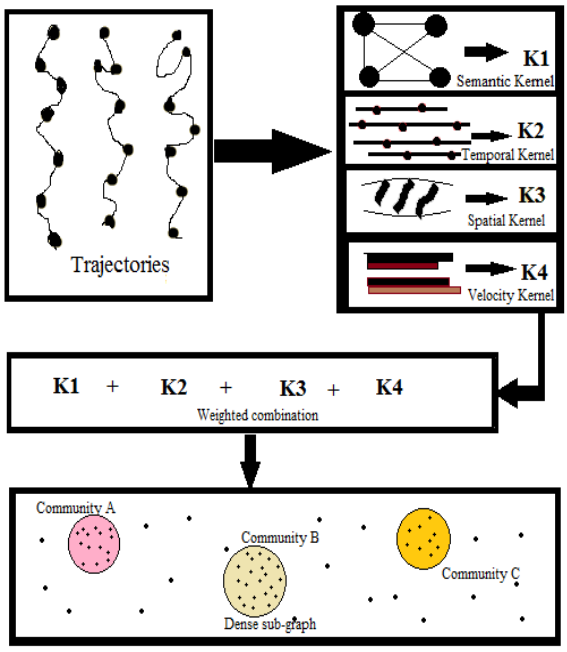

Figure 1. System Architecture

Temporal kernel: It contains the information about the amount of time the people will spend. If we consider the example of shopping mall, there we will obtain the temporal data based on the amount of time the customer spent in a specific shop.

Example: Consider the user A, if he is rooming inside the shopping mall, then if he sawed any interested thing then he will stop at that point and he will spend some amount of time there, incase if he is not interested in anything he may move out quickly. These results will be combined and the obtain results will be named as K2.

Spatial kernel: Spatial data is nothing but the earth data, which consists of the location details. It is used to measure the spatial similarity among the individual trajectories. We can use the global alignment kernel to measure the closeness among the trajectories.

Example: Consider the users called A and B, if they travelling, then the spatial similarities between the user A and user B will be calculated and the obtained results will be considered as result K3.

Velocity kernel: It is measured based on the velocity of the moving objects. For example if we take a group of peoples who are moving, then based on the movement the peoples will be classified. That means people who are moving slow will be categorized into one group, and people who are moving fast will be categorized into another group.

Example: Consider the user A, if he is travelling from source S to destination D, then the amount of time he is taking to reach the destination will be monitored, that is based on whether the user is moving fast or whether he is moving slow will be considered and the results will be stored in K4.

Above 4 similarities are compute by applying proper kernels for each dimension to extract the key relevant features.

- In the second phase we will combine all these similarities based on weight and multi-modal diffusion process and based on these results the trajectory community discovery will be performed. (K1+K2+K3+K4)

- In the last phase we use the dense sub-graphs detection method to detect the highly connected sub-graph from the graph. Based on these trajectory communities will be detected from similarity values.

IV. CONCLUSION

In this paper we recommend trajectory community for a multi-source scattered modelling. Our main

approach is to measure the behaviour of multi-source scattered process and combine the different dimension into a single multi-attribute weighted combination. The community detection is usually achieved by clustering. The objective of trajectory clustering is to identify cluster from a set of trajectory of moving objects Experiments were conducted on real life datasets like: customer in a shopping mall, students present in a campus building and cab drivers in a city. The results indicate that our user recommendation method detects the correct groups and sends the information to target from different trajectory data.

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Brain Functional Exploration Right over Left on the Preconception of Alzheimer's Using Perplexed Method

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ABSTRACT

Brain undertakes the responsibility to simulate the sense like touch, taste, vision, smell and hearing to perform some actions for the human. In General, Right Side Brain is worked as Imagination, visual effects than Left brain as well as Left Side Brain is too logical and with critical Thinking. Alzheimer diseases provide the communication as a chief to destroy the cell based on the memories, feelings and their thoughts. Progressive period can be varied based on age and the intake of the healthy food particles. Basically as in General, Language is recognize by the Left over than Right. Multiple tomography screening supports to identify the medical aspects of syndrome pattern. Data Prediction supports to identify the thinking capability over the brain of Alzheimer's, just for an easy communication and conversion over them as habitually.

Keywords: Alzheimer's disease, Brain Functional Exploration, Data Prediction, Right over Left Terminology

I. INTRODUCTION

In General, Alzheimer's diseases is a main blowing factor on destroying the brain communication over their memories. Before state into a full view about the Alzheimer, some basics things are analyzed for the survival to react further. The factor findings syndrome for the cause and identification of Alzheimer diseases are

- ✓ Memory loss
- ✓ Trouble in problem solving
- ✓ Feel difficulty to finish the easy and well known work
- ✓ Confusion with time or place
- ✓ Problem with the visual effects
- ✓ Reading and writing the words in a language
- ✓ Trouble in Retracing the misplaced things
- ✓ decline or poor decision making
- ✓ Involvement from their work or social activities
- ✓ Fell more depressed, fearful, confused or anxious.

As the disease may provide a progressive disorder of the brain based on destroying the memory and reasoning ability rather almost in the older adults. Alzheimer's Diseases are traced from the dementia, which also relates to loss of thinking ability, memory loss related to their routine day today life activities.

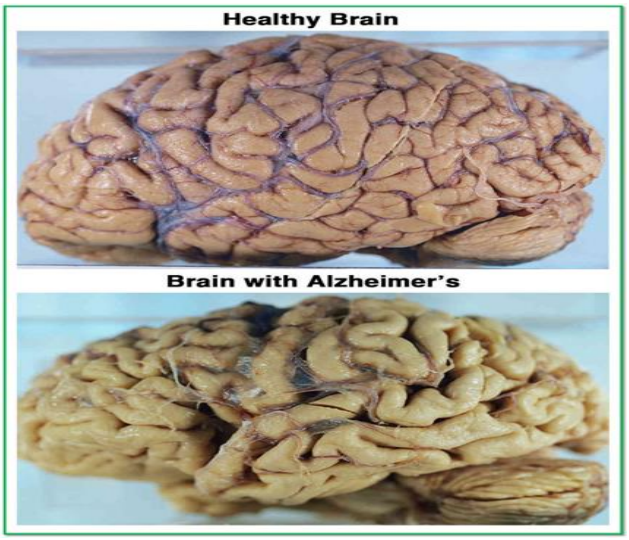

Figure 1. Comparison of the Normal brain with Alzheimer Disease

The main cause of the memory sustainability can be based on

- ✓ Side effects on some medicines intake
- ✓ Depression
- ✓ Insufficiency of vitamins
- ✓ Drinking more alcohol
- ✓ Blood clots or tumors in the brain
- ✓ Head injury
- ✓ Kidney, liver or thyroid problems

Alzheimer disease is affected more than 75 % in United States and related to the gene it may or may not be affected for the younger people. Among the survival level, it mainly affects the older aging of the adults as more than younger.

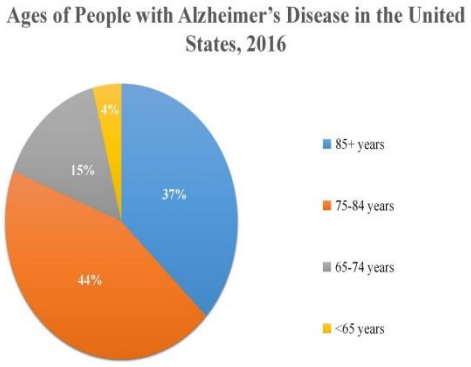

Figure 2. Aging Factor in United States

Dementia is a range of conditions highly affects with loss of cognitive functioning. They are various types of dementia include are: Parkinson' Disease, Creutzfeldt-Jakob, Huntington's disease. Treatment can be materialized after the full survival related to the syndrome and other test like, blood and urine test. If require they can take CT scan or MRI. Still the view of the disease provide a no result as an medical solution, some drug therapy are planned and implemented to save their life to be prolonged in future. Other Therapy can be needs a good assistance to provide a quality of the brain storming on learning and cognitive training as lifelong. [3]Community detection of the brain is trace based on flexible and inflexible assignment based on the two regions over their network modular structure.

I. PROBLEM STATEMENT

2.1 RESEARCH TYPE:

Planned approaches always provided as much as possible results to predict the data as per the functional features. Whenever the research applied to the medical aspects can be descriptive or explanatory type, because the vector analysis will be approaches either to an individual or to a set of peoples. Similar way, the research is simulated with multiple environments along with the multiple parameters as an ongoing terminology.

2.2 RESEARCH OBJECTIVE:

The main objective is to analyses and supports the patients, those who are identified as having Alzheimer's. The root cause of the disease has to be factorized and make them simplified, by analyze the various mining factor on process of the data collection are:

- ✓ At what age factor the disease get highly affected?
- ✓ What type of food habits may them to avoid the memory loss?
- ✓ How long the later and early syndrome can be predicted and warned
- ✓ How to analyze the brain work function
- ✓ How to stipulate the right over left to access the memory in easy way

II. PERFORMANCE FACTOR AND TERMINOLOGY

3.1 AGING FACTOR ANALYSES

The parameter which is mainly found out is the age factor. Diseases can be affected due to any type of cause and the surrounding of the every individuals life nature. In general, the Alzheimer disease highly affected to older adults than younger. As the study crossed with the limited tolerant to analyze the category, memory loss happens highly to the older age factor behind 65 and the pre-stage determination are identified at the age of 40 to 65.

3.2 SYNDROME ANALYSES IN EARLY AND LATER STAGE

As of know no medical stimulation are record in the human body when the Alzheimer disease are recognized to the patients. Evert aspects are defined based on the mental ability. To recognize in the early stage the main syndrome is language problem (right words or read words).The prolonged terms and future for the easy communication which happens as everyday activities will be forgotten. When they tried to remember, depression happens to them. Later Syndrome is mainly identified based on their decision making and problem with their visual effects.

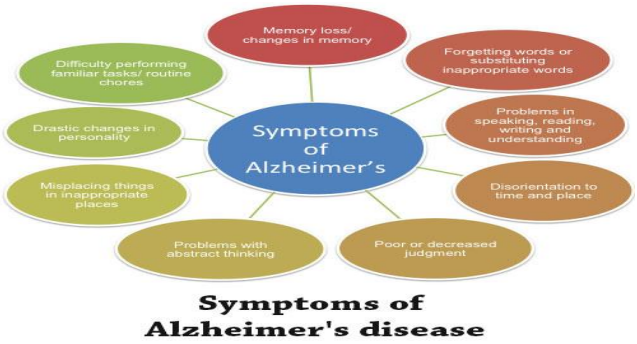

Figure 3. Syndrome of Alzheimer Diseases

III. IMPLEMENTATION RESEARCH PROCESS

Implementation of the proposed method applied based on the parameter related to the Alzheimer disease feature. Parameters defined as dependent variables are listed as:

1. Age - to identify the age of patients
2. Gender - to identify the gender of the patients
3. Syndrome – to identify the symptoms of the patients as in early or later stage
4. Perplexed questions set – to check the possibility of the recovery stage.

Age and gender parameter supports to recognize the statistical level of the diseases affected in the current trends easily.

Syndrome are detected and defined with codes, to identify it easily as in feature. Data Prediction is applied to defined as an algorithm process as an step to reconcile the syndrome are in early stage or in later stage to intimate warnings and protect the patients with more care.

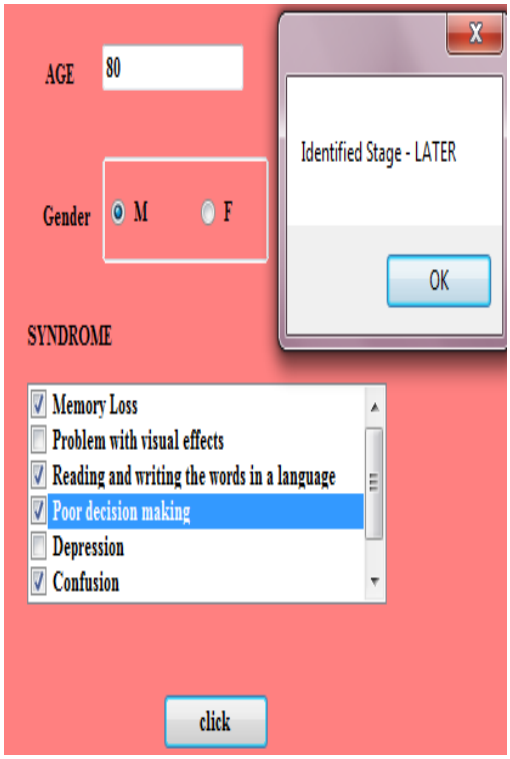

Figure 4. Syndrome Text View

Perplexed question set will be involved as jagged manner of array sequences and mainly differs from every individual as well as by every moment of action.

Brain Functional Exploration are recorded unpatriotically as per the requirements of the stituation,to recall as memory by applying the Data

Predication Procedure as an Algorithm to analyses the feature as directly.

Data Prediction is functionally applied as distinct on supervised Learning feature. Direct analyses over the parameter of class values of new instances, which are applied together for the findings of the Right over Left Terminology as a signpost for the process implementation. The main reasoning over the terminology is recorded as a set of values for the single query event and record it as like a jagged array sequence or otherwise, "The Zero-Frequency problem" may arises to stipulate the brain functional exploration as null to recall from the memory.

IV. PROPOSED WORK

5.1 RIGHT OVER LEFT TERMINOLOGY

In general for an normal human brain, Left side brain identifies the languages and think too critical with logical reasoning ability, where as the right side brain work as an virtualization or imagination with more creative thoughts and manner. Highlighting to the Alzheimer disease, the factor is vice versa. To make their brain as strengthen, visual impacts can be approached to sustain their activities a little bit easier. Problem can be overcome on Visual detection of the right brain over the left factor are

- ✓ Ability to identify the objects and face in easier easy
- ✓ Difficulty comprehend separate parts of a scene at a once , recapturing the activities as often by their assistance
- ✓ Difficulty with reading test can be crossed check with vision regularly

Perplexed questions are stated to identify the current status of the diseases. To recognize

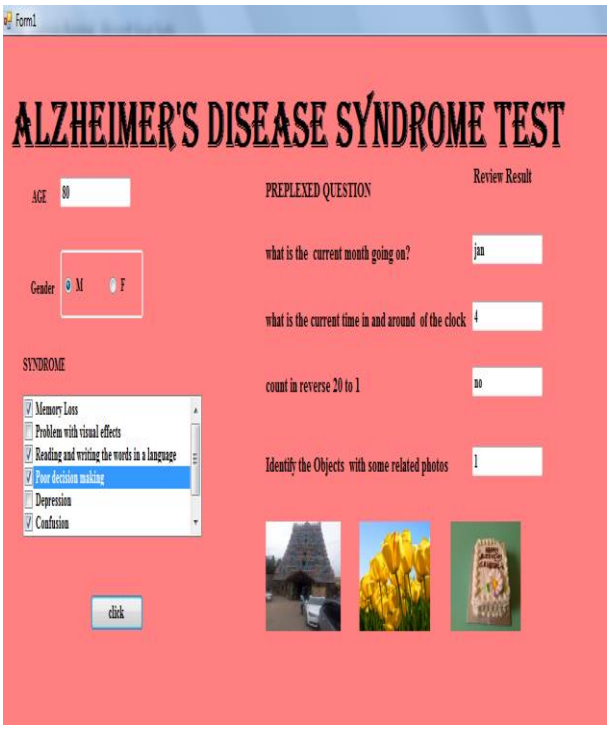

Figure 5. sample screening view

the level and to stipulate the various remember of their life's, visual effects will provide sufficient analyses to improvise the memory thoughts over than imaginations of the objects.

An ideal illustration is applied to analyze the related objects and things, family members and relatives images are visualized regularly through the care taken which intrudes the right brain to identify easily and supports to left brain for the voice communication through language.

V. CONCLUSION

The pattern enriched with perplexed form will definitely supported to analyses the stage of the diseases and provides a certain solution to proceed further on their memory staging. Multiple tomography level of the test will intrudes to regulate the food habits in a nominal way. Energy level Transferring to the brain cell plays a vital role of the memory loss. As plotted the visual effects will supports them to recall the near-to-near habitually easily, not exactly through a 100%, but it depends on the care taker, who provides an intended practice

progressively to carry over their life by recalling, whenever required.

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Camcorder Piracy – IR Based Antipiracy Screen

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ABSTRACT

Privacy protection is of increasing importance in this era of information explosion. One major source of the piracy is camcorder piracy i.e., Information are recorded by portable devices and then sold on internet and grey markets. Different techniques and strategies are explored to overcome the problem and secure the digital content, some are based on spatiotemporal modulation of light, watermarking techniques, maximizing annoyance and temporal effects. In this paper, we take an interesting look on identifying the pirates by exploiting the technology of RFID. The unique information embedded in the RIFD's serves as tracking information to reveal the one responsibility for the piracy.

This raises the question that to what extent antipiracy actions have been effective in deterring piracy? This is a challenging issue to explore because of the difficulty to capture user behavior. We tackle this question by embedding infrared led behind the screen through which a layer of IR rays generated aids in defecting piracy. A human viewing a screen containing information sees only the information on the screen and does not see the infrared rays being displayed simultaneously. Video cameras aimed to record a screen containing the information, though it comprises of IR filters they are unable to prevent the IR rays from interfering with recording the information.

Keywords: Camcorder, Antipiracy, Infrared Rays, RFID.

I. INTRODUCTION

Movie piracy has a profound act on the motion picture industry. In the view of the law, movie piracy is considered as crime all over the world. The major problem caused by movie piracy is internet traffic. As the main source for movie piracy is piracy by insiders it is of 77% possibly. As an important source of movie piracy, the camcorder piracy accounts for about 23% of the piracy methods according to the BBC News [3]. The pirated movies can be made prior to the theatrical release date and after the date, classified as: pre-release piracy and post-release piracy. Section II below discusses the sources of piracy which gives the difference between piracy due to consumers and insiders.

II. SOURCES OF PIRACY

Pirated information have differences in quality, potential impact on revenues, legal and business implications, and technologies that can be adopted to address the issues. Movie piracy is capturing a original motion picture through Several types of cameras which are having the similar CCD and COMS sensors in the camera device. The sources of camcorder-pirated movies can be classified as pre-release piracy and post-release piracy respectively. Pre-release sources of piracy include production, post-production and pre-release distribution, where film may be shown in private screenings to critics, sponsors and VIPs. After theatrical release, motion pictures can be pirated from the theatre, during controlled small-screen releases, from DVD or video releases, Internet distribution, or from broadcast

television. This method is known as Post-release. During the pre-release and post-release the piracy can be done in two ways, through cam and telesync [1]. It is the imitating of existing Content. These copies sold for the lesser price before they are officially available.

As a deterrent against the camcorder piracy, several watermarking technologies have been proposed [2].This technique is to embed watermarks into the movie. The message indicates the theater to which it was distributed, the equipment on which it was shown, the date and time of showing, and perhaps information identifying the projectionist. The content protection in the theater using a new paradigm of information display technology, called

III. EXISTING ANTI-PIRACY SCHEME

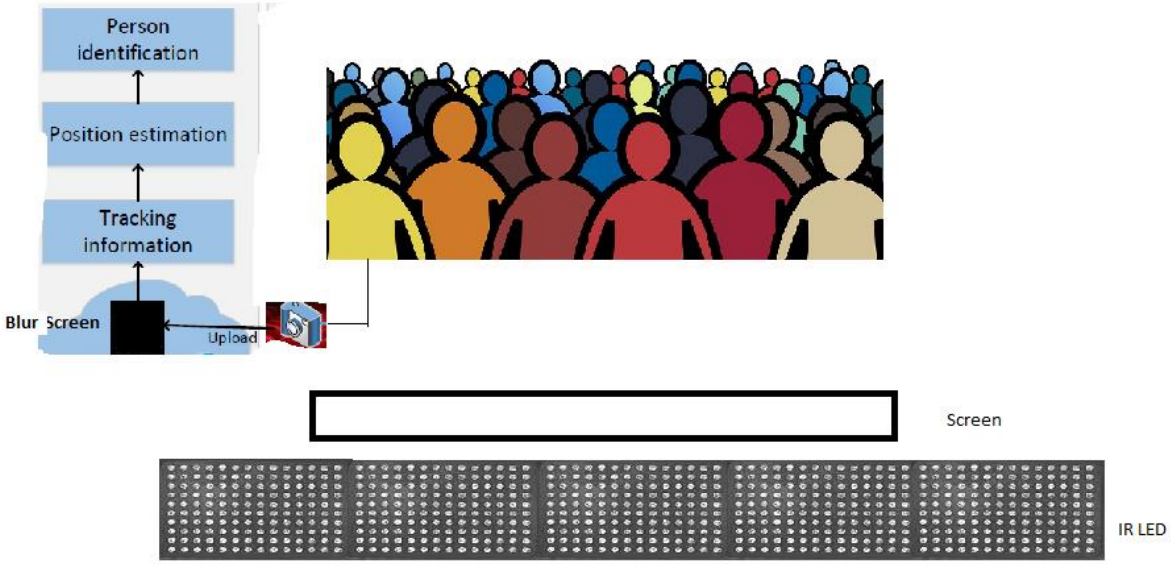

Figure 1. Working mechanism of camcorder piracy tracking by IR display technology

Temporal Psychovisual Modulation (TPVM) [1], which utilizes the differences between the human-eye perception and digital camera image forming to stack an invisible pattern on digital screen and projector. The pattern embedded in the movies can also serves as tracking information to reveal the one responsibility for the camcorder piracy.

IV. PROPOSED SYSTEM DESIGN

Figure. 1 represents the working mechanism of the proposed anti-piracy scheme. This system reveals the pirates and personal Information of them who attempts to capture the information that is unofficial. This technology uses the property of CCD sensors that are present in capturing devices, these are sensitive to infrared rays but the humans cannot identify them.

A card will be issued to each user, which helps in the authentication process. The information of the user will be stored and controlled by the Admin. Unique information will be generated through microcontroller which will send to user for the verification. In case error occurs during verification new information will be generated and resent to the user. If the user tries to capture the information, the IR LED's which are embedded behind the screen will avoid piracy. If the information is been distributed, the pirates can be identified with the help of details which is maintained by admin.

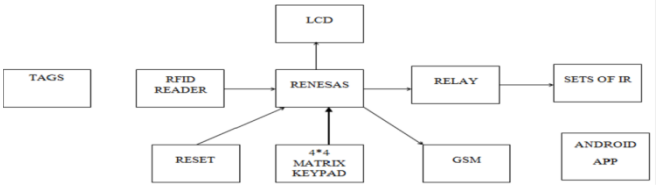

Figure 2. Block diagram of proposed anti-piracy system.

V. IMPLEMENTATION

In our project we are monitoring the copy right of information.

4*4 MATRIX KEYPAD- The keypad is set of buttons arranged in a block or a pad which usually consist of alphanumerical keys.

RFID TAGS and READERS- We use automatic identification method relaying on storing and remotely retrieving of data using RFID transponders. The transponder's consists of unique information, which when swiped through an electro-magnetic zone it detects a reader's activation signal and verifies the authenticated user.

GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)- The password which is used for authentication is generated by GSM and verified through renesas microcontroller.

MICROCONTROLLER- Since the output from the microcontroller is low, it is used for controlling the activity of other systems like Authentication, Verification and driver amplifies the signal and actuates the relays to control the IR LED's.

ALPHANUMERICAL LIQUID CRYSTAL DISPLAY (ALCD) - It helps in the directing of the users.

IR LED's- The IR's are designed to sense the presence or absence of partitions such that lighting functions change to accommodate the appropriate size space. These LED's are embedded behind the screen which is initiated by microcontroller. The way this technology works is that when any capturing devices flashes on IR light the pattern will be captured instead of the information show in figure 3.

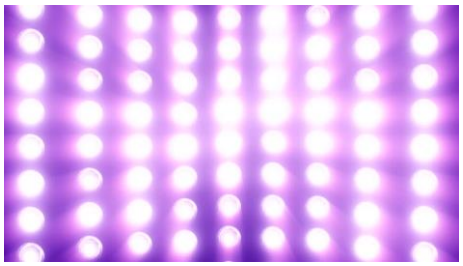

Figure 3. IR Patterns

VI. APPLICATIONS

By implementing this project we can have more security in the particular field.

I. The duplication of the portraits can be avoided in museums.
II. ii. Implementing in research centre and meetings the highly confidential information cannot be pirated.
III. iii. The piracy can be avoided in movie theatres by using this technique.

VII. CONCLUSION

This paper mainly deals with idea of avoiding piracy which is a major constraint of visual media. Here anti-piracy is achieved by the study of visual transparency of added interference signals to the theatre audience. The RFID transponders helps as a tracking information to reveal one who is responsible of piracy.

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Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection

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ABSTRACT

This paper presents an intelligent traffic control system to pass emergency vehicles smoothly. Each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. We use RFID reader, NSK EDK-125–TTL, and PIC16F877A system-on-chip to read the RFID tags attached to the vehicle. It counts number of vehicles that passes on a particular path during a specified duration. It also determines the network congestion, and hence the green light duration for that path. If the RFID-tag-read belongs to the stolen vehicle, then a message is sent using GSM SIM300 to the police control room. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light. This module uses ZigBee modules on CC2500 and PIC16F877A system-on-chip for wireless communications between the ambulance and traffic controller. The prototype was tested under different combinations of inputs in our wireless communication laboratory and experimental results were found as expected. Index Terms—ZigBee, CC2500, GSM, SIM300, PIC16F877A, ambulance vehicle, stolen vehicle, congestion control, traffic junction.

I. INTRODUCTION

INDIA is the second most populous Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints [1]. Also, Indian traffic is non lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options [2]. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. RFID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. Some RFID systems will only work within the range inches or centimeters, while others may work for 100 meters (300 feet) or more. A GSM modem is a specialized type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. AT commands are used to control modems. These commands come from Hayes commands that were used by the Hayes smart modems. The ZigBee operates at low-power and can be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands (868 MHz in Europe,915 MHz in USA and Australia, 2.4 GHz in rest of the world). Data transmission rates

vary from 20 Kilobits/second in the 868 MHz frequency band to 250 Kilobits/second in the 2.4 GHz frequency band [3], [4]. The ZigBee uses 11 channels in case of 868/915 MHz radio frequency and 16 channels in case of 2.4 GHz radio frequency. It also uses 2 channel configurations, CSMA/CA and slotted CSMA/CA [5].

The whole paper is grouped into 5 parts. Sections II talks about the literature survey. Section III discusses about the current problems that exist in making way to an ambulance and other vehicles. It also talks of how the proposed model will overcome the problems faced in developing Countries as well as developed countries. Section IV gives the implementation details of the proposed model. Section V presents the enhancement of this work.

II. LITERATURE SURVEY

Traffic congestion is a major problem in cities of developing Countries like India. Growth in urban population and the middle-class segment contribute significantly to the rising number of vehicles in the cities [6]. Congestion on roads eventually results in slow moving traffic, which increases the time of travel, thus stands-out as one of the major issues in metropolitan cities. In [7], green wave system was discussed, which was used to provide clearance to any emergency vehicle by turning all the red lights to green on the path of the emergency vehicle, hence providing a complete green wave to the desired vehicle. A 'green wave' is the synchronization of the green phase of traffic signals. With a 'green wave' setup, a vehicle passing through a green signal will continue to receive green signals as it travels down the road. In addition to the green wave path, the system will track a stolen vehicle when it passes through a traffic light. Advantage of the system is that GPS inside the vehicle does not require additional power. The biggest disadvantage of green waves is that, when the wave is disturbed, the disturbance can cause traffic problems that can be exacerbated by the synchronization.

Figure 1. Traffic in Bangalore city.

In such cases, the queue of vehicles in a green wave grows in size until it becomes too large and some of the vehicles cannot reach the green lights in time and must stop. This is called over-saturation [12], [13]. In [8], the use of RFID traffic control to avoid problems that usually arise with standard traffic control systems, especially those related to image processing and beam interruption techniques are discussed. This RFID technique deals with multivehicle, multilane, multi road junction areas. It provides an efficient time management scheme, in which, a dynamic time schedule is worked out in real time for the passage of each traffic column. The real-time operation of the system emulates the judgment of a traffic policeman on duty. The number of vehicles in each column and the routing are proprieties, upon which the calculations and the judgments are done. The disadvantage of this work is that it does not discuss what methods are used for communication between the emergency vehicle and the traffic signal controller. In [9], it proposed a RFID and GPS based automatic lane clearance system for ambulance. The focus of this work is to reduce the delay in arrival of the ambulance to the hospital by automatically clearing the lane, in which, ambulance is travelling, before it reaches the traffic signal. This can be achieved by turning the traffic signal, in the path of the ambulance, to green when the ambulance is at a certain distance from the traffic junction. The use of RFID distinguishes between the

emergency and non-emergency cases, thus preventing unnecessary traffic congestion. The communication between the ambulance and traffic signal post is done through the transceivers and GPS. The system is fully automated and requires no human intervention at the traffic junctions. The disadvantage of this system is it needs all the information about the starting point, end point of the travel. It may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance.

Traffic is a critical issue of transportation system in most of all the cities of Countries. This is especially true for Countries like India and China, where the population is increasing at higher rate as show in figure 1. For example, Bangalore city, has witnessed a phenomenal growth in vehicle population in recent years. As a result, many of the arterial roads and intersections are operating over the capacity (i.e., v/c is more than 1) and average journey speeds on some of the key roads in the central areas are lower than 10 Km/h at the peak hour. In [10], some of the main challenges are management of more than 36,00,000 vehicles, annual growth of 7–10% in traffic, roads operating at higher capacity ranging from 1 to 4, travel speed less than 10 Km/h at some central areas in peak hours, insufficient or no parking space for vehicles, limited number of policemen. In [11], currently a video traffic surveillance and monitoring system commissioned in Bangalore city. It involves a manual analysis of data by the traffic management team to determine the traffic light duration in each of the junction. It will communicate the same to the local police officers for the necessary actions.

III. PROPOSED MODEL

From the current problem section, it can be seen that, existing technologies are insufficient to handle the problems of congestion control, emergency vehicle clearance, stolen vehicle detection, etc. To solve these problems, we propose to implement our Intelligent Traffic Control System. It mainly consists of three parts. First part contains automatic signal control system. Here, each vehicle is equipped with an RFID tag. When it comes in the range of RFID reader, it will send the signal to the RFID reader. The RFID reader will track how many vehicles have passed through for a specific period and determines the congestion volume. Accordingly, it sets the green light duration for that path. Second part is for the emergency vehicle clearance. Here, each emergency vehicle contains ZigBee transmitter module and the ZigBee receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purpose. This will send the signal through the ZigBee transmitter to the ZigBee receiver. It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the ZigBee signal and the traffic light is turned to red. The third part is responsible for stolen vehicle detection. Here, when the RFID reader reads the RFID tag, it compares it to the list of stolen RFIDs. If a match is found, it sends SMS to the police control room and changes the traffic light to red, so that the vehicle is made to stop in the traffic junction and local police can take appropriate action. List of components used in the experiment are CC2500RF module, Microchip PIC16F877A, RFID Reader–125KHz–TTL and SIM300 GSM module. Figure 2 shows the pin diagrams (or pictures) of components used.

A.ZigBee Module CC2500

The CC2500 is a RF module and has trans receiver, which provides an easy way to use RF communication at 2.4 GHz. Every CC2500 is equipped with the microcontroller (PIC 16F877A), which contains Unique Identification Number (UIN). This UIN is based on the registration number of the vehicle. One of the most important features is serial communication without any extra hardware and no extra coding. Hence, it is a trans receiver as it provides communication in both directions, but only one direction. The microcontroller and CC2500 always communicate with the

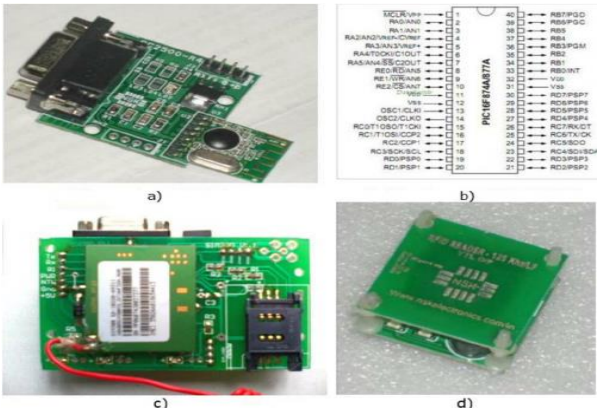

Figure 2. PIN diagrams of different components used in our prototype. (a) ZigBee module CC2500. (b) Pin diagram of PIC16F877A. (c) GSM Module SIM300. (d) RFID reader–125 kHz–TTL.

Microcontroller via serial communication. Rx pin of CC2500 is connected to Tx (RC6) of microcontroller and Tx pin of CXC2500 is connected to Rx pin of microcontroller (RC7). Other two pins are used to energize trans receiver. It is used to transmit and receive the data at 9600 baud rate. Figure 4.1.a shows the image of trans receiver. Here, we uses CC2500 ZigBee module and it has transmission range of 20 meters.

B.Microcontroller (PIC16F877A)

Peripheral Interface Control (PIC) 16F series has a lot of advantages as compared to other series. It executes each instruction in less than 200 nanoseconds. It has 40 pins and has 8K program memory and 368 byte data memory. It is easy to store and send UINs. At the junction, it is easy to store large number of emergency vehicles. Before switching to green, it should satisfy all the conditions. Simple interrupt option gives the advantage like jump from one loop to another loop. It is easy to switch any time. It consumes less power and operates by vehicle battery itself without any extra hardware. Figure 2.b shows the PIN Diagram of PIC16F877A.

C.GSM Module SIM 300

Here, a GSM modem is connected with the microcontroller. This allows the computer to use the GSM modem to communicate over the mobile network. These GSM modems are most frequently used to provide mobile Internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. GSM modem must support an "extended AT command set" for sending/receiving SMS messages. GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. SIM 300 is designed for global market and it is a tri-band GSM engine. It works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes. This GSM modem is a highly flexible plug and play quad band GSM modem, interface to RS232, it supports features like voice, data, SMS, GPRS and integrated TCP/IP stack. It is controlled via AT commands (GSM 07.07,07.05 and enhanced AT commands). It uses AC – DC power adaptor with following ratings DC Voltage: 12V/1A.

D.RFID Reader–125 kHz–TTL

Radio Frequency Identification (RFID) is an IT system that transmits signals without the presence of physical gadgets in wireless communication. It is categorized under automatic identification technology, which is well established protocol. The working of an RFID system is very simple. The system utilizes tags that are attached to various components to be tracked. The tags store data and information concerning the details of the product of things to be traced. The reader reads the radio frequency and identifies the tags. The antenna provides the means for the integrated circuit to transmit its information to the reader. There are two types of RFID categories, active and passive tags. The tags that do not utilize power are referred to as passive and they are driven by an antenna that enables the tag to receive electromagnetic waves from a reader. On the contrary, active tags rely on power and they have inbuilt power sources that enable it to send and receive signals from RFID reader. RFID range depends on transmit power, receive sensitivity and efficiency, antenna, frequency, tag orientations, surroundings. Typically, the RFID

range is from a few centimeters to over hundred meters. RFID reader uses frequency 125 KHz with a range of 10 cm.

IV. WORKING MODEL

In this model, there are mainly 3 modules as follows.

A. Automatic Signal Control System

In this module, for experiment purpose, we have used passive RFID tags and RFID reader with frequency 125 KHz. RFID tag, when vehicle comes in the range of the receiver will transmit the unique RFID to the reader. The microcontroller connected to the RFID reader will count the RFID tags read in 2 minute duration. For testing purpose, if the count is more than 10, the green light duration is set to 30 seconds ,if count is between 5 and 9, the green light duration is set to 20 seconds. If the count is less than 5, the green light duration is set to 10 seconds. The red light duration will be for 10 seconds and orange light duration will be for 2 seconds. Figure 3 implementation for automatic signal control and stolen vehicle detection system.

B. Stolen Vehicle Detection System

In this module, for testing purpose, we compare the unique RFID tag read by the RFID reader to the stolen RFIDs stored in the system. If a match is found, then the traffic signal is immediately turned to red for a duration of 30 seconds.

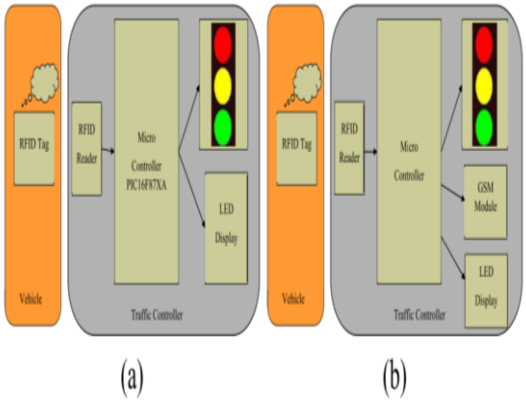

Figure 3. Implementation for automatic signal control and stolen vehicle detection system. (a) Block diagram for automatic signal control system. (b) Block diagram for stolen vehicle detection.

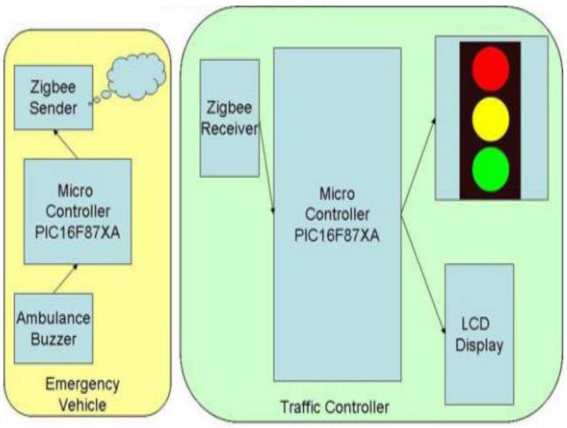

Figure 4. Implementation for ambulance. (a) Block diagram for emergency vehicle clearance.

Also an SMS is sent specifying the RFID number by using SIM300 GSM module. The LCD display will indicate that stolen vehicle is present as shown in Figure 3.

C. Emergency Vehicle Clearance System

In this module, there are 2 parts, first part which is ZigBee transmitter is placed in the emergency vehicle. When the

Figure 5. Proposed model images transmitter and receiver. (a) Pole status at different condition. (b) Transmitter (ZigBee). (c) LCD display at receiver. (d) Detailed image of receiver. (e) When stolen vehicle is detected. (f) Working model.

switch is pressed, it will transmit the signal. The signal contains unique id and security code. The transmitter contains PIC16F877A microcontroller and ZigBee module. The microcontroller sends the commands and data to the ZigBee via serial communication. Second part is the receiver, which is placed at traffic pole. It also contains PIC16F877A microcontroller and ZigBee module. The receiver compares the security code received to the security code present in its database. If it matches, then it will turn the green light on. For testing purpose, we used short range RFID reader in our prototype. First, the receiver part is turned on. The red and green signal will be on for 10 seconds duration and orange light will be on for 2 seconds duration one after the other. Secondly, we bring the RFID of stolen vehicle into the range of RFID reader. Then the signal will turn to red for duration of 30 seconds and a SMS is received.Thirdly,we bring 12 RFIDs into the rangeof RFID reader,andthen the greenlight duration will change to 30 seconds. Fourthly, we bring an emergency vehicle carrying ZigBee transmitter into the range of ZigBee receiver, and then the traffic light will change to green till the receiver receives the ZigBee signal as shown in Figure 4. Figure 5 shows the images of different components and highlighted features of the proposed work. Figure 5.a shows the signal pole installed in junction. In the default condition, red and green light will set for 10 seconds. The time period will be varied according to the traffic conditions, stolen vehicle, and emergency vehicle. Figure 5.b shows the transmitter part is placed in the ambulance. It transmits ZigBee signal continuously. Figure 5.c shows the LCD display status at different conditions (in that figure one is normal conjunction image(traffic signal running as per the default time period)and another one is LCD display status, when an ambulance coming near to junction. Figure 5.d shows the actual connections of different components like RFID, GSM, ZigBee, interfacing different microcontrollers. Figure 5.e shows the status updated at the time of stolen vehicle is found. The stolen vehicle RFID number should be updated in the database. If stolen vehicle is found, then it will immediately turn on red light in the signal. It sends immediately a message to authorized person. Figure 5.f shows the working model of the proposed work.

V. CONCLUSION AND ENHANCEMENTS

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. As the entire system is automated, it requires very less human intervention. With stolen vehicle detection, the signal automatically turns to red, so that the police officer can take appropriate action, if he/she is present at the junction. Also SMS will be sent so that they can prepare to catch the stolen vehicle at the next possible junctions. Emergency vehicles like ambulance, fire trucks, need to reach their destinations at the earliest. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Further enhancements can be done to the prototype by testing it with longer range RFID readers. Also GPS can be placed into the stolen vehicle detection module, so that the exact location of stolen vehicle is known. Currently, we have implemented system by considering one road of the traffic junction. It can be improved by extending to all the roads in a multi-road junction.

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A Survey on Early Fire Alarming Using Smoke Detection

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ABSTRACT

Nowadays, fire accidents can result in disastrous personal injury and destructive damage which causes both economical and ecological damage.
This paper presents a survey on smoke detection method for early fire-alarming system based on video processing. The fundamental approach of smoke-pixel judgment is composed of two decision rules. The first one is chromaticity based static decision rule and the second rule is diffusion based dynamic features decision rule. The first rule depends on the grayish color of smoke and dynamic rule is based on the spreading attributes of smoke. Experimental results show that the above two analysis provides lower rate of false alarm. These analyses are used in many of the applications like ships, tunnels and to identify the forest fires.
Keywords: Smoke detection, Video processing, Feature Extraction

I. INTRODUCTION

Our eyes and our brain are capable of extracting detailed information far beyond what can be described in text and, it is this ability we want to replicate in the "seeing computer", so a camera replaces the human eye and video replaces human brain. The main goal is to analyze the image with the purpose of first finding objects of interest and then extracting some parameters of these objects.

From a long-run, the fire accident normally causes economical and ecological damage and also it risks the people's life. To keep-off from fire tragedies, many fire detection techniques have been evolved, most of them are based on particle sampling, temperature sampling in addition with the traditional method. The drawbacks of traditional method are as it won't give some information about burning process, fire location, size, and growing rate and so on. Hence they are not reliable because of energy emulsion of bi-products, so this leads to the false alarm rate[1]. To get reliable information, we have to use the visual-based approach, the alarm system is used to alert about fire[2]. In many of the situations, smoke detection will offer more early alarm than the flame detection. It can be avoided by using two methods one is static analysis and the next one is dynamic analysis which reduces the false alarm rate. The fire detected by the static analysis is verified by using the dynamic analysis as to confirm it as a real smoke or not. In static analysis, these smoke pixels will be verified by using dynamic diffusion in dynamic analysis[3].

II. SMOKE DETECTION METHODS

The basic plan of smoke pixel decision is composed of two decision rules:

1. Static analysis 2.Dynamic analysis

Static Analysis: The smoke is generally displayed in grayish color during the burning process. Grayish color is divided into two regions; they are light gray and dark gray. This suggests the three components R,

G, and B of smoke pixel are equal or so. Hence, these grayish colors can be explained by the intensity (I) component of HSI color model [4][5]. The intensity of light gray lie between the ranges of L_1 and L_2 and the intensity of dark gray lie in the ranges of D_1 and D_2 of gray level regions.

By the chromatic analysis, the condition

$R \pm \alpha = G \pm \alpha = B \pm \alpha$ and $L_1 \leq I \leq L_2$ and $D_1 \leq I \leq D_2$, these can be used as one of the decision factor for recognizing the smoke. The values of α, L_1, L_2, D_1 and D_2 depend on the statistical data of experiments. The typical value of α ranges from 15 to 20, typical value of dark-gray ranges from 80 (=D_1) to 150 (=D_2) and 150 (=L_1) to 220 (=L_2).

Three decision rules for extracting smoke pixels from an image are deduced in the following:

Rule 1 : $R \pm \alpha = G \pm \alpha = B \pm \alpha$

Rule 2 : $L_1 \leq I \leq L_2$

Rule 3 : $D_1 \leq I \leq D_2$

If (Rule 1) AND [(Rule 2) OR (Rule3)] = TRUE

Then smoke - pixel

Else not smoke - pixel

If the above condition is satisfied, then the smoke is real, else not smoke-alias[3].

Dynamic Analysis: The smoke spreads out in the way of diffusion process, in the dynamic analysis. Usually airflows affect the smoke's shape, moving speed and moving direction of smoke particles. Reliability of smoke detection can be improved by considering the growth rate and disorder of smoke which can be involved as the decision factor for judging the smoke. Since airflows make the shape of smoke to be changed at any time, a novel disorder measure, the ratio of circumference to area for the extracted smoke region, is introduced to enhance the combination of smoke. The following decision rule can be used to detect the smoke.

If (SEP / STP) ≥ STD

then real smoke

else not smoke

In the rule, the parameter SEP denotes sum of circumstances of smoke regions segmented. STP is the number of smoke pixels extracted and STD means a disorder threshold that differentiates from other smoke like objects. SEP/STP denotes the disorder measurement of smoke. In addition to the disorder-based decision rule, the growth rate is also necessary condition for improving the reliability of the smoke detection. As a result of diffusion process, which exist in smoke, the smoke region eventually increases in the image sequence. The increment rate of the extracted smoke pixels by the chromatic decision rule is defined as

$$\Delta A_{d\,i} = \frac{d\,A}{d\,t} = \frac{A_{\,i+k} - A_i}{t_{i+k} - t_i} \quad (1)$$

Where A_i = smoke area at the interval between i+k and time i

In the digital image processing, the area can be represented with the pixel quantity and the time interval will be replaced by the frame number.

So, equation 1 is deduced to

$$\Delta A_{\,d\,i} = \frac{d\,P}{d\,t} = \frac{P_{\,i+k} - P_{\,i}}{(i+k) - i} \quad (2)$$

Where p_i =number of i-th frame

ΔA_{d_i} = ratio of pixel quantity obtained by frame difference between the frame i and the frame i+k to the frame number k.

To get more reliable growth rate measure, an average growth rate is adopted and defined as follow:

$$\overline{\Delta\, A_{\,d\,_1}} = \frac{1}{n}\sum_{i=1}^{n} \Delta\, A_{\,d\,i} \quad (3)$$

Where n=number of iteratively measuring the growth rate, $\overline{\Delta A_{d_1}}$ = average growth rate.

Hence, growth rate based decision rule in the dynamic characteristic is described as,

If NUM ($D_1 < \overline{\Delta Ad_1} < D_2$) $> N_d$

then smoke

else not smoke

Where D_1 and D_2 are low bound and high bound thresholds of growth respectively.N_d= threshold of checking times.

If the checking times of that the average growth-rate is between D_1 and D_2 are larger than N_d , it is regarded as the real smoke otherwise not a real smoke[3].

III. SMOKE DETECTION FLOW DIAGRAM

The smoke detection algorithm is as follows:

1. The presented smoke detection algorithm is dedicated for implementing for implementing an early alarm for feasible fire disasters.
2. Firstly the captured images which are in sequences are fragmented based on the frame difference[6] and thus the fragmented images are used as candidates for examining whether it is a real smoke or not by using chromatic analysis.
3. To verify and conclude that the extracted pixels are smoke, dynamic characteristics including growth-rate and disorder are utilised.
4. Finally as the real smoke is validated, a smoke alarming is given[3].

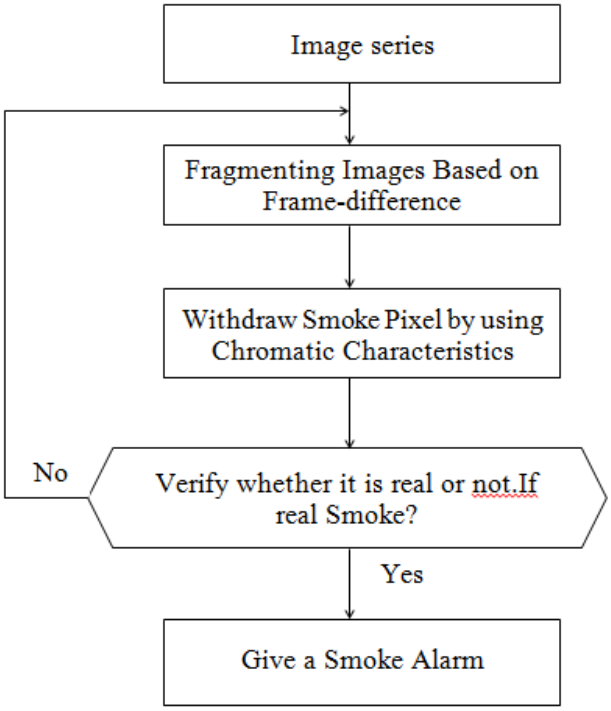

Figure 1. Smoke Detection Algorithm

IV.APPLICATIONS OF STATIC AND DYNAMIC ANALYSIS

Generally the static and dynamic analysis for smoke detection for early alarm is attractively used for the important military, social security, commercial applications and to identify forest fire and so on[7].

Some of the applications are described below

1. Static and dynamic analysis is used as one of the method for identifying the forest fire in forest fire monitoring system which is based on the digital image processing approach[8].
2. In ship, for early smoke detection inside the ships engine room. They use system CCTV system for capturing the images, and to judge whether the smoke is read or not they use the above described two analyses[9].
3. A fire in road tunnels is very dangerous as it can lead to loss of life. It is very essential to detect the fire as earliest to suppress them. For identifying the smoke, they use static analysis as one of the methods[10].

4. Massive tsunami, volcano, fire and terrorism cause property damage. For smoke detection at the earliest, they use CCTV's for capturing the image, for identifying it as a real smoke they use static analysis as one of the method[11].

V. CONCLUSION

After doing the survey on smoke detection method for early fire alarming system based on video processing. Both the static and dynamic analysis is used to verify it as areal smoke or not. The smoke pixels are extracted by using chromatic rule of static analysis and it is further verified by using diffusion rule of dynamic analysis.

One drawback of static analysis is if the surrounding is in gray color then this may leads to false alarm, so to overcome this drawback, dynamic analysis is used and these analysis are cost effective and it is having more advantages than the traditional methods.

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Decision Making for Heart Disease Detection Using Hybrid Neural Network-Particle Swarm Optimization Algorithm

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ABSTRACT

Cardiovascular disease is one of the most rampant causes of death around the world and was deemed as a major illness in Middle and Old ages. Coronary artery disease, in particular, is a widespread cardiovascular malady entailing high mortality rates. Angiography is, more often than not, regarded as the best method for the diagnosis of coronary artery disease; on the other hand, it is associated with high costs and major side effects. Much research has, therefore, been conducted using machine learning (genetic algorithm) and data mining to seek alternative modalities. Accordingly, we herein propose a highly accurate hybrid method for the diagnosis of coronary artery disease. As a matter of fact, the proposed method is able to increase the performance of neural network through enhancing its initial weights using Particle Swarm optimization Algorithm (PSO) that suggests better weights for neural network. Making use of such methodology, we can improve accuracy, sensitivity and specificity rates on Z-Alizadeh Sani dataset.

Keywords: Artificial Neural Network, Particle swarm optimizer, Coronary Artery disease, Evolutionary algorithm.

I. INTRODUCTION

Cardiovascular disease (CVD) is a class of diseases that involve the heart or blood vessels. Cardiovascular disease includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack). Other CVDs include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis.

The heart is a muscle that acts like a pump to move blood throughout the body. To function properly, the heart must receive oxygen. Oxygen is supplied to the heart by the coronary (heart) arteries that wrap around the surface of the heart. When coronary artery disease (CAD) is present, blood flow through the arteries can be reduced. When this happens, the heart muscle may not receive enough oxygen, and chest pain (called angina) may be felt. CAD is caused by the build-up of fatty substances, such as cholesterol, that collect along the lining of the coronary arteries, in a process known as atherosclerosis. This referred to as a “plaque”, “lesion”, “blockage” or “stenosis”. This means that there is a narrowing in the artery caused by a build-up of substances which may eventually block the flow of blood. Because the coronary arteries supply oxygen rich blood to the heart, untreated blockages can be very serious and can lead to a heart attack (myocardial infarction) or even death. Over the

course of a person's lifetime many influences can cause one or more of your coronary arteries to become narrowed or blocked.

The present study, given the risks of invasive diagnostic procedure such as angiography and auspicious experiences in the field of data mining, attempts were made to propose a model for identifying coronary arteries disease. The suggested detection model, based on artificial neural networks and Particle swarm optimizer algorithms, can detect coronary artery disease based on clinical data without the need for invasive diagnostic methods. Although ANNs are powerful, designing a proper network can be a very tough task and the more complex a desired dynamics are, the more difficult the design of the network becomes. Many researchers have sought to automate ANN design process by using computer programs. They have used algorithms that explore various combinations of network parameters (size, topology, connection weights, etc.) and the most suitable networks.

II. RELATED WORK

Evolutionary algorithms (EAs) are optimization and search methods, based on Darwinian evolution. EAs are especially useful for Finding global optima of functions which have many locally optimal solutions, because in comparison with traditional gradient-based search methods, EAs have more chances to escape from local optima. EAs are independent of gradient signals and are thus suitable for handling problems where such information is not available. EAs have been frequently used to carry out various tasks regarding 1[1].

Distribution of age and sex was different in the two groups. Subjects with disease had a mean age of 53.3 years and 84% were males, whereas those without disease had a mean age of 49.1 years and 51% were males. Because of these differences and the subsequent determination that the risk associated with cigarette smoking and serum cholesterol level differed with both age and sex, discriminant analyses were performed in nine age-sex subgroups[2].

Heart disease is the leading cause of death in the world over the past 10 years. Researches have been using several data mining techniques in the diagnosis of heart disease. Most of these systems have successfully employed Machine learning methods such as Naïve Bayes and Support Vector Machines for the classification purpose[3].

Predicting heart disease use inputs from complex tests conducted in labs. Developing a system which will predict heart based on the risk factors[4]. Artificial Bee Colony (ABC) Optimization for the Prediction of Coronary Heart Disease. This probabilistic algorithm has performed better to produce the best accuracy rate. The intelligent behaviour algorithm can be recommended for solving highly complicated optimization problems[5].

III. METHODOLOGY

A. Dataset

The present research used Z- Alizadeh Sani dataset, containing information on 303 patients, 216 of whom suffered from CAD. Fifty-four features were collected for each patient.

Table 1 Dataset

Feature type	Feature name
Demographic	Age
	Sex
	BMI
	DM(Diabetics Mellitus)
	HTN(Hypertension)
	Current Smoker
	EX-smoker
	FH(Family History)
	Obesity
	CRF
	CVA
	Airway diseases

	Thyroid Diseases CHF DLP(Dyslipidemia)
Symptoms and examination	BP PR(Pulse rate) Edema Weak peripheral pulse Lung rales Systolic murmur Diastolic murmur Typical Chest pain Dyspnea Function class Atypical Nonanginal chest pain Exertional chest pain Low th Ang
ECG	Rhythm Q wave St elevation St depression T inversion LVH Poor R-Wave Progression
Laboratory and echo	Fbs, Cr, TG, LDL, HDL, BUN, ESR, HB, K, NA, WBC, Lymph, Neut, PLT, EF, Region with RWMA,VHD.

A. Architecture

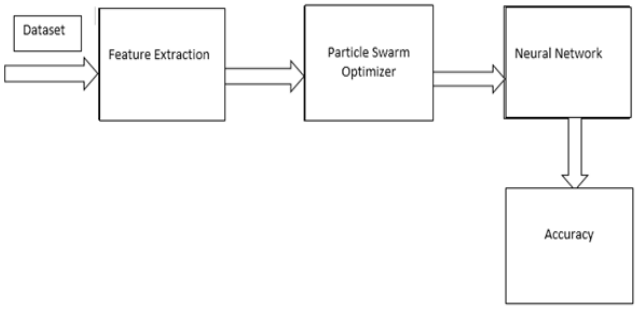

Figure 1. Block Diagram

Z-Alizadeh Sani dataset is considered for the work. Where the dataset contains information on 303 patients, 216 of whom suffered from CAD. Fifty-four features were collected for each patient. Firstly dataset is send for pre-processing where noise and missing data or record are removed. For feature selection, weight by SVM and principal component analysis (PCA) were used. In weight by SVM, attribute weights are the coefficients of the normal vector of a linear SVM .PCA converts a set of correlated variables into a smaller number of uncorrelated variables employing an orthogonal transformation. Later the selected feature are passed for the particle swarm optimization algorithm for the generation of global best weight. Where global weight are given as input for neural network for training and testing.

B. Workflow

The evolutionary algorithm approach is not the only approach for stochastic optimization of ANNs. In 1995, Kennedy and Eberhart introduced particle swarm optimization (PSO), which is a stochastic population-based search method inspired by social behaviour of animals such as birds. It is known that PSO is also successful for optimization of ANNs and in this case it produces better results than GAs. PSO excels in global search and compare to back propagation (BP) algorithm, which is a very common gradient based method for training the connection weights of ANNs, PSO shows faster convergence. Compared to evolutionary algorithms, PSO is faster

in approaching the optima. PSO consists of a swarm of particles where each particle has its own position and velocity. Each particle is initialized randomly at the beginning of the algorithm and the heuristics update the position and velocity in the latter stages of algorithm.

The pseudo code of PSO for global minimization problems is as follows:

Let P = fp1; p2; p3; : : :png be set of particles where each pi is of d dimensions;

pid = fpi1; pi2; : : : ; pidg. Each particle has its own

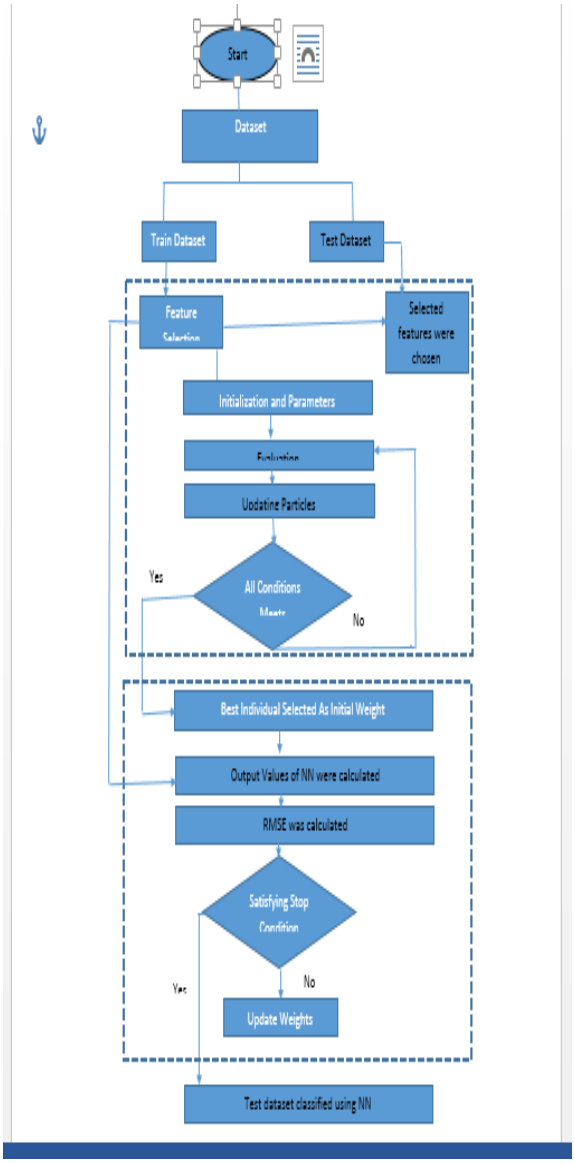

Figure 2. Workflow

individual velocities vi i.e.,

V = fv1;v2;v3; : : : vng.

Start

Initialize positions and velocities randomly of permissible range for each particle.

While convergence criteria is not met

DO

For each particle

Calculate the fitness value

If the fitness value of the particle is less than pibest (old) then

Update pibest to present value

End if

End

Update gbest with the particle that provides best fitness value of all the particles in

the swarm

For each particle

For each dimension

vid = w _ vid(old) +c1*rand*(pibestd _pid)+c2*rand*(gibestd _pid) // update

particles velocity

pid = pid (old)+vid // updating particles position

end for

end for

END

IV. RESULT DISCUSSION

A. Preprocessing and Feature extraction

The dataset contains 54 features for each record. Firstly all the missing data are removed. The values of all 54 features are converted into numeric. Where 'Yes' is considered as 1 ,'No' is considered as 0.For the feature extraction Principal component analysis and weighted svm[5] are mainly used. The Fig 4 shows the extracted features for training purpose.

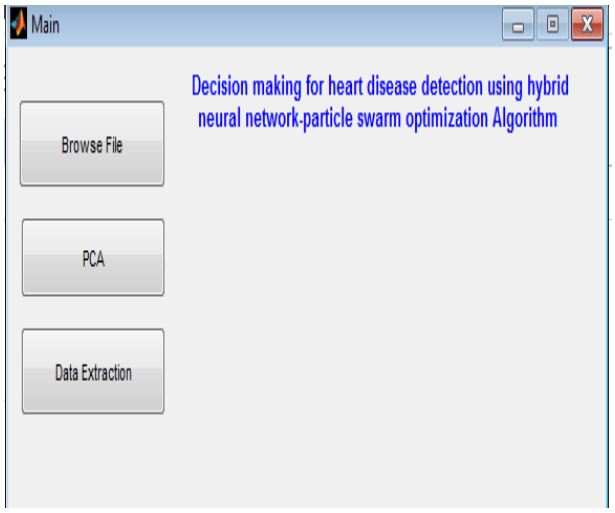

Figure 3. PCA Feature Extraction

Feature
Typical chest pain
Atypical
Age
Nonanginal
DM
Tinversion
FH
Region RWMA
HTN
TG
PR
Diastolic murmur
Current smoker
Dyspnea
ESR
BP
Function class
Sex
FBS
St depression
St elevation
Q wave

Figure 4. Selected features

B. Traning and testing phase

Artificial neural network (ANN) serves the objective providing a model which has the ability to relate very complex input and output datasets. This ANN model works extremely well for very complex data sets which are normally very difficult to predict using mathematical modelling (equations). The ANN is a network of neuron connected among themselves through weights and biase. Once the structure of the ANN is formed then the next task is to train the network.

Training of the networks means finding the optimum values of various weights and biases of the network. Normally, various types of techniques are used to find the suitable values of weights and biases of the ANN.

I this work, optimum training of the network have been obtained through particle swarm optimization (PSO).

The following seven steps have been used to train ANN using PSO.

Step 1) Collect dataset.

Step 2) Create input data and output data from the dataset.

Step 3) PSO algorithm parameters gets initialized.

Step 4) Weights gets generated.

Step 5) Training using PSO and neural network .

Step 6) Check the Network

Step 7) Testing

```
*****************************************
 RUN fval ObFuVa
     1 0.0964526    0.0965
Elapsed time is 163.723091 seconds.
Final nn model is net_f

err =

    0.0965

Trained ANN net_f is ready for the use
```

Figure 5. Result of traning phase

The trained ANN is '**net_f**'. Once the training is completed the regression plot will be displayed. Figure 6 shows the regression plot of the trained ANN (net_f). From this figure, it is observed that regression coefficient R is 0.77978.

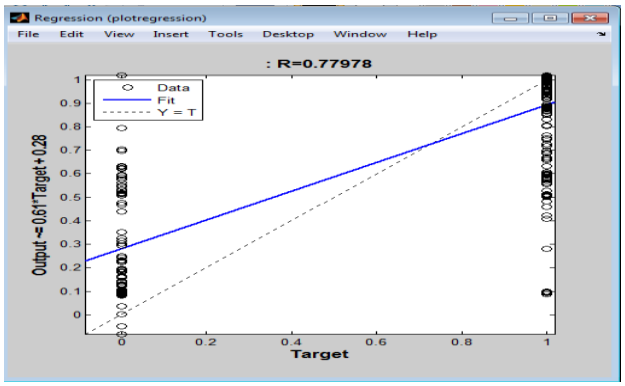

Figure 6. Regression Plot

IV. CONCLUSION

We proposed a new hybrid method to augment the perfor- mance of neural network. The method put forth can ameliorate the performance of neural

network as concerns CAD detection. Specifically, using this method, CAD can be detected without angiography which can help eliminate high costs and major side effects. Meanwhile, other versions of neural networks can be tested and compared. Parameters like learning rate, and momentum factor can also be optimized for this work. Finally, new data with some other features must be checked by this algorithm.

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Artificial Intelligence, its Applications and Associated Technologies

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ABSTRACT

This paper reviews the meaning of Artificial Intelligence and its various advantages and disadvantages including its applications. It also considers the current progress of this technology in the real world and discuss the applications of Artificial Intelligence in the fields of handwriting recognition, Speech recognition, Intelligent robots, Knowledge representation, Game theory and Strategic planning, Natural Language processing, aviation, Weather forecasting and Expert systems. This paper concludes by analysing the future potential of Artificial Intelligence.

Keywords: Artificial Intelligence, Turing test, Expert system, Speech recognition, Natural Language Processing

I. INTRODUCTION

Since the invention of computers or machines their capability to perform various tasks went on growing exponentially. Humans have developed the power of computer system in terms of their diverse working domains, their increasing speed and reducing size with respect to time. A branch of computer science named Artificial Intelligence pursues creating the computers or machines as intelligent as human beings.

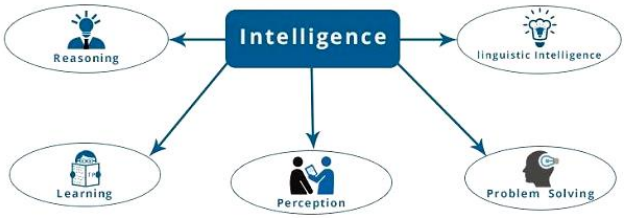


Figure 1. Overview of Intelligence

Intelligence in simple language is the computational part of the ability to achieve goals in the world. Intelligence is the ability to think, to imagine creating memorising and understanding, recognising patterns, making choices, adapting to change and learn from experience.

Artificial Intelligence is concerned with making computers behave like humans more human like fashion and in much less time, than a human takes. Hence it is called as Artificial Intelligence. According to the father of Artificial Intelligence, John McCarthy, "The science in engineering of making intelligent machine, especially intelligent computer program".

Artificial Intelligence is accomplished by studying how human brain think, and how humans learn,

decide and work while trying to solve a problem and then using the outcomes of this study as a bases of developing intelligent software and systems.

A. Philosophy of AI

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, "Can a machine think and behave like humans do?" Thus

the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

AI can be divided into two parts according to Philosophy of AI

a) Strong AI
b) Weak AI

Strong AI

The principle behind strong AI is that machines could be made to think or in other words could represent human minds in the future. Thus strong AI claims that in our future we will be surrounded by such kinds of machine which can completely works like human being and machine could have human level intelligence. If that is the case those machines will have the ability to reason, think and do all functions that a human is capable of doing. Current research is nowhere, near creating strong AI, and a lively debate is ongoing as to whether this is even possible.

Weak AI

The principle behind Weak AI is simply the fact that machine can be made to act as if they are intelligent. Weak AI simply states that thinking like features can be easily added to computer to make them more useful tools and this already started to happen. For example, when a human player plays chess against a computer, the human player may feel as if the computer is actually making impressive moves. But the chess application is not thinking and planning at all. All the moves it makes are previously fed in to the computer by a human and that is how it is ensured that the software will make the right moves at the right time. More examples of Weak AI are witness expert systems and speech recognition systems.

Intelligence = perceive + Analyse + React

Also, there is a huge difference between short term memory and RAM. Short-term memory holds the pointer to the long term memory where all the information is actually stored while RAM stores data that is isomorphic to data being held on hard disk. Also RAM has a memory limit while there seems to be no capacity limit when it comes to short-term memory.

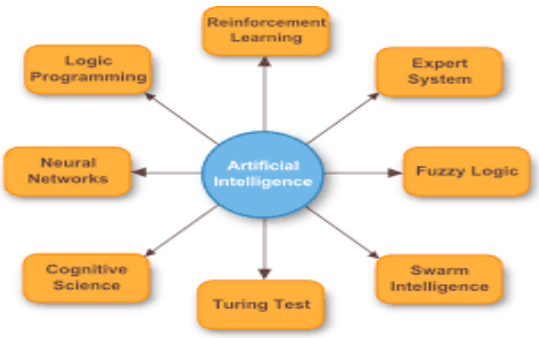


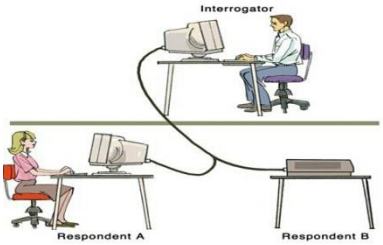
Figure 2. Overview of Artificial Intelligence

B. Turing Test

This test was introduced by Alan Turing in his 1950 paper "Computing Machinery and Intelligence". The original question behind this test was "Can machines think?"

A Turing test is a test performed to determine a machine's ability to exhibit intelligent behaviour. The basic concept behind the test is that if the human judge is engaged in a natural language conversation with a computer where he cannot reliably distinguish machine from human, machine passes the test. Responses from both the participants in the conversation are received in the form of a text-only channel.

The Turing test is used to measure a machines ability to think and is an important concept in the Philosophy of AI. A machine's success at thinking can be quantified by the likelihood that a human will misidentify as a human subject.



In a Turing test, the interrogator must determine which responses are from the computer and which are from the human

Figure 3. Turing Test

A computers ability to think is determined through an imitation game. In this game there are 3 players A, B and C. Player A is a man, B is a woman and C is of either sex. C cannot see A and B, and communicates with the others through written notes. Player C determines which of the others is a man and which is a woman by asking a series of questions. Player A tricks the interrogator into making wrong decisions, while B attempts to guide C towards the right path.

In the original imitation game test Turing proposes A to be a computer. The computer pretends to be a woman and tricks the interrogator into making an incorrect evaluation. The machines success is determined by comparing the outcome of the game when A is a computer against when A is a man. If the interrogator goes wrong when playing the game between man and woman, the computer is assessed to be intelligent. There are some variations on the interpretations of how a Turing test should be performed but the basic premise is whether a human judge can determine whether he is talking to a machine or another human.

C. Roots of AI

AI draws from many areas from philosophy, from mathematics, from economics, Biology and psychology, and from computer engineering, and also from linguistics.

Philosophers have analysed the nature of knowledge and have explored formal frameworks for developing conclusions. There have been mathematical formulations in logic, in computation and probability.

Economists have developed decision theory and biologists have recent about how the brain process information. Psychologists have long studied human cognition and they require knowledge about the nature of human intelligence.

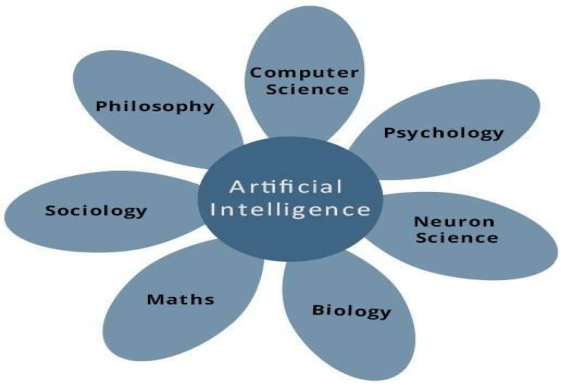


Figure 4. Roots of AI

The discussions about the importance of AI in our life have gained momentum in recent year.

Is it a boon or bane to future of human existence? , is an ongoing debate.

The very idea to create an artificial intelligence is to make the lives of human easier. Researchers of AI want to bring in the emotional quotient to the machines along with the general intelligence.

II. PROS AND CONS OF AI

Advantages

- Error reduction: AI helps us in reducing the error and chance of reaching accuracy with a greater degree of precision is a possibility. It is applied in various studies such as Exploration of space.
- Difficult exploration: AI and the science of robotics can be put to use in mining and other fuel exploration processes. Not only that, these complex machines can be used for exploring the ocean floor and hence overcoming the human limitations. Due to the programming of the robots, they can perform more laborious with greater responsibility. Moreover, they do not wear out easily.
- Daily Applications: Computed methods for automated reasoning, learning and perception have become a common phenomenon in our everyday lives. We have our lady SIRI or CORTANA to help us out. Artificial Intelligence is widely employed by financial institutions and

banking institutions to organize and manage data. Detection of fraud uses artificial intelligence in a smartcard based system.

- Digital Assistants: Highly advanced organizations use 'avatars' which are replicas or digital assistants who can actually interact with the users, thus saving the need of human resources. For artificial thinkers, emotions come in the way of rational thinking and are not a distraction at all. The complete absence of the emotional side makes the robots think logically and take the right program decisions. Emotions are associated with moods that can cloud judgment and affect human efficiency. This is completely ruled out for machine intelligence
- Repetitive jobs: These are monotonous in nature can be carried out with the help of machine intelligence. Machines think faster than humans and can be put to multi-tasking. Machine intelligence can be employed to carry out dangerous tasks. Their parameters, unlike humans, can be adjusted. Their speed and time are calculations based parameters only. We consider gaming to be the most common use of the benefits of artificial intelligence.
- Medical Applications: Medical professionals are often trained with the artificial surgery simulators. It finds a huge application in detecting and monitoring neurological disorders as it can simulate the brain functions. Robotics is used often in helping mental, health patients to come out of depression and remain active. A popular application of artificial intelligence is radio surgery. Radio surgery is used in operating tumors, this can actually help in the operation without damaging the surrounding tissues.
- No Breaks: Machines, unlike humans, don't require frequent breaks and refreshments. They are programmed for long hours and can continuously perform without getting bored or distracted or even tired.

DISADVANTAGES

- High cost: Creation of artificial intelligence requires huge costs as they are very complex machines. Their repair and maintenance require huge costs. They have software programs which need frequent up gradation to cater to the needs of the changing environment and the need for the machines to be smarter by the day. In the case of severe breakdowns, procedure to recover lost codes and re-instating the system might require huge time and cost.
- No replicating humans: Intelligence is believed to be a gift of nature. An ethical argument continues, whether human intelligence is to be replicated or not. Machines do not have any emotions and moral values. They perform what is programmed and cannot make the judgment of right or wrong. Even cannot take decisions if they encounter a situation unfamiliar to them. They either perform incorrectly or breakdown in such situations.
- No improvement with experience: Machines are unable to alter their responses to changing environments. We are constantly bombarded by the question whether it is really exciting to replace humans with machines. In the world of artificial intelligence there is nothing like working with a whole heart or passionately. Care or concerns are not present in the machine intelligence dictionary. They fail to distinguish between a hardworking individual and an inefficient individual.
- No original creativity*:* They are not the forte of artificial intelligence. While they can help you design and create, they are no match for the power of thinking that the human brain has or even the originality of a creative mind. Human beings are highly sensitive and emotional intellectuals. They see, hear, think and feel. Their thoughts are guided by the feelings which completely lacks in machines. The inherent intuitive abilities of the human brain cannot be replicated.

- Unemployment: Replacement of humans with machines can lead to large scale unemployment. Unemployment is a socially undesirable phenomenon. People with nothing to do can lead to the destructive use of their creative minds. They will lose their creative power and will become lazy. Also, if human starts thinking in a destructive way, they can create havoc with these machines.

III. CURRENT PROGRESS

Artificial Intelligence has created with the sole aim of mimicking or even outperforming human minds. Thus it is very important we question the fact that whether it has actually been able to do so.

It cannot be ignored that the fact of AI is being used all around us especially in the fields of medicine, robotics, law, stock trading etc. It is being used in homes and big establishments such as military bases and the NASA space station. NASA has sent out artificially intelligent robots to planets so as to learn more about their habitat and atmosphere, with the intention of investigating if there is a possibility of human living on these planets.

Expert systems have been used by Mercedes Benz and other auto manufacturers in the design of vehicle components, subway systems in Washington, D.C. use expert system software controllers to cause subway trains to stop within 3 inches of the right spot on the platform. These trains have motormen primarily to reassure passengers. AI has filtered into general applications in these fields and has become so common that is not referred to as Artificial Intelligence anymore. Blind supporters of AI would point to the time when AI Deep Blue II defeated chess master Garry Kasparov to prove that Artificial Intelligence can in fact be smarter than humans. Though there is no doubt that the AI Deep Blue II won that game, it is still probably one of the dumbest software alive. The operators were programming the AI in every round depending on the opposition's last move. Also, the Deep Blue II had studied all of Kasparov's previous games while the latter wasn't given the same benefit. One can safely say that even though the Deep Blue II AI defeated Kasparov, it was a never a fair fight to begin with.

Latest technologies like Xbox 360's Kinect and iPhone' s Siri use algorithms based on Artificial Intelligence, but it is a well known fact that these technologies are a long way from being perfect. Thus we can safely conclude that though Artificial Intelligence has made lot of progress in the past few decades, it is not a level where in one can confidently state that it is now ready to completely replace the human mind. That being said, large-scale research is now being conducted into the field of proper simulation of the human brain. Cortex is a project by Artificial Development Inc. and Swiss government's IBM sponsored Blue Brain Project, are two main ventures, whose goal is to simulate the human brain.

IV. APPLICATIONS

Artificial Intelligence in the form of neural networks and expert systems has applications in almost all human activities. The combination of high precision and low computation time makes AI a cutting edge technology. Robot ES' s are already taking over workshop level jobs in large industries, thus side lining humans into a more supervisory role. Stock brokerage firms are now using Artificial Intelligence to analyse data, make analysis and buy or sell stocks without the interference of any human beings beings.

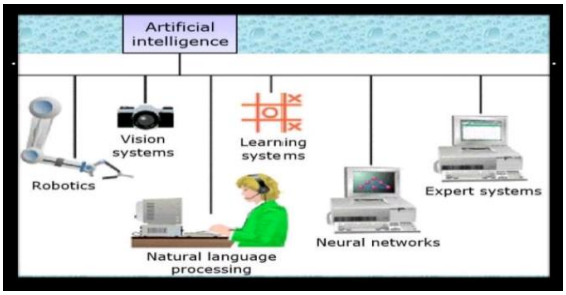


Figure 5. Applications

Artificial Intelligence has been dominant in various fields such as-

- Gaming- AI plays crucial role in strategic game such as chess, poker, tik- tak- toe etc, where machine can think of large number of possible positions based on heuristic knowledge.
- Natural Language Processing- It is possible to interact with the computer that understands natural language spoken by humans.
- Expert Systems- There are some applications which integrate machine software and special information to impart reasoning and advising. They provide explanation and advice to the users.
- Knowledge representation- Data mining seeks to discover interesting patterns from large volumes of Data. These patterns can take various forms, such as associated rules, classification rules, and decision trees, and therefore, knowledge representation becomes an issue of interest in data mining.
- Vision Systems- These systems understand, interpret, and comprehend visual input on the computer. For example a) Spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas. b) Doctors use clinical expert systems to diagnose the patient. c) Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.
- Speech Recognition- Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.
- Handwriting Recognition- The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognise the shape of the letters and convert it into editable text.
- Intelligent Robots- Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit Intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.
- Weather forecasting- Neural networks are nowadays being used for predicting weather conditions. Past data is provided to the neural network, which then analyses the data for patterns and predicts the future weather conditions.

V. FUTURE SCOPE

Artificial Intelligence is used by one another after the company for its benefits. Also, it's fact that Artificial Intelligence is reached in our day-to-day life, moreover with a breakneck speed.

On the basis of this information, arises a new question:
Is it possible that artificial intelligence outperforms human performance?
If yes, then is it happens and how much does it takes?
Only when artificial intelligence is able to do a job better than humans.

According to the survey results:

- machines are predicted to be better than humans in translating languages;
- running a truck;
- working in the retail sector, and can completely outperform humans by 2060

As a result, MI researchers believed that AI will become better than humans in the next 40year time frame

- To build AI smarter, companies have already acquired around 34 AI start-ups. It was acquired in the first quarter of 2017. These companies are reinforcing their leads in the world of Artificial Intelligence.
- In every sphere of life, AI is present. We use AI to organize big data into different patterns and

structures. Also patterns help in neural network, machine learning, and data analytics.

From 80's to now, Artificial Intelligence is now part of our everyday lives, it's very hard to believe. Moreover it is becoming more intelligent and accepted every day.

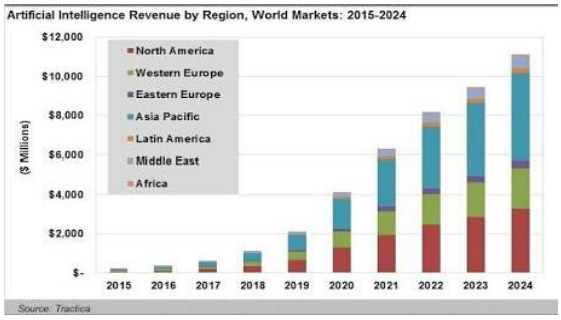


Figure 6. Artificial Intelligence revenue by Region

VII. CONCLUSION

AI is at the centre of new enterprise to build computational models of Intelligence. The main assumption is that Intelligence (human or other ways) can be represented in terms of symbol structures and symbolic operations which can be programmed in a digital computer. There is much debate as to whether such an appropriately programmed computer would be a mind, or would merely simulate one, but AI researchers need not wait for the conclusion to that debate, such as identifying diseases, nor for the hypothetical computer that could model all of human intelligence. Aspects of intelligent behaviour, such as solving problems, making inferences, learning, and understanding language, have already been coded as computer programs, and within very limited domains of soybean plants, AI programs can outperform human experts. Now the great challenge of AI is to find ways of representing the commonsense knowledge and experience that enable people to carry out everyday activities such as holding a wide-ranging conversation, or finding their way along a busy street. Conventional digital computers may be capable of running such programs, or we may need to develop new machines that can support the complexity of human thought.

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Automated Detection of Optic Disc Location in Retinal Images using Histogram Matching

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ABSTRACT

In this article, we propose a new method for localizing optic disc in retinal images. Localizing the optic disc and its center is the first step of most vessel segmentation, disease diagnostic, and retinal recognition algorithms. We use optic disc of the first four retinal images in DRIVE dataset to extract the histograms of each color component. Then, we calculate the average of histograms for each color as template for localizing the center of optic disc. On this data set, our method achieved 95% success rate for the localization of the optic disc and 70% success rate for the identification of the optic disc contour (as a circle).

Keywords. Optic disc', Retinal image, Identification algorithms, Diabetes, DRIVE and STARE dataset

I. INTRODUCTION

OD(optic disc)detection is the main step while developing automated screening systems for diabetic retinopathy and glaucoma. OD boundary and localization of macula are the two features of retina necessary for the detection of exudates and also knowing the severity of the diabetic maculopathy

Retina is the innermost layer of the eye which can be visua-lized using adequate apparatus such as fundus camera. The two main structures used in retinal image analysis are blood vessels and optic disc. The automatic and efficient detection of the position of the OD in colour retinal images is an important and fundamental step in the automated retinal image analysis system [1]. Optic disc is a key reference for recog-nition algorithms [2,3], blood vessels segmentation [4], and diagnosing some diseases such as diabetes [5]. Histo-gram is the main character of each image and histogram-based methods are used as the first step of most prepro-cessing methods to improve the contrast and illumination of retina images. One of the main drawbacks of uneven illumination in retina images and their poor quality is the inability to analyze the optic disc. Applying illumination equalization (histogram equalization, histogram specifica-tion, and other normalization methods) as preprocessing methods to retina images considerably improves the contrast, and illumination for further analysis tasks such as optic disc localization and vessel segmentation [6,7]. In this article, we propose a new method based on the histo-grams of some optic discs extracted from retinal images. For this purpose, we extract the optic disc of the first four retinal images in DRIVE dataset. Then, we calculate the average of histograms for each color component as template to localize the center of optic disc.

II. REVIEW OF PREVIOUS METHODS

Location of the retinal OD has been attempted by several researchers recently. According to S. Sekhar *et al.*, the OD is usually the brightest component on the fundus, and therefore a cluster of high intensity pixels will identify the OD location [7].

Osareh [8] proposed a method based on template matching for localizing the center of optic disc. In this algorithm, some of retinal images in dataset were used to create a template and the correlation between each image and template is computed. The point which has the maximum correlation value is selected as the center of optic disc.

The registration of retinal images is an important step for super-resolution and image change detection. Unique feature points within image are used as control points for registration. OD is an unique anatomic structure within retinal image. These methods play major role in automatic clinical evaluation system. When feature based registration algorithms are used, the accuracy of the features themselves must be considered in addition to the accuracy of the registration algorithms [9]. OD acts as landmark feature in registration of multimodal or temporal images.

Li and Chutatape [10] proposed a new method to localize optic disc center. The candidate regions were first determined by clustering the brightest pixels in retinal images. This strategy can only work when there is no abnormality in the retina image. Principal component analysis was applied to these candidate regions. The minimum distance between the original retinal image and its projection onto disk space was located as the center of optic disc.

Rangayyan et al. [11,12] proposed two different methods. In the first method, optic disc center was localized based on the property that it appears as the focal point of the blood vessels in retina mage. The method includes detec-tion of the blood vessels using Gabor filters and detection of peaks in the node map via phase portrait analysis. In the second method, edge detection using the Sobel operators and detection of circles using the Hough transform were employed to localize optic disc and its center.

Aquino et al. [13] used two independent methodologies to detect optic disc in retina images. Location methodology obtains a pixel that belongs to the optic disc using image contrast analysis and structural filtering techniques. Then, a boundary segmentation methodology estimates a circular approximation of the optic disc boundary by applying mathematical morphology, edge detection techniques, and the circular Hough transform.

Siddalingaswamy and Gopalakrishna Prabhu [14] pro-posed a new approach for the automatic localization and accurate boundary detection of the optic disc. Iterative thresholding method followed by connected component analysis was employed to localize the approximate center of the optic disc. Then, geometric model based on

Foracchia et al. [15] presented a new technique for localizing the optic disc center in retinal images. The method was based on the preliminary detection of the main retinal vessels. All retinal vessels originate from the optic disc and their path follows a similar directional pattern (parabolic course) in all images. To describe the general direction of retinal vessels at any given position in the image, a geometrical parametric model was proposed, where two of the model parameters are the coordinates of the optic disc.

Carmona et al. [16] used genetic algorithm method to obtain an ellipse approximating the optic disc in retinal images. A set of hypothesis points were initially obtained that exhibited geometric properties and intensity levels similar to the optic disc contour pixels. Then, a genetic algorithm was used to find an ellipse containing the maximum number of hypothesis points in an offset of its perimeter, considering some constraints.

A number of other interesting algorithms can be found in the literature that used vessel segmentation results for optic disc localization [17-20].

Li *et al.* [21] presented a model based approach in which an active shape model was used to extract the

main course of the vasculature based on the location of the OD. Next, the information from the active shape model was used to find the macular centre.

Huajun Ying *et al.* [22] utilized fractal analysis to differentiate OD area from other large and bright regions in retinal images due to the fact that the OD area is the converging point of all major vessels.

An important prerequisite for automation is the accurate localization of the main anatomical features in the image. An accurate and efficient detection of these structures is a significant task in an automated retinal image analysis system.

The contribution of this work is that we propose an automatic system to locate an OD not only in normal, healthy images but also in images affected because of diseases such as diabetic retinopathy and images of poorer quality. There are more chances of false OD detection in images affected due to diseases and images of poor quality than desirable. The problem with retinal images is that the quality of the acquired images is usually not good. As the eye-specialist does not have complete control over the patient's eye which forms a part of the imaging optical system, retinal images often contain artifacts and/or are of poorer quality than desirable [24]. Despite controlled conditions, many retinal images suffer from non-uniform illumination given by several factors. the curved surfaces of the retina, pupil dilation (highly variable among patients) or presence of disease among others [25]. However, our system avoids detecting false OD applying different criteria based on different principles. We tested proposed system on 453 retinal images which include normal (healthy) as well as abnormal (affected) retinal images. We are able to locate OD in 98.45% of all tested cases. Once the OD is located accurately, its centre is also located accurately.

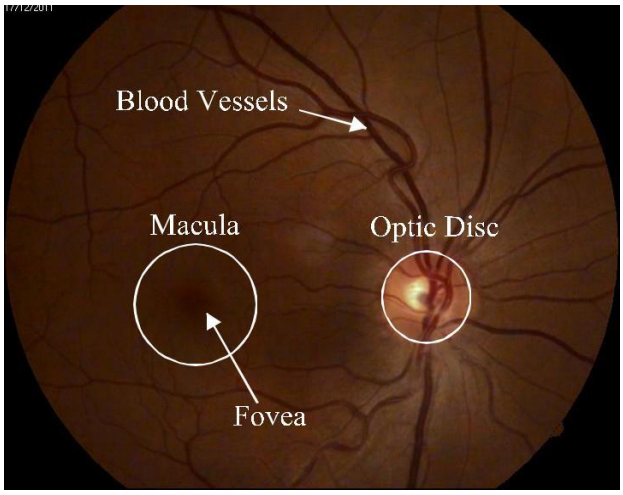

Figure 1. Retinal components

OD has approximately 0.5-mm thick and covers the inner side at the back of the eye. The center of the retina is the optical disc, a circular to oval white area measuring about 3 mm^2 (about 1/30 of retina area). The mean diameter of the vessels is about 250 μm (1/40 of retina diameter).

The main retinal components from figure[2]

1- Superior temporal blood vessels
2- Macula
3- Fovea
4- Optic disc

III. METHOD

Most of the methods for localizing optic disc fail when pathological regions exist in retina images . Some other algorithms suffer from high computational cost. Here, a new robust method for localizing the center of optic disc in presence of pathological regions is proposed. Since in this method preprocessing algorithms such as segmentation are not used, the computational cost is drastically reduced with respect to some counterparts.

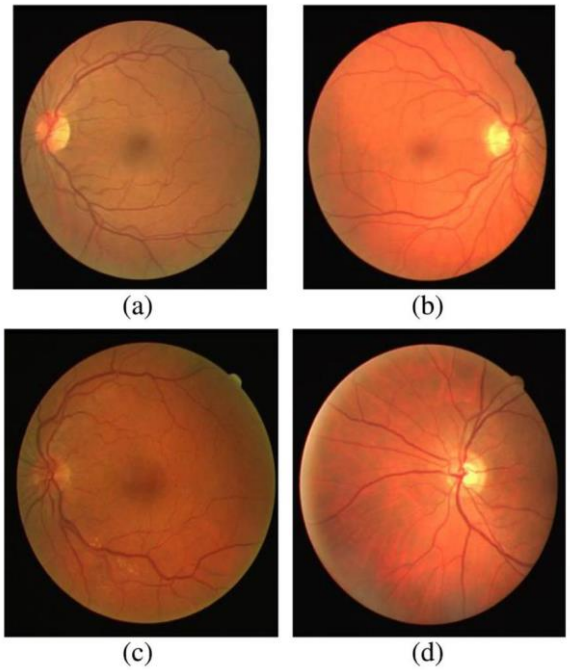

Figure 2. The four retinal images used to obtain their optic disc

In this method, we use a number of retinal images to create a template for optic disc. However, instead of creating an image as template, we construct three histograms as template, each corresponding to one color component. At the first step to decrease the effect of noise, we apply an average filter with the size of 6 × 6 pixels to retina images. Then, we use a window with the typical size of the optic disc (80 × 80 pixels) to extract the optic disc of each retinal image. In the next step, we separate color components (red, blue, and green) of each optic disc to obtain the histogram of each color compo-nent. Finally, the mean histogram of each color compo-nent for all retinal image samples is calculated as template. Histogram is a graph showing the number of pixels at each different intensity value found in an image. As illustrated before, we use the histogram of each three channels (red, green, and blue) as template for optic disc localization. Then, to decrease the effect of pathological regions and exudates that are high-bright regions like optic disc, we use the histogram of pixels which has the intensity value lower than 200. Therefore, we decrease the effect of high intensity regions that are common in optic disc, patho-logical regions and exudates and the role of vessels for optic disc localization will increase.

Template matching

Up to now, we determined three histograms as template for localizing the center of optic disc. For localizing the center of optic disc, at first step to decrease the effect of noise an average filter with the size of 6 × 6 pixels is applied to retina image. Then, an 80 × 80 pixels window is moved through retinal image. In each moving window, we separate the channels (red, blue, and green) and obtain the histogram of each channel. Then, we calculate the correlation between the histogram of each channel in the moving window and the histograms of its corresponding channel in template. For this purpose, we can use correlation or cross-correlation function to obtain the similarity of the two histograms; however, the optic disc centers obtained using these methods are not accurate.

where a and b are two histograms that we want to calculate their correlation and c is the result of the correlation. Therefore, if the two histograms (a and b) are similar $\Sigma_i (a_i - b_i)^2 \approx 0$, and $c \approx 1$, else and $c \ll 1$ because the contrast of the green channel is higher than red and blue channels [27]. In some retinal images, blue channel is noisy; therefore, to decrease the effect of blue channel on our localizing method.

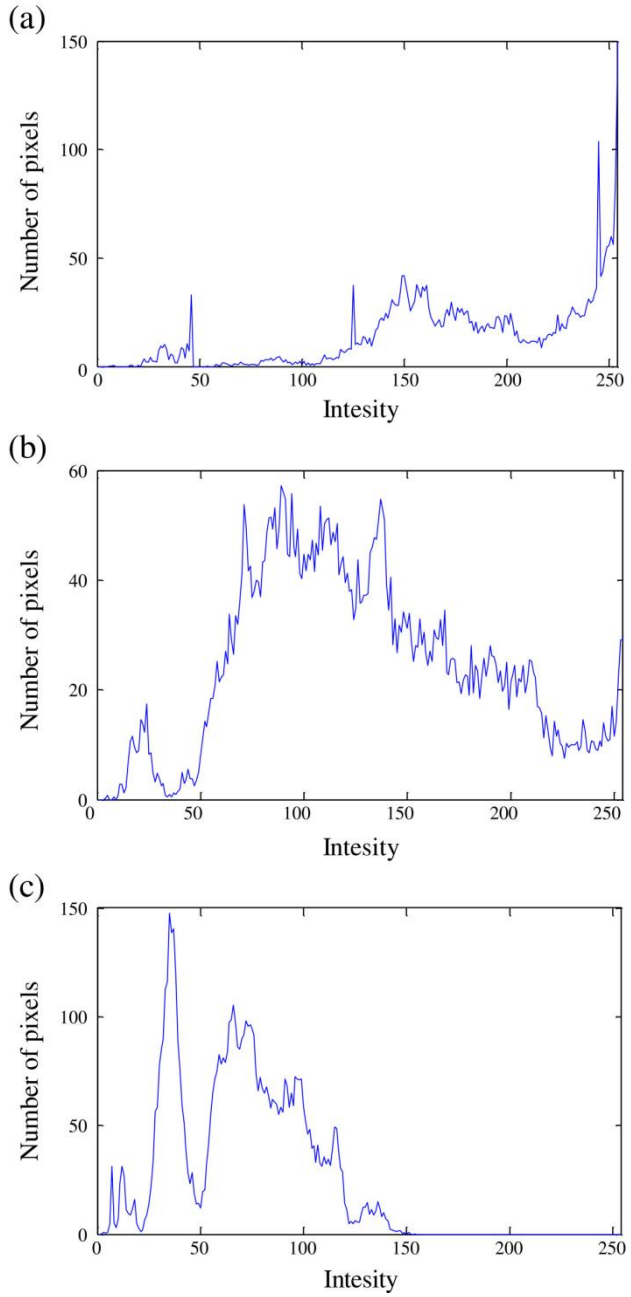

Figure 3. Histograms for three channels.(a) red, (b) green, (c) blue.

Here the contrast of the green channel is higher than red and blue channels]. In some retinal images, blue channel is noisy; therefore, to decrease the effect of blue channel on our localizing method, we determine the lowest weight for blue channel. The best weights that result high accuracy rate for optic disc localizing method are tr=0.5, tg=2, and tb=1. To localize the center of optic disc.

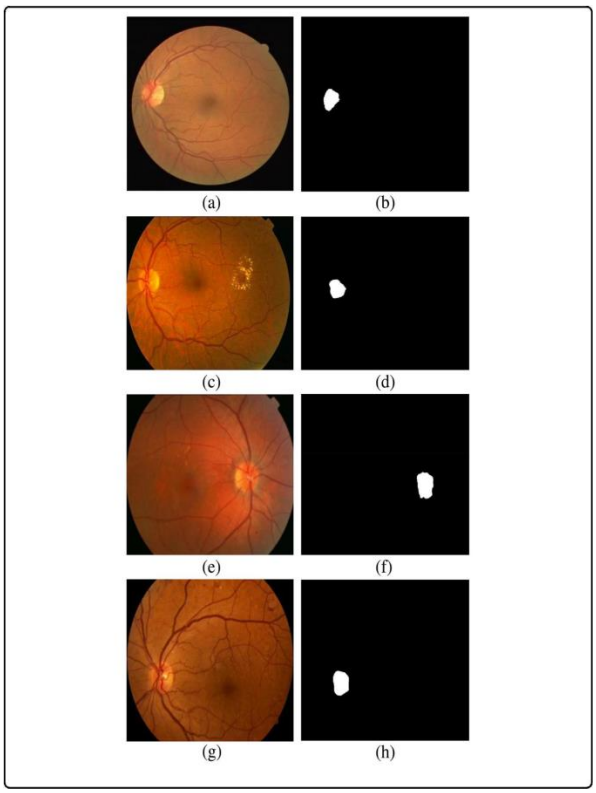

Figure 4. (a, c, e, g) Original images; (b, d, f, h) results of applying thresholding.

For finding the best threshold, we did a global scanning of different values and the best equation to determine the threshold (Th) was obtained as follows.

Th ¼ 0.5 maxð C Þ ð3Þ

where max(C) is the element of C with the maximum value. Therefore, the threshold value for each image is half of the maximum value of the correlation function. The center of gravity of the binary image obtained from thresh-olding is considered as the center of optic disc.

IV. RESULTS

We used the optic disc of the first four retinal images in DRIVE dataset to obtain their histograms as tem-plate. The first four retinal images from DRIVE dataset that have been used to extract the histograms of their optic disc are shown in Figure 5. The mean histogram of each color component for the optic discs of these four retina images is calculated as template.

In Figure 3, we can see three histograms obtained as template for localizing the center of optic disc.

The proposed method was applied on a dataset including 40 retina images from DRIVE dataset (565 × 584 pixels), 81 retinal images from STARE dataset (605 × 700 pixels) [29], and 273 retinal images from a local dataset (720 × 576 pixels). Retina images in local dataset were captured by a Canon CR5 in Razi clinica from normal and abnormal eyes. The success rate was 100, 91.36, and 98.9% for these three datasets, respectively. In Figure 5, some retina images in datasets and the results of applying threshold before determining the center of optic disc are shown.

In Figures 6, 7, and 8, the results of the proposed method for some retinal images in our datasets are shown. In presence of abnormality in the eye (pathological regions or exudates), using the histogram analysis

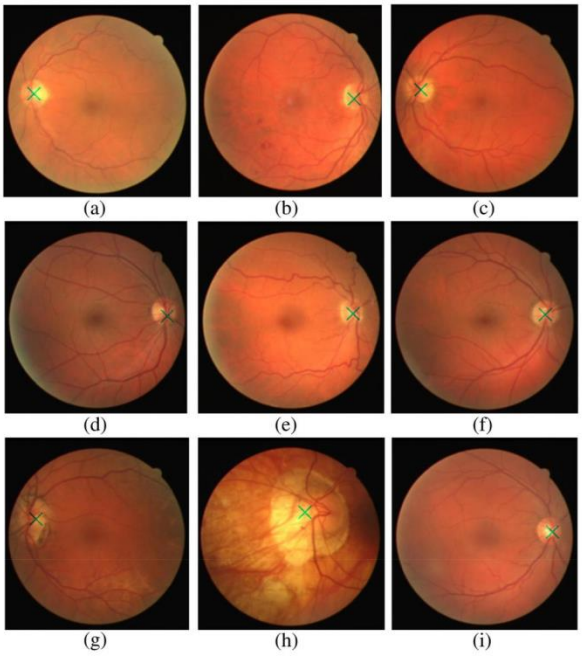

Figure 5. Optic disc center for retina images in DRIVE dataset.

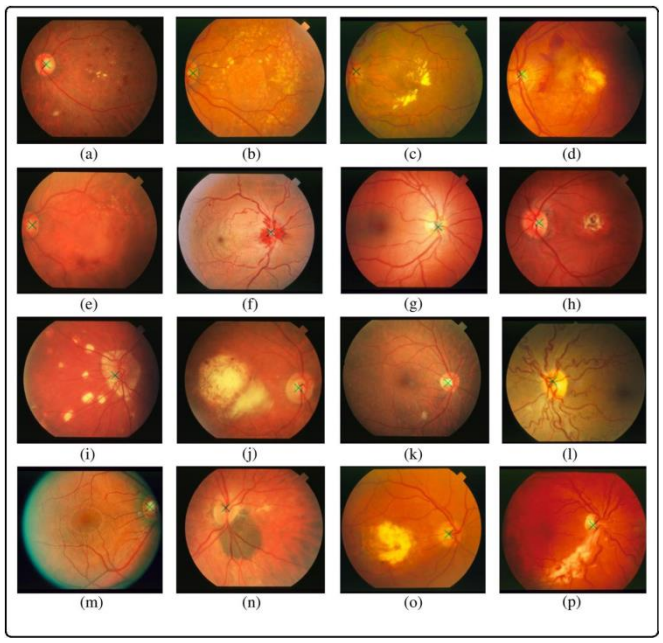

Figure 6. Optic disc center for retina images in STARE dataset.

of optic disc is more effective. Pathological regions, exu-dates, and optic disc are bright regions in the retina images. Therefore, methods such as template matching or methods which are based on the segmentation results of blood vessels fail to localize the center of optic disc in presence of pathological regions and exudates in retina image.

Figures 5, 6, and 7 show the result of the proposed method on normal retina image and retina images with pathological regions and exudates. Despite the existence of dark hemorrhages or bright exudates and pathological regions, the results of the proposed method are satisfactory and it shows the effectiveness of the proposed method for localizing the center of optic disc. In Figure 9, some retinal images with incorrectly detected optic disc center are shown.

In Figure 7a, there is not any vessel in vicinity of optic disc and the characteristic of optic disc-like brightness and high number of vessels in vicinity of optic disc cannot be seen; therefore, our proposed method failed to localize the optic disc center. For the retinal image in Figure 9b, optic disc is in the corner of image and there is really no vessel in optic

disc. Therefore, our proposed method failed to localize the optic disc center. Therefore, in situation like Figure 9a that there are not any vessels in optic disc vicinity or in situation that we have pathological region with high number of vessels, our proposed method failed to localize optic disc center.

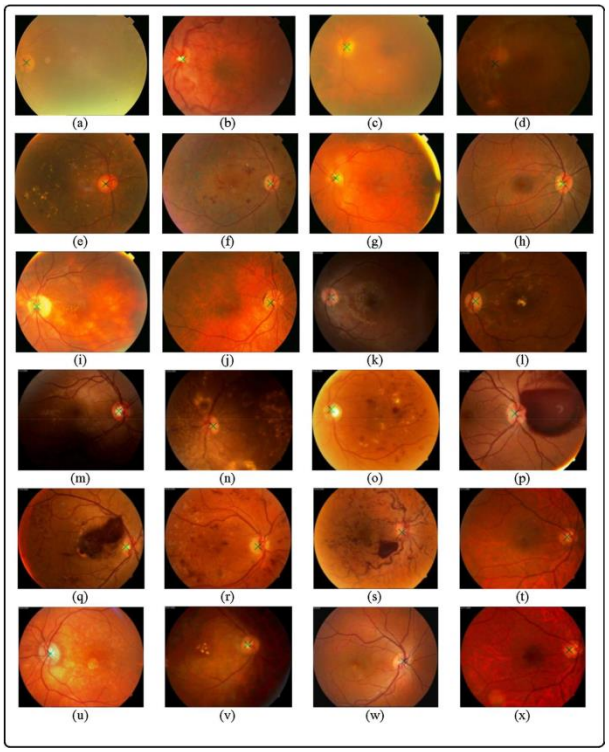

Figure 7. Optic disc center for retina images in local dataset.

Comparing the proposed method and its counterparts, Table 1 shows the effectiveness of the proposed method. The datasets used in the proposed method are larger than datasets used in other methods and thanks to avoiding pre-processing algorithms such as segmentation, the proposed method takes less computation time in

Figure 8. A number of retinal images with incorrectly detected optic disc center.

comparison to the counterpart methods. In Table 1, the running times of some methods are indicated. The system's configuration used in each algorithm was different. Therefore, simple comparison of the running time of different methods does not appear to be correct. A parameter which determines the running time of different methods is computational complexity. In methods that use segmentation, a large number of operations per pixel are needed and consequently these methods require high order of computational cost. In our proposed method, no preprocessing such as segmentation is required; therefore, it takes less computational time. To clarify that system's configuration does not have high effect we used a com-puter with system's configuration of Intel Core 2 Duo, 1.7 GHz, and 512 MB RAM and the average running time for this configuration was 32.5 s.

V. DATA SETS AND MATERIALS

The database we use is one public database used also by Park et al. [8], the DRIVE database (Digital Retinal Images for Vessel Extraction). The photographs for the DRIVE database were obtained from a diabetic retinopa-thy screening program in The Netherlands. Each image has been JPG compressed. The images were acquired us-ing a Canon CR5 non-mydriatic 3CCD camera with a 45 degree field of view (FOV). Each image was captured us-ing 8 bits per color plane at 768 by 584 pixels. The FOV of each image is circular with a diameter of approximately 540 pixels. For this database, the images have been cropped around the FOV. For each image, a mask image is provided that delineates the FOV. The data set includes 40 584x565 fundus images. Even if the database is divided into a train-ing set consisting of 20 images and a test set consisting of 20 images, we don't use images for training our sys-tem, as other systems were doing. We use all 40 images for testing our methodology.

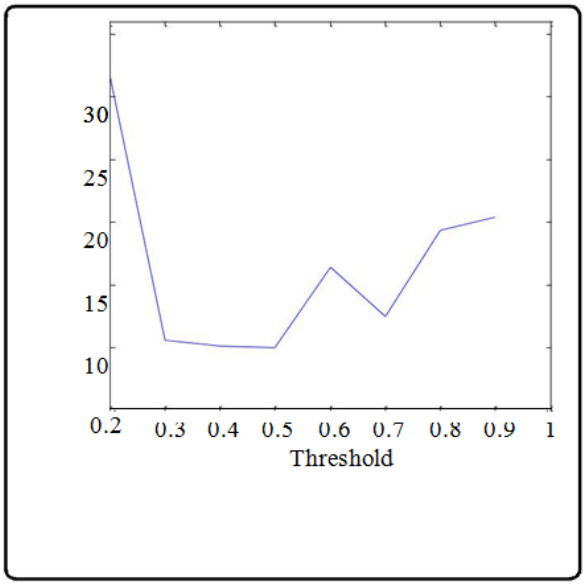

Figure 9. Sensitivity of the proposed method to thresholding based on average distance.

The average distance between the estimated and manually identified optic disc centers based on the different amount of thresholdings is plotted in figure 9

From Figure 10, we can understand the effect of thresh-olding on the average distance between the estimated and manually identified optic disc centers. Therefore, the best threshold value is half of the maximum value of the correlation function obtained before applying threshold.

VI. CONCLUSION AND FUTURE WORK

In this article, we presented a new method for localizing the center of optic disc. The average distance between the estimated and the manually identified optic disc centers is 17 and 26 pixels in [9] and 23.2 and 119 pixels in [11] for DRIVE and STARE datasets, respectively. These values in the proposed method are 15.9, 11.4, and 8.9 pixels for DRIVE, STARE, and local datasets, respectively. Therefore, the estimated optic disc centers obtained using the proposed method are more accurate in comparison to other algorithms such as methods introduced in [9,11,12]. In this article, we used the histograms of some optic discs and in presence of pathological regions and exudates in retinal images, and we could determine the center of optic disc correctly. Most of the counterpart methods perform well when there are no pathological regions or exudates in retinal images. In this article, the first four retinal images in DRIVE dataset were used to obtain their histograms as template, using more retinal images such as retinal images in STARE and local datasets may improve the effective-ness of our proposed method. Also to decrease the running time of our proposed method, we can combine our proposed method with other methods. For example, as we know template matching method proposed in fails in situation like pathological regions and exudates exit and also the accuracy of template matching method for localizing optic disc center of retina images without any pathological regions and exudates is low. Therefore, we can use template matching method for retina images to obtain candidate regions that probability of existing optic disc in them is more than other regions in retina images. Then, instead of applying our proposed method on the whole of retina images, we apply it to candidate regions to obtain optic disc center. Therefore, the running time of our proposed method will considerably decrease. In future work, we use optic disc center obtained as the first step for localizing the boundary of optic disc and also we can use the optic disc center for recognition algorithm in our future research for human recognition based on the retinal images.

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Intelligent Bot for Novice Reciprocal Action: A Survey

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ABSTRACT

Chatbot is the software delegates or programs designed to carry out near natural conversation with people. It is an artificial intelligent conversational entity. Chatbot is the current trends which are capable of automating services and thereby reducing human efforts. Turing test is said to measure the intelligence of chatbot and hence it must be able to pass it. This has been implemented with varying degrees of success. One of the most popular languages for the definition of a chatbot knowledge base is artificial Intelligence Mark-up Language (AIML).Just as people make use of language for human communication, similarly Chatbots make use of natural language to communicate with human users [1]. The intent of their creation is to simulate a way how a human interacts, attempt to cause user assume that they are writing to a human. In this work, we portray the transformation of chatbots from a simple model to an advanced intelligent system. For a chatbot to fully emulate a human dialogue, it must scrutinize the input given by a user accurately and devise a pertinent and best fitting response.

Keywords: chatbot, Turing test, AIML, intelligent system.

I. INTRODUCTION

With the growth in World Wide Web, it turns out to be a very tedious task to access any requisite information briskly. For this action to occur in a smoother way, human and artefact collaboration is vital. A Chatbots is an interactive assistant that handles reciprocal action through textual or aural method integrated with other platforms to attain fruitful results [3]. Chatbots are devised to credibly simulate human kindred conversation. The term chatter box was originally coined by Michael Mauldin in 1994. Chatbots can be categorized into two groups: The basic one uses predefined set of rules and the advanced one uses artificial intelligence. The one that uses artificial intelligence, gets smarter as it learns from the conversation with people. A Chatbot must also be able to execute fundamental functions such as calculations, alarms etc.

A. Turing Test

It was proposed by Alan Turing in 1950. It was devised to check the machines intelligent behaviour. This test was introduced in the paper entitled “Computing Machinery and Intelligence”, where he proposed a question ‘Can machines thinks?’, According to this test there is a human evaluator who would judge natural language conversations between a human and a machine designed to generate human like responses. Here the evaluator has prior information that one of the two in the conversation is machine. If the evaluator fails to distinguish amid human and machine, the machine is said to have passed the test.

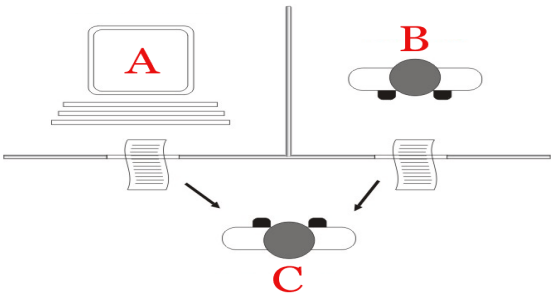

Figure 1. Illustartion of turing test [2].

B. Natural Language Processing (NLP) [3]

It is concerned with the interaction between humans and machines. Traditional Chatbot focuses on providing results based on keywords in the request, which is very difficult than pulling results based on intent behind the request. In order to understand the intent in the request, NLP and AI work together to bring the same intelligence that a person would respond for the corresponding request.

C. Artificial Intelligence Mark-up Language [4]

It is derived from base class named Extensible Mark-up Language (XML). It has class of data object called an AIML object that describes the behaviour of computer programs. It consist of units or tag called topics and categories. In AIML, categories are basic unit of knowledge. Each category consists of pattern which contains input and template which contain answer of chatbot.

Table 1. AIML Elements [9]

Sl.no	AIML Elements/Description
1	**<aiml> </aiml>** Defines the beginning and end of AIML document
2	**<category>** Defines the unit of knowledge
3	**<pattern>** Pattern to match what a user may input
4	**<template>** Defines the response based on user's input

There are three types of AIML classes:

1) Atomic categories
2) Default categories
3) Recursive categories

Atomic category: It is a sort of AIML classification where there is an exact match.

< category >
< pattern >How are you< /pattern >
< template >I am fine!< /template >
< /category >

In the above illustration if the client submits How are you then the chatbot will answer with I am fine!.

Default category: It is a kind of AIML class where the utilization of a wild card symbols, for example, * is utilized to coordinate any info.

< category >
< pattern >Who is * < /pattern >
< template > He is my brother < /template >
< /category >

In the event that ALICE does not discover an answer utilizing the main classification it continues to the next. For such situation if a client submits Who is Joy then ALICE will search until the wild symbol and if there is a match it will accompany the appropriate response.

Recursive category: It is a type of an AIML classification where exceptional labels are utilized to allude to a recursion to persuade the user to be more particular.

< category >
< pattern > Can you tell who the * is < /pattern >
< template > He is my brother < srai > Who is * < /srai > < /template >
< /category >

II. SURVEY OF CHATBOTS

Turing test proposed by Alan Turing, where he theorized that a truly intelligent machine must be indistinguishable from human during a text-only

conversation. This ideas eventually laid the foundation for the revolution of the chatbots [5][6].

ELIZA – it was an early computer program capable of passing the turing test and was also capable of natural language processing. It was created at MIT Artificial Intelligence Laboratory by Joseph Weizenbaum in the year 1966. It used to simulate human conversation using pattern matching and substitution methodology i.e., by matching user prompts to the scripted responses. It impersonates of understanding but has no built-in framework for contextualising events.

PARRY – it was scripted at Stanford University by psychiatrist Kenneth Colby in the 1972. It tried to simulate a person with paranoid schizophrenia. It incorporated an advanced conversational strategy than ELIZA, hence it was termed as "ELIZA with attitude". It was testing using a variation of Turing test in 1970s, where a group of psychiatrist analysed combination of real patients and computers running PARRY. The resulting transcripts from the test where provided to another set of psychiatrist to distinguish between human and computer, out of which they could make out 48 percent correct by random guesses.

Jabberwacky – it was programmed in 1988 and is one of the earliest attempt at designing an AI programs that would mimic human interaction and carry out conversation among users. It was mainly a form of entertainment. It aimed to move from a text based system to wholly voice operated system.

Dr. Sbaitso – it was an AI speech synthesis program released in 1992 by Creative Labs for MS-DOS based personal computers. It assumed the role of psychologist while interacting with other and was designed to showcase a digitized voice.

ALICE – (Artificial Linguistic Internet Computer Entity) also referred to as Alicebot was created by Richard Wallace in 1995. It a natural language processing chatterbot - that simulates conversation using heuristic pattern matching rules, but was still unable to pass Turing test. ALICE is based on XML knowledge bases i.e., it maps the user input to a pre-defined set of responses. Hence it is inefficient to answer all queries. But it has a potential to expand its knowledge bases through an XML dialect AIML. Hence by using this approach, it can be made a skilful domain specific chatbot.

SmarterChild – it was an intelligent devised by ActiveBuddy in 2001 and was widely distributed across global instant messaging and SMS networks. It offered a fun personalised conversation and was considered a precursor for Apple's SIRI and Samsung's S VOICE.

Watson - built by IBM in 2006, is a question answering (QA) computing system designed to apply advanced natural language processing, information retrieval, knowledge representation, automated reasoning, and machine learning technologies to the field of open domain question answering. Watson uses IBM's Deep QA software and the Apache UIMA (Unstructured Information Management Architecture) framework. It runs on the SUSE Linux Enterprise Server 11 operating system using Apache Hadoop framework to provide distributed computing. It participated in the Jeopardy! Competition and won in 2011.

Siri - Siri uses ASR (Automatic speech recognition) to translate human speech (which includes short utterances of commands, dictations or questions) into text. Using natural language processing (part of speech tagging, noun-phrase chunking, dependency and constituent parsing) it translates transcribed text into "parsed text". Using question & intent analysis it analyses parsed text, and detects user commands and actions. ("Schedule a meeting", "Set my alarm"). Siri did the groundwork for all later AI bots and personal assistants.

Google Now – it was developed by Google for Google search mobile apps. It was first included in Android 4.1 ("Jelly Bean"), which was launched on 2012. It employed natural language interface answer questions, make recommendation, and predict actions by passing requests to a set of web services. Google also came up with Google Assistant which was an intelligent extension of Google Now, which engaged in two-way dialogue with the user.

Mitsuku – it was created by Steve Worswick using AIML to understand and respond to people. Her intelligence includes the ability to reason with specific objects. She is a two-time Loebner Prize Winner in 2013 and 2016 as well as the 2015 runner-up.

ALEXA – it was scripted in 2015 which was a voice based service inhabiting the Amazon Echo device. Alexa uses natural language processing algorithms for voice interaction. She uses these algorithms to receive, recognize and respond to voice commands. She is capable of music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, and other real time information. Alexa can also control several smart devices using itself as a home automation hub.

CORTANA – is a virtual assistant developed by Microsoft for windows based devices in 2015. It is capable of performing tasks such as set reminders, recognize natural voice, and answer questions using information from the Bing search engine. It recognises natural voice commands and are available in different languages.

Bots for Messengers – in 2016 Facebook launched a messenger platform which allowed developers to create bots that could interact with Facebook users. By the end of 2016, M bots were available covering a wide range of use cases.

TAY – It was created by Microsoft via twitter to mimic the speech and habits of a teenage girl. It caused controversy when it began to post offensive tweets and became increasingly paranoid. It eventually had to be shut down just 16 hours after launch.

III. APPROACHES

A. The Linguistic Rules Approach

Here a chatbot developer takes a linguistic engine that has knowledge of a given language's syntax, semantics and morphology and then adds program rules that look for the key semantic concepts that determine that a sentence has a certain meaning. Here the bots are pre-programmed and are limited. Responds to a specific set of commands and fails to do so if given query doesn't match the database.

B. The Machine Learning Approach

It is based on neural networks. It has an artificial brain that's powered by Artificial intelligence. It not only understands commands but a complete language. It learns continuously with the conversation of past that eventually makes it smarter and better.

IV. ARCHITECTURE OF CHATBOT [7]

The above figure depicts the architecture of a chatbot. Intent of user message is identified. Since we are interested only in the structured data of the message, extracting it is the next task. The user request is processed as per domain and corresponding responses are generated. The response selector is responsible for selecting sensible responses corresponding to user input.

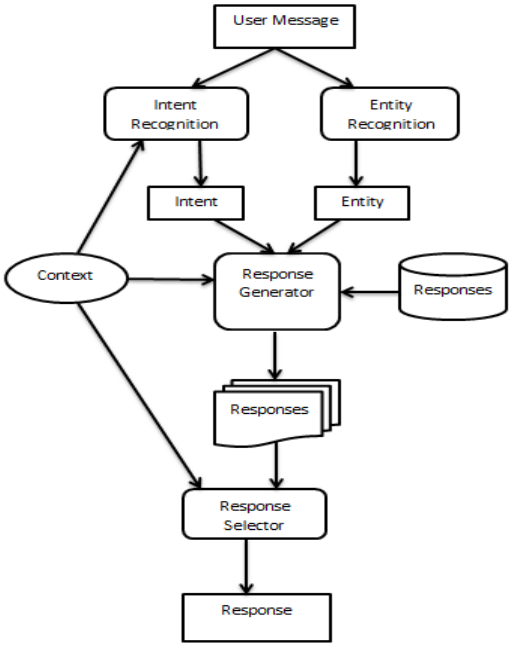

Figure 2. Chatbot architecture

V. MAKING OF CHATBOT

For designing any Chatbot, the designer must be aware of number of techniques such as:

1) Parsing: This process includes analysing the user request followed by manipulating it by using NLP functions.

2) Pattern matching: Here the responses are generated based on some pattern in the user request.

3) AIML: it is one of the important technique used in creation of chatbot.

4) Chat Script:. It fixates the suitable syntax to build a sensible default response.

5) SQL and relational database: Addition of database in chatbot design gives a way for the chatbot to learn from previous conversations.

6) Markov Chain:. The idea of Markov Chains is that there is a fixed probability of occurrences for each letter or word in the same textual data set.

7) Language tricks: Chatbot also has sentences, phrases and also paragraphs in order to build the knowledge base. The types of language tricks are:

- Canned responses.
- Typing errors and simulating key strokes.
- Model of personal history.
- Non Sequitur.

8) Ontologies: They are said to be semantic networks and are a set of concepts that are interconnected relationally and hierarchically. The aim of using ontologies in a Chatbot is to compute the relation between these concepts, such as synonyms, hyponyms and other relations which are natural language concept names.

1) Design

The basic idea of designing phase is to build the interaction between the user and the chatbot[1]. The designer has to specify the personality chatbot, the frequent possible queries from the users, and the overall interaction[2][3]. There are several available tools to design a chatbot that is packed with several features that makes the designing process a easy task [4].

2) Building

The Operation of building a chatbot can be prorated into two prime actions: understanding the user's query and answering correspondingly. The initial task is that the user input can be realised using NLP[6]. The final task of generating responses varies on the type of chatbot.

3) Analytics

The usage of the chatbot can be overseen in order to spot potential glitch or problems. It can also present pragmatic insights that can reform the final user experience[7].

4) Chatbot development platforms

The process of building, testing and deploying chatbots can be done on cloud based chatbot development platforms offered by cloud Platform[8] as a Service (PaaS) providers such as Oracle Cloud Platform and IBM Watson. [9][10][11] These cloud platforms provide Natural Language Processing, Artificial Intelligence and Mobile Backend as a Service for chatbot development.

[13] The three important criterion of an intelligent chatbot are:-

• Understanding rather than memorisation
• Ability to handle repetitive queries
• AIML based response mechanism

VI. CHATBOT CHALLENGES

Context Integration

Chatbots are expected to generate sensible responses. Context should be integrated in the chatbot but implementing it is the biggest challenge. Contextual data, location, time, date, details about users, and other such data must be fused with the chatbot.

Coherent responses

The chatbot must possess the ability to answer corresponding to the user input. For instance, an intelligent chatbot must provide the same answer to queries like Where are you from? and Where do you reside? Though it looks straightforward, incorporating coherence into the model is indeed a challenge. The secret is to train the chatbot to produce semantically consistent answers.

Model assessment

How is the chatbot performing?

The answer to this query lies in measuring whether the chatbot performs the task that it has been built for. Measuring is a challenge because there is a reliance on human judgment. Because the chatbot is built on an open domain model, it becomes increasingly difficult to judge whether the chatbot is performing its task. There's no specific goal attached to the chatbot. Moreover, researchers have found that some of the metrics used in these cases cannot be compared to human judgment.

Reading intention

In some cases, reading intention becomes a challenge. Take generative systems, for instance. They provide generic responses for several user inputs. The ability to produce relevant responses depends on how the chatbot is trained. Without being trained to meet specific intentions, generative systems fail to provide the diversity required to handle specific inputs.

VII. FUTURE SCOPE

To tag emotion categories, we apply sentimental analysis on the dataset and pick up dialogue with strong emotion. We take advantage of various machine learning techniques and introduce sentiment rewards during learning phase. [11]

Since timeliness of chatbot is a major concern, it gives a way to "Server less chatbots" where developers compose stateless functions to perform useful actions. Developers need to handle the coordination of the cognitive services to build the chatbot interface, conform the chatbot with external services, and worry about extensibility, scalability, and maintenance. [10]

VIII. CONCLUSION

Chatbot is a tool devised to speed up the interaction with human. A chatbot must preferably be simple, user-friendly and with a compact knowledge base [13]. We have surveyed several chatbot systems which success in practical domains like education, information retrieval, business, e-commerce, as well as for amusement. In the future, you could "imagine Chatterbots acting as talking books for children, Chatter- bots for foreign language instruction, and teaching Chatterbots in general". In general, the aim of chatbot designers is to build tools that help people, facilitate their work, and their interaction with computers using natural language.

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Video Processing on an ARM Based Embedded System

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ABSTRACT

One of the many applications of embedded systems is remote image/video acquisition for surveillance purposes. In the recent times, ARM processor and LINUX OS have become more popular in the embedded space with the availability of a number of libraries. In this paper OpenCV library and two cameras interfaced to an ARM development board are used for implementing the surveillance system. Video from more than one camera will provide better information for applications such as intrusion detection. ARM cortex-A8 processor based Beagleboard-xM with interfaces such as USB, DVI-D, S-Video, Ethernet, HDMI, LED and so on, is an ideal platform for low power embedded application development. Angstrom Linux distribution has the necessary device driver are supported by a flexible GNU cross compilation tool chain for application development. The environment supports both C and C++ programming. The primary objective of the paper is to display the processed video on the graphics display .The ARM based embedded system was interface with two cameras for video capturing. Video frames were capture at 10 frames/ second instead of 30 frames/second to conserve memory on the embedded system.

Keywords: OpenCV, ARM, BeagleBoard-xM, USB, DVI-D, LINUX, S-Video, HDMI, LED, DM3730, DSP, OMAP3530, MLL

I. INTRODUCTION

Embedded system have become integral part of our lives and they offer specific and cost-effective solutions to many of our day-to-day needs. Particularly the recent advancements in the design, architecture and integration of ICs along with the evolution of interface standards have opened up many avenues for the implementation of embedded systems. ARM has now-a -days evolved as a de-facto processor while Linux has matured into a light weight and fast enough OS for the embedded systems. BeagleBoard-xM is one development platform with embedded Linux from Texas Instruments (TI) DM 3730 processor architecture. The DM3730 processor is characterized by the presence of an asymmetric dual-core architecture, which including an ARM and a DSP along with a shared memory between them. The BeagleBoard-xM is an open source hardware single-board computer with a full set of Open Source tools. Angstrom distribution is an optimized embedded Linux environment meant for the BeagleBoard platform. This Linux distribution is much stable, and is widely adapted and supported by the open source and development community on internet. OpenCV is an open source computer vision library that runs on multiple platforms, including the combination of ARM and Linux, is known for its computational efficiency and strong focus on real-time applications.

Single camera based embedded systems are widely in use for surveillance applications. Images or video from a single camera may not be accurate always as the quality would differ for different light conditions and distances. If multiple cameras, say two of them,

along with application of appropriate image processing techniques, are used it would be possible to capture significant details and get depth perception. In video base surveillance systems, challenge is also to process voluminous information that was captured, while large amount of memory is needed on the capturing system.

The primary intent of this paper is to get exposure to embedded Linux, understand the architecture of the ARM cortex-A8 processor, leveraging on the features of the operating system and processing application for use in surveillance requirements.

The initial steps performed in this paper involve installation of the Angstrom distribution of Linux on the target BeagleBoard platform, followed by setting up of the toolchain for the cross compilation and then the installation of OpenCV library on the Ubuntu based development system. The implementation involve interfacing of two cameras to the platform and development of video capturing and processing software. Video frames were captured at 10 frames/second to conserve memory space and reduce processing time as well as complexity on the embedded system. The resolution chosen for the video frames is 320x240 pixels. The processed video output of the system can be viewed by connecting a graphics display through the HDMI port or S-Video output of the platform. Facedetection, water marking and gray scaling of the color video streams from the cameras are the video processing implemented in the current work.

II. RELATED WORK

Anumol Jose, Bibin Jose, Dinu L.D, Jomon John, Sabarinath G proposed a paper, "Implementation and Optimization of Embedded Face Detection System" This paper also gives a clear picture on BeagleBoard-xM ,it is a new low-cost low-power platform based on the Texas Instruments (TI) DM 3730 processor architecture. The DM3730 processor is characterized by the presence of an asymmetric dual-core architecture, which including an ARM and a DSP along with a shared memory between them. OpenCV is a famous open source computer vision library developed by Intel corporation was utilized for some of the algorithms. Comparative results for the different platforms are introduced and analysed with an emphasis on real-time Application [1] .

Pramod Poudel and Mukul Shirvaikar published a paper, "Optimization of Computer Vision Algorithms for Real Time Platforms". This paper presents work on performance optimization of common computer vision algorithms such as correlation on embedded systems. The correlation algorithm which is popular for face recognition, can be implemented using convolution or the Discrete Fourier Transform (DFT). The algorithms are benchmarked on the Intel Pentium processor and Beagleboard, which is a new low-cost low-power platform based on the Texas Instruments (TI) OMAP 3530 processor architecture. The OMAP processor consists of an asymmetric dual-core architecture, including an ARM and a DSP supported by shared memory. OpenCV, which is a computer vision library developed by Intel corporation was utilized for some of the algorithms. Comparative results for the various approaches are presented and discussed with an emphasis on real-time implementation [2] .

Wang Jing and He Huiming proposed a paper "ARM-based Embedded Video Monitoring System Research" This IEEE paper explain that the embedded system is a special computer system with strict requirements for functionality, reliability, cost, size, and power consumption. This paper also describes about the video monitoring based on ARM, which gives an idea to bring about various images on a single LCD screen by mounting a digital camera [3].

Yan Liping and Song Kai, " Design and Realization of Image Processing System Based on Embedded Platform", This paper gives new idea of developing an image processing system on embedded platform, which is designed and implemented with S3C2410 for the core processor, ARM Linux for the operation

system platform and MiniGUI for graphical user interface. The hardware architecture is introduced and the design, realization and the operation of the software system is described in detail. The testing result indicate that the embedded image processing system is running well, and can display image on the board [6].

Michal Sedlak published a paper, "Simulation of 2D physics of objects captured by web camera using OpenCV and Box2D" This paper presents one approach to simulation of physics applied on objects captured by web camera. It utilise OpenCV library for image capturing and contour detection. Objects detected by OpenCV are reconstructed from its outlines in Box2D environment so the physics can be applied to it. Because of restrictions of Box2D, approximation and scaling of outlines and tessellation of objects is done using with Delaunay triangulation algorithm [7].

III. SYSTEM OVERVIEW

A.Embedded platform

The BeagleBoard-xM is a pocket-sized reference board containing a Texas Instruments Open Multimedia Application Platform (OMAP) 3 system-on-a-chip (SoC) processor, which includes an ARM Cortex-A8 core, Texas Instruments C64x+ digital signal processor (DSP), and on-board graphics engine, as well as integrated dual data rate (DDR) random-access memory (RAM). The BeagleBoard is an inexpensive platform for hobbyists, academics, and professionals who are learning Linux and small systems. The best option for Beagleboard is Linux, mainly because there is an active project supporting Beagleboard which includes working drivers, a good toolchain (GCC based) and many common packages ready to build and install into Beagleboard.

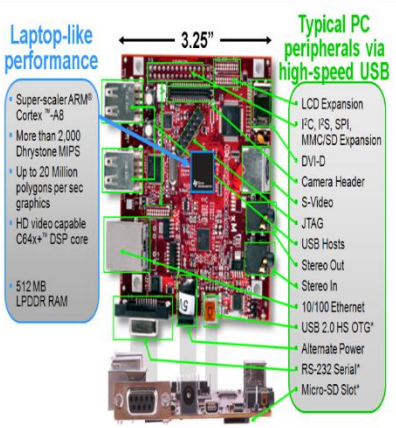

Figure 1. Hardware Specification of BeagleBoard-xM

B.OpenCV

OpenCV is an open source computer vision library of programming functions mainly aimed at real time computer vision developed by Intel Corporation. The library can be written in C and C++ and runs under Linux, Windows and Mac OS X. There is active development on interfaces for Python, Ruby, Matlab, and other languages. OpenCV was designed for computational efficiency and with a strong focus on real-time applications. OpenCV can be written in optimized C and can take advantage of multicore processors. If the library finds Intel's Integrated Performance Primitives on the system, it will use these proprietary optimized routines in many algorithmic areas.

The main aim of OpenCV's is to provide a simple computer vision infrastructure that helps people to build sophisticated vision applications. The OpenCV library contains over 500 functions that covers many areas in vision, including factory product inspection, medical imaging, security, user interface, camera calibration, stereovision, and robotics. OpenCV also contains a general-purpose Machine Learning Library (MLL).This sublibrary is focused on statistical pattern recognition and clustering. The MLL is highly useful for the vision tasks that are at the core of OpenCV's mission, but it is generally used for any machine learning problem. OpenCV has got so many usage in image processing and has been

tools for engineering students and researchers across the world for their researches.

Computer vision has found widespread acceptance in mobile applications like video streaming, smart cameras, vehicle navigation, smart traffic light systems, and virtual reality.

IV. RESULTS AND DISCUSSION

The phase one of the paper involved the study and understanding of the features of BeagleBoard-xM followed by installation of Angstrom Linux OS environment on the board. The subsequent steps involved exploration for the right toolchain for the cross compilation and the GNU toolchain from CodeSourcery was identified and installed on the Ubuntu 16.04 based development system. The OpenCV library and CMake packages were installed on the development system.

The phase two of the paper involved implementation of video capturing and processing appplications for capturing of videos at low frame rate, simultaneous capturing of videos from two cameras, facedetection, watermarking and gray scaling.

The RS232 cable is used for the serial communication between the windows based PC, which was used as the tty console, and the target board. The RJ45 cable is the Ethernet cable used to network the target board with the development system. The camera's were connected through the USB ports. The Target board is also connected to the development system via USB for communication as well as powering the board.

A graphics terminal is connected to the target board using an HDMI or S-Video cable. The setup is shown in the figure2.

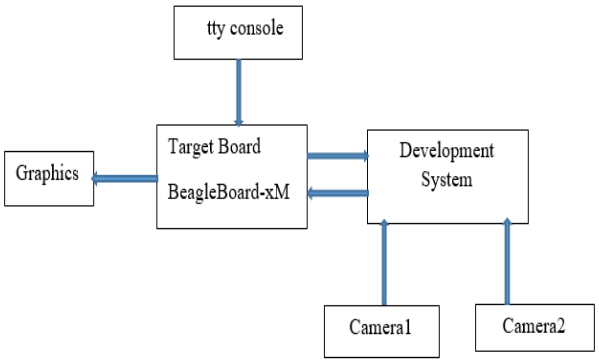

Figure 2. Project Setup

The raw and processed video are saved on SD card. The cameras are connected to the system and the compiled code is made to run, so that the processed video is displayed on the graphics terminal. Using the 'ipconfig' command/application two IP addresses are assigned to the development system and the target board. The cross complied executables could be uploaded to the target board from the development system. It is also possible to remotely log-in and execute the executable from the console of the development system.

A. Video Processing

Face detection:

A recognition process is more efficient if it is based on the detection of features that encode some information about the class to be detected. This is similar to Haar-like features that encode the existence of oriented contrasts between regions in the image. A set of these features can be used to encode the contrasts exhibited by a human face and their spacial relationships. Haar-like features are so called because they are computed similar to the coefficients in Haar wavelet transforms.The object detector of OpenCV has been initially proposed by Paul Viola and improved by Rainer Lienhart. First, a classifier (namely a cascade of boosted classifiers working with haar-like features) is trained with some sample views of a particular object (i.e., a face or a car), called positive examples, that are scaled to the same size (say, 20x20), and negative examples - arbitrary images of the same size. After a classifier is

trained, it can be applied to a region of interest (of the same size as used during the training) in an input image. The classifier outputs a "1" if the region is likely to show the object (i.e., face/car), and "0" otherwise.

B.Watermarking:

Is a standard industry practice to embed in the video recording "text" for safeguarding IP rights as well as incorporating additional information such as title, date, time, place etc of the video recording.

C. Gray Scaling

Gray scaling the color content is a standard video processing technique employed to help highlighting /inferring specific information. In this approach of video processing, each of the RGB values are multiplied with standard "weights" and then added to arrive at the corresponding value in the gray scale.

D. Project Results

An embedded image acquisition and processing system which can be used as a remote host on a net for the web access of acquired images has been implemented. The software implemented could be used for displaying the images acquired and stored, on a pen drive which is interfaced through an USB port, on the color LCD screen of the embedded system.

Figure 3. Overall setup of project

Figure 4. Output Face Detection

V. CONCLUSION and FUTURE WORK

An ARM based embedded system was interfaced with two cameras for video capturing. Video frames were captured at 10 frames/second to conserve memory on the embedded system. Video processing algorithms for gray scaling and face detection were implemented as possible used cases for surveillance applications. A very powerful yet light weight OpenCV library was identified for use in embedded image processing systems. The system has significant spare processing power and memory available, which could be used in future for implementing complex video compression and processing applications .Current work stopped with the generation of 2 separate low frame rate videos. The next steps could be stitch the two videos together and implement advanced algorithms for real-time detection of intrusions etc for realizing an efficient and effective Surveillance system. Interfacing an IR camera and/ or a different sensor to the system could add diversity of information acquisition of the system.

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A Survey on Approaches to Anonymity in Bitcoin and Other Crypto Currencies

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ABSTRACT

Bitcoin is a crypto currency with several advantages over approaches. Transactions are confirmed and stored by a peer-to-peer network in a blockchain. Therefore, all transactions are public and soon solutions where designed to increase privacy in Bitcoin. Many come with downsides, like requiring a trusted third-party or requiring modifications to Bitcoin. In this paper, we compare these approaches according to several criteria. Based on survey, coin Join emerges as the best approach for anonymizing Bitcoins today.

Keywords: Bit coin, crypto currencies, coin mixing, anonymity, transaction linkability

I. INTRODUCTION

Bitcoin [1] is a new cryptocurrency with several advantages over previous approaches. A peer-to-peer network is used to confirm the validity of transactions. However, the network stores all valid transactions which are therefore always public. Even though Bitcoin uses pseudonyms, it does not provide anonymity. Each transaction is linked to previous transactions and thus only one pseudonym must be known to infer other pseudonyms. Consequently, employers paying in bitcoins might be able to track your spending and stores, landlords or anyone receiving payments could be able to know your balance. In currently used monetary systems this is not possible. Therefore, anonymity is going to be an requirement for any crypto currency in the future that tries to replace existing systems. For Bitcoin, there already exist services that allow performing transactions through a third party. These are called mixers as they try to conceal a transaction in a large amount of unrelated transactions. Depending on the design, several problems can arise. For example, the mixing service might learn which addresses are connected. Therefore, other concepts were developed, even new cryptocurrencies which provide more privacy than Bitcoin.

II. RELATED WORKS

In Bitcoin, transactions are confirmed and preserved by being inserted into a chain of transaction blocks. as part of the chain they cannot be modified, as the blocks are linked to their precursor by embedding its cryptographic hash. This block chain forms the public ledger of the Bitcoin networkand represents the consensus about all performed transactions Each transaction can consists of many inputs and outputs. An output is an amount of bitcoins and a small program, called output script, that is used to verify if a person can spend the coins. Each input references an output and provides the input for the script. Usually, the output script verifies that the input was created with a specific private key.

Regal Reid and Martin Harrigan are able to demonstrate that multiple pseudonymous addresses can be linked to a single user. They construct an

graph of Bitcoin transactions (T) and a graph of Bitcoin addresses (U). Assuming that all inputs of a transaction belong to the same user, they then contract the graph nodes of U by merging addresses that appear in the inputs of a single transaction. Furthermore, they include temporal and and external information to link more addresses to real identities. Florian Tschorsch and Bjorn Scheuermann [BdL13] extensively discuss Bitcoin. They provide a section on enabling privacy where they present several approaches, also discussed in our work. However, they do not compare them or provide recommendations. Bonneau et also cover various aspects of Bitcoin. They discuss privacy andvanonymity in a short section including a comparative table. The approaches are divided into peer-to-peer mixing protocols, distributed mix networks and altcoins.

III. TAXONOMY

In this paper, we assume an honest but curious adversary. It could be for example a credit institute, that wants to learn about the spending habits of its clients, or a landlord that would like to know whether her tenant is financially stable. The adversary will conduct transactions with the user and therefore knows at least one of her pseudonyms addresses.To protect the privacy of the user, public information of the cryptocurrency should not allow the adversary to infer other pseudonyms or transactions of the user. We assume that he or she will not try to gain additional information that is not part of the blockchain.

We compare existing work based on several criteria. Most important to us is Bitcoin compatibility meaning whether the Bitcoin protocol would have to be modified or not. Right now, Bitcoin is the largest crypto currency1 by value and transaction volume and is actively developed and well understood. Therefore, it is likely that Bitcoin remains the dominant cryptocurrency and an incompatible mixing approach might not be adopted. The approach should make theft impossible as loss of reputation might be acceptable for a mix as long as it gains enough Bitcoins. Different protocols use different architectures for mixing coins. Like Bonneau et al. [Bo15], we will distinguish between peer-to-peer mixing protocols, mixing services and altcoins. Furthermore, most approaches need more than a single transaction to anonymously send an arbitrary amount of Bitcoins. This increases the time it takes to complete the mix, the amount of transaction fees payed and the energy needed by the network. In cases of peer-to-peer mixing protocols or services, anonymity againstthe mixer will be compared. We also distinguish whether it is reliant on new cryptographic methods not used in Bitcoin as it might lessen the confidence in the solution.

IV. VARIOUS ANONYMITY TECHNIQUES

A. **Mixcoin**: is a mixing service with accountability features. Bitcoin users negotiate a set of parameters with the service, including the address where the coins should be sent to. To provide anonymity, all users must use the same amount when mixing and multiple users must use the service at the same time. The service will provide a signed warranty that can be published in case the service steals the coins. Mixcoin is compatible with Bitcoin and does not require new cryptographic methods. As a central mixing service.

B. **Blindcoin**: improves on Mixcoin by using blind signatures to ensure that the mix can't link the input and output address. Nevertheless, the amount that can be mixed is still fixed and the anonymity depends on the number of simultaneous users. Also, the user must be able to anonymously publish the output address to a public log which might result into a bootstrapping problem. Furthermore, while theft will be detected and can be proven, it is not prevented and Bitcoins might still be lost.

C. **CoinJoin**: CoinJoin is a concept by Gregory Maxwell of mixing transactions by joining them into a larger transaction. It exploits the fact that a transaction can have multiple inputs and outputs that do not need to belong to the same person. This increases the anonymity of a single transaction, but also can increase the anonymity of Bitcoin in general. As theses join transactions are in principle indistinguishable from other transactions, the assumption that inputs of a transaction belong to a single person does no longer hold. A popular centralized implementation is the SharedCoin3 service. While it can not steal coins from users, it can link the input and output addresses. Thus, if the service is compromised, all anonymity gains are loss.

D. **CoinSwap**: is another proposal of Gregory Maxwell to perform a transaction through a third party. Instead of Alice transferring coins directly to Bob, she sends the coins to Carol who in turn sends them to Bob. The transactions between Alice and Carol and Carol and Bob are escrow transactions that can be spent with a redeeming transaction that is protected by a hash-lock. This ensures that neither Alice nor Carol can steal coins.

   CoinSwap is usable on Bitcoin today. It can even be used to perform transactions across different chains. However, the anonymity does depend on all of escrow transactions going on at the same time. Furthermore, it increases the number of needed transactions.

E. **CrytoNote and Monero:**CryptoNote describes a new crypto currency concept. While the basic structure of transactions and the block-chain is the same as in Bitcoin, address derivation and signature generation make use of new cryptographic methods. When transferring coins, the sender A calculates a new receiver address based on the public key B of the receiving party. The matching private key can only be calculated by the owner of the private key B. To spent coins, the transaction output is signed with a one-time ring signatures. These signatures can be veri®ed against a set of public keys without revealing the actually used private key. The most successful implementation to date is Monero5

F. **Zerocoin and Zerocash:**Zerocoin implements a new crypto currency atop of Bitcoin. It extends Bitcoin by new transaction types, that mint and spent a new sort of coins. The spending of these new coins can not be linked to the minting and thus provides anonymity. To prevent double spending, an accumulator of commitments is used. When a coin is spent, a non-interactive zero knowledge proof is used to proof that one such commitment is known. A serial number linked to the commitment ensures that each commitment can only be spent once

   Zerocash improves on Zerocoin by allowing any amount. It is able to hide the origin, destination and amount of a transaction. Compared to Zerocoin it also performs better by reducing the transaction size and time spend on veri®cation. However, it still requires breaking changes to Bitcoin and similar to Zerocoin needs a trusted party to setup public parameters of the protocol

V. CONCLUSION

Bitcoin is a new successful approach to crypto currency but does not guarantee anonymity.

Services like Mixcoin and Blindcoin do not require modifications to Bitcoin and are easier to implement than decentralized approaches. However, they do not prevent theft like CoinJoin implementations or CoinSwap. All of them are unable to hide the transaction amount and therefore require extra transactions with fixed amounts. This increases transaction delays and costs. It may also require more blocks in the chain and thus raise the energy needed by the Bitcoin network. More recent altcoins provide higher anonymity but are incompatible with Bitcoin and introduce overhead.

Furthermore, they also rely on new implementations of new cryptographic methods, that might not be trusted by everybody.

For current usage with Bitcoin, an implementation of the CoinJoin concept is the most promising approach. A peer-topeer implementation like CoinShuflle can be added to existing Bitcoin wallets and used opportunistically. This will increase the anonymity of participants and other Bitcoin users by breaking the assumption.

We think that future research on CoinJoin transactions with arbitrary values and whether they can increase anonymity is needed. This would allow making payments while simultaneously mixing and therefore reduce the number of overall transactions, fees payed and energy consumed. One such approach could be confidential transactions that hide the amount but can currently not be implemented in Bitcoin in a backwards compatible way.

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A Survey on Natural Language Processing and It's Applications

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ABSTRACT

NLP concerns with a design and implementation of computational machinery that communicates with humans using natural language. Humans can communicate easily and efficiently with one another using a natural language. Natural languages are those languages that are spoken by the peoples. Natural language aims to design the language input- output components of artificial intelligence system that are capable of using language flexibly as humans do. NLP is focused on human computer interaction. NLP is an interesting and difficult field in which we have to develop and evaluate or analyse a representation and reasoning theories. In this paper, we have carried out a survey on NLP, it's available tools and application.

Keywords. Linguistic, Natural language processing, Artificial intelligence, Data analytics

I. INTRODUCTION

NLP is a sub field of computer science artificial intelligence and inter disciplinary subject. Its aim is to build intelligence computation that can interact with human beings like human beings. NLP refers to the language spoken by the people example English, Kannada, Tamil and Japanese as opposed to artificial language like C++ and Java. [1] NLP is theoretically motivated range of computation and technique for analysing and representing naturally occurring text at one more levels of linguistic analysis it focuses on statistical methods. By utilising NLP, [2] [3]developers can organise and structure knowledge to perform tasks such as automatic summarization, sentimental analysis, speech recognition and topic segmentation. Apart from common word processor operation that treat text like a mere sequence of symbols, NLP considers the hierarchical structure of languages. NLP is used to analyse texts allowing machines to understand how humans speak. NLP is characterised as a hard problem in computer science. Human language is rarely precised or plainly spoken to understand. Human language is not only to understand the words but the concepts and how they are link together to create a meaning.

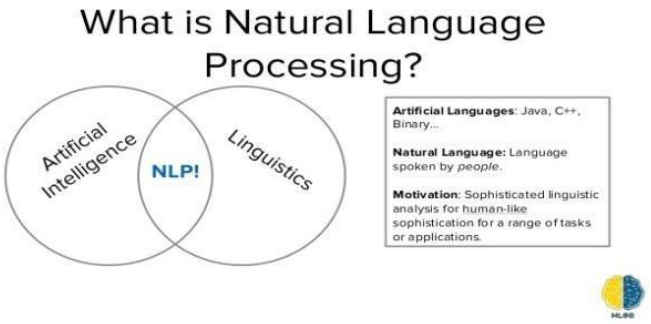

Figure 1a. Natural Language Processing

II. APPLICATIONS

NLP is everywhere even if you don't realise it. Does your e-mail application automatically correct you when you try to send an e-mail without the attachment that you referenced in text of e-mail? This is NLP applications at work. [5]

1. **Machine translation**

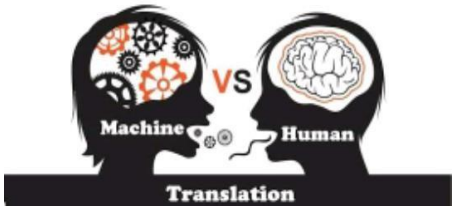

Figure 1b. Machine Translation

Amount of Information available online is growing the need to access it becomes increasingly important and the value of NLP applications becomes clear. Machine translation helps us to conquer language barriers that are often encounter by translating technical manuals. The challenge with machine translations is not in translating but in understanding the meaning of sentences to provide true translation.

1. **Automatic Summarization**

Figure 1c. Automatic Summarization

Information over loaded is a real problem when we need to access a specific important piece of information from huge known base. Automatic summarizing the meaning of document and information but also for understanding the emotional meaning inside the information such as collecting the data from social media.

2. **Sentimental Analysis**

The goal of sentimental analysis is to identify sentiment among several posts or even in the same post where emotion is not always explicitly expressed. Companies like NLP applications such as sentimental analysis to identify the opinions and sentiment online to help them understand what customers think about their product and services. (i.e., "I love the new Iphone;" and few lines later "But sometimes it doesn't work well where the person is still thinking about the Iphone").

Figure 1c. Sentimental Analysis

3. **Question Answering**

As speech understanding technology and voice input applications improves, the need for NLP will only increase. Question answering is becoming more and more popular. Thanks to applications such as Siri, Ok Google and Virtual Assistance. A Question answering application is a system applicable of answering human request.

Figure 1d. Question Answering

4. **Language Modelling**

Language modelling is really a subtask of more interesting natural language problems, specifically those that condition the language models on some other input. The problem is to predict the next word given the previous words. The task is the fundamental to speech or optical character recognition, handwriting recognition, and statistical machine translation it is the key component of many deep learning natural language processing architectures.

5. **Caption Generation**

Caption generation is the problem of describing the contents of a given digital image, such as photo. It generates a textual description of the contents of

the image, a language model is used to create the caption that is conditioned on the image Ex., Describing the contents of a scene, creating a caption for a photograph and describing a video. This is not just an application for the hearing impaired, but it is also in generating human readable text for image and video data that can be searched as web.

III. CHALLENGES

Many challenges facing the practical application of natural language processing, there is one in particular that has seen especially little serious computational attention.namely the problem of metaphor.[8] Although many researches not in the metaphor area may be tempted to think of metaphor as a peripheral problem (perhaps mostly to do with poetry and other literary language) it is in-fact a pervasive feature of mundane language (conversation, newspaper articles, popular science writing, etc.) Providing adequate unified solutions for the "Microscopic" (short messages) and "Macroscopic" (really long sentences). The proliferation of social media suddenly made the "New Lang" of Twitter and Facebook more relevant than before for the real word applications. Most NLP application start with basic situation.simple but grammatically correct sentences. Now simply the sentences some more but make them grammatically incorrect, possibly with lacking punctuation, spelling errors. This is much more difficult. On the other side, we have the "Whales". Very long sentences with sub-ordinates clauses, detours and complex hierarchy. [6] They very relevant, too even in the same scenario of media monitoring, if we include traditional media, or social media for people with higher attention span.

Generic Solutions

A language is an infinite set by definition, even if we look at the lexicon and not the utterances produced. Different techniques work with different success, but it is inconceivable to build a different tool for every new environment the availability of solutions also varies greatly depending on how mainstream a language is. Finally, the classic issues of the natural language processing are still not completely resolved today. There is no tool that can provide an expert human quality word-sense disambiguation yet.

IV. TOOLS

NLTK. It is a general library for NLP written in python. If your language of choice is Python, [4] then look no further than NLTK for many of your NLP needs. Similar to the Stanford library, it includes capabilities for tokenizing , parsing, and identifying named entities as well as many more features.
https://www.nltk.org/

Open NLP.It is library written in Java that implements different NLP tools [4]. http:j//opennlp.sourceforge.net/projects.html

Stanford Core NLP.It is a library including many of NLP tools develop at Stanford. [4] A GPL licensed framework of tools for processing English, Chinese and Spanish . It includes tokenization, part of speech tagging, named entity recognition and more. https://stanfordnlp.github.io/coreNLP

Weka.It is a machine learning library [4] spplying a large number of machine learning algorithm.
https://www.cs.waikato.ac.nz/ml/weka/

Apache Open NLP.Using different underlying approach than Stanford library,[4] the open NLP project is an Apache licenced suite of tools to do tasks like tokenizing, part of speech tagging, parsing and named entity recognition. It remains solid choice.
https://opennlp.apache.org/docs/1.8.0/manual/opennlp.html

NLP tool kit. It is similar to Stanford library, it includes capabilities for tokenizing, [4] parsing, identifying named entities as well as many more features.

http://www.phontron.com/nlptools.php

RapidMiner. RapidMiner Studio is a powerful data mining tool for rapidly building predictive analytic workflows. This all-in-one tool features hundreds of data preparation and machine learning algorithms to support all your data mining projects. RapidMiner Studio is a visual workflow designer that lets data scientist use machine learning to produce insights on any data at any scale. [4] Replace multiple IBM products with one. It blends data, and deploy into production-all in single tool. No coding required.

GATE and Apache UIMA. As your processing capabilities evolve, you may find yourself building, complex NLP [4] workflows which need to integrate several different processing steps in these cases you may want to work with a frame work like GATE or UIMA that standardizes and abstracts much of the repetitive work that goes into building a complex NLP applications http://uima.apache.org/http://gate.ac.uk/

Apache Lucene and Solr. While not technically targeted at solving NLP problems, [4] Lucene and Solr contain a powerful number of tools for working with text ranging from advanced string manipulation utilities to powerful and flexible tokenization libraries to blazing fast libraries for working with finite state automatons. lucene.apache.org/solr

MALLET.a java based package for statistical natural language processing, [4] document classification, clustering.

KYTea.A toolkit for word segmentation and pronunciation [4] estimation www.diylife.com/Tool

ScalaNLP. Is the umbrella project for several libraries, including Breeze and epic[4].
Breeze is a set of libraries for machine learning and numerical computing.

Epic is a high -performance statistical parser and structured prediction library. www.scalanlp.org

V. CONCLUSION

Natural language processing in short NLP, focuses on the interactions between human language and computers. It is the intersection of computer science, artificial intelligence and computational linguistics. NLP is the way for computers to analyse, understand, and derive meaning from human language. By utilizing NLP, developers can perform tasks such as, summarization, translation, entity recognition, relationship extraction, sentiment analysis, speech recognition. NLP analyses language by it's meaning and also perform roles like correcting grammar, converting speech to text and automatically translating between languages. It allows machines to understand natural language. This human and computer interaction enables real-world applications like machine translation, automatic summarization, sentimental analysis, question answering, language modelling and more. NLP is commonly used for text mining.

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Simulation of Lane Switching in Self-Driving Automobiles using GTA-V

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ABSTRACT

The key significance of a self-driving automobile is it is a mechanical contraption that can progress between objectives without human maneuvers, sounds exceptionally essential and clear yet, honestly, this scarcely covers the surface. For a self-driving automobile to come to affirmation, we require both gear fragments and programming packs that we compose and construct congruous with each other. In this paper, we exhibit the item points of view vital to producing a model that can make sense of how to drive an automobile in a to a great degree diverse plan of a virtual condition. To content with the software aspects of a self-driving vehicle, we make use of Convolutional Neural Networks (CNN) that works on the idea of regression at its crux. We further discuss the information outlines which shape the foundations of the proposed procedure. The process involves screen capturing by employing OpenCV while physically driving a vehicle in a PC amusement, GTA-V.

Keywords : Self-driving, CNN, Automobile, GTA-V, Simulation

I. INTRODUCTION

According to a survey by WHO more than 1.25 million people die in road traffic crashes and cause an additional 20-50 million people injuries or disability. 90% of these road crashes occur in low and centre pay nations. Road crashes cause tremendous monetary losses to individuals, their families and to the country as a whole. One strategy to tamper this global problem by a substantial amount is a self-driving automobile. Self-driving automobiles have the potential to significantly reduce the number of fatalities. They conjointly cut back the time period and fuel consumption, therefore truncating the extent of pollution.

An efficient self-driving automobile must hold the potential to eliminate or out or alleviate each one of the issues talked about beforehand. Self-driving automobiles are by and large composed of a variety of hardware equipment and software packages considered together. The key issues that a self-driving automobile designer must deal with are creating and maintaining maps for self-driving automobiles to tread, complex social interactions, change in climatic conditions and the driving approach to employ accordingly, regulations and political hindrances and cyber-security obstacles. A far more difficult hurdle, meanwhile, is from the fact that driving is an exceedingly communal process that as often as possible includes perplexing communications with different drivers, cyclists and pedestrians. In huge numbers of those circumstances, people depend on summed up insight and presence of mind that robots still particularly need. Fully self-driving automobiles will ultimately need to be adept at four key errands: 1) understanding the surrounding environment; 2) understanding why the general population they experience out and about are acting the way they are; 3) deciding how to respond and 4) communicating with other people. Out of the numerous choices that are to be made on the event snags that a automobile faces while conveying on roads, one major decision to be made is lane

switching. An ideally working self-driving automobile must have the capacity to transit between lanes in a manner that abides by traffic rules, spare time and energy.

To stimulate lane switching in a self-driving automobile we use Convolutional Neural Networks (CNN), a class of deep, feedforward artificial neural networks in machine learning used to analyze images. They utilize varieties of multilayer perceptrons intended to require negligible preprocessing. A CNN comprises an information layer and a yield layer and in addition various concealed layers. Convolutional Neural Networks use relatively little pre-processing compared to other image classification algorithms[10]. Biological model of connectivity patterned between the neurons in the animal visual cortex stands as the ingenuity for the conceptualization of convolutional neural networks.

Organization of the rest of the paper is as follows. Segment II cities related work. In Section III, we depict our data set and the systems for formation of the prediction model. Section IV depicts various methodologies providing an aid to model creation. We then present the result and an analysis of the model in Section V. Finally, we conclude the paper with Section VI.

II. RELATED WORK

In the recent times, there is a lot of interest in studying in the field of automation and self-driving automobiles. Although there have been multiple studies on self-driving automobiles, due to the ceaseless changing nature of traffic patterns, human behaviour and rising congestion and tailbacks the designing of the system is an iterative process to meet with the new requirements. Jiman Kim et al [1] proposes a consecutive end-to-end exchange learning technique to assess left and the right sense of self-paths specifically and independently with no post-processing. This approach does not include post-processing and is in this manner adaptable to change of target space. A further study to improve the efficiency of lane switching uses the concept of convolutional neural network to map raw pixels from a single front-facing camera directly to steer commands put forward by Mariusz Bojarski et al [2], however this system performs well only in case of smaller systems because the internal components self-optimize to maximize overall system performance, instead of optimizing human-selected intermediate criteria.

Yet, another body of work has been undertaken to study the process of lane detection and switching, proposed by Lin Li et al [3] that presents a new driver demonstrate in view of human conduct elements for autonomous automobiles, which enables driverless automobiles to move suitably in heeding to the behavioral highlights of driver proprietors. Validation of the proposed model is made consummate by the hardware-in-loop simulator and real driving experiment. From the perspective of human dynamics, this paper introduces the theory of planned behaviour (TPB) into modelling driver for autonomous automobiles. Dissimilar to the conventional approach that physically decomposes the autonomous driving problem into specialized technical segments such as lane detection, path planning and steering control, the end-to-end model proposed by Zhilu Chen et al [4] can directly steer the vehicle from the front view camera information in the wake of preparing, yet with confinements caused because of shifting environmental components.

One of the most recent studies in this field proposed by Chenyi Chen et al [5] describes a direct perception approach to estimate the affordability for driving. The thought set forward is to delineate input image to few recognition markers indicators that specifically identify with the affordance of a road/traffic state for driving. Falling in the middle of the two extremes of interceded discernment and conduct reflexes, the immediate recognition portrayal proposed in this paper gives the correct level of reflection. The demonstration appears via preparing a profound Convolutional Neural Network, therefore, demonstrating that this model can function admirably to drive an automobile in an exceptionally differing set of virtual conditions. virtual conditions.

III. DATASET AND FRAMEWORK

This section describes the dataset used to train the model and the framework of the proposed system

Dataset

The data we use in training our model is self-engendered. The process of data generation involves screen capturing by employing OpenCV while physically driving a vehicle in a PC amusement, GTA-V. The data frames so obtained by screen capturing is of high graphics quality, thus taking up large volumes of space. To ensure low storage with inversely proportional volumes of data, we first convert the RGB pixelated images to grayscale, thus reducing the size by 3 times approximately. The data frames so obtained undergo noise filtering, smoothing and sharpening. Canny algorithm realizes these processes, which achieves it through 5 stages; smoothing to remove noise or remove it, finding gradients to determine the edge strength, non-maximum suppression converts blurred edges to sharp edges, double thresholding distinguishes noise and colour and finally, edge tracking which includes strong edges in the final image and weak edges if they are in connection with a strong one. At the end of the preprocessing stage of data, we obtain a dataset that consists of approximately 100000 frames, filtered and made proficient to act as an input to the prediction model that is portrayed in the accompanying section.

System Model

Our approach consists of the idea of regression at its crux that is set up with a prodigious image dataset that has been procured from different conditions delivered by physically driving an auto in a PC amusement. Based on the input given, the training ensures that the model as shown in fig[1] can determine the appropriate action to take without any human interference. The accuracy of its decision lies on its trained data-sets from an image that it receives, the quality of the image and the number of course changing factors taken into account. The aim of our approach is to convert frames per second into appropriate steering angle. We obtain the input data frames are by screen capturing utilizing OpenCV while manually driving a automobile on a GTA 5 game. The data set is further scaled down to an optimal resolution suitable for training. This scaled data set acts as the input to the neural network consisting of multiple hidden layers. Each layer applies a function to transform the input that has been broadcast to it into an output. CNN make use of filters to assess the frames which improve the efficiency of the system by removing the unwanted parts of the frame which are irrelevant for making driving decisions. This system doesn't require the presence of the exact road markings and signboards. CNN does not require decomposition of the process into several parts such as lane detection and steering control as it can directly steer the vehicle from the front view camera data after training.

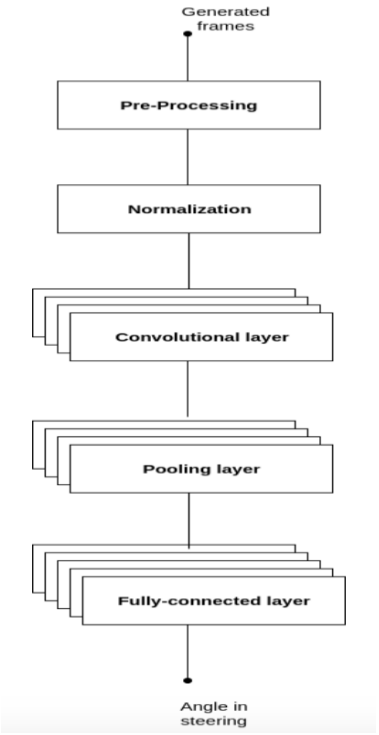

Figure 1. Network architecture

Pre-Processing**:** The preprocessing is a progression of tasks performed on the generated input frames. It essentially resizes and enhances the frame making it suitable for training. It fundamentally incorporates converting the RGB image frames into grayscale and resizing it to a lower resolution. Alternate activities incorporated into this stage noise filtering, smoothing and sharpening. This stage is imperative for influencing the preparation and forecast to process quicker.

Normalization: The second phase of the architecture performs image normalization. Normalization done prior to the training process is crucial to obtain good results as well as fasten significantly the calculations. This stage guarantees that every one of the data sources is at a tantamount range

Neural Network: This stage incorporates various convolutional layers designed to perform feature extraction. Convolution preserves the spatial relationship between pixels by learning image features utilizing bijou squares of input data. A weight matrix called filter slides over the input image to produce a feature map. The convolution of another filter (with the green outline), over the same image gives a different feature map. Convolutional Neural Network learns the values of these filters independently amid the preparation procedure.

Pooling: Spatial Pooling (also called subsampling or downsampling) reduces the dimensionality of each feature map while retaining the most important information. To rescale a large image, one natural approach is to aggregate statistics of these features at various locations. Spatial Pooling can be of different types: Max, Average, Sum etc. These summary statistics are much lower in dimension and improves results.

Max pooling: It registers the maximum value of a particular feature over a region of the image.
Mean pooling: It computes the mean value of a particular feature over a region of the image.

Fully connected layers: The frames then pass through a number of fully connected layers, leading to a final output control value which is the inverse-turning radius. The intent of the fully connected layers is to function as a controller for steering.

IV. METHODOLOGIES

TensorFlow is an open source programming library made by Google which is utilized to configure, construct and train profound learning models. The library of TensorFlow contains various powerful algorithms to do numerical computations, which in itself doesn't seem all too special, but achieve these computations with data flow graphs. In these graphs, edges depict the data while the nodes illustrate the mathematical operations, usually are multidimensional tensors and/or data arrays, that are conveyed between these edges. The operations which neural networks perform on multidimensional data arrays or tensors is literally a flow of tensors, hence the name "TensorFlow".

We utilize TensorFlow in our model to learn how to automatically spot a complex pattern or image. Depending on the images recognised the system takes the best possible decision independently. Further, we construct a computational graph that consists of nodes represents an operation and edges which represents multi-dimensional data arrays using TensorFlow. Subsequent to defining the operations we set up a TensorFlow session in order to perform calculations on the defined graph.

We employ Tensorflow TFlearn package to create an Alexnet, a type of CNN which contains five Convolutional layers and three fully connected layers as shown in fig.(2). The design of the convolutional layers is to perform feature extraction. It preserves the spatial relationship between the pixels by learning image features using small squares of input data. A weight matrix called filter slides over the input image produces a feature map. The network learns values of these filters on its own during the training process. The design of the fully connected layers is to function as a controller for steering where the image frames pass through these layers, leading to a final output control value which is an inverse turning radius. Rectified Linear Unit(ReLU) [6],[7] is applied after every convolutional and fully connected layer. ReLU is a function first introduced by Hahnloser et al. It was then stated by Nair et al that ReLU is an effective activation for use in neural network as well. ReLU function is given by:
$f(x)=max(0,x)$

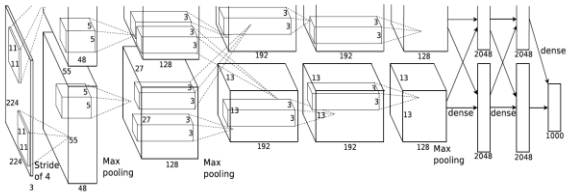

Figure 2. Alexnet Architecture

Dropout is applied before the first and the second fully connected layer. Dropout helps in removing complex co-adaption. Removal of complex co-adaption implies training node in a neural network with a randomly selected sample of other nodes. This makes the node more robust and drive it towards creating useful features, without relying much on other nodes. Overlap pooling is used to reduce the size of the network.

Further, we use TensorFlow object detection API to detect other vehicles on road and to determine the distance from them. They use pixels from the input matrix data set as predictors and predict which operation the vehicle has to perform (turn left/ turn right or / straight).

V. RESULTS AND DISCUSSION

In this section, we discuss the results of the prediction model. We have studied the effects of parameter variations in the tensor flow module. Our model works by providing an array of 3-values as the outcome, each of which is a floating number in (0,1). The array elements indicate the prediction of each direction namely; front left and right, made for that particular instance of time. Consequently, for every repetition of the same instance if the prediction value is above a threshold chosen then that action is performed accordingly. The threshold values we have appointed are 0.7 for the forward motion and 0.75 for both the turn (left and right) motion.

Making diligent alterations to the Alexnet parameters to obtain the most efficient model that results in the relatively high accuracy. The following graphs shown by fig (3), fig fig(4), fig(5) and fig(6) depict the accuracy of the prediction model. We have created proliferates as the size of the data frame input increases and on modification of parameters in the Alexnet. Thus, we can state with confidence that the prediction model has a high accuracy when the input frames are comparable to the size of the data set when the parameters are tuned to specific values.

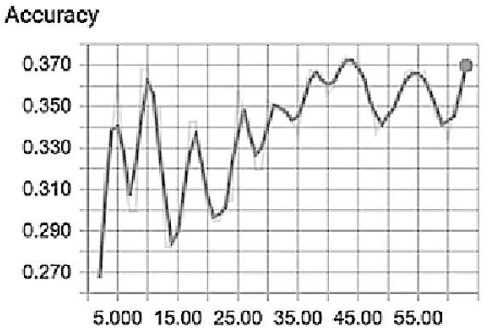

Figure 3. Accuracy plot with x-axis representing number of data frames (max value of x-axis : 55)

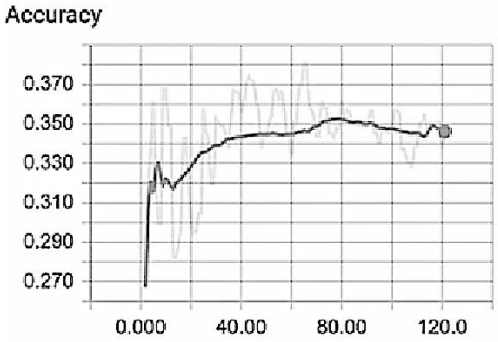

Figure 4. Accuracy plot with x-axis representing number of data frames (max value of x-axis : 120)

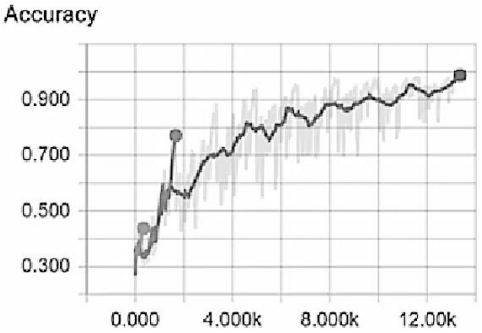

Figure 5. Accuracy plot with x-axis representing number of data frames (max value of x-axis : 12000)

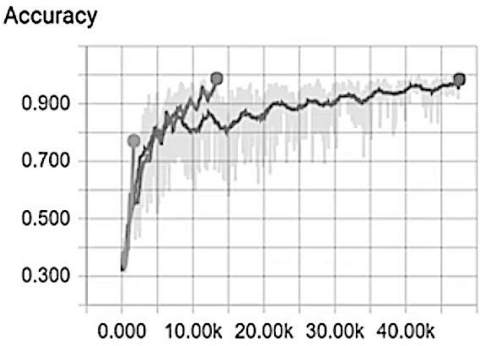

Figure 6. Accuracy plot with x-axis representing number of data frames (max value of x-axis : 40000)

VI. CONCLUSION AND FUTURE WORKS

In this paper, we have introduced the concept of lane switching in self-driving automobiles. We have clarified in detail Alexnet, a type of convolutional Neural Network which is most appropriate for this application. Put into words, the generation of input data sets using OpenCV, the system architecture and the methodologies employed for simulation. Further, a demonstration of the transition in system accuracy with the varying volumes of training data is portrayed through graphical depictions.

Robotization in automobiles is a fast developing field in the present world today. To stay aware of the changing scenario and requirements, the system must be updated frequently. Aside from the

reenactment of lane switching in self-driving we have delineated through this paper, there are couple of more areas under this vast field that can be enhanced in future. One such feature would be the capacity of a self-driving vehicle to have the capacity to discover the way of slightest harm if there should arise an occurrence of unavoidable conditions. This would diminish the dangers caused by an extraordinary degree.

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A Railway Locomotive Monitoring System Using IoT

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ABSTRACT

The explosively growing demand of internet of things (IoT) has rendered broad scale advancements in the fields across sensors, radio access, network, and hardware/software platforms for mass-market applications. A cost-effective IoT solution consisting of device platform, gateway, IoT network and platform server for smart railway infrastructure. The IoT solution applied for the smart railway application makes it easy to grasp the condition information distributed over a wide railway area. One of the important issues for railway operators is maintenance of their railway systems. The railway system consists of various entities including train vehicles, tracks, facilities (i.e. tunnels and bridges), catenary and electrical devices in trackside. It is essential for the railway operators to guarantee that every entity of the railway system operates in good condition. Any operational faults are supposed to be strictly prevented, because an unexpected fault may threat the safety of massive passengers. The proposed railway locomotive monitoring systems as the facilities like estimation of the fuel consumption & distance covered by train, to detect unwanted objects on tracks & any cracking in the tracks and also provide health services to the passengers.

Keywords: Internet of Things, Smart railways, Fuel Consumption, Object Detection, Tracks cracks.

I. INTRODUCTION

Railway has been playing a fundamental role of public transportation from 19'th century, in which a steam locomotive began to be run. From that moment, the railway was regarded as a core method to transport massive population moving along the determinant paths within and between metropolitan cities

The industrial "internet of things" has had a major impact on the transportation industry, with the advent of autonomous vehicles and improved cargo management. One area that has seen less coverage is the connected railway. The fact that trains operate at such high speeds through tunnels and extreme weather conditions, presents real challenges when it comes to deploying IoT systems. However, advances in networking have made smart trains a possibility, and one that could provide significant benefits when transporting goods, providing comfort for passengers and increasing operators' return on investments.

In fact, train management systems in which trains become interconnected communication hubs, transmitting data among themselves and to network control centers, and receiving instructions from control centers, is gradually replacing legacy infrastructure. Machine-to-machine communication, with some help from the cloud, enables operators to utilize equipment, tracks and stations more efficiently, while dramatically reducing safety risks.

II. OBJECTIVES

Railway system is the most commonly used transportation mode in India. It is also one of the modes of transport that faces a lot of challenges due to human errors such as accidents, collision etc. Railways are performing fault detection by means of manual inspection so it is better to go for advanced system where railway track damage status monitoring by using sensors and transfer related informed through wireless sensor.

The objectives of our railway monitoring system are:

1. To estimate the fuel consumption.
2. To provide health services to the passengers.
3. To detect cracking in railway tracks.
4. To detect unwanted objects on the Track.

III. SYSTEM DESIGN

The aim of our project is to develop a railway monitoring system-using IoT. The Figureure 3.2 shows architecture of our proposed system. The system has been designed using Raspberry Pi microcontroller, two IR Sensors, Pi Camera, Heart Beat sensor and a power supply. All these things are connected with IoT server and the output can be seen on mobile or PC.

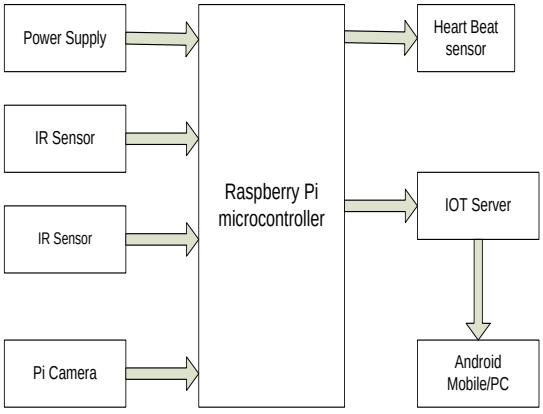

Figure 3.1 Architecture of railway monitoring system

The IR sensors are used to detect cracking in railway tracks & to detect unwanted objects on the Track. If cracks or unwanted objects are present on the tracks then that information will be send to driver as well as to the controlling unit and train well be stopped immediately.

Pi Camera is used to capture the people on the platform in a particular station. It helps to study the density of the people in a particular station so that driver will know how much seconds/minutes train can be stopped.

In our proposed has facility to monitor health conditions of the passengers who travel in train, Using Hear beat sensor the passenger health medications will be done. If passenger health condition is not proper, immediately message will be send to doctor of nearest station, so that passenger will be provided with proper medication.

IV. RESULTS

The following are the few snapshots and results of our project. Figure 4.1 shows conFigureuration of PuTTy software, which is used to connect user to Raspberry pi board.

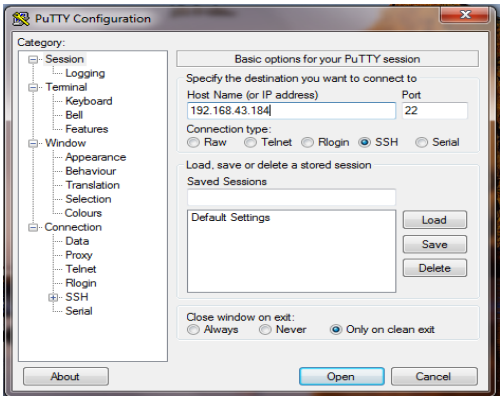

Figure. 4.1 PuTTy ConFigureuration

Figure 4.2 shows connecting to VNC Server by using IP address.

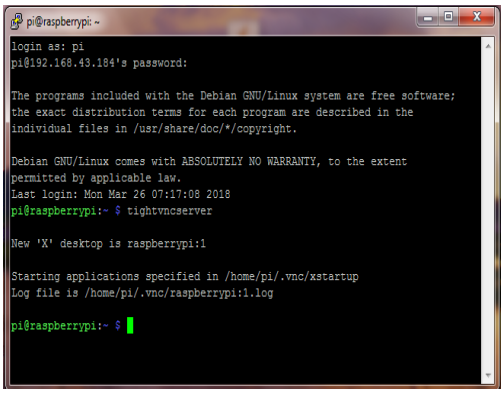

Figure. 4.2 Connect to the server

Figure 4.3 shows snapshot of when there is no object on the track. if there is no object found on the track. It gives the message to the Driver to move the Train forward.

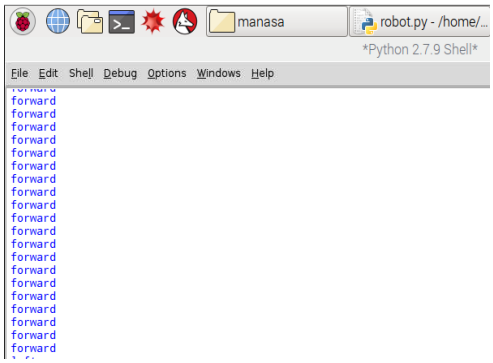

Figure. 4.3 when there is not object on the track.

The presence of any unwanted objects will be detected, our model also identifies whether object is in right or left track as shown in Figure 4.4.

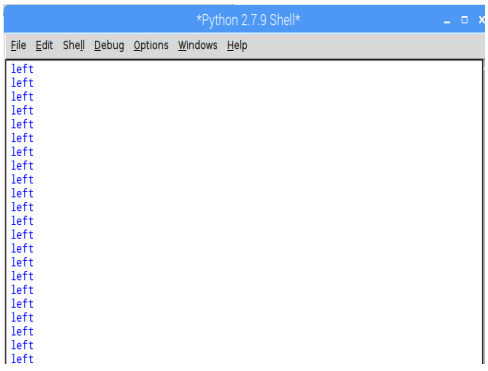

Figure. 4.4 shows the object placed on the track.

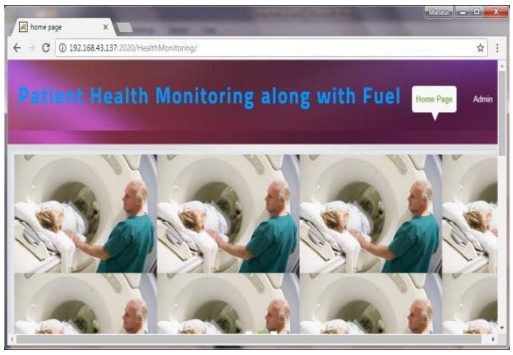

Figure. 4.5 Patient Health Monitoring.

V. CONCLUSION

In our project, we aimed to provide a monitoring system for railway using IoT by including many features like estimation of fuel consumption, detection of cracks and objects on tracks and provide health medication to the passengers.

VI. ACKNOWLEDGEMENT

A Successful project is a dream comes true for any student and to fulfill this dream, efficient teamwork is required. I am thankful to many people who are directly and indirectly involved in this project.

I am thankful to my guide Mr. Ashoka S, Assistant Professor, Department of CSE, K. S. School of Engineering and Management, Bangalore for providing the necessary facilities for carrying out this work successfully and for the helpful tips and timely suggestions, without whose assistance, I would have faltered in this effort. Finally, I would like to thank GSSS Institute of Engineering & Technology for Women for giving a wonderful opportunity to participate and present the paper in the Second national conference on Engineering Innovations & Solutions. I dedicate all my success to each one of them, thank you..!

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A Novel Approach to Develop a Compatible smart voting Machine with High Security

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ABSTRACT

In a democracy, a government is chosen by voting in an election. The election commission of "INDIA" is being following the manual voting system, which is done by electronic voting machine. The conventional voting mechanisms are widely being misused in such a way that people whatever and whomever they vote, will be converted into some other's party or candidates or people's right to vote are denied. These kind of illegal activities happening in both rural and urban areas results in less percentage of voting as the people are lacking interest to cast their votes for the candidates who represent their respective areas. To ensure 100% voting smart voting system is being introduced. As security and technology is a major drawback in developing countries like India smart voting system is not approved like any other developed countries. Our theme is to develop a compatible voting machine with security as main concern. This system is mainly designed for our country which has three phases, these phases involves extracting the details of the citizens above 18 years from aadhar card database since it is mandatory in present scenario. With the help of extracted information, a new voter ID is generated and intimation to the citizens will be given to their respective E-mail and phone numbers. At the time of voting, along with the ID and password provided in the intimation to the users, the finger prints of the voter is used as the main authentication concerning security, as the finger print pattern of each person is unique. The finger print system authenticates users to cast their votes. To avoid multiple votings, the voter ID and other details will be erased as soon as they cast their votes and the aadhar card details will be tracked and locked to access to preserve security.

Keywords: Vote, Aadhar card, Fingerprints, Voter ID, Matlab

I. INTRODUCTION

In a democratic country like India a eligible government is chosen by fundamental right of voting and the leaders are elected on a basis of majority of votes by the citizens of India. India is one of the world's largest democracies with a population of over 1.1 billion. In the recent Indian General Election of 2014 it has recorded that 814 million people were eligible to vote also over 828 thousands polling stations, 1.37 million voting machines and 5.5 million polling officials cover 543 parliamentary constituencies.

The past experience of voting system and their drawbacks lead to the use of latest technology in E-voting process. The current voting mechanism has many security problems, and it is very difficult to idntify the faults. A voting system that can be demonstrated correct has many considerations. Some

of the major concerns for a government regarding electronic voting systems are to expand election activities and to minimize the election expenses. Still there is some opportunity of work in electronic voting system in terms of secured voting and to protect the electronic voting machine from fraud activities.

During Electoral procedures candidates are required to file their nomination papers with the Electoral Commission of India days before the voting period starts. Then, a list of candidates is published. No party is allowed to use government resources for campaigning. No party is allowed to perform illegal activities to bribe the candidates before elections. The government halts all the functions and works during the period of voting. Campaigning ends at 6:00 pm on the second last day before the polling day. The polling is held between 7:00 am and 6:00 pm. The Collector of each district is in charge of polling. Government employees are employed as poll officers at the polling stations. Electronic Voting Machines (EVMs) are being used instead of ballot boxes to prevent election fraud. After a citizen votes, his or her left index finger is marked with an indelible ink. This practice was instituted in 1962.

Federalism is the basis of Indian government. During the election process, once the votes have been casted, elected officials are appointed at federal, state and local levels. Results of elections are determined by first-past-the-post system. The Election Commission of India conducts elections. Members of the Lok Sabha, the lower house of parliament elect the Prime Minister of India. The number of votes and seats won provides a ranking of political parties

II. OBJECTIVES

The Electronic Voting Machines (EVMs) are being used to cast the votes and due to the drawbacks of the existing system our proposed system aims at providing highly secured and compatible smart voting system to the citizens in order to ensure safe and proper voting

The objectives of our secured voting system are:

1. To design and develop an efficient finger print recognition system.
2. To fetch the details of citizens using Aadhar card.
3. To generate new voter ID by authenticating with the Aadhar card information.
4. To ensure proper working of our voting system both online and poll booth centre.

III. SYSTEM DESIGN

The Voting system in a democratic Nation aims for providing a best Government in order to help the development of country. The constitution of India gives power to the citizens for selecting the government by electing the eligible candidates of their interest in order to protect their fundamental rights. The existing voting procedure has some of disadvantages due to which we are facing less percentage of votes and also security problems, in order to overcome the same problems the proposed system is designed to provide highly secured and efficient voting procedure utilizing Aadhaar credentials and finger prints which are unique for every individuals.

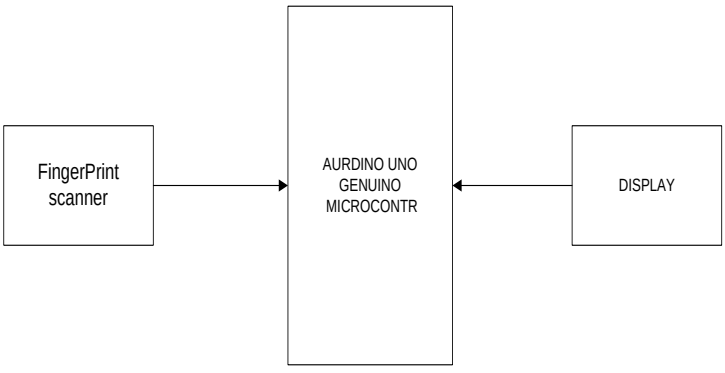

Figure 3.1 Architecture of voting system.

The Architecture of voting system depicts that there are three components Fingerprint scanner , Aurdino Genuino UNO Microcontroller and Display. The Fingerprint scanner is used for scanning the

fingerprint patterns and recognizing the person's fingerprint pattern thus it helps for Authorization. Aurdino Genuino UNO Microcontroller is used for powering the fingerprint scanner and also used to load the code for performing the system functionalities. Display is used to show the output of the whole system and provides the interface to the user.

IV. RESULTS

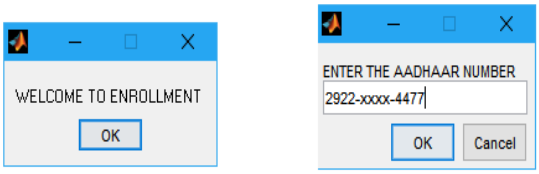

Figure 4.1 Enrollment using Aadhar credentials

Figure 4.1 says that Enrollment session has started and voter registers for the voting session.

Figure 4.2 Voting Session

Figure 4.2 says that the voting session has started and voter can choose the desired party.

datasheet1.xlsx | results.xlsx

	A BJP Number	B CONGRESS Number	C JDS Number	D OTHERS Number
1	1	0	1	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0

Figure 4.3. Results page, where votes are stored.

Figure 4.3 shows that votes are being stored and gets incremented as new votes are casted.

V. CONCLUSION

Eligible citizens who are 18 and above are given a "right to vote" for their desired candidate. During the process of voting due to various reasons people who stand for elections, practice various illegal activities to get their votes. Moreover, due to some reasons each year number of people who cast votes are decreasing gradually, lot of people are losing their trust in their own leaders. In such scenarios, the development of a secured and smart voting system would provide a base to solve all the above problems. A secured voting system prevents various illegal activities by providing finger print authentication and Aadhaar credentials where only one person can cast one vote. In addition, a smart voting system prevents people from changing the votes and makes it easier for every citizen to cast their votes to their desired candidate. This article makes use of Aadhaar details and fingerprints associated with it to provide secured voting.

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A Survey on Content Delivery Network Architecture Features And Their Benefits

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ABSTRACT

With the explosive increase in internet contents, the internet usage has shifted from host-to-host model to content dissemination model, e.g. video content accounts for the majority of Internet traffics. Content delivery networks (CDNs) can be seen as a solution to the problem and is one of the most important components of internet today. ISPs, content providers and other third parties have already deployed CDNs to improve user experience. In order to maximize the bandwidth, improve accessibility, maintain correctness through the content replication and bringing the content as close as possible to the clients system CDN's are proposed. CDN's web content is distributed to cache servers located to users resulting in fast, reliable applications and web services for the users. CDN maintains multiple point of presence (POP). As the Gateway network users and contents, POP's provide several key features for CDN's and they will be discussed in the paper. As the CDN architecture is evolving through the adoption of emerging paradigms, we make a survey on two general approaches to building CDN's one is the overlay model which replicates content to thousands of servers worldwide and another approach is network model which deploys code to routers and switches so that they can recognize specific application types and make forward decisions based of predefined policies. The benefit of each model has also been discussed. Layered architecture of CDN has been discussed in detail. Finally, we discuss potential avenues for further research aspects in CDNs.

Keywords: Content Delivery Networking, Content Centric Networking, Internet Architecture.

I. INTRODUCTION

Applications of content delivery networking are one of the hot topics in internet today. It is one of the biggest IP trends going on in internet right now. CDN's leveragehigh-layernetwork intelligences are managing the delivery of data which is multimedia in nature. They were initially built on top of public internet to accumulate website performance. The network engineers realized that the intelligent network tools could be applied in other beneficial and profitable ways [3].In order to meet the challenges of distributing massive amount of video data to users, almost all major video-streaming companies make use of content delivery network. CDN is a static web pages network optimized to deliver specific content, such as streaming video or audio.

The main goal of CDN is to distribute heavily requested contents from popular web servers, most of all image files.The purpose of CDN manages servers in multiple geographically distributed location, stores copies of video in it servers and attempts to direct each user request to CDN location that will provide the best user experience.

The CDN may be private CDN that is owned by the content provider itself or CDN may alternatively be a third party CDN that distributes content on behalf of multiple content providers.

CDN's already has a reasonable business case is in the website performance improvement. The CDN have a major goal to push contents as close to users as possible to minimize content latency and maximize available bandwidth speed. Hence in the next section we discuss on the approaches with respect to building CDN's.

II. APPROACHES TO BUILDING CDN'S

There are three approaches to building se CDN's.

1. Overlay model which replicate content to thousands of serversworldwide.The application caches are used to distribute the web graphics. The content delivery network are witnessing the outburst of video streaming where the video content, produced or accessed by the mobile phones, must be quickly transferred from a point to another of the network. Whenever a user request a video which is not directly available at the edge server ,the CDN network must
   1) Identify the best location in the network where the content is stored.
   2) Setup a connection.
   3) Deliver the video as quality as possible.
   For this reason, existing CDN's are adopting and overlay structure to reduce latency, leveraging the flexibility introduced by the Software Defined Networking (SDN) paradigm. In order to guarantee a satisfactory quality of experience (QOE) to users, the connection must respect several quality of services (QOS) constraint; our approach allows speeding up the transfer of video segments by finding minimum delay overlay path under constraints on hop count, jitter, packet loss and relay processing capacity [4].
2. Network model it deploys code to routers and switches so that they can recognize specific application types and make forward decision on the basis of predefined policies. Example of this approach include device that redirect content request to local cache or switch traffic coming into data centers to specific servers optimized to server certain content types .
3. CDN which uses both Network and overlay approach for example ,when a switch at a server farms front end redirect a hypertext transfer protocol request to an Akamai server located closer to end user. IP multicast is a good example of an early network -based approach to optimizing the delivery of specific content types.Conventional CDN's can be mainly classified into two subcategories, Commercial CDN's and Academic CDN's
   The commercial network are owned by corporate companies and generally follow centralized client - server architecture some of them have more than 20,000 servers around the globe to support their network[5].The Academics CDN's are non- profitable in nature and generally follow peer to peer architecture.

III. CDN ARCHITECTURE

In a CDN environment, specialized replicated web servers exist at the edge of the network to which end users are connected. The customer can sign up with CDN provider for service and to have their content placed on the content server. These contents are then been replicated in advanced or where the user request on demand. These users are served by the nearby replicated webserver. The user can end up communicating with a CDN and end users. CDN provider ensures the fast delivery of digital content.

They host third party content including static content (examples: static HTML ,pages ,images),streaming media(audio, real time video), user-generated videos(UGV).The end users can interact with the CDN by specifying the content/service request through cellphone, smartphone/PDA, laptop and desktop[6].

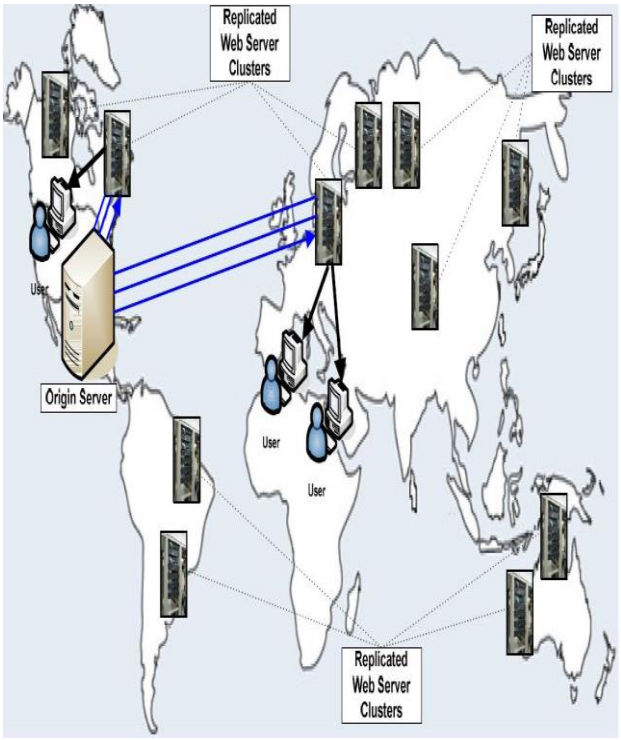

Figure 1: Abstract architecture of a Content Delivery Network (CDN) [1]

Layered approach in building the CDN's:

The layered architecture of the CDN is as follows:It consists of the basic fabric, communication and connectivity, CDN and end users.M.Pathan et al define the layers in the bottom up approach[7]. It constitutes of:

1. Basic fabric
2. Communication and connectivity layer
3. CDN layer
4. End User

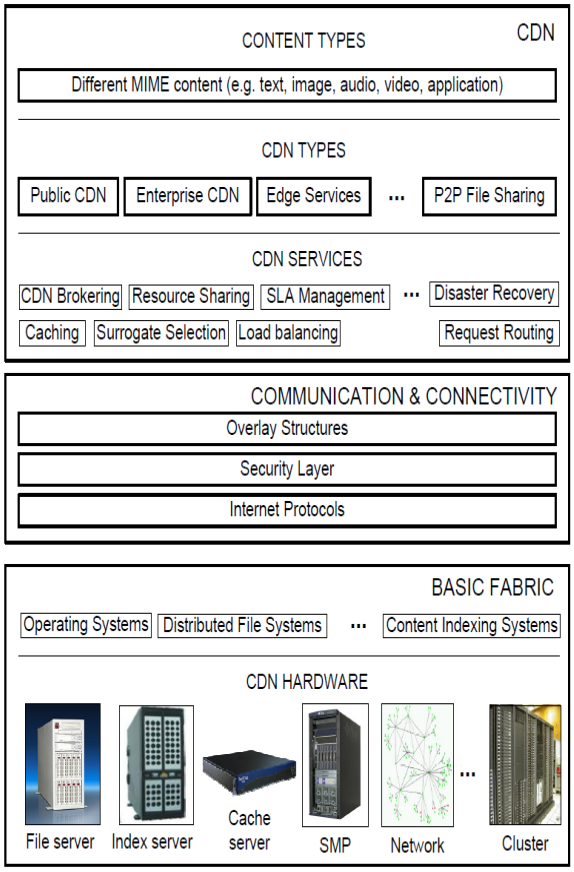

Figure 2: Layered architecture of CDN [1][7] Basic

fabric: It is a base layer of the CDN. It provides the infrastructure resources.This layer consists of the distributed computational resources such as symmetric multiprocessing servers(SMP),clusters,file servers,index servers,and basic network infrastructure connected by high bandwidth network.SMP is the processing of programs by multiple processor that shares a common operating system and memory.A single copy of the operating system is in charge of all the processor.SMP also known as "shared everything" system.

Communication and connectivity layer: It provides the core internet protocols such as TCP, UDP, FTP as well as CDN specific internet protocols called Internet Cache Protocol (ICP), Hypertext Caching Protocol (HTCP) and Cache Array Routing Protocols (CARP). Where ICP is a UDP based protocol used for coordinating web caches.Its purpose is to find out the most appropriate location to retrieve a requested object where in multiple cash is use at single site.HTCP is used for discovering,managing and

monitoring the HTTP caches and caste data.It permits full request and response headers to be used in cash management and expands the domain of cash management to include monitoring a remote cash addition and deletion.CARP is also used in load balancing. Connectivity layer also contains authentication protocols such as Public Key Infrastructure (PKI) or Secure Socket Layer (SSL) for communication,caching and delivery of content or service in an authenticated manner.Policies and procedure are needed in order to create,manage,distribute, use,store and revoke digital certificates to manage public key encryption.Application specific overlay structures provide efficient search and retrieved capabilities for replicated content by maintaining distributed indexes.

CDN layer: It consists of the core functionalities of CDN.It can be divided into three sub layers:

1. CDN services,
2. CDN types
3. Content types.

A CDN provides core services such as surrogate selection,request routing, caching and geographic load balancing and user specific services for Service Level Agreement (SLA) management,resource sharing and CDN brokering.The SLA is defined as an official commitment that prevails between a service provider and client.Particular aspects of service-quality,availability, responsibilities are agreed between service provider and service user.

End users: End users are at the top of the CDN layered architecture.In this layer,we have the web users who connect to the CDN by specifying the URL of content provider's website,in their web browsers.

The main goal of server replication in a CDN is to avoid large amount of data repeatedly traversing possibly congested link on the internet.Valkali et.al states are variety of ways and scale such as local area and wide area,in which content networks may be implemented.The local area contains webcluster that typically hosts single site and web forms. The wide area contains multiple sites. The distributed web server system is used to host single or multiple sites [9]. A cooperative proxy cache network is a service infrastructure to reduce latency in downloading web objects and content delivery network will be there.It is used to can deliver the content to the specific host.

M.Pathan et.al lists the main issues for CDN taxonomy are:

- CDN composition
- Contentdistribution and management
- Request routing
- Performance measurement

IV. MERITS AND DEMERITS OF USING CDN

There are several uses of hosting the web content using CDN. Few advantages are listed below:

- Decrease server load
- Faster content delivery
- 100 percent availability
- Increase in the number of concurrent users
- More control of asset delivery

Decrease Server Load

The strategic placement of content and surrogates can decrease the server load on interconnects, backbones and public and private peers, which frees up overall capacity and decreases delivery costs..

Faster Content Delivery

Since CDNs place servers as close to a group of users as possible, latency and packet loss are minimized due to a shorter distance traveled. Theoretically, the closer the content is to the user, the faster the delivery. Therefore, users will experience less jitter when streaming, fewer network spikes, and an overall improved streaming quality. Due to the reliability, operators can deliver high quality content

with a high level of service, low network server loads, and thus, lower costs.

Additionally, many CDN providers offer TCP acceleration technology which boosts performance, thus improving user experience. Since CDNs decrease latency, the acceleration working in conjunction with an already high-performing network results in explosive content.

100 Percent Availability

Due to the distribution of assets across many regions, CDNs have automatic server availability sensing mechanisms with instant user redirection. As a result, CDN websites experience 100 percent availability, even during massive power outages, hardware issues or network problems.

Increase in the number of Concurrent Users

Strategically placing the servers in a CDN can result in high network backbone capacity, which equates to a significant increase in the number of users accessing the network at a given time. For example, where there is a 100 GB/s network backbone with 2 TB/s capacity, only 100 GB/s can be delivered. However, with a CDN, 10 servers will be available at 10 strategic locations and can then provide a total capacity of 10 x 100 GB/s.

Control of Asset Delivery

Another beneficial feature of CDN technology is that more control of asset delivery and network load is awarded. Operators have the ability to deliver real-time load statistics, optimize capacity per customer, display active regions, indicate which assets are popular, and report viewing details to their customers. These details are extremely important, since usage logs are deactivated once the server source has been added to the CDN.

Unfortunately, there are several disadvantages to CDNs, which include:

- Impractical for many organizations
- Cost
- High cost per GB
- Support
- Maintenance
- Verification of the best locations

Impractical for many Organizations

Due to the inherent nature of the Internet being global, websites receive hits from across the world. Therefore, it is impractical for most organizations to maintain duplicate servers around strategically positioned around the world.

Cost

As a result, organizations must rely on support from third-party CDN vendors. Therefore, another one of the greatest limitations of a CDN are the fees associated with the service. Many of the larger CDN have high setup fees and other hidden fees. The high fee structure could potentially be to keep away smaller clients, focusing only on large business entities.

In many instances, the pricing structure is hidden, not readily available or can be difficult to understand all the moving parts – one of which is the limitation of high cost per GB or storage and data transfer. Therefore, it is critical to understand every aspect of the terms and conditions prior to entering into a contract.

Support

Since most organizations utilize third-party vendors to maintain the CDN, there is always the question of support availability. If a major issue arises, will the operator be able to fix it in a timely manner and prevent the same problem from occurring again?

Maintenance

Similarly, the CDN operator must also effectively maintain each server with the proper updates and patches without disrupting the client's content network. Placing a company's entire corporate network into the hands of an operator is a major step. Therefore, all factors must be considered and backup plans implemented prior to setup and usage. This also includes timely maintenance and application of updates.

Verification of the Best Locations

Additionally, organizations must research the location of the servers offered by each CDN and find those that best fit their customer's locations. It is pointless to utilize a CDN that is a significant distance from users, which will result in potential service disruptions, jittering streaming of video, downtime, low latency and thus low performance. Clients must completely verify the exact locations of all servers and determine if the CDN will be beneficial to its services and client base.

With the high number of products available on the Internet and the amount of money spent to purchase those items while checking information, reading, writing and conducting many other activities on the Internet, it is critical to have a system that delivers performance and reliability. CDNs maintain those tasks and do much more.

To overcome all the above issues Cloud Computing and Ad-Hoc networking can be a solution. Cloud Computing becomes a popular tendency in recent years. Content delivery network has been used for many years to distribute content over the world. The relative between Cloud computing and content delivery network is exciting.Thus Cloud-CDN and hybrid cloud will become the next generation of content distribution network. Vehicular Cloud networks give an opportunity for CDN to be implemented using ad hoc networking techniques.

V. CONCLUSION

Through more and more households purchasing high-speed access, it is obvious that the traffic volumes over CDNs will explode. The methods used for delivering content in CDNs today will not be suitable for the infrastructure load incurred as delivery of high-bitrate video content becomes commonplace. Technologies that offer better scalability and distribution should be used, such as high- throughput caching systems, content routing algorithms with global awareness and more efficient streaming systems. In conjunction with CDN peering, a CDN that will scale to future requirements is perceivable.

Content networking tools can be deployed in a variety of configurations that benefit everyone in the CDN and edge services supply chain: content owners, CDN network operators, service providers, equipment makers, and, ultimately, users. The same drivers that spawned content networking services in the public Internet are now pushing enterprises to build intranet CDNs as a way to reduce WAN costs while avoiding WAN performance bottlenecks—particularly as streaming applications, such as Web-based training and corporate communications, emerge.

Content networking technology is also beingexpanded to enable a whole new market area: edge services. These services include not only the traditional local distribution of cached content, but also create new opportunities for delivering services and applications specific to the user at the opposite end of the single-hop link. Localized and even personalized advertising, network services such as storage and security, and the delivery of regional and local content that pertains to a particular user become available through the use of content networking technologies.

Essentially, a CDN can peer with multiple others, thus being able to redirect end-users to a partner's POP instead of one's own if the content routing algorithm decides that this offers better performance. Of course, this isn't a simple prospect, since open protocols need to be developed to allow CDNs to communicate content location and availability to each other. Now different vendors produce different protocols. So it's time to standardize and adapt to advanced technology

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Smart Roadway Lighting and Security System

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ABSTRACT

Currently in manual system, the street lights will be switched ON in the evening before the sunsets and they are switched OFF in the next day morning after there is sufficient light on the outside. But the actual timing for these lights to be switched ON is when there is absolute darkness. With this, the power will be wasted up to some extent. This project gives solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. The proposed system provide a solution for energy saving. This is achieved by calculating the intensity of the sunlight by incorporating the LIGHT DEPENDENT RESISTOR(LDR).This project is implemented with smart embedded system which controls the glow of street lights based on the intensity of the sunlight and lights will get automatically ON/OFF according to the light intensity. And whenever there is any defect in the street lights ,the defected light poles can be known with the LDR and smart embedded system , with this an automated report can be generated. The real time information of the street light (ON/OFF Status) can be accessed from anytime, anywhere through internet. and also the model will consist of a sensor that detects any accident that happened nearby. This way, model can be programmed to automatically report the accident even without the SOS button being pressed.

Keywords: IOT, LDR, SOS button.

I. INTRODUCTION

A street light, light pole, lamppost, street lamp, light standard, or lamp standardis a raised source of light on the edge of a road or path. Modern lamps may also have light-sensitive photocells that activate automatically when light is or isnot needed: dusk, dawn, or the onset of dark weather. Appropriate and adequate lighting at selected locations on roadways is essential for roadway safety.

This system is proposed to improvise the existing system using IOT and increase the efficiency of the system as well as provide security using existing infrastructure. The Internet of Things (IOT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data.

Cloud Storage is a backend –as-a-service which provides seamless scalability and it removes the necessity of operating databases which are distributed in nature. The key feature of the server is that it can store a large amount of data centrally and also it is able to provide access to restricted users via the internet across different geographical regions just by connecting into the same network.

Objectives:

- Increasing the efficiency of the highway lightings to its maximum

- Obtaining efficient Security in highways.
- To improve the visibility of roadway features and objects on or near the roadway.
- To automatically report the problems to the concerned. To reduce the apprehension of those using the roadway.

II. LITERATURE SURVEY

The highway lighting already has automatic on off states based on sunlight. We can increase the efficiency of their working by incorporating 'Light Dependent Resistors (LDR)' so that we can calculate the amount of light intensity getting by a light and decide the amount of glow the light needs to output. This way at evenings and early morning lights can work more properly and minimize the amount of electricity usage. Reducing the amount of electricity used by efficiently managing the light required at every moment will have significant impact in total electricity spent for highway lighting.

We can also rectify the drawback of the defected lights with a smart solution where if the light is not working, another LDR can detect it and an automated report can be generated, consisting the location of the exact defective light pole with GPS coordinates or other pole information to a cloud database which then can be notified to the respective department. Getting exact location will help the maintenance staff to easily spot the defective light and fix it immediately. We can also have the option of sending the same report to the superiors if it is not fixed within a specified time.

Next, highway accidents and highway robberies at night are usually common. The victims met with these accidents or robberies won't be in a situation to immediately get their proper location and report it to hospital or police station. Also if there are any passersby they also find it difficult to immediately obtain the exact location of accident and report it to hospital for ambulance. This is solved by incorporating an SOS button present in all the highway light poles so that whenever it is pressed it immediately sends the location details to nearest hospital and police station so that they can get there as soon as possible and address the situation. The model will also consist of a vibration sensor that detects any accident that happened nearby. This way, model can be programmed to automatically report the accident even without the SOS button being pressed. This really helps the accident victims in getting immediate help if the situation is too critical. Although false alarms can also be triggered by accidentally pressing SOS buttons or by the vibration sensor, hence this model will be added with a camera for every 3 poles that continuously monitors the highway for any accidents, robberies or any other problems so when someone presses the SOS button or vibration sensor senses unnecessary vibration caused by accidents, last 10 minutes image data can be uploaded to the cloud DB.

The camera, sensors, cloud DB connection and the data can be controlled using an embedded computer called 'Raspberry Pi' which acts as an IoT hub. This way Highway lighting can be enhanced and taken to the next step to make them as an intelligent system that works much more than just lighting the road.

- **Highway lighting — Principles and sources**

Linking the first studies of highway lighting with the present studies, this paper enumerates some aspects of the optical problem involved in producing satisfactory levels of brightness on typical pavements to insure adequate visibility under various weather conditions. Characteristics of incandescent, sodium vapor and high intensity mercury vapor lamps are discussed, together with the designs of luminaries, mounting heights, and spacing necessary to provide optimum conditions for vision.

- **Intelligent Energy Efficient Traffic Safety & Alert system**

The Intelligent Energy Efficient Traffic Safety & Alert System is the system for highways lighting that we called vehicle detection. This proposed study

develops a system that would enable the efficient use of solar light poles with implementation of a solar system to achieve greater than ever electrical energy. The solar panel detects sun light and control solar system to achieve greater than ever electrical energy. The system consists of solar light poles deployed in dangerous portions of highways. These poles would be assembled in groups and each group will be equipped with a wireless sensor. The wireless sensor would serve for vehicle detection while the controller would be responsible of Switching on and off the light-emitting diodes (LEDs) of a group of poles.

Relevance and applications to the field (industry/ technology/ agriculture/ health/ society etc.)

- ✓ This system can be implemented in any different area which helps in securing the pedestrians and drivers in highways or streets during night time.
- ✓ The government can take initiative and this system can be implemented where the highways of different states and the nation can be securely maintained.

III. ARCHITECTURE

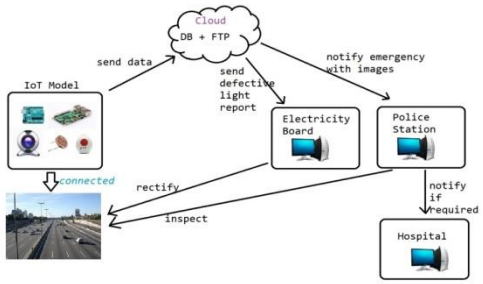

Figure 1

The IOT model consists of camera, arduino, SOS button, LDR and Raspberry pi. The images captured will be stored in the FTP cloud database and the SOS button information and LDR information is stored in cloud database. If any light pole is defected it is notified to the electricity board and they will rectify the problem. When the SOS button is pressed on an emergency then an automated report will be send to the nearest police station and on a emergency police will send the report to the hospital.

IV. METHODOLOGY

i. MPLAB IDE:

MPLAB IDE is a free, integrated toolset for the development of embedded applications on Microchip's PIC and ds PIC microcontrollers. It is called an Integrated Development Environment, or IDE, because it provides a single integrated environment to develop code for embedded microcontrollers. MPLAB IDE runs as a 32-bit application on MS Windows, is easy to use and includes a host of free software components for fast application development and super-charged debugging. MPLAB IDE also serves as a single, unified graphical user interface for additional Microchip and third party software and hardware development tools. Moving between tools is a snap, and upgrading from the free software simulator to hardware debug and programming tools is done in a flash because MPLAB IDE has the same user interface for all tools.

ii. Arduino IDE:

The Arduino Software (IDE) is an open source software and it makes easy to the code and upload it to the board. I t runs on the different plant from Windows, MAC OS, Linux. The environment is written in Java and before running the IDE Java software to be installed on the machine this software can be used with any Arduino board.

iii. OrCAD

OrCAD is a blessing when it comes to PCB design and the subsequent manufacture. This utility helps from designing the schematic to implementing the routes of the electrical connections and further mounting diagrams of the components. In general it offers a total solution for core design schematic and PCB layout. The Capture program includes a project wizard that provides an easy method for creating a project, complete with library and simulation

resources. Creating a project does not create a design within the project. A new design inherits characteristics from the settings in the design template dialog box, so we should always check those settings before we create a design. After creating a schematic folder we can move existing pages into it and we can create new pages in it.

RASPBERRY PI(capturing images and performing actions when SOS button is pressed)

```
import time,os
import serial
from threading import Thread
class arduinoThreads:

    def __init__(self ,devPath ,baudrate):
        self.s = serial.Serial(devPath ,baudrate)
        self.run = True

    def terminate(self):
        self.run = False

    def readSOS(self):
        while self.run:
            self.data = self.s.readline()
            if int(self.data) == 0:
print 'Emergency'
 # send photos to cloud with rpi id as primary key

class rpiThreads:
    def __init__(self):
        self.run = True
    def terminate(self):
        self.run = False
    def takePicture(self):
        while self.run:
            #make different dir for different pole
os.system('fswebcam -fps 15 -S 8 -r 420x320 --no-
banner
/home/highway_security/Campics/%H%M%S.jpg')
   time.sleep(5) #every 5sec photo is taken
#arduinos as objects
arduino1 = arduinoThreads('/dev/ttyACM0' , 9600)
readSOSThread1 = Thread(target =
arduino1.readSOS)
takePictrueThread1 = Thread(target =
rpi.takePicture)
deletePictureThread1 = Thread(target =
rpi.deletePicture)
#start threads(sos and camera)
readSOSThread1.start()
takePictrueThread1.start()
#start delete after 5mins
time.sleep(60*20)
deletePictureThread1.start()
```

V. RESULTS

Android application format

Figure 2

Format of an android application where the pop up messages will displayed when the SOS button is pressed.

Desktop application format for police station

Figure 3

After the police views the pop messages ,they use this format of desktop application to view the images and to know the exact location and further if there is any emergency police will notify to the hospital.

Desktop application format for hospital

Figure 5

Hospital will view the images and know the exact location to provide the necessary facilities after being notified by police.

VI. CONCLUSION

The efficiency of the highway lightings is increased and visibility of roadway features and objects on or near the roadway is improved and also the efficient Security in highways is obtained by automatically reporting the problems to the concerned in order to reduce the apprehension of those using the roadway. Future scope:If more sensors are added then roadway safety can be monitored efficiently and passenger safety can be managed.

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Big 'Internet-of-Things' Data Analytics: A Review

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ABSTRACT

In recent era, 'Internet of Things' gained an inordinate attention from the researchers, since it becomes a significant technology that potentials a smart human being life, by letting a 2-way communications between the objects, machines and such other things. It signifies a system, which consists of things in the real world and sensors attached to or combined to these things, associated to the Internet via wired or wireless network structure. Internet of Things enables user to discover everything in the world uniquely, take control over identified things everywhere and guarantees various applications in society much easier, efficient, safe and smart. There are numerous applications such as smart cities, smart homes, transportation, energy and smart environment, smart agriculture, medical, industry and everywhere. The amount of data collected from sensors related to dissimilar events occurrences is huge (Big Data) and such data can be analyzed and turned into real life information. Numerous big data, Internet of Things, and analytics solutions have enabled people to obtain valuable insight into large data generated by Internet of Things devices. This paper highlights an overview on Internet of Things, its Applications, Architecture, Challenges, Technologies and Architecture for Big Internet of Things Data Analytics, and useful insights.

Keywords: Internet of Things, Applications, Technologies, Big Data, Big Internet of Things Data.

I. INTRODUCTION

Internet of Things (IoT), signifies a universal notion for the capability of network devices for sensing and collecting data around the globe, and shares that data across the Internet where it can be processed and used for a variety of fascinating intentions. An IoT is consisting of smart machines interacting with other machines, objects, environments and infrastructures. Now a day's everybody connected with every other by lots of communication way. The most popular communication way is internet thus in other word we can say internet which connect peoples[1]. The number of devices availing internet services is increasing every day and having all of them connected using wire or wireless will put a powerful source of info at our finger tips [2]. An IoT, as we can assume by its name, is the method of converging data achieved by dissimilar types of things for any virtual platform on available Internet infrastructure [3].

The notion of IoT dates back to 1982 when a customized coke machine was linked to the Internet that was able to report the drinks contained and that whether the drinks were cold. Later, in 1991, Mark Weiser [4] first provided a modern visualization of an IoT in the form of ubiquitous calculating. Conversely, in 1999, Bill Joy gave a clue about Device-to-Device communication in his categorization of internet [5]. In the same year,

Kevin Ashton presented the term "Internet of Things" to portray a system of intersected devices [6].

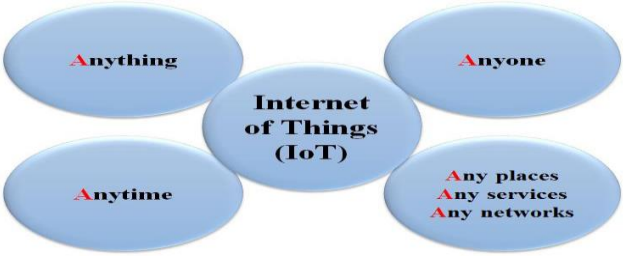

Figure 1: Concept of Internet of Things

Figure 1 appraises that with the IoT, anything's will able to communicate to the internet at any time from any place to offer any services by any network for anyone.

The remaining sections of this paper is organized as follows. Section 2 describes the generic architecture of the IoT; Section 3 discusses the technologies that IoT is composed of; Section 4 forecasts the applications of IoT; Section 5 thrash outs the security challenges posed by IoT; Section 6 confers role of big data analytics in IoT and finally section 7 concludes the paper.

II. ARCHITECTURE OF IOT

More than 25 Billion things are projected to be connected by 2020 [7]. Thus the available architecture of Internet with TCP/IP protocols, adopted in 1980 [8], cannot handle a network as big as IoT. These grounds a essential for a new open architecture that could address several security and Quality of Service (QoS) concerns as well as it could encourage the available network applications using open protocols. Without a specific privacy assurance, IoT is unlikely to be take on by many. Hence, protection of data and secrecy of users are crucial challenges for IoT [9].

For further development of IoT, the amount of multi-layered security architectures are presented. A 3 vital level architecture of IoT is defined in [10] and a 2 key level architecture is in [11]. In the similar way, a 6-layered architecture was also presented centered on the network hierarchical structure. The six layers as revealed in the Figure 2.

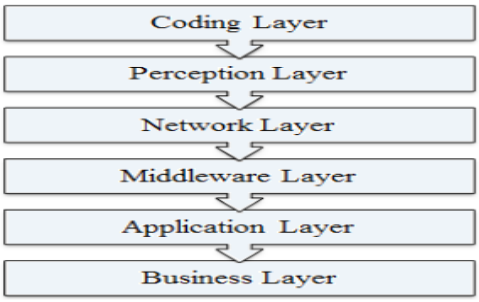

Figure 2: Six Layered Architecture of IoT

2.1 Coding Layer:

It is the groundwork of IoT that offers identification to the objects of interest. Here, each object is allocated an exclusive ID that builds it easy to differentiate the objects.

2.2 Perception Layer:

It is a device layer of IoT that provides a physical meaning to the entire objects. This contains data sensors in dissimilar forms like RFID tags, IR sensors or other sensor networks that can sense the objects' temperature, humidity, speed etc. This layer collects the beneficial info of the objects from the sensor devices linked and translated the information as digital signals that transported onto the Network Layer.

2.3 Network Layer:

This layer obtains the necessary info in the form of digital signals from the Perception Layer and transmit it to the processing systems in the Middleware Layer via the transmission mediums likeWiFi, Bluetooth, WiMaX, Zigbee, GSM, 3G etc with protocols like IPv4, IPv6, MQTT, DDS etc.

2.4 Middleware Layer:

This layer deals with the information obtained by the sensor devices [2]. This contains Cloud computing, Ubiquitous computing technologies and such technologies that makes a direct access to the database to store all the required information. With the use of few Intelligent Processing Equipment, the information is handled and a completely mechanized

action is obtained centered on the processed outcomes of the information.

2.5 Application Layer:

Application layer realizes the applications of IoT for entire varieties of industry, centered on the processed data as applications promote the development of IoT. Therefore, this layer is supportive in the large-scale development of IoT network.

2.6 Business Layer:

The applications and services of IoT are managed by business layer. This layer is also liable for entire research relating to IoT. It produces diverse business models for effective business strategies [1].

III. TECHNOLOGIES

In this section, we discuss the relevant technologies that can help in the large-scale development of IoT [12].

3.1 Radio Frequency IDentification (RFID):

RFID is a system, which communicates the identity of an object or person wireless manner via using radio waves in the form of a serial number. This Technology acting a significant character in IoT for resolving identity matters of objects about us in a price in effect fashion. This system is self-possessed of readers and allied RFID tags that release the identification, location or any other particulars around the object, on activated by the compeers of any suitable signal. Figure 3 describes RFID scenario.

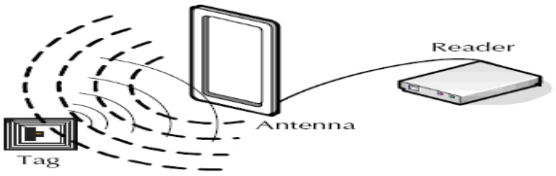

Figure 3: RFID Scenario

The RFID can work as an actuator to activate dissimilar actions and it has even alteration capabilities that Bar codes noticeably do not have.

3.2 Wireless Sensor Network (WSN):

WSN is a 2-way non-wired connected network of sensors in a multi-hop manner, constructed by numerous nodes distributed in a sensor field each connected to one or more sensors, that collects the object precise data i.e., temperature, humidity, speed etc and then sent to the processing device. WSN and RFID technology are pooled together opens up opportunities for even more smart devices, in such a way that amount of resolutions have been presented.

3.3 Cloud Computing:

It is an intelligent processing technology, where number of servers are congregated on single cloud platform to permit imparting of resources among each other that can access at any time and place. Cloud computing do the sensors and even offer good storage ability gain the much imperative part of IoT that not only congregates the servers but also processes on an increased processing power and analyses the beneficial info. Cloud computing interfaced with smart objects by possibly millions of sensors can be of enormous profits and can benefit IoT for a very large-scale expansion to researchers.

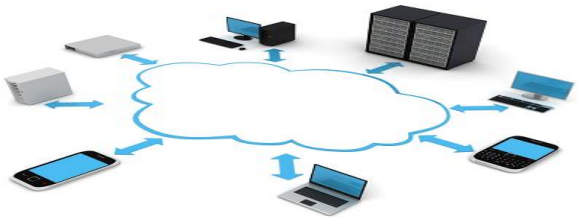

Figure 4: A typical Cloud computing Scenario

3.4 Networking Technologies:

We need a firm and an active network to manage large number of potential devices. For wide-range broadcast net, we use 3G, 4G etc. however as we know, mobile traffic is so much probable since it only has to execute the normal tasks like making call, sending message etc. Therefore as we step into this modern era of universal computing, will not be expectable anymore for a necessity of a super-fast, super-efficient 5th generation wireless system that could deal a lot more bandwidth. Likewise, for a short-range communication network we use Bluetooth, WiFi, etc.

3.5 Nano Technologies:

This technology understands slighter and better form of things, which are interrelated and lessening the consumption of a system through allowing the expansion of devices in nano meters scale that can be used as a sensor and an actuator just like a usual device. Such a nano device is created from nano components and resultant network describes a new networking paradigm i.e., Internet of Nano-Things.

3.6 Micro-Electro-Mechanical Systems (MEMS):

MEMS are grouping of electric and mechanical components employed together to offer solicitations containing sensing and actuating that are at present being commercially used in numerous field in the form of transducers and accelerometers. MEMS are a economical resolution to improve the communication method of IoT and further benefits alike size lessening of sensors and actuators, incorporated ubiquitous computing devices and etc.

3.7 Optical Technologies:

Rapid expansions in an era of Optical technologies, Li-Fi, an important Visible Light Communication (VLC) technology. It offer a inordinate connectivity on a upper bandwidth to the objects interrelated on the concept of IoT. Likewise, Bi-Directional (BiDi) technology provides a 40G Ethernet for a big data by multifarious devices of IoT.

IV. APPLICATIONS

Many of the day-to-day lifecycle applications, which we usually see are at present smart but they are incompetent to connect with each other and empowering them to connect with each other and share beneficial info by each other can create a extensive variety of pioneering applications [13]. There are number of potential upcoming applications that can be of great benefit [14]. Here, we present some applications.

4.1 Smart Cities:

The IoT can advance the cities in numerous levels, by successful infrastructure, improving public transportation, decreasing traffic crowding, and keeping citizens safe, healthy and much involved in the society. Along with the support people by the internet in the entire place to access the database of airports, railways, transportation tracking operating under specified protocols, cities will converted as smarter by means of the IoT.

4.2 Domestic and Home Automation:

In home, by means of using IoT system remotely monitor and handle home appliances and cut down the monthly bills and resource usage. With home automation, we can remotely control the appliances according to our requirements. Suitable monitoring of utility meters, energy and water supply will aid saving resources and detecting unpredicted overloading, water leaks etc. some of the important benefits are:

- ✓ **Energy and Water Use:** Energy and water consumption monitoring to obtain advice on how to save cost and resources.
- ✓ **Control Appliances:** Switching on and off remotely appliances to avoid accidents and save energy.
- ✓ **Intrusion Detection Systems:** Detection of windows and doors openings and violations to avoid intruders.
- ✓ **Art and Goods Preservation:** Monitoring of conditions inside museums and art warehouses.

4.3 Medical Field:

A close attention that is essential to hospitalized patients, their physiological status would be monitored uninterruptedly can be persistently done by using IoT monitoring technologies. The great benefits are:

- **All Detection:** Support for elderly or disabled people living self-governing.
- **Fridges:** Monitoring and Control of conditions inside freezers storing medicines, vaccines, and organs.
- **Sportsmen Care:** Vital signs monitoring in high performance centres and fields

- **Patients Surveillance:** Monitoring of conditions of patients inside hospitals and in old people's home.
- **Ultraviolet Radiation:** Measurement of UV sun rays to warn people not to be exposed in certain hours.

4.4 Security and Emergencies:

- ✓ **Perimeter Access Control:** Detection and control of people in unauthorized and restricted.
- ✓ **Liquid Presence:** Liquid detection, sensitive build & warehouses to avoid breakdowns & corrosion.
- ✓ **Radiation Levels:** Distributed measurement of radiation levels to generate leakage alerts.
- ✓ **Explosive and Hazardous Gases:** Detection of gas leakages and levels in industrial environments, surroundings of chemical factories and inside mines.

4.5 Smart Agriculture:

- ✓ **Wine Quality Enhancing:** Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.
- ✓ **Green Houses:** Control micro-climate conditions to maximizes production of fruits, vegetables & quality.
- ✓ **Golf Courses:** Selective irrigation in dry zones to reduce the water resources required in the green.
- ✓ **Meteorological Station Network:** Study of weather conditions in forecast ice formation, rain, drought, snow or wind changes.
- ✓ **Compost:** Control of humidity and temperature levels in alfalfa, hay, straw, etc., to prevent fungus and other microbial contaminants.

4.6 Industrial Control:

- **Machine-to-Machine Applications:** Machine auto-diagnosis the problem and control.
- **Indoor Air Quality:** Monitoring of oxygen levels and toxic gas inside chemical plants to ensure workers and goods safety.
- **Temperature Monitoring:** Monitor the temperature inside the industry.
- **Ozone Presence:** In food factories, monitoring of ozone levels during the drying meat process.
- **Vehicle Auto-diagnosis:** Information collection from the Bus to send real time alarms to emergencies or provide advice to drivers.

V. BIG 'IOT' DATA ANALATICS

An explosive development in the number of devices associated to the IoT leads to exponential upsurge in data shaped from these associated components echoes the growth of big data. The management of big data in an uninterruptedly growing network provides upswing to crucial issues concerning data collection, efficiency, data processing, analytics, and security. These Internet-connected objects, which contain PCs, smart phones, tablets, WiFi-enabled sensors, wearable devices, and household appliances, form the IoT, shown in Figure 5.

Figure 5: Big Data sources in IoT

However, such data are not beneficial devoid of analytic power. Plentiful big data, IoT, and analytics resolutions have permitted people to attain valued vision into huge data produced by IoT devices. Big data is classified depending on 3 aspects: (a) volume, (b) variety, (c) velocity [15]. These groupings were initially presented through Gartner to define the elements of big data challenges [16]. Immense chances are presented through an ability to analyse and use large amounts of IoT data, containing applications in smart cities, smart transport and grid

systems, and remote patient healthcare monitoring devices.

5.1 Different Analytic Types for IoT Applications:

Following are the various analytic forms, used according to the necessities of IoT applications [17].

Real-time analytics is typically executed on data composed from sensors. In this condition, data change continually, and rapid data analytics methods are necessary to attain an analytical outcome within a short period. Accordingly, two current architectures have been presented for real-time analysis: parallel processing clusters via traditional relational databases and memory-based computing platforms. Greenplum and Hana are examples of real-time analytics architecture.

Off-line analytics is utilized when a rapid response is unnecessary. For example, several Internet initiatives use Hadoop-based off-line analytics architecture to decrease the price of data format translation. Such analytics advances data acquisition efficacy. SCRIBE, Kafka, Time-Tunnel, and Chukwa are examples of architectures that conduct off-line analytics.

Memory-level analytics is smeared when the mass of data is tinier than the memory of a cluster. To date, the memory of clusters has touched terabyte (TB) level. Memory-level analytics is appropriate to conduct real-time analysis. Mongo DB is an example of this architecture.

BI analytics is adopted when the mass of data is bigger than the memory level, but in this case, data may be imported to the BI analysis environment. BI analytic presently provisions TB-level data. Furthermore, BI can aid determine calculated business openings from the flood of data. Additionally, BI analytics permits easy interpretation of data volumes.

Massive analytics is applied when the mass of data is bigger than the whole capability of the BI analysis product and traditional databases. Enormous analytics utilizes the Hadoop disseminated file system for data storage and map/decrease for data analysis. Enormous analytics supports create the business foundation and increases market competitiveness by extracting meaningful values from data. Moreover, huge analytics gains correct data that leverage the hazards involved in building any business decision.

5.2 Association between IoT and Big Data:

One of the the majority outstanding features of IoT is its study of info concerning associated things. Big data analytics in IoT necessitates processing a huge amount of data on the fly and storing the data in a variety of storage technologies. In general, the use of IoT enhances the amount of data in quantity and category; Therefore providing the chance for an application and improvement of big data analytics. Furthermore, the application of big data technologies in IoT accelerates the research progresses and business models of IoT. The association between IoT and big data [18] that is shown in 3 stages in Figure 7. The 1st stage comprises handling IoT data sources, where connected sensors devices utilize applications for interacting through one another. For example, the communication of devices such as CCTV cameras, smart traffic lights, and smart home devices, produces huge amount of data resources through dissimilar formats. This data can be stored in inexpensive commodity storage on the cloud. In the 2nd stage, the produced data are known 'bigdata', which are depending on their volume, velocity, and variety. These vast amount of data are stored in big data files in communal dispersed fault tolerant databases. The final stage pertains analytics tools such as MapReduce, Spark, Splunk, and Skytree, which can analyse the stored big IoT data sets.

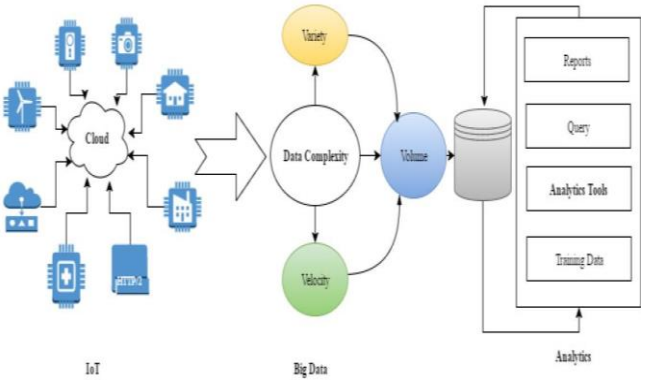

Figure 7: Relationship between IoT and Big Data

5.3 Big Data Analytics Methods

Big data analytics aspire to instantly take out the knowledgeable information that facilitates in making predictions, discovers recent trends, searching hidden information, and eventually, make decisions [18]. We can present big data analytics techniques under categorization, clustering, association rule mining, and prediction categories. Figure 8 illustrates and recapitulates entire categories. Each category is a data mining function and entails numerous techniques and algorithms for fulfilling the information extraction and analysis necessities.

Classification is a supervised learning method, which utilizes prior knowledge as training data to categorize the data objects into groups. A predefined category is allocated to an object, and hence, an objective of the predicting a group or class for an object is accomplished. Searching unknown or hidden patterns is much difficult for big IoT data.

Clustering is another data mining method utilized as a big data analytics technique. Contrary to classification, clustering utilizes an unsupervised learning method and builds groups for specified objects depending on their distinct meaningful features. The well-known techniques utilized for clustering are hierarchical clustering and partitioning. The hierarchical clustering technique remains unite small clusters of data objects to form a hierarchical tree and build agglomerative clusters. Disruptive clusters are formed in an opposed style by separating a single cluster, which includes entire data objects into smaller suitable clusters.

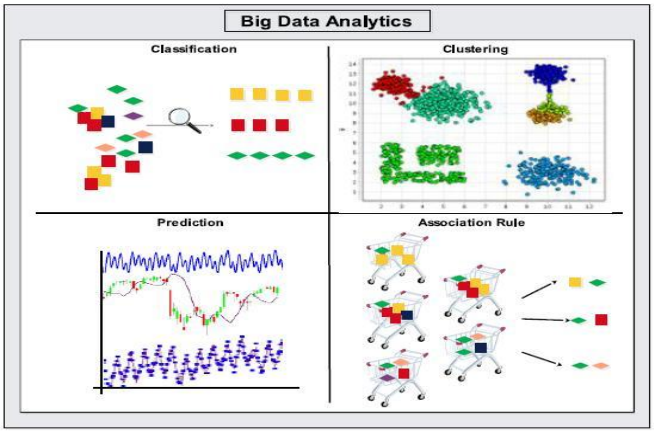

Figure 8: Overview of Big Data Analytics Methods.

Association rule mining entails recognizing appealing relationships between dissimilar objects, events, or further things for analyzing market trends, consumer buying behaviour, and product demand predictions. Here, Data processing is performed in 2 types. 1st, in order data processing utilizes priori-based algorithms, like MSPS and LAPINSPAM, to recognize interaction associations. 2nd, temporal sequence analysis that utilizes algorithms for analyzing event patterns in uninterrupted data.

Predictive analytics use historical data that are called as training data, for determining the outcomes as tendency or behaviour in data. SVM and fuzzy logic algorithms are utilized for recognizing relationships among non-dependent and dependent variables and for achieving regression curves for predictions such as for natural disasters. In addition, customer buying predictions and social media tendency are analysed by predictive analytics.

VI. CONCLUSION

IoT has been gradually bringing a sea of technological changes in our daily lives, which in turn helps in making our life simpler and more comfortable, though various technologies and applications. This emerging paradigm of networking will influence every part of our lives ranging from the automated houses to smart health and environment monitoring by embedding intelligence into the objects around us. The key observations in the literature are that (1) There is no standard definition in worldwide (2) Universal standardizations are required in architectural level (3) Technologies are varying from vendor-vendor, so needs to be interoperable (4) For better global governance, we need to build standard protocols. Let us hope future better IoT. IoT is one of the biggest sources of big data, which are rendered useless without analytics power. IoT interacts with big data when voluminous amounts of data is needed to be processed, transformed, and analysed in high frequency. Finally, the existing big IoT data analytics solutions remained in their early stages of development. In the future, real-time analytics

solution that can provide quick insights will be required. The deployment of IoT requires strenuous efforts to tackle and present solutions for its security and privacy threats.

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A Wireless Sensor Network Based Smart Farming Using Internet Of Things Approach To Modernise Agribusiness Framework

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ABSTRACT

Internet of Things (IoT) is transforming the agricultural field and proving to be a boon to farmers by helping them in solving various issues by combining their practices with advanced technologies and equipment. Simplifying complex issues, sensors can be placed across farm locality and farming machineries in order to enable farmers to gain an abundance of insightful data, such as the soil temperature and health, the amount of fertilizer used, the water holding capacity of the soil based on which a graph can be plotted, the pH of the soil which will further help us analyse many factors influencing behaviour of the soil and which in-turn will help us conclude the status of the soil. Our work here aims to achieve the result by placing remotely monitored sensor station at the farm. This station measures various soil and weather parameters from its sensors and sends this data through RF module to a central hub station. At central hub, the data received is uploaded to the cloud through internet. Through this smart farming system, agriculturist can keep a track on accurate real-time field data and form valid decisions regarding appropriate use of pesticides and fertilizers, measure crop health and other analytic informative to increase gross yield. A questionnaire is prepared with an aim of collecting prerequisite data so that it further helps us to give precise output of the procedure and to put up a detailed summary. We hope that the entire series of observations can help us find apt solutions which can make difference and take us towards increase in productivity in a sustainable manner.

Keywords. Wireless Sensor Network, Internet of Things, Cloud.

I. INTRODUCTION

Agriculture is the backbone of many countries. If proper agricultural method is not followed then it impacts the economy of the nation. Increased supply of food by agriculture sector is important for the growth of our country. The agriculturists are sometimes unaware of the new advanced technologies that exist to increase their crop production. The major concern of our project is to increase the yield both quantitatively and qualitatively and also to preserve the water which is a major issue in recent days. Hence we came up with the idea of using Internet of Things approach in agriculture. Internet of Things technology is a boon to agriculturists. By using IOT approach sensors can be placed wherever you want on the ground, so that it collects the data like the soil moisture and the health of the crop and sends it to the target. If this technology is used there will be increase in the

quantity, quality and the sustainability of the agriculture products. Our project mainly focuses on the issues put forth above. Our project aims at helping farmers get better yield both qualitatively and quantitatively and to preserve the water. For this to be achieved, we use sensors like DHT11 (temperature and humidity sensor) connected to multiple hubs, and the data from these hubs are sent to a RF hub after which it is pushed to cloud and stored in a Dropbox account. Primarily, the sensors will be placed at different locations in the farm which will be connected to Arduino. The sensed data from the sensor DHT11 is collected by the end nodes. All the sensed data from the Arduino are sent to the Raspberry Pi. There is no physical connection between the Arduino and the Raspberry Pi. For the establishment of the connection, a transceiver module, NRF24L01, is used. The transceiver connected to Arduino acts like a transmitter and the transceiver connected to Raspberry Pi acts like a receiver. Hence, the transceiver connected to Arduino sends the sensed data and the transceiver connected to Raspberry Pi receives this data. This data which is received in Raspberry Pi is then set to a Dropbox, where the information is stored in a text format. This stored information can be accessed by any user who has access to their respective Dropbox account. It helps the agriculturists to be more precise about the soil to be used or the irrigation method to be practiced and about the kind of crops to be used in their farm land. The main objective of this system is to consider different environmental factors,like moisture of the soil, temperature and so on, so that they can take up a better and precise decision in farming that result in increase in their yield. If this system is in place,it will be helpful for the farmers to take up informed and precise decisions like which crop grows well in which kind of soil or the irrigation method to be used etc.

II. DESIGN

In the agricultural farm, we position multiple end nodes (Arduino) which are equipped with various sensors and a battery to power up the Arduino. The data collected by these sensors attached to each end node is sent to Raspberry Pi (gateway that connects Arduino and cloud). An intranet network is built using NRF24L01 Wi-Fi module also used as a transceiver module i.e. It is used in Arduino as transmitter and in Raspberry Pi as receiver. After the Raspberry Pi receives sensor data from the multiple end nodes, the data are pushed to cloud (here, Dropbox) so that the farm holder can do live monitoring of his/her farm.

A. Architectural Design

We have listed below all the hardware equipment that was required in order to design a working module.

1) DHT11 Sensor.The DHT11 sensor is a basic, cost effective digital temperature and humidity sensor. It consists of a thermistor and a capacitive humidity sensor that measures the temperature and humidity respectively of the air surrounding it, and spits out digital output on the data pin to which it is connected.

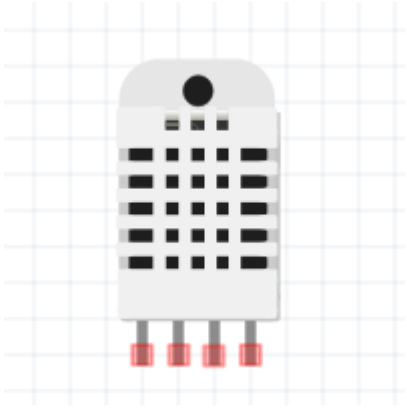

Figure 1.DHT11 Sensor

2) NRF24L01 (Wi-Fi Module).An effective communication between Arduino and Raspberry Pi requires the installation of this transceiver module on the sender and receiver side. This module works as transmitter for Arduino and receiver for Raspberry Pi.

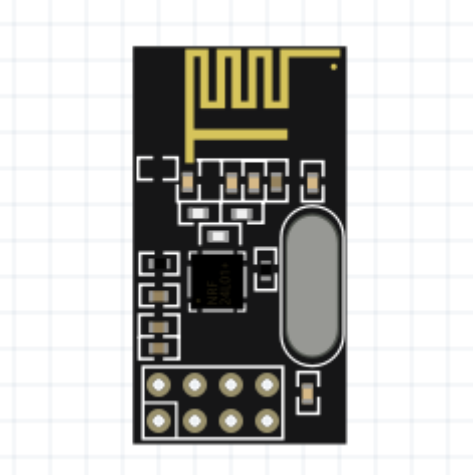

Figure 2.NRF24L01 Wi-Fi module

3) Arduino Uno.Arduino Uno is a microcontroller board based on the ATmega328P (datasheet) and equipped with 14 digital input/output pins, 6 analog inputs and a 16 MHz quartz crystal. It is programmable with Arduino IDE via USB cable. It can be powered by an external 5V battery or a USB cable.

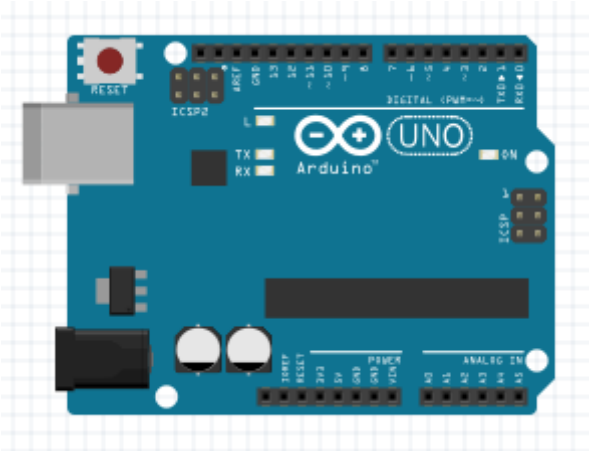

Figure 3. Arduino Uno

4) Raspberry Pi:The base station is set up using a low power credit-card-sized single-board computer Raspberry Pi Model B. The board is equipped with a combination of interfacingperipherals, including USB port, SD Card storage, 512 MB RAM, HDMI port. We can connect monitor, keyboard and mouse to it and using a HDMI cable, we can create a desktop terminal. The Raspberry Pi can be connected to a local area network through Ethernetcable or USB Wi-Fi adapter, and then it can be accessed through SSH remote login.

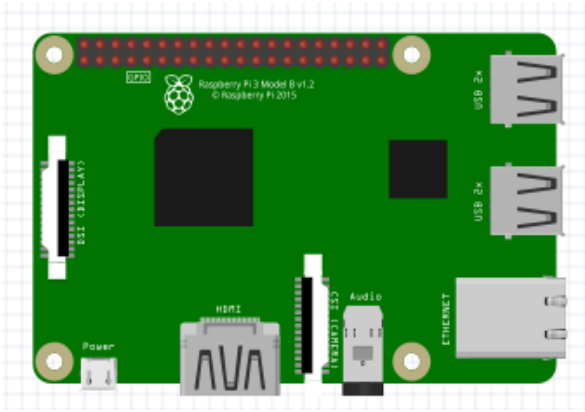

Figure 4. Raspberry Pi

B. System Design

The outline design of the system is shown in figure 5.Many Arduino Uno boards equipped with NRF24L01 (Wi-Fi module) and DHT11 sensor are connected to a gateway i.e. Raspberry Pi connected with NRF24L01. This gateway acts a base station, from which the data sensed by the sensor are stored in a text file and then uploaded to a cloud storage platform. At the time of configuration of Dropbox, the users can feed their respective credentials. In order to know the status of the farm, the owner or the user can log on to their respective Dropbox account and access the data stored in the text file. This is the overall procedure to be followed in order to access the data from the cloud.

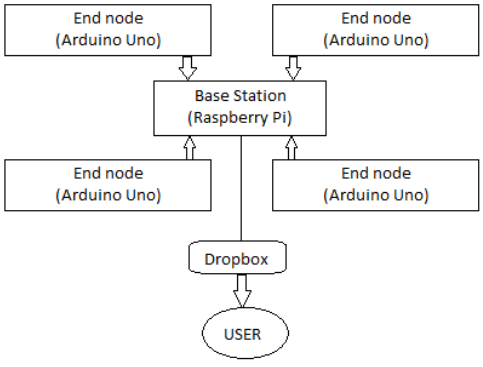

Figure 5. System Design outline

1) Connecting NRF24L01 Wi-Fi module and DHT11 sensor to Arduino board.Figure 6 shows the connections of DHT11 sensor and NRF24L01 module to Arduino Uno board.

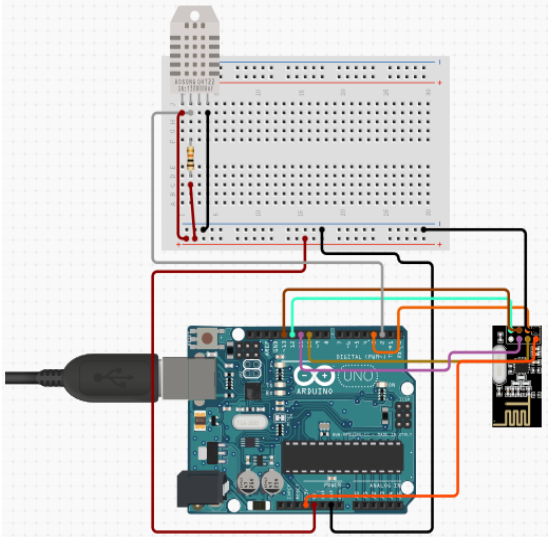

Figure 6. Arduino connection with NRF24L01 and DHT11

2) Connecting NRF24L01 Wi-Fi module to Raspberry Pi.Figure 7 shows the connections of NRF24L01 module to Raspberry Pi Model B.

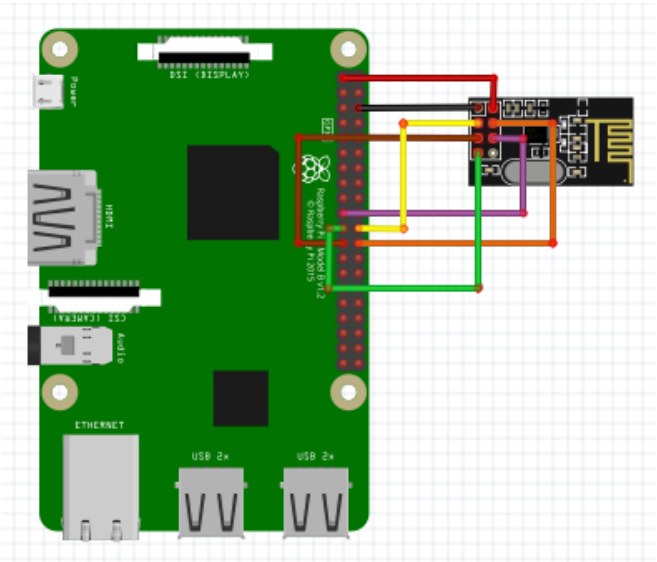

Figure 7. Raspberry Pi connection with NRF24L01

II. IMPLEMENTATION

The experimental agricultural farm can be spread across a large area, due to which the temperature and humidity values of the surrounding air at different areas can vary.The end nodes which are placed in different locations get the values read from the sensors. To collect the values read from the end nodes, there will be a base station (Raspberry pi). The base station collects the readings from multiple end nodes (Arduino), stores it in the form of text and sends it to the Dropbox. It should be noted that there is no physical connection between the end nodes and the base station. They communicate among themselves by the transceiver module that is used. A transceiver module, NRF24L01, which is a Wi-Fi module, is used for communication between Arduino and Raspberry Pi. In our experimental analysis, we have used an Arduino Uno, to which the DHT11 sensor is connected using jumper wires and a breadboard. The sensor gets the values of both temperature and humidity from the field. The transceiver which acts as a transmitter when connected to the end node will send the sensed values from the Arduino to the Raspberry Pi. The transceiver which acts as receiver when connected to the Raspberry will receive the data from the end nodes and sends it to the Pi. The Pi is programmed in such a way that it collects the data and stores it in a sheet. After a definite period of time the Dropbox uploader script running on the background will upload the data from the Pi to the Dropbox which can then be accessed from any platform at any time.

A. Sender Side Algorithm. There are mainly two functions in the sender's side algorithm i) loop function and ii) setup function. We define the pin configuration of the DHT11 temperature and humidity sensor and NRF24L01 Wi-Fi modules. The serial monitoring of Arduino ide begins with the execution of setup function. In the loop function,, Variable t.h is initialised for temperature and humidity respectively. The temperature and humidity values obtained by the sensor are read and stored in a character array. An inbuilt function (radio.send()) is executed to transfer the data to the base station.

B. Receiver Side Algorithm.A file descriptor is created for creating or opening a text file. By using the available function, we check whether the radio is available or unavailable. Until the radio is available and responding, we receive the data in the buffer and write this buffered data in the file descriptor.

IV. TESTING AND COMPARISON

1)MODULE-1 (Sending sensor values from Arduino to Raspberry pi).When the sender algorithm is run to test this module and the component receives values through sensors. The sensed temperature and humidity readings (from several Arduino Uno- end nodes) are received at the Raspberry Pi end.

2)MODULE-2 (Receiving data from Raspberry pi).We run the receiver end set of codes to test this module and observe results displayed on the screen. The sensed temperature and humidity values from the end nodes are received in Raspberry Pi in parallel and in real time. This base station receives the data and stores it in a text file.

3)MODULE-3 (Uploading data to and accessing data from cloud platform-Dropbox).A shell script is run to upload the text file to the Dropbox. Then this uploaded file can be accessed where we get the name of text file in the website and they are further opened through click operation to obtain the data.

V. RESULTS

The following results are obtained after testing the modules:

1) Displaying the sensor values on the Arduino IDE.Figure 8 shows the values of temperature and humidity as sensed by the end nodes placed at different locations. The values of temperature and humidity sensed by one node (Arduino) may or may not be different from the values sensed by another node (Arduino). Nevertheless, these ranges of values are sent to Raspberry Pi which is the base station.

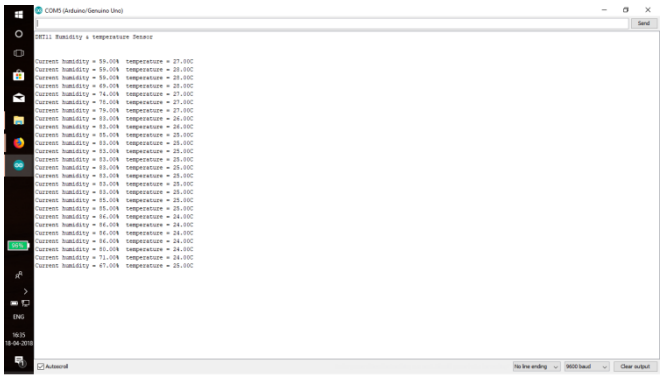

Figure 8. Displaying sensed values in Arduino IDE

2) Receiving data from Raspberry pi.The Raspberry Pi receives the data sent by the end nodes and displays it on its terminal. These values are then later pushed to cloud storage where the user can access by entering their details.

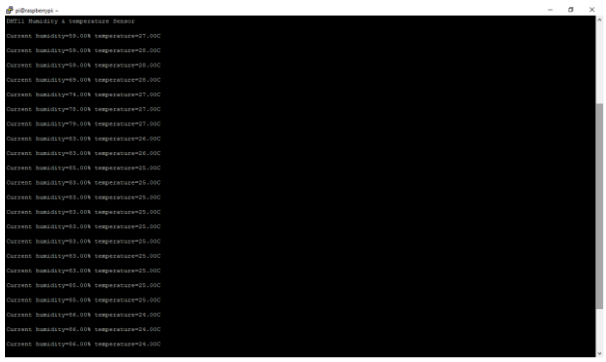

Figure 9. Displaying the sensed values in Raspberry Pi

3) Uploading data to and accessing data from cloud platform-Dropbox:A user needs to enter his/her credentials and create a Dropbox account (here, an alternative option is Google Drive). The data stored in the text file can be uploaded and stored in the account; the user needs to be signed in for this task. Next, the user can access this valuable data at any time, from anywhere.

VI. SCOPE AND FUTURE ENHANCEMENT

Many agricultural hurdles can be brought down on successful implementing the full version of the designed system. Then agricultural standards can be up scaled by many levels definitely facilitating the

agriculturalists and easing the entire procedure of farming. We are aware that very module has a stipulated range in which it can act. We can use more components with better range capabilities to observe the entire farm land. It can be used for various research and scientific systems also. We can also have a system which balances excess moisture by sucking away water till the moisture has reached the required range.

Also, there are other several ways through which sustainable moisture maintenance can be observed. We can have a system which is fed with the range in which the moisture content can vary between and this can operate both ways, one during the increase in the moisture level and two during the fall in the moisture level. This shall pass signals to the sprinklers to operate accordingly. Certainly, we shall appreciate upgradation in technology as well as simplifying the process to attain similar implementations advancements.

VII. CONCLUSION

Smart farming through scientific methods is the main aim behind designing the entire system with the intentions to better the existing systems. Agriculture is a traditional occupation of a huge part of a population. Instead of following the traditional methods blindly, one should first do the thorough check of the soil condition and then grow different products according to the type of soil. That shall also influence their choices of crop rotation in a large range. For this purpose, this system can play a major role, as it helps in collecting the soil information (temperature and humidity values) which are required to check the fertility of the soil and henceforth can be used for further researches on the soil and examining of soil for agricultural purposes. This examination of soil can help us find out the fertility of soil more precisely in the use of pesticides and fertilizers, irrigation techniques and harvesting decisions to maximize the yield of the agricultural field. Thus, overall the system contributes to the smart agriculture by applying modern agricultural techniques by using the principles of IoT.

This examination of soil can help us find out the fertility of soil more precisely in the use of pesticides and fertilizers, irrigation techniques and harvesting decisions to maximize the yield of the agricultural field. Thus, overall the system contributes to the smart agriculture by applying modern agricultural techniques by using the principles of IoT. Furthermore, it brings to our notice as to how important it is to utilise the available resources in a sustainable manner to retain the soil health and make use of right amount of water through which the significance of the reasons used in to conventional agricultural practices can be identified.

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An Android App for Teaching & Training Special Children

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ABSTRACT

This Project is based on the development of mobile application that can teach and train speech and hearing disability children to learn basic concepts like Animals, Fruits & Vegetables. Disabled children will be provided with multimedia interactive interface in which each Animals, Fruits & Vegetables. will be taught using different objects and required description. In multimedia instructional environments, learners are exposed to material in verbal (such as on-screen text or narration) as well as pictorial form (including static materials such as photos or illustrations, and dynamic materials such as video or animation). Analysis modules will be developed through which test can be taken by the disabled and analysis will be carried out. Which Increase the interest of learning, fostering motivation, self-efficacy and impacting handicapped peoples' attitude to study.

I. INTRODUCTION

There is a remarkable growth trends in mobile applications (apps) and smart phones marketplaces currently. An app generally describes to a software application or program that is designed to run on smart phone platform. This project introduces a mobile application (app) for teaching basic concepts to speech and hearing disability children. Speech and hearing disability children are acknowledged to have problems for learning. Addressing the problems of teaching speech and hearing disability children needs to take the advantages from the recent advanced mobile technology, such as mobile app.

In this project a design model is proposed for the development of mobile application that can teach and train speech and hearing disability children to learn basic concepts like Animals, Fruits & Vegetables. Disabled children will be provided with multimedia interactive interface in which each concept will be taught using different objects and required description. Multimedia instructional environments are widely recognized to hold great potential for improving the way that people learn. In multimedia instructional environments, learners are exposed to material in verbal (such as on-screen text or narration) as well as pictorial form (including static materials such as photos or illustrations, and dynamic materials such as video or animation). Test module and analysis modules will be developed through which test can be taken by the disabled and analysis will be carried out. Increasing interest of learning, fostering motivation, self-efficacy and impacting disabled peoples' attitude to study.

A systemic research is required to determine how to optimize the promising marketing potential of mobile apps, particularly in healthcare field. Hence, we propose to design and develop a mobile apps to train and teach basic concepts to the hearing and talking disabled children. It can be concluded that graphic, text, multimedia, animation interpreter are among mostly required features to be included in their mobile application to ensure the applications are usable for this community.

II. METHODS AND MATERIAL

- Identify the target users (the speech and hearing disabled children) for the mobile apps game in the research market and user study.
- Data collection via surveys.
- Development of methods to create object, description and animations using interfaces and integrate it.
- The entire process that transforming the design concepts into mobile apps prototyping is iterative as the mobile apps will be improved in several cycles throughout the implementation process.
- Test module and analysis modules will be developed through which test can be taken by the disabled and analysis will be carried out.
- Performance evaluation: Conduct an evaluation to ensure the usability and functionality of the app match with user requirement. The effectiveness of the mobile apps also will be evaluated to prove the significance of the study.
- Improving proposed method by adding more visual forms of presentation with animations.

Research articles and report writing.

III. RESULTS AND DISCUSSION

This project will be delivered to speech and hearing institutions & speech and hearing disability students,also for the teachers who are involved in the teaching and training of speech and hearing disability children.

This project will also be delivered to parents of speech and hearing disabled children that helps as a useful and powerful tool to guide their disabled children in teaching the basic concepts.

Figure 1. Initial Page (Loading)

This tool allows uneducated specially abled people to learn about Animas, Fruits & Vegetables by providing interactive and attractive multimedia interface which includes Animation Fig 1 shows the welcome page & loading screen of the application.

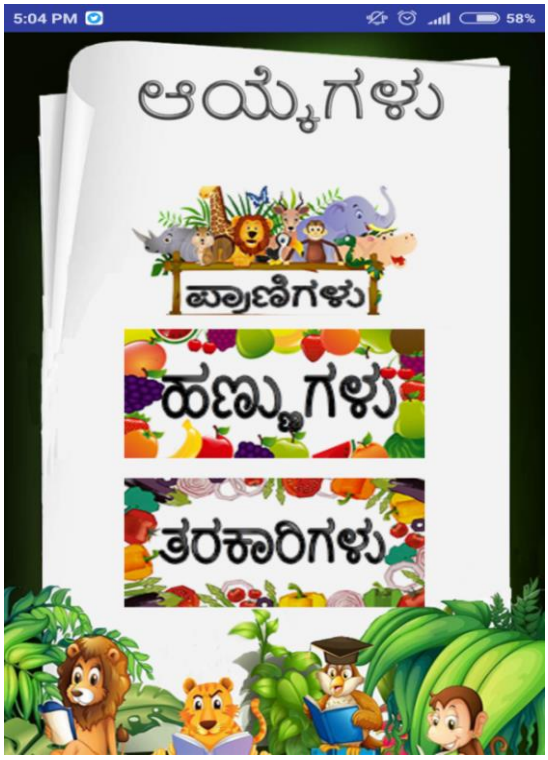

Figure 2. Menu page

Whereas Figure 2 depicts the main menu where the user can choose to learn from any of the module like Animals, Fruits & Vegetables Where everything is

presented along with audio in the background when any transition takes place, on a click action gives transition to submenu from the Main Menu.

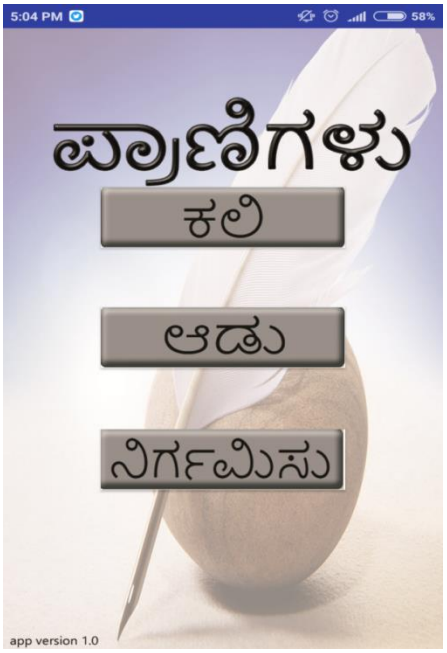

Figure 3. Sub-Menu with Learn, Play & Exit

Figure 3 represents the Sub Menu where user is presented with option to either learn or go with the play where the user can test his skills of what is learnt in the learning module. And one more menu option to exit.

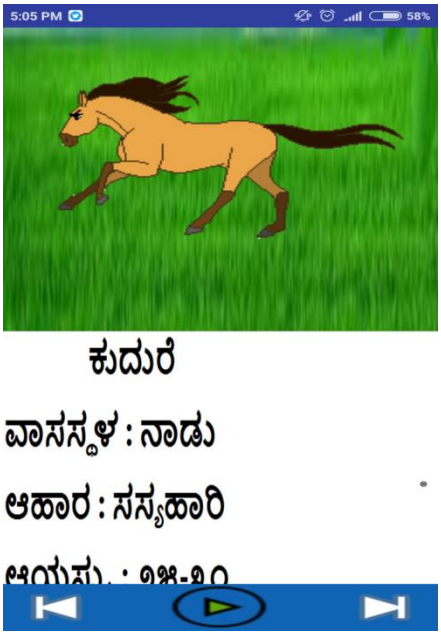

Figure 4. Description page

In Sub Menu on choosing the learn module the description page is opened which contains animation of the learning object or and the play button is used to give audio based description of the leaning object. Wherein the animal module the audio of the animal sound is added for more interactive learning where on user clicking on the animal the sound made by the animal is played in background.

Figure 5. Test Module

After the learning module the user can go with the test module where the user can take test, the test module contains MCQ type question where the user can select the right option based on the question given, the score is then calculated based on the no of right and wrong options chosen by the user. Post the Quiz module the result will be displayed based on the scores with motivating animations and sounds in the background as shown in Fig 6

Figure 6. Result Page

IV. CONCLUSION

The research outcome will be delivered to speech and hearing institution, who are involved in the teaching and training of speech and hearing disability children.

The research outcome will be delivered to parents of speech and hearing disabled children that helps as a useful and powerful tool to guide their disabled children in teaching the basic concepts.

The same will be published in national and international journals/ conferences for reference by other researchers.

Industrial companies and product designers could use this as guidelines for further product development activities.

Researchers could use this for further optimization studies.

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Miniaturized Two Electrode ECG System for High Motion Ambulatory Environment with Bluetooth Connectivity

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ABSTRACT

Nowadays, due to advancements in technology the world is moving towards miniaturizing devices in various fields. This also includes medical field where the physician can effectively analyze various disease. The proposed system helps the doctors to perform preliminary diagnosis of the heart. There are several ways of diagnosing and checking the condition of heart such as ECG, MRI, CT Scan. ECG is preferred because of its precision, convenience and low cost. The proposed system has an ECG ASIC i.e. MAX30003 provides ECG waveforms and heart rate detection. The system also has an arduino pro mini 3.3V which collects data from ECG ASIC and sends to PC through HC-05 Bluetooth. Then, the ECG waves are displayed on the PC. The components used for the construction of the system are of low cost, high precision and low power consumption. The system enables wireless transmission of ECG signals to a PC through Bluetooth. The advantage of the system is compactibility and portability.

Keywords. ECG ASIC (MAX30003), Arduino Pro Mini 3.3V, HC-05 Bluetooth, Wireless transmission

I. INTRODUCTION

The modern lifestyle has lead people more prone to cardiovascular diseases. Cardiovascular disease is a common class of disease which involves heart and blood vessels. Angina, myocardial infarction known as heart attack and Bradycardia are some of the commonly known coronary artery diseases. This is caused by high blood pressure, excessive alcohol consumption diabetes, smoking, obesity, high blood cholesterol and lack of exercise poor diet. ECG is the most common method of diagnosing heart diseases. Electrocardiography is a process which records electrical activity of the heart using electrodes placed on the skin. An abnormal ECG can tell irregular heartbeat, an enlarged heart, areas of the heart with reduced blood supply, a silent heart attack. ECG method is used when a patient is suspected with cardiovascular system.

The contraction and relaxation of the cardiac muscles result in generation of electrical potential. Electrodes detect the tiny electrical changes on the skin.ECG interpretation requires a structured assessment of the waves and the intervals. There a 5 waveforms of ECG, P wave, Q wave, R wave, S wave, T wave. P wave is the initial deflection of the heartbeat and it is a small upward wave. It depicts atrial depolarization. The Q wave is any initial downward deflection after the P wave. The normal Q wave indicates septal depolarization. The R wave is the next upward deflection after the P wave . It is represented by early ventricular depolarization. The S wave is the first lower deflection that appears after the R wave. It represents the late ventricular depolarization. The T wave represents repolarization of the ventricles.

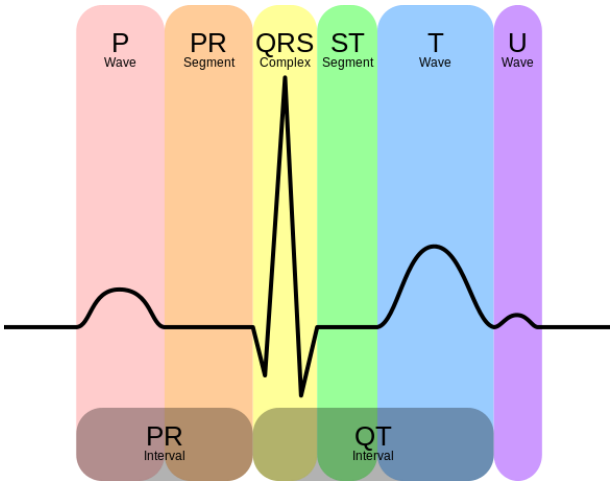

Figure 1. Waves and Intervals of ECG waveform

A normal resting heart rate for adults ranges from 60-100 beats per minute. If a resting heart rate is consistently above 100 beats per minute or if it is below 60 beats per minute then hear rate is considered to be abnormal and should be diagnosed.

Due to the exponential development of the information technology, there are some ECG monitor products which uses technologies such as Internet solutions, Bluetooth, cellular phones[6], and wireless local area networks(WLAN)[1]. Transmission of ECG signals by Bluetooth and wireless networks has an impact in the market and has been used extensively[2]. The proposed ECG system has advantage of interfacing the ECG signals on PC through Bluetooth connectivity.

II. HARDWARE DESCRIPTION

A. Arduino Pro Mini 3.3V

Arduino Pro Mini is a microcontroller board based on the ATmega328P. It consists of 14 digital input-output pins, 6 analog inputs, a reset button and holes for mounting pins. Arduino Pro Mini is used for semi-permanent installations. The pin layout of the board is compatible.

There are two versions of Pro Mini. One runs at 3.3V and 8MHz, the other at 5V and 16MHz. Here, Arduino Pro Mini 3.3V is used. It doesn't have any pre-mounted headers, users can connect a connector or wire in any orientation.

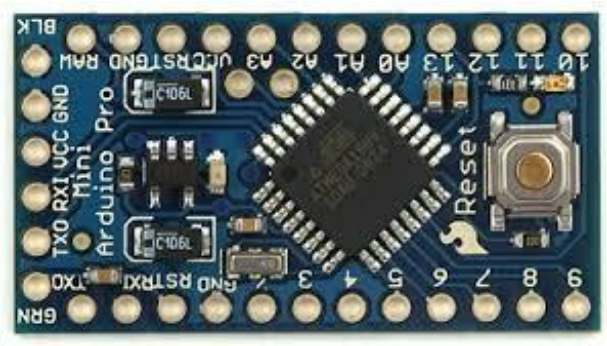

Figure 2. Arduino Pro Mini 3.3V

B. Power Supply

The power supply to Arduino Pro Mini can be given via an FTDI cable or breakout board or with a regulated 3.3V supply on the Vcc pin. Automatically the power source will be selected. The external power supply can be either from a battery or an AC to DC adapter. The unregulated power is connected to RAW pin on the board not on Vcc.

C. Ag/AgCl Electrodes or Conductive Fabric Electrodes

Ag/AgCl are traditional medical electrodes, used to sense the tiny electrical signals of the muscles, when dampened. An adhesive gel is used to stick electrodes on the skin [3]. They may cause irritation to the skin and retain on the skin for long time causing side effects. Conductive Fabric Electrodes are used for sensing muscle activity. It is a simple way to make reusable electrodes and are of low cost. They are sown into garments or used as a strap. Conductive fabric based electrodes are capable of collecting ECG with accuracy compared to that of the signal collected by the gel electrodes.

Since, no any adhesive is used in conductive fabric, no pain or irritation is caused to skin.

D. Bluetooth Chip

Bluetooth is used as a wireless transmission interface to transmit the ECG signals to PC. HC-05 Bluetooth

communicates with Arduino via Serial Communication

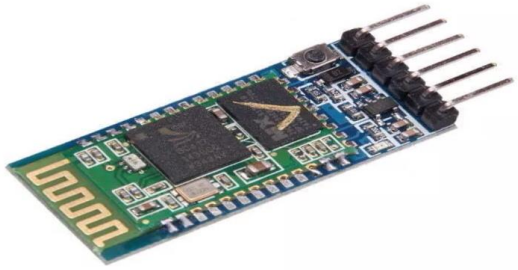

Figure 3. HC-05 Bluetooth

E. ECG ASIC

The MAX30003 is a single bio-potential channel which provides Electrocardiogram (ECG) waveforms and heart rate detection. It is a complete, biopotential, analog frontend solution for wearable applications. It consumes ultra-low power for long battery life. It provides high performance for clinical and fitness applications. Some features of MAX30003 are - It has a built-in Heart Rate Detection with Interrupt feature which eliminates the need for running HR Algorithm externally [5]. It has better dry starts due to improved CMRR and high input impedance. Due to high accuracy more physiological data can be extracted.

III. SOFTWARE DESCRIPTION

Processing is a flexible software sketchbook. It is built on Java language with simple syntax and a graphical user interface [7][8] .

IV. PRINCIPLE OF OPERATION

The two electrodes are placed on left and right arm of the subject. These are connected to MAX30003 an ECG ASIC. This ECG ASIC has an in-built ADC to convert the analog ECG signal to digital one and a Heart Rate Detection algorithm to calculate the heart rate. These digital data are then sent to Arduino board where the data are stored, formatted and made ready to get transmitted [4]. The HC-05 Bluetooth is connected to Arduino Pro Mini 3.3V. This bluetooth module is used to connect to PC. The PC receives transmitted data through the in-built Bluetooth settings.

The program is made to run and then the ECG signal is displayed on the screen. This heart rate is also displayed.

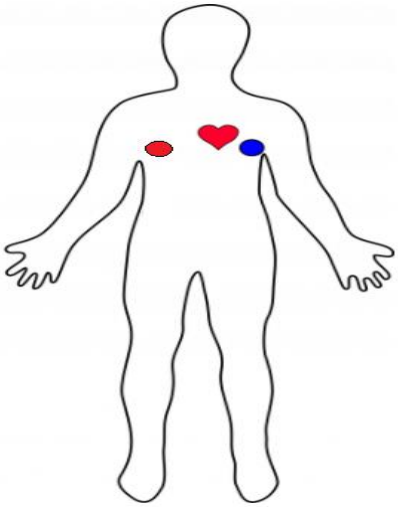

Figure 4. Two electrodes placed on the subject

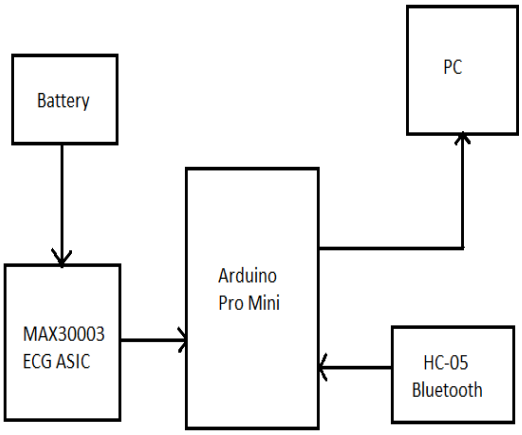

Figure 5. General Block Diagram

V. RESULTS

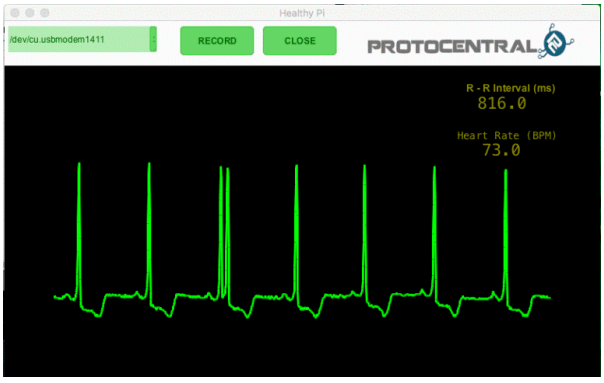

Figure 6. ECG signal acquired through conductive fabric.

Figure 7. ECG signal acquired through Ag/AgCl electrodes

The above results depict clearly that the ECG signal acquired by conductive fabric are more accurate than that of Ag/AgCl electrodes. The waveforms displayed are more clear in Fig6 and are easy to make diagnosis of the heart.

VI. CONCLUSION

In this paper, MAX30003 ECG ASIC is used to calculate the Heart Rate. An Arduino Pro Mini 3.3V, used is of low cost and small in size. The ECG signals acquired are processed accurately and made to display on the screen. This system detects the ECG signal when the subject is ambulatory.

The conductive fabric used instead of traditional electrodes increases comfortability for the subjects. Unnecessary, noise is removed and required ECG signals are displayed.

VII. FUTURE WORK

The current system displays the heart rate and R-R interval distance on the screen. This can be further modified to obtain few more necessary information to be displayed on the screen by making simple modifications in the program. The signals transmission distance is limited in this system. This can be improved by adopting new technologies which support long distance transmission.

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A New Approach of Data Hiding in BMP Image Using LSB Steganography and Caesar Vigenere Cipher Cryptography

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ABSTRACT

The digital image is one of the most common media is known by the public. Steganography is a method of cryptography used to hide the data in a digital image so that data transmitted cannot be identified by irresponsible parties. One of a kind of digital imageries that is a BMP format or bitmap, bitmap file format may consist of 1,4,8,24 and 32 bits of color for each pixel. The method used to conceal secret messages is how to insert cryptography messages into the low bits to the pixel data that make up a digital image file BMP. By developing a method of Steganography then sending the data which do not only have a good level of security, but also has a level of security to protect a copyright of a digital image.

Keywords: Cryptography, LSB, Steganography, BMP

I. INTRODUCTION

In the current era of globalization with a variety of technologies that have already matured, any person can easily make use of technology to do business in order to meet the needs of his life. However, with advances in technology nowadays, anyone can easily do piracy against the work of others to profit from piracy results the results of the work of others. Based on the provisions of the legislation that the hijacking was a copyright infringement, said copyright infringement for having violated the exclusive rights of the creator or copyright holder. Exclusive rights are rights that are solely reserved for the holder so that there is no other party may utilize such as announcing or reproduce those rights without the permission of the holder.

The protect the copyright of digital image can be done by inserting messages of text, where the text contains information from the photography or owner of the digital image. One way to insert messages into digital image steganography techniques by.

Steganography is a technique used to hide data in digital image so that data transmitted cannot be identified by irresponsible parties. One goal of steganography is submitting confidential information without causing suspicion.

Besides that steganography can also be used to perform authentication against an artwork as the utilization of watermarking. Steganography requires two properties. The first property is the container(cover) and the second is data that are hidden. One of the methods of steganography can be used to insert messages into digital imagery is a method of LSB is by way of

inserting a bit messages into every last pixel bits of digital imagery.

To increase the level of security of the data stored can be done by adding a key property(key) the secret. This key property can be either symmetric key or public key or private key in cryptographic techniques can be form. This cryptography which will secure the messages to be inserted into digital image. After the message is secured with cryptography then the message will be posted on the digital image using steganography techniques.

II. METHODS AND MATERIAL

A.Steganography:.

Steganography is a technique to hide personal information by something that the result will look like other normal information. The medium used is generally a different media with media bearer of confidential information, where this is a function of the technique of steganography using disguises techniques as other media are different so that confidential information in the initial media is not clearly visible.

Steganography is usually often in incorrectly sense with cryptography, therefore both equally to protect valuable information . The fundamental difference between the two i.e. steganography-related information hidden so it looks like there is no hidden information at all [8]. If one observes the object store hidden information, he will not think that there is a secret message in the object, and therefore he will not attempt to solve the information (decryption) of the object.

Basic concepts from steganography are that an image which has a cover that was used in order to cover images of original message. The output of images called stego image with, which has a hidden message. Stego images are then sent to recipients where the recipients take a picture message with steganography .

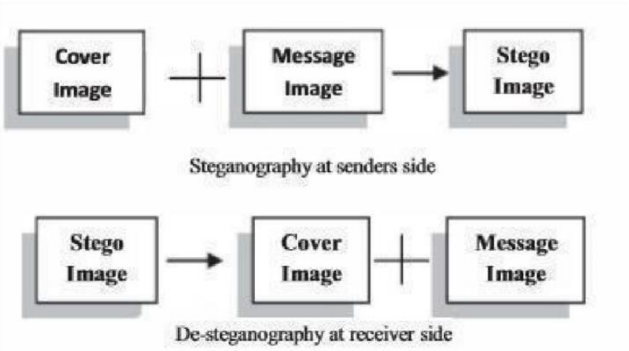

Figure 1: Encoding and Decoding Process

B. Digital Image

A digital image is an image that is stored in a digital format. Only the digital image can be processed using a computer. If the type of the image wants to be processed by the computer, the image should be converted into a digital image. Digital images are usually stored as image files with a size of 24-bit or 8-bit. Image size 24-bit known as the true color image. The 24-bit image is scattered with 3 bytes at each pixel represents the color red, green, and blue (RGB) respectively. The color is derived from combining the light red, green, and blue with different proportions. For the 8-bit image, each pixel is represented by 1 byte, which has a range of values from 0 to 255 with 256 possibilities, so there are 256 color or grayscale values for black and white images.

C. BMP Digital Image

The bitmap is a representation of the graphic image which consists of a point that is stored in

computer memory. Developed by Microsoft and the value of each point by a single bit of data for an image in black and white, or more for color images. This file type is usually used for the Windows operating system and OS/2. Excess BMP file type is to be opened by almost all image processing programs. Either the compressed BMP files or uncompressed, BMP files have a size much **larger** than the other types. Excess is the Bitmap Image supports the use of up to 32 -bit color 1bit. Suitable for bitmap images such as logo design, banner and so on. While the shortage of bitmap image is larger than the size of the image to other formats. On the representation of the bitmap, an image divided into small boxes where each box stores the value of the intensity of color called pixels.

BITMAPFILEHEADER
BITMAPINFOHEADER
RGBQUAD array
Color-Index array

Figure 2: BMP Data Structure

D. LSB Steganography

The simplest method for hiding data in pictures is a method of LSB (least significant bit) [1]. LSB method exploiting human visual senses in the observed changes a bit in the picture [5]. Figure 24 bit or often called with RGB true color, very suitable for the insertion of this because the lsb method consists of 3 components i.e. red, green and blue. When using a 24-bit image, bits of channel red, green and blue can be used, so the number of bits for each pixel can be inserted as much as 3 bits [7]. For example, the image of 3 pixels of a 24bit image uses 9 bytes of memory [6].

(00100110 11101111 11001010)
(00100101 11001010 11101011)
(11001100 00100011 11101101)

When the letter D (ASCII 68), with the binary number 1000100, inserted and the results :

(00100111 11101110 11001010)
(00100100 11001011 11101010)
(11001100 00100011 11101101)

In the example above is not significant pixel replacement done in order. No significant pixel replacement can also be sorted by, even this can increase the level of data security (imperceptibility).

In addition to the possibility of damage to information stored in file on the file changes due to stego , LSB steganography method also only able to store information with a very limited size. For example, a 24-bit image (R = 8-bit, 8bit G =, B = 8 bits) is used as a container to store the data size is 100 bits, if each color component (RGB) used one pixel to store confidential information, then each pixelnya stored 3 bits of information, so at least it takes the image of a container measuring 34 x 34 pixel or equivalent 3 x 8 = 816 bits (8 fold). So a 24-bit image if used to store confidential information is only able to accommodate the maximum size of information 1/8 of the size of the image of the reservoir .

E. Algorithm for embedding data inside image

For the steganography algorithm, Fig.3 shows the algorithm for embedding the secret message inside the image. During the process of embedding the message inside the image, a secret key is needed for the purpose of retrieving the message back from the image.

From Figure 3, the secret message that is extracted from the system is transferred into text file first. Then the text file is compressed into the zip file. The zip text file then is used for

converting it into the binary codes. The purpose of zipping the text file is because the zipped text file is more secured if compared with the file that is without the zipped.

The contents in the zipped file will significantly hard to be detected and read. Furthermore, this series of binary codes of the zipped text file and the key is a long random codes in which they only consist of one and zero figures. A data hiding method is applied by using this series of binary codes. By applying the data hiding method, the last two binary codes from the series are encoded into a pixel in image, then, next two binary codes are encoded to the next pixel in image, the process is repeated until all the binary codes are encoded. The secret key in this proposed steganography algorithm is playing an essential role where the key is acts as a locker that used to lock or unlock the secret message. For the data hiding method, each last two bit is encoded into each pixel in image. This will ensure the original image will not be tempered with too many changes.

Begin Input: Cover_Image, Secret_Message,Secret_Key;
Transfer Secret_Message into Text_File;
Zip Text_File;
Convert Zip_Text_File to Binary_Codes;
Convert Secret_Key into Binary_Codes;
Set BitsPerUnit to Zero;
Encode Message to Binary_Codes;
Add by 2 unit for bitsPerUnit;
Output: Stego_Image;
End

Figure 3. Algorithm for embedding data inside image.

F. Algorithm for retrieving data inside image

Once the message is hidden inside the image, this message can be extracted back from the stego image. Fig. 4 shows the algorithm for extracting the secret message from the stego image. In order to retrieve a correct message from the image, a secret key is needed for the purpose of verification.

From Figure 4, for the data extracting method, a secret key is needed to detect whether the key is match with the key that decodes from the series of binary code. Once the key is matched, the process continues by forming the binary code to a zipped text file, unzip the text file and transfer the secret message from the text file to retrieve the original secret message.

Begin
Input: Stego_Image, Secret_Key;
Compare Secret_Key;
Calculate BitsPerUnit;
Decode All_Binary_Codes;
Shift by 2 unit for bitsPerUnit;
Convert Binary_Codes to Text_File;
Unzip Text_File;
Output Secret_Message;
End

Figure 4. Algorithm for extracting data from stego image.

G. Caesar Cipher

Caesar cipher is taken from the name of the Roman Emperor Julius Caesar, in Julius Caesar mengamankannya sending a message by way of the existing content of the message is encoded by replacing the position of each letter of the message with others who have a position difference the other letters of the alphabet [4]. As for steps-steps that are performed are as follows: a. Determine the magnitude of the shift amount of letters that will be replaced b.

Replace each letter of the message according to the number of shifts in the specified font. c. return the number of letter Arrangement in accordance with the order of the original message.

A	B	C	D	E	F	G	H	I	J	K	L	M
0	1	2	3	4	5	6	7	8	9	10	11	12
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
13	14	15	16	17	18	19	20	21	22	23	24	25

Figure 5: The Order of the Alphabet

To encode a message simply replacing the letters in the message with the letter password corresponds to the number of shifts in the desired letter.

Caesar Encryption Example:

Original text: PESAN INI SANGAT RAHASIA

Sliding Number (Key): 120

Cipher Text: BQEMZ EMZSMF DMTMEUM UZU

H. Vigenere Cipher

The Vigenere algorithm used for the Encryption of data or messages by means of data or messages are encoded by using a keyword (Key) in the form of a word or words of the chorus Each letter on the data or message paired with a letter at the specified keyword, and then do the encryption process that is encryption.

Vigenere Encryption Example :

Plain Text: PESAN INI SANGAT RAHASIA

Key: ARMADA

Cipher Text: PVEAQ INZ EAQGAK DAKA

III. RESULTS AND DISCUSSION

The number of characters that can be inserted into the image is based on the size of the image. Here are 5 Images used for analysis.

In this experiment, the image consists of five RGB images and five Grayscale images. After we find out how the dimensions of images, then we can calculate the number of words that are inserted into the images using the formula:

RGB Image Formula

(pixel x pixel x 3)/ 8 ..... (1)

No	Image	Resolution	Size
1		8x8 Pixel	248 Byte
2		9x9 Pixel	308 Byte
3		10x10 Pixel	376 Byte
4		11x11 Pixel	452 Byte
5		12x12 Pixel	488 Byte

Figure 6: Resolution and Size of the Image

The number of characters that can be inserted into the image is based on the size of the image. Here are ten Images used foranalysis. After

calculations are finished, we'll get the graph of five RGB images and five Grayscale images,

The following is an analysis of data from a number of texts with the resolution of the image and the maximum text size to the size of the image.

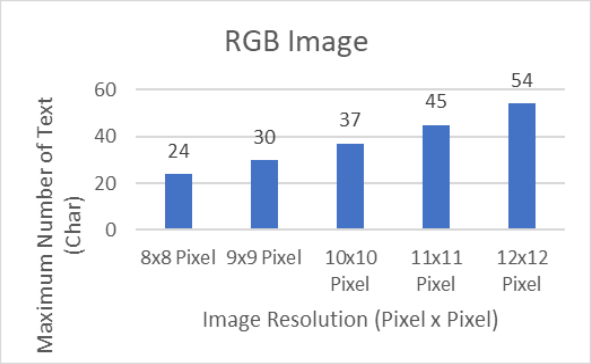

Figure 7: Maximum number of text that can be inserted into the RGB image

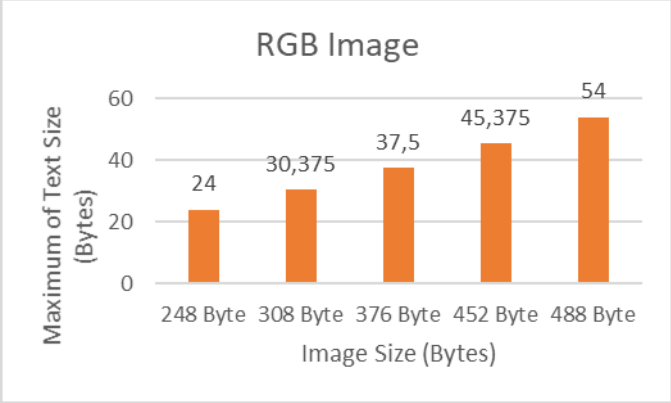

Figure 7: Maximum of text size that can be inserted into the RGB image

From the figure 6 and 7, the overall resolution of the larger image can be more inserted characters. It can be concluded The greater resolution of the image so more characters that can be inserted. From the discussions, it can be concluded that RGB image is better used for insertion process because RGB image can insert more character than Grayscale image.

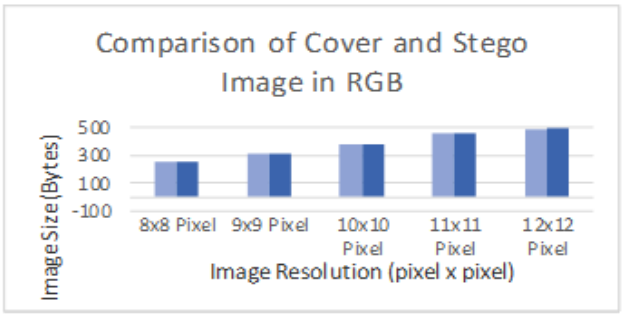

Figure 8: Comparison of Cover and Stego Image in RGB

From Figure 8, a comparison of the cover images as a whole the image size of the stego image is is more large than the cover image.

A. Avalanche Effect

Avalanche effect is one way to determine whether or not a cryptographic algorithm, which will be known how big the changes which occurred in the ciphertext bits due to the encryption process. The greater the avalanche effect will the better cryptographic algorithms. How to calculate avalanche effect as follows:

$$Avalanche\_Effect\ (AE) = \frac{\sum bit\_change}{\sum bit\_total} * 100\% \quad \text{.... (2)}$$

Plain text: APD

Cipher text: EKH

Avalanche_Effect = 100%

B. PSNR

Peak Signal to Noise Ratio (PSNR) is a comparison between the maximum value of the signal measured by the magnitude of the noise effect on the signal. The image is referred as the original source signal, and the noise is represented as error introduced after encoding. Although a maximum PSNR indicates that reconstruction of the image is up to its maximum quality. PSNR can be evaluated using the formula [17].

$$PSNR = 10 \log_{10} \left(\frac{C^2_{max}}{MSE} \right) \quad \text{..... (3)}$$

C. MSE

Mean Square Error calculates the difference between experimentally estimated value and true value, which signifies the loss in the quality or quantity of the image during the technique. In this case, the Mean square error is calculated for finding the quantity of deviation in pixel value after embedding the transformed data bits into it. The estimation of MSE showcases the quality change in the stego image, which has to be maintained in order to benefit the methodology. MSE is calculated by the formula [17].

$$MSE = \frac{1}{MN} \sum_{x=1}^{M} \sum_{y=1}^{N} (S_{xy} - C_{xy})^2 \quad \text{..... (4)}$$

1		8x8 Pixel	0,0677
2		9x9 Pixel	0,0617
3		10x10 Pixel	0,0567
4		11x11 Pixel	0,0303
5		12x12 Pixel	0,0394

No	Image	Resolution	PSNR
1		8x8 Pixel	59,8584
2		9x9 Pixel	60,2599
3		10x10 Pixel	60,6315
4		11x11 Pixel	63,3499
5		12x12 Pixel	62,2151

Figure 9: Result of MSE

III. CONCLUSION

From the results of experiment and this analysis , then the conclusions to be drawn regarding the application of steganography with the method of Least Significant Bits, among others:

1. In comparison with a large number of characters, type the RGB image can be inserted more characters.
2. The size of the bitmap file after inserted character (Stego image) changes from the previous bitmap file size (Cover Image)

3. The larger image size, the more messages can be inserted
4. The integrity of the data before and after the process of extract does not change at all
5. The addition of cryptography in security messages then it is adding a level of security data text.

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Facial Key-Point Detection and Real-Time Filtering Using Convolutional Neural Network

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ABSTRACT

In this paper, an effort is made to combine the knowledge of computer vision techniques and deep learning to build and end-to-end facial keypoint recognition system. Facial keypoints include points around the eyes, nose, and mouth on any face and are used in many applications, from facial tracking to emotion recognition. The partially complete module should be able to take in any image containing faces and identify the location of each face and their facial keypoints. The proposed facial recognition system uses few of the many computer vision algorithms built into the OpenCV library and are implemented at the basic level. This expansive computer vision library is open source and is still growing. The proposed system does real time filtering and facial key point detection. This implementation uses a Convolutional Neural Network to train the system at each step, visualize the loss and learn in the next detection.

Keywords: Convolutional Neural Network, Face Detection, Facial Keypoints, Facial Recognition, Real-time Filtering.

I. INTRODUCTION

Our face plays an elementary role in day to day social interactions. Today, adoption of facial biometric identification technology, facial tracking, emotion recognition have become a global trend covering a wide gamut of applications ranging from business(commercial) to social media and even law enforcement. Some countries and their governments are using facial biometrics for automating the immigration process. As a part of boundary security enforcement, governments are using facial recognition scanners with critical information about criminals and wanted individuals pre-loaded to them. Further driving licences and identity cards contain facial recognition processes for verification and authentication. In the recent past, major companies like Google, Snapchat and Facebook etc, have been using facial detection and recognition systems to tag, blur and identify images real-time. Even companies like Apple, Samsung, LG, Panasonic have also incorporated face recognition, eye detection, emotion recognition systems to their smart devices. All the aforementioned applications demand highly accurate and efficient face recognition technology which can run with minimum loss in real-time.

The existing face recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. These algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw and use it to detect faces in images from different data sets. Recognition algorithms can be divided into two main approaches, geometric, which looks at distinguishing features, or photometric, which is a statistical approach that distills an image into values and compares the values with templates to eliminate

variances. However, these recognition systems do not include any deep learning techniques such as G-CNN and F-CNN[3] (Convolutional Neural Network) to train the image recognition system. The current systems are simply based on image pre-processing, denoising the image and recognizing the facial points. These systems are incapable of learning from each image and hence show fairly lower results when used real-time. Although these methods achieve promising results in terms of recognition rate with constrained scenario datasets such as CMU, FEI, Grimace, Face95 and Yale, these features show considerable degradation in uncontrolled scenario datasets such as FIE and LWF.

Convolutional Neural Networks have achieved substantial success in the field of patttern recognition including object detection and recognition, speech recognition, OCR, action and handwriting recognition due to the fact that it addresses the problems of Multi-Layer Perception Neural Networks. Hence, the proposed system uses a Convolutional Neural Network which is a class of deep, feed-forward artificial neural networks that has successfully been applied to analyzing visual imagery. The system uses Keras which is a high-level neural networks API, written in Python and capable of running on top of TensorFlow. Tensorflow is an opensource tool for machine learning which contains a wide range of functionality, TensorFlow[6] is mainly designed for deep neural network models.

The main objective of the proposed system is to implement a real-time facial keypoint recognition system using OpenCV library for image processing and Keras with Tensorflow backend for building and training a deep learning CNN.

II. METHODS AND MATERIAL

This facial-keypoint recognition system can be built and run on any platform as it uses an open source Keras module with Tensorflow backend and OpenCV library. The modules can be programmed using Python. The system comprises of three module

1. PRE-PROCESSING AND FACE DETECTION

This module is aimed towards investigating the OpenCV library to process images from a dataset and apply the tool to detect faces in the images.

1.1 Detect Faces Using a Haar Cascade Classifier

At its root face detection is a classification problem - that is a problem of distinguishing between distinct classes of things. With face detection these distinct classes are 1) images of human faces and 2) everything else. This is achieved by using Haar feature-based cascade classifiers.[1]

Figure 1.1 Face Detection using Haar Cascasde Classifier

1.2 Adding Eye Detection using pre-trained Haar Cascade Classifier

In this step, pre-trained Haar Cascade[1] Classifiers are used to detect faces in an image and also to recognise the position of the eye in the detected face.[2]

Figure 1.2 Eye Detection using pre-trained Haar Cascade Classifier

1.3 De-noise an Image for Better Face Detection

In the context of face detection, the problem with an image like this is that - due to noise - we may miss some faces or get false detections. Using OpenCV's built in color image de-noising

functionality, we de-noise the images enough so that all the faces in the image are properly detected.

1.4 Blur an Image and Perform Edge Detection

Edge detection is a dimension reduction technique - by keeping only the edges of an image we get to throw away a lot of non-discriminating information. And typically the most useful kind of edge-detection is one that preserves only the important, global structures (ignoring local structures that aren't very discriminative). So removing local structures / retaining global structures is a crucial pre-processing step to performing edge detection in an image, and blurring can do just that

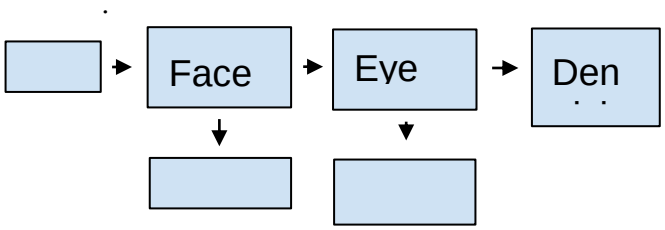

Fig 1.3 Pre-processing and Face Detection

2. TRAINING A CONVOLUTIONAL NEURAL NETWORK TO DETECT FACIAL KEYPOINTS

Once the system is accustomed with face detection, it needs to be trained to perform facial keypoint detection. This is achieved by creating a Sequential CNN using the Keras backend[5]. Images from the Kaggle dataset are used here to train and test the CNN visualise the loss and detect upto 15 facial keypoints. Facial keypoints include facial landmarks around eyes, nose and mouth. This system is aimed towards identifying these facial keypoints real time using the trained CNN.

Figure 1.4 Images with Facial Keypoints Detected(using Kaggle Dataset)

3. COMPLETING THE CV PIPELINE

With the work done in Modules 1 and 2 of the project, along with a freshly trained facial keypoint detector, we can now complete the full pipeline. That is given a color image containing a person or persons we can now

1. Detect the faces in this image automatically
2. Predict the facial keypoints in each face detected in the image
3. Mark predicted keypoints on each face detected and use it various application

III. RESULTS AND DISCUSSION

For each training image, there are two landmarks per eyebrow (**four** total), three per eye (**six** total), **four** for the mouth, and **one** for the tip of the nose.

The system is trained to predict these facial keypoints using the following Convolutional Neural Network architecture

Layer (type)	Output Shape	Param #
conv2d_1 (Conv2D)	(None, 96, 96, 16)	160
max_pooling2d_1 (MaxPooling2	(None, 48, 48, 16)	0
conv2d_2 (Conv2D)	(None, 48, 48, 32)	4640
max_pooling2d_2 (MaxPooling2	(None, 24, 24, 32)	0
conv2d_3 (Conv2D)	(None, 24, 24, 64)	18496
max_pooling2d_3 (MaxPooling2	(None, 12, 12, 64)	0
conv2d_4 (Conv2D)	(None, 12, 12, 128)	73856
max_pooling2d_4 (MaxPooling2	(None, 6, 6, 128)	0
flatten_1 (Flatten)	(None, 4608)	0
dense_1 (Dense)	(None, 512)	2359808
dropout_1 (Dropout)	(None, 512)	0
dense_2 (Dense)	(None, 30)	15390

Total params: 2,472,350
Trainable params: 2,472,350
Non-trainable params: 0

Figure 2.1 CNN Architecture with total trainable parameters

The validation of MSE(Mean Squared Error) for different Convolutional Neural Networks for recognition and detection of facial keypoints is obtained as follows

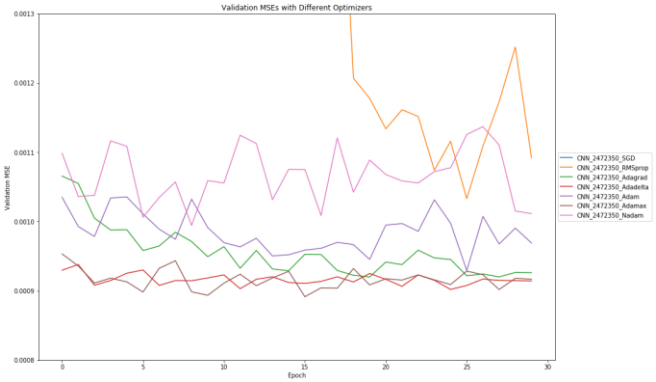

Chart 2.1 Plot of Validation MSE with different Optimisers

The training and validation loss for the designed neural network is as follows

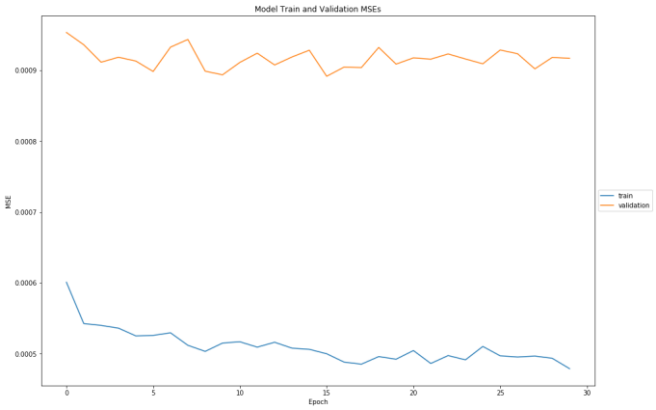

Chart 2.2 Plot of Train and Validation MSE

To reduce overfitting and increase the generalization abilities of the model I experimented with **four different level of dropout rates [0.25, 0.3, 0.4, 0.5] between the last two denses layers** and got the best generalization results with a **dropout rate of 0.5**.

Finally, as a final hyperparameter tuning step, as shown above, **all the optimizers provided by Keras** were implemented and ended up selecting the one with the **lowest validation MSE using 20% of the training data as validation data**. Best results were obtained using the Adamax and Adadelta optimizers and for the proposed implementation **Adamax optimizer is chosen for the final model**.

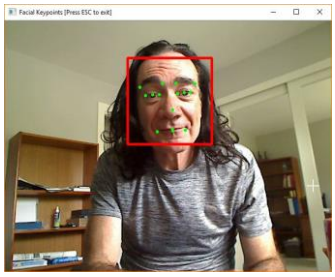

Figure 2.2 Facial Keypoint Detector with Real-time filtering

IV. CONCLUSION

The proposed system is able to detect and mark facial keypoints in any image. It has a similar but better performance when compared to older techniques. Also, the older techniques do not include facial keypoint detectors for facial biometrics. This system is capable to functioning real time and hence can be used in wide range of aforementioned applications like Facebook, Snapchat and Google. The Network architectures proposed in this paper effectively reduces processing time, improves accuracy of the CNN running on low-end GPUs or even on CPUs. Also, the system proposed here has room for change. The OpenCV library which is used for image processing is an expanding library and hence this system is built to incorporate any changes in the library. Further enhancements for this paper would be to expand the network architecture to larger datasets, improve performance and accuracy and make the system run efficiently even on low computing devices and provide range of applications for facial biometrics.

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An Embedded System for Enhanced Passenger Security in Radio Cabs 33

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ABSTRACT

With the world turning towards wireless and radio systems in every field, the use of better communication technology has been the prime focus for all major industries. India has been adopting such systems on a large scale to meet the demands of a large and diverse population. Radio Cabs have been on a tremendous hike during the past few years. The industry has crossed a record-breaking turn over with all the companies aiming at better and comfortable services. During the past three to five years, Delhi has seen some worst rape and crime scenes involving cabs directly or indirectly. This raises a question mark on the safety and reliability of these services, even in the capital city of one of world's fastest growing countries. This paper is based on enhancing the safety and reliability of these services.

Keywords: GPS, Tracking of vehicle, Safety and Security Enhancement, GSM, RFID

I. INTRODUCTION

This concept installs a panic button system in the car, which is directly connected to the car's ignition system. Whenever the passenger feels unsafe, he/she can press this panic button. As soon as the button is pressed, the car ignition is turned off. The system commonly uses a Global Positioning System (GPS) for locating the vehicle and sending this location to the nearby police station through the use of GSM (Global System for Mobile Communication).

The Audio Playback module incorporated in the system starts recording the conversation going on at that particular instant. This recording can later be used as an evidence for legal proceedings as well. An alarm for gaining the local attention for immediate help.

To enhance the security of this system, an RFID module is employed in the circuit, which is connected to the power supply of this panic button system and the car ignition. The car ignition would only work if the driver's details were matched with the RFID tag. This means that the car would only work when the Panic button system is working, since the RFID reader is essential for the ignition to work. Hence, a driver cannot bypass the panic alarm system.

II. EXISTING SYSTEMS AND THEIR DRAWBACKS

'Nirbhaya', is a Women Safety mobile application of Uttar Pradesh Police. It is currently available for Noida residents. It sends a distress message to a specified contact group in an emergency confronting a woman. It sends an alarm through SMS denoting a woman's location, to the configured

group through GPS. It is used for communicating exigencies like accidents apart from attempted molestation through pre-defined text messages, as well.

The literature review about the previous work related to vehicle navigation reveals that tracking of the vehicle is carried out with the help of SOS button; a single click on the button, present in the Radio cabs' application will enable the passenger to escalate matters of safety and related concerns to the concerned safety response team in real time. This feature is implemented in common radio cab online transportation network companies such as Ola and Uber.

In the existing systems, safety is provided only through GPS module, where the location of the person in danger is sent to the concerned authority in real time. Whereas, no other measure is taken in order to ensure the safety of the passenger.

When a passenger is in a critical situation and is in need of immediate help, opening the application and requesting for help through SOS buttons and other such message sending modules, is not an optimized solution.

III. PROPOSED SYSTEM

In the system proposed in this paper, we will overcome the above drawbacks by introducing a physical button/switch placed inside the radio cab, known as Panic Switch. A passenger in need will not have to open an application in order to cry out for help but press a switch placed around him/her.

An enhanced security is provided through incorporating a RFID reader into the surveillance system. Using this, the authentication of the driver is checked. If the driver fails to pass the authentication, the car ignition will fail, as the DC motor connected to the micro-controller (controlling all the modules) will not start. Once the authentication is checked for, only then will the driver be able to start the ride.

When the Panic Switch is pressed during an emergency by the passenger, the following features will get activated in order to provide safety to the passenger:

1. The car ignition stops as the DC motor will automatically stop on pressing the Panic Switch
2. A buzzer/ an alarm will ring to alert local people around the radio cab for immediate first hand help
3. An alert message will be sent to nearby Police Stations and concerned safety authorities of the Radio Cab Network through GSM module
4. The location where the incident has happened and the passenger is in emergency, can be tracked in real time through an application on the concerned authorities' mobile phones using GPS(A pop up notification will arrive denoting that a passenger is in trouble)
5. The Audio Playback module incorporated in the system starts recording the conversation going on at that particular instant. This recording can later be used as an evidence for legal proceedings
6. An alcohol sensor is incorporated near the driver's seat in order to sense if the driver is drunk or not. In case the driver is drunk, the engine (DC motor in this case will not ignite)

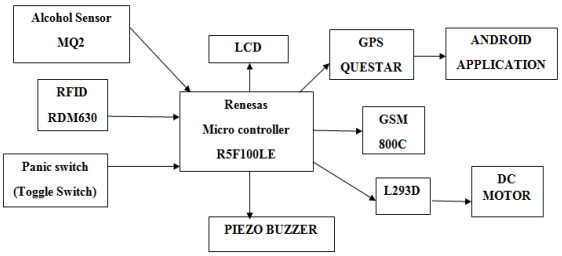

Figure 1. Block Diagram of the Proposed System

IV. TECHNOLOGIES

An Embedded System is a computer system with a dedicated function within a larger mechanical or electrical system, often with real time computing constraints. It is embedded as a part of a complete device often including hardware and mechanical parts.

In the proposed system, we include the following technologies as a part of the Embedded System, to meet the requirements:

A. Microcontroller

Renesas R5F100LE belongs to RL78/G13 family. The main features of this microcontroller are as follows:

- Lowest level of consumption current
- High speed operation of 32MHz main clock, when supplied with 2.7 to 5.5V
- Both flash memory programming and on-chip debugging are supported

B. Global System for Mobile Communication (GSM)

- SIM800C is a complete Quad-band GSM/GPRS solution in a SMT type, which can be embedded in the customer application.
- SIM800C supports Quad-band 850/900/1800/1900 MHz; it can transmit voice, SMS, and data information with low power consumption.
- With tiny size, it can smoothly fit into slim and compact demand of customer design

C. Global Positioning System (GPS)

- A GPS navigation device is a device that accurately calculates geographical location by receiving information from satellites
- The GPS Questar is a compact all in one GPS module solution intended for a broad range of original equipment manufacturer products
- The receiver continuously tracks all satellites in view and provides accurate satellite positioning data

D. Radio Frequency Identification (RFID)

- RDM6300 125KHz card-reader mini module is designed for reading code from 125KHz card compatible read-only tags and read/write card
- Maximum effective distance up to 50mm
- Less than 100ms decoding time

E. Audio Recording and Playback Module

- APR 9301 is a single chip Voice Recorder and Playback device for 20 to 30 seconds Voice recording and Playback
- It is an Ideal IC for automatic answering machine, door phones etc
- This IC has Data Storage Capacity and requires no software and microcontroller. It provides high quality voice recording and playback up to 30sec

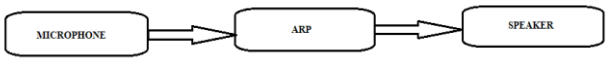

Figure 2. Block Diagram of the APR (Recorder)

F. Alcohol Sensor

- The Grove-Gas sensor(MQ2) module is suitable for detecting H2, LPG, VH4< CO, Alcohol, Smoke, Propane
- Due to its high sensitivity and fast response time, measurement can be taken as soon as possible
- It can sense up to a maximum distance of 30cm

V. APPLICATION

An Android Application is developed, in order to track the passenger's location. This application will be installed in concerned authorities' mobile devices. Whenever a passenger presses the panic button, through GPS, the location of the passenger is sent to

all the registered mobile numbers through the GSM module. The application opens instantly, retrieves the location, and tracks the passenger in real-time using Google maps.

VI. RESULT

The above-mentioned modules are coded using Embedded C and the code is dumped into the Microcontroller. An Experimental set up/prototype is tested to validate all the security measures.

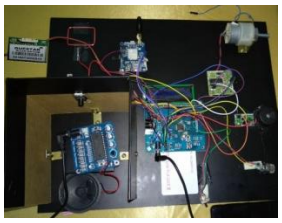

Figure 3. Prototype of the Proposed System

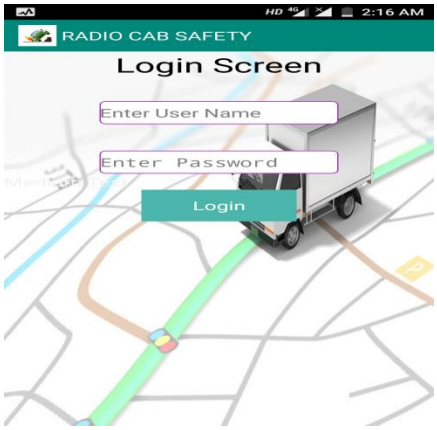

Figure 4. Login Screen of the Application

Figure 5. Screen that Retrieves the Passenger's location

VII. CONCLUSION

Providing security is the fundamental aim of this paper. GSM and GPS together will help in finding the crime location. Recorder audio will be useful in post-crime investigation. RFID reader will prevent access to unauthorized users and the buzzer will help in gaining the local attention.

In future, this system can be enhanced for security at a higher level by incorporating the following features:

1. A live transmission of the scenario with wi-cam
2. A biometric system to authenticate the fingerprint of the driver and hence prevent the ignition of car without authorized usage

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A New Feature Selection Method for Oral Cancer Using Data Mining Techniques

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ABSTRACT

The word cancer is used basically for more than 1000 different diseases including malignant tumours of different sites. Common to all forms of the disease is the failure of the mechanisms that regulate normal cell growth, explosion and cell death. Ultimately, there is evolution of the resulting tumour from mild to severe abnormality, with incursion of adjoining tissues and, ultimately, spread to other areas of the body. The primary risk factor for evolving oral cancer is tobacco use. Smoking cigarettes, cigars, and pipes all increase risk of oral cancer. Smokeless tobacco, also called "dip" or "chew," also enhance the risk. Alcohol consumption is another habit that is strongly associated with the growth of oral cancer. This paper uses data mining technology such as classification and prediction to identify oral cancer. Apriori algorithm is the innovation algorithm of Boolean association rules of mining frequent item sets. The datamining methods and techniques will be discovered to identify the suitable methods and techniques for efficient classification of data. The data mining techniques are effectively used to extract meaningful relationships from the data. Genetic algorithm were applied to association and classification techniques.

Keywords. cancer, oral, genetic algorithm, data mining, apriori algorithm

I. INTRODUCTION

Worthy dental care is significant to maintaining healthy teeth, gums and mouth. Dental problems, with bad breath, dry mouth, tooth decay, or thrush are all treatable with proper treatment and care. Oral cancer can affect any area of the oral cavity including the lips, gum tissues, tongue, cheek lining and the palate. Possible signs and symptoms of oral cancer when patients may report include. a lump or thickening in the oral soft tissues, throat soreness or feeling that something is trapped in the throat, struggle in mastication or consuming, ear pain, difficulty moving the jaw or tongue, roughness, numbness of the tongue or other areas of the mouth, or swelling of the jaw that causes dentures to fit inadequately or become Uncomfortable. Other symptoms of oral cancer may include.

1. a sore in your mouth or on your lip that does not heal
2. wound on the tongue or tonsil
3. white and red patches in the mouth or lips that does not heal
4. bleeding from the mouth
5. Difficulty swallowing, chewing, speaking, or moving the tongue
6.

A. THE RISK FACTORS FOR ORAL CANCERS ARE

Tobacco and Alcohol The major risk factors related with oral cancer are tobacco use, in any existing forms, and heavy alcohol drinking (people who drink

five to eight drinks per day). The mutual effects of alcohol andtobacco smoking have been shown to be synergistic. Of attention, a recent study showed that consumption is inversely associated with oral cancer. The threat for emerging oral cancer is five to nine times greater for smokers than non-smokers. The mechanisms of oral carcinogenesis is made by the tobacco smoking components. In specific the polymorphic inconsistency in the enzymes involved in biotransformation of tobacco-related pro-carcinogens plays an significant role in controlling oral cancer vulnerability. Alcohol drinking is associated to oral cancer because many organichazards derived from alcohol deprivation are digested into active forms that have toxic effects on entities. Ethanol isdissolved to acetaldehyde, a supposedcancer-causing agent.

Age and family history of cancer Age indicates a sequentialmodule in the chemical and biophysical procedures of cells that allow malignant change or the decrease of the resistant system ability. Exactly, the durablecontact to risk factors may affect the gene products that control epithelial cell propagation and death resulting in an unrestrained malignant propagation of cells. Also, family history of oral cancer plays an important role and is careful a risk factor. However, more studies are necessary to clarify which fragments and genes are responsible for oral cancer vulnerability in families. Family history of oral cancer is mostly related with an onset of the disease at an early age (about 45 years old). Oral cancer is also seen in family members without practices such as tobacco chewing, smoking or alcohol consumption.

HPV infection While the relationship between HPV infection and oropharyngeal cancer is now well recognized, it is still indistinct whether HPV infection may lead to oral cancer as well. Numerous studies propose an association between human papillomavirus (HPV) infection and oropharyngeal cancers, mainly HPV 16 (90-95% of HPV-positive tumors). In the US there has been a recent increasing occurrence of cancer of the oropharynx due to persistent HPV infection, particularly among young white men.

The role of the protective effect of HPV vaccines against oropharyngeal cancer remains unclear. However, a recent randomized precise trial has shown that the occurrence of oral HPV four years after immunization is lower when compared to women who did not accept the vaccine. This advises that the injection may have possibly important insinuations for anticipation of progressively common HPV.

Other Risk Factors

I. Viral infections
II. Immuno-deficiencies
III. Poor nutrition
IV. Exposure to ultraviolet light

Signs and Symptoms of Oral Cancer

- ✓ Sores in the mouth or on the lips heal.
- ✓ A white or red patch of skin in the mouth.
- ✓ Swallowing and chewing is difficult.

Broadcast for oral cancer

Early detection of oral cancer using visual examination of the mouth stands being considered in countries where occurrence is high, such as Bangladesh, India, Pakistan, and Sri Lanka. The oral cavity is easily reachable for routine examination, and nonmedical recruits can willinglynoticewounds that are the ancestors of carcinoma. Furthermore, there remainwarnings that precursor wounds may retreat if tobacco use ceases, and that surgical treatment of early oral cancer is very actual.

Association Rule Mining

Data mining technique, association rule mining is applied to find the unknown relationships among the attributes. It identifies strong rules firm in databases using dissimilarmethods of interestingness. Thus, an

association rule is a pattern that states when X occurs, Y occurs with certain probability. Association rule mining follow on two main steps. The first step is to find all item sets with acceptable supports and the second step is to generate association rules by merging these common or enormous item-sets. In the outdated association rules mining, minimum support threshold and minimum confidence threshold values are presumed to be available for mining frequent item sets, which is hard to be set without specific knowledge; users have difficulties in setting the support threshold to obtain their required results. To use association rule mining without support threshold, another constraint such as similarity or confidence clipping is usually introduced

II. HISTORY OF ORAL CANCER

Traditionally, it has been difficult to determine which irregular tissues in the mouth are worthy of apprehension. The detail is, the regular person regularly has situations current in their mouths that impersonator the presence of pre-cancerous changes, and very early cancers of the soft tissues. One study determined that the average dentist sees 3-5 patients a day who show soft tissue irregularities, most of which are benign in nature. Even the humblest things, such as pathos ulcers, herpes simplex, herpes labialise, the wound left by accidentally biting the inside of your cheek, or sore spots from a poorly fitting prosthetic appliance or denture, all at first examination, share similarities with dangerous lesions. Some of these conditions cause physical discomfort, others are painless. There has been a propensity to watch these areas over an extended period to determine if they are unsafe or not. Inappropriately, this thinking leads to a state in which a dangerous lesion may continue to prosper and grow into a future stage, hard to cure cancer. Any sore, discoloration, induration, prominent tissue, irritation, hoarseness, **which does not resolve within a two week period on its own, with or without treatment**, should be considered suspect and worthy of further inspection or appointment. Besides a dull visit to the dental office for regular examinations, it is the patient's responsibility to be aware of changes in their oral environment. When these changes occur, they need to be carried to the consideration of a capable dental expert for examination. The dental expert needs to be present in the knowledge base essential to make a proper analysis, and be knowledgeable in the proper broadcastmeasures to identify oral cancer.

III. EXISTING SYSTEM

Oral cancer is one of the major disease and it needs to be identified in the early stages. Disease detection is also one of the significant areas of research in medical. There is no automation for Oral Cancer Prediction. In existing we have many health maintenance tools and software. All these tools are used to store the data and retrieve the same data but no analysis is done. Today's medical field requires extraction of useful information from the analyzed data. Here we are concentrating on Oral Cancer Prediction using data mining techniques.

Problem Statement

Oral cancer is one of the major disease and it needs to be identified in the early stages. There is no automation for Oral Cancer Prediction and discovering the relationship between oral cancer and its attributes is tedious task and challenging.

IV. PROPOSED SYSTEM

To overcome the different drawbacks and issues mentioned in the existing system we develop an automation for the "oral cancer prediction" and finding the association among different attributes. Proposed system is an health sector application where the major objective is to predict the oral cancer disease in early stages. Proposed system makes use of data mining techniques "classification rules" for oral cancer prediction and uses "association rules" to discover the relationship between the oral cancer attributes.

V. DATA FLOW DIAGRAM

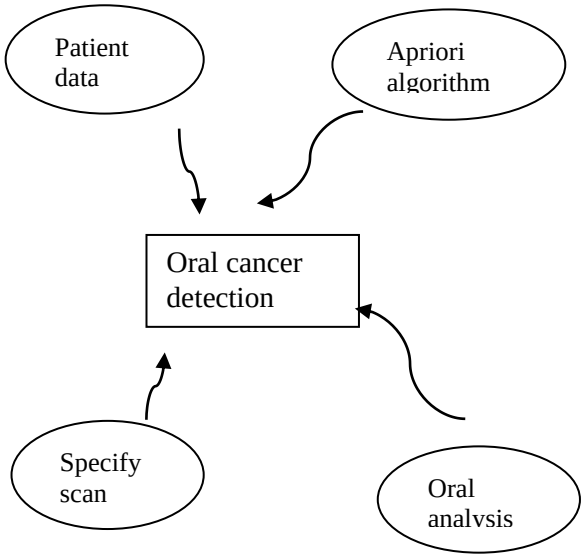


Figure 2. dataflow diagram

VI. METHODOLOGY AND IMPLEMENTATION

Our paper mainly concentrates on two algorithm

1 Genetic algorithm

2 Apriori algorithm

1 Genetic Algorithm

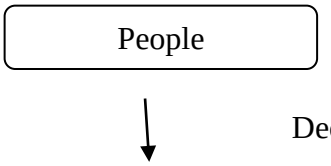
These are search algorithms based on the mechanics of natural genetics. They combine a "Darwinian survival of the fittest" approach with a organized, yet randomized, information discussion. The advantage is that they can search complex and large amount of spaces efficiently and locate near best results quickly. The algorithm operates through a simple cycle.

1 Formation of a people of strings

2. Assessment of each string

3. Collection of the finest strings

The GA maps strings of numbers to each possible solution.



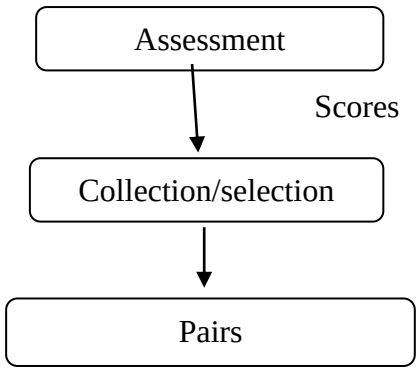


Figure 3. Genetic algorithm flow chart

2 Apriori Algorithm

The apriori is a typical algorithm for common item set mining and association rule learning over the transactional databases. It continues by identifying the frequent individual items in the database and spreading them to larger and larger item sets as long as those item sets appear adequately often in the database. The frequent item sets firm by a apriori can be used to control association rules, which highlight general tendency in the database. Association rules mining using apriori algorithm uses a "bottom up" method, breadth-first search and a hash tree structure to count the applicant item sets efficiently.

Apriori algorithm. Applicant Group and Test Approach

Step 1. Firstly, scan the database once to get common itemset.

Step 2. Make length (k + 1) applicant item sets from length k common item sets.

Step 3. Test applicants against DB.

Step 4. Terminate, if no common or applicant set can be generated.

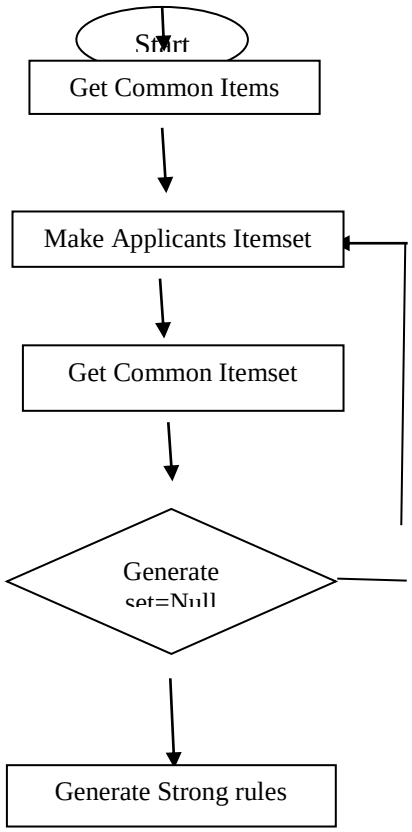


Figure 4. Apriori algorithm flow chart

VII. CONCLUSION AND FUTURE WORK

Data mining is the non-trivial abstraction of hidden before unidentified and possibly useful information about data. Here, we use data mining techniques in oral cancer treatment. Data mining techniques have been broadly used for oral cancer analysis. In this paper we have deliberated the genuine methods that can be used for oral cancer classification.In future, we aim tospread this research by endeavoring to extractmomentousdesigns and useful rules through theassociation rule mining algorithm from extractingmost actual course of action.

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Speed Control of Vehicle in Accident Zone

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ABSTRACT

In today's world increase in population and life standards of people leading to rapid increment in the density of vehicles with enhanced speed and extra features. The craze in drivers makes them to drive the vehicles in high speed in all the regions (school zones, hospitals, bus stops etc.). The number of accidents is increasing due to which people are losing life and may be leading to permanent disabilities. In order to avoid all these problems the government authorities has taken several necessary steps like, sign boards, wearing helmet, speed humps etc. The rules and regulations are not effectively followed or not been observed by the drivers. If there is a system that intimates the driver about the rules and also control the vehicle in these sensitive areas. In this paper implementation of the system is proposed using two methods such as RF communication and Geo-fencing. The proposed system is an attempt to control the speed of the vehicle. The system is designed with software and hardware to intimate the driver about the speed of the area in which the vehicle is currently located. The main focus of this work is to provide safety and precaution to the driver as well as to the passengers and to avoid the accidents. In RF communication method RF transmitter is placed at accident zones and RF receiver placed in the vehicle will communicate using electromagnetic waves. The microcontroller is the brain of the system that activates the particular action corresponding to the received signal (represents the speed limit of the area). The implementation part is done by using geo-fencing technology to overcome from the drawbacks which are encountered in RF technology. Geo-fencing is a virtual geographical boundary defined by GPS that activate software solution when the device is tracked. Geo-fencing delivers the range of efficiency, utilization and safety benefits.

Keywords: RF transmitter and receiver, speed limits, sign boards, accident zones, Geo-fencing.

I. INTRODUCTION

Over the decades most of the road accidents are due to over speeding of vehicles. The road accidents are increasing year after year due to more number of vehicles. The youthfulness in drivers makes them to drive the vehicle very rashly, which is the craze of every driver.Overspeeding in accident zones (like school areas, hospitals and crowded areas etc.) and also the speed humps are major cause for the accidents. In addition to that drivers often can't recognize the appearance of unmarked speed breakers and inconspicuous in low visibility conditions like at night or during raining or snow leads to lose control of the vehicles, causing serious accidents and loss of lives. For prevention of accident, government made some rules such as helmet, seat belt compulsion etc. Speed control of vehicles in curved roads, is also necessary to avoid accidents. For this, there is no any system to control the speed of vehicle. So there is need of a system which controls the speed of vehicle automatically at given limit at particular limiting distance. If this concept of methodology is possible, then the problems related

to traffic as well as accidents due to collision will be controlled. Due to advancement in technology, it is possible to control or set the speed of vehicle at a given limit on the roads like highways, express high ways and any area where the speed limit is desired by the authority. The system is applicable for any speed limit which can be set or controlled as per the requirement. The system is implemented using two methods, one is using RF communication system and the second is using geo-fencing. In RF communication, the system consists of transmitter and receiver. The transmitter is installed at the road side where the speed of the vehicle has to be controlled. The transmitter transmits the speed limit of that area is received by the receiver which fixed in the vehicle. The received speed limit is fed to microcontroller which activates the necessary action to control the speed of the vehicle. The RF transmitter and receiver communicates using radio frequency signal.

In geo-fencing, the geo-fence apps and tools monitor when mobile devices or other physical objects enter or exit an established geo-fenced area and provide an alerts or notifications to the controlling system. These alerts can be in form of text messages, e-mail notifications, phone calls or similar means of communication. Depending on the notifications, the speed of the vehicle is controlled.

II. METHODS

The paper discuss about the two different methods to implement the objectives (providing prevention and precaution in accident zone). The two methods are RF communication system and Geo-fencing system. These are two different domains which are used to achieve the same goals. The RF communication method deals with the transmitter and receiver section with an encryption and decryption to provide security to the information to be transmitted. The information transmitted is the speed limit of the particular area, where the speed of the vehicle has to be controlled. The Geofencing method consists of server and client. The server works with a principle of location based service and exchanges of information takes place with the push and pull method. The client refers to the vehicle that its speed has to be controlled to the speed defined for that geo-fenced area.

A. RF Technology

i. RF Transmitter

RF transmitter module shown in Fig. 1, is connected to a microcontroller through an encoder it transmits the radio wave signals. The transmitter works with Atmega328 microcontroller that transmits the data in parallel form to the encoder. The transmission range of an antenna is affected by the environmental factors like noise, harmonic and multi path data reception. The high range of transmission can be achieved by improving efficiency of antenna.

The encoder HT12E has 12 pins, in which 8 pins are address pins and other 4 pins are control pins connected to the microcontroller. The control pins are represented as D0 to D3 and address pins are from A0 to A7 and also the Transmission Enable (TE) pin is connected to ground or it can be left open. The data of encoder from analog pins has to match with decoder. The 1.1 MΩ resistor is connected across encoder to provide external resistance for the oscillator.

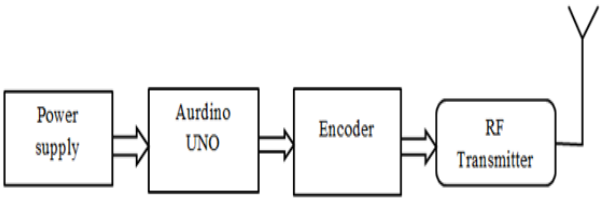

Figure 1.Block diagram of transmitter module

ii. RF Receiver

The RF receiver module shown in Figure 2, demodulates the signal. The different types of RF receivers are available, each receiver module works for specific application, in general the super heterodyne receiver is low cost and it extracts the data from transmitted signal with less power range. The super heterodyne receiver has better efficiency

compared to super generative receiver. The quality of reception is high and also power design is complicated.

The data which is transmitted through the air medium is in analog form with amplitude modulation. The HT12D decoder is used to demodulate the original signal by providing additional bits so that the data can be recovered even if it is affected by noise. Here the decoder also has four control pins and eight address pins. The demodulation takes place only when the address pins of encoder and decoder matched. When the VT pin is high and blinking of LED indicates that the receiver has received the signal. The resistance of 51KΩ is used as an external resistance for oscillator in decoder.

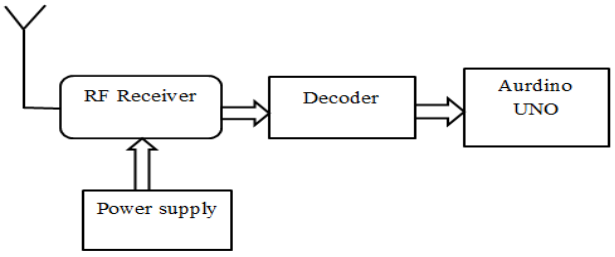

Figure 2. Block diagram of receiver module

iii. Data Conversion for Transmission and Reception

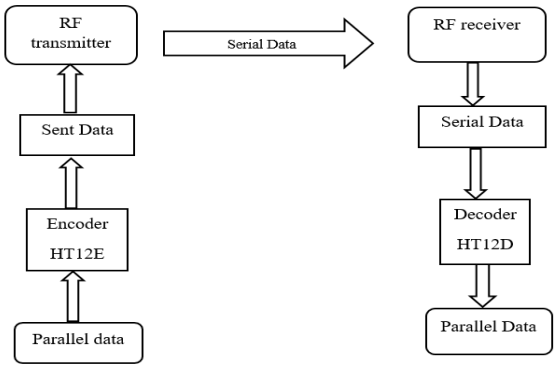

Figure 3. Data transmission of RF Tx and Rx

The transmission of data shown in Fig. 3 takes place between the transmitter and the receiver through the free space, so the air acts as a medium to transfer data. There is physical connection existing between transmitter and receiver. First the data is in parallel form is converted to serial form, data transmission in free space in forms of serial manner, and in the receiver part these data are converted to a parallel form. These conversions of data take place in encoder and decoder, these conversions of data from one form to another form is explained below.

The RF technology has better prospective in other communication systems but in speed control system it has few drawbacks like one way communication, transmission range, installation and maintenance. The drawbacks of the system can be overcome by the Geo-fencing technology which is explained in the below section.

B. Geo-fencing

The implementation of Geofencing is to track, monitor and control the speed of vehicles. Firstly, the particular area has to be created as a geo-fenced area where the speed of the vehicle is to be controlled. The areas which are taken into consideration are school zone, accident zone, hospitals. The Fig. 4 shows the block diagram of the proposed system using geo-fencing. The inclusion of a microcontroller makes the system to be a stand-alone, which has capability to take decisions to keep the system functioning properly. The system consists of GPS and GSM modules.

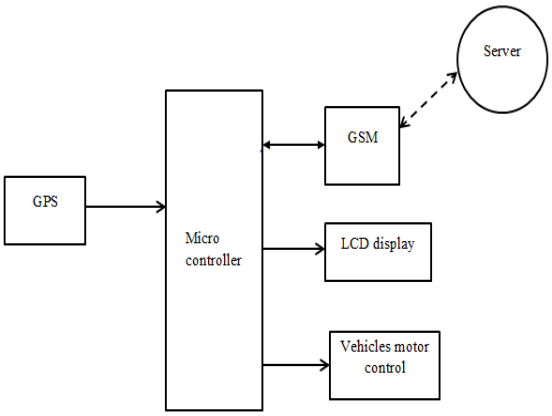

Figure 4. Block diagram of the proposed system

GPS used to keep a track on location of the vehicle, in order to get the latitude and longitude values of the location. The GPS values (latitude and longitude) of the vehicle are fed to the GSM through the microcontroller. The GSM is used to establish the communication between the system and the server and transmit the GPS values of a position to the

server. The server is created to maintain the database. The database contains GPS values of the geo-fenced locations and the corresponding speed limits of those locations and the unique identity of the vehicles. When the vehicle enters the geo-fenced area the server compares GPS values of the location to which vehicle entered with the values which already stored in the server. The server sends a particular speed limit of that area only when the compared values are matched. The speed limit of the particular area is fed to microcontroller through GSM.Then the microcontroller takes necessary action to control the speed of the vehicle. The LCD display is used to display the particular speed limit of that area.

III. RESULTS AND DISCUSSIONS

In this section the results are discussed for two different methods they are RF communication system and Geo-fencing. The hardware and software are implemented in prototype. This chapter shows the working of prototype and also the result obtained.

A. Results of RF Technology

The RF communication system consists of transmitter and receiver, which communicates with one another using pre-defined radio frequency range.

Figure 5. A snapshot of the RF communication system

The different speed limits are set in the transmitter part for different speed limit areas. The speed limit of particular area is transmitted in the form of both analog as well as digital forms. Receiver part is the controlling unit of the prototype. In non-speed limited areas the speed of the DC motors can be varied as per the user requirement. Potentiometer acts as an accelerator in which the speed can be increased or decreased.

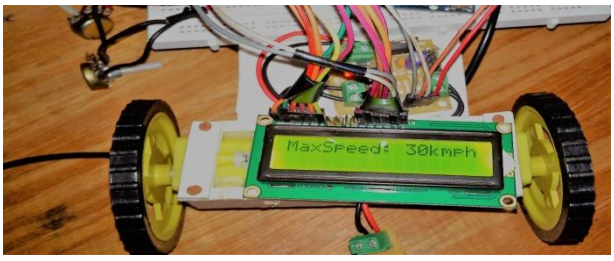

Figure 6. Testing of speed level-1

The Fig.6 shows the testing of speed level-1. In speed level-1 the maximum allowable speed is 30Kmph. If the user actual speed is greater than the allowable speed then the actual speed is reduced to 30kmph or below even though the user accelerates the vehicle is in a specified speed.

Figure 7. Testing of speed level-2

The Fig. 7 shows the testing of speed level-2. In speed level-2 the maximum allowable speed is 60Kmph. If the user actual speed is greater than the allowable speed then the actual speed is reduced to 60kmph or below even though the user accelerates the vehicle is in a specified speed. Similarly for different speed levels like level-3, level-4, and level-5 with speed limit of 90Kmph, 120Kmph and 150Kmph respectively, the actual speed is reduced to below the specified speed even though the user accelerates the vehicle.

Figure 8. Testing of speed level-6

The Fig. 8 shows the testing of speed level-6. In speed level-6 the maximum allowable speed is 180Kmph. If the user actual speed is greater than the allowable speed then the actual speed is reduced to 180kmph or below. Even though the user accelerates the vehicle is in a specified speed.

Figure 9. Testing of speed level-7

The Fig.9 shows the testing of speed level-7. In speed level-7 the maximum allowable speed is 210Kmph. If the user actual speed is greater than the allowable speed then the actual speed is reduced to 210kmph or below. Even though the user accelerates the vehicle is in a specified speed.

B. Results of Geo-fencing Technology

Geo-fencing technology deals with client and server. Here the local host server is used to communicate with client. The channel is established by turning on hot spot of host device and connecting the client and application software installed in the system.

At first when the device in the vehicle turns ON, the Wi-Fi module updates the location of the vehicle by sending the latitude and longitudinal values. The devices which are created in the server are gets activate when it receives the positional value with unique identity number. The below Fig. 10 shows how the devices are activated in the server.

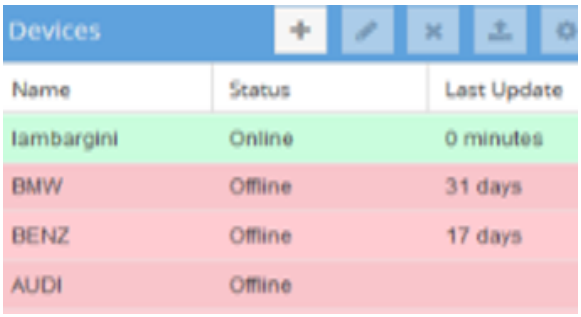

Figure 10. Device activation

Once the device is activated, the client and server are ready to establish communication with each other. In the beginning the reference location is send. The device comes into that reference position when vehicle turns on. The vehicle employs a rotary encoder to calculate the speed of the vehicle the speed will set in the vehicle by evaluating the feedback speed.

When the client is moving the latitude and longitude position of the vehicle gets updated. For every two seconds the client sends a location update. This data is transmitted through the wireless channel created from the mobile hotspot and the data send to the server. In server it checks the corresponding speed limit of that location and it is transmitted back in the same way.

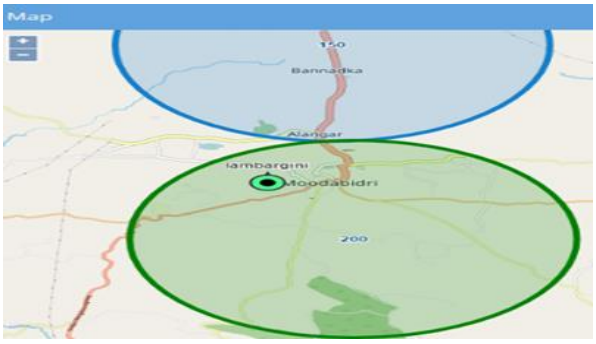

Figure 11. Snapshot of a device in reference position

Latitude and longitudinal value updates change according to the speed of the client. The in the map the 4 different zones are created and each represent the different speed limit. If client moves to the second circle that represent different speed compared to the previous zone. So according to the speed limit received by the client the speed of

vehicle is reduced. The Fig. 12 shows the different speed zone in which vehicle is moved.

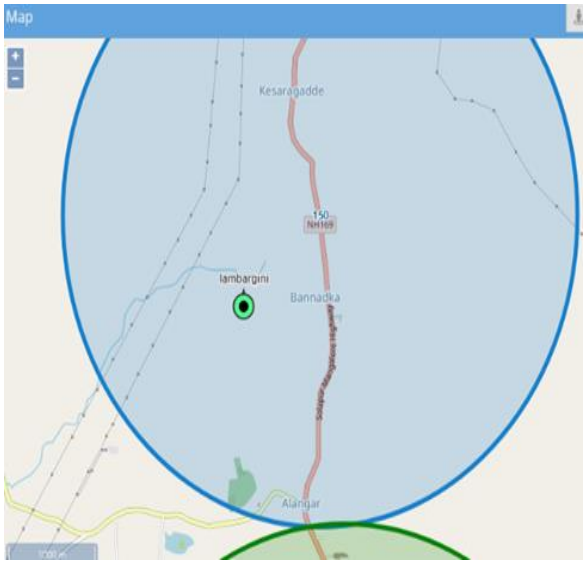

Figure 12. Image of a device moving to different speed zone

IV. CONCLUSION AND FUTURE SCOPE

The different techniques and methods to control the speed of vehicle in accident zones are discussed in literature. The techniques used so far have the drawbacks which are complicated in implementation part and to meet the real time applications. The important aspect is that even the gap has to be built in terms of technology. The objectives can be met by using the geo-fencing technology. The proposed system is much more accurate and easy to implement in the real time. As the different accident zones like schools, hospitals, public areas and sensitive areas are marked in the traccar software. The additional information can also be provided for driver like nearby fuel stations, hospitals etc. there are some more additional features in this particular system like providing the location of the vehicle to the server and even vehicle tracking can be done.

The proposed work has great advantage and also it has some limitations, and every limitation is subject for research there are various methods to alert the driver and control the speed of the vehicle, a lot of research can be conducted in this field. The geo-fencing technology is the new method to alert and respond according to it in the vehicle as the geo-fencing technology has various other futures which are required for the driver and also for the vehicle. The additional features are mentioned in the implementation.

The proposed work has a great application in the smart city. The most of smart activities is performed by the vehicle through the geo-fencing system. The activities like an alert can be made for no harm area, restricted speed limit area, payment of toll road and tracking vehicle etc.

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Virtual Eye Glasses Try-On System

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ABSTRACT

This paper presents a virtual eyeglasses try-on system. With this system, users can virtually try on glasses to see how a particular glass style looks and fits their face via a live video approach, before they purchase it. Also, the system recommends flattering style of eye glasses based on the user's face shape. This really saves a lot of time for the selection of eyeglasses in the store When the user starts the system, initially face detection will be done by using the Viola and Jones algorithm. Further, eye detection is done again by using Viola and Jones algorithm. After this, face shape estimation is performed where the system recommends the user, the best pair of glasses which suites the user's face based on his/her face shape. The user can then try on the glasses virtually by using live video approach. Keywords: Live video approach, Viola and Jones algorithm.

I. INTRODUCTION

Old traditional method of going to eyeglasses store and trying on multiple glasses is usually a hectic task. According to global eyesight, around 6 out of 10 people in the developed world are those wear eye-glasses. As mentioned earlier, the old method of trying out different glasses in a store is certainly a hectic task as it is time consuming.

In this paper, the proposed system of virtual eyeglasses try on creates a product in which the users could come in with nothing but their face and can get information and an idea about what type of glasses will flatter their face the most which will reduce time required during selection of eyeglasses. This system collects data about the facial geometry of the user, and uses that information to recommend them a flattering style of glasses which suites their face the best. The user is then able to try on different pairs of those glasses to see which type of glasses exactly suites them the best, through a live camera interface. The best-suited glasses can then be purchased online.

The virtual try-on glasses proposed in this paper poses certain advantages over physical try-on of eyeglasses in some cases. To select an eyeglass model that looks good and perfect on the customer's face, is usually time consuming. Also, the virtual try-on system encourages online shopping which enjoys greater popularity these days. In this system, the user can try the various eyeglasses recommended by the system through a live video approach. The eyeglass that is selected is then perfectly positioned on the customer's face. With the possible recommendations from the system, the virtual try-on system can be used to narrow down the selection to a few designs and sizes efficiently and interactively.

These reasons make the virtual try-on system to have a reasonable good commercial potential in the eyewear market.

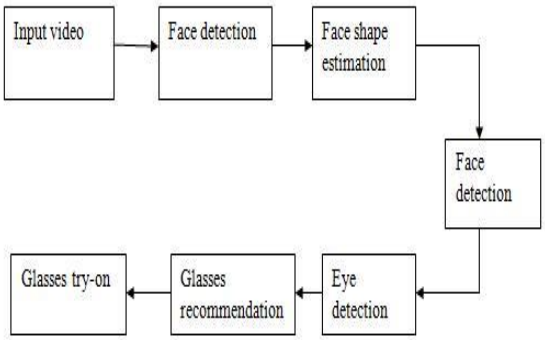


Fig 1: Proposed system overview

II. METHODS AND MATERIAL

A. Viola and Jones algorithm:

In this paper, we use Viola and Jones algorithm for face and eye detection.

Fig 2: Face detection using Viola and Jones algorithm

The algorithm comprises of four stages

1. Haar features selection
2. Creating integral image
3. Adaboost training algorithm
4. Cascade classifiers

Haar features selection:

Haar like features are digital image features, which is used in object detection. It considers adjacent rectangular regions, which is at a particular location

in a detection window that adds up the pixel intensities in each and every region and then calculates the difference between these sums.

Creating integral image:

In a haar feature the black region is replaced by +1 and white region is replaced by -1. It is found that it is time consuming to add up all the black region pixels and white region pixels at every step to solve this problem Viola and Jones algorithm is used which solves this problem by an integral image. This algorithm introduces the concept of integral image, which finds the sum of all the pixels under a rectangle with just four corner values instead of summing up all the values. To generate an integral image, the value at pixel (x, y) in this integral image is the sum of pixels above and to the left of the pixel (x, y).

Adaboost training algorithm:

It is a machine-learning algorithm, which is used for finding only the best features among all the identified features. Once these features are found, a weighted combination of all these features are used in evaluating and deciding if any given window has a face or not. Only if they can at least perform better than random guessing, each of the selected feature is considered to be included. These features are also called as weak classifiers. A strong classifier is constructed by Adaboost as a linear combination of this weak classifier. Adaboost constructs a strong classifier as linear combination of these weak classifier. The classifier, which is only slightly correlated with the true classification, is defined to be a weak learner. In contrast, a strong learner is a classifier that is well correlated with the true classification. Weak classifier would at least perform better than random guessing.

Cascade classifier:

The Viola and Jones algorithm scans the detector many times through the same image in-order to determine whether there is a match or not. The Viola and Jones algorithm should consider the regions having high chances of face and should discard the regions which do not have faces quickly. Hence a strong classifier which is the combination of

all best features are not good to evaluate on each window, because this would lead to a high computational cost. Therefore, a cascade classifier

which is composed of stages, in which each stage will contain the strong classifier. The job at each stage is to determine whether the given sub window is definitely a face or not. The given sub window should be immediately discarded if it is not a face when it fails in any of the stage. Adaboost decides which classifiers or features to use at each stage.

Face shape estimation:

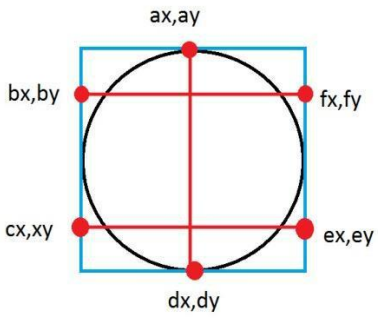
Face shape estimation deals with estimating face shape of the user and frame suggestion is provided according to the face shape of the user. In order to estimate the face shape we have made use of distance formula. Distance formula is a numerical measurement of how far apart objects are. In most of the cases distance from a to b is interchangeable with distance from b to a.

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Mrs. E Teaches Math

Various formulae have been used to estimate different face shape of the user.



similar width in appearance. If width of the forehead and the jaw are equal to one then it is considered as square face. The system determines the oval face shape if the face length is longer than the cheekbone width as well as forehead width larger than jaw line. It likely that both chin and jaw line aren't pronounces and have a slight roundness to them. If the face length and face width are greater than or equal 1.55 then, it is considered as oval face. And if the forehead is wider and chin is narrower then it is determined as heart shaped face. If the forehead width and the jaw width is greater than 1.24 then, it is considered as heart face.

Forehead width is determined by:

Forehead width = $\sqrt{(fx - bx)^2+(fy - by)^2}$

Jaw width is determined by:

Jaw width = $\sqrt{(ex - cx)^2+(ey - xy)^2}$

Face length is determined by:

Face length = $\sqrt{(ax - dx)^2+(ay - dy)^2}$

Face width is determined by:

Face width = (forehead width+ jaw width)/2.0

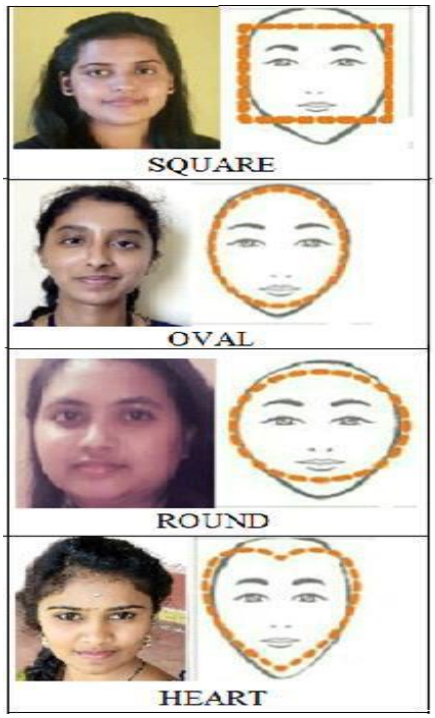


Fig 3: Various face types

The user's face shape is determined by the system by using the predefined formulae mentioned below. Suppose the user have round face then the user's face vertical to horizontal ratio is equal. Cheeks are the widest part of the rounded face shape. As the formula below indicates if all face length, forehead width and jaw width are same then it is considered as a round face. If the user have a square face then

the face is very equal in regards to length and width. The forehead and jaw lines of a square face have a.

Live video:

The major work that needs to be done by the admin is to perform this operation as a live video by placing the eyeglasses on the eye of an individual. Live video is a process where frames are taken one after the other to make it into a continuous video. Every frame is overlayed with the eyeglasses on the region of eye detected.

Try on glasses

Eyeglasses try on is a process where the form is loaded with the eyeglasses images. Face detection with eye detection takes place where the eye region detected is overlayed with the png image of glasses thus justifying as virtual try on.

III. RESULTS AND DISCUSSION

Accurate, precise and interactive virtual environment is created in virtual eyeglasses application. The application is highly accurate with low cost and simple, this makes the application available to every individual . The most important problems that are addressed in the project are shape estimation based on points and stabilization of eyeglasses on individuals face in live video. The goal was to build live 2D eyeglasses with face shape estimation and was successful. The major drawback in the project is that the temples of the eyeglasses i.e. the piece of the frame that extends over the ear cannot be placed as it is done in 2D. To design the virtual eye glasses try-on system, we have made use of OpenCV. The figure below shows various examples of the results which are obtained using our system.

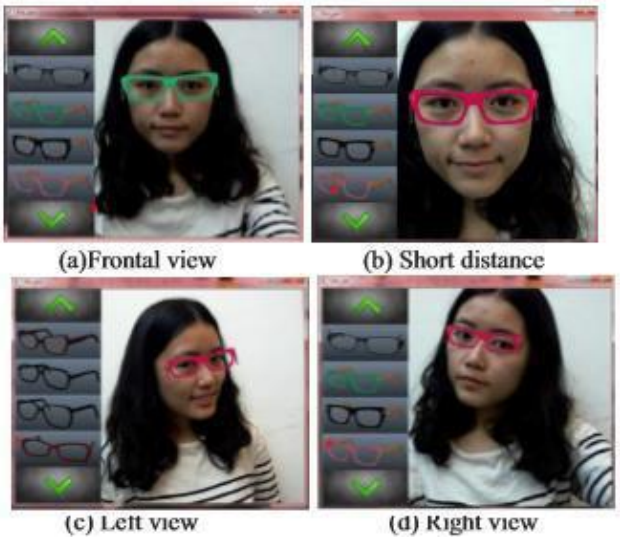


Fig 5: Results of virtual eye glasses try-on system

As we can see from the previous figure, the first case

(a) frontal view in a normal face to camera distance,
(b) frontal view in a short face to camera distance,
(c) the view when the user rotates her head to left, and
(d) the view that the user rotates her head to right.

We see that, even when the user moves close or far from the camera or rotates his/her head, the eyeglass images still fit face well.

Table 1. Overview Of The System

Sr. no	Parameters	Proposed Application
1	Applicable areas	In academics and industry
2	Operating systems on which it is accessible	Windows
3	Platform status	Platform dependent
4	Advantage	Minimal or null changes are required by this system
5	Disadvantage	It is not platform independent which

		makes it accessible only to a particular system.

IV. CONCLUSION

This system overcomes the few drawbacks of the pre-existing methods of trying the eye glasses online by using the live video approach. Unlike in the pre-existing systems we use live video approach and not pre-recorded videos or just uploaded videos/photos. Hence, this makes our system more realistic and user friendly. Also, the system recommends various flattering eye glasses based on the shape of the user's face which makes it easy for the user to select the best suited eye glass. This in turn saves the user time.

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Estimation and Visualization of 2D Orbits of GPS Satellites Using GPS Navigation Data File from Mangalore GNSS Receiver

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ABSTRACT

This paper is to estimate and visualize the 2D orbits of the GPS satellites based on GPS navigation data file generated from Mangalore GNSS receiver. The Global Navigation Satellite System (GNSS) determines position, velocity and time with high accuracy by the process of Trilateration. It is a satellite navigation system. The Receiver Independent Exchange Format (RINEX) File is used to extract the parameters from GPS navigation data file. These parameters are implemented in the formulas by using MATLAB software and the XYZ coordinates of GPS satellite are obtained and they are plotted individually in 2 Dimension.

Keywords: GPS, GNSS receiver, Trilateration, RINEX File, MATLAB software.

I. INTRODUCTION

A global coverage satellite navigation system is termed as GNSS. The geographic location of user can be found using the GNSS system. This GNSS system include the Global Positioning System (GPS) of United States, Global Orbiting Navigation Satellite System (GLONASS) of Russian Federation, Galileo of Europe and many more [5]. The space based radio positioning system called Global Positioning System (GPS) provides the user's 3 dimensional position, time and velocity information in any type of weather and anywhere on Earth. The GPS satellite provides services to community. In the modernization of the air traffic system of the globe, GPS acts as backbone. Even though the GPS satellite orbit's height is high it can provide user location 24 hours a day with the accuracy ranging from 50 to 100 meters [2].

The GPS satellite is operated by U.S. Department of Defense which consists of 32 satellites out of which 24 are visible at a time and aims at determining the user position, time and velocity accurately. The 3 segments of GPS are Space, Control and User segments.

The users are transmitted with radio signals by a constellation of satellites. The GPS satellites rotate an altitude of 12,550 miles in medium Earth orbit (MEO). The satellite revolves around the Earth twice a day with a period of 11 hours 58 minutes. The satellites in GPS constellation are arranged into six equally spaced orbital planes placed at an angle of 60 degrees and 55 degrees to equator. Each plane contain four satellites.

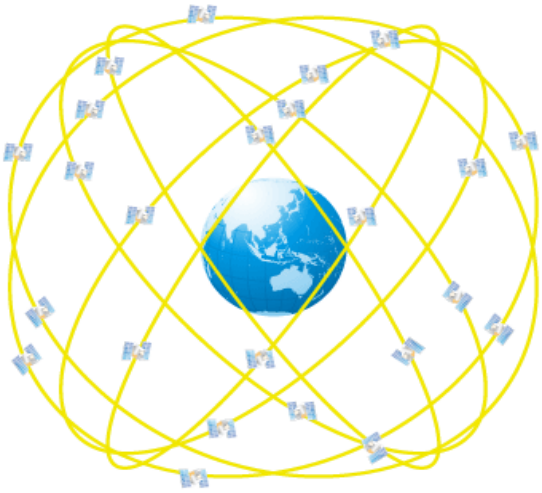

Figure 1. Orbits of GPS satellites.

The Control segment monitors the path of satellite and rectify the satellites clocks. The User segment contains GPS receiver which receives the signals from GPS satellites and calculates position and time [3]

II. DETERMINATION OF USER POSITION

The Trilateration process is used to determine locations of user by locating points and by measuring the distance using circles. A GPS device accurate position is determined provided it transmits GPS satellite signals high above the Earth. A GPS satellite requires minimum three satellites to locate the user position anywhere on the globe which means that a GPS can locate longitude, latitude and altitude. But we prefer four satellites to locate the position of user as when we use three satellites we get high positional error and clock error in order to rectify that we use four satellites to locate position of user anywhere on the globe by the process of Trilateration. This process have some practical applications in surveying and navigation, including GPS. In contrast to triangulation, it does not measure angles.

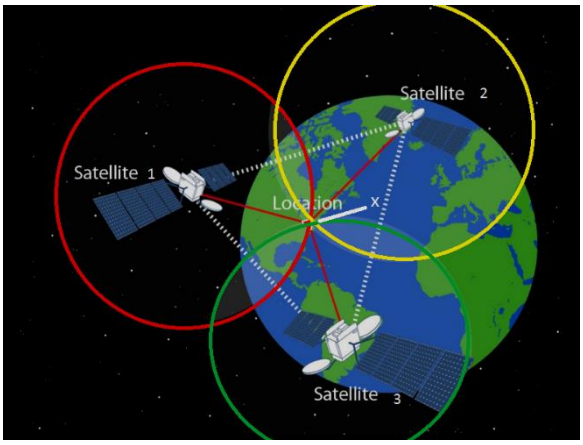

Figure 2. Process of Trilateration.

III. DETERMINATION OF PATH OF SATELLITE ORBIT

There are some parameters which are useful for evaluation or estimation of GPS satellite position around the globe. These parameters are extracted from GPS navigation data file by comparing it with RINEX File [1]. Some of the parameters are shown in the below table.

Table 1. Structure Of Parameters

A	The long axle of elliptical orbit.
IODE	Extrapolation time interval of satellite parameter.
IODC	Clock correction parameter
IDOT	Rate of inclination angle
Crs	Radius of the sine harmonic term
Δn	Difference in mean from computed value
Mo	Mean anomaly at reference time value
Cuc	Argument of latitude of the cosine harmonic term
E	Value of Eccentricity
Cus	Argument of latitude amplitude of the sinusoid harmonic term
Toe	Reference time
Cic	angle of inclination of the cosinusoid harmonic term
Ωo	Longitude of node
Cis	Angle of inclination of the sine harmonic term

Io	inclination angle
Crc	Radius of the cosine harmonic term
Ω	Rate of change of right ascension
omega	Argument of perigee
T	Epoch time

These set of parameters extracted from GPS navigation data file are then applied to the formulas and used to obtain XYZ coordinates by using MATLAB software. The set of mathematical equations or formulas used in determining satellite position [7] are shown below.

The radius of elliptical orbit:

$$A = (\sqrt{a})^2 \quad (1)$$

Computed mean value in rad/s:

$$no = \frac{\mu}{A^3} \quad (2)$$

Time ephemeris epoch in seconds (t is GPS system time):

$$tk = t - toe \quad (3)$$

Corrected mean value:

$$n = n0 + \Delta n \quad (4)$$

Mean anomaly evaluation:

$$Mk = M0 + (n * tk) \quad (5)$$

Kepler´s equation for eccentricity:

$$Mk = Ek - esinEk \quad (6)$$

The equation (6) is solved by iteration method by using Newton-Raphson method of iteration assuming Ek = Mk as the initial condition.

$$\dot{Ek} = \frac{\dot{Mk}}{(1-e\cos Ek)} \quad (7)$$

Value of true anomaly from tan:

$$\upsilon k = \tan\text{-}1 \{ \frac{\sin Ek\sqrt{1-e2}}{\cos Ek - e} \} \quad (8)$$

$$\dot{vk} = \frac{\sin EkEk(1+\dot{e}\cos vk)}{(1-\cos Eke)\sin vk} \quad (9)$$

Argument of latitude:

$$\Phi k = \dot{vk} + \omega \quad (10)$$

$$\dot{\varphi k} = \dot{\upsilon k} \quad (11)$$

Argument of latitude evaluation of the second harmonic:

$$\partial uk = Cus * \sin(2\varphi k) + Cuc * \cos(2\varphi k) \quad (12)$$

$$\dot{\partial uk} = 2[Cus * \cos(2\varphi k) - Cuc * \sin(2\varphi k)]\dot{\varphi k} \quad (13)$$

Argument of radius evaluation of the second harmonic:

$$\partial rk = Crs * \sin(2\varphi k) + Crc * \cos(2\varphi k) \quad (14)$$

$$\dot{\partial rk} = 2[Crs * \cos(2\varphi k) - Crc * \sin(2\varphi k)]\dot{\varphi k} \quad (15)$$

Argument of inclination evaluation of the second harmonic:

$$\partial ik = Cis * \sin(2\varphi k) + Cic * \cos(2\varphi k) \quad (16)$$

$$\dot{\partial ik} = 2[Cis * \cos(2\varphi k) - Cic * \sin(2\varphi k)]\dot{\varphi k} \quad (17)$$

Corrected argument of latitude:

$$uk = \varphi k + \partial uk \quad (18)$$

$$\dot{uk} = \dot{\varphi k} + \dot{\partial uk} \quad (19)$$

Corrected argument of radius:

$$rk = A(1-e\cos Ek) + \partial rk \quad (20)$$

$$\dot{rk} = Ae \sin Ek \dot{Ek} + \dot{\partial rk} \quad (21)$$

Corrected argument of inclination:

$$ik = i0 + ((IDOT) * tk) + \partial ik \quad (22)$$

$$\dot{ık} = IDOT + \dot{\partial ik} \quad (23)$$

X satellite coordinate of satellite orbital plane:

$$\acute{xk} = rk \cos uk \quad (24)$$

$$\dot{xk} = (\dot{rk} \cos uk - rk \sin uk)\dot{uk} \quad (25)$$

Y satellite coordinate of satellite orbital plane:

$$\acute{yk} = rk \sin uk \quad (26)$$

$$\dot{yk} = (\dot{rk} \sin uk + rk \cos uk)\dot{uk} \quad (27)$$

Corrected longitude of ascending node:

$$\Omega k = \Omega 0 + (\dot{\Omega} - \dot{\Omega e})\, tk - \dot{\Omega e}\, toe \quad (28)$$

$$\dot{\Omega k} = \dot{\Omega} - \dot{\Omega e} \quad (29)$$

X coordinate in ECEF Frame:

$$xk = \acute{xk} * \cos \Omega k - \acute{yk} * \cos ik * \sin \Omega k \quad (30)$$

X coordinate in ECEF Frame:

$$yk = \acute{xk} * \sin \Omega k + \acute{yk} * \cos ik * \cos \Omega k \quad (31)$$

X coordinate in ECEF Frame:

$$zk = \acute{xk} * \sin ik \quad (32)$$

From the above set of equations, we get XYZ coordinates of GPS satellite which depends on universal gravitational parameter of earth's rotation rate. According to WGS-84 model the values are:

$$\mu = 3.986005 \times 10^{14} \quad m^3/s^2 \quad (33)$$

$$\dot{\Omega e} = 7.292115167 \times 10^{-5} \quad rad/s \quad (34)$$

The XYZ coordinates obtained with respect to ECEF (Earth Centered and Earth Fixed) coordinate system are then plotted in two dimensions by using MATLAB tool.

IV. VISUALIZATION OF SATELLITE ORBIT PATH

The XYZ coordinates obtained in ECEF system by implementing the formulas in MATLAB and plotting the two dimensional plot with the help of MATLAB where y-axis represents data or value of GPS satellite and x-axis represents time at which GPS satellite was present or visible.

The below figure shows the two-dimensional plot of XYZ coordinates of GPS satellites.

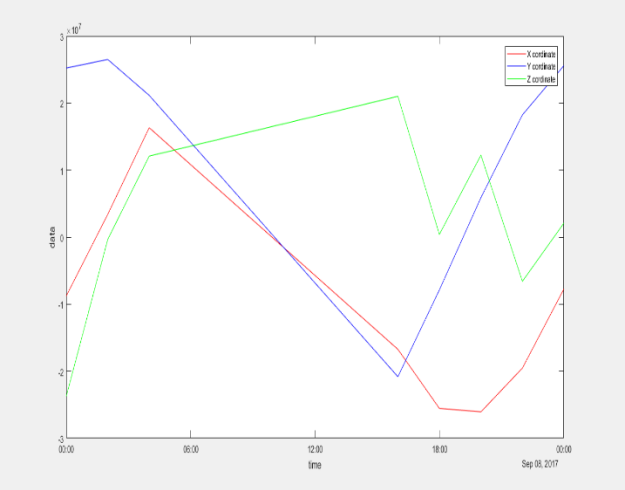

Figure 3. Visualization of path of GPS satellite.

IV. CONCLUSION

The present work focuses on finding the position, velocity and time of the GPS receiver with user by the process of Trilateration, where we use three satellites to identify user location anywhere on globe. To find the orbital path of GPS satellite we extracted some parameters from GPS navigation data file and compared with RINEX File. These parameters are then implemented in formulas by using MATLAB and XYZ coordinates in ECEF system are obtained and a 2-dimensional plot. In future it can be interpolated to make it smooth curve by increasing the number of samples and to convert the 2-dimensional plot into 3-dimensional plot.

V. ACKNOWLEDGEMENT

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Effect of Dynamic Stoplist on Keyword Prediction in RAKE

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ABSTRACT

Keywords which we define as a sequence of words that provide a condensed representation of the document in question. These keywords are vital in numerous applications from web search engines to abstractive text summarization. Rapid Automatic Keyword Extraction (RAKE) [1] is an unsupervised, domain and language independent method for extracting keywords from documents. RAKE is based on the simple observation that keywords seldom contain stop words – such as and, of and the. RAKE uses a list of stop words to split the document text into candidate keywords. The list of stop words or stoplist is static. In this paper, we make the stoplist dynamic, in that, stop words, that do not currently belong to the stoplist but are identified as potential stop words for the given document are added to the stoplist. Consequently, every document has a unique stoplist. We compare the performance of our implementation to the standard RAKE implementation on Wikipedia articles.

Keywords:RAKE, Keyword extraction, Stopwords, Dynamic, Wikipedia

I. INTRODUCTION

With respect to text documents, keywords refer to phrases which paint a holistic picture of the article to the reader. The increase in the number of documents on the web without a list of keywords has necessitated the need for tools that automatically generate keywords for the given input document. Keyword extraction is also an important task in problems like Natural Language processing, text mining and summarization. A typical keyword extraction tool has three main modules:

1. Selection of candidate keywords: Using stop words, phrases which can potentially be the keywords of the document are identified.
2. Property evaluation: Every candidate keyword is evaluated based on a number of factors such as adjacency, frequency, location in the document.
3. Selecting keywords: All candidates can be scored either by uniting the properties into a formula or by using machine learning techniques to calculate the probability of a candidate being a keyword.

Our study is restricted to Rapid Automatic Keyword Extraction (RAKE) – an unsupervised, domain and language independent keyword extraction tool proposed in [1]. RAKE uses a static stop list to break the document down into a list of stopwords. A method to automatically generate the stoplist from a set of documents where the keywords are defined, called the Keyword Adjacency (KA) stoplist has also been proposed. It is based on the insight that words adjacent to, and not within the keywords are likely candidates for stop words. The frequency of each word appearing adjacent to the keyword is tabulated, and words which occurred more frequently within keywords than adjacent were excluded. This method

was compared with the stop list generated by Term Frequency (TF). It was concluded that the KA stoplist outperformed the TF stoplist, and moreover the best TF stoplists underperforms compared to the worst KA stoplist. However, this method requires a document with pre-defined stop words, and the stoplist only makes considerable difference in keyword prediction if the KA algorithm is run on several documents.

Our work focuses on studying the effect of keyword prediction in RAKE, when every document has a unique stoplist to reflect its characteristics, and the improvements in prediction that arise compared to the standard RAKE implementation - that uses the NLTK stoplist.

II. RELATED WORK

Stop words in review summarization using TextRank by Sonya RapintaManalu, 2017 presents a comparison of automatic review summarization with and without stop words. An extractive, unsupervised graph-based ranking model TextRank is employed to highlight the differences between both approaches. Experimental results on 50 sample reviews have shown that the usage of stop words removal can be impactful in determining the result of review summarization, which suggests that depending on the user requirements, it should be considered whether stop words removal needs to be performed or not. [2]

Stop-words in keyphrase extraction problem by S. Popova, L. Kovriguina, D. Mouromtsev, I. Khodyrev, 2013. Keyword extraction problem is one of the most significant tasks in information retrieval. High-quality keyword extraction sufficiently influences the progress in the following subtasks of information retrieval: classification and clustering, data mining, knowledge extraction and representation, etc. The research environment has specified a layout for keyphrase extraction. However, some of the possible decisions remain uninvolved in the paradigm. In the paper the authors observe the scope of interdisciplinary methods applicable to automatic stop list feeding. The chosen method belongs to the class of experiential models. The research procedure based on this method allows to improve the quality of keyphrase extraction on the stage of candidate keyphrase building. Several ways to automatic feeding of the stop lists are proposed in the paper as well. One of them is based on provisions of lexical statistics and the results of its application to the discussed task point out the non-gaussian nature of text corpora. The second way based on usage of the Inspec train collection to the feeding of stop lists improves the quality considerably. [3]

Wilbur, W.J. and Sirotkin, K., 1992. The automatic identification of stop words. Journal of information science, 18(1), pp.45-55 [4] defines a stop word as “a word which has same likelihood of occurring in those documents not relevant to the query as in those documents relevant to the query”. This paper follows the TF-IDF model, first by calculating the similarity between two documents, and then calculating the number of words which occur in both the documents. This effort is done in order to explore the effect of stop words in information retrieval.

Silva, C. and Ribeiro, B., 2003, July. The importance of stop word removal on recall values in text categorization. In Neural Networks, 2003. Proceedings of the International Joint Conference on (Vol. 3, pp. 1661-1666). IEEE [5] - A comparison on accuracy and precision-recall values corresponding to a support vector machine states that Stop word removal removes information that could mislead the learning machine. The test conditions which were followed in the paper were based on frequency of the words, existing stop words and using stemming.

Yao, Z. and Ze-wen, C., 2011, March. Research on the construction and filter method of stop-word list in text preprocessing. In Intelligent Computation Technology and Automation (ICICTA), 2011 International Conference on (Vol. 1, pp. 217-221).

IEEE defines certain rules for construction of stop word list and also compares the efficiency of different filters which are used to detect and eliminate the stop words from a given corpus. [6]

"Automatically building a Stopword list for an information retrieval system" by Rachel Tsz-Wai Lo et. al. [7] evaluates different methods for generating the stop list for a given collection of documents automatically. An innovative approach called the term back random sampling is introduced - which determines how informative a term is, to aid with the stop list generation. It is also shown that the best results can be obtained by combining the classical stop word list with the stop words generated by term back sampling method.

"On Stopwords, Filtering and Data Sparsity for Sentiment Analysis of Twitter" by Hassan Saif, Miriam Fernandez, Yulan He, Harith Alani [8] concludes that pre-compiled stoplist negatively impacts sentiment classification whereas dynamic generation of stop list result in better performance.

III. PROPOSED SYSTEM

The RAKE algorithm, makes use of a static stop word list which is common to a variety of documents [1]. The proposed system suggests that generation of stop words which are specific to document can improve the efficiency of the algorithm. One of the methods which can be followed to extract stop words from the document is based on their lexical categories. Intuitively, stop words can be tagged as conjunctions, determiners and so on. This information is extracted using a part of speech tagger to generate the stop word list which is exclusive for the given document.

Algorithm

```
lexCategory = [adverb, conjunction, determiner, article, pronoun,…]
for everyWord in document
        if wordCategory in lexCategory
                append word to stopWordList
```

This is done with the help of NLTK's part of speech tagging module [9]. This returns the tag for every word in the document corpus. A list of categories of all possible stop words is constructed and then compared with all the words in document, which gives the set of stop words.

Further, this list of stop words, is sent as an input to the RAKE algorithms to get the key phrases and score.

IV. RESULT AND ANALYSIS

In this section, we highlight the working of the algorithm taking a few examples. For simplicity, we consider two general categories – Politics and Sports. Under each of these two categories, we again consider two personalities each. Under the category of politics, we consider – Narendra Modi and Justin Trudeau. For sports – Roger Federer and Lewis Hamilton.

We have considered two test cases of stop words that will be compared. The first test case is the standard set of NLTK stop words that Rake has included in its package. These stop words are fed into the Rake algorithm and a set of words with their relevance score is obtained. Similarly, for test 2, again a set of words with their relevance score is obtained, but the code is modified to also accept a set of dynamically obtained stop words along with the NLTK stop words. These two cases are compared using graphical analysis and will help prove that dynamically obtained stop words help in obtaining higher relevance score words. This results in a higher accuracy of summarization for the personality, or any subject for that matter.

The line graph is drawn according to the relevance score (from Rake) vs. the top words that were common between two test cases considered for stop words – Only NLTK stop words and NLTK stop words plus dynamically obtained stop words.

Considering the personality of Justin Trudeau, we obtain the graph in Fig. The dotted line represents the graph obtained in the case when only NLTK stop words are considered and the solid line represents the graph obtained when both NLTK and dynamically obtained stop words are considered.

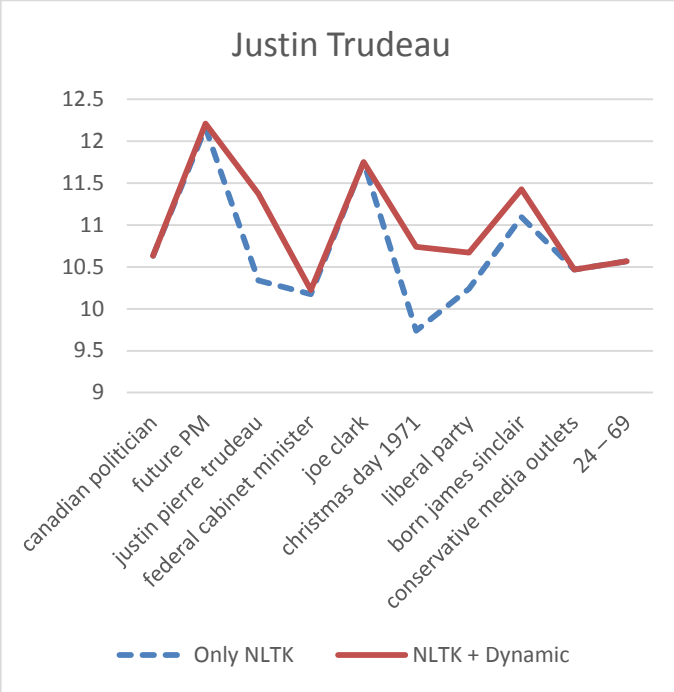

Figure 1: Line graph of top relevant words vs. score for 'Justin Trudeau'

Words such as 'christmas day 1971' and 'justinpierretrudeau' clearly show a higher relevance value in the latter case over the former. These words are significant to the subject because the word 'christmas day 1971' describes his birthday and 'justinpierretrudeau' is his full name. Words such as 'canadianpolitican' and 'federal cabinet minister' have no increase in their relevance scores.

These characteristics can also be highlighted in a similar personality figure under the same category of politics – Narendra Modi.

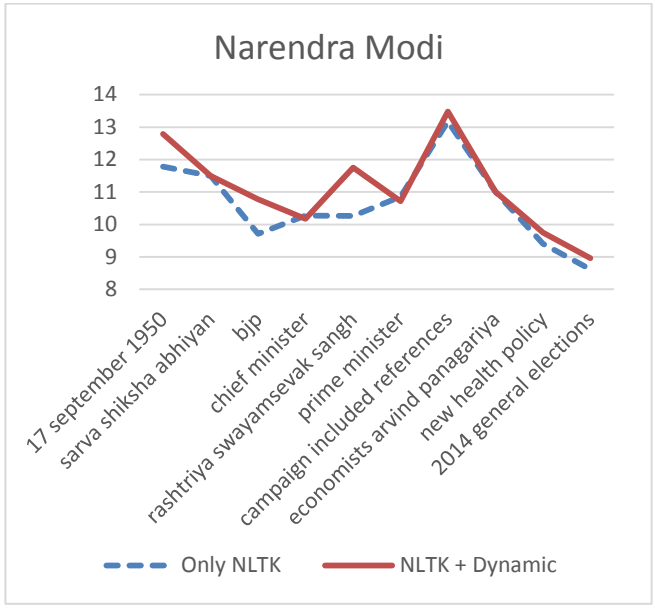

Figure 2: Line graph of top relevant words vs. score for 'Narendra Modi'

Here we notice that words such as '17 september 1950' and 'bjp' have a higher relevance score in the case of dynamic plus NLTK stop word list algorithm, as compared to only the NLTK stop words list algorithm. Other words such as 'sarvashikshaabhiyan' and 'prime minister' have negligible increase in their relevance scores.

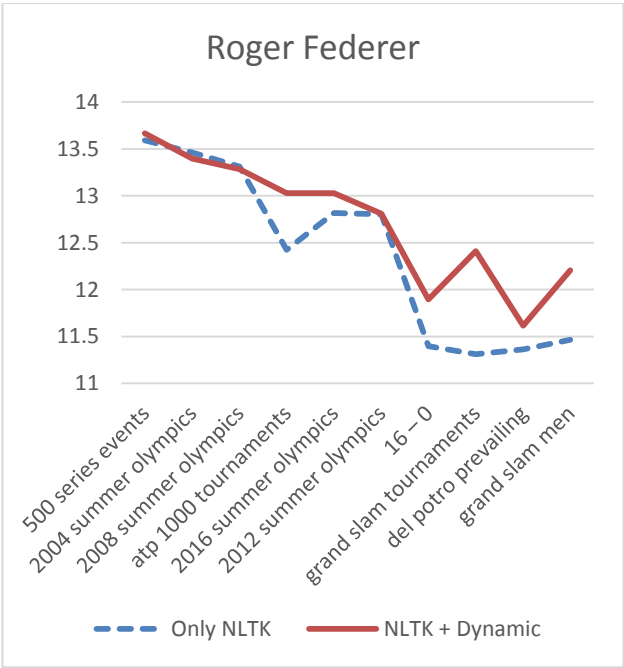

Figure 3: Line graph of top relevant words vs. score for 'Roger Federer'

Under the category of Sports, we take the example of Roger Federer. Here we notice that words such as

'atp 1000 tournaments' and 'grand slam tournaments' have a higher relevance in the case we use NLTK + Dynamic stop word list as compared to only the NLTK list.

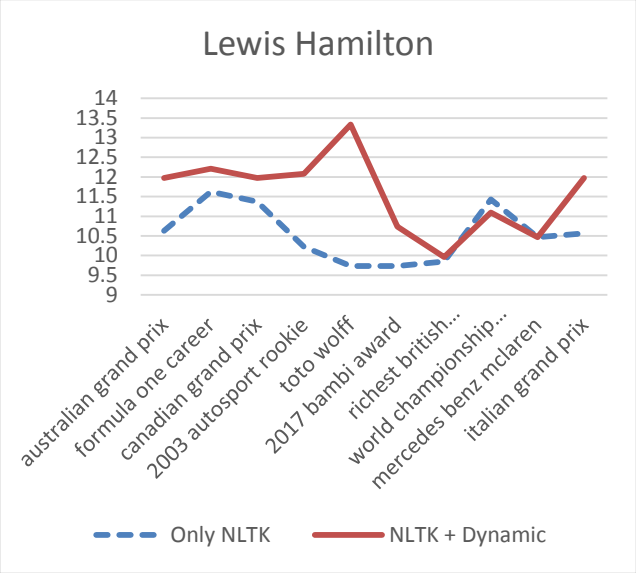

Figure 4. Line graph of top relevant words vs. score for 'Lewis Hamilton'

Similarly, we can draw the same conclusions with the personality of 'Lewis Hamilton' where terms such as 'toto wolff' and '2003 autosport rookie' take a higher relevance value when dynamic stop words are considered along with the NLTK list of stop words.

We notice that important details about the personality tend to obtain a higher relevance score in the second case as compared to the first. This happens due to the fact that the second test case offers a larger data set of stop words hence eliminating more common words particular to that category. In doing so, information pertaining particularly to the subject tends to be given a higher score amongst the list of remaining words. This translates to the words holding information about the personality that pertain to individual subject either gaining a higher score or remaining the same.

V. CONCLUSION

The variation and different styles of writing makes keyword extraction a very difficult problem. While the standard NLTK stoplist is universally applicable, it isn't perfect. As we have shown, a dynamic stoplist that captures properties of the article along with the standard stoplist produces better results in RAKE. The downside to our system is that using words belonging to the document in the stoplist results in omission of certain phrases that would otherwise have been categorized as candidate keywords. We can add additional conditions such as the location of the keyword in the document, frequency and relevance to the document to improve the stoplist. In conclusion, a dynamic stoplist produces better results but comes with the tradeoff that certain phrases are omitted from consideration as keywords.

VI. ACKNOWLEDGMENT

We would firstly like to thank Prof. H D Phaneendra, Head of the Department of Computer Science and Engineering, The Natioanl Institute of Enginering, Mysore for giving us the support and opportunity to work on this paper. We also thank Dr.Anitha C for her guidance. We also extend our warm regards to all the faculty members of the department for their constant encouragement and invaluable advice.

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Heart Disease Classification: A Case Study using Machine Learning and Data Mining

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ABSTRACT

The diagnostic of heart disease remains more or less the most difficult and tedious task in the medical field and it various factors and symptoms of prediction which is involved in several layered issue that could engender the negative presumptions and unpredictable effects. Wu et al proposed that the integration of clinical decision support with relation to the computer- based system of the patient record could reduce the rate of errors in medical predictions, low the unwanted practice variation, enhance safety for patients, and the improvement of patient outcome. This knowledge provides a useful environment which can help to significantly improve the quality of clinical decisions. Many of hospital information in recent days are designed to implement patient billing, patient data storing, inventory management and generation of simple statistics computation. Most of the hospitals use decision support systems but they are still in most cases bounded. The majority of doctors are predicting heart disease symptoms based on their learning and working experience. In this case, prediction system should be implemented so that to reduce the risk of Heart Disease.

Keywords: Algorithms, Diseases, Heart-attack, Random forest, Decision trees , Data mining, Naive Bayes, Support Vector Machine.

I. INTRODUCTION

TheHeartdiseasehasbeenthemostsignificantcauseofdeathin the world during the past 10 years [1]. The use of heart monitoring systems, such as for example [2], and heart disease classification methodologies for decision support systems has been increasing accordingly. Unfortunately, many different factors can influence and complicate the detection of possible heart anomalies and can result in an inaccurate diagnosis or in a delay in a correct diagnosis.According to [3], due to the many and uncertain risk factors, sometimes heart disease diagnosis is difficult even for experts, who frequently require accurate tools that consider all these risk factors and give a clear result in a specific timeperiod.

Motivated by the need to acquire such an indispensable instrument for diagnosis and by the importance of avoiding as far as possible any unwanted biases, errors and excessive medical costs that might affect the quality of treatment provided to patients [4], many researchers have tried to find the most accurate machine learning techniques to discover the relationships between different heart disease and patient attributes in order toassist physicians [5], [6].

This paper provides a comparison of different machine learning classification techniques, such as

Decision Tree (DT), K Nearest Neighbour (K-NN), Random forest, and of their use in combination, through bagging, boosting and stacking on a heart disease data set. The dataset used is the Cleveland Heart Disease data set taken from the University of California, Irvine (UCI) learning data set repository, donated by Detrano.

Cardiovascular diseases (CVD) are the leading cause of death globally [1]. Diagnosis of CVD is a complicated and important taskthat needs to be executed accurately and efficiently. In order to improve the quality of health care and relieve the pressure of medical service, many data mining techniques are applied for clinical decision making supported by clinical decision support systems (CDSS). Classification is one of the most important algorithms in CDSS. The performance of classification is greatly affected by feature selection. It is a challenging problem to get good features. It is the motivation of thispaper.

Heart disease can be also known as (CVD) cardiovascular disease, contains a number of conditions that affect the heart including the heart attacks. In addition, Heart diseases possess some functional problems of the heart such as infections of the heart muscles like myocarditis (inflammatory heart diseases), heart-valve abnormalities or irregular heart rhythms etc. are the reasons that can be led to heart failure. The components that expansion the odds of heart attacks are smoking, absence of physical activities, hypertension, elevated cholesterol, unfortunate Eating routine, unfavourableutilisation of liquor, and high sugar levels. Cardio Vascular Disease (CVD) constitutes coronary heart, cerebrovascular or Stroke Hypertensive heart disease, inborn heart, fringe course, rheumatic heart disease and incendiary heart disease. Data mining is a learning revelation system to analyze data and typify it into valuable data.

II. LITERATURE REVIEW

The researchers [8] used Machine leaning and data mining methods in predicting models in the domain of cardiovascular diagnoses. The experiments were carried out using classification algorithms Random Forest, Decision Tree, K-NN and results proves that the decisiontrees provides better results than othercounterparts.

In the last few years, several studies have been dedicated to an evaluation of the classification accuracies of different classification algorithms applied to the Cleveland heart disease database [7] freely available at an online data mining repository of the UCI. Since its creation, this database has been used by many researchers investigating different classification problems with various classification algorithms. Detrano in [8] used a logistic regression algorithm and obtained a 77.0% classification accuracy.

In this paperwork [7] there are three different data mining techniques such as Random Forest, K-NN, Decision tree were addressed to analyse the dataset. In this paperwork, the experiment has been performed by the use of 3000 instances training dataset with 14 different attributes. The data set is classified into two categories in which we have 70% of the data were used for training while 30% were used for testing. Considering these experimental results, it is shown that the classification accuracy of decision tree algorithm is better compared to other algorithms.

Gudadhe et al. [5] realized an architecture base with both the MLP network and the SVM approach. This architecture achieved an accuracy of 80.41% in terms of the classification between two classes (the presence or absence of heartdisease, respectively). On the other hand, HumarKahramanli and NovruzAllahverdi [10] obtained an accuracy of 87.4% by using a hybrid neural network that combines a fuzzy neural network (FNN) with an artificial neural network (ANN).

Another study on heart disease prediction has been proposed and implemented by SY Huang, AH Chen, CH Cheng, PS Hong and EJ Lin. The classification and prediction was trained via learning Vector Quantization Algorithm which is one of Artificial Neural Network learning technique. There were three steps in their methodology. The first one was to select of 13 clinical features which are important compared to others, i.e., age, cholesterol, chest pain type, exercise induced angina, max heart rate, fasting blood sugar, number of vessels colored, old peak, resting ecg, sex, slope, thal and trestbps. Second one was using Artificial Neural Network algorithm for classification. Lastly, the heart disease prediction system was developed. The accuracy of prediction rate which was obtained from the study is near 80%. [4] Soni et al [9] provided a survey of current techniques in Data mining for heart disease prediction. Experiments has been conducted with various sorts of techniques using the same dataset out of which Decision tree shown high accuracy than that of the Bayesian classification, KNN, neural networks. The accuracy has been further improved by applying genetic algorithm with Decision trees. The work can be extended by using real dataset from health care organizations for the automation of Heart Diseaseprediction.

Rafiah et al [10] using Decision Trees, Naive Bayes, and Neural Network techniques developed a system for heart disease prediction using the Cleveland Heart disease database and shown that Naïve Bayes performs well followed by Neural Network and Decision Trees. The relationship between attributes produced by Neural Network is more difficult to understand than that of the other models used to predict heart disease. Continuous data can be used instead of categorical data and text mining methods can be incorporated to mine vast amount of unstructured data available in healthcare databases.

III. RESEARCH METHODOLOGY

Important concepts such as the data set, data portioning models and data mining techniques are described following.

1. The Cleveland DataSet

The data set used in the current research contains 303 instances with a total number of 76 attributes. However, the majority of the studies use a maximum of 14 attributes [11] as these are closely linked to heart disease [12]. The features included are age, sex, chest pain type, resting blood pressure, cholesterol, fasting blood sugar, resting ECG, maximum heart rate, exercise induced angina, oldpeak, slope, number of vessels colored and thalassemia, respectively. The main class has two values, “False” and “True”, corresponding to the absence or presence, respectively, of any heartdisease.

2. Machine LearningTechniques

In the current study, seven classifiers, namely DT, NB, MLP, RFB, SCRL, K-NN and SVM, and combinations of these classifiers, using ensemble learning methods such as bagging, boosting and stacking, are discussed. In each scenario, the performance is calculated using the standard metrics, namely accuracy, precision, recall and F-measure. In addition, the Receiver Operation Characteristic (ROC) curve area has been employed to compare the performance of each classifier

1) Decision Tree (DT): A Decision Tree is a flow chart- like structure that includes a root node, branches, and leaf nodes. The dataset attributes are defined through the internal nodes. The branches are the outcome of each test against each node. It is a popular classifier because it is simple, fast, and easy to interpret, explain and implement. It requires no domain knowledge or parametersetting.

2) 2) K-Nearest Neighbors (K-NN): K-Nearest Neighbors classifies an object by the majority vote of its closest neighbors. In other words,

based on some distance metrics, the class of a new instance will be predicted. The distance metric used in nearest neighbor methods for numerical attributes can be a simple Euclideandistance.

3) Support Vector Machine (SVM): Support Vector Ma-chine models are defined as finite-dimensional vector spaces in which each dimension represents a 'feature" of a particular object. It has been shown to be an effective approach in high-dimensional space problems. Due to its computational efficiency on large datasets this technique is usually used in document classification and sentimentanalysis.

DATA CLASSIFICATION USING RANDOM FOREST CLASSIFIER

1) **Random forest (or random forests) is an ensemble classifier that consists of many decision trees and outputs the class that is the mode of the class's output by individual trees. It is one of the most accurate among the learning algorithmsavailable.**

For many data sets, it produces a highly accurate classifier. The algorithm for inducing a random forest was developed by Leo Breiman and Adele Cutler [12] the method combines Breiman's "bagging" idea and the random selection of features, in order to construct a collection of decision trees with controlledvariation.

Algorithm: Random forest

classifier Input:

1. Training Dataset N, Which is a set of training observations and their associated classvalues.

Output: Generates Decision trees

Each tree is constructed based on the followingsteps:

1. Let the number of training cases be N, and the number of variables in the classifier beM.

2. The number m of input variables to be used to determine the decision at a node of the tree; m should be much less thanM.

3. Choose a training set for this tree by choosing n times with replacement from all N available training cases (i.e. take a bootstrap sample). Use the rest of the cases to estimate the error of the tree, by predicting theirclasses.

4. For each node of the tree, randomly choose m variables on which to base the decision at that node.Calculate the best split based on these m variables in the trainingset.

5. Each tree is fully grown and not pruned (as may be done in constructing a normal treeclassifier).

For prediction a new sample is pushed down the tree. It is assigned the label of the training sample in the terminal nodeit ends up in. This procedure is iterated over all trees in the ensemble, and the average vote of all trees is reported as random forest prediction. done in constructing a normal tree classifier). For prediction a new sample is pushed down the tree. It is assigned the label of the training sample in the terminal node it ends up in. This procedure is iterated over all trees in the ensemble, and the average vote of all trees is reported as random forestprediction.

DATASETS

Table 1. Confusion Table

Prediction		Disease	
		+	-
Test	+	True Positive (TP)	False Positive (FP)
	-	False Negative (FN)	True Negative (TN)

For the datasets, we met patients having past history of heart disease, gathered valuable information from

the doctor, compiled all the reports into the dataset consisting of more than 100 records. We also gathered necessary datasets form the internet for testing purpose. The following attributes with nominal values are considered: Patient Identification Number (replaced with dummy values), Chest Pain, Cholesterol, Fasting Blood Sugar, Rest ECG, Thalach (Maximum heartrate achieved), Exang (Exercise induced angina) and Slope (the slope of the peak exercise STsegment) Cleveland database was used for heart disease prediction system. Because Cleveland database is the most commonly used database by ML researchers. The dataset contains 303 instances and 76 attributes, but only 14 of them are referred by all published studies. The "goal" field which has varying values from 0(absence) to 4 denotes if heart disease present or not in the patient. Studies on the Cleveland database have focuses on distinguishing absence(value 0) from presence (values range from 1 to 4) [13].

The dataset has some missing values in it. Firstly missing values were filled with interpolation values. Then dataset was split into three parts: one for training (%70), second one for testing (%15) and third one for validation(%15). There are 213 instances and 13 attributes in training data. Test data and validation data contain 45 instances and 13 attributes 13 of the attributes listed below were used as input data for the networ. The remaining attribute, num which is predicting value, was used as output data for the network. The num can get values between 0 and 4. Only 0 means absence of disease.

$$Accuracy = \frac{TP + TN}{TP + FP + FN + TN}$$

Attribute information (only 14 used) is shown in Table

Table 2. Clinical features and their descriptions

Clinical Features	Description
Age	Age
Ca	Number of major vessels (0-3) colored by flourosopy
Chol(mg/dl)	Serum cholesterol
Cp	Chest pain type
Exang	Exercise induced angina
Fbs	Fasting blood sugar
Num	Diagnosis of heart disease
Oldpeak	ST depression induced by exercise relative to rest
Restecg	Resting electrocardiographic results
Sex	Gender
Slope	The slope of the peak exercise ST segment
Thal	3=normal ; 6 = fixed defect; 7= reversible defect
Thalach	Maximum heart rate achieved
Trestbps(mmHg)	Resting Blood Pressure

IV. PERFORMANCE MEASURES

2) In this approach, the classification accuracy rates for the datasets were measured. For example, in the classification problem with two-classes, positive and negative, an single prediction has four possibility. The True Positive rate (TP)and True Negative rate (TN) are correct classifications. A False Positive (FP) occurs when the outcome is incorrectly predicted as positive when it is actually negative. A False Negative (FN)

3) occurs when the outcome is incorrectly predicted as negative when it is actually positive.

1. Accuracy - It refers to the total number of records that are correctly classified by theclassifier.

2. Classification error - This refers to the misclassifieddatasets from the correctly classifiedrecords.

3. True Positive Rate (TP) - It corresponds to the number of positive examples that have been correctly predicted by the classificationmodel.

4. False Positive Rate (FP) - It corresponds to the number of negative examples that have been

wrongly predicted by the classificationmodel.

5. Kappa Statistics - A measure of the degree of nonrandom agreement between observers or measurements of the same categoricalvariable.

6. Precision - is the fraction of retrieved instances that are relevant.

$$Precision = \frac{TP}{TP + FP}$$

7. Recall - is the fraction of relevant instances that are retrieved.

8. Root-Mean-Squared-error - It is a statistical measure of the magnitude of a varying quantity. It can be calculated for a series of discrete values or for a continuously varying function.

Since the class label prediction is of multi-class, the result on the test set will be displayed as a two-dimensional confusion matrix with a row and column for each class. Each matrix element shows the number of test cases for which the actual class is the row and the predicted class is thecolumn.

V. CONCLUSION

Data mining plays an important role in the identification and prediction of various sort of metabolic syndromes and hence various sorts of diseases can be discovered. In the existing work, Decision tree classification algorithm has been used to assess the events related to CHD. The proposed work is mainly concerned with the development of a data mining model with the Random Forest classification algorithm. The developed model will have the functionalities suchaspredicting the occurrence of various events related to each patient record, prevention of risk factors with its associated cost metrics and an improvement in overall prediction accuracy. As a result, the causes and the symptoms related to each event will be made in accordance with the record related to each patient and thereby CHD can be reduced to a great extent.

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BSN-Care:IoT Based Human Health Care Using Body Sensors

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ABSTRACT

Human service is a standout amongst the most quickly growing application zones of the Internet of Things (IoT) innovation. IoT gadgets can be utilized to empower remote wellbeing checking of patients with perpetual infections, for example, cardiovascular diseases (CVD).Body sensor Network (BSN) innovation is one of the center advancements of IoT improvements in social insurance framework, where a patient can be observed utilizing an accumulation of minor controlled and lightweight remote sensor hubs. The fundamental goal of the proposed work is to transmitting the patient's wellbeing observing parameters through remote correspondence in a crisis circumstance utilizing distinctive sensors. Sensors are utilized to follow patient's wellbeing with the help of web. The wellbeing perception framework can monitor patient's heartbeat rate, weight level rate, temperature and so forth. In the event that framework identifies any sudden changes in understanding pulse or temperature, the framework mechanically cautions the client concerning the patients remaining over IOT and moreover demonstrates subtle elements of patient live finished the web.

Keywords: Internet of Things, Body sensor Network, Raspberry Pi, Temperature Sensor, ECG Sensor, Heartbeat Sensor

I. INTRODUCTION

The most recent couple of decades have seen an enduring increment in future in numerous parts of the world prompting a sharp ascent in the quantity of elderly individuals. A current report from United Nations [1] anticipated that there will be 2 billion (22% of the total populace) more established individuals by 2050. Likewise, look into demonstrates that around 89% of the matured individuals are probably going to live freely. Appropriately, giving an personal satisfaction for matured individuals has turn into a genuine social test right then and there. The quick multiplication of data and correspondence advancements is empowering inventive human services arrangements and devices that show guarantee in tending to the previously mentioned challenges. Presently, Internet of Things (IoT) has turned out to be a standout amongst the most capable correspondence standards of the 21th century. IoT expands the idea of the Internet and makes it more unavoidable. IoT permits consistent collaborations among diverse sorts of gadgets, for example, restorative sensor, observing cameras, home apparatuses so on. [2]. Since of that reason IoT has turned out to be more gainful in a few regions, for example, health insurance framework. In health insurance framework, IoT includes numerous sorts of shabby sensors (wearable, embedded, and condition) that empower matured individuals to appreciate current health insurance benefits anyplace, whenever. Moreover, it likewise incredibly enhances matured people groups nature of life. The body sensor network (BSN) innovation [2] is a standout amongst the most basic advances

utilized as a part of IoT-based present day medicinal services framework. It is essentially an accumulation of -power and lightweight remote sensor hubs that areutilized to screen the human body works and encompassing condition. Since BSN hubs are used to gather life-basic data and may work in threatening conditions, in like manner, they require strict security components to forestall vindictive collaboration with the framework.

II. RELATED WORK

Advances in information and communication technologies and embedded systems have given rise to a new disruptive technology, the Internet of Things (IoTs). Modern health care environment, the usage of IoT technologies which brings convince of physicians and patients and hence applied to various medical areas such as real time monitoring, patient information management and healthcare management. The body sensor network (BSN)is one of the core technologies of IoT developments in healthcare system, where a patient can be monitored using a collection of sensors nodes. Provide the information aboutIoT-based healthcare system using BSN-Care requirements [2].

Healthcare applications in the fields of wireless sensor networks, where patients can be monitored using wireless medical sensor networks. Current medical sensors healthcare research trends focus on patient reliable communication, patient mobility, and energy-efficient routing, as a few examples and mainly focused on different new technologies in healthcare applications without considering security makes patient privacy vulnerable. Therefore, security is a paramount requirement of healthcare applications, especially in the case of patient privacy, if the patient has an embarrassing disease.

Few critical issues in healthcare application depend directly on patient security and privacy.So privacy plays a major in health care monitoring systems [3].

Advance technologies in IoT-based health care reviews the state-of-the-art network architectures, applications, and industrial trends in health care solutions for that purpose proposed an intelligent collaborative security model to minimize security risk and discussed about how different innovations such as big data, ambient intelligence, and wearables can be leveraged in a health care context. Addresses various IoT and eHealth policies and regulations to provide some avenues for IoT-based health care based on a set of open issues and challenge [4].

Sensor networks a new class of devices, have the potential to revolutionize the capture, processing, and communication of critical data for use by first responders. Sensor networks consist of small, low-power and low-cost devices with limited computational and wireless communication capabilities. They represent the next step in communication's miniaturization, their power and size and make it feasible to embed them into wearable vital sign monitors, location-tracking tags in buildings, and first responder uniform gear[5].

III. METHODOLOGY

A. Architecture

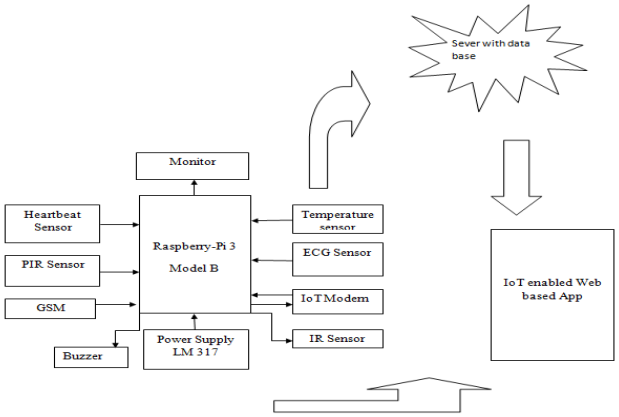

Figure 1: Block Diagram

Body Sensor Network (BSN) is the integration of intelligent, miniaturized low-power sensor nodes in, on or around human body to monitor body functions and the surrounding environment. Temperature sensor,Heart Beat sensor, ECG sensor,IR sensor are connected to Raspberry Pi through IC MCP3008. Heartbeat sensors arebased on the principle of photo phlethysmography. It measures the change in volume of blood through any organ of the body, which causes a change in light intensity through that organ. PIR sensor is a motion detection sensor, it detects whether the person is in movement or rest condition. IR sensor is used as obstacle sensor, which transmits an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver.

IR sensor can be used in ICU or for security purpose or if a person met with an accident and continuously if the data obtained is unconscious, the alert will be sent to doctors, family and emergency unit simultaneously.

B. Modules

a. RASPBERRY PI3 B

Raspberry Pi 3provides the same Pi features but with double the ram and 6x faster processor speed. It is credit-card sizedcomputer capable of performing the multitask at single time. It runs on several flavors of Linux based operating system.

It consists of Broadcom BCM2836, an ARMv11 Quad Core ProcessorSystem-on-Chip, running at 1Ghz, and a Videocore 4 GPU. The GPU provides Open GL ES 2.0, hardware-acceleratedOpenVG, and 1080p30 H.264 high-profile decode and is capable of 1Gpixel/s, 1.5Gtexel/s or 24 GFLOPs of generalpurpose compute. The biggestchange that has been enacted with the Raspberry Pi 3 isan upgrade to the main processor and an increase of ram from 512MB to 1GB.

b.Temperature Sensor

Temperature sensor is a gadget which detects varieties in temperature crosswise over it. LM35 is a fundamental temperature sensor that can be utilized for trial reason. It gives the readings in centigrade (degree Celsius). The LM35 series are exactness coordinated circuit temperature sensors, whose output voltage is proportional to the Celsius (Centigrade) temperature. It operates from 4 to 30 volts and has less than 60 Micro amperes current deplete.

c. ECG Sensor

ECG sensor is the pressure exerted by circulating blood upon the walls of blood vessels. When used without further specification, "blood pressure" usually refers to the arterial pressure in the systemic circulation. Blood pressure is usually expressed in terms of the systolic (maximum) pressure over diastolic (minimum) pressure and is measured in millimeters of mercury (mm Hg). Normal resting systolic (diastolic) blood pressure in an adult is approximately 120 mm Hg(80 mm Hg), abbreviated "120/80 mm Hg". Blood pressure varies depending on situation, activity, and disease states. It is regulated by the nervous and endocrine systems. Blood pressure that is low due to a disease state is called hypotension, and pressure that is consistently high is hypertension.

d. Heartbeat Sensor

Heart rate is the speed of the heartbeat measured by the number of contractions of the heart per minute (bpm). The heart rate can vary according to the body's physical needs, including the need to absorb oxygen and excrete carbon dioxide. It is usually equal or close to the pulse measured at any peripheral point. Activities that can provoke change include physical exercise, anxiety, sleep, stress, illness, and ingestion of drugs. Many texts cite the normal resting adult human heart rate range from 60 to 100 bpm. Tachycardia is a fast heart rate, defined as above 100 bpm at rest. Bradycardia is a slow heart rate, defined as below 60 bpm at rest. The normal resting adult heart rate is probably closer to a range between 50 to 90 bpm. During sleep a slow heartbeat with rates around 40 to 50 bpm is common and is considered normal. When the heart is not beating in a regular pattern, this is referred to as an arrhythmia. Abnormalities of heart rate sometimes indicate disease.

e. PIR Sensor

PIR sensors allows to sense motion, used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. The PIR (Passive Infra-Red) Sensor is a pyroelectric device that detects motion by measuring changes in the infrared levels emitted by surrounding objects. This motion can be detected by checking for a high signal on a single I/O pin A PIR detector combined with a Fresnel lens are mounted on a compact size PCB together with an analog IC,SB0081, and limited components to form the module. High level output of variable width is provided. The PIR sensor has a detection range, ranging from 2-3meters. Supply voltage of 3-5v.Current drain is less than 50uA Temperature ranges from -15C to +70C.

f. GSM [Global System for Mobile Communication]

GSM module is used to establish communication between a computer and a GSM system. Global System for Mobile communication (GSM) is an architecture used for mobile communication for the users. GSM t enables higher data transmission rate for sending the alert messages when abnormalities occurs.

g. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. It is used for alerting when abnormalities occur to the patients.

C. Workflow

The Body sensor network architecture composed of wearable and implantable sensors. Each sensor node integrated with biosensors.These sensors collect the physiological parameters and forward them to a coordinator called Local Processing Unit (LPU), when the LPU detects any abnormalities then it provides immediate alert to the person.When the server receives data of a person from LPU, then it feeds the BSN data into its database and analyses those data. Subsequently, based on the degree of abnormalities, it may interact with the family members of the person, local physician, or emergency unit.

Algorithm Steps:

Step 1: Read the sensor yield esteem.
Step 2: Check the sensor yield an incentive with the typical esteem.
Step 3: if the sensor yields, esteem is typical nothing to do.
Step 4: if the sensor yields,esteem is abnormalbut not severe.
Step 4a: Inform to relatives and doctor.
Step 5: If the sensor yields, esteem is abnormal and severe.
Step 5a: Inform family members,doctor,and emergency unit at the same time.
Step 6: Send the information to all.

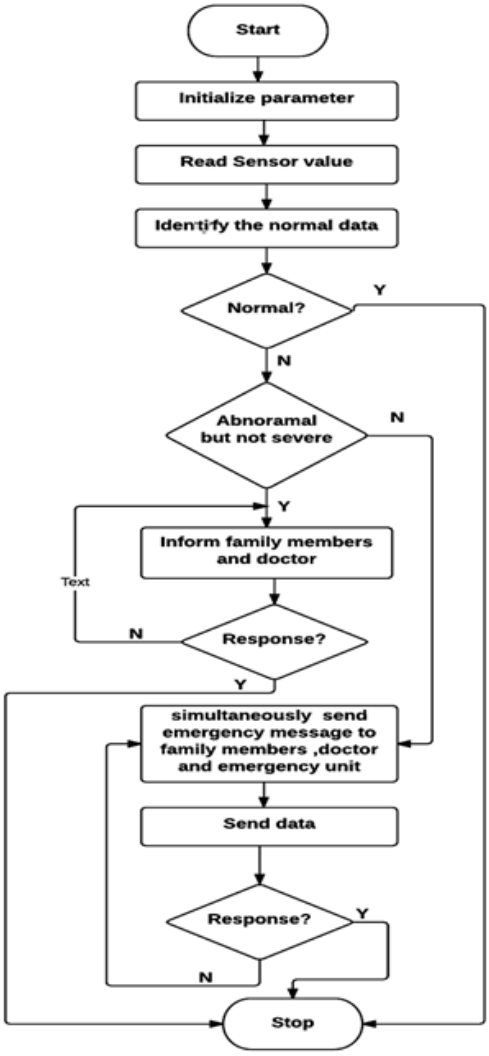

Figure 2: Workflow

IV. Result Discussion

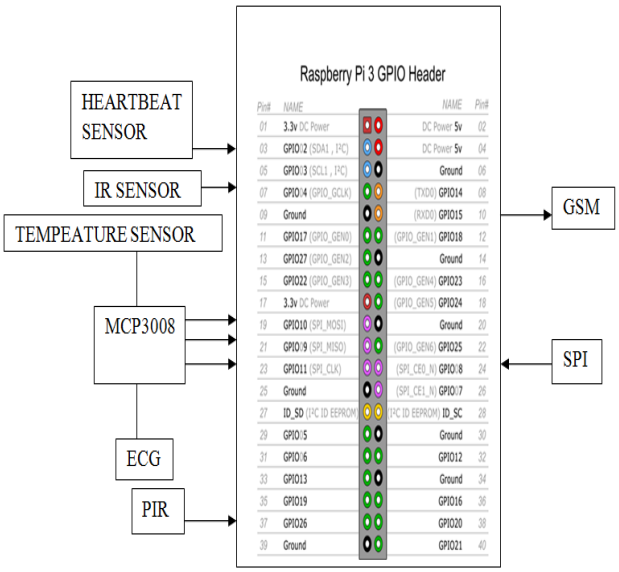

Figure 3: Pin Configuration of Raspberry Pi 3 with sensors

Fig 3 shows Raspberry Pi 3 pins configured with sensors respectively. Heartbeat sensor is connected to GPIO 2, pin 3 where SDAI is function. IR sensor is connected to GPIO 4, pin 7, where GCLK is the function; PIR sensor is connected to pin 37, GPIO 26; GSM is connected to pin 10, GPIO 15, where RXD0(UART) is its function. Temperature sensor and ECG sensor are connected to MCP3008 which is interfaced to SPI in Raspberry Pi 3 model B with pins 19,21,23, these pins are SPI pins functions as MOSI(SPI) for pin 19, MISO(SPI) for pin 21 and SCLK(SPI) for pin 23.SPI is Serial Peripheral Interface between IC MCP3008 and ADC respectively, the interface has to be done since analog values obtained must be converted to digital values. Temperature sensor and ECG sensor produces output in the form of analog values, to covert these values to digital, ADC is used which is interfaced with Raspberry Pi 3 through SPI pins in it respectively.

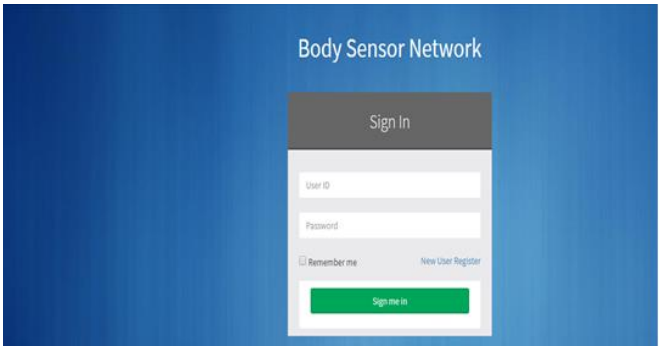

Figure 4: Sign in Page for BSN

Fig 4 shows sign-in using login ID and password in Body Sensor Network Web-app through internet in mobile or system which is convenient to the person respectively.

Figure 5: Current Patient Status

Fig 5 shows the current patient status were it contains the information of the different sensors values.

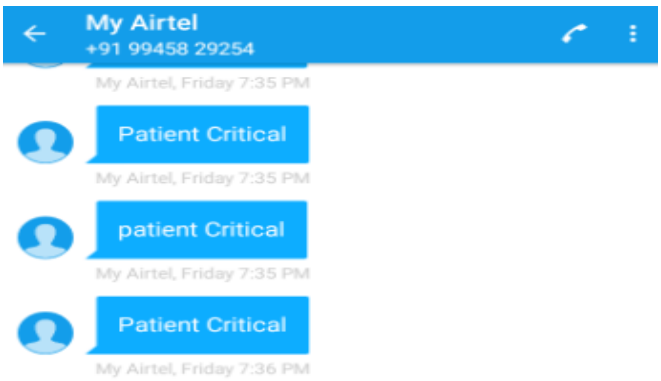

Figure 6: Alert Message

Fig 6 shows the alert message to the recipient when the abnormal conditions occurs.

V. CONCLUSION

Health care services plays an important role in the society, automating these services lessen the burden on humans and eases the measuring process andalso the transparency of this system helps patients to trust it. When threshold value is reached, the alarm system that consists of buzzer, alerts the doctors, relatives and emergency unit based on the severity. The goal of developing monitoring framework is to reduce health care costs by reducing physician office visits, hospitalizations, and diagnostic testing procedure.

The GSM technology helps the server to update the patient data on website. Many further improvements can be made in the system to make it better and easily adaptable such as adding more advanced sensors and by developing the android application, which helps the user to use the application more conveniently.

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Prediction Of Diseases Using Haematology Records

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ABSTRACT

Health information system is a system used for decision making such as capturing, storing, transmitting information which is related to the health of particular individual or the activities that are associated to health steam. The health information system collects data from relevant health sector that analyze, check the quality, relevance and timeliness, and then converts data into information for decision-making.. A good health information system gathers all the data to make sure that users of health information have access to data. Sound decision-making at all levels of a health system requires reliable health statistics that are disaggregated by sex, age and socioeconomic characteristics. Decisions along with proof contribute to more efficient resource allocation and information about the quality and effectiveness of services can contribute to better outcomes in health information system.

Keywords: Hematology records, Clustering algorithms, Prediction, Accuracy

I. INTRODUCTION

Haematology disease is the science or study that makes the blood the center of concern. This science studies the components of blood, blood forming organs and diseases caused by blood.

Analysis of haemogram blood test and Liver Function Test (LFT) samples can be used to predict the diseases using data mining techniques such as K-means, Fuzzy C means. Among data mining techniques, clustering technique is considered as one of the efficient DM technique, which groups the data items based on similarities and dissimilarities. Several similarity and dissimilarity measures are applied to find the relationships and patterns which exist in data items. This paper focuses to extract hidden rules and relationships between diseases from a real-world Healthcare Information System. The information regarding the presence or absence of a disease is only used. The parameters used for the disease prediction are cholesterol level, blood sugar, blood pressure and so on. The method also predicts disease based on other diseases that a patient already has. The advantage of this approach is that it can be applied to predict any disease rather than a specific disease by using the parameters.

Parameters considered for Complete Blood Count (CBC) and Liver Function Test (LFT)-

Complete Blood Count Parameters	Liver Function Test Parameters
-Haemoglobin (Hb) -Red Blood Cells (RBC) -White Blood Cells (WBC) -Neutrophils or Polymorphs -Eosinophil -Basophils -Lymphocytes -Monocytes -Platelets	-Serum Bilirubin -Alkaline Phosphate (ALP) -Serum glutamic oxaloacetic transaminase (SGOT) -Serum glutamic pyruvic transaminase (SGPT) -Total Proteins -Albumin -Globulin

-Mean corpuscular volume (MVC) -Mean corpuscular haemoglobin (MCH) -Mean corpuscular haemoglobin concentration (MCHC)	

Parameters considered for Complete Blood Count (CBC) are:

-**Haemoglobin percentage**:

Males -Normal: 14-18 gm%

Average: 15.5 gm%

Females- Normal: 12-15.5 gm%

Average: 14 gm%

Probable disease-Less than normal- Anaemia

More than normal- Polycythaemia vera

-**Red Blood Cells**:

Males- Normal: 5.6 million/ML

Average: 5.5 million/ML

Females- Normal: 4.5-5.5 million/ML

Average: 4.8 million/ML

Probable disease-Less than normal- Anaemia

More than normal- Polycythaemia vera

-**White Blood Cells:**

Normal: 4000-11000/ML

Probable diseases-Less than normal-Thyroid, Viral infection, Protozoan infection, Bone marrow depression.

-**Neutrophils or Polymorphs:**

Percentage: 50-70%

Absolute count: 3000-6000/ML

Probable diseases-Less than normal-Typhoid fever, Viral infection

More than normal- Bacterial infection, Myocardial infection

-**Eosinophil:**

Percentage: 1-4%

Absolute count: 150-300/ML

Probable diseases-More than normal- Bronchial asthma, Warm infestation

-**Basophils:**

Percentage: <1%

Absolute count: 10-100/ML

Probable diseases-More than normal- Chickenpox, Smallpox, Tuberculosis, Influenza

-**Lymphocytes:**

Percentage: 20-40%

Absolute count: 1500-2700/ML

Probable diseases-Less than normal- AIDS (HIV)

More than normal- Tuberculosis, Lymphatic leukaemia, Viral infection

-**Monocytes:**

Percentage: 2-8%

Absolute count: 300-600/ML

Probable diseases-Less than normal-Hypo-plastic bone marrow

More than normal- Tuberculosis, Syphilis, Leukaemia

-**Platelets:**

Normal: 1.5-4 lakhs/ML

Probable diseases-Less than normal- Bone marrow depression, Dengue fever

More than normal- Trauma, Surgery, Injury, Splenectomy

-**Mean corpuscular volume (MVC):**

Normal: 78-84 FL

Probable diseases-Less than normal- Iron deficiency anaemia

More than normal- Megalablastic anaemia

-**Mean corpuscular haemoglobin (MCH):**

Normal: 28-32pg

Probable diseases-Less than normal- Iron deficiency anaemia, Thalassemia

-**Mean corpuscular haemoglobin concentration (MCHC):**

Normal: 32-35%

Probable diseases-Less than normal- Iron deficiency anaemia, Thalassemia

More than normal- Megalablastic anaemia

Parameters considered for LFT-

-**Serum Bilirubin:**

Total Bilirubin: 0.2-1 mg/dl

Direct Bilirubin: 0.1-0.3 mg/dl

Probable diseases-More than normal- Hepatitis, Haemolytic disease, Gilbert's disease, Biliary obstruction, Liver failure, Cirrhosis

-**Alkaline Phosphate (ALP):**

Normal: 33-36 U/L

Probable diseases-More than normal- Hepatitis, Bone diseases

-**Serum glutamic oxaloacetic transaminase (SGOT):**

Normal: 12-38 U/L

Probable diseases-More than normal- Hepatitis, Liver failure, Cirrhosis, Myocardial infarction

-**Serum glutamic pyruvic transaminase (SGPT):**

Normal: 7-41 U/L

Probable diseases-More than normal- Hepatitis, Cirrhosis

-**Total Proteins:**

Normal: 6-8 gm%

Probable diseases-Less than normal- Hepatitis, Cirrhosis, Liver failure

-**Albumin:**

Normal: 3.5-5.5 gm%

Probable diseases-Less than normal- Hepatitis, Cirrhosis, Liver failure

-**Globulin:**

Normal: 2-3.5 gm%

Probable diseases-More than normal- Hepatitis, Cirrhosis Performances of the clustering algorithm are analyzed by factors like accuracy, execution time and error rate.

- Time factor describes the amount of time needed for predicting the disease.
- Accuracy is verifying whether all the data items are grouped or clustered correctly to their respective groups.
- Error rate is identifying the percentage of data items which has been placed incorrectly in the set of clusters.

All these factors are compared using the algorithms like K-means, Fuzzy C means, Random Forest Algorithm, Naïve Bayes Algorithm and Support Vector Machine Algorithm

K-means clustering algorithm-K-means clustering is a type of unsupervised learning, which is used when you have data without defined categories or groups. The goal of this algorithm is to find groups in the data, with the number of groups represented by the variable K . The algorithm works iteratively to assign each data point to one of *K* groups based on the features that are provided. Data points are clustered based on feature similarity. The results of the K-means clustering algorithm are: The centroids of the K clusters, which can be used to label new data. Labels for the training data (each data point is assigned to a single cluster.

Fuzzy C means-This algorithm works by assigning membership to each data point corresponding to each cluster centre on the basis of distance between the cluster centre and the data point. More the data is near to the cluster centre more is its membership towards the particular cluster centre. Clearly, summation of membership of each data point should be equal to one. It is frequently used in pattern recognition.

Random Forest Algorithm- Random Forest is a flexible, easy to use machine learning algorithm that produces, even without hyper-parameter tuning, a great result most of the time. It is also one of the most used algorithms, because it's simplicity and the fact that it can be used for both classification and regression tasks.

Naïve Bayes Algorithm- The Bayesian Classification represents a supervised learning method as well as a statistical method for classification. Bayesian classification provides practical learning algorithms and prior knowledge and observed data can be combined. Bayesian Classification provides a useful perspective for understanding and evaluating many learning algorithms. It calculates explicit probabilities for hypothesis and it is robust to noise in input data.

Support Vector Machine- Support Vector Machine (SVM) is primarily a classifier method that performs classification tasks by constructing hyperplanes in a multidimensional space that separates cases of different class labels. SVM supports both regression and classification tasks and can handle multiple continuous and categorical variables.

II. CONCLUSION

A large volume of data is generated in the healthcare sector and doctor has to come to a direct contact the patient. Instead the data mining tools and classifying algorithms can be used to predict the diseases. Further the tests considered in this paper are LFT and CBC. The expected success rate of our proposed model is in the range of 65-70%. The same procedure can be applied to all the blood tests and enhance the probability of prediction. The future scope of the model includes usage of model in remote places and in places where health care facility is not accessible.

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Automation Of Street Light System Using Qr Code To Avoid Wastage Of Electricity

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ABSTRACT

Automation, power consumption and cost efficiency are considered important in the present day to day life. In today's world, streetlights are very much required in populated regions. Due to busy lifestyle of humans, switching operations on streetlights are not carried out on time, and a huge amount of electricity is being wasted. In the present system it is observed that streetlights are not turned OFF even when there is ample amount of light after sun rise and are turned ON even before sunset. This results in delay after sunset and wastage of energy in the morning as the operator needs time to cross from street to street. This paper eliminates the above problems and also provides additional feature like real time controlling.

Every individual has access to smart phone and individual identity can be established by using Quick Response (QR) code. Hence we make an attempt to propose a system and its design where weautomate street lights using QR code in order to save electrical energy. In this paper we initially make a survey on various techniques used to automate and monitor street lights. We make an attempt to present what QR codes are and their application. Then we propose system design and finally we conclude by highlight the scope for further enhancement.

Keywords: Automation, Street light monitoring system, QR code, Energy optimization.

I. INTRODUCTION

The Street lights are the major requirements in today's life for safety purposes and avoiding accidents during night. Providing street lighting is one of the most important and expensive responsibilities of a city. The main consideration in the present field technologies are Automation, Power consumption and cost effectiveness. Automation is intended to reduce man power with the help of intelligent systems. Power saving is the main consideration forever as the sources of the power are getting diminished due to various reasons. Designing a cost-efficient system is very important as the requirement is more. In order to overcome this problem, automatic street light control methods are introduced. The main objective of our project is to provide a better solution to minimize the electrical wastage in operating street lights.

The proposed work is to control switching of street light using QR code using wireless communication. The proposed system utilizes specific and unique QR code generated to a street light. If an individual observes a street light being either ON or OFF during

unaltered time , he can access the street light by scanning the QR code with the right credentials.

NOTE : Unaltered time in this case is referred to a street light if turned ON from 6AM – 6PM and similarly if turned OFF during 6PM – 6AM.

II. PROBLEM STATEMENT

Now a day energy loss occurs in street lights during unaltered time (i.e., from morning 6am to evening 6pm) in this duration there is no need of street lights to be turned ON where in sometimes the street lights will be turned ON due to malfunctioning. The street lights are turned OFF if its turned ON in unaltered time using electric switches where it can be again turned ON. If the street lights are of older version there is no option for turning OFF the street lights during unaltered time and people used to plug off the wire or disconnect the wire to switch OFF the street light where it can be a threat to human life.

III. LITERATURE SURVEY

Figure 1 shows a sample case where in the street lights were reported to be turned ON for 2 days and this issue was unreported for their repair and maintenance.

When energy crisis is a big threat and unscheduled power cuts are the order of the day, street lights can be seen burning during daytime in many parts of the city.A scathing audit of the city of San Diego's street light repairs finds the service does not operate efficiently.

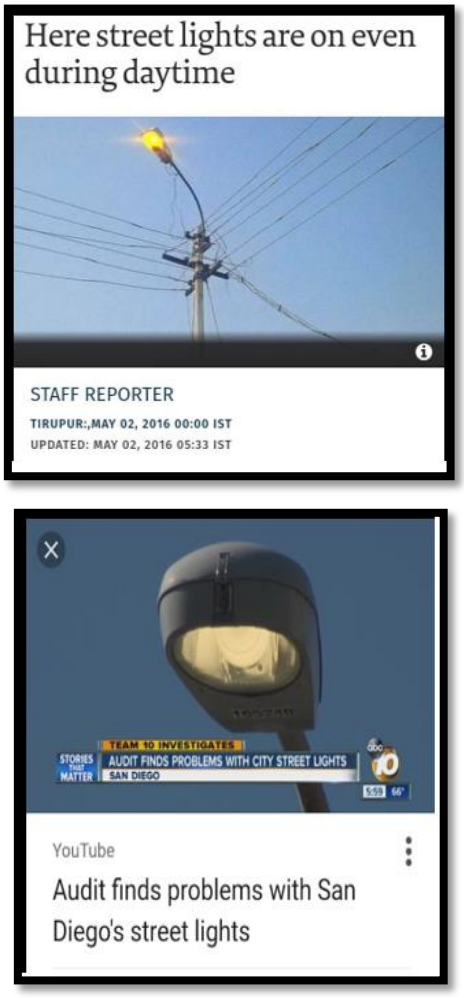


Figure 1. A report from few local newspapers where in street light was kept on with for 2 days.

Automatic Street Lights,

In order to overcome the above problem, there are few projectsin which human interference to control the power consumptions at the streets have been eliminated. This includes controlling a circuit of street lights with specific Sensors, LDR and Microcontrollers during day and night. This requires three basic components i.e. LDR, Sensors and microcontroller. During daytime there is no requirement of street lights so the LDR keeps the street light off until the light level is low or the frequency of light is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Thus the street lights do not glow. The below mentioned are few street light monitoring systems which are proposed and used.

Automatic Street Light Control System Using Microcontroller, This paper aims at designing and executing the advanced development in embedded systems for energy saving of street lights. Nowadays, human has become too busy, and is unable to find time even to switch the lights wherever not necessary. This paper gives the best solution for electrical power wastage. Also the manual operation of the lighting system is completely eliminated. In this paper the two sensors are used which are Light Dependent Resistor LDR sensor to indicate a day/night time and the photoelectric sensors to detect the movement on the street. the microcontroller PIC16F877A is used as brain to control the street light system, where the programming language used for developing the software to the microcontroller is C-language.

Intelligent Street Lighting System Using GSM, Conventional street lighting systems in areas with a low frequency of passers are by online most of the night without purpose. The consequence is that a large amount of power is wasted meaninglessly. With the broad availability of flexible-lighting technology like light-emitting diode lamps and everywhere available wireless internet connection, fast reacting, reliably operating, and power-conserving street lighting systems become reality. The purpose of this work is to describe the Intelligent Street Lighting (ISL) system, a first approach to accomplish the demand for flexible public lighting systems.

GSM based smart street light monitoring and control system, it is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled switching of street lights they are basically two modules which include the client side and the server side. the client side consists of GSM modem which is further connected to the microcontroller. the server side consist of java based web server

Arm Based Street Lighting System with Fault Detection, In this paper a new innovative street light system with optimized street light management and efficiency is presented. It uses many sensors to control and guarantee a better efficient system. Presence of a person or an obstacle is detected by using the presence detector sensors. Street lights will be switched ON only when a person or an obstacle comes in the detection range else it will be switched OFF. Wireless communication uses GSM devices which allow more efficient street lamp management system and control. Arm processor will check the state of street lamp and informs through GSM module to the control by sending a message to the prescribed number. The system allows substantial energy savings with increased performance and maintainability. By using this system the manual works will be reduced to a great extent

GSM based smart street light monitoring and control system, it is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled switching of street lights they are basically two modules which include the client side and the server side. The client side consists of GSM modem which is further connected to the microcontroller which is further connected to the relay circuit; the server side consists of GSM modem connected to the Monitoring and Control Application

EXISTING SYSTEM

Street light is poorly designed and inadequately maintained, there are large number of burned out lamps which leads to insecurity. There is a complaint register in every zonal office street light section. It is being maintained by the line inspector. The complaint received from public, councilors and corporation officials either over phone is in person being recorded in the complaint register. The complaint thus entered is being handed over to the fieldwork man so as to rectify the complaints. the field staff will have the rounds in the respective areas twice in a week and the complaints about non

burning are also being attended then and there. But this is not the immediate remedy on complaints and has many disadvantages like the repair work takes days/even months instead of taking few hours which results in delay, telephone line may be busy, sometimes no response.

Operating street light manully

Figure 2: The switches of street lights are switched ON/OFF manually by the workman in all the zones. This leads to the rise of man power and time. As it is human operation it is prone to errors.

Street light is poorly designed and inadequately maintained, there are large number of burned out lamps which leads to insecurity. There is a complaint register in every zone office street light section. It is being maintained by the line inspector. The complaint received from public, councilors and corporation officials either over phone or in person being recorded in the complaint register. The complaint thus entered is being handed over to the fieldwork man so as to rectify the complaints. The field staff will have the rounds in the respective areas twice in a week and the complaints about non-burning are also being attended then and there. But this is not the immediate remedy on complaints and has many disadvantages like the repair work takes days/even months instead of taking few hours which results in delay, telephone line may be busy, sometimes no response.

IV. PROPOSED SYSTEM

The objective of the project is to design a street lights where the street lights can be monitored by the public when the street lights are ON/OFF in unaltered time by using QR code, And even the complaints can be lodge by the public when failed to monitor the street light ,the energy saving and autonomous operation on economical affordable for the streets and immediate remedy on complaints. Moreover, errors which occur due to manual operation can also be eliminated. As all the Street Lights can be switched ON/OFF through computer from central control station and no labor is required for switching ON/OFF. Doing all these in turn increases the performance and life of the lamps.

Functionalities of the project

- ✓ Switch on and offthe street light using QR code in unaltered time.
- ✓ Public can also lodge complaints when failed to monitor the street light.
- ✓ Bill Payment.
- ✓ Street light fault detection.
- ✓ If complaint not rectified by area wise system then information tohigher leveloffice(Zonal level) based on some constraint like not rectified even after two days.
- ✓ The useful information is collected from the street light at the end of each day this information is stored in a database and based on this information charts are derived.
- ✓ Chart contains information like, Power consumption, Total number of burning hours, and total number of interruptions.

QR code

QR code abbreviated from Quick response code) is the trade mark for a type of matrix barcode (2-D barcode) first designed for the automotive industry in Japan. A barcode is a machine-readable optical label that contains information about the item to which it is attached.A QR code uses four standardized encoding modes (numeric, alphanumeric, byte/binary, and kanji) to efficiently store data; extensions may also be used. QR codes have become common in consumer advertising. Typically, a smartphone is used as a QR code

scanner, displaying the code and converting it to some useful form (such as standard URL for a website, thereby obviating the need for a user to type it into a web browser). User with a camera phone equipped with correct reader applicationcan scan the image of a QR code to display text, contact information, connect to wireless network, or open a webpage in the telephone's browser. Either the application that scan the QR code retrieves the geo information by using GPS and cell tower triangulation or the URL encoded in the QR code itself is associated with a location.

Figure 3. A sample QR Code

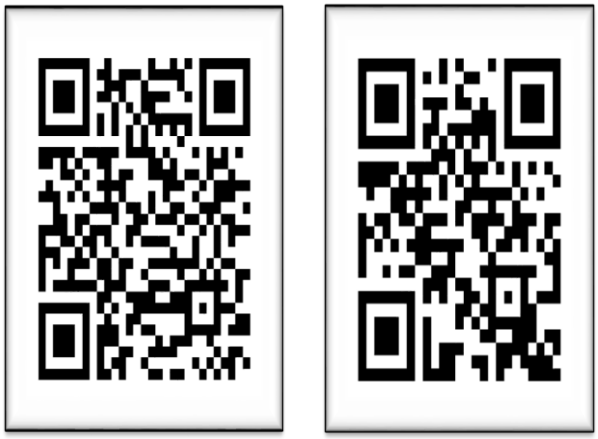


Figure 4. QR code samples to retrieve GPS location and URL

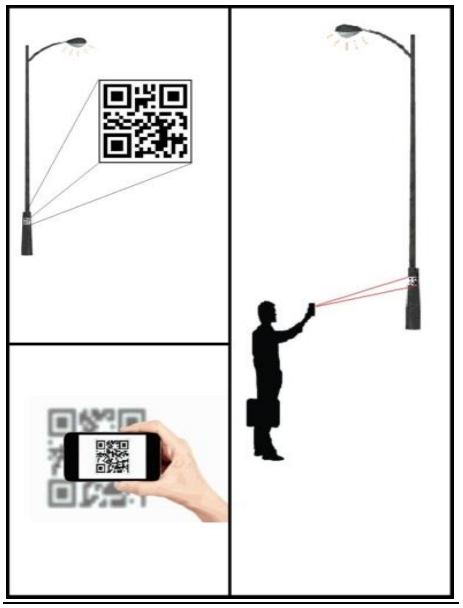


Figure 5. Picture depicting usage of QR code in street light monitoring

Working:

- As mentioned in the introduction part the proposed system utilizes specific and unique QR code generated to a particular street light where an individual public who observes a particular street light is either ON or OFF during unaltered time can access the particular street light by scanning the QR code.
- Once the code gets scanned the user gets an access to automate the street light via internet.
- The access made by the user if found genuine then a webpage will be popped out to automate the street light.
- Here the access mode and genuineness is calculated by generating the QR code in such a way by restricting the unwanted access. For this restriction to be done the QR code will be coded on the basis of :
  - ✓ Authorized access
  - ✓ Unauthorized access.

If the user fails to automate the street light (turning it OFF/ON during unaltered time) getsoptions to:

a. Share the geographical location of the street light so the authority responsible for this will be alerted for immediate repair.

b. Write a complaint regarding the repair and maintenance of street light via message.

c. Calling the authority for immediate repair and maintenance.

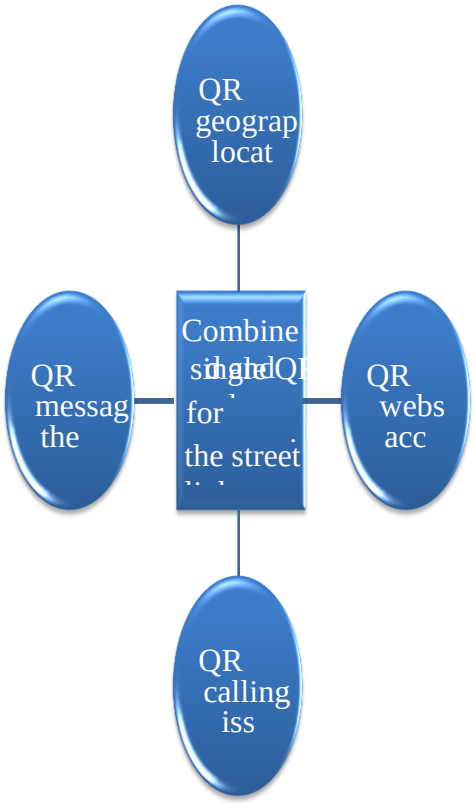
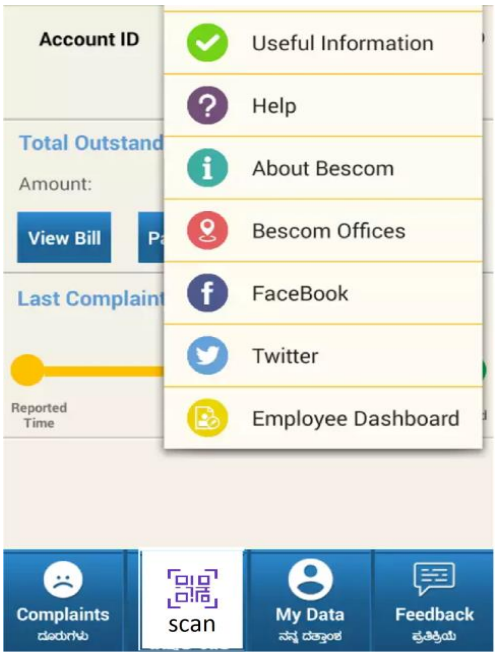
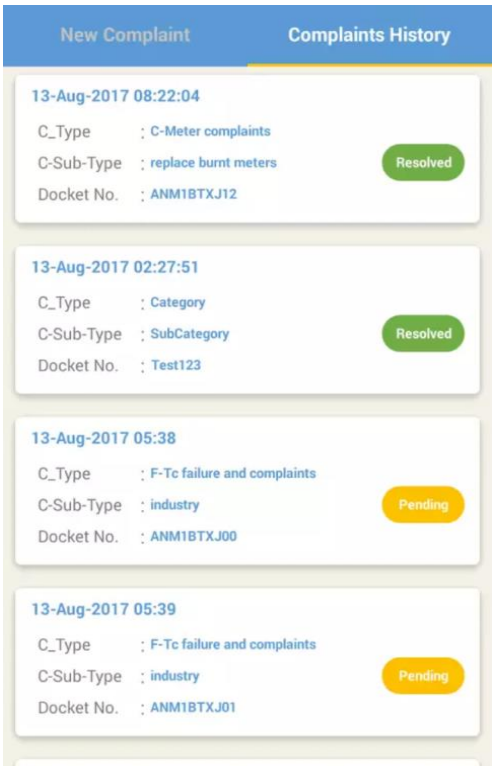


Figure 6. QR code usage in the proposed system





UI DESIGN

Initial UI design shows login /register page ,for scanning, complaint status view, reporting a complaint

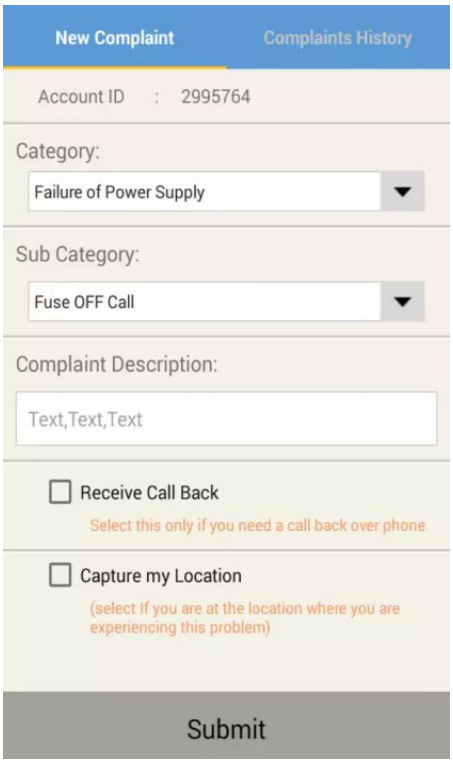


Figure 7. User Interface of mobile application

Figure 7 shows the Use Case diagram that introduces the major characters of the project i.e. Admin, System/Application , Street light and the worker . It also mentions their respective functions and the operations they are involved in.

The admin is mainly responsible for managing the area and also responsible for when to start or stop the service. System/application is mainly used by public to ON /OFF the street lights in unaltered time by scanning the QR code. The Street light actor report the failure to system then the system sends SMS based alerts to the authorized worker.

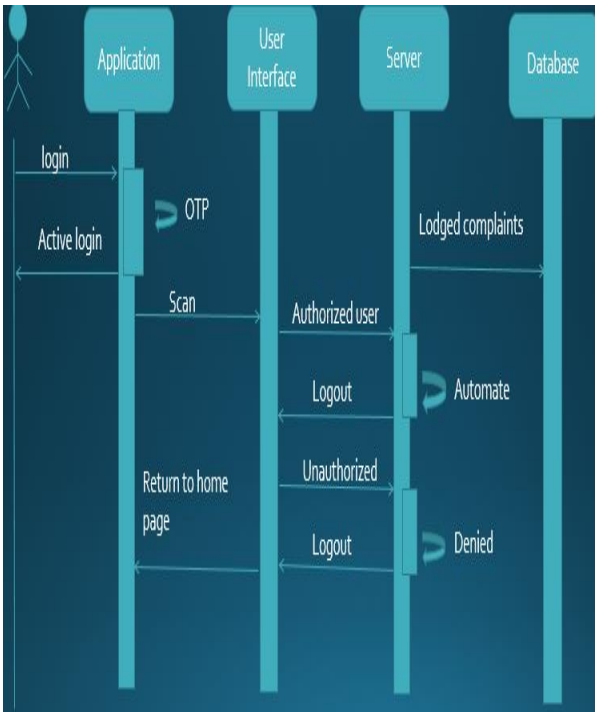


Figure 8. Sequence diagram to show system usage

Figure 8 showsthe step by step tasks that occur during the course of the project are mapped using the Sequence system. A continuously running application manages the database containing the number of areas, number of street light poles, information regarding the workman assigned to a street etc.it also periodically allow public to get register and to monitor the street light i.e. switch ON/OFF street light in unaltered time by scanning QR code if user fails to monitor the street light then user can also lodge complaints where admin is notified about the complaint which is stored in database and message is sent to the concerned workman to rectify the problem and also to the application system to update the database. The user can also view the updates done in database by the admin.

ACTORS

1. **KEB server**
   - Manage streetlights.
   - View and process complaint.
2. **End user**
   - Register and login.
   - Scan QR code.

- Control street lights.
- Register complaints.
- View complaint status.

ACCESS MODE

AUTHORIZED USER

- ✓ The street light if turned ON during day time. By scanning the QR code the user get a successful access to turn OFF the street light.
- ✓
- ✓ The street light if turned OFF during night time. By scanning the QR code the user get a successful access to turn ON the street light.

UNAUTHORIZED USER

- ✓ The street light if turned OFF during day time. By scanning the QR code the user will get access denied message for unwanted usage of this project.
- ✓ The street light if turned ON during night time. By scanning the QR code the user again get same access denied message.

V. CONCLUSION

The system for automatic control of street light using QR code helps to save a large amount of electric power which is wasted in conventional street lighting system. The turning ON or OFF the street light in unaltered time can be made by public by using QR code. Furthermore, the drawback of the street light system by just using timer controller has been overcome, where the system depends on both timer and Arduino uno microcontroller.

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Automation of Form Filling

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ABSTRACT

Nowadays, at any academic institution, form filling transactions are quite common at a regular interval. It is possible to identify the fields in a form which are likely to be entered in another. Unlike previous proposals this mechanism does not depend on the compilation of a dictionary of common terms. Each content provider is able to define private dictionaries where desirable. The scheme remains traceable since the interests of content provider will encourage the use of established schemes whenever possible. With digitalization and e-governance across academic institutions, the data or information required by such forms are available in different digital sources like databases, spreadsheets and other file formats, however the data from the available sources is not migrated into fields in the format automatically, but is filled either by extracting contents from digital sources and retyping or by using copy and paste option provided by the technology which requires human intervention. This motivates the research with an objective to analyze and design various conceptual models to automate the filling of various web enabled forms by making system intelligently interpret the required data i.e., using pattern recognition and natural language processing of data.
Keywords: Auto filling, Micro formats, Web forms concept mapping and Semantic Web.

I. INTRODUCTION

Recently, web services play important role in people's life. They are the main input mechanism for users to supply data to web applications.Every activity is done in web applications by using a smart phone or computer. They do so to sign up to social network applications and do advanced searches on search based web applications. Although one person has only one system, to fill multiple e-forms, one basic set of information of a person is not used to auto fill. The end users often have to repetitively type the same information and it increase competition productivity i.e., must maintain multiple accounts. It is redundant, time consuming and not an efficient use of technology. To save users from repeatedly typing, it is more efficient for users if the information commonly required among different websites can be propagated and pre-filled for the user.

The first proposal of our project is to design query for every question in web form and enable automatic push of data or information from the user specific digital source to the form. The second proposal is to accomplish automatic fill up in the case where there are more than one form. In this project the techniques are used to develop software that would support the user on the process of filling e-form through automatic and pseudo intelligently filling the fields of forms with information possessed by an intelligent system.

II. EXISTING SYSTEM

In the existing system in order to fill in the same information into the fields of different application forms they require same tag name for the field and the systems are user interface dependent. Minimum collection and analysis of user input is done. Web application is linked externally and cannot detect user's contextual information.

In the recent years, industry and academic worlds have developed several tools and approaches to address the problem. Web browsing software provides web form Auto-filling tools, such as Mozilla Firefox Add-on Autofill Forms, to help users fill in forms. In general, these auto-filling tools record the values entered by a user in a given form and fill the entered values into the same form when the user visits the same website again. The tools also allow users to modify the values manually. But the problem is they are not able to fill in the different application forms having the same fields requiring same information.

III. PROPOSED FRAMEWORK

The problem we address in this work is how to automatically fill in the information related to a particular person into different applications, by making use of the generalized form which consists of common fields from various applications and information related to those fields.

Our solution is divided into a series of steps organized in an architecture. Initially various application forms from different areas are collected and categorized based on the type of application. Then common fields among collected web application forms are identified and put in the separate file as generalized form. Tokenization of these identified fields is carried out by assigning a general tag name for the common fields which require the same information. Then matching the fields of a particular form which need to be filled by the user with fields of generalized form is done. Filling of data into the required fields is automated. Suppose there are three application forms, the field Candidate name in Government form can appear as Patient name in Hospital form and as Student name in a Academic form, but all the three phrases mean the same and require the same input. So these three common fields are generalized and given the tag name as Name in the generalized form.

Following Figure shows the example for proposed architecture.

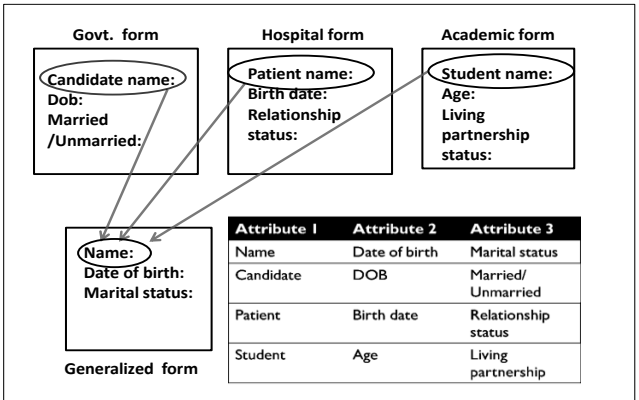

Fig .Generalization and Tokenization

Our proposed framework has the following benefits

1. Reduces the time required to fill the form.
2. Reduces the chance of manual errors done by the user during the form filling process.
3. Avoids repeated and redundant entry of same information into different forms.
4. Avoids references used to remember lengthy data.
5. Provides easy to use environment by automating the process of form filling, hence reduces the efforts of the user.

IV. CONCLUSION

The automation of form filling is important aspect in modern world. The different forms have different requirements. Creating a generalized form with generalized filed name with attributes and possible matching field name must be build initially like for a spouse field name, if female has filled the form , then husband's field name must be matched vice versa for male filled forms. The application system must be intelligent enough to solve such ambiguity City and town are synonyms, so both quires should refer to

the same data value. Using the above method can improve the process of automation.

The user interaction must be minimized, only those values that are new or unique for a given form must be filled manually by the user and all must be automated.

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Smart Car Parking System

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ABSTRACT

Due to population explosion, especially in India and China as population is increasing simultaneously number of vehicles on road also increasing. Therefore congestion is the main problem nowadays, during parking the vehicles finding available parking slots is tedious job it is better to identify the available parking slot before living the current location. By identifying and reserving the parking slot in destination place or nearby it is the good job. This study is aimed at analyzing available parking slots. This system allocates available parking space to a needed driver to park their vehicles. Renews the availability of the parking space when vehicles leaves and computes the charges, due to implementing this system will increase parking utilization. The system does this by providing more efficient and effective parking enforcement. In this system keypad, cloud, sensors, motors are used. Sensors are used to detect space is available or occupied, Cloud is used to store data of parking details, keypad is provided for the manual entry of OTP number by users. With sensors, LED Lights like Red, Green and Yellow etc are used to slot status.

Keywords: Arduino, Cloud, Sensor, Smart parking.

I. INTRODUCTION

There are two types of parking management system first is a normal parking system and another one is an automatic parking system. What we are using nowadays to park the vehicle is normal parking system. In normal parking system, problem faced by people due to lack to car parking management is shown in figure.1. An automatic parking system is used to make the whole process of car parking more efficient and less complex for both drivers and supervisor. This can be done through sensors, microcontroller, LEDs as indicator, LCD display, keypad, and stepper-motor. By storing the data related to parking area in cloud can be accessed from anywhere. To access the data from cloud internet is required.

The main objective of this paper is to develop an intelligent, user friendly automated car parking system which reduce the human intervention and traffic congestion and to offer safe and secure parking slots within limited area.

The main problem nowadays people facing is it is tedious job to find the vacant spaces during weekends or public holidays. Insufficient car park space leads to traffic congestion and driver frustration.

Figure 1. Improper parking system..

II. METHODS AND MATERIAL

We are designing a less complex system, thus the components required is also less. There will less man power involved for installation operation and maintenance. Hence system requires small space for installation and less power consumption. It allows pre-booking. It restricts user entry, as only user with more than threshold balance can enter parking slot. System allows user to give individual parking preference. It automatically deducts amount from user's wallet. De-allocates the parking slot once the car leaves. System notifies user of allocated slot through SMS during booking, deducted charges and remaining balance during exit. If user not able reach the parking slot within the buffer time then reservation will be auto cancelled (buffer time means like 15min, 30min). Then user need to reserve slot once again if required.

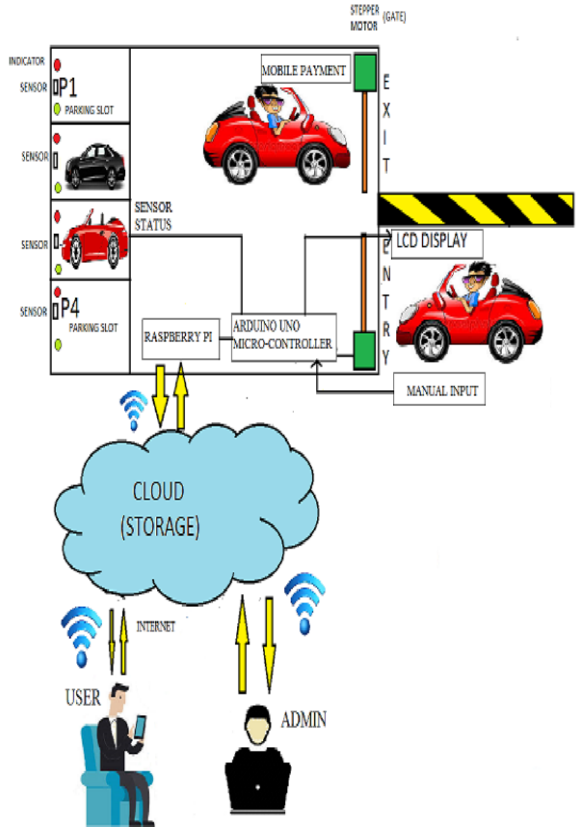

Figure.2. System Architecture of Smart Car Parking System.

The smart parking system encompasses numerous sensor nodes, GSM, micro-controller, cloud, barrier gate, LCD display and keypad as illustrated in Figure.2. Active IR sensor installed on every slot in parking area in order to collect information from them [12] [13]. Data collected from sensor is transferred to cloud through Raspberry-pi [10]. The cloud stores these data and presents them as useful information for drivers on the screen. The sensor stay in sleep condition most of the time to preserve the battery's power and starts it's reading from the active IR sensor at the appropriate time interval and then updated to cloud. The cloud manages the availability or occupancy states of all the parking slots and also offer the status of parking slot information to driver through browser and also at the entrance of the parking area in LCD display. Smart parking system has different functionalities that are managing user, parking slots, payment and messages. User can check the status of parking slot through android application and reserve specified parking slot if available. After successful reservation,

confirmation message is send to the user with OTP or reference ID. User as to enter received OTP or reference ID at entrance of parking area .If those numbers are matched the barrier gate opens. User will park the vehicle in reserved slot. During exit time user needs to make payment by scanning QR code (like Paytm). To make payment smart phone is required [11]. After successful payment it allows user to exit from that point.

A. Hardware Description

The required hardware component are Arduino UNO microcontroller, Raspberry pi, Router, LCD, Active IR sensor, stepper motor, power supply, Key pad and LEDs.

1) Arduino Uno: The Arduino Uno is a microcontroller board based on the ATmega328 (data sheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), analog inputs, a 16MHz ceramic resonator, a USB connection, a power jack, and a reset button. This contains all the required support needed for microcontroller.

2) Sensor: Sensor is placed in each slot to know the status of each parking slots. It sends signal to microcontroller, here active IR sensor are used.

3) Indicators (LEDs): Neopixels are used and placed in each parking slot. Advantage of it is these are addressable LEDs and it require only 3 wires to connect 'n' number of LEDs. Each slot separate color can be assigned and Red indicates slot occupied and Green indicates available.

4) Stepper motor: It is used to open the barrier gate when user arrives at entry point and departure at exit point.

5) LCD Display: Display is placed in outside of parking area at entrance. It contains parking slots status like number of slots occupied and number of slots available.

6) Raspberry pi: A raspberry pi is a credit card sized computer originally designed for education. Raspbian comes preloaded with python, the official programming language of the Raspberry Pi and IDLE3, a python integrated development Environment. It is used in education, industrial and home automation [10].

B. Software Requirements

1) LINUX: Linux is a family of free and open source software operating system built around the Linux kernel. Linux OS is a cross-platform operating system based on UNIX that can be installed on PCs, laptop and more.

2) Arduino IDE: Arduino consist of both a physical programmable circuit board (often referred to as a Microcontroller) and a piece of software, or IDE (integrated development environment) that runs on your computer, used to write and upload computer code to the physical board.

3) php / html / JS: JS is used for interface between hardware and software. HTML and PHP is used for developing front end.

C. Modules

Entire system is divided into three Modules:-

1) Slot Reservation: Initially user needs to register his details using smart phone in android application. After registration, logging to his profile user can check parking slot status. All information related to parking area will be stored in cloud. Data stored in cloud will be displayed to user in on android application. Based on the data displayed on android application user reserve the required slot. After selecting the slot an OTP will be sent to the user as a confirmation message.

2) Authentication: In case of registered user, the registered user arrives at the parking slot and the OTP number is entered with the help of keypad which user received during reservation as a confirmation message. After verification of the entered OTP number microcontroller send the signal to open the barrier gate. Then user is allowed park the vehicle in reserved slot.

In case of Un-Registered user, the unregistered user at the entrance of parking area LCD displays the status of parking area that is total number of occupied and free slots. If the Parking space are available then user need to enter some minimum details like vehicle number and phone number. Next user will get confirmation message with OTP, user needs to enter received OTP then barrier gate will open user is allowed to enter into parking area and park's the vehicle in allocated slot.

3) Check Out: User leaves parking slot and arrive at exit point. User has to make payment by scanning QR code (like paytm). After successful payment only barrier gate will open for user to exit. Allocated space is de-allocated and make available to another user to make use of it. All details (timings, payment, and user information) get updated in the cloud. Those details are accessible to the supervisor.
Complete working flow of smart car-parking system is shown in activity diagram Fig.3.

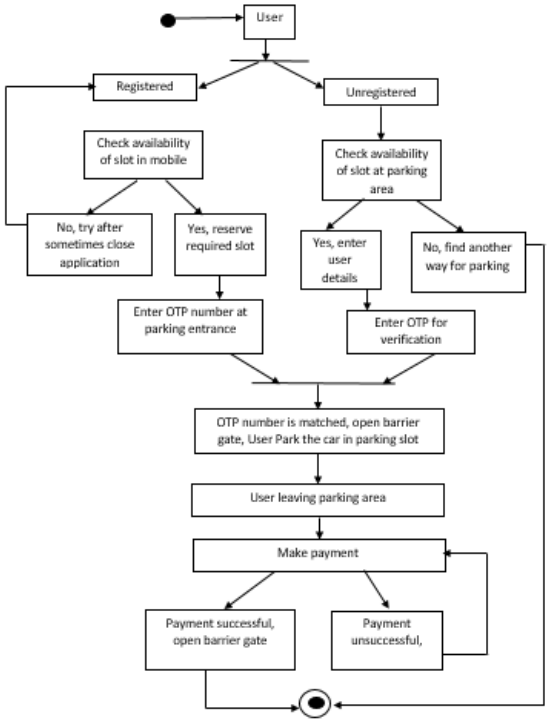

Figure 3. Activity diagram for smart car parking system

III. RESULTS AND DISCUSSION

When we saw how people park these , we came up with this idea that we certainly need a better parking system that exist today as there is no authorization and anyone can park their vehicle where they want.

At entrance it reads RFID Tag and checks it is authorized user or not. If authorized user than gate opens for entry to parking slot and park the vehicle, if slot is available and counter get updated. IR sensors are used to sense the car present in slot or not [1]. User need to get registered by entering their credentials. Those details are get updated to cloud. When user arrives at parking area captures car number plate and processed parking slip will be displayed on the owner's application upon verification. Also LED allotted to slot turn to Red indicating that slot allocated. As soon as user leaves parking area billing amount will be calculated according to the parking time and will be withdrawn from the linked payment wallet customer .cloud provide data storage and computing resource for the car parking service [2][5].

Admin application is used to define new parking area, specify number of parking lots, the parking cost per hour and other details. Parking application used to send vehicle plate number and reservation password to central server for verification when user checks in and issue bill to user on checkout. Application for user to register for service, find parking area from the list of area, and reserve an available parking slot and specify duration of reservation [3].

In some of the proposed system, using image processing concept number of slots available or not is predicted and updated to cloud [6][7]. And also to check arrived user at parking entrance is authorized user or not using OCR algorithm [8] [9].

IV. CONCLUSION

Due to advancement in technology, drivers are demanding easier and less time consuming parking facilities. There are various methodologies of smart parking that have been implemented to provide better service to end users and improve the overall management of the existing parking system. The real time monitoring of available parking lots and allotment of the suitable parking area by advanced reservation are some of the characteristics services provided to the customers through a user friendly interface like a browser or using SMS services.

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Data Access Control of Personal Health Records using Cryptography

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ABSTRACT

The goal of real health care reform must be high quality, universal coverage in cost effective way. Personal Health Record (PHR) systems plays prerequisite act in digital transformation of healthcare.PHR health systems turn out many over and above features like scrutinize one s health related information ,secure transmission and traverse the same data with health care providers. A cloud facilitated PHR systems bloats the contingency for PHR systems to co relate with our systems in health information executive system environments. An individual human being who is enduring a disorder needs to inscribe (encrypt) his/her data before transmitting it in cloud since the patients will lose their physical access to their health data accumulated in cloud servers.The callout assert here is to procure fine grained data ingresss control onm encrypted PHR data in an effectual and ascendable manner. In PHR Systems there are multifarious owners or patients & extant data connection & access control tactics are designed for sinle-authority /owner .The proposed scheme derives flexibility ,scalablity & fin grined patient centic data acces limitation scheme called revovable multi authority attribute set based encryption.(R-MA-ASBE)

Keywords: PHR systems; attribute set based encryption; access control; user revocation; health cloud.

I. INTRODUCTION

The PHR system shows a great potential to improve the quality of medical diagnosis, reduce medical costs and helps to address the on-demand health care challenges posed by the aging society. The definition of PHR is heterogeneous and evolving. Markle Foundation defines PHR as a set of computer-based tools that allow people to access and coordinate their lifelong health information and make appropriate parts of it available to those who need it [16]. In some concepts, PHR are any consumer/patient-managed health record. The term “PHR” refers to the collection of information about and individual's health and health care, stored in electronic format. PHR data may come from the patient, caregiver, healthcare provider, payer, etc.

To ensure the availability of PHR in electronic form adheres to the same levels of data privacy as applicable to paper-based patient-records accessible only from the physician’s office. With the recent advancement of cloud computing, PHR data is usually stored at the cloud storage rather than storing them in a local server thus ensuring availability with reduced capital and operational expenditures [10]. In cloud server environments, data is stored on one or more third-party servers where the server can be administrated on demand with proper access privileges.

The cloud-based PHR systems offer new possibilities in ubiquitous computing, data mining, easy development and deployment of new applications, high-degree of fault tolerance, etc., all without the concern of data storage and location of the actual

infrastructure. Google Health, Microsoft Health Vault and Dossia solutions took the initial steps in the trend of constructing PHR systems in a cloud environment. Moving patients PHR into this cloud storage offers infinite conveniences to the e-Health care providers, since they do not have to be bothered about the complexities of direct hardware management [11].

However, computerized PHR are vulnerable to potential abuse and security threats. Storing large amounts of patient's sensitive health related data in third-party cloud storage is exposed to loss. Data confidentiality is a desired property when patients outsource their PHR to public health cloud service providers and encryption is used to secure the data. This paper addresses the problem of patient –centric access privilege to highly sensitive Patient Health Record (PHR), where PHR is expected to be securely stored in cloud storage for anywhere anytime remote access.

In order to assure the privacy of PHR in a multi – user environment, a novel cryptographically enforced data access control named Revocable Multi Authority Attribute Set Based Encryption (R-MA-ASBE) is proposed by extending Cipher text Policy Attribute Set Based encryption (CP-ASBE) [8].

Problem description

A PHR system normally consists of multiple data owners/ patients who will encrypt their personal health data before uploading to a health cloud server. In such a multi authority- multi owner cloud environments, it is very difficult to implement fine-grained data access control using traditional public key (PKE) and symmetric keyencryption (SKE) schemes. Moreover, the traditional PKE based schemes uses different user secret keys for encrypting multiple copies of a single data [1]. The attractive property of attribute based encryption (ABE) schemes is resistant to user collusion and there are many works available in the literature used ABE as a cryptographic primitive to achieve fine-grained data access control and user revocation. A privacy preserving electronic health record system was proposed in [12] using secure broadcast Ciphertext policy Attribute Based Encryption (CP-ABE) scheme. Their scheme can also be applied to other general security sensitive database applications. A multi authority patient-centric fine-grained data access control scheme was proposed in [1] based on multi authority attribute based encryption (MA-ABE) [9]. In the existing CP-ABE based schemes, the patient or the data owner encrypts PHR data according to the pre-defined access policies. The data consumers who satisfy the access policies could only decrypt it. The standard model of CP-ABE consists of only a single authority, which is responsible for managing all attributes and distribution of keys in the system. If the authority is corrupted, the entire system will be totally broken. By introducing a multi level setting to these CP-ABE schemes, the patients may have an appropriate data access control since attributes are issued by multiple authorities and also can share their PHR data using policies defined over different attributes from these authorities. In multi authority PHR systems, attribute revocation is a serious problem since the attributes are issued by different authorities. An attribute associated with a data consumer in a multi authority PHR system may adopt new attributes or revoked some existing attributes [4]. Moreover attribute revocation mechanisms proposed in [1, 6, 7, 11] rely on a trusted authority and do not deal with the attribute revocation problem in a multi authority cloud storage systems.

The Proposed R-MA-ASBE scheme

In this paper, a secure, revocable multi authority cipher text policy attribute set based encryption scheme is proposed to solve the revocation problem in a multi authority PHR system. The proposed scheme extends the Ciphertext policy attribute set based encryption (CP-ASBE) scheme proposed in [8] to a multi level setting and makes it revocable. A multi authority attribute based encryption (MA-ABE) scheme was proposed in [7] extending CP-ABE

scheme. However, the attribute revocation in a multi authority scenario was not carried out in MA-ABE scheme. Since CP-ASBE scheme prevents users from combining attributes from multiple keys, the proposed scheme also prevent collusion attack. In the proposed R-MA-ASBE scheme, the entire system is divided in to one global certificate authority (GCA) and multiple attribute authorities (AAs). The GCA sets up the system and authenticates the registration of all the users and attribute authorities in the system. In the system, each user is assigned a unique user identity Uid and each attribute authority is assigned an identity AAid . The key update is enforced by individual AA in the system and the health cloud server in the proposed R- MA-ASBE scheme is considered to be an un –trusted Server. The proposed R-MA-ASBE scheme is based on bilinear pairing and uses Decisional Bilinear Diffie-Hellman(DBDH) complexity assumption to prove the security of the proposed R- MA-ASBE scheme. In information theory,an encryption scheme is perfectly secure if an adversary cannot extract any information about the plaintext from the Ciphertext. The security of the proposed scheme can be proven purely using information theory and these schemes are often called as information theoretically secure schemes [13]. Therefore, the encryption schemes proposed in this paper can be referred as computationally secure scheme.

System model and security model

In the proposed R-MA-ASBE scheme, a multi authority PHR data access control system is considered where there exist five types of entities as described in Fig.1. The five types of entities are (i) Global Certificate authority (ii) Attribute authorities (iii) Data owners (Patients) (iv) Health Cloud server (v) Data Consumers. The Global Certificate Authority (GCA) is responsible for system setup, registering legal data consumers and attribute authorities in the system, issuing unique global user identity and public key to the user. In the system model, there are N independent attribute authorities that have full control over the attribute structure. Each attribute authority is responsible for issuing/revoking user (data consumer) attributes in its domain and generating secret key for the users. Data owners (Patients) first encrypts the PHR data, defines the attribute based data access policies and store at the health cloud storage. Data consumers constitute the fourth entity who is interested in accessing some specific patient related information and can decrypt the encrypted data only if the user successfully completes the access policy. Thus, data consumers with different attributes obtain different granularities of information from the same PHR data. In the security model, The GCA is assumed to be honest and will not collude with any user in the system to gain illegal profits. The N attribute authorities are trusted but can be corrupted by the adversary. The health cloud server is curious about the content of the encrypted PHR data but it follows the proposed protocol and thus they are assumed to be honest. Data consumers are dishonest and may collude to access the files beyond their privileges. Though the proposed R-MA- ASBE scheme is an extension of CP-ASBE scheme with a multi authority setting, the R-MA-ASBE scheme do not use the security proof given in [8]. Instead, the security model of MA-ASBE scheme uses the proof technique in [14]. The security model of the proposed scheme can be explained in terms of a game between Challenger A and an adversary B Setup: The challenger runs the attribute authority setup algorithm and generates public key PK. The challenger Also runs the secret key algorithm and generates secret key SK. The GCA Setup algorithm generates global public parameters. Let {AA} denote the set of all the attribute authorities. The adversary specifies A specifies a set of corrupted attribute authorities {AA}' {AA}. The challenger B sends the public keys PK to adversary A for the uncorrupted attribute authorities in {AA}-{AA}' whereas it sends both the public keys PK and secret keys SK for corrupted authorities in {AA}'.

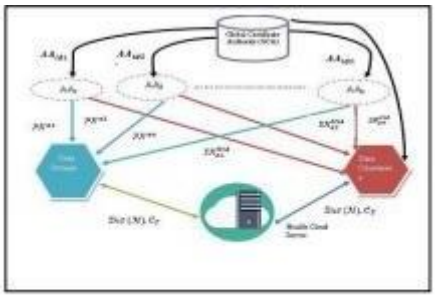

Fig.1. System model

Phase 1: The adversary *A* makes repeated queries for secret private keys corresponding to attribute

$$GSK_{U_{id}} = U_{U_{id}}$$
$$GSK'_{U_{id}} = U'_{U_{id}}; U_{U_{id}}, U'_{U_{id}} \in Z_p$$

The user's global public key as,

$$GPK_{U_{id}} = g^{U_{id}}$$
$$GPK'_{U_{id}} = g^{U'_{U_{id}}}$$

Also, the registered *AA* with global identity AA_{id} is assigned by the *GCA*.

(ii) AA Setup: This algorithm is run by each attribute authority. It takes the attribute universe AU_{AUid} as input .It outputs a secret key/public key pair $(SK_{AA_{id}}, PK_{AA_{id}})$ and a set of version keys and public attribute $\{VK_{xAA_{id,}} PK_{xAA_{id}}\}$where

$AA_{id} \in AU_{AA_{id}}$

A ^{p1}. The challenger *B* gives the corresponding set of

$SK_{AA_{id}} = (\alpha_{AA_{id}}, \beta_{AA_{id}}, \gamma_{AA_{id}})$ secret private keys to the adversary *A*. The adversary *A* also makes key update queries and the challenger *B* gives the corresponding update keys to the adversary *A.*

$$PK_{AA_{id}} = \left(g^{\beta_{AA_{id}}}, g^{\frac{1}{\beta_{AA_{id}}}}, e(g,g)^{\alpha_{AA_{id}}}\right)$$

Challenge: The adversary A submits two equal length messages m_0 and m_1. In addition the adversary also gives a challenge access

The AA secret key, The public key, structure A such that none of the attribute sets $A_s^1 \ldots\ldots A_s^{p1}$ From phase1 satisfy the access structure. The challenger *B* then flips a random coin *c* and encrypts m_c under A .The Ciphertext *CT** is given to the adversary *A*

Phase 2: Phase 1 is repeated with the restriction that none of the attribute setsA $^{p1+1}$ A ^{p1} satisfy the access The public attribute keys,

$PK_{xAA_{id}} = (H(xAA_{id})^{vxAA_{id}}, H(xAA_{id})^{vxAA_{id}\gamma xAA_{id}})$

SK_{α}^{Uid}

$(GPK_{U_{id}}, GPK_{U_{id}}')$

Secret key issuing: This algorithm is run by each AA. It produce secret key for the user by taking global structure corresponding to the challenge.

Guess: The adversary outputs a guess *c'* of *c.*

The advantage of an adversary in this game is defined as

Pr[c'=c]-1/2

Definition 1. A revocable multi-authority CP-ASBE scheme is secure if all polynomial adversaries have at most a Negligible advantage in the above game.

Theorem 1. Suppose the decisional q-parallel BDHE assumption holds, then no polytime adversary can selectively break our system with a challenge matrix of size l*x n*

where l*,n<.q,

Algorithms

Setup:

(i) GCA setup (*d*=2): This algorithm is run by the *GCA* and accepts both user registration and *AA* registration. It takes the security parameter λ as input and generates Global Master Key (*GMK*) and global public parameters (*GPP*). It also generates unique user identity (U_{id}) global public keys (GKP_{uid}, GPK'_{uid}), global secret keys (*GMK*)for each user (U_{id}). The proposed scheme uses a key structure of depth,*d*=2 .This algorithm chooses a bilinear group *G* of prime order *p* with generator *g* and then chooses random exponents α,β_i ; where *i* will range from 1 to *d.*

Here,

$GMK = (\beta_1, \beta_2, g^{\alpha})$

$$GPP = \left(g, g^{\beta_1}, g^{\beta_2}, g^{\frac{1}{\beta_1}}, g^{\frac{1}{\beta_2}}, e(g,g)^{\alpha}\right)$$

The global secret key for each user U_{id}, Public keys one global secret key of the user $AS_{U_{idAA_{id}}}$ GSK_{Uid} and the secret key SK_{AAid} an attribute set as input, its corresponding version keys and public attribute keys $PK_{xAA_{id}}$

This secret key generation algorithm randomly chooses a random number,and computes the user secret key $VK_{xAA_{id}}$ The attribute set,

$$AS_{U_{idAA_{id}}} = \left\{AS^0_{U_{idAA_{id}}}, AS^1_{U_{idAA_{id}}}, \ldots\ldots\ldots AS^m_{U_{idAA_{id}}}\right\}$$

where, $AS^0_{U_{idAA_{id}}}$ is the set of attributes in and

are sets of attributes at depth of 2 that the PHR data consumer has. The algorithm also chooses a set of m unique random numbers, $\gamma_a^{Uid} \in Z_p$, one for each set $A_i \in AS_{U_{idAAid}}$

.1<m<i

Encryption:

The data encryption algorithm first divides the patient PHR data 'M' into several data components such as {patient name, age, sex, identity number, hospital, department, doctor} and encrypts the PHR data components A_T is the tree access tree and for encryption the algorithm chooses a random encryption component S ϵ Z_p. This algorithm outputs the cipher text CT by taking input a message M, global public parameters GPP public key PK and an access tree A_T. This algorithm computes the Cipher text as follows:

Where, q_x is the polynomial associated with each node in x in A_T, denotes the set of leaf nodes in A_T and X denotes the set of translating nodes in the access tree A_T.

1) Data decryption:

The data consumer runs the decryption algorithm to decrypt the cipher text by using its secret

keys from different AAs. The decryption algorithm will verify whether the key structure A in user secret key satisfies the tree access structure associated with the cipher text. The decryption algorithm is a recursive algorithm which takes a cipher text CT, global public key and global secret key of the user, a set of secret keys of all the involved $AA's$, a node 't' in the access tree input. If t ϵY i.e., then Decrypt Node is defined as follows.

Decrypt $e(g,g)^{\gamma_{a,i}^{Uid}} . q_t^{(0)}$

Break-glass Access: To handle emergency situation, the regular PHR data access policies may no longer be applicable and break-glass access is needed to access the patient's PHR. In this proposed scheme, the PHR -owner's data access right is also delegated to an emergency department. The emergency department staffs needs to contact the emergency department to verify his identity and obtain temporary access keys. After the emergency is over, the patient can restore the normal access by revoking the emergent access via the emergency department.

Attribute revocation: In the proposed scheme as in [2] , the revoked PHR data consumer cannot decrypt new cipher texts encrypted with new public attribute keys and the newly joined PHR data consumer who has sufficient attributes can be able to decrypt the previously published cipher texts which are encrypted with previous public attribute keys. For example, in a hospital x, some PHR documents are encrypted under the policy "Medicine Dept.AND (Doctor OR M.D Student)", which means that only the doctors or the M.D Student in medicine department are able to decrypt these documents. When a new doctor/M.D student joins the medicine department of the Hospital, he/she should also be able to decrypt these documents. The attribute revocation method used in this scheme is same as that of [2] which can achieve both forward security and backward security.

Key update: If an attribute is revoked from a data consumer, the corresponding attribute authority runs the key update algorithm to compute the update keys. Similar to the algorithm of [3], our scheme also takes as inputs the secret key of the

associated attribute authority, the revoked attribute and its current version key. It generates a new version key for the revoked attribute. The AA then generates a unique update key for secret key update by each non revoked data consumer and generates the update key for cipher text update. The AA sends the unique update key to

non-revoked data consumer and sends updated cipher text the cloud server. Then, the AA updates the public attribute key of the revoked attribute and broadcasts a message for all the PHR data owners that the public attribute key of the revoked attribute is updated. Upon receiving the update key, the data consumer then updates his/her secret key.

Cipher text Update: In our scheme**,** the cipher texts associated with the revoked attribute are required to be updated to the latest version so that a newly joined data consumer having sufficient attributes can still decrypt those previous PHR data as followed in [3]. The cipher text update algorithm uses proxy re-encryption method, which can improve the efficiency of the proposed scheme by moving the computational overload of updating the cipher text from PHR data owners to health cloud server. The health cloud server runs the cipher text update algorithm to update the cipher text associated with the revoked attribute by taking as inputs as cipher texts associated with the revoked attribute and the update key. The efficiency of the proposed scheme is greatly improved by updating the components associated with the revoked attribute of the cipher text, while the other components which are not related to the revoked attribute are not changed. In this manner the proposed revocable MA- ASBE scheme achieves backward security and reduces the storage overhead on PHR data consumers.

Discussion and performance evaluation

In this section, we analyze the security of our proposed scheme and its performance evaluation. In the secret key update phase of our scheme, each AA generates an update key for the corresponding non- revoked user. A revoked user could not use the updated secret keys of non-revoked user to update its own secret key, since the update keys are associated with the global identity of the user. Moreover, since the version of the revoked attribute is updated to a newer version after each attribute revocation, secret keys of the users who are newly join the system are associated with attribute with new version. The newly joined users can decrypt old cipher texts encrypted under old version attributes with the help of Cipher text update algorithm included in the proposed R-MA-ASBE scheme. Thus the proposed scheme guarantees backward and forward security. The PHR data consumers cannot collude together to gain illegal PHR data access by combining their attributes together since the secret key is also associated with the data consumer's global unique identity. In our scheme, the GCA cannot decrypt any ciphertext since the secret keys are issued by the AA and not GCA. Also our scheme uses proxy-encryption method which prevents the health cloud server from getting the PHR data. The R-MA-ASBE scheme supports compound attributes and multiple numerical assignments for a given attribute efficiently than a standard CP-ABE scheme. Since R-MAASBE has its roots on CP-ASBE scheme, it rganizes user attributes into a recursive set structure and allows users to impose dynamic constraints on how those attributes may be combined to satisfy a policy. Single authority attribute based encryption schemes could not deal with key generation on a large–scale basis and are not scalable. But this kind of a situation can be easily handled by introducing multiple authorities in to ASBE scheme thus achieving great scalability. The access structure of R-MA-ASBE scheme is very expressive and the data owners can precisely control the data user access and thus enjoy fine-grained access control. The performance of R-MA-ASBE scheme is

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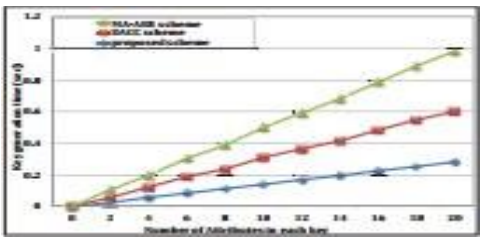
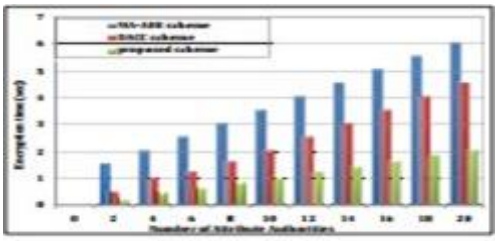


Fig2a. key generation



b.encryption time

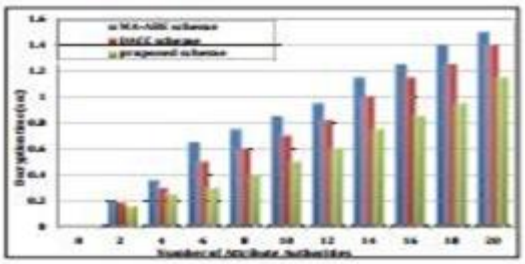
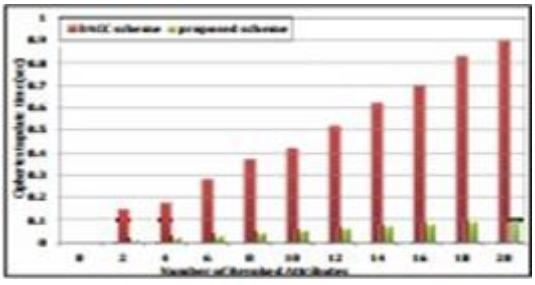


Fig 3a.decryption time



b.ciphertext update time

The user key generation of the proposed scheme shown in Fig. 2

(a) performs better compared to the other two schemes. The Fig. 2 (b) describes the time required for updating cipher text during attribute revocation and the proposed R-MA- ASBE scheme is more efficient than MA-ABE and DACC scheme. The unique feature of the proposed R-MA-ASBE scheme is, during attribute revocation events, ciphertext update is done only for the ciphertexts associated with the revoked attribute.

Table 1.Comparison of security and computational complexity

Scheme	Authority	Computation (Encryption + Decryption)	Revocation security	Revocation enforcer
Our scheme	Multi	$O(TA_{CT}) + O(TA_u)$	Yes	AA
DACC [5]	Multi	$O(TA_{CT}) + O(TA_u)$	Yes	Data Owner
MA-ABE [9]	Multi	$O(TA) + O(TA_{CT} \times TA_u)$	No	----
MA-ABE [15]	Multi	$O(TA_{CT}) + O(TA_{CT})$	YES	Data Owner

TA_{CT} - Total number of attributes in the cipher text; TA_u - total number of attributes associated with the user

The Table 1 shown above compares the proposed verifiable RMA-ASFD scheme with other multi authority attribute based encryption schemes in terms of the support of multiauthority, computation in terms of encryption and decryption, revocation security, revocation enforcer and the verification property. From the table, it is clear that the proposed scheme incurs less computation cost for the decryption on the user and provides revocation security enforced by attribute authorities. In the proposed scheme,the complexity of encrypting the data file depends on the data file size and the underlying encryption algorithm. Thecomputational time for encryption is directly related to the total number of attributes in the ciphertext

II. CONCLUSION

To deal with data security and privacy problems in cloud assisted PHR systems, various data access control schemes based on the attribute based encryption have been proposed recently. However, the privacy problem of PHR data stored in untrusted health cloud server is yet to be solved. This paper proposes a revocable multi authority attribute set based encryption (R-MA-ASBE) scheme to address the attribute revocation problem in multi authority

cloud assisted PHR systems. The efficiency of the proposed scheme is greatly improved by updating the components associated with the revoked attribute of the cipher text, while the other components which are not related to the revoked attribute are not changed. Our multi authority scheme achieves not only fine-grained data access control but also user revocation. Furthermore this scheme provides system flexibility and scalability along with forward and backward security. Therefore, the proposed R-MA-ASBE scheme can serve as an ideal candidate for patient related data security and privacy in PHR systems. The analysis and simulation results show that the proposed scheme is secure and is more efficient than previous works.

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Decentralized Access Control Using LDAP (Lightweight Directory Access Protocol)

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ABSTRACT

Lightweight Directory Access Protocol (LDAP) provides the need of high level security through single sign-in and centralized user management at server with a facility of decentralized access control. LDAP protocol offers security services and integrated directory with an ability of storing user management information in a directory. Through which at the same time the user can determine which application and service to be accessed from server and also the user privileges. Here in this paper, we explain authentication mechanism for web server application by using LDAP method. We also show the result and performance analyses on the access speed in using LDAP method.

I. INTRODUCTION

Advance of Internet technology has brought about very positive impact in all sectors. One of which is web-based application, which is required by government institutions, private sectors and education sectors. In line with the trend of using web applications on business activity, and security level, user's identification requirement became main concerns. Client server applications on web server has been started to be used widely and growing fast.

Data confidentiality of client is more important in any sector of work, where in user authentication became more and more important. Access to web applications which is connected to LAN or single host will attract other parties who have no access to the network and application. Therefore, mechanism to identify user who have privilege to access the application is needed. This is to be added by providing the username and password for login process, so only right user can access the application which is in the network. It is also known as the user authentication, which is done with the help of lightweight directory access protocol (LDAP).

Authentication process for web-based application is needed, in order to enable this each member to register or they need to be added. The objective of this process is to store user information and to collect information for database server. Usually, each web server applications have their own database table of login credentials. This matter became a must if the web application needs a login process for accessing the application pages.

However, in the modern era number of web server application is growing, each application will need to authenticate user or member. Therefore the user will have a lot of username and password to remember, this will complicate the user to remember all of it. For the simplification purpose, the authentication method for user by using Lightweight Directory Access Protocol (LDAP) was introduced in 1993 [1].

This method accommodates the need of high level of security, single sign-on, and centralized user management which offers services of security and integrated directory especially with ability of storing and managing user information in a directory.

With this authentication method by using LDAP, each web-based application can be united using single identification of user information stored in the directory of LDAP server. The user can accessed every application easily without having to remember more than one username or password as well as privilege to users according to the existing information on the LDAP server.

II. HISTORY OF LDAP

International Telecommunication Union (ITU) and International Organization for Standardization (ISO) in year 1990 released a standard for directory service called X-500. The main feature for X-500 is to build a global distributed system which offers an access to information comprehensively to the directory. X-500 defines Directory Access Protocol (DAP) used by client to access the directory. The implementation of X-500 as service protocol was too heavy for desktop at that time. In the year 1993, Michgan University with the help of ISODE Consorsium designed and built a protocol which can work on TCP/IP. The result is **Lightweight Directory Access Protocol (LDAP).**

LDAP is a client-server protocol which works on TCP/IP to access and manage data on the directory. This method accommodates the need for high level of security, single sign-on, and centralized user management which offer service of security and integrated directory especially with the capability to store and manage user information in a directory. Here at the same time the user can determine application, service and server which need to be accessed, and the privilege of that user.

III. LDAP DIRECTORY ADVANTAGE

There are many advantages for directory service, such as [2]:

- Make network administration easier: Central management of people information
- Central management of computer and machine configuration Central management of user accounts
- Reduced support costs from centralized management
- Unify access to network resources: Uniform naming convention; Potential for single login to network resources
- Provide single destination for users to search for information: Contact information
- Central location of network resources
- Help streamline business processes
- Provide repository and look up for application and service data

Compare with standard database, LDAP directory has some advantages, such as flexibility, scalability, heterogeneity, replication facility, distributed data management support, query optimization, and maintainability.

IV. SYSTEM ARCHITECTURE DESIGN

Design of system architecture includes client computer and server. In designing, web application is store in server and LDAP server directory, which store user account information with relevant attributes. Client computer is connected with servers. The authentication mechanism that is located at web login form determines what credential is being used by user. This can be LDAP credential or database web server credential. Figure below illustrates the system architecture Client can use computer with different operating system or specification such as Windows, UNIX, or Linux. **Secure Socket Layer (SSL)** protocol is a protocol which describes how a client-server based application can work over a secure channel and also can be processed quickly.

Security protocol such as SSL offers a facility to encrypt data, server authentication, message integrity and also choice for client authentication over TCP/IP connection on transport layer. Application layer protocol usually works over SSL/other which include HTTPS or even Lightweight Directory Access Protocol (LDAP).

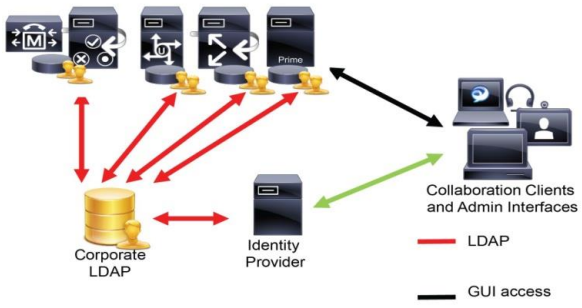

Figure 1. System Architecture Design

The client-server authentication implementation of LDAP uses three basic components, which are hardware, software and programming code. The LDAP client computer with standard specification and any operating system (windows, unix, linux). The web based application and all computers should be connected to the internet via Network Interface Card (NIC) as communication interface between client and server.

V. AUTHENTICATION & AUTHORIZATION MECHANISM

Networked applications and web server application frequently use LDAP to support authentication. In the simplest form, they present the username and password supplied by the user in an LDAP Bind operation. If the Bind succeeds, this proves that the password is correct.To access the LDAP service, the client must first authenticate them self to access service. It must tell the LDAP server who is going to access the data so that the server can decide what can be seen and done by the client. If the client authentication is successfully to the LDAP server, then the server will check the authority of the client for the request. This process is called access control.

There are mainly three kind of authentication process using LDAP method.

- ***Anonymous***

A client that sends a LDAP request without doing a "bind" is treated as an anonymous client. That client can view the directory and is treated like a guest who is unable to modify data in the server.

- **Simple Authentication**

This authentication mechanism consists of sending the LDAP server the fully qualified Domain Name of the client (user) and the client's clear-text password. This mechanism has security problems because the password can be read from the network.

- ***Simple Authentication and Security Layer (SASL)***

To avoid exposing the password we can implement this way, you can use the simple authentication mechanism within an encrypted channel (such as SSL), provided that this is supported by the LDAP server. Simple Authentication and Security Layer (SASL) specifies a challenge-response protocol in which data is exchanged between the client and the server for the purposes of authentication and establishment of a security layer on which they carry out subsequent communication. By using SASL, LDAP can support any type of authentication agreed upon by the LDAP client and server.

LDAP server can also authenticate users from other services (ie: Send mail, Login, Ftp, etc.). This is accomplished by migrating specific user information to LDAP server and using a mechanism called Pluggable Authentication Module (PAM).

Authorization can be more complex. This is the job of working out what the user is permitted to do once they proved their identity. Most applications define a set of roles, each with permission to do certain things, and assign users to some roles. This can be represented using multi-valued attributes in the LDAP directory.

In web application, several access levels will be implemented for read-only access to public data, read-only access to data in certain defined categories. Author access to create new content, editor access to modify content created by author, and for manager to set access permissions for others and all.

VI. PERFORMANCE ANALYSES OF AUTHENTICATION MECHANISM USING LDAP

This part of the paper will describe and analyze the performance LDAP authentication method [3]. We tested using different user ID and different distance between the client's computers to the server device. The data collection has been done as follows:

Performance evaluation tools (Ethereal) view Ethereal is used to measure the performance of the system in which the traffic is analyzed on both sending and receiving direction. The information obtained consists of time between first packets an last packet, average packet size, average packets/sec, average Mbit/sec. The following are several graphics which show the performance of the authentication system using LDAP method based on varying the user ID and distance of the user from the server.

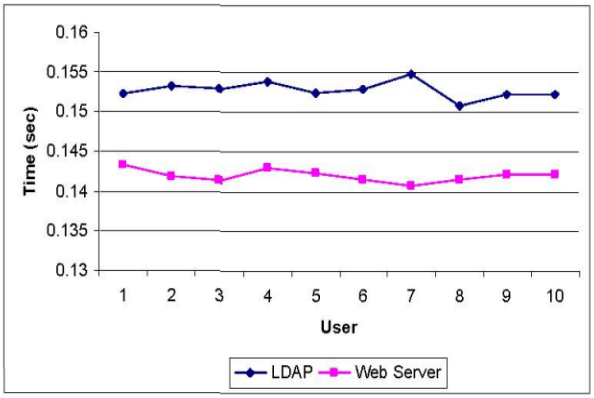

Figure 2. The average speed of access with LDAP and web server authentication

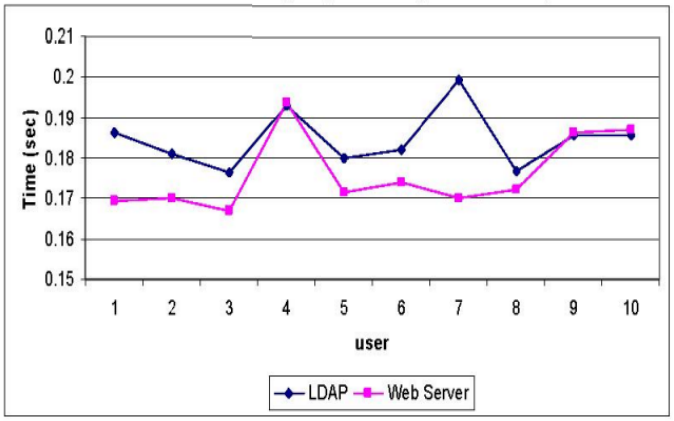

Figure 3. The time between first packet and the last packet with LDAP and web server authentication

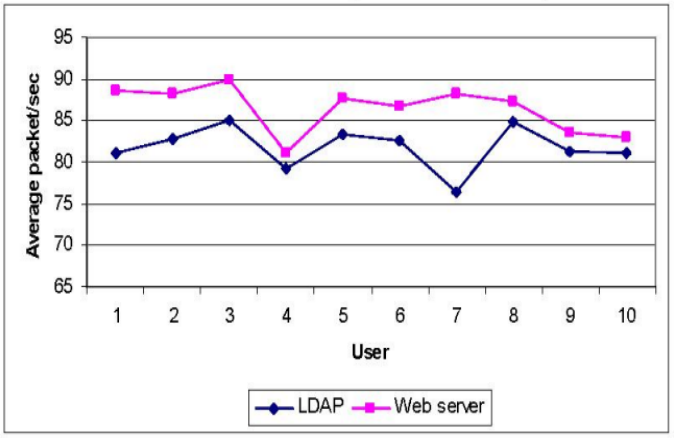

Figure 4. The average packet/sec with LDAP and web server authentication

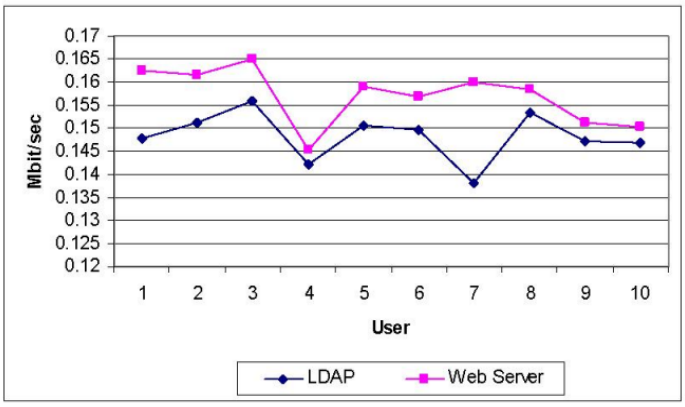

Figure 5. The network throughput with LDAP and web server authentication

The distance factor does not affect much the access speed when **decentralized** access method is used. The access speed is more affected by factor of real traffic condition on the network, such as the average packet/sec that is transmitted and also how much bandwidth can be used on the transmission process (network throughput).

VII. CONCLUSION

LDAP authentication method supports the single sign-in mechanism. This will allow many web server applications to be authenticated using the same credential of the user on a centralized LDAP server directory. Access speed is inversely related with the access time required, although the access time is inversely related with the average packet/sec and throughput value on the network. The performance of the LDAP authentication mechanism is based on the variation of different user or different location.

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Autonomous Seeding and Spraying Spider Robot

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ABSTRACT

Farmers today spend a part of money on machines that offer assistance them decrease labor and increase yield of crops but the profit and efficiency are especially less. Hence automation is the perfect arrangement to overcome all the shortcomings by making machines that perform one operations and robotizing it to increment yield on a large scale. Robott able of performing operations like automatic seed dispensing, and pesticide spraying. Legged robots are well suited to walk on troublesome landscapes at the cost of requiring complex control frameworks to walk indeed on flat surfaces. It should be assumed that walking on abrupt terrain is the typical situation for legged robot. . With this premise in intellect, we have created a robot controller for a four legged robot that permits it walk over difficult terrains in an independent way. The main component here is the Attiny2313 microcontroller that oversees the entire process. Its hexapod body can independently walk in any direction, avoiding objects with its ultrasonic sensor. Its walking algorithms allow it to instantly change direction and walk in any new direction without turning its body. Robot capable to dig a hole and plant a seed and make a hole and apply fertilizers on the marking agent. The device used for route is an ultrasonic sensor which persistently sends data to the microcontroller. On the field the robot operates on automated mode, but outside the field is strictly operated in manual mode.

Keywords: Attiny2313 microcontroller, fertilizers, automation.

I. INTRODUCTION

Farmers today spending a lot of money on machines that help them decrease labor work and increase yield of crops. There are different machines that are accessible for plugging, harvesting, spraying pesticides etc., however these machines have to be manually worked to perform the required operations and in addition separate machines are used for each functions. The profit and yield returns from utilizing these equipment are very less as compared to the investment. Another issue is the growing requests because of increasing world's population. According to World Health Organization estimation, Earth's population will touch 9 billion in 35 years which will leads to a increasing demand for food crops. Automation is the perfect solution to overcome from all the above mentioned problems by creating machines that perform more than one operation and robotizing those operations to increase yield on a large scale. Robotics in agriculture is not a new concept; in current situation, it has a history of more

than 20 years. Robotics technology plays an very important role in all sections of organization societies and industrial units. We can use robotics for the various operations which are done in agriculture. There is a need to design a better automatic machine which will be available to the farmers at a cheaper rate and which will sow and seed the crop at the same time.

In the world of globalization, different technologists are upgrading a new development based on automation which works very effectively and within a period of time. The rapid growth in the industries forces the labors who are situating in the villages to migrate to the cities. This issue creates the labor problem for the agricultural operations. The wages for the labor is also more. These factors forces the farmers who are interested in agricultural activity to leave their land uncultivated. So it's a time to automate the sector to overcome this problem. An imaginative idea of our project is to automate the process of sowing crops such as sunflower, groundnut, cotton and vegetables like beans, lady's finger, pumpkin and pulses like black gram, green gram etc to reduce the human effort and increase the yield. The plantations of seeds are automatically done by using DC motor. The distance between the two seeds are controlled and varied by using Microcontroller. It is also possible to cultivate different kinds of seeds with different distance. Also the project consists of sprinkler, which would be used for reducing the wastage of fertilizers that is done by spraying appropriate amount of fertilizers required for the particular crop. The sprinkler would sprinkle on the senses from wheel movement and the on and off of the sprinkler would be controlled by Microcontroller. The whole process is controlled by Microcontroller.

PROBLEM STATEMENT

The rapid growth in the industries forces the labors who are situating in the villages to migrate to the cities. This issue creates the labor problem for the agricultural operations.

- Machines have to be manually operated to perform the required operations
- Wheels are not comfort with all surfaces.
- Repetitive tasks are not comfort with manpower.

Basically we can divide this problem into four major parts

- Chassis
- Gripping Mechanism
- Spraying, Sowing & Drilling Mechanism
- Control system

MOTIVATION

- As we are interested in Embedded Electronics based projects and there are many advantages of the embedded system as well in spite of the electronics based projects.
- We can control the speed and angle of the Servo motor which is an electrical component by using a delay in the source coding. We are motivated for doing this project because it is an autonomous agricultural based project and here we get to deal with the controller, its interfacing with the dc motors, interfacing with the ultrasonic sensor, a linear actuator which is used for opening and closing of the valve required for the dispension of seeds and so on.
- Need to build a autonomous robot capable of moving around any surfaces with gripping also drilling, sowing & spraying techniques in one robot.

OBJECTIEVES

Reduces the amount of labor requirement. Gradually diminishes the amount of the time required for sowing seeds and fertilization. The technique of sowing and fertilization is automatic. Only single seed can be sowed at a time. appropriate (exact) distance is maintained between seeds. Wastage of fertilizers and seeds are reduced to a larger amount. Due to proper cultivation, the harvesting of the crop is done at once that is no crop grows earlier or later the yield comes at once. It is eco friendly that is it

doesn't cause any pollution or harm to the environment.

II. LITERATURE REVIEW

Sl.No	Authors Name	Year of Publication	Methodology	Proposed work
1	Gulam Amer, S.M.M.Mudassir, M. A. Malik,	2016	Agribot using Arduino and Raspberry pi	In this paper Agribot is a prototype and implemented for performing various agricultural activities like seeding, spraying offertilizers, insecticides. AgriBot is controlled with a Arduino.
2	Enric Celaya Josep M. Porta	2000	Six-legged robot that has been built to walk on abrupt terrain.	The walk level can be seen as a low level of locomotion that keeps the robot advancing on rough terrain, comparable to the level at which a wheeled vehicle keeps the robot advancing on at ground by turning its wheels at a constant speed.
3	Amrita Sneha. A, Abirami. E, Ankita. A, Mrs.R.Praveena, Mrs.R.Srimeena	2015	Robot controlled using AVR atmega microcontroller and GSM module	Robot capable of performing operations like automatic ploughing, seed dispensing, fruit picking and pesticide spraying. It also provides manual control when required and keeps tabs on the humidity with the help of humidity sensors
4	Tanupriya Choudhury, Arashdeep Kaur, Utsav Singh Verma	2016	Robot vehicle equipped with a camera, a digital image processing unit and a seed cultivation unit.	A quadcopter is chosen as an aerial vehicle is independent of the form and shape of the ground and is not deterred by these factors while providing high mobility and reliability.

III. METHODOLOGY

An autonomous robot which can be able to move in field rows, agricultural plain fields or greenhouses. In this section, design criteria and overview of the system is described.

The components used in this design are:

- ✓ At mega8 micro controller. (AT MEGA8)
- ✓ Servo board.
- ✓ Servo motor. (MOTOR-PWMSERVO)
- ✓ Geared DC motor.
- ✓ Battery
- ✓ Power source.
- ✓ Grounding.

The following system design is achieved depending upon the requirements. The block diagram of the robotic end and control section is shown in figure given below. This system has two fundamental sections, control and robot end section. The robotic station possess the seed dispenser, seed storage, fertilizer storage, fertilizer dispense, robotic system with motors, microcontroller and power supply. The controller used here is the "At tiny2313 Microcontroller". The microcontroller is brain of this

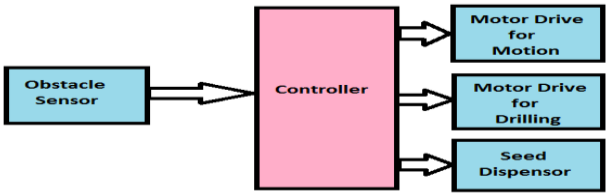

Figure 2. Block diagram

framework, which will supervise whether the order of suggestions received to all the networks, and sensible factors processed by their corresponding embedded programs.

Robotic mechanism played by their motor drivers and internal motors that drive the robot in desired directions. Here the one will monitor the robot and send the signal, according to the received signal the robot will move in the specified direction and it will plant/sow the seed and spray fertilizer at that field for every specific distance. Its tetra pod body can autonomously walk in any direction, avoiding objects with its ultrasonic sensors. Its walking algorithms allow it to change its direction instantly and walk in any new direction by using servo motor. The angular movement of the motor can be controlled by the microcontoller. An underbody array of sensors allows the robot to know if a seed has been planted in the area at the specified spacing and depth. Robot can then dig a hole using driller, plant a seed in the hole, cover the seed with soil, and apply any herbicides and/or pre-emergency fertilizers along with the marking agent.

AGRICULTURAL PROCESSES

A. **Seeding**

This process basically deals with two mechanisms one is drilling and other is dropping the seed.

B. **Driller**

The driller is attached underneath of the robot. The frontal part of the driller is a sharp spade that is attached to a dc motor with a shaft and performs the digging operation by the robot. The up-down motion of the driller is associated with the limbs of the bot. The digging varies from crop to crop.

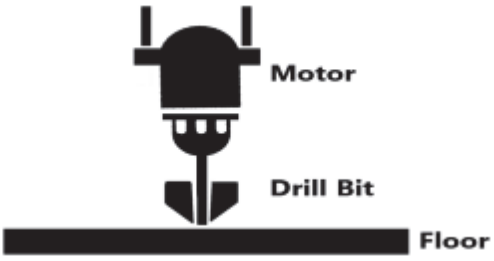

Figure 3. Drilling Action

C. Seed Dropper

There are three different approaches for this mechanism. The seed tank is attached to the dropping mechanism which performs the seeding process. The mechanism is designed in such a way that only one seed should drop at a time. The

mechanism is a servo dropping mechanism which takes the seed from the tank when in vertical position and turns 90 degree to horizontal position and releases the seed into the pipe though which the seed is dropped to the soil. This is a high precision mechanism.

D. Chemical Tank

Now this particular tank can be used for the insecticides or pesticides. It is sprayed at the crop for its protection. This particular tank can also be used to spray herbicide with a more precise liquid ejector as the crop has to be avoided being sprayed.

IV. RESULTS

The proposed system gives a compact, low power and low cost system with an efficient output. Agribot gives near about 93 % accuracy regarding placement of seeds. Robot is serving all the necessary requirement of farmers, it will be the great initiative and contribution to the society.

V. APPLICATIONS

The applications of the proposed project are: -

- The robot will be used to increase cultivation in inaccessible or remote areas.
- It will be made possible to farm under unfavorable weather conditions.
- Vast area of barren and uncultivated land can be covered with greenery.
- Hill farming can be made safer by using the robot in hilly areas.

VI. ADVANTAGES

- ✓ Autonomous design reduces human errors in controlling, thus reducing labour dependency.
- ✓ Legs provide more versatility on farm ground mud.
- ✓ Drilling before seeding reduces the chance of exposure to elements, thus helping the crop protection.
- ✓ Almost equal amount of seeds will be dispensed each time. (Uniformity)

VII. CONCLUTION

In this project we tried to overcome some problems in agriculture. The fast development in the businesses is leading the labors who are residing in the villages to migrate to the rural areas. This is creating the labor problem in the agricultural field. The wages for the labor is also more. As the prices of commodities such as food grains, fuels, cloths and other essentials of daily life is increasing rapidly the labors demand for the more wages from the owners. These factors influencing the farmers who are interested in agricultural activity to leave their land uncultivated. By implementing this project in the field of agriculture we can help the farmers in the initial stage of agriculture i.e. during the seeding and fertilizing. This project can be a better substitute for the human who performs the seeding, fertilizing. This project is very useful for the farmers who are interested in agricultural field but facing the labor problem.

VIII. ACKNOWLEDGEMENT

It is my proud privilege and duty to acknowledge the kind of help and guidance received from several people in preparation of this report. It would not have been possible to prepare this report in this form without their valuable help, cooperation and guidance.

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Risk Factor Analysis of Diseases Using Machine Learning Techniques

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ABSTRACT

Analysing the risk factors of Mental health from Electronic Health Records is a challenging task as it is difficult to assess the prevalence of diseases due to lack of culturally adapted and validated assessments. In this study, we find the risk factors of Memory deterioration using Machine Learning techniques by implementing Correlation, Regression Analysis and Random Forest algorithms on MYNAH cohort (Mysore Studies of Natal effect on Ageing and Health) which was carried out at the Epidemiological Research Unit, CSI Holdsworth Memorial Hospital, Mysuru, South India. Correlation is used to find the influence of one parameter on the other which play roles in identifying risk factors of Memory deterioration. Regression analysis helps in estimating the relationships among parameters that are used for disease prediction. Random forests or random decision forests algorithm brings extra randomness into the model to search for the best parameter among a random subset of parameters. It is an ensemble learning method for classification, regression and other tasks in which a multitude of decision trees are constructed at training time and the class is output. In Classification problem, the ensemble of simple trees vote for the most popular class. In the Regression problem, the responses are averaged to obtain an estimate of the dependent parameter. Implementation of tree ensembles has lead to significant improvement in prediction accuracy. This work facilitates health care organizations to perform analysis on sector of population prone to various diseases using Electronic Health Records and educate people regarding the risk factors of diseases to enable effective therapy at the right time and place.

Keywords: Electronic Health Records, Correlation, Regression Analysis, Random Forests

I. INTRODUCTION

Electronic health record is a digital format containing a systematic collection of health information of an individual patient or populations that is maintained by the provider over a period of time [1]. It contains information such as the patient's demographics, contact information, medical history, current and past medications, vital signs, allergies, daily routine, immunizations, family history, radiology reports and laboratory data [2]. It is a more longitudinal collection of health information of individual patients or population. EHRs make it easier to store and retrieve health information and make information available instantly and securely to authorized users.

Non-Communicable diseases like Diabetes, Hypertension, Cardiac diseases, Memory deterioration and others are burdensome in developing countries like India [3].Diseases related to

the memory are caused due to the damage of neuro-anatomical structures[4]. The damage to these structures reduces the capacity of the brain with regard to the retention and storage. It also leads to problem in recollection of memories. Memory disorders can range from mild to severe, but they all result in severe diseases at the end such as Alzheimer. There are several reasons that can cause memory disorders such as high blood pressure, alcohol consumption, wrong consumption of medicines, etc. Some past events, shocks, and strokes also lead to such diseases. Even depression can cause symptoms similar to dementia. Some of the disorders affecting memory deterioration include ability to reason, remember, completing daily chores, muddled thinking, and loss of skill or hobby, make decisions and communicate [5].

In this paper, we develop a model to mine the EHR for important features that play vital role in identifying risk factors for memory deterioration using Machine Learning techniques.

Correlation is a statistical measure that indicates the relationship between two variables and the association between them. The two most popular correlation coefficients are: Spearman's correlation coefficient rho and Pearson's product-moment correlation coefficient. Pearson's product-moment coefficient is used in this study as a measurement of correlation and it ranges from minus one to plus one. Plus one indicates the strongest positive correlation possible and minus one indicates the strongest negative correlation possible. A correlation of zero indicates that there is no relationship between the two variables, hence values closer to zero highlight weaker or poorer correlation than those closer to plus one or minus one. When there is a positive correlation between two variables, it indicates that as the value of one variable increases, the value of the other variable also increases. When there is a negative correlation between two variables, it indicates that as the value of one variable increases, the value of the other variable decreases and vice versa [6].

Regression analysis is a type of data analysis. It is a way of estimating mathematically which of the variables do indeed have an impact and to estimate the relationships among the variables. It is widely used for prediction and forecasting. Here, we have two types of variables – the dependant variable and the independent variable, mainly knows as the response variable (dependant variable) and predictor variable (independent variable). The dependant variable is the main factor we are trying to predict or understand and analyze. The independent variables are the factors we suspect to have an impact on our dependant variable. Hence, regression analysis helps us to understand which among the independent variables are related to the dependent variable and to explore the forms of these relationships [7].

The Logistic Regression is a regression model used for regression analysis in which the response variable (dependent variable) has categorical values such as True/False or 0/1. It actually measures the probability of a binary response as the value of response variable based on the mathematical equation relating it with the predictor variables. It is used when the response variable is categorical in nature.

Random forest or random decision forest is an ensemble learning method for classification, regression and other tasks, that operate by constructing a multitude of decision trees at training time and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees [8]. For classification problems, the ensemble of simple trees vote for the most popular class. In the regression problem, their responses are averaged to obtain an estimate of the dependent variable. Using tree ensembles can lead to significant improvement in prediction accuracy. The random-forest algorithm brings extra randomness into the model, when it is growing the trees. Instead of searching for the best feature while splitting a node, it searches for the best feature among a random subset of features. This process creates a wide diversity, which generally results in a better model [9].

MYNAH cohort is approved by HMH Research and Ethics Committee and the studies were carried out at the Epidemiological Research Unit, CSI Holdsworth Memorial Hospital, Mysuru, South India.The hospital has maintained obstetric records from 1934 to till date with details including birth weight, length, head circumference, weight and pelvic

diameters of the mother, etc. The cohort size is 1321 patient records with 1201 parameters from which features relevant to memory deterioration are chosen for the implementation of Correlation, Regression Analysis and Random Forest algorithms to identify risk factors [10].

Mizanur Khondoker et al, compare the performance of classification of important attributes using machine learning algorithms. The classification algorithm shows better correlation between variables, but Random Forest goes bad when the variables are very high [11]. V Y Kulkarni et al present approaches for improving performance of Random Forest classifier in ways like accuracy and time for learning and classification and show that Random Forest has inherent parallelism and can be easily parallelized for scalability and efficiency [12]. V. Arun et al find the relevant features of the data sets using Principal Component Analysis and an ensemble classification framework is used which consists of three modules, namely data acquisition and preprocessing, classifier training and Hierarchical Majority Voting ensemble model for disease classification and prediction [13]. K.Rajeswari et al use the Brute force approach and genetic search feature selection for heart disease to reduce features and improve the performance [14].

Artificial intelligence methods for the diagnosis of dementia in epidemiological studies in low- and middle-income country (LMIC) settings have been implemented by Bhagyashree et al by developing a culture and education fair battery of cognitive tests. Validation is done for population based studies in low- and middle-income countries including India by the 10/66 Dementia Research Group. Machine learning methods are used based on the 10/66 battery of cognitive tests for the diagnosis of dementia based in a birth cohort study in South India [15].

In the existing system, the diagnosis of memory disorders is done considering various tests and assessments which include the personal history of the patient, physical examination and laboratory tests, cognitive tests, neuropsychological tests, radiology tests, brain imaging techniques and numerous other tests [16].

In the proposed system, we develop a model to estimate the relationships among parameters used for disease prediction using Regression analysis. Random forest approach is used to search for best parameters among a random subset of parameters. An ensemble of trees vote for the most popular class that leads to improved prediction accuracy.

II. METHODOLOGY

The risk factor analysis and prediction analysis based on correlation and regression models involves finding the relationship between the attributes and then considering the subset of the attributes most responsible for prediction of a person having memory deterioration. The MYNAH cohort consists of 30 related predictor variables which are in the form of questionnaires and one categorical response variable which indicates the presence or absence of memory deterioration. The questionnaire predictor variables such as apathy, difficulty in completing chores, loses place in conversation etc have discrete values such as 0 and 1.

The process of analyzing the risk factors and then performing the prediction analysis on the cohort involves the following procedures:

Step 1 : Input MYNAH dataset.
Step 2 : Preprocess data by handling missing or NA values.
Step 3 : Perform Correlation analysis on the whole data and find the most and least correlated attributes.
Step 4 : Perform Regression analysis on the whole data and obtain the significant attributes.
Step 5 : Implement Random Forest algorithm on the same data and obtain the attributes ranked in decreasing order of significance.
Step 6 : Compare the results of regression and random forest in analyzing the most and least significant risk factors.
Step 7 : To perform prediction analysis, divide the data into train and test set, Train the binomial logistic regression model using train set.
Step 8 : Predict the class of test set using the trained model.
Step 9 : Evaluate the performance of the regression model.

The dataflow for Risk factor analysis model is as shown in Figure 1 and Prediction Analysis is done as shown in Figure 2.

The correlation among 30 predictor variables D(x1, x2, ..., x30) along with the response variable y is identified. In general, the correlation of two variables X,Y is given as in (1)

$$cor(X,Y) = P(XUY)/P(X)P(Y) \quad (1)$$

If the correlation value of x and y is between 0 to 1 then they are said as positively correlated which in turn indicates the increase in variable x will result in increase of variable y. According to the parameters we have considered in the data, we find there exists positive correlation between attributes such as forgets friends names and forgets family names with correlation co efficient 0.66. The highest positive correlation is found to be between attributes forgets when last saw informant and forgets where he/she is with the value of the correlation co-efficient 0.8.

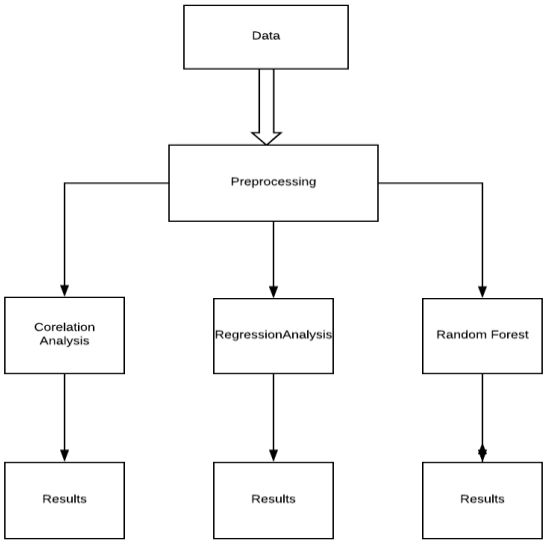

Figure 1. Risk factor Analysis Model

If the correlation value of x and y is between -1 to 0 then they are said to be negatively correlated which in turn indicates increase in variable x will result in decrease of variable y. According to the attributes we have considered, there exists a negative correlation between irritability and forgets what did previous day attributes with negative correlation coefficient of -0.04. Few attributes such as depression and difficulty completing chores, gets lost inside house and apathy are found to be least correlated. Thus the inter relationship between the 30 predictor attributes can be found out using the correlation analysis.

Logistic regression gives the quantified value to measure the strength of relationship among the attributes of the data. The logistic regression is concerned only about the probability of the outcome dependant variable. The expression of regression model of our research can be written as in (2).

$$y = f(x1, x2, ..., x30) + \varepsilon \quad (2)$$

where y is dependant(response) variable and x1,x2,.....,x30 are independent(predictor) variables. ε is the standard error associated with analyzing the association of attributes with the class attribute-memory deterioration. The results of the regression analysis consists of estimated co-efficient, standard error associated with the co efficient, z value which indicates the ratio of estimated value and error value and pr value which indicates the significance of the attributes.

Table 1 consists of the values of attributes such as **forgets** where things are put, **loses** places in conversation and difficulty handling money.

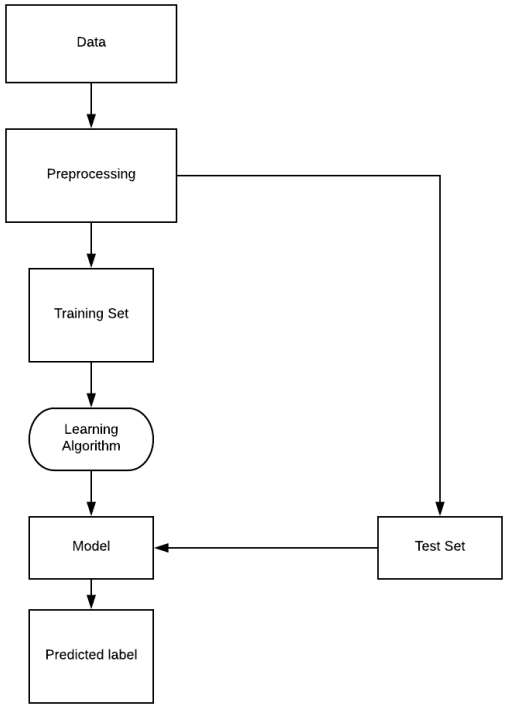

Figure 2. Prediction Analysis Model

The binomial logistic regression model considers the attributes of high significance that is the attributes having pr value less than 0.05 as the subset such as forgets where things are kept, loses place in

conversation are found to highly significant attributes in predicting the presence of disease. The prediction of the test set is done using the regression values obtained from the attributes and the trained model assigns the class. In our case, the binomial logistic regression has class variable memory deterioration with categorical values 0 or 1.

The importance of the features can be measured and ranked by using Random Forest algorithm. Considering the data with 30 attributes, the importance of each attribute is calculated using the mean squared error obtained during the fitting process.

Table 1. Regression Values Of Attributes

Attribute name	Estimate	Standard error	Z value	Pr value
Forgets where things are kept	1.21e+00	2.23e-01	5.44	5.16e-08
Loses place in conversation	1.03e+00	4.35e-01	2.37	0.01
Difficulty handling money	1.91e+00	9.98e-01	1.91	0.05

The tree is formed fitting the values of regression and the error associated with it is calculated. The difference in error values obtained are averaged and the importance score is obtained. Attributes with high scores such as **forgets** where things are kept, **forgets** where things are put, **loses** place in conversation, **forgets** friends names, general decline in mental function are ranked as important than attributes with the low scores such as past history of family.

III. RESULTS AND DISCUSSION

The highest correlation value was found to be 0.8 between the attribute forgets when last saw informant attribute and forgets where he/she is attribute. Difficulty coping with change in routine and difficulty handling money has correlation coefficient of value 0.76. Attributes like gets lost in the house and difficulty completing chores, apathy, irritability are found to be least correlated.

The Logistic Regression on the data identified attributes such as **Forgets** where puts things, **forgets** friends names, **loses** place in conversation, difficulty handling money as the high risk factors as their significance values are less than 0.05. The attributes such as dwells on past and past history of family are not considered as risk factors as the pr value of those attributes are higher making them least significant.
The Random Forest ranks and orders the attributes based on values of percentage increase in mean squared error. The attributes such as **forgets** where things are put, **forgets** where things are kept, **loses** place in conversation, **forgets** friends names, **forgets** family names, general decline in mental function are ranked highest. The past history of the family attributes are ranked last in the analysis.

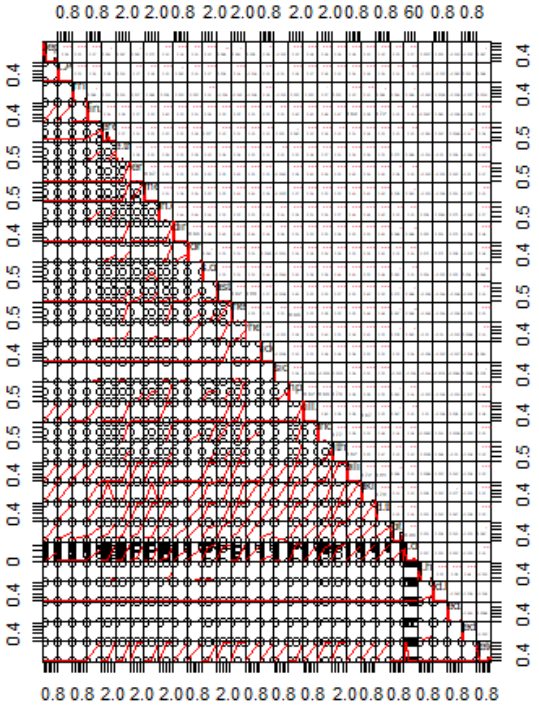

Figure 3. Correlation Plot of all the attributes

The performance of the binomial logistic regression is evaluated using the Receiver Operating Characteristic (ROC) curve as shown in Figure 5. The curve is plotted with true positive rate against the false positive rate.

The Area Under the Curve (AUC) should be greater than 0.5 in order to call classifier as a good one. Here, the area under curve is found to be 0.72 which in

turn indicates that the classifier model is efficient. The Accuracy of the model is found to be 88.72%.

The results help in early diagnosis of cognitive impairment in patients which may lead to Alzheimer's disease in future [17 18].

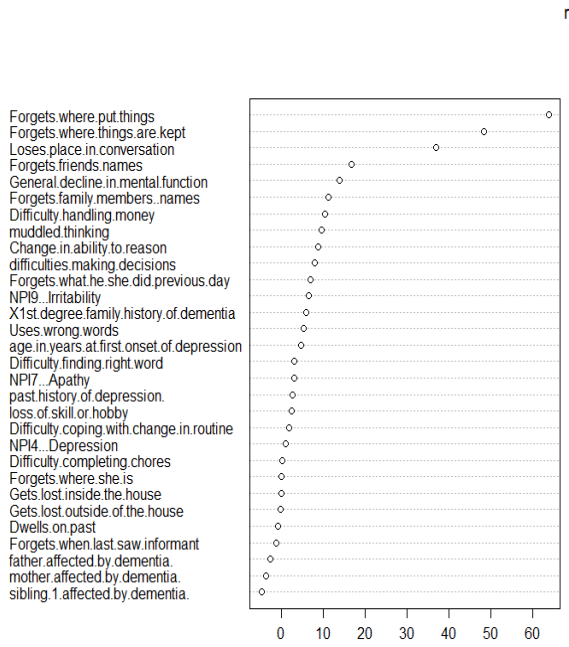

Figure 4. Variable importance plot obtained by Random Forest

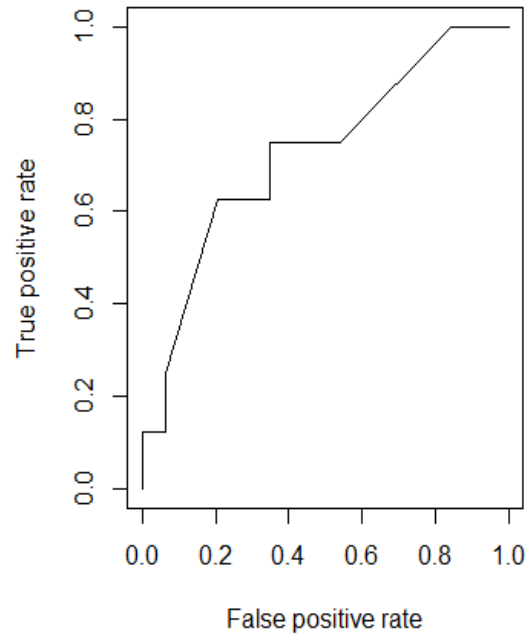

Figure 5. ROC Curve to evaluate the performance

IV. CONCLUSION

Correlation analysis is done in order to find the relationship between the attributes of MYNAH dataset. The symptoms identified and their correlation indicate the association of them with causing the memory deterioration. The Logistic Regression and Random Forests results give us the important risk factors of memory deterioration. The Random Forest ranks many attributes as risk factors when compared to regression. The binomial regression model identifies the subset of risk factors and does the prediction with better accuracy in population based epidemiological studies.

V. FUTURE ENHANCEMENT

In future analysis, we intend to implement PCA in order to optimize the number of risk factors responsible for a person having or prone to get memory deterioration. The prediction analysis can also be done using other classifiers such as decision trees, support vector machine and others. A comparative study on the results of different classifiers can be done in order to predict the presence of various diseases using EHR.

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Smart Vehicle for Traffic Rule Enforcement Using Internet of Things

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ABSTRACT

Road Traffic is one of the most vital problem in our hastily developing world. This paper presents of study of different aspects and issues related to the problem. This paper emphasizes on using prominent technology-Internet Of Things(IOT) for developing smart system to monitor various parameters related to road traffic and using it for effective solution. The survey of the existing systems and concerned techniques related to the problem area are discussed. Different issues like traffic rule enforcement, accident detection, parking, speed limit and related methods to solve these issues are explored. We propose our "Smart vehicle for traffic rule enforcement using Internet of Things" consisting of Raspberry pi, GPS as input and process it to gather information about the traffic rules and parking, and this will be displayed on the display screen. This helps to solve the problem of parking and accidents.

Keywords: : Internet of Things(IOT); Raspberry Pi; Arduino; GPS; Cloud; Display screen;

I. INTRODUCTION

The Internet of Things (IOT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The Internet of Things (IOT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. Cloud Storage is a backend –as-a-service which provides seamless scalability and it removes the necessity of operating databases which are distributed in nature. It is a fast and fully managed service. The key feature of the server is that it can store a large amount of data centrally and also it is able to provide access to restricted users via the internet across different geographical regions just by connecting into the same network. The Raspberry Pi is a series of credit card–sized single-board computers developed by the Raspberry Pi Foundation. A private cloud server can be set up in a Raspberry Pi which could be used as a storage device for applications involving real time signals. Raspberry Pi is a cheaper microprocessor in which cloud computing infrastructure can be obtained using cloud platforms. Arduino is an open-source project that created microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices. It is used to send instruction to driver and communicate with wifi for data transmission. Vehicle monitoring technology is rapidly increasing in the present years, with many different forms of this technology now available. Essentially it monitors how, when and where a vehicle is being driven, records the data and

provide an analysis as feedback to the driver and/or other parties. Some also provide in-vehicle alerts if pre-set parameters are exceeded (for example, hard acceleration). The driving behaviors that are monitored are ones that influence the likelihood of the driver crashing (for example, speed) or the severity of the crash. These are proxies for crash and injury risk, and monitoring a driver's propensity to indulge in such behaviors enables the technology to calculate a risk rating for that driver. It also, potentially, enables measures to be identified that may reduce the driver's crash risk. In the road safety surveillance technology has the potential to provide a wide range of safety benefits, including: relatively inexpensive and continuous measurement of driving behavior and vehicle use, which is otherwise difficult to observe more accurate and objective data about driving for example, in improving safety, reduce crash rates and operational costs, meet their obligations and reduce the risk of prosecution or civil action a way to help novice drivers, and licensing authorities to monitor and improve the driving, accordingly a powerful research tool to enable the collection of large amounts of real-life, natural driving behavior and the effectiveness of safety interventions on that behavior a tool to inform further training and guidance to identify problem locations on their road network.

II. METHODS AND MATERIAL

Architecture

In this whole architecture we have created a rule table which is connected to the cloud using Amazon web services EC2. The Data base is created with front end on Microsoft visual studio and the backend is connected to the cloud using MYSQlite. There is a GPS device which collects the co-ordinates from the cloud and send the analog signals to the Arduino which converts the analog signals to the digital systems and sends it to the Raspberry pi 3.0. this device is connected to the display screen. The display screen gets the battery source from a external battery source. The display screen gives all the information about the traffic rule enforcement.

Raspberry pi 3.0

III. RESULTS AND DISCUSSION

EXISTING SYSTEM

Road transport is vital to development. Unfortunately, inadequate attention to safety has meant that road transport systems have developed in ways that have led to significant loss of lives, health and wealth. Reliable and accurate data are needed to raise awareness about the magnitude of road traffic injuries, and to convince policymakers of the need for action.

Reliable and accurate data are also needed to correctly identify problems, risk factors and priority areas, and to formulate strategy, set targets and monitor performance. Ongoing, data-led diagnosis and management of the leading road traffic injury problems enables appropriate action and resource allocation. Without this, there will be no significant, sustainable reductions in exposure to crash risk or in the severity of crashes. Data relevant to road safety are collected every day in most countries, but for these data to be useful for informing road safety practice, they must be properly coded, processed and analyzed in a computerized database system.

The purpose of this manual system is to give practical guidance on establishing data systems that produce timely, reliable data on road traffic injuries that can be used to inform road safety management. The manual system begins with road safety management, and what kinds of data are required for effective monitoring. The manual system also describes a range of strategies for improving data quality and strengthening the performance of systems already in place, and describes the steps needed to plan, design and implement a new system – noting that there is no single approach that will be right for every jurisdiction which is automated and it does not reduce the complexities of the existing system.

Finally, the manual system does not guide the user on how to disseminate road safety data and maximize the likelihood of its use, and on how to improve road safety, monitor results and assess the impact of interventions. Thus, there is a want of the application which reduces all the complexities and eases and safeguards the driver.

IV. PROPOSED SYSTEM

Traditionally, road safety has been assumed to be the responsibility of the transport sector. But road traffic injuries are indeed a major public issue, and not just an offshoot of vehicular mobility. The health sector would greatly benefit from better road injury prevention in terms of fewer hospital admissions and a reduced severity of injuries. A Safety Management System is a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. Many in-vehicle monitoring devices are essentially with in-built accelerometers, GPS and other features. The advantage of safety surveillance system is that it provides data to show when, where and how a vehicle is being driven. This enables the driver to calculate the risk of an individual holder based on their driving style. By using the system, it provides a more accurate picture of what actually happening and the nature of the vehicle, which helps the driver to establish to reduce accidents, and ensuring about safety.

The user when he is on driving he may exceed the speed limit in few areas from the system the speed limit of the vehicle can be controlled by using "DC gear motor" thus by reducing the chances of accidents by controlling the rotation of the wheel. In case of any restricted areas such as schools, hospitals etc where horn is not allowed, the hardware device called "5V continuous buzzer" helps to control the inbuilt horn present in the vehicle. While travelling from one place to another there are chances of finding many of the obstacles in between, these obstacles may not be visible during night times, which may lead to accidents or any uncertain incidents. This cannot be controlled if the obstacle finding devices are not found in the vehicle. So, in the present system the user is known about these obstacles from notification on the dashboard by using GPS technology. Global positioning system finds nearby obstacles or any such foreign particles and notifies the driver about it. By this, the driver can avoid accidents and unexpected situations from being faced. The speed of the vehicles, no horn areas, and other details are maintained by the RTO department and can easily keep track of vehicles from this.

Nowadays, parking of vehicles is very difficult but from using the application it is made easy. It helps the driver to park vehicle in the permitted parking area. If the area has no parking permission then it notifies the driver about it and hence from this one can easily park vehicles. The driver will also be notified about the traffic signals such as red is to stop, green is to proceed and orange is to get ready. When it is red, the tire of the vehicle will be stopped by producing the nails as obstacle and it flattens as soon as the signal turns green.

V. CONCLUSION

The proposed application can widely be used in vehicles for reducing accidents and limiting the speed of the vehicle. Also the application lets know about the obstacles easily by notifications on the dashboard. Hence, the application can be used in day to day life to reduce hazards.

VI. ACKNOWLEDGEMENT

To ensure drivers safety and providing him the guidance about the obstacles as well. The system also helps to limit the speed of the vehicle thus by reducing the risk of accidents.

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Smart Bridge Safety Monitoring System

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ABSTRACT

In this study, smart bridge safety monitoring system is developed. This system is composed of:(1) monitoring devices installed in the bridge environment; (2) communication devices connecting the bridge monitoring devices and the cloud-based server; (3) a dynamic database that stores bridge condition data; and (4) a cloud-based server that calculates and analyzes data transmitted from the monitoring devices. This system can monitor and analyze in real time the conditions of a bridge and its environment, including the waters levels nearby, cracks and other safety conditions. The detected data and images are transmitted to the server and database for users to have real-time monitoring of the bridge conditions via mobile telecommunication devices.

Keywords: Internet of things (IoT); bridge safety monitoring; data analysis.

I. INTRODUCTION

Because of climate and location, incidents of bridges or bridge piers severely damaged by typhoon floods and earthquakes are frequently reported each year. In addition to floods, typhoons and earthquakes may also cause disastrous accidents of fires, explosive gas leakage and liquid chemical leakage. Different disasters and damaged sites require different professional disaster rescue knowledge and equipment in order to achieve optimal rescue results. However, lack of information about the damage site can impede information management at the rescuecenter and rescue operation, resulting in poor rescue efficiency or even preventable causalities. Therefore, in this study, the IoT, wireless sensor network (WSN) and smart building technologies are adopted to solve the above mentioned problems of abridge safety monitoring system capable of monitoring the environmental data of a bridge and transmitting the data to the mobile devices of bridge safety management staff for reference and documentation. The data can be used for bridge safety management and, in the occurrence of a disaster, for disaster rescue. The system developed in this study can help promote the advancement of bridge safety management and control by providing breakthroughs to the above mentioned problems of conventional systems.

II. EXISTING SYSTEM

Traditional methods of bridge safety management have the following problems: (1) failure to collect data or monitor on-site conditions in real time and failure to comprehensively record or analyze the collected data of on-site conditions in real time, resulting in poor disaster rescue efficiency; and (2) data collection through visual assessments or use of large-size electronic equipment, often resulting in inaccurate monitoring results or higher costs and higher power consumption. Therefore, an IoT-based bridge safety monitoring system is developed in this

study with a view to solving the above-mentioned problems.

III. PROPOSED FRAMEWORK

The system adoptsIoT and WSN technologies.The system can monitor and analyze in real time the conditions of a bridge and its environments. Real time conditions include water levels nearby, crack detection and other safety conditions. The detected data and images collected by the monitoring units are transmitted to the server system for further computing and decision-making.The decision made by the system, related analysis contents and alert messages are all transmitted by the server system via the internet to the management center for them to have real time and comprehensive understanding of the bridge's surrounding environment and keep records of the data for appropriate responses when a disaster occurs. The detected data and images are also transmitted to the users to have the real time monitoring of the bridge conditions via mobile telecommunication devices.

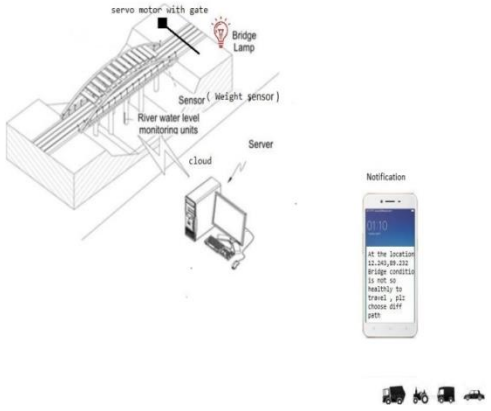

Figure 1. Bridge safety monitoring server system and notification mechanism

IV. CONCLUSION

This study is intended to develop a bridge safety monitoring system that integrates the technologies of IoT, crack detection and monitoring sensors. This system is unique in its ability to monitor the bridge environment, transmit the environmental data through wireless communication and send alerts to the bridge management staff in real time for prompt reactions. This system can enable 24x7 bridge safety management as well as prompt and appropriate responses to emergency incidents. All the collected environmental data sent to the server in the system can be used for big data analysis or follow-up research. The system developed in this study is a preliminary exploration. Future research is needed to improve the system by analysing data collected by the system and developing more advanced computing models and operational practices for the system.

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User Assistance in Android Platform Using Tensorflow

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ABSTRACT

Technology is making life easier. While the requirement currently is how the technology will be smarter in reducing the involvement of humans for decision making, recognizing or classifying. With the advent of mobile phones not only communication but user assistance which means the smart applications that can ease out day to day activities also witnessed an evolution. Android being one of the most preferred operating systems for mobiles has revolutionized this aspect. Machine learning which the most trending technique of Artificial intelligence is is essential in making this true. Machine learning platforms compatible with android have realized several possibilities of user convenient applications and also have paved a way for infinite innovations. In this paper we explain how TensorFlow one of the machine learning platform combined with android can be employed for error code detection in thermostats. We mostly focus on the deep learning mechanisms being implemented in TensorFlow.

Keywords: Machine learning, Tensor flow.

I. INTRODUCTION

Artificial Intelligence seems to be a modern concept but its thoughts dates back to Greek mythologies where mechanical men simulated more powerful work than humans. In 1950's Alan Turing 's "Computing Machinery and Intelligence" was published in Mind which invoked an idea of thinking machine. Artificial Intelligence in simpler words means to simulate human intelligence in machines. The attempt of bringing about activities such as learning, planning, problem solving which involve thought process, in machines by simulation of human brain functionality is known as Artificial Intelligence. Machine learning is the integral part of Artificial Intelligence. It is redundant to bring about the complex mechanism of decision making or intelligence in machines using conventional programming techniques. Machine learning is the way of teaching the computers to learn by them instead of teaching them everything what they need to do and when. This involves giving the machines access to the information and make them learn to see a pattern, classify or analyze how input mathematically deduces to output through examples. Machine learning can be defined as the mechanism that teaches systems how to learn by themselves without being explicitly programmed.

TensorFlow is a machine learning library actually developed for the purpose of machine learning and deep neural networks research by researchers and engineers working on the Google Brain Team within Google's Machine Intelligence research organization, but with the system being evolved in a way that it is general enough to be used for various domains. TensorFlow performs numerical computation using data flow graphs. Nodes in the graph represent

mathematical operations, while the graph edges represent the multidimensional data arrays (tensors) communicated between them. The flexible architecture allows deploying computation to one or more CPUs or GPUs in a desktop, server, or mobile device with a single API.

Android is one of the most widely used mobile operating system. Smarter applications can provide highest assistance to end users for several use case scenarios. Artificial intelligence embedded to android through TensorFlow opens up several possibilities. In this paper we have come up with one such solution of detecting error codes in thermostats and displaying the respective error message. Thermostatically controlled devices constitute at least 50% of the devices used in our day to day lives. The aim is to provide a solution that can help in troubleshooting the thermostat as an android application using TensorFlow. The rest of the paper is organized as follows: Section 2 explains about neural networks, Section 3 presents related work, Section 4 presents methods of developing proposed error code detection system, Section 5 presents achieved results and discussion related to them, and Section 6 holds our conclusion.

II. NEURAL NETWORKS

Neural Networks is the part of machine learning technique that is inspired by biological brain which empowers computer to learn from set of data. Basic unit of computation in neural network is an artificial neuron which is referred as "node" or "unit". This is a mathematical model of biological neuron. The signals are represented as numerical values. Each input value is multiplied with value called as weight which brings about modulation as in biological neuron. A step function is applied on the weighted sum of the input which is the strength of the input to based on which the output is determined. Stack of neural networks is called as Deep learning, which means network composed of several layers. It basically has three types of layers. Input layers, hidden layer and output layer. Input layer links with external environment that presents a pattern to the network. Hidden layer is the collection of neuron which has activation function applied to it. The output layer of the neural network collects and transmits the information accordingly in way it has been designed to give to the external environment. Major types of deep learning neural networks are as listed below:

- ✓ Feed forward Neural Network.
- ✓ Radial basis function Neural Network.
- ✓ Kohonen Self Organizing Neural Network.
- ✓ Recurrent Neural Network.
- ✓ Convolutional Neural Network
- ✓ Modular Neural Network

Feed forward Neural network is unidirectional in nature. The data passes from input node to output node and there is no back propagation. It may or may not have hidden layers making it the simplest of the Artificial Neural networks. Such networks have implications in voice recognition and in computer vision as the target output classes are complicated. Radial basis function neural networks depend on the distance of input point with respect to center. The first layer performs the radial basis function out of which is given to the next layer. Next layers perform functions based on this output. This network finds it application mostly in power restoration systems.

Kohonen neural networks mostly work towards recognizing patterns in the data. The network model is input with the arbitrary dimensions. It needs to be trained to create own organization. During training the location of the neuron remains constant while the weights differ based on the value. The network clusters all the point and every kind of cluster is represented by neuron. It is mainly used in medical analysis applications. Recurrent Neural network mainly works on the principle of looping the output of the layer to the input layer that plays an important role in predicting the next outcome of the layer. It works like a feed forward neural network. But after an output is shot from the neuron it is saved by the

neuron which differentiates it from feed forward neural network. After a cycle of output the neurons acts like memory cells from further. These Neural networks are the backbone of Text to Speech conversion applications.

Convolutional Neural Networks are advanced feed forward neural networks that has learnable weights and biases. Input is divided into batches of filters where extraction of features through process of convolution from which it derives its name. The input goes through series of operations like convolution and pooling which helps the network to extract features and be able to learn the values of weights or biases by itself and then correct those values through back propagation of errors. It mainly finds its application in image processing, feature extraction and classification. Modular Neural Networks as the name suggests has several modules of neural networks that works independently towards the output. Here the network modules get unique input and performs subtask. Networks do not communicate with each other as they work independently reduce the communication overhead and increases the processing speed as the work gets distributed. It is employed in task decomposition, multi modular strategies.

III. RELATED WORKS

In [1] this example deep learning neural networks are implemented in TensorFlow to perform optical character recognition. Various methods to perform OCR are available like fuzzy logic, matrix matching, structural analysis of sub features and so on. It is an area where there is always scope for improved accuracy. Here deep learning neural networks are employed mainly because of their accuracy and generalization power. The Deep Learning Convolutional Neural Network is implemented using TensorFlow. This was tested with android application enclosing the TensorFlow trained model to perform number plate recognition. A varied and large data set is used to train the CNN model to make it learn the value of weights that will be further used for recognition of real time example. The Android application provides interface through device camera and output the predicted values after recognition. This aims at providing solution in terms of performing number plate recognition as an Android application. The promising results final overall accuracy for the plate detector CNN was 98.5% and 96.8% for character recognition CNN makes it an efficient user assisting application with scope for improving and modifying as specific to use case scenario criteria such as font of recognition and number of digits to be recognised

In [2] these example TensorFlow applications are used in user assistance through recognition of heritage centers of a city and providing them information about it through Android application. This solution implementation can be differentiated into two parts. The artificial Intelligence part of recognizing the heritage centre when encountered with an image of it is brought about by deep learning neural networks TensorFlow. Camera device input and interface for output and providing user assistance through information regarding the recognized heritage center is implemented as an android application that has TensorFlow model. The object recognition is brought about in TensorFlow by Inception V3 model. Inception V3 is a CNN model of Google trained for ImageNet Large Visual Recognition Model capable of recognizing 1000 classes, each classes associated with a label. Its final layer has been retrained with the artworks, historical buildings, painting, statues of the city. Using TensorFlow API for android, a mobile application is developed that takes a still from the camera of the device and recognize the heritage site. This provides a user assistance by recognizing the site of significance. As smart phones are easily available it serves to be of a great user assistance.

IV. DEVELOPING ERROR CODE DETECTION COMPONENT

Thermostats play a major role in maintaining device temperature there by providing control over temperature and saving electricity. As complicated advancement thermostat goes through even the problems grow with it. Error codes is a way in which the modern digital thermostat expresses the problem associated with it. Developing a component for detection of error codes in thermostat includes several steps. Collection of data set, retraining of the model and defining an Error code detection model to be implemented in android.

A. Data set and Pre-processing.

Quality of dataset and amount of dataset that is used plays a major role in developing an efficient model for detection. Images of thermostat are wide in range as they vary with the manufacturing companies. For the purpose of this research one specific kind of thermostat were used. Considering the few images available images were artificially synthesized for this purpose. As the error codes are complex in number a specific number of error codes were used for dataset. Dataset synthesis was varied based on the focus angle, lighting conditions. Amount and quality of dataset directly affects the prediction accuracy. There is always a margin to improve the accuracy through well defined and refined dataset. Samples of the generated dataset are displayed in Figure 1.

Figure 1. Samples of the dataset

B. Retraining of model.

"Inception" is the convolutional neural network model implemented for image classification by Google capable of recognizing 1000 classes. This model is retrained with the specific data set of error codes to create the model graph that is customized for the recognition of Error codes in Thermostat. Retraining involves supervised learning of the model. The initial layers extract the general features such as picking out edges and basic shapes. It is the final layer that comes up with the relevant high level categorisation. So we can obtain the model for specific recognition by retraining the final layer. Retraining needs a very profound dataset. A large number of labelled images of thermostats error codes considering the factors and circumstances of recognition scenario needs to be created and collected. This well-formed huge data set is to be provided to model for retraining. figure 2 depicts the results of retraining in a graph and a label file that has learnt values of "biases" or "weights" that will be used to recognise image.

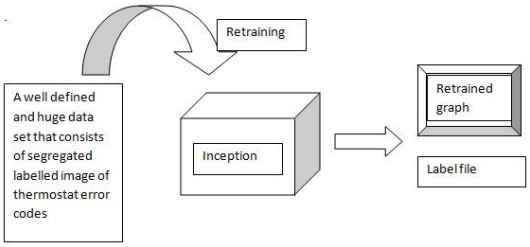

Figure 2. Retraining process

C. Implementation in android

Android serves as the platform for implementing the model as an application with the use case of displaying error message related to recognised error code of thermostat. Application starts with the

camera API implemented to continuously capture frames of image of thermostat and send the image of proper focus to the model for recognition. The graph file used in android is a static. pb extension file. The graph obtained after retraining has to be optimized to be used in the android application. This optimization includes freezing of the graph values. When the image is sent as bitmap pixel values to the graph it performs recognition and returns the error code name along with probability matching from the label file. Once the error code is recognised further the matching error message associated with the error code along with its probability is displayed.

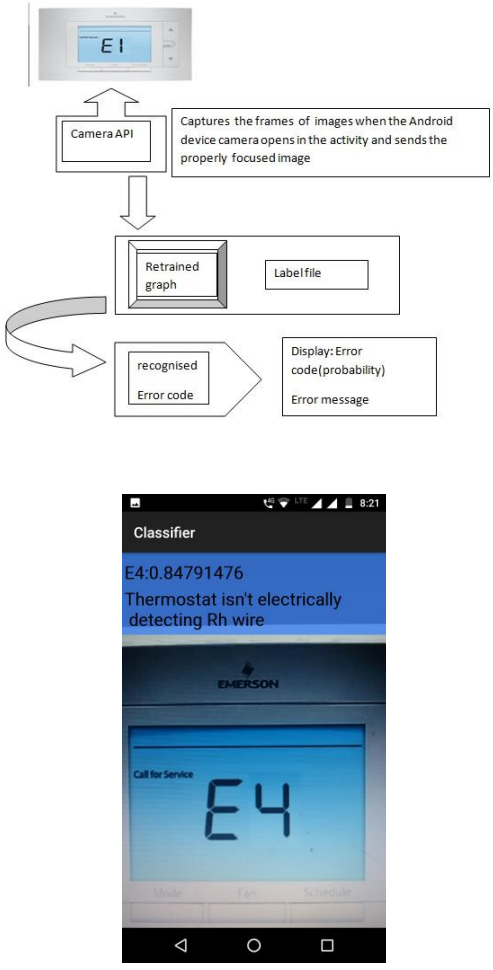

Figure 3. Implementation process

V. RESULTS AND DISCUSSION

Proposed system of error code recognition was tested in the real-time environment using the android implementation. Fifty thermostats in different position and light conditions were tested. Overall accuracy for the error code detection was 98% when implemented directly through a python script, 94.5% when tested through an android application shown in figure 4. The device camera, light conditions tend to lower the accuracy . There is a limitation of training data set with specific number of error codes and specific brand of thermostat. There is scope for increasing the accuracy and implication through expanding the dataset.

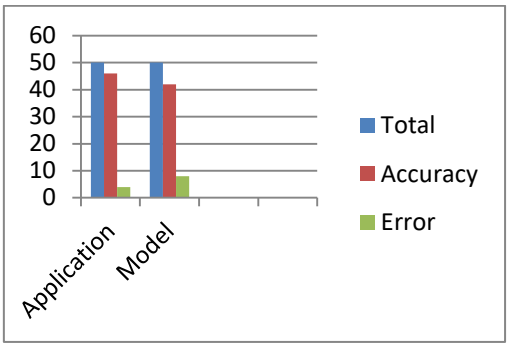

Figure 4. CNNs accuracy in real time environments

VI. CONCLUSION

Over the years deep learning has been providing easy and accurate solutions to complex problems. May be it the recognition and classification deep learning has been a path breaking concept giving infinite possibilities to be envisioned. Object recognition though has several methods deep learning CNNs provide the best possible solution for the varying recognition conditions. The proposed system has the limitations of specific number of error codes and the kind of the thermostat. With the smart phones being widely used smarter solutions through android applications is the main focus. TensorFlow which was originally developed by engineers at Google for research purposes is not limited to the same anymore. Through this the area of user assistance can be powered with Artificial Intelligence resulting the applications to smarter. This provides an up gradation from normal computations to intelligent solutions that involves artificial intelligence.

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Grouping of Similar Images into a Folder Based on Face Recognition

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ABSTRACT

Face recognition has made significant advances in the last decade, but robust commercial applications are still lacking. We address the problem of grouping of all the images of the particular person from the bulk of images into a single folder. We propose a method called Pixtract (picture-extraction) which is an application for supporting the officers or employees of the company/organization to search for all the images in which the particular input face is present. The main aim is to extract all the images which matches with the particular image/pic that is given as an input. These matched images will be extracted and is provided as the output in form of a folder/album that containing all the matched images. The main concentration of this work is on the amusement park where there is a need of this technology.

Keywords: Face detection, Face recognition and Grouping

I. INTRODUCTION

FACE recognition has been an intensely researched field of computer vision for the past couple of decades. It is becoming an increasingly more important trend in tech development. You may already be engaging with facial recognition technology on a day-to-day basis without realizing, but there are massive implications for the future of tech development. There are several ways in which we can compare one face with other for the recognition. The images to be selected among a group of 10-20 images is easily done by manually searching through all the images for the match. But the problem arises when one wants to select all the images of his/her requirement among thousands of images in such case manual searching is impossible. The paper brief you out about how to extract all the images which matches with the particular image/picture that is given as an input to the application which intend to select all required matched images automatically without human intervention. This leads the selection of the several images of a particular person who is present in each and every picture and will help to solve the searching of images from bulk very easily, quickly and accurately.

II. RELATED WORKS

This section specifies set related works that has been used . Maria De Marsico at all., [3] proposed that the Viola Jones algorithm is used to detect face and principal component analysis for face recognition combination of Viola Jones algorithm and Principle component analysis gives result with fast detection and high 90% accuracy with some false

positive values[3]. Each Eigen value is an Eigen vector and it tell how much images vary from mean image. Viola Jones Algorithm is a fast face detection technique but it has some false positive values for images with occluded faces.

Divya Meena at all.,[4] proposes a method for Robust face recognition under uncontrolled illumination conditions , the author has developed a generalized Weber-face (GWF) which extracts the statistics of multi-scale information from face images. By assigning different weights to the inner-ground and outer- ground, further more develop a weighted GWF (wGWF) version.[4] and can obtain promising performance comparable with existing approaches.
The author Priyanka Vageeswaran at all.,[1] has explained method that shows that the set of all images obtained by blurring a given image forms a convex set. Based on this set theoretic characterization, and propose the DRBF i.e DIRECT RECOGNITION OF BLURRED FACES[1. Pose and illumination changes for each biometric query, before submitting it to the classifier.[1] Samples with poor quality are possibly discarded or undergo a manual classification or, when possible, trigger a new capture. After such filter, template similarity for matching purposes is measured using a localized version of the image correlation index.

Kavitha R Singh at all.,[7] Gabor filters have proven themselves to be a powerful tool for facial feature extraction. An abundance of recognition technique presented in the literature exploits these filters to achieve robust face recognition. Gabor shortcomings the fact that the filters are not permitted probably the most important[7]. This makes the information contained in the Gabor face representation redundant and also affects the size of the representation. The filters, named principle Gabor filters for the fact that they are computed by means of principle component analysis are assessed in face recognition The author Yan Ouyanga, Nong Sanga,n, Rui Huangb[5] proposed the robust facial expressions recognition [5]. First, Histograms of Oriented Gradients (HOG) and Local Binary Patterns (LBP) are used to extract features. Second, Sparse Representation based Classification (SRC). Finally, HOG mainly extracts shape information while LBP primarily represents texture information, a strategy of combining HOG&SRC and LBP&SRC is implemented.

III. PROPOSED METHOD

The motivation of the proposed method is the drawbacks of the existing system. The flow can be explained by classifying it as the modules[Fig: 1].

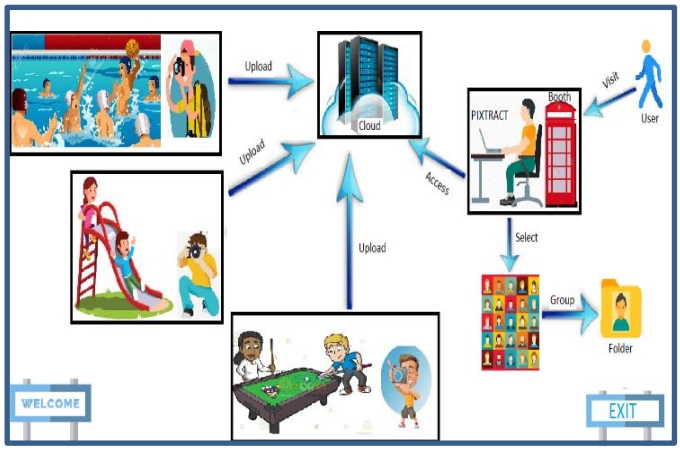

Figure 1. Overall Flow of System

Modules: The application is divided into three different modules which specifies the overall functionality[Fig:1].

- **Module 1**: Photo capturing & uploading:
  This module deals with the capturing[Fig 2] and then uploading[Fig 3] of the captured images for the database. The photographers is deployed at each & every events. These photographers will capture the images in random and are provide with the latest cameras so that the captured photos can be uploaded to the database using the modern technology.

Figure 2. Photo capturing

Figure 3. Photo Uploading

- **Module 2**: User image capturing:
  This module deals with the capturing of the individual face image [Fig 4] and fed to the database. The booth is setup so that he provides his image through the camera which is deployed in the booth.

Figure 4. User image capturing

- **Module 3**: Grouping and delivery:
  This module deals with the main part of our application. The application is fed with the input image which is used to group all the images in which the particular face is found. The matched images is grouped[Fig 5] into folder and is given as an output in the form of folder which is then copied into some secondary storage device.

Figure 5. Photo Grouping

IV. FACE DETECTION

For the detection we are using a new image feature called Normalized Pixel Difference (NPD) is proposed[8] . It is inspired by the Weber Fraction in experimental psychology.

First NPD feature measures the relative difference between two pixel values[8]. The sign of f(x,y) indicates the ordinal relationship between the two pixels x and y, and the magnitude of f(x,y) measures the relative difference (as a percentage of the joint intensity x+y) between x and y.

$$f(x,y) = x–y / x + y$$

where $x,y \geq 0$ are intensity values of the two pixels and f(0,0) is defined as 0 when $x = y = 0$.

Second the sign of f(x,y) is an indicator of the ordinal relationship between x and y.[12][13][14]. we propose a Deep quadratic tree to learn the optimal subset of NPD features and their combinations. The NPD feature evaluation[Figure 6] is extremely fast, requiring a single memory access using a look up table. [8] Multi scale face detection can be easily achieved by applying pre-scaled detection templates. The unconstrained face detector does not depend on pose specific cascade structure design; pose labeling or clustering in the training stage is also not required. resolution face images in unconstrained scenarios. The [Figure 7] shows how the faces are detected for image.

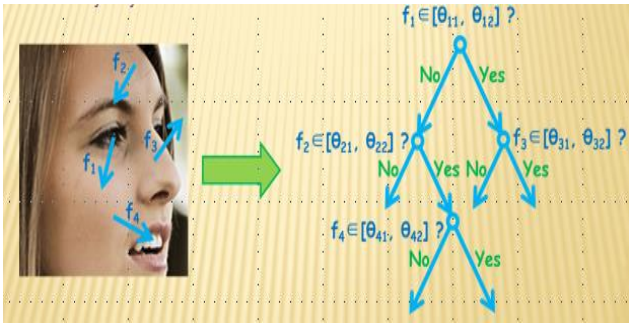

Figure 6. Learning and combining NPD features in deep quadratic tree.

The NPD algorithm [8] is divided as shown:

- **Step 1:** The NPD feature is identified, so either f(x,y) or f(y,x) is adequate for feature

representation, resulting in a reduced feature space. Therefore, in an s × s image patch (vectorized as p × 1, where p = s · s), NPD feature f(xi,xj) for pixel pairs 1 ≤ i < j ≤ p is computed, resulting in d = p(p–1)/2 features.

- **Step 2:** The sign of f(x,y) is an indicator of the ordinal relationship between x and y. Ordinal relationship has been shown to be an effective encoding[8] for object detection and recognition.

Figure 7. Face detection

V. RECOGNITION

The recognition can be done using the Gabor method. Texture analysis using filters based on Gabor functions[15] falls into the category of frequency-based approaches. These approaches are based on the premise that texture is an image pattern containing a repetitive structure that can be effectively characterized in a frequency domain, such as the Fourier domain. One of the challenges, however, of such an approach is dealing with the trade off between the joint uncertainty in the space and frequency domains[15]. They achieve the optimal tradeoff between localizing the analysis in the spatial and frequency domains[15].The Gabor filter is a linear filter whose impulse response is defined by a harmonic function multiplied by a Gaussian function. Because of the multiplication-convolution property (Convolution theorem), the Fourier transform of a Gabor filter's impulse response is the convolution of the Fourier transform of the harmonic function and the Fourier transform of the Gaussian function and it is given by

$$g(x,y;\lambda,\theta,\psi,\sigma,\gamma) = \exp\left(-\frac{x'^2+\gamma^2y'^2}{2\sigma^2}\right)\cos\left(2\pi\frac{x'}{\lambda}+\psi\right)$$

Where $x' = x\cos\theta + y\sin\theta$ and $y' = x\sin\theta + y\cos\theta$

and, λ represents the wavelength of the cosine factor, θ represents the orientation of the normal to the parallel stripes of a Gabor function, ψ is the phase offset, σ (sigma) is the Gaussian envelope and γ is the spatial aspect ratio specifying the ellipticity of the support of the Gabor function.

VI. GROUPING

The grouping of the similar images is done using the concept of k-d tree. It is a binary tree in which every node is a k-dimensional point. Every non-leaf node can be thought of as implicitly generating a splitting hyper-plane that divides the space into two parts, known as half-spaces. Points to the left of this hyper-plane are represented by the left sub-tree of that node and points right of the hyper-plane are represented by the right sub-tree as shown in [Figure 8].

The hyper-plane direction is chosen in the following way: every node in the tree is associated with one of the k-dimensions, with the hyper-plane perpendicular to that dimension's axis.

For example, if for a particular split the "x" axis is chosen, all points in the sub-tree with a smaller "x" value than the node will appear in the left sub-tree and all points with larger "x" value will be in the right sub-tree. In such a case, the hyper-plane would be set by the x-value of the point, and its normal would be the unit x-axis.

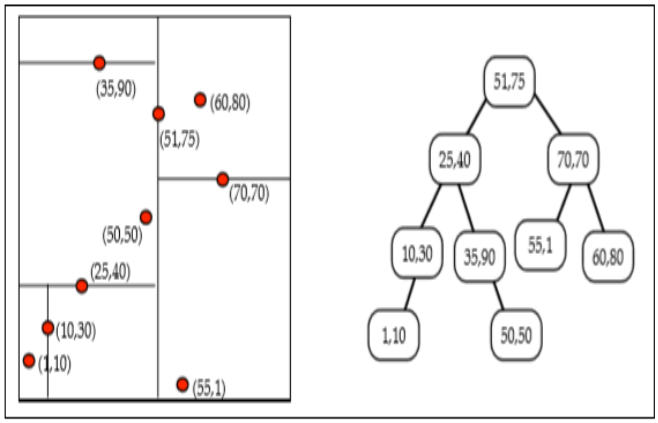

Figure 8. K-D tree formation

Searching for a nearest neighbor in a k-d tree proceeds as follows:

1. Starting with the root node, the algorithm moves down the tree recursively, in the same way that it would if the search point were being inserted (i.e. it goes left or right depending on whether the point is lesser than or greater than the current node in the split dimension).
2. Once the algorithm reaches a leaf node, it saves that node point as the "current best"
3. The algorithm unwinds the recursion of the tree, performing the following steps at each node:
   - If the current node is closer than the current best, then it becomes the current best.
   - The algorithm checks whether there could be any points on the other side of the splitting plane that are closer to the search point than the current best.
     - ✓ If the hyper-sphere crosses the plane, there could be nearer points on the other side of the plane, so the algorithm must move down the other branch of the tree from the current node looking for closer points, following the same recursive process as the entire search.
     - ✓ If the hyper-sphere doesn't intersect the splitting plane, then the algorithm continues walking up the tree, and the entire branch on the other side of that node is eliminated.
4. When the algorithm finishes this process for the root node, then the search is complete

VII. DATASETS

In this work we have created our own database consisting of the images that are collected from the amusement park people [Fig 9]. The data sets is nothing but the collection of images on which the specified work is implemented and experimented. The images considered in the data set consists of the images of the real time scenarios captured. The data sets is having the images that is consisting of the four common challenges that are often encountered in image i.e. pose variation, illumination variation, occlusion and blur face detection and recognition. Some of the sample dataset images are as shown.

Figure 9. Dataset images

VIII. RESULT AND CONCLUSION

The specified concept can be used efficiently for the grouping of all the images into a particular folder for the given input Image. Proposed system is a combination of the NPD features and tree classifiers. The NPD detector performs better than the Haar, LBP, and POF detectors.

Table 1. Matching accuracy

Result Analysis			
USER	**Number of images present**	**Number of images matched**	**Percentage of match**
Person 1	40	38	95%
Person 2	62	50	81%
Person 4	35	32	91%

Person 3	27	24	89%
Person 5	35	26	74%
Person 6	22	20	90%
Person 7	54	46	85%
Person 8	15	14	93%

The proposed NPD face detector, compared with the Viola-Jones5 face detector in OpenCV 2.4, which is known to be optimized for speed. The gabor recognition gives high face recognition rate, of approximately 90%, has been reached by our recognition system in the experiments. The result comparison[Table 1] for the set of 8 person to check for the accuracy is as shown .The graphical representation of the accuracy of the match that is tabulated in [Table 1] is as shown in the bar graph representation [Figure 10].

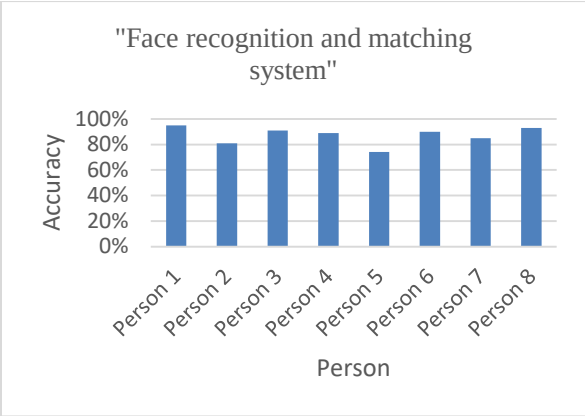

Figure 10. Bar-graph representation for the accuracy of the matched images.

The K-D tree for grouping will have normal efficiency of O(2^d + log n) and log n if the match is near the query point and 2^d to search around the cells in that neighbor. The good performance can be achieved for all types of images. Still we are working on the greatest performance irrespective of the size of images.

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Match Winner Prediction Using Tennis Players Data Analytics

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ABSTRACT

Tennis is one of the popular sports in the world. Many Analysts have find out who will be the Winner of the Match by Using Players Statistics and Players Past Results. This paper proposes analysis of Tennis Players and a technique to predict the Winner of the Tennis Match. The proposed technique combines Players Statistics, Players Past Results, Players Performance on Different Type of Court and The Present Year Performance based on Multi-Layer Perceptron with Back-Propagation learning algorithm.

Keywords: Tennis, Neural Network, Multi-Layer Perceptron, Back-Propagation learning algorithm.

I. INTRODUCTION

Nowadays, tennis is one of the popular sports in the world. In every year, there are four major Grand Slam Tennis Tournaments that is Australian Open, French Open, US Open and Wimbledon. The four majors have different court surfaces; Australian and US Open is played on hard court, French Open is played on clay and Wimbledon is played on grass. Each court surface has its own characteristics and makes difference in speed and bounce of the ball. Clay court has a slower paced ball and a fairly true bounce with more spin. Hard court has a faster paced ball and very true bounce. Grass court has a faster paced ball and more erratic bounce. The scoring system for both men's and women's matches are same, that is the player who wins two-sets is the winner of the match. The scoring system for men's Grand Slam Tournaments is different, that is the player who wins three-sets is the winner of the match.

Due to the growth of sport competition, analysis and prediction are widely used in many kinds of sports, especially tennis. The tennis prediction model is created to evaluate the chance of winning. Most people believe that the first serve person in the set has more advantage than another because most of the games often go like that so the first serve affect to the games score. Similarly, lots of players always make fault in the first serve and do better in the second serve so second serve might affect to the games score too. Nevertheless, the first serve and the second serve affect to the games score but there is another criteria that might be refuting an advantage of serves, it is the returns of serve. Moreover, the surface characteristics also affect to the players, e.g., some players perform better on grass but they may get worse on clay.

The first tennis model was proposed by Kemeny and Snell which has only one parameter; probability of each player winning a point. Furthermore, Barnett and Clarke proposed the prediction of a match played at the Australian Open by using Markov chain model set up in Microsoft Excel which has the probability of player A winning a point if player A is serving and the probability of player B winning a point if player B is serving as inputs.

Many papers calculate winning percentage of players considering serving and receiving for statistics. Some of the problems associated with statistics are the data is not updated, the data contains many features and environmental data that is the surface of the court.

The purpose of this paper is to combine player statistics, past results, environmental data and present year performance based on Multi-Layer Perceptron. MLP is the basic of Artificial Neural Networks (ANN). ANNs are powerful technique to solve real world classification problems and have the learning ability from experience to improve their performance. ANNs are particularly effective for predicting outcome when the networks have large database of examples to draw on and able to deal with incomplete information or noisy data.

II. PROPOSED METHOD

A. Analysis

In our paper the analysis of tennis players is done based on winning percentage, first serve winning percentage, second serve winning percentage, break points winning percentage, return of serve winning percentage and the injuries of a players in different type of court. Here Injuries play important role because if a player had major injury he or she cannot play tennis and takes many days to recover.

B. Multi-Layer Perceptron (MLP)

An Artificial Neural Network (ANN) is a mathematical model or computational model based on biological neural network. The network consists of an interconnected group of artificial neurons and processes information using a connectionist approach to computation. ANN is an adaptive system for which its structure can be changed using external and internal information flowing through the network during the learning phase. For the learning models, there are three major types of learning: supervised learning, unsupervised learning, and reinforcement learning.

The Multi-Layer Perceptron (MLP) is a supervised learning neural network with the input layer, hidden layer, and output layer. One input fed to one node of the network on the input layer corresponds to one input feature. In the case, N neurons are used to represent the N features of the input vector. The input layer gives out the corresponding input vector to each neuron in the hidden layer.

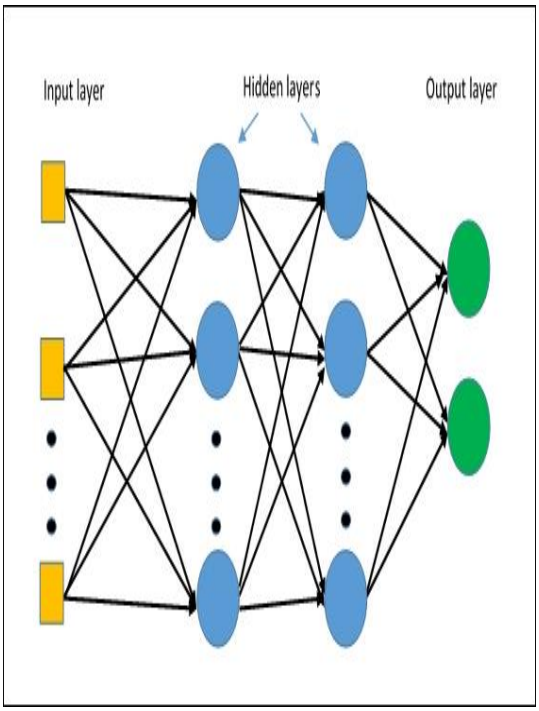

Figure 1. MLP

Some issues for training the MLP network; defining how many number of the hidden layers used in the network, deciding how many number of neurons to use in each hidden layer, finding a technique to avoid local minima, converging to an optimal solution in a reasonable period of time, and validating the neural network to avoid over fitting problem.

a. Input Features

The Input features are

1. Winning percentage on the first serve, this feature represents a chance of the player to get point on the first serve.
2. Winning percentage on the second serve, this feature represents a chance of the player to get point on the second serve.

3. Winning percentage on break point, this feature represents a chance of the player to get point when he faces the break point game.
4. Winning percentage on return of serve, this feature represents a chance of the player to gets point on receiving from opponent's serve.
5. Winning percentage of played match, this feature represents a chance of the player to win the overall matches played.
6. Type of Court: Hard Court, this feature represents the match that play on hard court. Clay Court, this feature represents the match that play on clay court. Grass Court, this feature represents the match that play on grass court.

In Tennis Match all the above inputs are considered for two players because it is played between two players.

b. Workflow

All the required data is fetched from the Database, it includes data of two players, some data are used as training set and some as test set, for testing real time data can be used. Then training and test data are together fed to MLP to get the results.

III. EXPERIMENTS AND RESULTS

A. Data Managing

The proposed method gets the collected data of the tournaments and the data is used as the input of MLP. The Input Features are statistical data, by using these player statistics and present year performance can be found. The Head to Head Match results of two players can be calculated for the past results. The environmental data that is performance based on type of court can be calculated.

B. MLP Modeling

The model consists of results based on player statistics and past results, results based on type of court and present year performance. The above are input nodes which contain input features mentioned in 2.3 if required.

To find the suitable MLP model, the learning parameters are adjusted until the error is reduced into acceptable value.

C. Training Data

The statistical data and environmental data of match played is obtained from ATP repository and www.atpworldtour.com (ATP World Tour).All the tournaments data is considered.

D. Results

By using the above model the accuracy of predictions is around 70%.

IV. CONCLUSION

In this paper an approach to create the tennis prediction model is shown. MLP is used to predict the winner of the Tennis Matches. In this model we concentrate on some important input features and consider the present year performance of the players. Coaches and Players can use this to devise strategies, Fact-based decision making, Building better teams, Improving players performance and Spotting top performers and Retaining and Engaging fans.

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Iot Enabled Smart Lighting System For Smart Cities

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ABSTRACT

Home automation system achieved great popularly in the last decades and it is still an attractive and confidential area of research.by increasing the quality and comfort of life.IOT with embedded lithology is a growing research network of everyday object from industrial machine to consumer home appliances, which share information and has minimum computation tasks. While areas are busy with other activities or task .another activity can be achievable remedy using tax concept, the IOT aims to only everything in our world under common infrastructure giving as not only control of things around us, but also keeping us informal of life state of the things.This capacity can be used for automating the systems like smart homes or precision agriculture which have a social relavance.it is observed that the IOT has been used extensively for building smart homes.smart homes automation of activities such as controlling lighting heating and others. This paper is an effort in such direction how to and how the IOT based smart home lighting automation system are built and its implementation.the main objective of this paper is to proved an overview of IOT there architecture usage in the application of lighting system and few design of the same discussed. The working principle of different architectural model of various researches are mentioned with communication techniques such as Zigbee wi-fi Bluetooth and GSM are studied and compared.so the users can choose their own choice of technology to build home lighting automated system. Moreover, in this research work the survey of different home lighting automation systems are discussed.

I. INTRODUCTION

IoT is a system of interconnected gadgets with cutting edge abilities to associate with each other, people their encompassing physical world to perform distinctive assignments. IoT empowers simple access Contributed similarly to this work. also, mix between an assortment of gadgets for example home machines, vehicles, PDAs and so on in a canny urban living setting. By incorporating IoT in the brilliant city, adaptable asset administration for various application spaces can be accomplished in urban territories.A fundamental requirement for power is for lighting in broad daylight and private neighborhoods.Brilliant Cities are a rising field in inquire about and advancement, proposing a considerable measure of new conceivable outcomes and openings for its natives and administrators.Changing a city into a Smart City requires: changes in the way ventures, open specialists, and non-benefit associations communicate with their clients; changes in the built up plans of action; also, changes in the administrations that should be outlined and actualized. Savvy Cities are considered an exceptionally significant research and application. In such an IoT-empowered keen city condition, one of the real concerns is the proficient administration of vitality on the grounds that, with the developing populace, interest for power needs

to be met by the constrained asset Brilliant city includes properties, topics, and framework. Traits of a keen city are otherwise called qualities of shrewd city. Since the constant movement of a keen city depends on topics, they are additionally called as mainstays of the keen city. Truth be told, foundation is a fundamental component for any savvy city, which gives the operational stage. This area expounds on previously mentioned includes considering a nonexclusive brilliant city arrangement. Smart intelligent lighting control framework that is overseen in a unified or on the other hand conveyed route by various IoT correspondence conventions, gadgets, and their sensors. The utilization of Smart Computing advances to make the basic foundation parts and administrations of a city. Today, around 10% of the aggregate vitality dissemination is devoured by open lighting.

II. OVERVIEW OF SMART LIGHTING SYSTEM

The term keen in a lighting framework in a keen city condition alludes to its being self-sufficient and proficient which is accomplished by the highlights of the IoT innovation. Regular lighting approaches which are proposed to screen and control the vitality utilization of lighting frameworks have been centered around either manual arrangements (e.g., utilizing LED knobs, proficient wiring, and so forth.) or orchestrating on/off term of the lights for certain time of a day. While manual arrangements experience the ill effects of higher usage cost, clock-based arrangements squander the power in less populated areas amid uncrowded evenings. In any case, to think about these disadvantages, a SLS employments various sensors (movement sensors, light sensors, haze sensors, and so on.). These sensors are utilized to alter the on/off time agreeing to human nearness and light power.Fig 1 shows SLS in context smart city.

In a SLS, there are three fundamental segments of the framework design:

1) Lamp Unit (LU): as of late, huge enhancements have been accomplished in light assembling advances. The utilization of reflection and refraction highlights of light in assembling offers productive force control of a light unit. Lamps utilized as a part of SLS must be vitality effective and ought to have simple upkeep steps.
2) Neighborhood Control Unit (LCU): Local control unit gathers the information from a variety of LUs through a short-range correspondence convention (e.g., IEEE 802.15.4 conventions for example, ZigBee, 6LoWPAN or Bluetooth Low Energy .and so forth.) transmit the information to the Control.
3) Control Center (CC): The Control Center gathers assorted types of information from LCUs and stores it on a server. With later progressions in distributed computing it is likewise conceivable to store information in the cloud rather than a server.

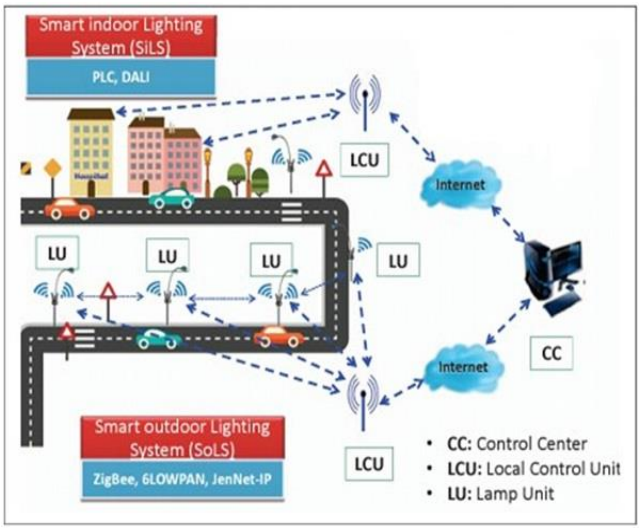

Figure 1. Smart Lighting System in Smart City

SLSs can be utilized as a part of either Indoor or Outdoor lighting. Shrewd indoor lighting frameworks (SiLS) are utilized as a part of the general population benefit structures like clinics, schools or enormous production lines, and organizations.

There are two kinds of correspondence to be used in an SLS.

Long-extend Communication: Long-go correspondence with regards to SLS for the most part alludes to data sharing amongst LCUs and CC and furthermore between LCUs. For a huge urban territory, SLS for the most part comprises of a few LCUs and one focal CC. a long-run correspondence convention is expected to set up a correspondence channel to associate LCUs and CC. Conventions, for example, Wi-Fi, Ethernet, GPRS, WiMAX, 3G/4G/5G are used to build up correspondence channels amongst LCUs and CC.

Short-run correspondence: Short-extend correspondence typically alludes to correspondence between gadgets that are in the observable pathway. For a SLS, separates between LUs also, comparing LCU are in little range (under 100 meters. Short-go conventions are used to give a correspondence primarily between the LCUs and LUs in a SLS. Short-go conventions can be both wired (e.g., DALI) and remote (e.g., ZigBee, JenNET-IP , 6LoWPAN).

III. RESILIENT_SMART_CITIES

Versatile Smart City (RSC) is portrayed as a city which has data and correspondence innovation (ICT) and incalculable applications sent that add to manageable financial, social and natural advancement of their nationals.While a smart city applies ICT with the aim of providing an infrastructure that guarantees: sustainable development, quality of life to citizens, efficiency in the administration of public and private resources, commitments to the environment, avant-garde architectural elements, and where the buildings are fitted with the most advanced technological solutions to facilitate interaction between citizens and urban elements (whether citizen participation is taken into consideration), it is important to indicate that these are supposed if everything in the city is running without any problem, but, what could happen if there are problems that endanger these assumptions and the city can't solve them in a short time. In this section, we intend to give an approach to smart cities from the point of view of a catastrophe. Yet a considerable lot of them endure a few bothers.

A.RSC Architecture

In this area, a propose of RSC engineering is introduced which is isolated in the accompanying stages: Keen City Phase - The diverse IoT objects are introduced by utilizing the IoT scientific classification connected to Smart Cities, Intelligent Administrations are acquired in view of the necessities of the clients.

Crisis Phase - In the expressions of Mark Pelling is normally a time of high accord in the group, with much unselfish conduct went for averting or decreasing human enduring. Next, exercises that will return the group to typical working are embraced. At the point when we are in the crisis stage, it is fundamental that urban communities have a possibility and crisis design, alleviation associations, etc..., "what ought to be done in every occasion"

Flexible Smart City Phase - the unique parts are displayed that ought to be considered in a Brilliant City, as long as the civil life forms can center on the benefit of all of the group.

Maintainable Development

In a RSC, maintainable improvement is the center of such urban areas which comprises not just in creating IoT administrations what's more, applications that implant the city, giving advancements, but instead than in every advancement can be connected the five mainstays of a urban domain sustainable.

Activity administration is winding up more troublesome in huge urban areas. The specialists are conceating on savvy urban communities which mean to address every one of the issues relating to huge urban communities counting movement

administration issues. In this paper, movement administration arrangement with regards to brilliant urban areas has been explored. At some point the activity streaming towards a specific course needs additional time at specific timings. In a few circumstances, the activity cop on obligation may need to implement a specific activity lights controlling example unique from the customary example of lights.

In the future, it is required to test in a research center condition a Keen City, and perform tests for absence of correspondence, loss of information and others, to validate certain parts of an RSC.

IV. IOT INFRASTRUCTURE FOR SMART CITY

In this segment, we will exhibit the building squares of shrewd city IoT Infrastructure. As the key mechanical empowering agent, IoT is presented from three distinct spaces: arrange driven IoT, Cloud-driven IoT, and information driven IoT, relating to correspondences, administration, and calculation prerequisites of keen city advancement and organization.

System Centric IoT: The vision of IoT can be deciphered in two ways: "Web" based and “Protest" based. The Internet-based engineering will include Internet benefits as the principle center while information is contributed by the items. In the protest-based engineering, the brilliant items will take the inside stage.

Cloud-Centric IoT: With a specific end goal to incorporate the universal urban detecting and the savvy city applications.

Information Centric IoT: It isn't shocking that there will be a huge measure of information created in a completely working IoT. Information driven IoT stresses all parts of information stream, including gathering, handling, capacity, and representation.

V.FRAMEWORK FOR CREATING SMART CITIES

While the focal point of this contextual investigation is the advancement of an IoT foundation that tends to the commotion related issues, it can reach out to a blander urban data system based on innovation that empowers proficient information gathering. The capacity to accomplish estimation, comprehension and perception of various urban condition parameters is a key paradigm in building up a brilliant city. Keeping in mind the end goal to approve this structure, a lab-based testbed has been made with hand crafted sensor sheets fit for catching clamor levels and other natural parameters. At the physical layer, Crossbow's iMote2 and IRIS bits are utilized as sensor interface.

Along quick urbanization, influencing the urban areas to brilliant moves toward becoming basic. Most would agree, WSN is developing into the IoT. As a result, the WSN testbed exercises of the most recent decade have given profitable data about the design, security, systems administration, and information taking care of basic to expansive scale IoT implementation.

With fast advancement in the rising IoT innovation, we give, in this paper, a far-reaching outline of building up a keen city utilizing IoT, which is really inspired and emphatically requested from city boards as they look to guarantee the arrangement of fundamental administrations and personal satisfaction for city occupants. In this specific situation, we recognize the key IoT building pieces of brilliant urban areas, and in addition give the methodologies and resolutions to meet their particular correspondences, figuring, and calculation prerequisites.

V. CONCEPTUAL MODELING FOR SMART CITIES

We thought about the circumstance of a Smart City organizer, in charge of arranging, administration and working a Smart City. We determined various situations, concentrating on undertakings of the Smart City organizer and adjusted them to the exploration structure. The basic objectives were to acquaint understudies with the Smart Cities space, to control them through an activity of "abstracting" this space, where they have to detach some important ideas/properties for a given situations to control them through an activity of formally and graphically speaking to this deliberation by planning an area particular demonstrating dialec, to make them mindful of various methods for how the model substance might be prepared (questions, reenactment) and how this genius cessing relies upon a formal meta model, to control them through executing all these in a devoted stage that permits quick prototyping and additionally spryness. So as to help the Smart City organizer in planning a marathon, ideas of a Smart City that are applicable for the marathon should be incorporated into an applied demonstrating dialect. This incorporates e.g., sensor information that tracks the nature of the air, the movement volume in the city, and information about the people on foot (volunteers, members, onlookers).

VI. INTEROPERABILITY AND OPEN STANDARD DEVELOPMENT

With the ubiquity of IoT gadgets, numerous IoT conventions and norms have been produced. As opposed to common PCs, IoT gadgets are regularly compelled with regards to memory space and handling capacity. Also, IoT gadgets may be sent where there's constrained or no access to consistent power supply, which implies that they have to work under power provided from batteries or little sun oriented boards. As an outcome, control productive correspondence professional tools with little memory impressions what's more, constrained requests on preparing have been created to help IoT gadgets.

Be that as it may, utilizing open models doesn't naturally bring about open frameworks. In our unique situation, an open sys- tem implies an incorporated open IoT framework answer for keen cities, giving access to open information and APIs for cloud administrations. In numerous cities, that framework will be paid for, in any event to some degree, by the city specialists utilizing open subsidizing. To propel this venture, and get the most advantage for society, we contend that any savvy city IoT foundation should be a really open framework, where hardware from numerous merchants can be utilized, and where the produced information can be pretty much uninhibitedly utilized by anybody to grow new administrations, in view of low-level and also prepared sensor and IoT information.

The vision of the "brilliant city," making utilization of the IoT to give serindecencies for the benefit of natives and open specialists, guarantees arrangements to some of the present societal difficulties for example, air quality, transportation, also, vitality productivity. These IoT system must be founded on open information and open benchmarks, including conventions what's more, interfaces, so the frameworks empower outsider advancement in new benefits, and to maintain a strategic distance from merchant secure. Institutionalized conventions won't not be enough to accomplish these objectives-systems must be outlined with transparency as a primary concern at all levels.

VII. REASONABLE MODELING FOR SMART CITIES

We thought about the circumstance of a Smart City organizer, in charge of arranging, administration

and working a Smart City. We indicated numerous situations, concentrating on errands of the Smart City organizer.

Keeping in mind the end goal to help the Smart City organizer in outlining a marathon, ideas of a Smart City that are pertinent for the marathon should be incorporated into a theoretical displaying dialect. This incorporates e.g., sensor information that tracks the nature of the air, the movement volume in the city, and information about the people on foot (volunteers, members, observers).

VIII. USES OF MOVEMENT ANALYTICS IN THE CONTEXT OFSMART CITY

Versatility is a natural piece of a shrewd city.The utilize of the data about clients' follows and their development history is multi-faceted. Finding the correct devices for the gathering, understanding, examination, perception and semantic handling of client movement information is a critical advance towards growing better Area Based Services, which will add to the end- clients prosperity and towards a connecting with savvy city that puts the natives first. Individuals spatiotransient setting and history of developments offer critical data to help an assortment of administrations and applications, from better confinement to individual colleague and illness counteractive action. The exploration around there is multi-disciplinary and wide-enveloping. Our paper pointed at giving some brought together diagram of the diverse parts of the development investigation with regards to keen urban areas, by underscoring the open-get to part of such an examination and by giving an accumulation of versatility models, open-get to repositories, accessible stages and over a wide span of time consortium ventures.

IX. CONCLUSION

The outcome of these studies related to different home automation systems surveyed indicate their use of IOT technology for smart home lighting automation,it along with this each methodology in mentioned with their pros and cons centrically measured are discussed there is good scope for research in the area as future society is predicted to IOT.IOT driven lighting based system are most suitable for elderly and handicapped people they can control the appliances by just saying commands remotely from their places.GSM and GPS based home automation system and different researchers architecture of lighting systems is also studied ,according to this system user can control and monitor the home light appliances by sending a text message from the mobile phones.IOT based home automation design is discussed in this paper. further, it can be implemented as wireless network inside this wireless network user can have full remote-controlled access of all home appliances.

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Multipurpose Robot for Agribusiness Utilizing Android Smartphone

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ABSTRACT

The paper aims on the design, development & the fabrication of the robot which can put the seeds, plough the land, cut the grass and irrigate the land. These whole systems of robot draws energy from solar panel and as an alternative battery is also used . In India near about 70% people dependent on agriculture. So the agriculture system in India should be advanced to reduce the efforts of farmers. Various operations are performed in the agriculture field like seeding, grass cutting, plowing ,irrigating etc. Very basic operation is seeding, plowing & grass cutting. But the present method of seeding, plowing & grass cutting are problematic. The equipment's used for seed sowing are very difficult and inconvenient to handle. So there is a need to develop equipment which will reduce the man power. The machine can be advanced for sowing seeds in farm with particular distance between seed is adjusted. Hindrance locator sensor is utilized to identify diverse obstruction in the way of the robot. In the event that any obstruction is distinguished in the way of the robot the data of the snag is sent to the client. Moisture sensor is used to detect soil moisture, when it reaches threshold or below irrigation is carried out. In this paper robot direction is provided by using Software programs.

Keywords: Agriculture Machinery, Bluetooth, Robotics.

I. INTRODUCTION

Agriculture is the main occupation. So this system in India should be advanced to reduce the efforts of farmers. Agriculture is the cultivation and breeding of animals, plants and fungi for food, fiber, bio fuel, medicinal plants and other products used to sustain and enhance human life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. The study of agriculture is known as agricultural science. The history of agriculture dates back thousands of years, and its development has been driven and defined by greatly different climates, cultures, and technologies. Industrial agriculture based on large-scale monoculture farming has become the dominant agricultural methodology. The machine can be advanced for sowing seeds in farm with particular distance between seed is adjusted. It cans automatically sowing seed in land. The basic requirements of this machine for small scale cropping, they should be suitable for small farms, simple in design and technology and versatile for use in different farm operations. An automatically operated template row planting will be designed and developed to improve planting efficiency and reduce drudgery involved in manual planting method. Seed planting is also possible for different size of seed at variable depth and space between two seeds. In the present era the vast majority of the

nations don't have adequate talented labor particularly in agrarian area and it influences the development of creating nations. So it's an opportunity to computerize the area to defeat this issue. Remote control applications, all things considered, seem to an ever increasing extent, particularly in farming. Industry assumes an essential part. Presently a day's Robotics is a piece of today's correspondence and correspondence is a piece of progression of innovation, so chosen to take a shot at Robotic field, and plan something which will make human life today's perspective. There are distinctive sorts of portable robots which can be separated into a few classifications comprises of wheeled robot, creeping robot and legged robot. This venture manages a wheeled self-sufficient Robot. It is the piece of Automation; Robot has adequate knowledge to cover the most extreme territory. This venture work depicted here is very helpful in the rural fields. The venture points on the plan, advancement and manufacture of the exhibition unit of the venture "multipurpose robot for agribusiness utilizing android smartphone"

II. RELATED WORK

In olden days technology was not developed that much. So they were seeding by hand in sunlight In the field of Agriculture various problems are faced by the farmers. Nowadays seed sowing is done either manually or by tractors. Manual method includes broadcasting the seeds by hand. Sometimes method of dibbling this is making holes and dropping seeds by hand is used. Plowing or Furrowing is one of the means in cultivating. Amid this procedure we till the land and make it prepared for the seed sowing. By working we imply that furrow will be utilized which will have teeth resembles structure toward the end and will have the capacity to turn the top layer of soil down and bad habit versa. In the field of horticulture different issues are confronted by the ranchers in the operation like furrowing, seeding and so on. Additionally the types of gear used to play out the operation are overwhelming and hard to deal with. Grass cutting is the fundamental operation in development. The primary piece of the grass cutting machines are DC engine, transfer for controlling engine. The grass cutting is giving a rapid turn to the sharp edge, which cuts the grass. The edge will get motor vitality while expanding the RPM. The supplies are badly arranged to deal with. So there is a need to create hardware which will diminish the endeavors of agriculture.

III. PROPOSED SYSTEM

The Block graph for the most part contains ultrasonic sensor, Bluetooth module, microcontroller, L293, LCD and Power supply. These modules are incorporated to do a solitary assignment. The proposed framework is controlled with Renesas 64 stick microcontroller. Here, Bluetooth will send the contribution to the microcontroller. Microcontroller takes just advanced info. Robot machine can't read computerized input so L293 is a Motor driver circuit that believers advanced flag to simple or mechanical info. Engines are appended to robot machine that is controlled by driver circuit. To do development, engines are required. Driver circuit is utilized to control speed. In Seeding valve there is opening and shutting development. At right position it will open and close, will settle some deferral. Ultrasonic sensors will detect the obstacle .Grass cutting is finished by engines. Transfer is an exchanging operation and furrowing is performed.

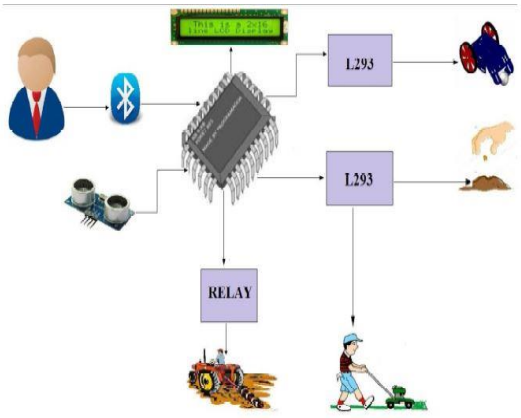

Fig 1 Block diagram of System model

SOFTWARE

Cube suite +.

Embedded C.
Renesas flash tool.

HARDWARE

It is the level integration of the hardware components into android application. Here using Renesas microcontroller interacting between all modules. Bluetooth (HC-05) will be given to communicate with the robot. Ultrasonic sensor (HC-SR04) will detect the obstacle on both left and right side.. The complete project will be displayed on LCD screen. 12v Power supply is provided to drive Motor and Microcontroller; drivers are used to control the speed movement of the robot.

IV. PROPOSED METHODOLOGY

Bluetooth module HC-05 Bluetooth is a serial port convention module. It is a simple to utilize "Bluetooth" and intended for straightforward remote serial association setup.HC05 Bluetooth module was associated with the same microcontroller to set up a duplex correspondence channel amongst itself and the android advanced Mobile Phones.

Figure 2. Bluetooth Module.

Ultrasonic Sensor module HC-SR04 ultrasonic sensor is used. The module naturally send wave and distinguish the deterrent and how far it is. Supply voltage will be given 5v. This is eye of the robot. The Ultra-sonic sensor is a gadget you can use with the BASIC Stamp to gauge how far away a protest is. With a scope of 3 centimeters to 3.3 meters, it's a shoe-in for any number of mechanical autonomy and ventures. It's likewise surprisingly precise, effortlessly distinguishing a protest's separation down to the half centimeter.

Figure 3. Ultrasonic sensor.

Flowchart of the overall System

Figure shows the flow of events in overall system. The user activates Bluetooth Once connection is established user select any of the operation like seeding, plowing and grass cutting is performed until the stop signal is received

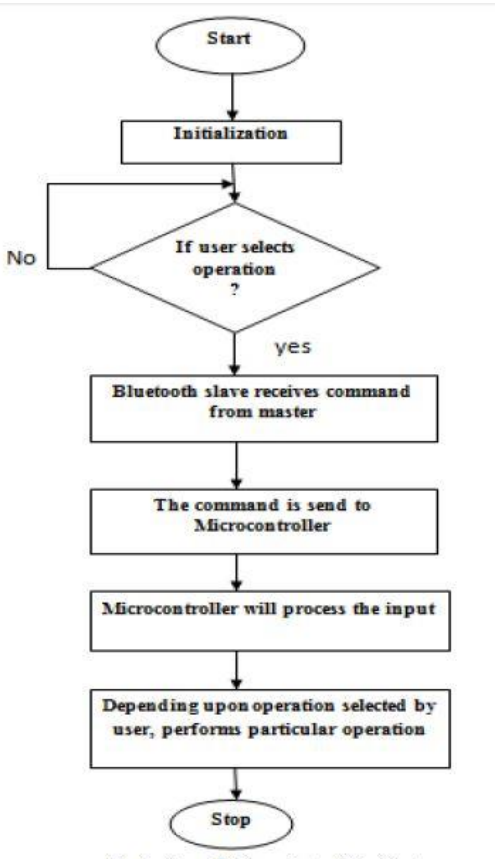

Fig 4: Overall Flowchart of the System

V. RESULT

Bluetooth is utilized to communicate with robot through android and send the charges to the Microcontroller. As per the guidelines given by the client the robot move in forward, turn around, left

and right bearing to drop the seeds at a specific position. Four wheels are associated at the base for the adaptable development of robot. Two DC engines are utilized to drive the wheels associated with the robot. L293D is utilized to drive the DC engines. Hindrance locator sensor is utilized to identify diverse obstruction in the way of the robot. In the event that any obstruction is distinguished in the way of the robot the data of the snag is sent to the client through remote association. In Seeding engines are utilized to drop a seed one by one. Grass cutting is finished by engines. Transfer is an exchanging operation and Furrowing is performed.

Fig 5: Snapshot of Overall Robot Model

VI. CONCLUSION AND FUTURE WORK

The system is beneficial to the farmers for the basic seed sowing operation. The mode of operation of this machine is very simple even to the lay man. Low germination percentage leading to wastage of seeds can be reduced by the use of this system. Creation of gap due to non-germination of seeds can be avoided. Total yield percentage can be increased effectively. Labor problem can be reduced. As compared to manual & tractor based sowing time, energy required for this robot machine is less. Also wastage of seed is less. So this system will be a better option for the farmers who want to perform the basic operation in a well organized manner. To make the system applicable for real time purposes components with greater range needs to be implemented.

In future, this project can be taken to the product level. To make this project as user friendly and durable, I need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system. Solar panel can be provided for minimize the usage of renewable sources. Bluetooth can be replaced by GSM, Zigbee for longer distance. And can use camera for video interaction which will detect the obstacles during seed sowing. Smart robots can be used which will work automatically for sowing the seeds without use of human interaction. It also includes the weeding and harvesting in this system.

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Malware Detection Using Machine Learning

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ABSTRACT

Malware is any software or a computer program that performs malicious actions on a legitimate user's computer system such as information stealing and spying. While the number of malware attacks is rapidly increasing, the major task of cyber security is to protect computer systems from malware attacks which can be done through efficient malware detection. Currently used signature-based methods for malware detection do not provide accurate results in the case of polymorphism or zero-day attacks. Hence, this paper focuses on detecting malware using machine learning techniques. A program can be trained to identify if certain software is malicious or not. By using a Python script, we train a classifier such that it can detect whether Portable Executable (PE) format files are malicious or non-malicious. Five different classification algorithms – Gaussian Naive Bayes, AdaBoost, Gradient boosting, Decision tree, Random Forest classifiers are applied and the best classifier is chosen for prediction by comparing their results in terms of accuracy. The overall best performance is expected to be given by Random Forest classifier with accuracy above 95%.

I. INTRODUCTION

With the growth of the Internet, malware has become one of the major cyber threats nowadays. Malware, or malicious software, is any program or file that disrupts a computer system by performing malicious actions such as information stealing, spying, espionage. Kaspersky Labs define malware as "a type of computer program designed to infect a legitimate user's computer and inflict harm on it in multiple ways." While the diversity of malware is increasing, anti-virus scanners cannot fulfil the demands of security, resulting in millions of PCs being attacked. According to a survey conducted by Kaspersky Labs in the 2016, more than 6 million different hosts were attacked and around 4 million malware objects were identified.

Adding to the increase in malware attacks, and because of the high availability of anti-detection techniques and online attacking tools, the skill level that is required to write a malicious code or build a software that contains malware is decreasing,. Hence, it is very necessary to protect computer systems from malware attacks as even a single attack can result in data leaks and irreversible loss.

The main agenda of this technical paper is understanding the various types of malware, analysis of these malwares, and detection methods.

II. TYPES OF MALWARE

Before dealing with malware analysis and detection, it is important to know the various types of malwares that are at large in the world today. The classes are as follows:

1. Virus - This is the simplest form of software. It is any piece of software that is loaded and launched without user's permission while reproducing itself or infecting (modifying) other software.
2. Worm - This malware type is very similar to the virus. The difference is that worm can spread over the network and replicate to other machines.
3. Trojan - This malware class is used to define the malware types that aim to appear as legitimate software.
4. Adware - The only purpose of this malware type is to display advertisements on the computer. Often adware can be seen as a subclass of spyware and it will very unlikely lead to dramatic results.
5. Spyware - As it implies from the name, the malware that performs espionage can be referred to as spyware. Typical actions of spyware include tracking search history to send personalized advertisements.
6. Rootkit – It's functionality enables the attacker to access the data with higher permission than is allowed. Root kits always hide its existence and quite often are unnoticeable on the system, making the detection and therefore removal incredibly hard.
7. Backdoor - The backdoor is a type of malware that provides an additional secret "entrance" to the system for attackers. By itself, it does not cause any harm but provides attackers with broader attack surface. Because of this, backdoors are never used independently. Usually, they are preceding malware attacks of other types.
8. Keylogger - The idea behind this malware class is to log all the keys pressed by the user, and, therefore, store all data, including passwords, bank card numbers and other sensitive information .
9. Ransomware - This type of malware aims to encrypt all the data on the machine and asks the victim to transfer some money to get the decryption key. Usually, a machine infected by ransomware is "frozen" as the user cannot open any file, and the desktop picture is used to provide information on attacker's demands.

III. MALWARE ANALYSIS AND DETECTION

All malware detection techniques can be divided into signature-based and behaviour-based methods. Before going into these methods, it is essential to understand the basics of two malware analysis approaches: static and dynamic malware analysis. As it implies from the name, static analysis is performed "statically", i.e. without execution of the file. In contrast, dynamic analysis is conducted on the file while it is being executed for example in the virtual machine.

Static analysis often relies on certain tools. Beyond the simple analysis, they can provide information on protection techniques used by malware. The main advantage of static analysis is the ability to discover all possible behavioral scenarios. Static analysis is safer than dynamic, since the file is not executed and it cannot result in bad consequences for the system. On the other hand, static analysis is much more time-consuming. Because of these reasons it is not usually used in real-world dynamic environments, such as anti-virus systems, but is often used for research purposes.

In dynamic analysis, unlike static analysis, the behaviour of the file is monitored while it is being executed and the properties and intentions of the file are inferred from that information. Usually, the file is run in the virtual environment, for example in the sandbox. During this kind of analysis, it is possible to find all behavioral attributes, such as opened files, created mutexes, etc. Moreover, it is much faster than static analysis. On the other hand, the static analysis only shows the behavioral scenario relevant to the current system properties.

Now, with the knowledge of malware analysis, malware detection methods can be defined. The

signature-based analysis is a static method that relies on predefined signatures. These can be file fingerprints, SHA1 hashes, static strings, file metadata. The scenario of detection, in this case, would be as follows: when a file arrives at the system, it is statically analyzed by the antivirus software. If any of the signatures is matched, an alert is triggered, stating that this file is suspicious. Often this kind of analysis is enough since well known malware samples can be detected based on hash values.

However, attackers started to develop malware in a way that it can change its signature. This malware feature is referred to as polymorphism. Such malware cannot be detected using purely signature-based detection techniques. Moreover, new malware types cannot be detected using signatures, until the signatures are created. Therefore, anti-virus vendors had to come up with another way of detection – behaviour-based also referred to as heuristics-based analysis. In this method, the actual behaviour of malware is observed during its execution, looking for the signs of malicious behaviour: modifying host files, registry keys, establishing suspicious connections. By itself, each of these actions cannot be a reasonable sign of malware, but their combination can raise the level of suspiciousness of the file. There is some threshold level of suspiciousness defined, and any malware exceeding this level raises an alert.

The accuracy level of heuristics-based detection highly depends on the implementation. The best ones utilize the virtual environment, e.g. the sandbox to run the file and monitor its behaviour. Although this method is more time consuming, it is much safer, since the file is checked before actually executing. The main advantage of behaviour-based detection method is that in theory, it can identify not only known malware families but also zero-day attacks and polymorphic viruses. However, in practice, taking into account the high spreading rate of malware, such analysis cannot be considered effective against new or polymorphic malware.

Malware detectors that are based on signatures can perform well on previously-known malware, that was already discovered by some antivirus vendors. However, it is unable to detect polymorphic malware, that has an ability to change its signatures, as well as new malware, for which signatures have not been created yet. In turn, the accuracy of heuristics-based detectors is not always sufficient for adequate detection, resulting in a lot of false-positives and false-negatives.

Need for the new detection methods are dictated by the high spreading rate of polymorphic viruses. One of the solutions to this problem is reliance on the heuristics-based analysis in combination with machine learning methods that offer a higher efficiency during detection.

IV. FEATURE SELECTION

In the domain of machine learning, feature selection, also called as variable selection, attribute selection or variable subset selection, is the process of selecting a subset of relevant features for use in model construction. Feature selection methods are used for 4 purposes:

- ✓ simplification of models to make them easier to interpret by researchers/users,
- ✓ reduced training times,
- ✓ enhanced generalization by reducing overfitting.

The primary concern when using a feature selection technique is that the data may contain many features that are either redundant or unnecessary, and can thus be discarded without facing much loss of information. Redundant or unnecessary features are two distinct notions, since one necessary feature may be redundant in the presence of another necessary is strongly inter-dependant distinct notions, since one necessary feature may be redundant in the presence of another necessary feature with which it is strongly dependant.

The three main categories of feature selection algorithms are wrappers, filters and embedded methods.

In wrapper methods, we try to use a subset of features and train a model using them. Based on the inferences that we draw from the previous model, we decide to add or remove features from your subset. The problem is essentially reduced to a search problem. These methods are usually computationally very expensive.

Filter methods are generally used as a pre-processing step. The selection of features is independent of any machine learning algorithms. Instead, features are selected on the basis of their scores in various statistical tests for their correlation with the outcome variable. The correlation is a subjective term here. Embedded methods combine the qualities of filter and wrapper methods. It's implemented by algorithms that have their own built-in feature selection methods.

1) DebugSize: Denotes the size of the debug-directory table. Usually, Microsoft-related executable files have a debug directory. Hence many clean programs may have a non-zero value for DebugSize.

2) ImageVersion: Denotes the version of the file. It is user definable and not related to the function of the program. Many clean programs have more versions and a larger image-version set. Most malware have an ImageVersion value of 0.

3) IatRVA: Denotes the relative-virtual address of the import-address table. The value of this feature is 4096 for most clean files and 0 or a very large value for virus files. Many malware may not use import functions or might obfuscate their import tables.

4) ExportSize: Denotes the size of the export table. Usually, only DLLs, not executable programs, have export tables. Hence the value of this feature may be non-zero for clean files, which contain many DLLs, and 0 for virus files.

5) ResourceSize: Denotes the size of the resource section. Some virus files may have no resources. Clean files may have larger resources.

6) VirtualSize2: Denotes the size of the second section. Many viruses have only one section and the value of this field is 0 for them.

7) NumberOfSections: Denotes the number of sections. The value of this feature varies in both virus and clean files and it is not clear from inspection how this feature helps separate malware and clean files.

V. MODEL SELECTION BY ALGORITHM COMPARISON

Selection of candidate model to find .optimal classifier among the following algorithms.

Gaussian Naive Bayes - Naive Bayes is the classification machine learning algorithm that relies on the Bayes Theorem. It can be used for both binary and multi-class classification problems. The main point relies on the idea of treating each feature independently. It evaluates the probability of each feature independently, regardless of any correlations, and makes the prediction based on the Bayes theorem.

AdaBoost – AdaBoost, short for adaptive boosting, is a machine learning algorithm that can be used in conjunction with other machine learning algorithms to enhance the performance. The output of the other learning algorithms is combined into a weighted sum that represents the final output of the boosted classifier.

Gradient Boosting – Gradient boosting is a machine learning technique which produces a prediction model in the form of an ensemble of weak prediction models, typically decision trees. It builds the model in the same way the other boosting methods do.

Decision trees - Decision Trees are a type of Supervised Machine Learning where the data is

continuously split according to a certain parameter. It tries to solve using a tree representation where each internal node corresponds to an attributes and each leaf node corresponds to class label. The goal is find the most accurate result with least number of decisions.

Random Forest – Random forest is a supervised classification algorithm. It is basically a collection decision trees. There is a direct relationship between the number of trees in the forest and the result it can get: larger the number of trees more accurate the result.

VI. CONCLUSION

A large number of malicious attacks have been reported in recent days. Machine learning can be another approach to deal with evolving malicious attacks. In this paper, Random Forest algorithm has been used for feature selection. The above mentioned features have been selected as feature subset. The dataset is fit onto five classification algorithms and the results are compared measuring the accuracy. The overall best performance is expected to be given by Random Forest classifier with accuracy above 95%.

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A Survey on Sentiment Analysis and It's Applications

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ABSTRACT

Sentiment analysis refers to one of the particular task which is included under natural language processing and it's used to determine whether a piece of text contains some of the subjective information or not. And if there existany subjective information then it expresses whether the attitude behind the text is positive, negative or neutral. Understanding the opinions of other people will be of great help for commercial as well as for political use and also among others fields. Sentiment analysis, sometimes also known as "opinion mining" will let us know if there is been any change in public's opinion towards any of the aspect's regarding to business or any other areas. By obtaining the customer's feedback over the business regularly, one can improve the quality of service if required. Therefore, Sentiment analysis is said to be not a once done effort. In this paper, we have carried out a survey on Sentiment analysis, it's application's, challenges facing it, available tools and techniques implemented in this area.

Keywords: Sentiment analysis, Social Media, Sentiwordnet, StanfordCore, WEKA,Naive Bayes.

I. INTRODUCTION

Sentiment analysis also known as opinion mining is a process by implementing which we can analyze people's opinions, sentiments, evaluations, attitudes, and emotions.[1]It is one of the most active area which is used and implemented among the different research fields like natural language processing and it is also widely studied in data mining, Web mining, and text mining.Now a days Sentiment analysis has become a very important part in our day to day life therefore, the growing importance of sentiment analysis coincides with the growth of an individual along with social media's such as reviews, forum discussions, Twitter and also includes many other social networks.In order to take any decision sometimes we often seek out the opinions of others. This is true not only for individuals regarding to their personal or professional life but also it includes different business organizations and various other fields where we seek out for others opinion[1][2].Therefore, Sentiment analysis is said to be a process which is being implemented in almost every business and social field because, opinions are said to be the key factor to almost allhuman activities and are also said to be the key feature of human behaviors.Understanding the mood of humans is said to be very useful in many of the instances.Sentiment of any particular type of an entity can be very easily determined using different types of classification techniques, which are as described in below part of the paper. The advancement which have been made in some of the social networking medias like YouTube, has provided an opportunity for people in order to share their opinions in the form of audio, video, image, as well as in the form of text. Therefore,

we can say that sentiment analysis can be implemented not only on text input, but also it can be done on audio, video as well as on the image inputs.

Figure 1a. Sentiment Analysis

II. APPLICATIONS

Sentiment analysis, which plays a major role in today's technological world,has beenimplemented vastly in different fields. Therefore we can say that the applications for sentiment analysis are endless. [3]More and more we use the concept of sentiment analysis mainly in the field of social networking areas. However, apart from the social networking areas we use it in business analytics and also in certain situations where different forms of textsare needed to be analyzed, for the sentiment in it. In today's world Sentiment analysis is in demand because of its efficiency. By using the concept of sentiment analysis thousands of text documents can be processed at a time in order to detect for the sentiment in it.This particular process can be carried out in seconds of time rather than taking hours to complete it, by including the group of people who can manually carry out the complete process without any interruption[3][4]. Hence,due to its efficiency sentiment analysis has been utilized by many of the business organization in order to improve their quality of services.

The following are some of the areas where sentiment analysis is used and implemented:

1. BUSINESS

Sentiment analysis can be used in the field of business in order to provide the valuable insights representing that how people feel about the product brand as well as the service's provided by that particular business organization.In this case sentiment Analysis is said to be very helpful for the business organization in order to know and to identify the quality of their own products, which is determined based on the customer's feedback, where the feedback of the customer can either be positive, negative or neutral.

Therefore the main objective of using sentiment analysis in the field of business, by a particular organization is to find out the better ways in order to improve their quality of current services and to focus on negative feedbacks in order to work on it.

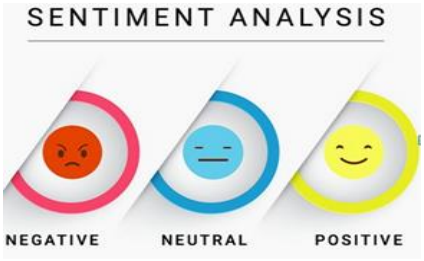

Figure 1b. Represents Different Opinions of People

2. SOCIAL NETWORKING MEDIAS

Apart from the business field sentiment analysis is mainly used in social networking areas in order to identify the spikes in sentiment (i.e., used to classify among the different opinions shared by people on the social media's). People now a day's expresses their feelings (i.e.,either positive or negative) regarding to government or any other organization or which can also be related to their personal life through the social networking sites.

Therefore, sentiment analysis plays a key role in classifying the different opinions of people that are expressed through social media's.

Figure 1c. Sentiment Analysis in the Field of Social Networking Areas

3. MARKETING

The very next important field where sentiment analysis implemented is in the field of marketing. In this particular fieldsentiment analysis is majorly used by the group of people who have involved themselves in the marketing area, where they implement the concept of sentiment analysis in order to determine the need of a customer by analyzing which they can manufacture new product's, that satisfies the customer needs. And also they gather different opinions and feedback from the people in order to improve the quality of product and their service.

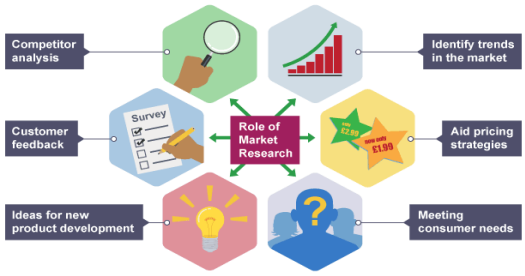

Figure 1d. Implementation of Sentiment Analysis in Marketing Field

4. ON-LINE ADVERTISING

Online advertising, where in case of social media's, an organisation may place an advertisement which could be favourable and provide a good review of a product but sometimes in order to promote their product they may de-promote the other products by giving a bad reviews over the other products.

Therefore, the major concept involved or used here is sentiment analysis where people are going to analyse which product to be bought based on the reviews given to the products.

5. MEASURING CUSTOMER SATISFACTION

When a particular product is developed or manufactured by an organization, the main intention behind this will be to satisfy the customer need. Any particular product or an item will be developed based or depending on the customer's needs and feedback.Hence, sentiment analysis is the major concept used by any organization in order to measure the level of customer satisfaction regarding to their products.For example, A Company may make an update to the product which is manufactured by them.By measuring the reactions of people through the process of sentiment analysis, the company can determine whether their customers took the update positively or negatively i.e., they determine whether the updated product will satisfy the customer needs or not.

III. CHALLENGES

Sentiment analysis is a particular term used for representing the large number of opinions and some of the tasks related to it, where each of the particular tasks go through their own unique challenges[6].

Firstly, the major challenge associated in the field of sentiment analysis is that, people who go through the sentiment analysis approach should be of open minded about their findings. As we know that sentiment analysis is a process, after going through which one can analyze the emotions as well as the thoughts of others which may sometimes hurt one's personal feelings or emotions. Therefore, one must be strong enough to take all opinions and feedback from people, which may be either positive or negative.Sentiment analysis, sometimes may be referred to as unambiguous process, but by having a closer view sometimes it becomes possible in order to identify or to determine how sentiment can be associated with any of the entities like the speaker or writer, the reader or listener, or any other entities.

Sometimes there may arise several situations where it becomes more difficult to determine whether the sentiment of the speaker is as same as in the situation or not. Consider the following statement given by a speaker;

Statement:"The dancer died due to a massive heart attack"!

The statement above represents a negative event i.e., death of a person, but by this statement it's not clear that whether the speaker is saddened by the event or not, i.e., we cannot identify the sentiment of speaker by referring to above statement.

Sometimes it becomes very difficult in order to analyze the sentiment of people in such particular situation when people react differently over the same utterance, where it becomes very hard to conclude the sentiment associated with respect to that particular situation.

Example: Consider a debate competition, on given a particular topic the teams will give different opinions over the same topic regarding to its pro's and con's which finally becomes hard to identify the sentiment associated with that topic.

Apart from the above challenges there exist another key challenge which is associated with sentimental analysis and it's termed as Named Entity Recognition – where the challenge associated here is to identify what the person is talking about.Example: Consider the following statement: "We watched the movie and went to dinner; it was awesome!"

In the above statement it's not specified that for what the term 'it' refers to(i.e., it's not clear that whether the term awesome is mentioned for the movie or for the food). Such type of challenge associated with respect to sentiment recognition, in case of sentiment analysis is referred to as "named entity recognition problem".

IV. TOOLS

The choice of which tool to be used and at what situation it should be used will be based on or it will be depended upon the specific problem that we are dealing in the field of Sentiment Analysis [7][8].There are many tools that are available for sentiment analysis among which some of them are mentioned as follows:

SENTIWORDNET: It's is one of the tool used in sentiment analysis for sentiment classification and it is completely based on the quantitative analysis approach and is freely available for research purposes, as well as it is included with a Web-based graphical user interface[GUI].

Itis a type of lexical resource which is widely used for opinion mining and it mainly represents three sentiment scores: i.e., positivity, negativity, and objectivity [7]. The main feature of this tool is that it has a Web-based GUI, and it is freely available for research purposes.

WORDSTAT: Word Stat is one of the particular tool which is used and implemented in the field of sentiment analysis [7]. This tool includes more than 9164 negative word patterns and 4847 positive word patterns. Even though it contains these number of word patterns, the sentiment is not measured using these word patterns.

Negative sentiment is measured by using the following two rules i.e.,1)The first rule is negative words cannot be preceded by a negation within three words in the same sentence. 2) The second rule is that the positive words can be preceded by a negation within three words in the same sentence. The rules for the positive sentiment are the same: positive words cannot be preceded by a negation as well as negative terms following a negation.

STANFORDCORENLP: When we need any part of the speech categories, as well as any syntactic

analysis i.e., the phrase structure OR dependency analysis and also any part of the named entities in the form of text i.e., in the textual format, this type of tool is implemented in order to carry out the process mentioned above [7]. These type of tools are been used as potential features by the sentiment analysis research community.

WEKA:WEKA is one of the very important tool that used in the field of sentiment analysis.If we already have some amount of data where each of the data content is associated with a key feature then we can use a tool named WEKA for the purpose of clustering these parts of the data [7].
This tool is said to be very highly configurable and it's easy to use the GUI availability.

NLTK: If one knows python, which is one of the most important programming language used now a days then NLTK is said to be a very smart choice as it includes the functionalists of the above two tools ie STANFORDCORENLP and WEKA [7].

Other than this, using NLTK one can very easily implement some of the lexical resources like WordNet which is often required and used in the field of sentiment analysis.

V. TECHNIQUES

There are many ways available in order to implement Sentiment Analysis. Ultimately, sentiment analysis is said to be a type of text classification problem which can be mainly divided into two areas[9][10]:

A) Supervised Learning

This is one of the technique used in sentiment analysis, which is mainly used for the construction of a "Classifier". The particular type of Classifier which is constructed is said to be responsible for categorizing the texts into either a positive, negative or neutral polarity.The three main classification techniques that come's under supervised learning are as follow

- Naïve Bayes
- Maximum Entropy
- Support Vector Machines (SVM)

1. NAÏVE BAYES CLASSIFIER (NB)

The Naïve Bayes classifier is one of the very simplest as well as the most commonly used classifier. The Naïve Bayes classification model computes the probability of a class, based on the distribution of the words in the document. It uses Bayes Theorem to predict the probability, that a given feature set belongs to a particular label.

$$P(label \mid features) = \frac{P(label)*P(features \mid label)}{P(features)}$$

The Naïve Bayes theorem was discovered by an English Presbyterian and mathematician named as **Thomas Bayes**. *P*(*label*) is the prior probability of a label. *P*(*features*/*label*) is the prior probability which represents that a given feature set is being classified as a label. *P*(*features*) is the prior probability which represents that a given feature set is occurred. If we consider the Naïve assumption which states that all features are independent, then the equation above can be rewritten as follows:

$$P(label \mid features) = \frac{P(label)*P(f1 \mid label)*\ldots..*P(fn \mid label)}{P(features)}$$

2. Maximum Entropy Classifier (ME)

The Maximum Entropy Classifier (ME) is also known as a Conditional Exponential Classifier. It converts the labelled feature sets into vectors, using the encoding technique. This encoded vector is then used in order to calculate the weights for each feature which is then combined to determine the label for a feature set. This classifier is parameterized by a set of *X*{*weights*}, which is used to combine the joint features that are generated from a feature-set by an *X*{*encoding*}. Particularly, the encoding maps each *C*{(*featureset*, *label*)} is paired to a vector. The probability of each of the label is then calculated using the following equation:

$$P(fs \mid label) = \frac{dotprod(weights\ ,\ encode(fs\ ,\ label))}{sum(dotprod(weights\ ,\ encode(fs\ ,l))\ forlinlabels)}$$

3. Support Vector Machines Classifiers (SVM)

The major use of implementing the SVM classifier is to identify the linear separators, such that these of the separator's are used to separate the different classes.Example: consider the figure present below, there are 2 classes ie *x*&*o* and there are 3 hyper planes A, B and C. Hyper plane A provides the best separation between the classes, because the normal distance among any of the data points is the largest, so it represents the maximum margin of separation.

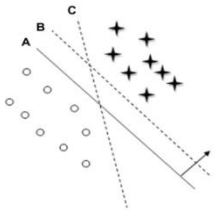

Figure 1e: Using Support Vector Machine on a Classification Problem

B) Unsupervised Learning: Unsupervised Learning consists of followingthree steps:

1. Implement thePOS tagging (Part of Speech), and then the two consecutive words are extracted in order to identify if their tagsconform to the given patterns or not.
2. Estimate the sentiment orientation of the extracted phrase.
3. Compute the average sentiment orientationof all phrases that were extracted in terms of positive or negative.

VI. CONCLUSION

Sentiment Analysis is the study of people's opinion, emotion or attitude towards an event, conversation on topics in general. Sentiment analysis which is also known as opinion mining is used in various applications, we use it to determine the mindset of humans based on their conversations with each other, in order to know the insights of one's business i.e., their quality of service and their products which is determined based on the customers feedback, When applied to social media channels, it can be used in order to identify the spikes in sentiment of the people, who expresses their opinion and feelings through social media channels.Sentiment analysis is a particular term used for representing the large number of opinions as well as some of the tasks related to it, where each of the tasks has its own unique challenges. In order to carry out the process of sentiment analysis in a perfect, as well as in a structured manner we use a number of tools in this field among which some of the tools are as mentioned and explained in the above part of the paper. Sentiment analysis, which is rather referred to as a text classification problem, utilizes many of the techniques in order to implement the process and to overcome the text classification problem.Sentiment analysis is done not only on text inputs, but it can also be implemented on audio, video and image inputs.

VII. ACKNOWLEDGEMENT

We are using this opportunity to express our gratitude to thank all the people who have contributed in some way to the work described in this paper. Our deepest thanks to our project guide Mr Hemanth Kumar A, Asst. Professor Dept. of Computer Science and Engineering, GMIT, Bharathinagar for giving timely inputs and giving us intellectual freedom of work.

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Android Application For Retail Stock Management

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ABSTRACT

"Retail Stock Management App" is an android application that comes with a set of features where retailer can manage sales, purchase and inventory though an Android device. The android application uses centralized SQL database so that retailer can access data from wherever he wants. A retailer can login to retail stock management application, can add products to the database and can manage sales. Retail stock management application comes with an enhanced feature called E-Billing, on sale–it enables retailer to send Purchase bill to the customer's E-mail directly. This application helps the retailer to upload the products by scanning the barcode using a mobile camera. The billing section has an addition of GST dashboard that has GST slabs for creating GST invoice to individual products. The retailer is alerted whenever the stock reaches a minimum number of requirement and if the product crosses the expiry date.

Keywords: Android application, Retailer, Centralized Sql, E-billing, Barcode-mobile camera, GST dashboard, Alert notification.

I. INTRODUCTION

Android Technology [4]booms the market beyond expectation. Android is one such technology which has greater future and much flexible for users and as well as developers. Most of the smart devices in the world running android gives additional advantage.

There are n numbers of ERP software for stock management which enable the retailer /shopkeeper to maintain stock in an efficient way. Majority of the software are desktop version which limits the mobility of the machine/device, retrieving/feed of data to the system is forced to happen at one place. "Retail stock management App" is an android application which enables retailer to upload product details to stock management database by just scanning the barcode of the product through mobile camera.[5]

The efficiency of a retail store is based on the retailer's ability to provide the right goods to the consumer, in the right quality, in the right quantity, at the right place and in right time. The entire process of retailing depends on the efficient inventory management.

Inventory management is one area that differentiates successful and unsuccessful retail stores. Inventory control is not just a materials management or warehouse department issue.

II. LITERATURE SURVEY

Over view of Android

Figure 1

[2]Android is an open source and Linux-based Operating System for mobile devices such as smart phones and tablet computers. Android was developed by the Open Handset Alliance-a consortium of hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices, led by Google, and other companies.

Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. In addition to touch screen devices, Google has further developed Android TV for televisions, Android Auto for cars, and Android Wear for wrist watches, each with a specialized user interface. Variants of Android are also used on notebooks, game consoles, digital cameras, and other electronics.

History of Android

The code names of android ranges from A to L currently, such as Aestro, Blender, Cupcake, Donut, Eclair, Froyo, Gingerbread, Honeycomb, Ice Cream Sandwich, Jelly Bean, KitKat and Lollipop. Let's understand the android history in a sequence.

Code name	Version number	Initial release date	API level
(No codename)[3]	1.0	September 23, 2008	1
(Internally known as "Petit Four")[3]	1.1	February 9, 2009	2
Cupcake	1.5	April 27, 2009	3
Donut[4]	1.6	September 15, 2009	4
Eclair[5]	2.0 – 2.1	October 26, 2009	5 – 7
Froyo[6]	2.2 – 2.2.3	May 20, 2010	8
Gingerbread[7]	2.3 – 2.3.7	December 6, 2010	9 – 10
Honeycomb[8]	3.0 – 3.2.6	February 22, 2011	11 – 13
Ice Cream Sandwich[9]	4.0 – 4.0.4	October 18, 2011	14 – 15
Jelly Bean[10]	4.1 – 4.3.1	July 9, 2012	16 – 18
KitKat[11]	4.4 – 4.4.4	October 31, 2013	19 – 20
Lollipop[13]	5.0 – 5.1.1	November 12, 2014	21 – 22
Marshmallow[15]	6.0 – 6.0.1	October 5, 2015	23
Nougat[16]	7.0 – 7.1.2	August 22, 2016	24 – 25
Oreo[17]	8.0 – 8.1	August 21, 2017	26 – 27
Android P	9		

Table 1

III. EXISTING MODEL

There are several ERP software (desktop/android) for retail stock management system.

1. Zoho Application

Figure 2

[6] Falls under both CRM and ERP category.It is a cloud-based inventory management software that helps to create and manage both sales and purchase order, and track the inventory.It also provides integration to other online sales channels.

2. Management System

Figure 3

Falls under ERP category.It is most complete management system made for android devices It

provides features like user management,internal messaging , products, reports an articles.

3. Effia Soft

Figure 4

[7] It falls under both CRM and ERP category. It is compatible for both windows and android. It provides comprehensive and affordable billing and ERP software such as billing, inventory , procurement and e-commerce application as service.

4. Stock Management System

Figure 5

It falls under ERP category.It is a fully secure inventory management app for retailer and wholesaler.It provides additional feature of internal backup.

IV. PROPOSED MODEL

- ✓ Add product :By scanning barcode of product through mobile camera.[5]
- ✓ E-billing: Retailer can send purchase bill to customer e-mail directly.[3]
- ✓ GST dashboard: Includes GST slabs for creating GST invoice for sales accurately in fraction of second using touch, barcode.
- ✓ Alert notifications.
- ✓ View inventory.
- ✓ User Login and Logout modules.

V. REQUIREMENT SPECIFICATION

Introduction

Software Requirement Specification is the starting point of the software development activity. It includes an introduction that gives the purpose, scope and an overview of the system. This needs requirement by talking to the people and understanding their needs. It also includes a general description of the product perspective, product function and certain user characteristics of the system. It also specifies the overall functional requirements, performance requirements and design constraints.

Software system requiremnet

- ✓ JDK 1.8
- ✓ IDE : Android Studio – (Intel IJ Platform) / Eclipse
- ✓ Android SDK versions 2.2, 2.3.3 and 3.x
- ✓ Android Development Tool (ADT)

Hardware system requirement

- ✓ Processor : Dual Core Onwards
- ✓ RAM : 4GB Onwards
- ✓ Hard disk space : 100GB
- ✓ Android Phone : V 4.4(Kit Kat) –API 19 Onwards

VI. SYSTEM DESIGN

Retail Stock App mainly consists only one actor, which is Retailer.

Retailer

By definition, a retailer, is an entity that sells goods such as closing or groceries or cars directly to consumers, through various distribution channels with the goal of earning a profit.

He works on all the modules as listed below.

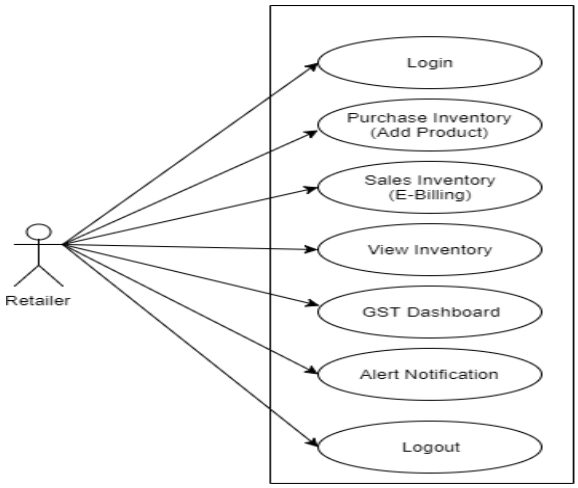

Figure 6

Login

This module helps the retailer to log into the application.This is supported by a unique user id and password which enables security for the application.

Purchase Invertory

Here,the products are added to the database by just scanning the barcode of the product through a mobile camera.In addition,the retailer also gets to know the number of products being purchased from the inventory.[5]

Sales Inventory

The number of sales can be viewed in this module.This module has an additional feature of e-billing which enables the retailer in sending the bill directly to the customers's mail.

View Inventory

This module helps to have a complete view of the inventory which includes the number of purchases,sales,quantity,expiry dates,profits and losses.

GST Dashboard

Here, the General Service Tax(GST) is calculated for each item individually based on the government norms during billing.This section can be updated as and when the government rules are changed.

Alert Notification

The retailer is notified whenever the stock of an item reaches the minimum amount of requirement or when the item crosses the expiry date.

Logout

This is the final module which ends all the processes by just coming out of the application.

VII. CONCLUSION

This paper briefs about the designing and technical details of Retail stock android Application. We presented information about the various modules involved in the App This Android Application would be more feasible to create a platform that connects wholesaler to their retailer.

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Automatic Dialect Classification using SVM

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ABSTRACT

Automatic Dialect Classification has attracted researchers in the field of speech signal processing. Dialect is defined as the language characteristics of a specific community. As such, dialect can be recognized by speaker phonemes, pronunciation, and traits such as tonality, loudness, and nasality. Dialect classification is a substantial tool in speech recognition and has the potential to improve the efficiency of Automatic Speech Recognition systems. This paper presents a study of different dialects in English language (American) and features that are useful for their classification. The experiment demonstrates that there are several features of the speech signal which are conducive for recognizing different dialects within a language such as chroma features and spectral features. Other speech features including MFCC and FDLP were also used with these features in order to improve the performance of the classifier. The supervised machine learning classifier that has been used in our research is the Support Vector Machine. Some refinements were introduced to the existing chroma feature extraction processes to make them more suitable for speech signal classification.

Keywords: Dialect classification, MATLAB R2014a, chroma features, spectral features, Support Vector Machine, MFCC.

I. INTRODUCTION

Dialect classification[9] is a substantial tool in speech recognition and has the potential to improve the efficiency of Automatic speech Recognition systems. In this study we employ the definition of dialect as a pattern of pronunciation and/or vocabulary of languages used by a community of native speakers belonging to the same geographical region. Due to such differences in dialects the same language has multiple versions across different regions around the globe. Dialect classification also plays a key role in characterizing speaker traits and knowledge estimation, which can then be utilized to build dynamic lexicons by selecting alternative pronunciations and generate pronunciation modelling via dialect adaptation. In this project we plan to study about different dialects in American English language and features that are useful for their classification. An experiment was conducted to demonstrate that there are several features of the speech signal which are conducive for recognizing different dialects within a language such as Chroma features[2] and spectral features[3], etc. Other speech features including MFCC[5] and FDLP[4] can also be used with these features in order to improve the performance of the classifier. Chroma features[2] can be primarily used to classify music signals into different genre of music but the process of separating frequencies into bins is also applicable for classifying speech signals. Some refinements can be introduced to the existing Chroma feature extraction processes to make them more suitable for speech signal classification.

A. Datasets

The first dataset used is a text dependent dataset which consists of total 9 dialect classes with 67 speech samples in each class. The second dataset is spontaneous or text independent dataset and contains 9 dialect classes with 72 speech samples in each class. The third dataset is "TIMIT dataset" and has 8 dialect classes from different regions of America. In this dataset the number of speech signal samples varies from one dialect class to another. TIMIT dataset is also text dependent but the variations between the dialects of different classes are very circumstantial and difficult to observe.

TIMIT is a corpus of phonemically and lexically transcribed speech of American English speakers of different sexes and dialects. Each transcribed element has been delineated in time. The corpus contains a total of 6300 sentences, 10 sentences spoken by 630 speakers selected from 8 major dialect regions of the USA. 70% of the speakers are male, 30% are female. The text corpus design was done by the Massachusetts Institute of Technology (MIT), Stanford Research Institute and Texas Instruments (TI). The speech was recorded at TI, transcribed at MIT, and has been maintained, verified and prepared for CDROM production by the American National Institute of Standards and Technology (NIST)

The dialect regions are:

- dr1: New England
- dr2: Northern
- dr3: North Midland
- dr4: South Midland
- dr5: Southern
- dr6: New York City
- dr7: Western
- dr8: Army Brat (moved around)

In our experiment we have ignored the dr1 since it belongs more to a British dialect.

II. METHODOLOGY

In the given Figure-1 input signal is from the datasets which has been explained in section II. The data is cleansed[1] and then the feature extraction phase starts where several features are extracted namely chroma features[2], MFCC/FDLP[5,4] features and spectral features[3], also named as other features here. Further proceeding in the experiment is the training and testing phase with the help of the SVM classifier[6,7]. The dialects are then suitably classified according to their dialects and the accuracy of the system is noted. The implementation has been done using MATLAB[10].

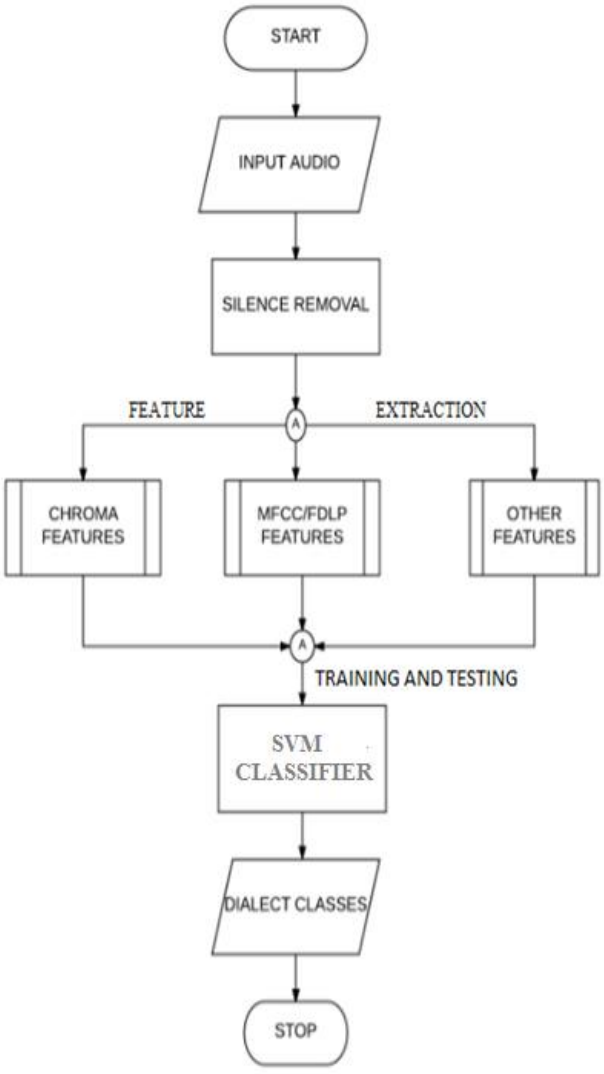

Figure 1. Flow of control of system

III. FEATURE EXTRACTION

A. Chroma Features

The primary aim of this experiment was to employ chroma features in our process of dialect classification. These features were originally built to classify music samples into different genre of music[2]. Due to its capability to use frequency bands for classification of signals it was quite practical to use them for dialect classification as well. People belonging to different regions intuitively use different proportions of these frequency bands in their regular speech. Therefore it is viable to distinguish between speech signals of different dialects on considerate observation of these frequency bands.

A total of 12 chroma features were extracted corresponding to the normalized energy of each of the frequency bins. It was later confirmed that only 10 such bins were enough for speech signal classification as the remaining 2 bins always remained unused for all the speech samples taken into consideration.The speech signal is first segmented into a number of frames and then the chroma features are extracted from all these frames.
After applying these changes it was found that the efficiency of classification process improved significantly in comparison to the previous version of the same features. A total of 20 features were extracted from the speech samples.

B. Other Features

Other than the chroma features, spectral features[3] were also involved in the classification process. These are obtained by converting the time based signal into energy domain using the Fourier transform. It includes energy entropy, spectral centroid, spectral entropy, spectral flux, spectral roll-off and harmonic features. These were used with chroma features in order to improve classification accuracy of the speech signal. A total of 16 such features were extracted from the speech samples.

C. MFCC Features

MFCC (Mel Frequency Cepstral Coefficients) features[5] are widely used in speech recognition process. MFCC are used because it is designed using the knowledge of human auditory system and is used in every state of speech recognition system. It is a standard method for feature extraction in speech recognition tasks.

They inherently have only 13 features but the deltas and delta-deltas which are also known as differential and acceleration coefficients are also extracted from the speech signal. The presence of these 26 extra features contributed from deltas and delta-deltas improve the performance of MFCC features. The MFCC vector describes only the power spectral envelope of a single frame, but speech also has information in the dynamics like the trajectories of the MFCC coefficients over time. Therefore it was found more profitable to calculate the MFCC trajectories and append them to original features. A total of 78 features were extracted from the speech samples.

D. FDLP Feature

FDLP(Frequency Domain Linear Prediction) features[4] have three different types. The first is FDLP-s features which are quite similar to MFCC features. These are alternatively used and compared against MFCC features throughout the experiment to find out which one of them is more suitable for dialect classification process. The second type of feature in FDLP is FDLP-m which are long term modulation features. The third variety in FDLP is FDLP-PLP features which are short term features resembling two PLP features. In our experiment, we have use FDLP-s features for the classification process. For FDLP-s a total of 78 features were extracted from speech samples.

IV. EXPERIMENTS AND RESULTS

A SVM model[6,7] was used for classification of speech signals into various dialects. Each of the

above mentioned datasets were divided into five equal parts and a 5 fold cross validation method was applied on them. Thus using 80% of data for training and remaining 20% of data for testing.

A. Selecting appropriate features

Initially a number of experiments were conducted on text dependent dataset over the choice of optimum features for dialect classification. The supervised machine learning classifier is the Support Vector Machine[6,7]. Experiments were done for folds=5 and folds =10. The results that are going to be discussed are for folds=5.

The first comparison was made to elect a set of chroma features from various chroma features and its derivatives available. This includes chroma features, CENS (chroma energy normalized statistics) and CRP (chroma DCT- reduced log pitch). The result of the experiment were as follows:

Table 1. Comparison between various chroma features for dataset 1(Text Dependent)

Feature Name	No. of Features	Accuracy(%)
CENS	24	64.667
CRP	24	45.21
Chroma	24	85.271

Table 2. Comparison between various chroma features for dataset 2(Text Independent)

Feature Name	No. of Features	Accuracy(%)
CENS	24	58.139
CRP	24	45.052
Chroma	24	69.767

The next comparison was between original chroma features and the modified chroma features to decide which of them was more suitable for speech signal classification. In the modified chroma feature extraction process the features corresponding to 4th and 7th class were removed as none of the frequency bands were assigned to those bins for any speech sample. The comparison between them can be observed from the following result:

Table 3. Comparison between original chroma features and updated features for dataset 1(Text Dependent)

Feature Name	No. of Features	Accuracy(%)
Chroma Original	24	85.271
Chroma Updated	20	95.16

Table 4

Feature Name	No. of Features	Accuracy(%)
Chroma Original	24	69.767
Chroma Updated	20	91.318

Table 4 Comparison between original chroma features and updated features for dataset 2(Text Independent) In the next comparison it is observed that text dependent dataset when MFCC features[5] combined with chroma[2] and spectral features[3] were more accurate than the FDLP-s features combined with chroma and spectral features whereas for the text independent[8] dataset MFCC features combined with chroma and spectral features were equally accurate as the FDLP-s features combined with chroma and spectral features. The accuracy of classification of speech signals into their dialect classes were observed as follows:

Table 5. Comparison between MFCC and FDLP-s features for dataset 1(Text dependent)

Feature Name	No. of Features	Accuracy(%)
MFCC(13)	26	37.818
MFCC(rasta)	78	67.5
FDLP-s	78	90
MFCC +chroma+Others	114	96.39
FDLP-s+ Chroma+Others	114	90.31

Table 6. Comparison between MFCC and FDLP-s features for dataset 2(Text Independent)

Feature Name	No. of Features	Accuracy(%)
MFCC(13)	26	84.03
MFCC(rasta)	78	95.8
FDLP-s	78	80.63
MFCC +chroma+Others	114	87.115
FDLP-s+ Chroma+Others	114	86.656

So our feature vector contained a total of 114 features including 78 MFCC or 78 FDLP-s features depending upon the dataset which the classification was taking place along with 20 chroma features and 16 other features.

The third dataset that is "TIMIT" dataset was also used for the classification process but since the dialect classes in that dataset were quite similar to each other the accuracy of classification of the speech samples were not impressive. The dataset consisted of different dialects from various regions of America. The following were the observed results with the selected feature sets:

Table 7. Comparison between various features for TIMIT dataset

Feature Name	Accuracy
MFCC(13)	19.7
MFCC(rasta)	22.9
Chroma(Original)	21.687
Chroma(Updated)	20.9
MFCC+Chroma+Others	20.482
FDLP-s	18.765
FDLP-s+Chroma+Others	21.205

In the initial stages of the experiment the number of folds being used was ten with the same number of features as mentioned in section (). But due to it's over-fitting behaviour it was superseded by five number of folds.

The most optimum features discussed in the report were selected from each of the experiments performed to ensure maximum possible accuracy of classification. After the set of features were finalised they were now used for dialect classification on the available datasets. The following observations were made about the performance of the selected feature sets on one text dependent and another text independent data set:

Table 8. Various datasets and their highest accuracy of classification

Dataset	Feature Name	No. of features	Accuracy (%)
Text Dependent	MFCC+Chroma+Others	114	96.39
Text Independent	MFCC+Chroma+Others	114	87.115

The results during the initial stages of the experiment where over-fitting occurred with folds=10.

The first comparison was made to select a set of derivatives of chroma features. This includes CENS (chroma energy normalised statistics) and CRP (chroma DCT-reduced log pitch). The result of the experiment were as follows, accuracy is mentioned in (%):

Table 9. Comaprison between various derivatives of chroma features for dataset 1(Text dependent) and dataset 2(Text independent)

Feature Name	Dataset 1- Accuracy(%)	Dataset 2- Acuuracy(%)
CENS	68.333	61.718
CRP	69.0	60.93

Table 10. Comparison between various features for dataset-1(text dependent), dataset-2(text indeoendent) and TIMIT dataset

Feature Name	Dataset 1-Accuracy(%)	Dataset 2-Acuuracy(%)	TIMIT-Accuracy(%)
MFCC(13)	96.562	98.33	97.2
MFCC(rasta)	92.83	87.187	93.915
FDLP-s	90.0	85.781	21.0
Chroma(original)	96.167	94.062	97.2
Chroma(updated)	95.667	91.876	97.6
MFCC+Chroma(updated)+Others	96.667	93.281	95.9
FDLP-s+MFCC+Others	96.718	97.187	20.487

V. CONCLUSION

A. Summary

Two different sets of features were constructed which were capable to classify a given speech signal into the dialect class it belongs to for American English language. Both these feature sets are useful on different types of datasets. In real life situations it is very unlikely to encounter such a dataset for training and testing, thus limiting its usage. Although it can be used in PDAs (Personal Digital Assistant) where the commands are limited and hence can be considered to be text dependent.

In the experiments it was found that FDLP-s are a great alternative of MFCC features. Using these set of features dialect class of any given speech sample can be found with high accuracy.

B. Limitations

The experiment had various limitations and attempts are needed in the process of overcoming them. The features selected were language specific and won't work for any given language with good classification accuracy. The third dataset having very similar dialect classes was not classified efficiently by the selected feature sets.

C. Future Scope

Some of the future works include finding a feature set that are language independent and hence are able to classify the dialects of any given language. It would be quite difficult to achieve as there are various different kinds of languages and a general dialect classifier should first identify the language (or at least the type of language) before attempting to properly classify it. Also the set of features finalized should be fixed for both text dependent and text independent datasets and should give a fairly good accuracy for all the cases.

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A Framework to Improve Network Performance by using Mobile Relay

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ABSTRACT

Ad-hoc networks are array of mobile nodes connected by wireless links forming a temporary network. MANET's are infrastructure less network and all nodes are battery powered. The primary objective of the paper is to address the two major issues that is energy depletion and congestion in MANET's by considering relay nodes as intermediate hops for data transmission by mobile nodes, as relay nodes have abundant energy. We determine the residual energy of a node by considering the rate of energy consumption. The relay nodes are implemented using the network simulator NS-2. This framework improves the energy efficiency and thereby improving the overall network lifetime.

Keywords: Relay Nodes, Wireless Network, Energy Efficient Routing, Congestion Control, MANET's.

I. INTRODUCTION

The term MANET refers to a multihop packet based wireless network composed of a set of mobile nodes, that can communicate and move at the same time, without using any fixed infrastructure. Wireless networks are classified as infrastructure based networks and infrastructure less networks[1].In mobile ad-hoc network[MANET] the mobile node communicate with each other by sending data flows either directly or intermediate relay. Every mobile node in a network will be associated with certain amount of energy, the energy will be dependent on the battery associated with each node.

The node loses its energy when an event occurs. The events involve are receiving a packet, transmitting a packet, energy consumption in ideal state and transition from sleep state to active state[2].The major events that consume most of the node energy are receiving and transmitting packets. The remaining energy of a node after transmitting data packets in the network is called as residual energy[3]. Energy efficient routing may be the most important design criteria for MANETs. .Mobile nodes are battery powered hence they have limited capacity.Failure of a node effects the node as well as its ability to forward packet and thus it effects the overall network lifetime[4].

Congestion refers to bandwidth issues,the bandwidth keeps varying and when there is insufficient bandwidth the demand of packet flow is not satisfied and the issue of congestion occur. Traditional congestion control mechanism applied by the Transport layer protocol (TCP) is unable to catch up the network dynamics of adhoc network[5]. The main objective of this work is to solve both energy depletion and congestion problem in MANETs.

This paper is organized as follows. Section II explores the related work about MANETs. Section III shows our proposed method for energy efficient routing

and congestion control by using mobile relay. Section 1V explains the strategy for implementation. Finally, conclusions are drawn in section V.

II. RELATED WORK

A. Extending the Lifetime of Wireless Sensor Networks

The authors Wei Wang, Vikram Srinivasan, and Kee-Chaun proposed "extending the lifetime of wireless sensor network[6]" here they investigate the benefits of a heterogeneous architecture for wireless sensor networks (WSNs) composed of a few resource rich mobile relay nodes and a large number of simple static nodes. The mobile relays have more energy than the static sensors. They can dynamically move around the network and help relieve sensors that are heavily burdened by high network traffic, thus extending the latter's lifetime. We first study the performance of a large dense network with one mobile relay and show that network lifetime improves over that of a purely static network by up to a factor of four. Also, the mobile relay needs to stay only within a two-hop radius of the sink. We then construct a joint mobility and routing algorithm which can yield a network lifetime close to the upper bound. The advantage of this algorithm is that it only requires a limited number of nodes in the network to be aware of the location of the mobile relay. Our simulation results show that one mobile relay can at least double the network lifetime in a randomly deployed WSN. By comparing the mobile relay approach with various static energy-provisioning methods, we demonstrate the importance of node mobility for resource provisioning in a WSN

B. Mitigating Performance Degradation in Congested Sensor Networks.

The authors Raju Kumar, Riccardo Crepaldi, Hosam Rowaihy, Albert F. Harris III, Guohong Cao, Michele Zorzi, and Thomas F. La Porta proposed "mitigating performance degradation in congested sensor netwoks[7]".Data generated in wireless sensor networks may not all be alike some data may be more important than others and hence may have different delivery requirements. In this paper, we address differentiated data delivery in the presence of congestion in wireless sensor networks. We propose a class of algorithms that enforce differentiated routing based on the congested areas of a network and data priority. The basic protocol, called Congestion-Aware Routing (CAR), discovers the congested zone of the network that exists between high-priority data sources and the data sink and, using simple forwarding rules, dedicates this portion of the network to

C. Congestion-Aware Routing Protocol for Mobile Ad Hoc Networks

The authors Xiaoqin Chen, Haley M. Jones, A.D.S Jayalath Proposed "congestion aware routing protocol for mobile ad-hoc networks[8]".Congestion in mobile ad hoc networks leads to transmission delays and packet loss, and causes wastage of time and energy on recovery. Routing protocols which are adaptive to the congestion status of a mobile ad hoc network can greatly improve the network performance. In this paper, we propose a congestion-aware routing protocol for mobile ad hoc networks which uses a metric incorporating data-rate, MAC overhead, and buffer delay to combat congestion. This metric is used, together with the avoidance of mismatched link data-rate routes, to make mobile ad hoc networks robust and adaptive to congestion.

Using a proper energy efficient routing and congestion control techniques will enhance the network life in Wireless sensor network . Our work is based on all the above studies we did from various papers and referred web .

III. PROPOSED METHOD

Our idea considers the of residual energy of a node as well as the rate of energy consumption(REC) of a node. Inorder to overcome energy depletion we introduce the concept of mobile relays. The relay

node will act as an intermediate node and thus helps to maintain and improve the connectivity of the network. A node has multiple threshold like low rate energy consumption(LREC),High rate energy consumption(HREC),Average rate energy consumption(AREC).

LOW RATE ENERGY CONSUMPTION

```
Pseudo code: if (REC < thresh1)
                REC = LREC;
Pseudo code: if (LREC)
             {
              if (residual energy < rthreshl)
              node = critical; //Call for mobile relay
              else
              node != critical;
              }
```

HIGH RATE ENERGY CONSUMPTION

```
Pseudo code: if (REC > thresh2)
                REC = HREC;
Pseudo code: if (HREC)
             {
              if (residual energy < rthreshh)
              node = critical; //Call for mobile relay
              else
              node != critical;
              }
```

AVERAGE RATE ENERGY CONSUMPTION

```
Pseudo code:
          if ((REC > thresh1) && (REC < thresh2))
          REC = AREC;
Pseudo code: if (AREC)
             {
              if (residual energy < rthresha)
              node = critical; //Call for mobile relay
              else
              node != critical;
              }
```

For heavier load of applications the threshold will be set high. On reaching this high threshold the node becomes critical, And the service of mobile relay will be required to balance the node. Once the rate of energy consumption returns to an efficient level, the node will no more be in a critical state[9].Thus, we can say that mobile nodes have multiple threshold Based on the rate of consumption of energy rather than a single threshold based on analysis. The approach of using mobile relay enchance the overall lifetime and performance of MANET's[10].

IV. STRATEGY FOR IMPLEMENTATION

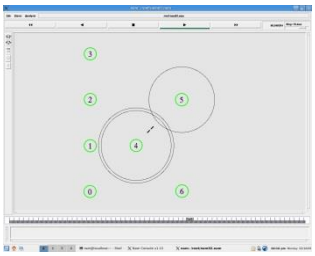
1. Simulation Setup for the Energy depletion problem

A. Checking residual energy of a node deprived of mobile relays

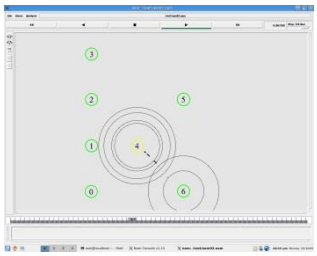
We carry out the simulation on 7 nodes. The nodes 1, 2,3 and 4 are considered as source nodes that generate huge amount of data. Nodes 6 and 7 will be the destination nodes. Node 5 is the intermediate node that transmits the data from source nodes to destination node.

Table 1. Details of Simulation Parameters

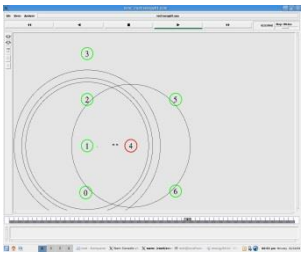
Sl.No.	Description	Name/Values
1.	Grid Size	1000 meters * 1000 meters
2.	IFQ	DropTail
3.	Mac Protocol	802.11
4.	IFQ Length	100 packets
5.	Network Protocol	AODV
6.	Number of Nodes	7
7.	Initial Energy	200 joules
8.	Simulation Time	300 seconds
9.	Propagation Model	TwoRayGround



(a)



(b)



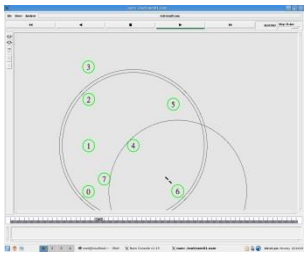
(c)

Figure 1. (a) Topology of 7 nodes in 1000m x 1000m boundary.
(b) Node 4 changes its colour from green to yellow.
(c) Node 4 changes its colour from yellow to red.

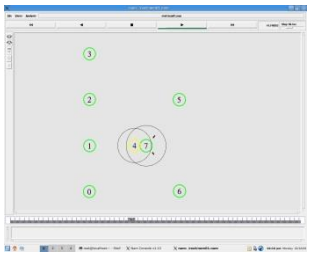
Node 5 loses most of its energy in receiving and transmitting packets from source nodes to destination nodes .The color of node 5 changes to red when only 20 % of initial energy is left.

B. Checking residual energy and rate of energy consumption (REC) of a node using concept of a mobile relay

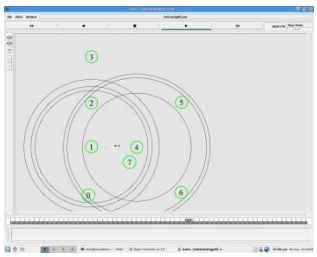
The simulation is performed on 7 mobile nodes + 1 mobile relay i.e. 8 nodes. Based on the setup, the nodes will change their colors from green to yellow based on the measure of the residual energy. Green color indicates that the node is not in critical state and service of mobile relay is not required. Yellow colour indicates that the node is in critical state and the service of a mobile relay is mandatory to share the load. Node 8 acts as a mobile relay and will keep moving around the topology waiting to be called for service by the critical nodes. Thus, when a node becomes critical based on REC and the measure of residual energy, the node will change its color from green to yellow and calls for a mobile relay.Once the rate of energy consumption (REC) returns to an efficient level the node changes its color from yellow to green again and will release the mobile relay, so that it can provide service to other critical nodes.



(a)



(b)



(c)

Figure 2. (a) Topology of 8 nodes. (b) Service of mobile relay is called to share the load. (c) Mobile relay is released and node 5 becomes green.

1) Monitoring only residual energy of a node without using mobile relays

The simulation will be performed for 300 seconds and the residual energy will be observed for critical nodes at the end of the simulation. In this scenario we have only one critical node (node 5).

Critical Node ID	Residual Energy
5	7 joules

2) Monitoring residual energy and REC of a node and use of a mobile relay

Critical Node ID	Residual energy
5	*15 joules*

3)Calculating the number of dropped packets at a congested node without using mobile relays

Congested node id	Total packets sent by sources	Total packets received by destinations	Total packets dropped by node
5	644036	433446	210220

4)Calculating the number of dropped packets at a congested node using mobile relays

Congested Node id	Total packets sent by sources	Total packets received by destinations	Total packets dropped by node
5	644036	499488	200704

Energy Efficient Algorithm

start

1. Input the no of nodes(n)
2. Initialize the energy values for the nodes.
3. Input the mobile relay node(+1).
4. Apply AODV(adhoc on demand distance vector) protocol
5. Routing of packets

6. if (REC)

{

if(residual energy <threshold)

Node=critical; //call for mobile relay

Else

Node!=critical;

}

7.measure the energy of all the nodes and no of packets dropped

end

V. CONCLUSION

In this paper, solution for energy depletion and congestion in mobile ad hoc network is proposed.

Energy efficiency is most important because all the nodes are battery powered. Failure of one node may affect the entire network. If a node runs out of energy the probability of network failure will be increased. Since all mobile nodes have limited power supply, energy depletion has become one of the major threats to the lifetime of the mobile ad-hoc network

In order to avoid energy depletion problem as a result of excessive energy consumption at a higher rate, we introduce concept of mobile relays . The mobile relay decreases the power consumption in the node by balancing the load. When the rate of energy consumption that is based on the application returns to efficient levels, the mobile relay is released so that it can be used for the service of other critical nodes. This technique can be applied to any protocol used in Mobile Ad-hoc Networks(DSDV, DSR, AODV, etc).

The second major problem is congestion in Mobile Ad-hoc Network. when the node becomes congested (starts dropping the packet due to queue overflow), it calls for the service of a mobile relay . The mobile relay shares the load of the congested node.When the load of the congested node returns to efficient level, the mobile relay is released so that it can provide service to other congested nodes in the network. This method reduces the number of packets being dropped in the network, and thereby improving the overall performance of the network.

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A New Secure Image Transmission Technique via Secret-Fragment Visible Mosaic Images by Nearly Reversible Color Transformations

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ABSTRACT

A new secure image transmission technique is proposed which transforms automatically a given large-volume of secret image into a so-called secret-fragment-visible mosaic image of the same size. The mosaic image, which looks similar to an arbitrarily selected target image and may be used as a camouflage of the secret image, is yielded by dividing the secret image into fragments and transforming their color characteristics to be those of the target image. Skillful techniques are designed to conduct the color transformation process so that the secret image may be recovered nearly lossless.

Keywords: Transmission technique, image, color transformation, mosaic image

I. INTRODUCTION

The proposed method converts images provided by the user into the mosaic images. Commercial image editing applications also provide a similar function. However, .these applications often trade results for low-cost computing. It is desirable to create high quality images even if the computational cost is increased. We introduce a general energy based framework for mosaicing problems that extends some of the existing algorithms such as Photomosaics and Simulated Decorative Mosaics. We demonstrate the use of our method by applying it to a wide range of container images and tiles.

II. EXISTING METHOD

In this existing method, the LSB technique is used for data hiding process. In computing, the least significant bit (LSB) is the bit position in a binary integer giving the units value, that is, determining whether the number is even or odd.

Disadvantages:

It is more predictable and hence less secure, since there is an obvious statistical difference between the modified and unmodified part of the stego-image.

Also, as soon as we go from LSB to MSB for selection of bit-planes for message embedding, the distortion in stego-image is likely to increase exponentially, so it becomes impossible to use higher bit-planes for embedding without any further processing.

III. PROPOSED SYSTEM

In this proposed method, the tile image and the mosaic image plays a vital role in the data hiding process. The input image which is undertaken for the process is the target image. At first, a mosaic image is yielded which consists of fragments of an input

secret image with color corrections according to a similarity criterion based on color variations. The data hiding and the recover consist of two major steps.

The first category includes four main steps: Fitting the tile images of secret image into target blocks of a preselected target image.Then transforming the color characteristic of each tile image in the secret image. Next rotating each tile image into a direction with the minimum RMSE value with respect to its corresponding target block. Then embedding relevant information into the created mosaic image for future recovery of the secret image.

The second category includes two steps: Extracting the embedded information for secret image recovery from the mosaic image. Then recovering the secret image using the extracted information.

Advantages:

1) Compared with the existing system, this method is processed with a large number of data embedded into the image.
2) The noise level of the output is also reduced, so that the accuracy of the output is gradually increased.

A. ARCHITECTURE DIAGRAM

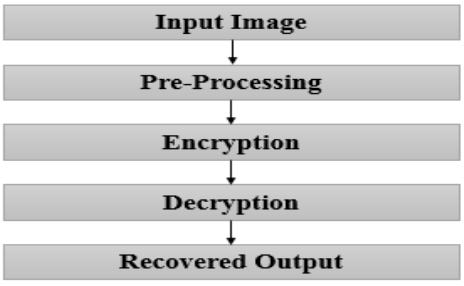

Figure 1. Architectural diagram

B. BLOCK DIAGRAM

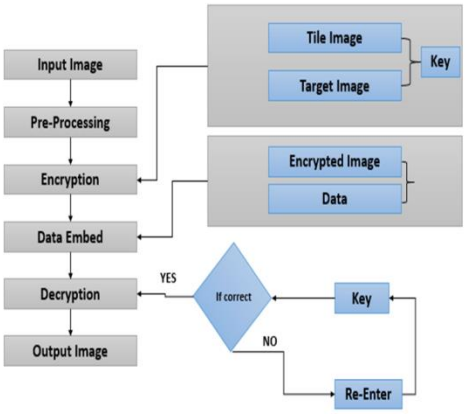

Figure 2. Block Diagram

IV. LITERATURE SURVEY

Title: Reversible Data Embedding Using a Difference Expansion (2003)
Author: Jun Tian
Title: Reversible Data Hiding (2006)
Author: Mehmet U. Celik, Gaurav Sharma, A. Murat Tekapl, eli Saber
3. Title: Reversible Image Watermarking using Adaptive Prediction Error Expansion and Pixel Selection (2008)
Author: Pramod R Sonawane, K.B Chaudhari
4. Title: Secure Reversible Data Hiding in Encrypted Images by Allocating Memory before Encryption via Security keys (2008)
Author: Priya Kumar Jambhulkar
5. Title: Expansion Embedding Techniques for Reversible Watermarking (2007)
Author: Diljith M. Thodi and Jeffrey J. Rodriguez

V. CONCLUSION

In this paper, we presented our experience of porting mosaic algorithm on to cuda architecture. This paper design a method to compute the data bits parallel using the threads respectively based on cuda. This is in order to realize performance improvements which lead to optimized results. This paper has analyzed majority of algorithms related to public key algorithms and then designed and made an

implementation of a public key algorithm mosaic in cuda.

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A Survey on Secure DICOM Transfer through Network

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ABSTRACT

DICOM, a standard used for secure connection and transfer of digital images, which is the integration of medical images with patient related information. The procedures in hospitals require the radiological images which contains few attributes of the image and the patients whose information belongs to. Report without any images is difficult to understand by common man, hence it requires a combination of both image and report. The main issue during transfer of these images is their security. It must be taken care that transfer of data should be protected from third parties, for this DICOM should provide some mechanism for security. Many methods are available for securing the data, by encrypting and decrypting the data. The developing system is used to transfer DICOM files, and extend the same in the system to meet the requirement of security. There are hospitals which allow systems to connect to hospital infrastructure only via secure way i.e., certificate based authentication. The current system on which it is being used supports only standard DICOM protocols, hence the systems cannot be used in hospitals which mandates certificate based authentication. Therefore, the systems which supports certificate based DICOM connectivity software is being developed and this has become a vast area for research.

Keywords: DICOM, Certificate, PACS, Security

I. INTRODUCTION

Storage formats standardization is a very important requirement to enable proper operations between devices and equipment within Healthcare system. Digital Imaging and Communications in Medicine (DICOM) being the most widespread and accepted standard for effective, efficient and secure medical imaging storage and transfer over large geographical areas.

DICOM is the healthcare industry standard for transfer of digital medical images and other medical information between different systems such as computers. Since various modalities such as CT, MR, XA and US are based on this DICOM standard, digital treatment is possible. The dynamic process of the examining position of patients is reflected by multiple frame images that exist in DICOM medical images. The commonly used image processing software cannot process, display and convert this file format because of the particularity of the DICOM image format.

DICOM makes medical image exchange more easy and independent of the imaging equipment manufacturer. Besides the image data, DICOM file format supports other information useful to describe the image. This makes DICOM easy to use and the data exchange fast.

In order to efficiently manage the storage capacity of PACS, DICOM allows image compression, JPEG2000 is one of the most used compression algorithm in

DICOM images due to its compression efficiency. A highly secure role-based access control policy has been implemented by DICOM. The security policy is entirely based on cryptography; the most sensitive DICOM contents which are fields and/or the image if it identifies the patient are put into individual digital envelopes and sealed by means of Cryptographic Message Syntax (CMS). With current security measures, a corrupted DICOM file can still be queried and the contents of non-corrupted envelopes can be retrieved normally. many times certain sensitive information associated with the image is engraved on the frame itself. DICOM supports anonymization which is by blackening the data on the image, it does not define specific mechanisms for finding

DICOM provides the basis for picture archiving and communications systems (PACS) and is the most extensively used standard for storage and transmission purposes. PACS requires high-speed networks to transmit large image files between components. In case of intranet, that is, PACS within a healthcare campus, Gb/s switches with Mb/s connections to workstations are mostly adequate and is a standard in most hospital and university network infrastructures. Their transmission rates, even for large-image files, are acceptable for clinical operation. However, in case of using the Internet for tele radiology applications or enterprise PACS, image data must be transmitted between hospitals and campuses. While transmitting these images from hospital repository to PACS or vice versa, confidentiality of data place an important role.

Thus, although the information can be protected in the DICOM header, the same information is sometimes accessible in the frame. The data which faces such problem usually is the patient's name, which many times is displayed in the frame which is also included in the DICOM header. To overcome this problem, a file format enabling the segmentation of frames in different regions in combination with signal-based security methods that enhances the protection of the information can be used.

II. LITERATURE SURVEY

DICOM makes medical image exchange more easy and independent of the imaging equipment manufacturer. Besides the image data, DICOM file format supports other information useful to describe the image. This makes DICOM easy to use and the data exchange fast.

DICOM file structure:

The structural units of DICOM file DICOM sets, these DICOOM image files are based on standard DICOM. The DICOM sets consists of data elements which are in particular order. An example of DICOM structure which consist of DICOM file header and DICOM data sets is as shown in the Figure1.

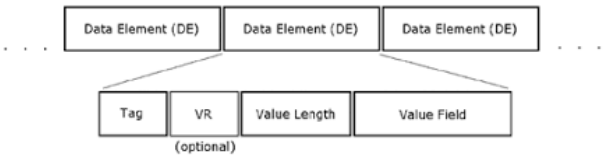

Figure 1. Structure of DICOM

DICOM file header:

The 128 bytes in the DICOM file header is known as DICOM preamble which is used for providing compatibility with the format of common file. The information required for identifying the DICOM data set is present in the DICOM file header. If the 4 bytes behind DICOM preamble consists of "DICM", then the file is based on DICOM standard otherwise not.

DICOM Data Set:

The data set is formed by the most basic unit called data elements. Each data element consists of 4 parts, they are tag, value representation (VR), value length (VL) and value. The data elements are arranged in tag order. Each tag has 16 bits of unsigned integer where first 8 bits represent group number and the second 8 bits represent element number. All the data

elements are uniquely identified by the tag. The data type of the data element is specified by VR and it must exist if transfer syntax is explicit. It can be ignored if it is implicit.

Image Coding:

The most important data unit is the pixel data identified by the tag (7EE0, 0010) is the pixel data identified and is the most important data unit. It is the last element in the data set and contains useful information required for medical image display. This pixel data is required for converting single frame DICOM image to PNG and also to multiple frame DICOM image to MP4. The other important data elements are:

- ✓ The number of frames is identified by tag (0028, 0008). It is greater than 1 in case of multiple frame image.
- ✓ The height of the image (rows) is identified by tag (0028, 0010).
- ✓ The width of the image (columns) is identified by tag (0028, 0011).
- ✓ The number of bits allocated for each pixel sample (Bits Allocated) is identified by tag (0028, 0100).
- ✓ The number of bits stored for each pixel sample (Bits stored) is identified by tag (0028,0101)

DICOMDIR

DICOMDIR contains the metadata about the DICOM files. It is a special DICOM file which is like an index of DICOM files or like a small DICOM database. If present, the DICOMDIR is always present in the root folder of the media. The DICOM files contain their own DICOM data objects and DICOMDIR contains information about these DICOM files. All directory data is classified into four DICOM levels by DICOMDIR: Patient, Study, Series and Image as shown in Figure2. For each file in the DICOM folder, DICOMDIR consists of 4 entries- patient, study, series and image information corresponding to that file.

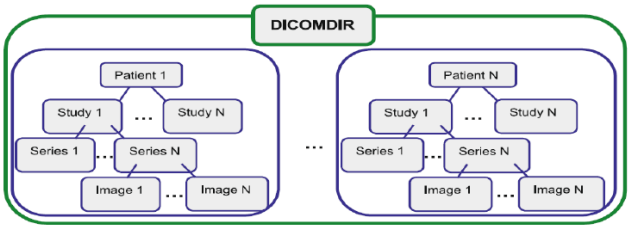

Figure 2. Structure of DICOMDIR

III. SECURITY ISSUES

Security plays an important role while transferring the medical images through different network. Security components include Confidentiality, privacy, integrity, authenticity. High security is required as the medical images contain the sensitive information of patients. When transferring the medical images through network, the security threats are as follows:

Confidentiality:

Confidentiality is considered as important for following reasons. It builds and develops trust. It helps in free flow of information between the client and server and acknowledges that a client's personal life and all the issues and problems that belongs to them.

Privacy:

Privacy is the process of maintaining the security and confidentiality of patient records. It includes both the conversational data by health care providers and the security of medical records. This can also refer to the physical privacy of patients from other patients and providers while in a medical facility.

Integrity:

Integrity means ensuring that the image captured or provided is the original or first handed information and it has not been corrupted. Since many participants are involved in the network based medical image exchange, any modification can take place due to the participants knowingly or

unknowingly. Hence integrity is a big issue to medical images in network.

Authenticity:

The medical images can be transferred only if the patients and doctors is authorized. For authenticity, the identity of the client and the server must match with each other. If the details are revealed, unauthorized users can have access to the data.

IV. SECURE DICOM COMMUNICATION

Secure transmission of data from one hospital to another through public networks is usually characterized in terms of privacy, authenticity, and integrity. Figure3 shows a data flow of image secure delivering from one hospital to another through the network.

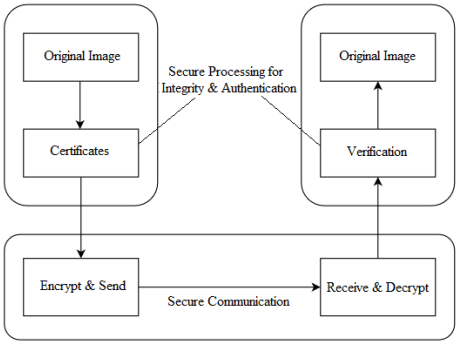

Figure 3. Data flow of medical image secure communication from one site to another through network

The two processing steps to provide secure measures for delivering images: First, for the data integrity and authenticity, the hash computing on data and digital signature. It also includes the decoding signature and comparing digest, on the images before and after transferring at both the sending and the receiving sides; Second, for the privacy of the data, the secured communication channels are provided to transmit the image through networks. The focus is on the secure measure, where data privacy, with evaluation results are given more importance. There are two methods to provide secure communication channels with TCP/IP protocols: IPSec and SSL/TLS.

Medical image communication uses DICOM communication services to transfer the image data between the imaging modalities such as PACS archiving server, workstations, and other components. It also includes transfer between tele radiology systems, and in enterprise PACS environment with WAN interconnection. In DICOM, the open system interconnection (OSI) reference model is used for the interconnection of medical-imaging equipment, as shown in Figure4. DICOM uses the OSI upper-layer service to separate the exchange of DICOM messages at the application layer from the communication support provided by the lower layers. For the medical-image transmission through high speed broadband networks with IPv4, the DICOM upper layer for TCP/IPv4 must be developed and also make it compatible with IPv4. For software, it only needs to replace the original TCP/IPv4 socket functions with requests for RFC standard TCP/IPv4 compatible socket functions, provided by each operating system, recompile the software, and link it to DICOM services. For this environment, there is a need to install the IPv4-stack software and perform some re-configurations, such as assigning IP address, configure the tunnel for that specific operating system, such as Windows XP, which have already supported the IPv4.

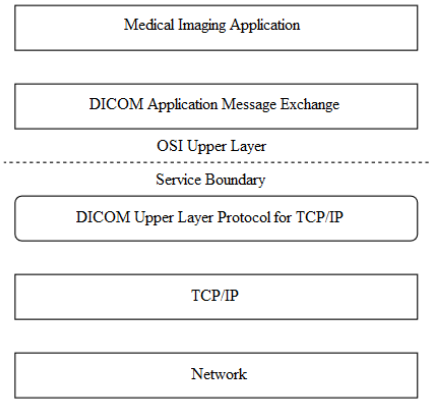

Figure 4. DICOM network communication protocols architecture.

For this, we come up with three basic IPv4-enabled DI-COM-communication services and applications:

1. DICOM Storage (C-Store) service-class user (SCU)) and service-class provider (SCP);

2. DICOM Query (C-Find) SCU and SCP;
3. DICOM Retrieval (C-Move) SCU and SCP.

DICOM provides a standardized method for ensuring secure communication and certificate based verification. The secure communication of IPv4 enables DICOM image transmission and it utilizes IPsec protocol, which is now used in virtual private network (VPN)) applications, and will be widely used in high-speed broadband networks.

The SSL was developed by Netscape Communications which allows secure access of a browser to a Web server. SSL has become the standard for Web security. It provides secure communication channel between client and server by providing mutual authentication. Authentication uses certificates for integrity, and encryption for privacy. The protocol was designed to support specific algorithms used for cryptography, digests, and signatures. SSL 3.0 is the basis for the TLS protocol, which is still in developing stage by the Internet engineering task force (IETF).

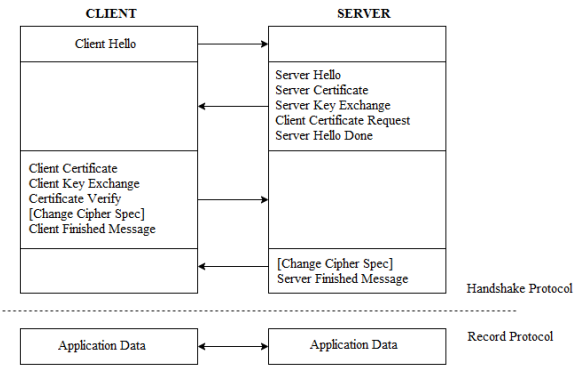

Figure 5. SSL Handshake between Client and Server

The SSL protocol supports both public-key and symmetric-key encryption. Symmetric-key encryption is faster than public-key encryption, but public-key encryption has better authentication techniques. SSL consists of two protocols: the handshake protocol and the SSL-record protocol. The handshake protocol gives information on how the peer entities exchange associated information, such as, SSL version and ciphers, and authenticates certificate. The SSL-record protocol gives the format of SSL record, in which all of the SSL-associated messages should be transferred. The SSL connection is executed in two phases: the first is the handshake, and the second is data transfer as shown in the Figure5. The data flow of the DICOM Storage includes SCU and SCP entities with SSL/TLS support. The SSL/TLS works between the TCP layer and the application layer. For IPSec and SSL/TLS-based security communications, X.509 certificates were created for both sites of DICOM C-Store SCU and DICOM C-Store SCP from the same certificate authority attached in the ssl tool kit. After the complete transfer of the images the ssl tool indicates the Handshake between the client and the server and finally indicating the closure of socket.

V. CONCLUSION

DICOM, a standard protocol used in the transfer of digital images which is the integration of medical images with patient related data. In this paper the various security challenges faced while transferring the medical images through the network and how the medical images is transferred from client and server using certificate based authentication is discussed. Using this method, the third party or man-in-middle attack can be avoided.

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Oracle Application with Database Testing tool

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ABSTRACT

Oracle Database is simple and highly scalable database. It is majorly used for online transactions processing. Large enterprises widely use Oracle Database in their organization in multiple departments like HR Department, IT Department etc., Each department would host their database with large schema and tablespace. Ensuring database is sized well to handle multiple users to get optimal performance is very important. Oracle deployment can be done with single node deployment and Real Application Cluster (RAC) with multiple nodes. Database testing tools help in measuring the workloads on the database. The tool will provide measured values of latency, throughput and Input / Output Operations per Second (IOPS). Mainly there are two notable Oracle Database tools like Vdbench testing tool and Silly Little Oracle Benchmark (SLOB) testing tool.

Keywords: Oracle Database, Real Application Cluster, Vdbench, Silly Little Oracle Benchmark.

I. INTRODUCTION

A database is a collection of data and a database server is a vehicle for information management. The primary purpose of a database is to store and retrieve related information. These servers can manage large amounts of data, reliably in a multiuser environment. At the same time, they also prevent unauthorized access and provide efficient solutions for failure recovery. A database's physical and logical structures are separate. The physical storage of data can be managed independently of logical storage structures.

Oracle Database is a Relational Database Management System (RDBMS) from the Oracle Corporation. It is the first database designed for enterprise grid computing and flexibility in managing information and application in a cost-effective manner. Large pools of industry-standard modular storage and servers are created by enterprise grid computing. With Oracle Database architecture, each new system can be rapidly provisioned from a pool of components. Extra hardware to support peak workloads is not required since capacity can be easily added or reallocated from the resource pools as needed.

Users may directly access data objects through structured query language. This is a feature of the Oracle Database's relational database framework. Global enterprises which handle data across WANs often use Oracle Database because of its scalability and robustness. It has its own network component to allow communications across networks. It is supported on most major platforms including Windows, UNIX, Linux and Mac OS. Oracle Database deployments are popular in RHEL.
Figure 1 Represents Oracle Database Architecture. Oracle Database server consists of an Oracle database and an Oracle instance.

Oracle Database have three different type of files, Datafiles, Control files and Redo Log files. Datafile stores all data related to database and it has logical storage structure called tablespace. Control files store the physical structure of the data in database, Redo Log files store the redo logs in the database and used for database recovery process in case of database crash. Oracle instance is the combination of System Global Area(SGA), Program Global Area(PGA) and Background processes.

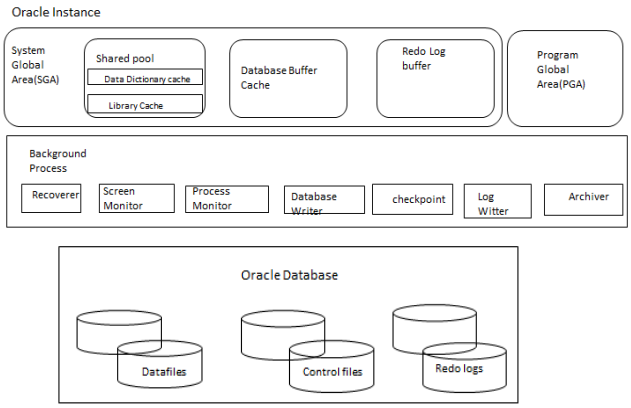

Figure 1. Oracle Database Architecture.

System Global Area starts one or more Oracle process by allocating the memory space in the database. It consists of Shared Pool Database Buffer Cache, Redo Log Buffer. Shared Pool Database plays an important role in the SGA, it is the temporary place to store the information in the RAM heap and used to execute the sequential query language statements. Program Global Area is the memory place to store the data information and control information for a server process. Background Processes includes Recoverer, System Monitor, Process Monitor, Database Writer, Checkpoint, Log writer and Archiver.

II. LITERATURE SURVEY

Most of the business companies and institutions are facing problem in maintaining the huge related information and processing it properly. The process of sorting the useful information leads to both individual and organizational challenge. This paper provides the model to classify the information using the rule-based classification by loading the document in the Oracle12c database. Oracle 12c provides a stable foundation base. It has a very close integration between the Oracle SQL execution engine and the query plan optimizer. A single storage can be used by the structured data and text data. Easy in maintenance operations such as data backup, tuning and other database tasks. This makes the storage mechanism more efficient for queries [1].

The storage of critical information in the companies or in the organizations is highly challenging. The information is not only in structured text form or numeric data. unstructured content such as images, videos, PDF, word documents and other types are becoming more and more common in various fields. This paper presents the model for storing unstructured data such as documents in Oracle 12c database using basic file and secure file method. Secure file method helps in storing the critical data in different forms like videos, PDF and word documents [2].

The three artifacts are generated to reduce the problem in the automated approach for the systematic black-box testing of database management using the relational constraint they are

1) Using SQL queries for testing
2) Proper input data to populate test databases
3) Expected results for the SQL queries used for testing.

This paper presents a detailed description of the framework for automated SQL Generation using the Alloy tool-set and the experimental results of testing database engines using our framework and explains the SQL grammar constraints can be solved by translating them to Alloy constraints to provide semantically and syntactically correct SQL queries [3].

Oracle Real Application cluster(RAC) allows two or more database instances run on different server nodes in a cluster.

It is an instance recovery, when a single database instance is suffering from the hardware or the software failure it is will not affects the other node which are present in the cluster and still the cluster is able to provide the database service. During the instance recovery, database resources which needs recovery must be identified and should be locked then repaired. The client's requests are blocked for the database access at this time. The complete database is in frozen state called brownout.

This paper describes the uses of Buddy instance, a mechanism which reduces the brown-out time and the duration of the instance recovery. It is introducing in the 12.2.0.1 release of Oracle Database to reduce the period of identification of resources needing recovery [4].

III. ORACLE DEPLOYMENT

Oracle Deployment can be taken place in two different ways.

- Oracle Database Deployment in Single Node.
- Oracle Database Deployment in Real Application cluster with Multi Node.

A. Oracle Database single node deployment.

Oracle Single Node Deployment is single instance of an Oracle Real Application Cluster. It enables database running on one node in the cluster in all normal operations. Single node deployment method adds the flexibility and reducing the management overhead by providing the standard deployment for Oracle Database in the enterprise. Figure 2 represents the Single Node Deployment in the Oracle database which contain only a single database instance.

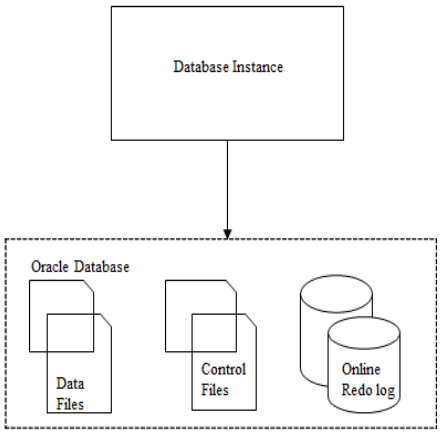

Figure 2. Oracle Single Node Deployment.

It utilizes a shared disk architecture to provide the high availability, the volume management and file system used for storing database data must be cluster-aware. It provides an Oracle Database failover solution

Oracle Automatic storage management is the recommended clustered volume manager for the oracle database. Oracle Grid Infrastructure is required for the deployment of the Oracle database. Oracle Database should contain the similar hardware setup as an Oracle real application cluster database and certified on Oracle Virtual Machine. Combining Oracle single node and Oracle virtual machine increases the benefits of Oracle Virtual Machine with the high availability and scalability of the Oracle Database.

Eliminates the single Database server as a single point of failure and takes further advantage of clustering to apply rolling patches and database service relocation without incurring downtime. Provides all the software components required to easily deploy Oracle database instances on a pool of servers and take full advantage of the performance, scalability and availability that clustering enables. Multiple single database instances can be configured on a physical Oracle One Node server. In addition, with full support for Oracle VM, multiple database instances and be configured in a virtualized environment.

B. Oracle Real Application Clusters with multiple node deployment.

Oracle Real Application Clusters allows two or more computers to run Oracle RDBMS software parallelly while accessing a single Database, which provides the clustering. In an Oracle Real Application Clusters environment two or more instances simultaneously access a single database. The main objective of Oracle Real Application Clusters is to to provide performance, scalability, resilience and high availability of data at multiple instance level. This allows an application or user to connect to either computer and have access to a single similar set of data. Multiple instances which are inter connected can access the database at a single point in time.

The Architecture of Oracle Database is differing from the Oracle Databases single-instance, which contain two or more instances are connected to single Oracle Database containing the different types of files like Datafiles, Control files, Redo log files. Each Oracle RAC database instance also has: One additional thread of redo for each instance are present. An instance-specific undo tablespace is present. Figure 3 Represents the Oracle RAC Database Architecture. shared cache architecture is present in the clustered architecture of real application cluster which overcomes the limitations of traditional shared-nothing and shared-disk approaches to provide highly scalable and available database solutions for all business applications. It is the major component of Oracle's private cloud architecture. It provides customers with the highest database availability by removing individual database servers as a single point of failure. In a clustered server environment, the database itself is shared across a pool of servers, if any server in the server pool fails, the database continues to run on surviving servers.

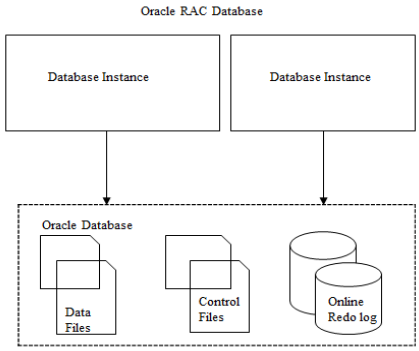

Figure 3: Real Application Cluster Architecture.

On Oracle Real Application Cluster not only enables customers to continue processing database workloads in the event of a server failure, it also helps in further reduce costs of downtime by reducing the amount of time databases are taken offline for planned maintenance operations.

It enables the deployment of Oracle Databases across a pool of clustered servers. This enables customers to easily re-deploy their single server Oracle Database onto a cluster of database servers, and thereby take full advantage of the combined memory capacity and processing power the Clustered database servers provide. It provides all the software components required to easily deploy Oracle Databases on a pool of servers and take advantages of the performance, scalability and availability that clustering provides. It utilizes Oracle Grid Infrastructure as the foundation for Oracle Real Application Clusters database systems. Oracle Grid Infrastructure includes Oracle Cluster ware and Oracle Automatic Storage Management (ASM) that enable efficient sharing of server and storage resources in a highly available and scalable database cloud environment.

ORACLE DATABASE TESTING TOOL.

A. SILLY LITTLE ORACLE BENCHMARK

Silly Little Oracle Benchmark(SLOB) is one of the useful I/O workload generator for the Oracle Database by using the minimal CPU resource. It is the best Input Output workload generation toolkit for the database. It performs the sustained throughput test by considering a large transactional

workload is driven through the database over a long period to measure the ability of the storage system to offer a sustained and predictable response. It performs the sequential query language execution in the Oracle Database with the minimal host CPU utilization.

Oracle Database is highly CPU-intensive in the input output operations, has much code associated with resources sharing. resource sharing is for the mutual exclusion in the database operation.
SLOB minimize this overhead by avoiding contention on the shared resources.

SLOB requirements for Oracle Database testing

- An Oracle installation on the server where SLOB is installed, with a working SQL*Plus
- An Oracle database.
- SYSDBA access to the database.

SLOB configuration file should comprise the parameters like UPDATE_PCT,RUN_TIME,WORK_LOOP,WORK_UNIT, SCALE, REDO_STRESS, LOAD_PARALLEL_DEGREE, SHARED_DATA_MODULUS. Fig represents the SLOB config file with parameters assigned value.

```
UPDATE_PCT=25
RUN_TIME=28800
WORK_LOOP=0
SCALE=1398101
WORK_UNIT=3
REDO_STRESS=LITE
LOAD_PARALLEL_DEGREE=
16
```

Figure 4. Slob configuration file

UPDATE_PCT

Set to X where X is the percentage of all SQL that will be UPDATE DML executions. Setting N to value 0 or to value 100 are the functional equivalent of prior generations of SLOB where one might either execute 100% SELECT or 100% UPDATE workload. Values between 51 and 99 are non-deterministic.

RUN_TIME

Set to X where X is the number of seconds you want the test to run. This can be overridden with WORK_LOOP. If the value set, RUN_TIME the value should set WORK_LOOP to 0.

WORK_LOOP

Set to X where X is the fixed number of loop iterations. Testing in this manner is a way to measure job completion as opposed to fixed test period with sampling of stats. If you want to do a fixed-iteration test. recommend value to RUN_TIME large enough to make sure the run doesn't end based on RUN_TIME.

SCALE

Set to X where X=10000 is the old SLOB scale. X==250000 is ~256GB with 8KB block and 128 schema users. WORK_UNIT SLOB picks a random 256 blocks to work on in each iteration of the work loop.

REDO_STRESS

Set either to HEAVY or any other non-null value. HEAVY maps to the old writer. SQL heavy. Any value other than HEAVY reduces the redo payload in MB/s by about 80%.

SHARED_DATA_MODULUS

This parameter controls the degree of shared data contention. If set to a non-zero value it is used in modulo arithmetic for every UPDATE to direct either to the session's private schema or shared data manipulation.

LOAD_PARALLEL_DEGREE

The setup.sh script uses this to control concurrent data loading.1 per core at a minimum and 1 per processor thread at a maximum.

SLOB runs in the Oracle database to calculate the input output operations per second, latency and throughput. By plotting the graphs with respect to the number of users reads the Oracle database. Figure 4 represents the graph of IOPS, Figure 5 represents the graph of Latency and Figure 6 represents the graph of throughput.

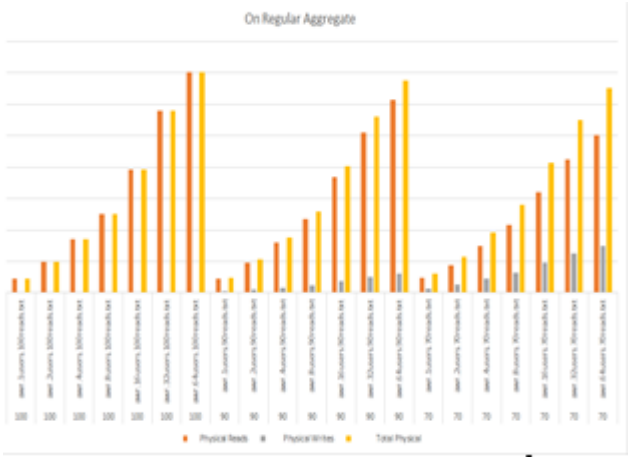

Figure 4, Graph with respect to IOPS in Oracle database.

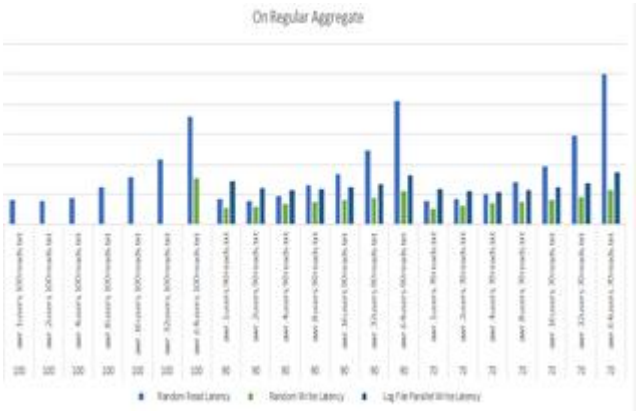

Figure 5. Graph with respect to latency in Oracle database.

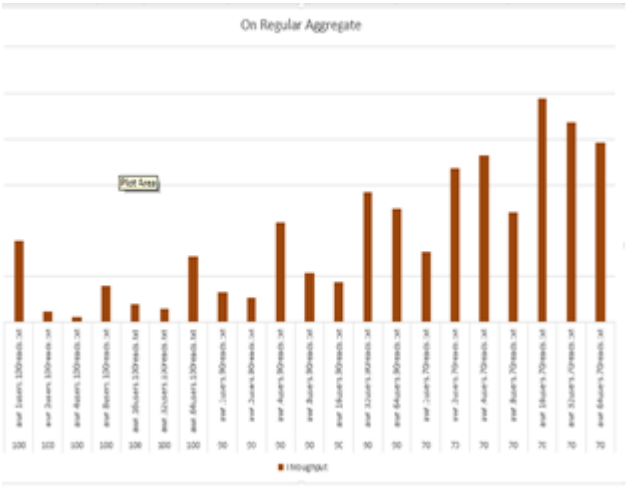

Figure 6. Graph with respect to Throughput in Oracle Database.

IV.CONCLUSION

Database application like Oracle can grow large with multiple databases over period. As with data growth, data management becomes very challenging. Testing tools help in measuring the workloads on the database. The tool will provide measured values of latency, throughput and Input / Output Operations per Second. The notable Oracle Database tool is Silly Little Oracle Benchmark (SLOB) testing tool helps in providing the measured values and benchmarking for existing and future storage products and databases. It supports logical read scaling, testing physical random single-block reads and writes. Silly Little Oracle Benchmark(SLOB) is an I/O workload generator for Oracle Database that drives lots of real database I/O using minimal CPU resources.

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Automated Real-Time Face Recognition and Tagging

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ABSTRACT

This paper mainly addresses the building of facial recognition software which falls into a large group of technologies known as biometrics. It has been one of the most interesting and important research fields. The methods may vary, but they generally involve a series of steps that serve to capture, analyze and compare your face to a database of stored images. For automatically identifying or verifying a person from a digital image or a video source, there is a need for an automated face recognition system. One of the ways to do this is by comparing selected features of the faces from the image and the database of several faces. Automatic face detection is a complex problem in real-time video processing. This problem is commonly referred to as face location, face extraction, or face segmentation. This paper presents a new algorithm to automatically segment out and recognize a person's face from a real-time video and the main objective is to tag the faces accordingly by comparing the facial features from the existing dynamic database. By using this technique a large number of individuals or a group of people can get benefited. This is the reason which is responsible for a great need in the field of facial recognition.

Keywords: Face detection, Face recognition, Feature Extraction, Eigen face, Eigenvector, Haar-like features, PCA, LDA, ICA, MCPA, LPP, Feature selection, Dimension reduction, Covariance.

I. INTRODUCTION

The face plays an important role in our social life conveying our identity and emotions. It is the primary focus of attention in a human being. One can recognize and identify the maximum number of faces at a glance which they have seen or observed in a lifetime even after years of separation. This skill of human being is quite robust despite of large variations such as aging, changing conditions and distractions such as glasses, beard or changes in hairstyle.

In face recognition, Computational models are interesting because they can contribute to practical applications also along with the theoretical knowledge. Computers that detect, identify and recognize faces can be applied to a wide variety of processes including security system, criminal identification, image and film processing, verification of identities, tagging purposes and human-computer interaction. Unfortunately, as faces are multidimensional and complex having meaningful visual stimuli, developing a computational model of face detection and recognition has become quite difficult.

The automatically tagging feature acts like a new dimension to share pictures among the people in the picture. It also helps other people to identify the person in the image. In this paper, we have studied and implemented a simple but very effective face detection algorithm.

Our aim is to develop a method for face recognition and tagging which is fast, reasonably simple, robust and accurate with easy to understand and relatively simple algorithms and techniques. The examples provided in this paper are real-time and taken from our own surroundings.

II. FACE DETECTION

Face detection is done by Feature-based approach which makes use of the different unique elements of a human face such as eyes, nose, and lips to detect a face. This approach is reliable because the structure and size of these elements of a human face are different from the non- face objects. Also, the positions of the elements in the human face are related to each other and are always on the face of the subject. As human skin has unique colour and texture than that of non-face objects, it is also used to detect the face nowadays. Here highlighting the desired region of a face is an important task which can be done with the help of edges of an object by using blobs and contours for this purpose.

Feature-based approach first step is to locate the face on the image. In this method, the skin region is found. It is also validated by finding at least one eye in the image. The second step is to identify the facial features which are also known as fiducial points. In this process, eye detection is done by using the concepts of Haar-like features and cascade classifier. Haar-like features are nothing but simple rectangular features which locates the rectangular regions containing the eyes of a human face.Here hue information of the eye image is taken to develop an algorithm which can locate the eye pupil in the given rectangular region of the eyes. So using this hue image which is a threshold, a contour is detected in the threshold image where the centroid of the contour is measured to find the eye pupil.

Next step in this approach is to detect the nose of a human face in the image. This process is done by using Haar-like features which locates the rectangular regions containing the nose of a human face. As the center of the eyes and the position of the nose are located based on the geometry of the face and its features, an approach is proposed to detect the location of the mouth. This approach states that the uniform distance between the eye and the nose tip in a detected face location are enough to find the other element of the face.

Figure1. Face detection result

Figure2. Nose detection result

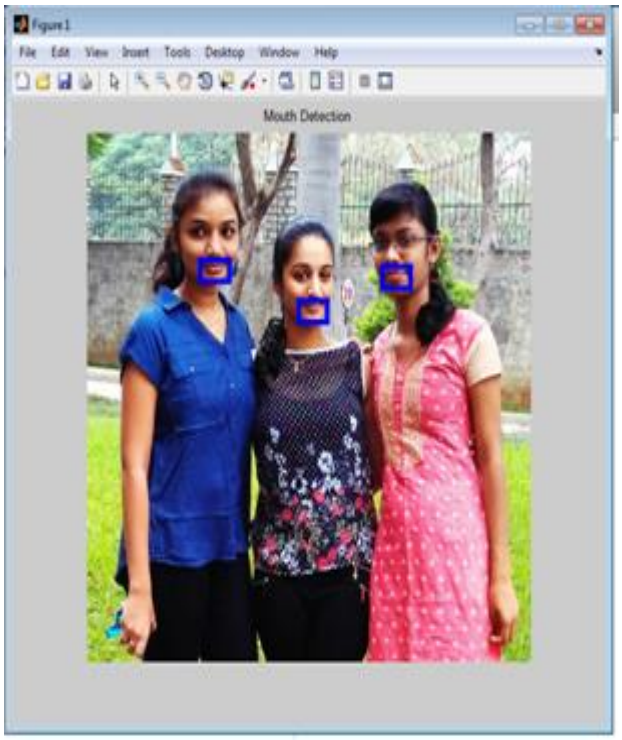

Figure3. Mouth detection result

III. FACE RECOGNITION

Face recognition is done by using Principal Component Analysis technique often called as PCA. PCA is one of the popular methods for selection of the features and reduction of its dimensions. The Face recognition in an image is achieved by using the reduced data space which is extracted from the process of eigen face method. Basically, eigen face method defines a feature space that reduces the dimensionality of the original data space. Some of the common problems that arise in this PCA method are large computation and poor discriminating power within the class. These problems are overcome by Linear Discriminant Analysis (LDA).

LDA is the most popular and powerful algorithm used for selection of features in appearance based methods. Here the face recognition system first uses PCA method to select features, reduce its dimensions and then uses LDA method to maximize the discriminating power, reduce the complexity of computation in feature selection process. This LDA method shows good results in discriminating features extraction if the selected dataset have larger samples per class in the database. But when LDA is implemented directly with smaller samples per class in the selected dataset, it will result in poor extraction of discriminating features.

In this proposed method of face recognition, a filter called Gabor filter is used to filter frontal face images, PCA method is used to select the features and reduce the dimension of filtered feature vectors and then LDA method is used for feature extraction purpose. When PCA, LDA and ICA methods are tested and compared for the face recognition of colored images, PCA is found to be better than LDA and ICA methods under different illumination variations. As PCA method is less sensitive to partial occlusions than LDA and ICA methods, PCA method is used as a feature selection and dimension reduction technique for modeling expression deformations in a face recognition system.

A simple yet recursive algorithm is introduced for calculating the Discriminant features of PCA-LDA procedure. This algorithm process focuses on the challenging issues of computing vectors of discriminating nature which are from an incrementally arriving high dimensional data stream without computing the corresponding covariance matrix and also without knowing the data in advance.

The proposed algorithm of incremental PCA-LDA method is very efficient in the usage of memory and also in the calculation of first basis vectors. This algorithm produces an acceptable success rate of face recognition when compared with other face recognition algorithms such as PCA and LDA methods. Here high face recognition rate is achieved by combining two techniques called Modified PCA (MPCA) and Locality Preserving Projections (LPP**).**

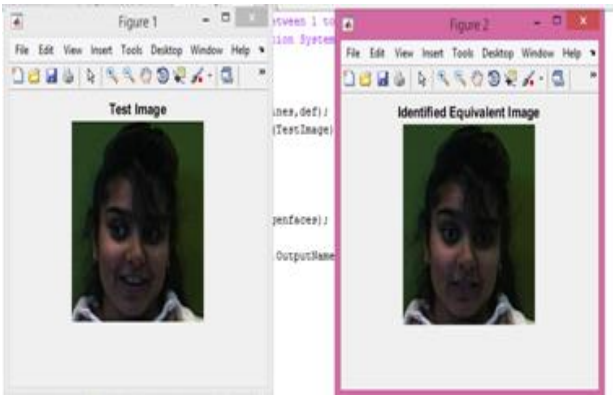

Figure 4. Face Recognition result

IV. TAGGING THE FACES

After the detection and recognition of each face, the final process is to recognize the identities of the faces. In this process, the building of face database is essential in order to achieve automatic recognition. For each person, several images can be taken in different angles and their features can be extracted and stored in the database with the details of name etc. Then finally when the image of a face comes in as an input to the system, it performs face detection, feature extraction and compares its features to each face class stored in the database. The system then gives the details of the matched face from the stored database as the output result.

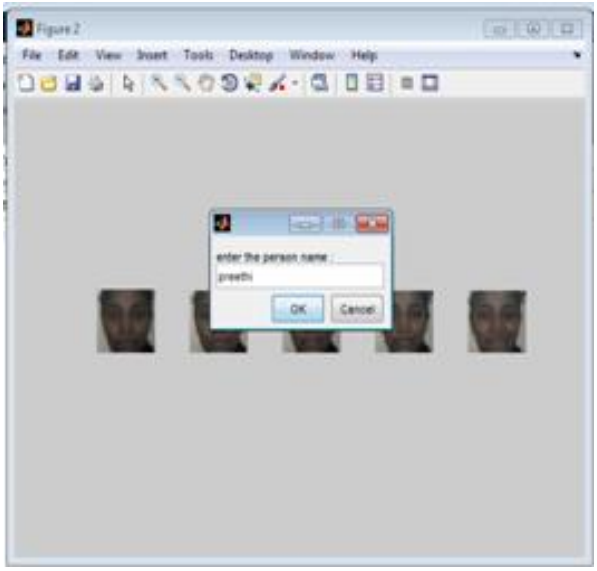

Figure 5. Several images of a person is taken as input

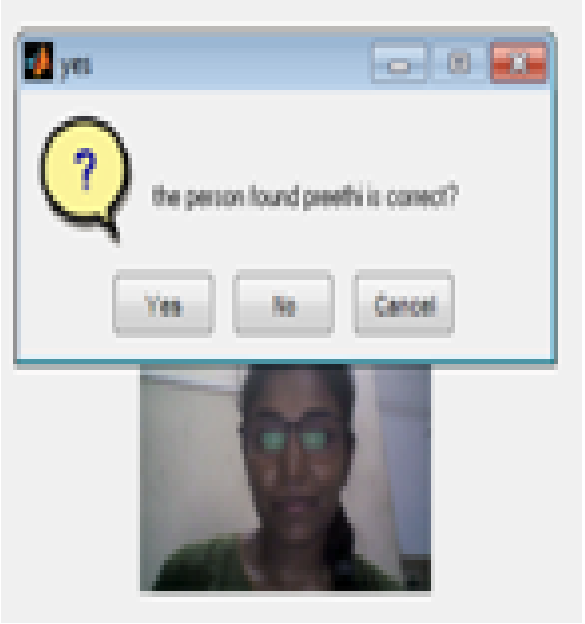

Figure 6. Result of tagging the face.

V. CONCLUSION

In this paper, the goal concept of implementing an automated real-time software system to detect, recognize and tag human faces is achieved. Implementation of the algorithm was examined in MATLAB to check the accuracy of the software. Although there are some modifications are required to the original algorithm for the transition of concept from software to hardware, the initial goal was still accomplished.

The face detection algorithm was derived from Viola-Jones face detection method. Face tracking was achieved by computing the centroid of each detected region, although it only worked in the presence of at most two people. Different types of the filter were applied to avoid flickering. The system was proved to work in real-time with no lagging and under varying conditions of facial expressions, skin tones, and lighting.

VI. FUTURE WORK

To implement the face detection and recognition in live video streaming technology and tagging the faces in live videos which can be used for the following:

- Automatic log of student's attendance
- Maintaining the log of restricted persons
- Log of Rule violating persons in public area.

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Health Care Using Big Data

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ABSTRACT

Since there is huge population in the world, we need to maintain the record of each and every individual. From the day we are born until the day we day, we need to keep track of all the records. Hence we need to store the data of each and every thing related to our personal health. For this Big Data can be used which deals with the seven Vs. Those seven Vs are volume, variety, velocity, validity, veracity, value, volatility. In order to get enormous benefits in the form of savings, improved healthcare quality, and better productivity, we need to manage theses seven characteristics carefully. According to the government regulations doctors, hospitals, insurance companies keep record of all the data of every individual. But even in some cases they are just recorded on paper which may not exist forever. Hence this problem can be solved by Big Data Cloud Computing process. In this all the information of the healthcare industry like workflow management, patient care and treatment, scientific research, and education are stored and saved in detail for further references and best results.

Keywords: Big data, Cloud computing, healthcare.

I. INTRODUCTION

In order to provide social control and manage the environment, recently many municipalities have invested in the development of ICT infrastructure to decorate all their branches with technological setups to support big data applications to provide ambient automation and promote social control and management for the environment. The prospects of smart cities are really very promising, and different smart device manufacturing groups, for instance, IBM and Intel, are launching diverse initiatives to consolidate their guidance in this sector. There are around ten important fields which plays a major role in the smart city formation. They include smart health, smart security system, smart building, smart government, smart tourism, smart grid, smart transportation, smart environment, smart home and smart lifestyle (Caragliu, del Bo, & Nijkamp, 2009).

Some components of smart cities like public safety, economic development, pollution, traffic conditions and so on are based on large-scale dataset analytics. The exploration of healthcare data is achieved because of the availability of smart devices at minimal cost with computing power and storage, hence the development of electronic communication has become easier. The volume of the datasets is estimated to be 500PB (petabytes, 10^15 bytes) in 2012, which is comparable to the contents of 10 billion file cabinets, and they may increase up to 25,000PB by 2020, which is equal to 500 billion file cabinets. Big healthcare data is captivating not only due to its volume but also the heterogeneous nature of data and speed at which it must be managed.

With the help of big data in healthcare the efficiency can be increased and the costs can be diminished.

The various organs involved in the healthcare systems are physicians, hospitals, insurance companies, and pharmacies, are exploring paths to better understand big data application within smart systems.Figure 1.

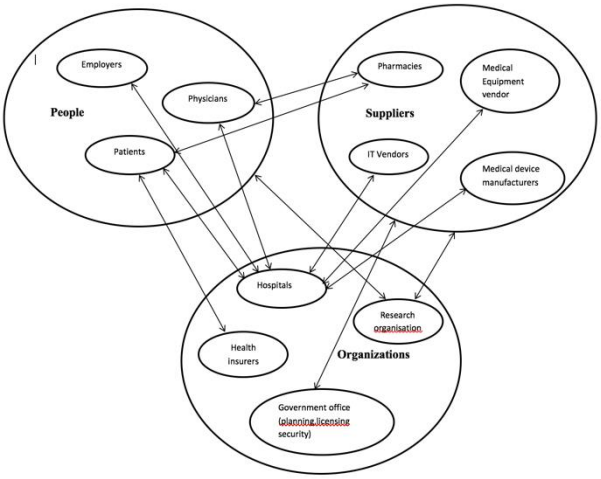

Figure 1. various components in healthcare

Hence this helps us in easy classification of prospects to reduce costs, improve services, and streamline processes involved. We can know the challenges involved regarding technical complexities, security and privacy concerns, economic constraints, data complexities, and also cultural aspects.

II. PRINCIPAL COMPONENTS

When we compare smart health and big data both are individually very new concepts, but they have received a lot of attention by academia and industry recently. We can represent an extraordinary user centric environment within the context of big data in smart health as this is one of the new application in smart cities.

SMART CITIES:

The concept of smart cities is not defined precisely and is still a vague idea. However, according to IBM (https://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/), a "smart city" is defined as the intelligent utilization of advanced technology to sense, examine, process and integrate large volumes of useful information of core systems in running cities. The intelligent responses include various kinds of daily needs, including citizens' livelihood, security systems, public transportation and environment, public health, and industrial and commercial activities (Pramanik, Zhang, Lau, & Li, 2016a; Qin, Li, & Zhao, 2010). In a smart city analysis of different datasets takes place in order to represent smart planning ideas, smart construction models, smart management, and so on.In the medicinal services setting, a smart city can help doctor's facilities to accomplish smart human services.

SMART HEALTH:

Smart wellbeing is emphatically associated with the ideas of health and prosperity (Suryadevara & Mukhopadhyay, 2014) and includes a huge volume of information, gathered by a lot of biomedical sensors, (e.g., temperature, heart rate, circulatory strain, breathing rate, volume, and so on.), genomic driven huge information (genotyping, quality articulation, sequencing information), payer–supplier enormous information (electronic wellbeing records, protection records, drug store solution), and web-based social networking information (patients' status, input, reactions) actuators, to watch and anticipate patients' physical and mental conditions. smart wellbeing is an incipient however encouraging field of concentrate at the convergence of restorative informatics, general wellbeing and furthermore business, implying smart human services benefits or upgraded machine gear capacities through the IoT (Internet of things). As of late, scientists have begun to consider the use of Big data in smart healthcare systems. Despite the fact that there have been numerous questionable explanations about Huge Information, in the social insurance setting it can be spoken to all the more precisely utilizing 5'V' characters which we examine in the following segment.

Big data applications in healthcare associations can give significant benefits which incorporate recognizing ailments at a beginning period when they can be recommended all the more effortlessly

and viably. The real activities of the National Science Establishment (NSF) identified with enormous wellbeing information investigation is the NSF Keen Wellbeing and Prosperity (SHB) program (NSF, 2012). The primary objective of the SHB program is to address ICT issues in the enormous information setting that help a genuinely necessary upheaval in human services from being receptive and doctor's facility focused to proactive and quiet focused, and emphasize prosperity as opposed to illness control (Chen, Chiang, & Storey, 2012). Various healthcare frameworks have been presented over the most recent two decades, for example, digital healthcare system, electronic healthcare system, doctor's facility based human services framework, unavoidable medicinal services framework, lastly smart healthcare system. We speak to keen wellbeing as a durable arrangement of three distinctive healthcare plans: Pervasive healthcare , Digital Classical healthcare and Hospital-based healthcare where all procedures are considered in the electronic social insurance (e-human services) condition. This e-healthcare primarily includes the utilization of electronic wellbeing records (EHR) for putting away, getting to and handling every single therapeutic data (Peng, Dey, & Lahiri, 2014).

Pervasive healthcare is a proactive framework where restorative facilities are outfitted with remote neighborhood (LANs), so doctors, specialists, specialists, attendants and staff can audit and refresh a patient's medicinal information from each positional setting utilizing handheld gadgets (Varshney, 2003, 2007).

Digital Classical healthcare is a receptive framework. This is a customary social insurance approach where specialists visit patients subsequent to getting a call from them. Dissimilar to the conventional traditional human services framework in Aday (2004) Aday (2004), computerized social insurance frameworks include the utilization of electronic medicinal services records (EHR) and ICT instruments too.

Hospital based healthcare is a settled place social insurance benefit where EHR and present day ICT apparatuses are broadly utilized, and all previous wellbeing records are widely explored (Jha et al., 2006),to make decisions on future activities.

2.1. The 5 "Vs" of big data analytics in healthcare:

Three understood attributes – volume, variety, and velocity – are dealt with as the essential qualities of big data in medicinal services since every one of these properties are truly considered in theory and rehearse (Groves, Kayyali, Knott, & Van Kuiken, 2013; Sakr & Gaber, 2014). As of late a few specialists and scientists have presented two other new qualities of big data in human services – veracity and value (James et al., 2011). In spite of the fact that these two dimensions of big data are less noteworthy in different fields and regarded as auxiliary attributes, they are as a rule genuinely considered in the medicinal services setting for moving the restorative care worldview to smart systems (Groves et al., 2013).

In smart healthcare systems, information accumulation and displaying forms are being directed at high speed, nearly progressively, which implies that there is a rising prospect for huge information investigation in human services to give prompt input on a patient's encompass ing condition. As information producing and capacity forms have changed because of the utilization of shrewd gadgets, and 26 billion IoT gadgets will be useful by 2020 (Middleton, Kjeldsen, & Tully, 2013). Despite the fact that some human services information are typically static, for example, x-beam film and paper records, most information are dynamic and speak to general observing, for example, different standard diabetic glucose measurement, circulatory strain readings, and heartbeat rate on electrocardiograms (ECGs).At long last, it is advocated in the writing and by that the 5Vs speak to a correct beginning stage for a talk about big data examination in shrewd human services.

2.2. Smart Healthcare System Architecture Framework

High-quality services are fundamental in healthcare frameworks be-cause some genuine outcomes can come about because of basic wrong judgments or medicines. As indicated by Zhan and Miller (2003), every year overall patients need to remain 2.4 million extra days in healing facility absolutely due to pharmaceutical related blunders. These errors likewise cause 32,000 passings and $9 billion in costs anually. More-more than, 1.5 million preventable antagonistic responses happen every year in healthcare systems. Tending to these issues here we propose a keen healthcare system structure that maintains a strategic distance from mistakes and diminishes social insurance costs. Our proposed structure likewise enhances the co-appointment of care, gives chances to social insurance organizations to send huge information stages and innovation, and presents universal medicinal services arrangements with less dangers and expanded intelligent administrations. In the proposed framework, we endeavor to receive a smart framework with suitable utilization of 3T and augment the potential of Big data examination in healthcare. In smart healthcare system diverse smart gadgets, advanced mobile phones, and sensors are utilized for continuous wellbeing observing, which can assume a significant part in enhancing healthcare benefits and guaranteeing ongoing reactions responses (Baig & Gholamhosseini, 2013).Fig 2. demonstrates the applied structure of a big data empowered smart healthcare sys-tem (BSHSF) which incorporates information sources, big data analytics, smart service based engineering and calculated help, and learning discovery administrations.

Healthcare systems utilize a lot of heterogeneous datasets to enhance their administration quality. These datasets are either structured, semi-organized, or unstructured. Big data in medicinal services begin from different inward (e.g., electronic wellbeing records, diagnosis reports, clinical choice emotionally supportive networks, Computerized doctor arrange section, and so on.) and outer sources (e.g., protection, government sources, and so forth.). These information sources convey information in different arrangements, for example, level document, .csv, content, figure, and so on. As per (IHTT, 2013) wellbeing information compose incorporates web and online networking information (cell phone applications, site, websites), observation information (e.g. sensors, close circuit TV (CCTV), correspondence get to television (CATV), geographic data frameworks (GISs)), exchange information (e.g., charging), biometric information (e.g., unique mark, X-beam, heartbeat and heartbeat oximetry perusing, circulatory strain, retinal sweep), and human-created information (e.g., specialist solution, email, paper archives).

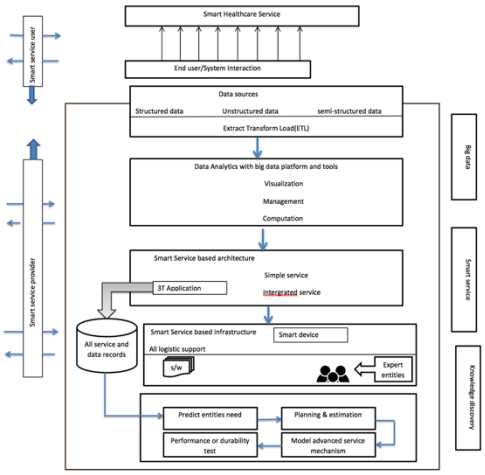

Figure 2. An applied framework of a big data enabled healthcare system.

In addition, Big data source segment is mindful to clean gathered information where raw data are changed into arranged datasets. Utilizing the procedures of concentrate, changes, and load (ETL), information from different sources is rinsed and sorted out.

Arranged datasets are dissected in huge information stages and apparatuses in the second part of the structure. The most essential and prominent stage for big data investigation is the open-source distributed processing stage Hadoop (Apache condition), which can play out the twin parts of information coordinator and systematic device also. Disseminated

figuring is a critical character of Hadoop that enables one to process greatly a lot of information by dispersing parceled datasets to a few pertinent servers (master cessors/machines), every one of which settle particular lumps of a noteworthy marvel and after that coordinate them to exhibit the last outcome (Raghupathi & Raghupathi, 2014; Agarwal & Dhar, 2014. In the social insurance area, every single huge datum stages and devices can be grouped into three general classifications. They are (an) administration stages and devices (Big Data Appliance, Pentaho Data Integration, SAP HANA; Russom, 2013) , (b) perception stages and instruments MapReduce , and (c) computational platforms and tools (HDFS, MapReduce; Russom, 2011).

Diagnostic outcomes from various stages and tools are utilized to give quality healthcare services in the following part, where the framework guarantees information checking, protection, and security agreement amongst buyers and service providers. Progressed 3T techniques are generally utilized as a part of healthcare services administrations. In the healthcare services area distinctive 3T calculations and models can gain from past cases in clinical information and afterward display astute and continuous social insurance administrations for shoppers.

With the reception of BSHSF, social insurance organizations can introduce answers for the accompanying difficulties - supply chain administration, protection and security challenges, coordinated mind, and composed data frameworks. BSHSF guarantees high - quality medicinal services frameworks through empowering interdisciplinary groups to cooperate among partners (see Figure 2). BSHSF allows mechanization of business forms that can effectively lessen the costs identified with mistake ridden manual procedures. It can diminish wellbeing costs, enhance contract administration, and accomplish administration of better quality. In addition, through receiving BSHSF, any social insurance business association can appreciate the installed part of IT where data frameworks are used to deliver, catch, store, professional cess, and convey opportune data to all accomplices for efficient synchronization of medicinal services.

In BSHSF, distinctive investors are connected by means of computerized systems and the cross-plays among these substances create a huge volume of profitable information that encourage healthcare associations to advance and develop. In any case, the information downpour likewise makes genuine security issues that may cause an administrative kickback and block encourage authoritative creation. To address the test of data security, the BSHSF approach will utilize distinctive viable and efficient anonymisation, and cryptographic models in information accumulation, control, and discharged frameworks. Fundamentally, business concentrated on BSHSF offers a chance to build up another healthcare services approach that can help enhance security and protection, improve primary tenance, decrease expenses, and better utilize data innovation in the social insurance industry.

III. RESULTS AND DISCUSSION

In BSHSF, distinctive investors are connected by means of computerized systems and the cross-plays among these substances create a huge volume of profitable information that encourage healthcare associations to advance and develop. In any case, the information downpour likewise makes genuine security issues that may cause an administrative kickback and block encourage authoritative creation. To address the test of data security, the BSHSF approach will utilize distinctive viable and efficient anonymisation, and cryptographic models in information accumulation, control, and discharged frameworks. Fundamentally, business concentrated on BSHSF offers a chance to build up another healthcare services approach that can help enhance security and protection, improve primary tenance,

decrease expenses, and better utilize data innovation in the social insurance industry.

IV. CONCLUSION

Hence smart cities mainly includes smart devices.The across the board application and appropriation of smart gadgets in civil areas has brought about the presence of smart cities. This paper has examined the difference in innovations and applications with regards to information, city, and healthcare. This change is a change in perspective that enables individuals to learn different issues with superlative administration and imaginative true dreams. In this paper, we additionally found distinctive progressed 3T applications which have just increased substantially more fame lately as a dream of moving advancement and monetary development and giving computerized and efficient medicinal services administration and city improvement. Besides, this article has likewise proposed a major information empowered smart healthcare framework (BSHSF) that offers calculated models of intra and inter organizational business task. Keeping that in mind, the few difficulties are featured in the dialog area that must be tended to. In the human services setting, as large information and SMART frameworks turn out to be more critical, issues, for example, guaranteeing security, ensuring security, building up quality and control, and as often as possible refining the apparatuses and technologies will earn consideration. As needs be, we planned some rules for hierarchical analysts with the goal that they can better use BSHSF chances to accomplish practical upper hands and persistent development. In any case, BSHSF approaches are in a blossoming period of improvement, yet fast development of cutting edge 3T applications can rush their developing procedure.

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An Iot Approach to The Issues of Bus Commuters

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ABSTRACT

As we are rapidly moving towards the India, which Dr. A.P.J Abdul Kalam mentioned in his vision for India 2020, we have projected our nation as a developing country in transition to developed nation status. The development of smart cites is in full swing and several hundred crores of INR is being spent on the development of smart cities. Various sectors in economy have seen immense involvement of technology. Public transit, especially buses are considered as the lifeline of the nation. But, the development of this sector is very subtle since the last few decades. The introduction of Internet of Things(IoT) in the blooming silicon market provided us with an opportunity to enhance customer experience of bus commuters(especially daily commuters).With the integration of various sensors and Arduino modules, we have designed a solution for various problems(such as overcrowding) faced by the bus commuters on a daily basis. It will help immensely in the development of smart cities which will eventually lead to the nation's overall development.

Keywords: IoT, Smart Cities, Arduino, Overcrowding

I. INTRODUCTION

Public transport has always been the first priority for daily commute on every commoner's mind. The reason why public transports are preferred is that, public transits are relatively cheaper than private travel. Private vehicles require servicing, insurance and repairs on a timely basis. Public transport on the other hand, offers concessions for elderly citizens and also students. Also, public transports are a boon to the environment. Big cities have public transport networks that reach out all around the city, thereby making it very convenient for people. Public transport comes as a boon to all those people who can't drive and are dependent on their friends or relatives to do the driving. Public transportation can convey many more people in much less space than individual auto mobiles, which helps to keep traffic congestion lower, and helps riders avoid the stress that comes from daily driving in highly congested areas.

However, public transports have their own set of flaws. A major drawback to this service, is overcrowding. Due to the burgeoning population of India, there is also an increase in the demand of public transportation. The ratio of buses to the population using the bus services is highly disproportionate. Also, in India, the buses are driven according to the whims of the bus drivers. The money making conduct practised by the drivers often results in overcrowding of the buses. Another downside we see, is that the schedule of the buses is rarely maintained. People end up waiting in their respective stops for long durations, only to find out that the bus arrives completely full. Those people then have to either wait for the next bus, or make other arrangements after wasting time at the stop. The purpose of this document is to provide with

some IoT based approaches that can help solve these problems faced by daily commuters.

This paper attempts to provide solutions to the problems stated above, we want to provide solutions with the help of this paper. For instance, a weight check can be installed on all the buses which will ensure that the buses do not run overloaded. Also, real time data can be provided to the passengers on their mobile devices, regarding the arrival and status of the buses. The status can be shown indicating whether the bus is filled or not. If a person finds his bus already filled, he need not wait until the bus arrives. He can make alternate arrangements. Also, real time information regarding any bus break downs on any route can be indicated on the mobile application.

The paper is organised as mentioned further. Section II talks about **Methods Used** in which, we have briefly explained the methods we have used as solutions to the aforementioned problems. Section III discusses **Implementation Details**, an in-depth view of how the proposed methods are implemented. Section IV and Section V contain and the **Future enhancements** of this presentation.

II. METHODS USED

A. Overcrowding check

A weight sensor is to be installed on the bus, so that the weight can be monitored at all times. This will ensure that the buses are not getting overcrowded. The weight will be checked using a weighing scale built using load cells, Arduino module and a Load cell amplifier -HX711.The scale will be positioned on the buses.

B. Real time data using mobile application

For real time bus tracking, we will be using "The Transport Tracker Solution". This can help us create an Android app which will capture the real time data and store it on an online NoSQL database "Firebase". The map built with the Google Map JavaScript API will provide the real time tracking of the vehicle.

III. IMPLEMENTATION DETAIL

A. Implementing weighing scale sensor

The weighing scale is built using load cells, Arduino module and HX711(load cell amplifier).A load cell is a transducer that can translate pressure (force) into an electrical signal. There are various kinds of load cells available, but we are going to use strain gauge load cells.

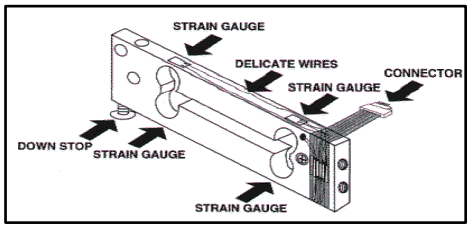

Figure 1. A Load cell

We are also going to use a strain gauge. The gauge factor for metallic strain gauges is typically around 2. Strain measurements rarely involve quantities larger than a few millistrain. For instance-suppose we apply a strain of 500με. A strain gauge with a gauge factor of 2 will have a change in electrical resistance of only 0.1.

$$2 * (500 * 10^{-6}) = 0.1$$

For a 120Ω gauge, this is a change of 0.12Ω.

0.12Ω is a very small number that cannot be detected at all. So we are going to need another device that takes that very small change in resistance and turn it into something that we can measure accurately.

That device that can help us achieve the above, is HX711.

A good way of converting small changes in resistance and into something more measurable is using a Wheatstone bridge.

In a Wheatstone bridge,R1/R2=R3/R4 implies V_{out}=0.

$V_{out}=[(R3/(R3+R4)-R2/(R1+R2))]*V_{in}$ (1)

One of the resistors is replaced by a strain gauge. The change in V_{out} is calculated and the force applied is

studied.

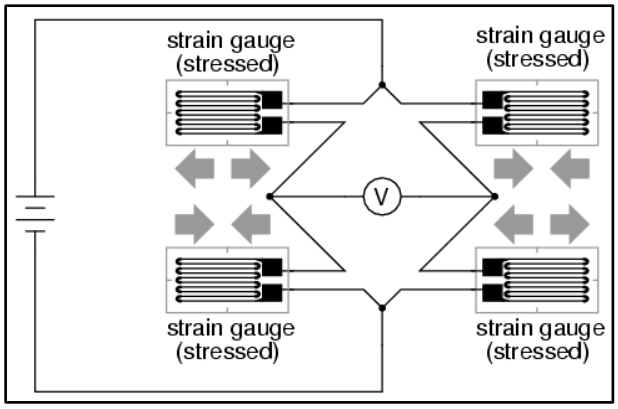

Figure 2. Full-bridge strain gauge circuit

Now, the load cell is connected using 5 wires to the HX711 load cell amplifier. The pins are- RED,BLK,WHT,GRN AND YLW.

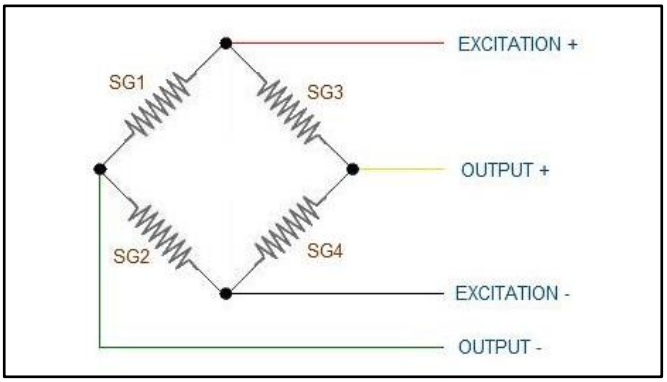

Figure 3. Load cell wiring

Once the load cell is connected to the amplifier, the loose ends of wires(VDD, VCC, DAT, CLK, GND) are connected to an Arduino/RedBoard board.

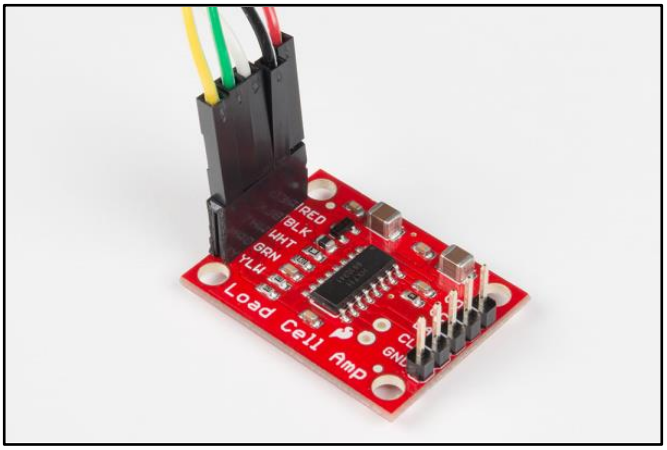

Figure 4. Load cells wires connected to HX711 Amplifier board

After the load cell, amplifier and microcontroller (Arduino/RedBoard) are set up; we can calibrate it to check the weight of the bus, using Arduino codes. The check will ensure that the buses are not overcrowded and accurate information will be processed and passed on to higher authorities, if the buses ply overloaded.

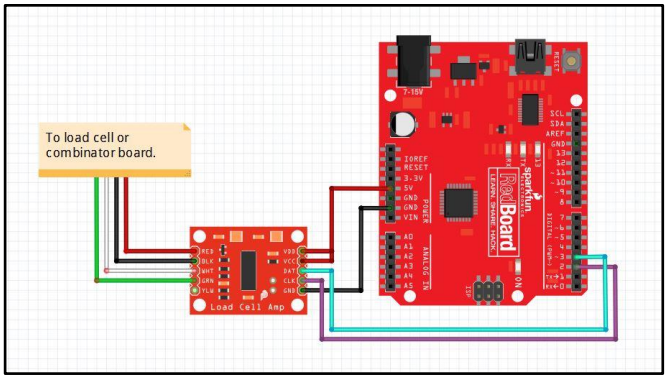

Figure 5. HX711 connected to Red Board

B. Implementation Details of the mobile Application

Different Components:

1. Map

An app based interface that displays information about the current buses plying on the route and the location of vehicle based on the concept of Digital Twin.

Figure 6. Real time information on **map**

2. Bus Location

You can enter the vehicle number into the mobile application and check the details about the same e.g. current occupant check and driver details etc.

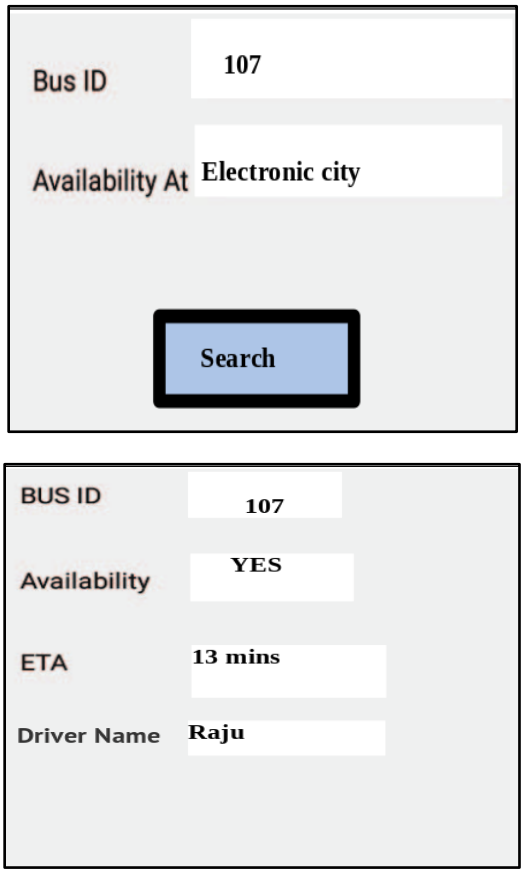

Figure 7. The interface

3. **Admin's Interface**

The administrator will have the control of the application and will monitor the application for trends and with the help of Cookies we can suggest the customers frequently searched bus numbers for the ease of use.

4. The database backend

A Real time NoSQL database Firebase is used to store the vehicle location and occupant status data sent from the vehicle locator and provide real time data synchronization to the map and administrator's overview.

IV. CONCLUSION

The use of public transport needs to be encouraged as much as possible, in today's world, where global warming is such a serious issue. Public transport is a very convenient means of commute for people. But, if people have to think twice before they wait at a stop every time, just to avoid an overcrowded bus, then public transport will not serve its purpose. This paper has presented some solutions that can be used, to help daily commuters. Weighing scales that are built using load cells can help in ensuring that buses do not travel overcrowded. Also, a mobile application that informs passengers real time data related to buses in a route can help people save time, and plan their schedules and arrangements without getting disappointed waiting for a bus that does not turn up, or a bus that arrives filled up.

V. FUTURE ENHANCEMENTS

This architecture can be used for various kinds of public transits, to overcome the problem of overcrowding. The frequency of the number of people requesting information on the application can be used to bring the number of operational buses to a proportionate figure. Another enhancement is that, alternate routes can be provided to users if a certain bus suffers a break down.

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IoT Based Smart Home Automation System

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ABSTRACT

The high energy needed by home appliances (likewhite goods, audio/video devices and communication equipment's) and air-con systems (heating and cooling), makes our homes one among the foremost essential areas for the impact of energy consumption on natural surroundings. AIM for the planning of a system which will minimize energy waste in home environments with efficiency managing devices operation modes. In our design we tend to use a wireless sensing element network to observe physical parameters (like light-weight and temperature) additionally because the presence of user's reception and in every of its rooms. In order to optimize energy consumption and value while guaranteeing the specified comfort level. When users change their habits as a result of unpredictable events, the system is able to notice wrong predictions analysing in real time info from sensors and to switch system behaviour consequently. Parameters that might stop the introduction of home automation systems for energy saving into the mass market.

Keywords: Smart Automation, Sensors, Smart home appliances, smart home technology, Blue pill Development board, RFID Sensor.

I. INTRODUCTION

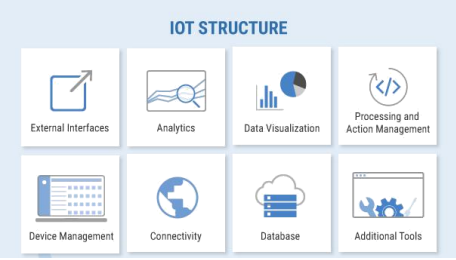
While the cost of living is going up, there is a growing focus to involve technology to lower those prices. With this in mind the Smart Home allows the user to build and maintain a house that is smart enough to keep energy levels down while providing more automated applications. Smart homes connect all the devices and appliances in your home so they can communicate with each other and with you. A smart home will take advantage of its environment and allow seamless control whether the user is present or away. Smart home technology makes the automatic communication with the surroundings possible, via the Internet or mobile phones. Smart home technology gives a totally different flexibility and functionality than does conventional installations and environmental control systems, because of theprogramming, the integration and the units reacting on messages submitted through the network.

Smart home is one in which all electrical equipment around the home technologically smart or intelligent or automated with highly advanced automatic system for security in other system. Smart home is useful for everyone and can also be used in everyday life at home. Smart home is
consisting of three parts- network, controlling device and home automation.

Network can be wire or wireless. It is used for connecting the automation to controlling devices. Controlling devices can be used for managing the system. Home automation is the devices which control the physical environment. It can be used in kitchen, home or offices etc. These three parts will be discussed in detail in the "Smart Home Technology" section.

The Structure of IoT: The IoT can be viewed as agigantic network consisting of networks of devices and computers connected through a series of intermediate technologies where numerous technologies like RFIDs, wireless connections may act as enablers of this connectivity.

1. ***Tagging Things:*** Real-time item traceability andaddressability by ***RFID***s.
2. ***Feeling Things: Sensors*** act as primary devices tocollect data from the environment.
3. ***Shrinking Things:*** *M*iniaturization and ***Nanotechnology*** has provoked the ability of smaller things to interact and connect within the "things" or "smart devices."



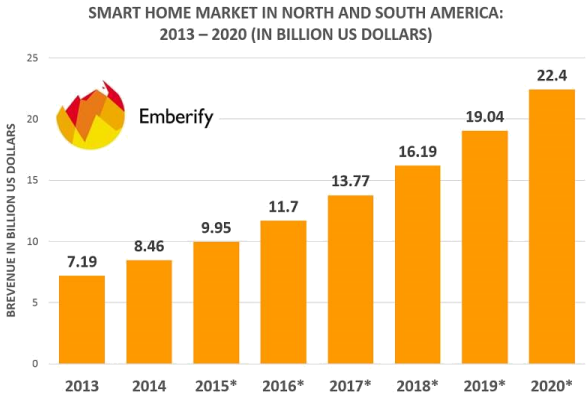
4. **Thinking Things: Embedded intelligence** in devicesthrough sensors has formed the network connection to the Internet. It can make the "things" realizing the intelligent control.

II. VISION

In the 1950s, the Jetsons popularized the concept of home automation with automated doors and intelligent rooms that took care of their occupants.

Clearly, the idea of the smart home has been around for several decades, and every year we are getting closer: according to Business Insider, there will be 1.8

billion connected devices in homes around the world by 2019.



III. LITERATION SURVEY

In recent year, there are many implementation is going for the smart home system for residential building to make it more efficient day by day.

Many researches are implementing to optimize the efficiency of the smart home automation system; through simulation we can also implement the smart home technology. But now a day's mostly VB (visual basic) and PLCC is being used. Practically we can implement the smart home by many researchers to optimize the better result and to improve the technology for the less consumption of electricity.

IV. MATERIALS AND METHODOLOGY

Through VBB and optimization of smart home has been done. We observed the variation in temperature, and the speed of fan is also varying according to the temperature as they programmed in c language. And the loads which are connected through relays which are used to switch on and switch off the loads through sending tones via mobile phone and through serial connection we can also control the whole system by connection through PCs with server through client PCs. RS232 IC is used their which is act as the transmitter and receiver as well as. This is also called the USART (universal synchronous asynchronous receiver and transmitter) and through switches we can control it manually.

We use the 16F877A PIC microchip to feed the c language program in it. It will work only with the output voltage of +5V. We feed the coding in PIC microchip to run the system according to the feed coding.

V. ARCHITECTURE

The overall structure parts are composing of hardware platforms, network system structure and the gateway, as shown in Fig 2. The home system achieves the following functions are:

1. Smart Burglar - is a system designed to detectintrusion.
2. Smart environment climate—the room temperature, humidity and air quality monitoring and control, auto open in the room and shut automatically when you are out.
3. Smart sound—turn on in the room, turn left when you out.
4. Smart phones—if don't have call, all the telephone shrilled, only asks a bell rang for the short distance of people.
5. Lighting system—according to the brightness and close automatically, automatic and get up at night. When you leave, shut automatically and manual controls with priority.
6. Remote function—use the internet and mobile phone remote.
7. Open of system—convenient connected with the housing estate or a lane [6].
8. First Aid System-convenient connected with the house estate.

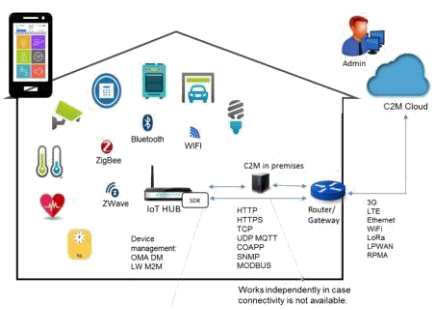


Figure 1. Architecture of the Smart home Application

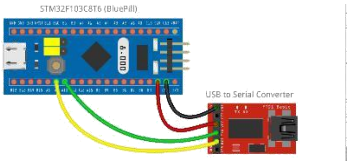


Figure 2. Block diagram of the Blue pillSTM32F103C8 and USB to Serial Controller.

VI. MODEL DESIGN

The below fig. shows the Basic Model design of the proposed paper, in which we can use following components.

i) RFID RC522
ii) Blue pill STM32F103C8
iii) USB to Serial Controller
iv) RS232 IC
v) LCD

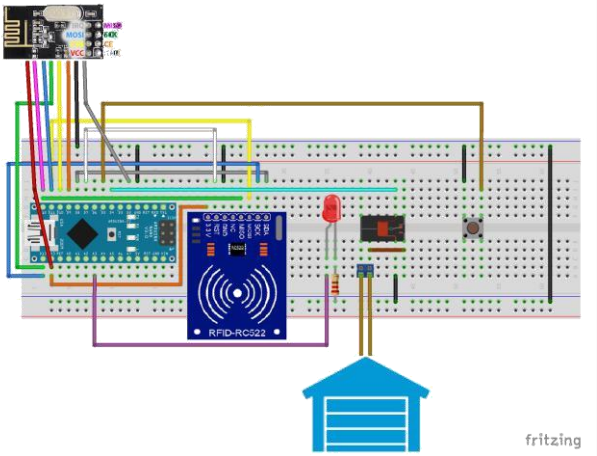


Figure 3. Basic Implementation Model Design

VII. HARDWARE IMPLEMENTATION AND WORKING

The above fig is a small example model for smart home where the aim is to open the door when any user enters the room. Firstly, we have to provide the 220v supply to the model project, after that step

down transformer is used to step down the power from 220V to 5V to the circuit. It works smartly if anyone enters through the door than IR sensors which are placed in door to count the person, if person enter in the room then the starts working, it means it won't work if there is no person inside the home then automatically the loads of the home is turns off. There are three control methods through which we can control it through three methods:

- ✓ Manually control
- ✓ DTMF Control
- ✓ Computer control

VIII. WORKING OF RFID MOTION SENSOR

RFID methods utilize radio waves to accomplishthis. At a simple level, **RFID** systems consist of three components: an **RFID** tag or smart label, an **RFIDreader**, and an antenna. **RFID** tags contain anintegrated circuit and an antenna, which are used to transmit data to the **RFID reader**.

IX. WORKING OF PROTOTYPE

The prototype can be used in following two ways:

- As a smart security system
- As a smart home automation system

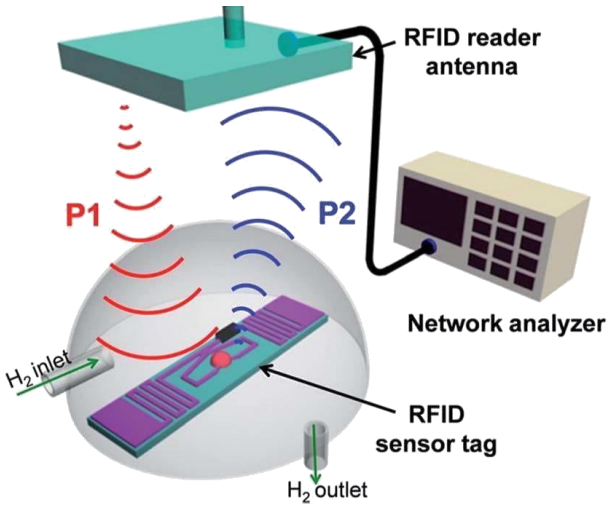
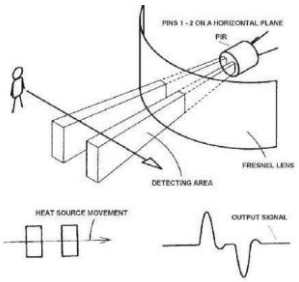


Figure 4. RFID Sensor working principle

WORKING OF

The prototype can be used in following two ways:

i. As a smart security system
ii. As a smart home automation system



A. As a smart security system

PIR motion sensors are installed at the entrances of a building. These sensors as explained earlier detect the motion of human beings. This signal which detects their presence becomes the input trigger for the micro-controller. The owner, who may or may not be present in that building, will be receiving a voice call on his mobile phone (whose number is predefined in the program) stating that 'There is an Intruder in the House'. To turn ON the lights and alarm at house so that the intruder will be warned, the owner can press '1' from his mobile keypad. Moreover, if the owner finds that his building is not safe, he can send an SMS [8] to the concerned authority in police department; explaining his situation. The module will turn OFF the alarm and lights after a fixed time delay. The call will be triggered again as soon as the module detects any unexpected motion and the owner will receive the call again and the process continues so on.

B. As a smart home automation system

This application of the module can be explained by an example. Suppose the owner is expecting a guest at his house but he is not available there. Now, as the guests reach at his house the owner will receive a video call. But now the owner can press digits other than 1 (such as 3 for lights, 4 for fan, 5 for A.C., and so on) or even can disable the security system. Similarly, if the user or somebody leaves the house, the user will still receive a video call and this time he can switch Off the appliances or can enable the

security system again by pressing proper digits known to him. Since the appliances are connected to mains supply through a relay they can be easily controlled using micro-controller

X. FLOW CHART

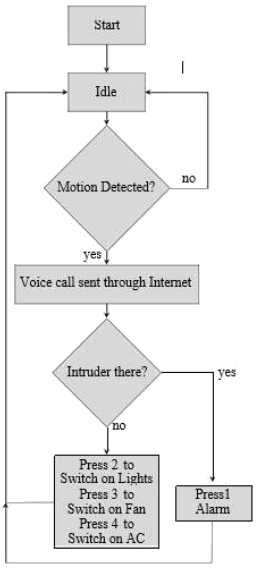


Figure 5. Flow chart of simple Smart Home Application.

XI. SECURITY AND PRIVACY CHALLENGES

The major challenges with smart homes are the reliability of the sensors and surveillance systems, their calibration, provision of reliable communication from and to smart homes, granting security and integrity of data, provision of action plan or scenario in case of system failure or denial of services, security for the integration systems, including devices and decision taking software. In addition to the danger, related to the reliability and security, which are of technological and architectural design nature, there are also social dangers and also Smart Home can collect massive amounts of data, some of which can be sensitive.

Smart home systems can be manipulated, hijacked, or attacked impacting the private lives of user.**XII.**

PERFORMANCEELEMENT

We have measured temperature and humidity. Which we have set by which it continuously senses temperature and humidity. In the screenshot given below, it continuously senses temperature and humidity after every 5 sec.

Table 1. performance reading

Sl.no	Parameter	Reading
1	Temp	21
2	Humidity	27

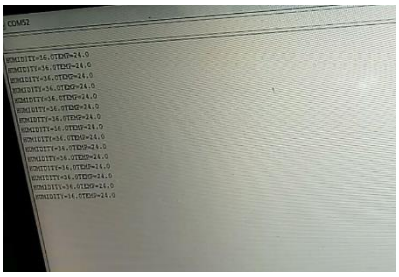


Figure 6. Displaying current temperature and humidity.

XII. APPLICATION

- Lighting Control: Leaving the Dark Ages and Stepping into the Light
- HVAC Regulation: No Longer Burned by Your Heating Bill
- To help Handicapped people
- Where less energy consumption is major factor

XIII. DISADVANTAGE

HIGHER COST

Govt. Spend a lot of electronic facilities and new book.

NOT MUCH DEMOCRATIZATION IN EDUCATION

Student have no choice on what to learn and when to sit for exam.

They don't have enough time to study and understand the lesson as they have different ability to learn.

LACK OF TECHNOLOGICAL INFRASTRUCTURE AND TEACHING MATERIALS IN SCHOOL INRURAL AREA

Don't have much chance to be expose to technology. Limited internet connectivity.

XIV. CONCLUSION

This paper is based on the meaning of smart phones and all the details of smart home elements, projects and challenges. The use of modern technology is adding to a safe and comfortable living environment for everybody. For the disabled person, the benefits are even greater. Many new technologies are exploring more and more and day by day. Smart is the good and beneficial who is very much easy with their professional life and also for those who are about security and comfort but they want to save their electrical energy that is wasted by many people in regular span of time. With the introduction of smart home people are living and will obviously live more comfortable life. All the time home can be save from automation so that we will have much more time work on the other things or pursuits. The use of **Blue pill** development board will reduce around 70% of cost on Development board. In order to have security and to reduce the cost instead of RFID we can use PIR sensor and GSM Sim model by sending message to the controller.

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Upgrading Normal TV into a Smart TV using Raspberry Pi

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ABSTRACT

Context- A television is perhaps the most common gadget in any household. Recent technological advancements have given rise to the idea of Smart TV. The general cognition of "smartness" encompasses features including but not limited to internet access, social media, live media streaming etc. Researchers have shown that people tend to like puzzles and memory games on a Smart TV more than the usual social media content.

Objective- To provide additional features to a traditional TV such as video streaming, games, puzzles, health tips. TV usage analytics can prove useful to extract usage patterns and predict health effects.

Methods- We use Raspberry Pi as the base hardware. The video extracted using TV tuner is analysed using machine learning algorithms. Health tips are provided based on TV usage patterns. An open source software i.e Kodi was used to provide live media streaming. Kibana was used to display analytics interactively. A web interface was developed to interact with the system.

Results- We were able to implement the design in a cost effective way compared to available solutions. Additionally, health tips, puzzles, memory games were provisioned.

Significance- Smart TV can provide facilities in rural areas to improve the education quality. Additional facilities such as remote health monitoring can be provided. A Smart TV can serve as a tool in providing wholesome IoT solutions.

Keywords: Smart TV, Raspberry Pi, Health Monitoring, Machine Learning, Image processing.

I. INTRODUCTION

The purpose of this research is to devise a method to upgrade a normal TV into a Smart TV. The term "Smart" may conjure up many fascinating ideas in the mind. For the purpose of this paper, we are considering a subset of the meanings induced by this term. They include, accessing social media content, live media streaming, memory games, puzzles etc.

Costa et al. [1] has shown that the most appreciated services on Smart TV include puzzles, sequence sorting games, rehabilitation videos, news and so on. The most obvious and usual perception of Smart TV is about internet connectivity, video streaming and social media. For the purpose of completion of this definition, we have added features supporting social media also.

The uniqueness of our paper lies in the fact that we are proposing a system that can analyse users' behaviour and suggest health tips. Billis et al. [2] suggests that there is a hidden relation between the TV usage patterns and people's emotional conditions. Their research uncovers the underlying patterns between telemetric data and mental health.

We investigated the available solutions in the market relating to this subject. We found that products such as Google Chromecast and Amazon Firestick employ very minimum features. Google Chromecast, being the most limited in the features it provides. The Andorid phone's screen is mirrored onto the television assisting the user to view content on a larger screen. Amazon Firestick adds a couple other features including videos on demand, custom remote and Amazon exclusive movies. We observed that the products were slightly overpriced compared to the features they provide.

We used Raspberry Pi as the underlying hardware to support data collection and processing. Raspberry Pi, being a powerful embedded system with an affordable price just fits in the niche. A cloud-based solution is chosen to visualise the collected data. Kibana provides an interactive and intuitive dashboard to display analytics. We used Kodi, an open source media entertainment software to connect to the social world. Finally, a wide-ranging product is made available to the user. The product being a mixture of entertainment, social media, puzzles, news articles, memory games, health tips etc.

In the further sections, the overall system design is discussed, followed by image extraction and logo detection using machine-learning algorithms. At the end, a novel user interface to interact with the system is discussed in detail.

II. SYSTEM DESIGN

The system is designed in the form of a pipeline. The following flowchart shows the components used and the flow of control.

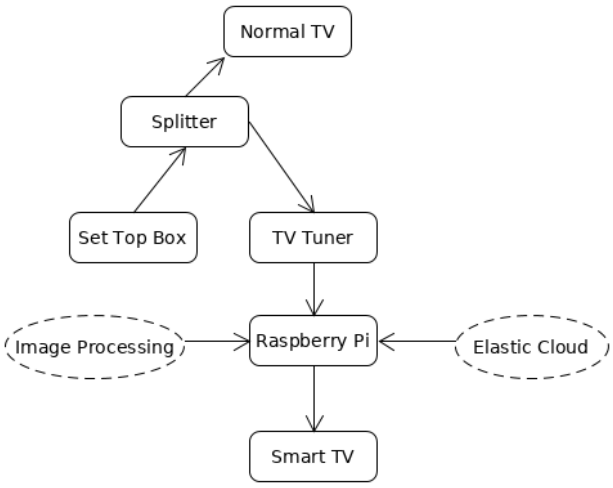

Figure 1. System Design showing all the components

The central hardware used in this project is a Raspberry Pi. The video input from set top box is sourced into Raspberry Pi via a TV tuner. The splitter assists in providing inputs to both the normal TV and TV tuner. We use Elastic Cloud to analyse the data. News articles, games are provided by a custom interface.

III. IMPLEMENTATION

A. Channel Logo Extraction from real-time video

It is imperative for our project to extract image of channel logo that the user is currently watching. Since we have a continuous stream of video, we need to extract logo of the currently active channel at fixed intervals along with its timestamp. The interval cannot be too long, because it might miss channel change events and it cannot be too small because it will be computationally intensive for our systems. The entire process of channel logo extraction can be divided into two major steps: 1) Extracting frames at fixed intervals and, 2) Cropping out the channel logo from the frame.

1) Frame extraction: Frame extraction is achieved by using a free and open source video processing software - ffmpeg. We use a command like this:

ffmpeg -i "$INPUT_VIDEO" -s 640x480 -ss 00:00:$TIME -vframes 1 $FRAME; where -i refers to the video stream from the TV, -s defines the resolution of frame shot to be taken, -ss tells the fixed interval to take frame shot at, -vframes defines the number of frames to be taken at the end of time interval and $FRAME is the name of the output variable. At the end of the process, the frame shot is stored in the file named $FRAME and is passed onto the next stage.

2) Cropping out the logo from the extracted frame: Once the frames are extracted and stored along with their timestamps, the next step is to crop out the unnecessary part of the frame image so that only the channel logo remains. This makes it easier to process for image processing and machine learning in the next stages. We have used image magick a free and open source software for image conversion and processing for this task. We used the following custom command. convert $FRAME -crop $channel_dimen $LOGO; where $FRAME is the same frame shot that be extracted in the previous stage, -crop gives the dimensions and (x,y) coordinates of the logo in the frame to be cropped and $LOGO is the variable that stores the output logo. Once the logo is extracted in this step, it is passed onto the next stage where robust image processing and machine learning techniques are used to classify the logo images to channel names.

B. Channel detection using ML on Logos

As the logos were extracted in the previous steps, the next step would be to recognize a channel by its logo. We used machine learning for this task.

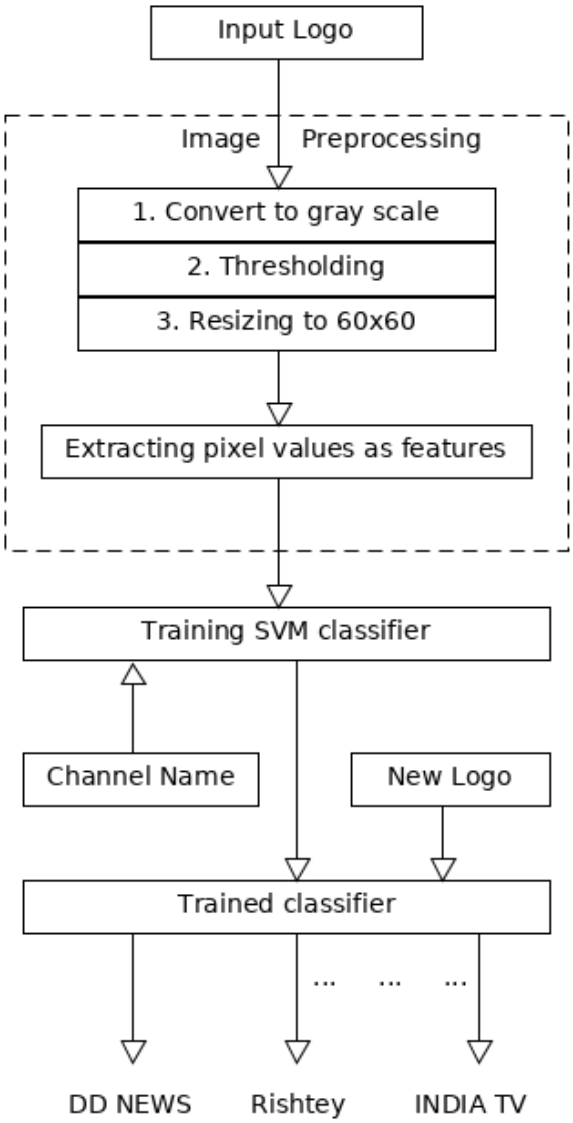

Figure 2. The complete process of logo recognition using machine learning

In order to successfully build an image classifier, we needed to convert the image into a format that is computationally less expensive and extract useful features that represent the image into a format that the machine learning model can understand. This is achieved by pre-processing and feature engineering. Image pre-processing typically includes: converting the image to gray scale to simplify the representation of image into a 2D array as compared to previously a 3D array; thresholding to make the foreground of the logo more prominent than the background, resizing all the images in the dataset to a common 60x60. Feature engineering is done when we need to extract

features from the image that can better represent the information present in it. In this case, since we are using SVM that works well with sparse data, we represented each image by a vector of its pixel values (each such vector was 60x60 = 3600 data points).

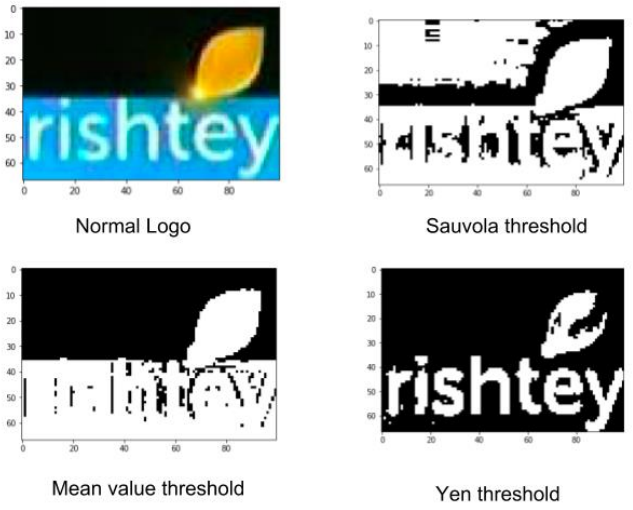

Figure 3. Shows how choosing different thresholding techniques can impact the performance of the classifier by better or worse representing an image.

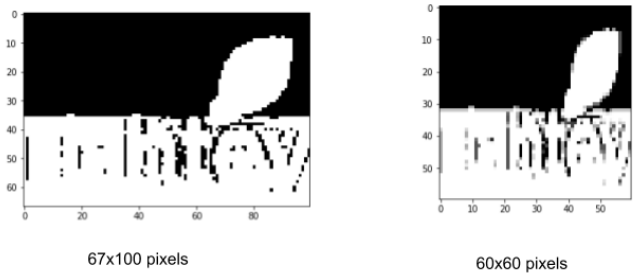

Figure 4. Shows how resizing helps to standardize the entire dataset into a size of 60x60.

C. Data logging to Elasticsearch using curl

After the channel logo is recognised, it is logged into Elasticsearch along with a timestamp. Elasticsearch is hosted on the AWS cloud. RESTful API is used to send data into Elasticsearch. The data can then be analysed and presented in a visually appealing way using the front-end software Kibana. These tools form a part of the ELK stack. A sample POST request using curl is given. curl -XPOST "hostname/index/type" -d '{ "name" : "test" }'. All the softwares were implemented in a Linux environment. The output from Kibana is taken as a web iframe and integrated with the custom web interface provided along with this product.

D. Suggesting Health tips

To consider the implementation of health tips, we closely studied the traditional Indian model of human mind as given in Shrimad Bhagavad Gita. It consists of modelling the mind as a mixture of three distinct qualities. They are Sattva, Rajas and Tamas. They can be loosely understood as, equanimity of the mind i.e. Sattva, vibrancy in actions i.e. Rajas and inertia in the activities i.e. Tamas. Every human being is a mixture of various proportions of these qualities. They keep dynamically changing in every person per situations.

In this project, we have tagged TV channels based on this model relating to the content displayed. For example, a news channel can be classified as predominantly Rajasik, a spiritual channel as Sattvik and a movie channel as a combination of Rajasik and Tamasik.

$$Health\ Index = \frac{0.4\sum Sattva + 0.4\sum Rajas + 0.2\sum Tamas}{Count(Readings)}$$

Equation 1. Calculation of Health Index value

The Health Index value ranges from 0-100 (Larger is better). Based on the various viewing patterns of a person, the probable effects are predicted. Other factors such as longest watching streak, time of the day and frequency of TV viewing are also considered to predict health effects. For example, physical effects due to continuous TV viewing can be dehydration, dry eyes, inertia due to physical inactivity etc. Mental effects are judged based on the type of the content consumed. We do not claim these effects to be an exhaustive list, but provide a method to predict the effects.

E. Web Interface to integrate Kodi, Kibana and Games

We provide a custom built web interface to integrate various softwares and present analytics using Kibana. User Interface is the key part of experiencing a software. Here we provide the user with a web interface where it has features of homepage that shows the user, news & trending topics, analytics page where user gets TV usage patterns shown in graphs. Kodi is the open source software, which adds social media features to the TV and has controls that enable users to turn on and off the application from the UI. Games are also part of smart TV and hence are integrated in such a way that controls are shown on mobile and game is projected onto the TV which makes user interaction flow.

React framework is used at the frontend to register user actions and act accordingly. Python server is used at the backend to run the game server and keyboard control server.

To interact with the Smart TV, keyboard events are dynamically generated using xdotool.

IV. RESULTS AND DISCUSSION

The results are discussed separately for different activities in the product pipeline. The various components are tied into a single product, which perform independent tasks in collaboration with each other.

Raspberry Pi processor clocked up to 0.5 load average and a peak temperature of up to 65°C.

The image processing and recognition involved a heavy-duty training process for machine learning algorithm. Finally, we generated a Python pickle file containing trained data, which could be used for image recognition on the fly. Accuracy in logo recognition is tabulated below along with the waiting time to recognise the logo.

An interesting observation was made while completing logo recognition. To recognise any logo independently for the first time, the time taken was 5.5 seconds on an average. But subsequent rounds took negligible time. Eg. The total time taken to recognise a set of 45 logos was 6.7 seconds.

Table 1. Logo Recognition Metrics

Channel Name	Number of Samples	Total time taken to recognise(s)	Accuracy (%)
DD News	45	6.7	95.5
India TV	56	7.2	100
Rishtey	43	6.8	100
Zee News	39	6.6	97.4
Aastha	63	7.5	98.4

The data is logged onto the Elastic Cloud, which takes about a second for every log operation.

The custom dashboard is provided with the help of React framework on a web browser. Chromium is used for this purpose which performs under 0.5 load average.

No-IP solution is used to cope with dynamic IP address.

Such solutions can be used freely in the process of deployment of this product.

V. CONCLUSION

We were able to provide a Smart TV experience in a normal TV. The final product is able to recognise the channel watched by the user in real-time. The product is able to calculate the health index by mixing proportions of Sattva, Rajas and Tamas. Games are provided as an additional entertainment source.

This paper proposes a design to convert a normal TV into a smart TV. In addition, a novel method to get health index is discussed.

The significance of this paper emerges from the fact that our proposed Smart TV system can be used in rural household to provide quality education to children. The elderly population can get health tips in the course of using our product. In addition, the middle-aged population is benefited by the virtue of an indicative health index as proposed in our system.

VI. FUTURE SCOPE

In this paper, we provide a method to design the pipeline of Smart TV. Many enhancements can be provisioned. In the future, we plan to integrate methods to support remote doctor consultation. These must be preceded by addition of hardware components such as pinhole camera to Raspberry Pi. We also plan to make the analytics process independent of external dependencies such as the cloud. We also plan to add educational content in the Smart TV so that it can prove helpful in rural areas.

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Big Data Analytics With Business Intelligence: A Survey

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ABSTRACT

Everything in today's world stands on data. Usage of many applications is resulting in the generation of several petabytes of data every day. This generated data is very important in order to take business decisions. Thus to analyse this big data business intelligence systems are built. There are many platforms to perform this analysis such as hadoop, spark, orange etc. and also there are many algorithms to perform scheduling such as FCFS, capacity scheduling, priority scheduling, shortest job scheduling etc. The main aim of this paper is to build an efficient business intelligence system which uses a scheduling algorithm called MSHEFT-"Memory sensitive heterogeneous earliest finish time".

I. INTRODUCTION

Big data is huge collection of data. It is the mixture of structured, semi-structured and unstructured data. There will be a variety of data like text files, images, videos, xml files etc. The multi-V (volume, velocity, variety, veracity, and value) model is frequently used to characterize big data processing needs. Volume defines the amount of data, velocity means the rate of data production and processing, variety refers to data types, veracity describes how data can be a trusted function of its source, and value refers to the importance of data relative to a particular context. This data is very important in order to make business decision. Business intelligence systems are built in order to make this possible. Business intelligence and analytics (BI&A) and the related field of big data analytics have become increasingly important in both the academic and the business communities over the past two decades. Business systems will have several constraints on building such as cost, efficiency, maintenance etc. These systems should be very accurate in analyzing the data so as to reduce the risk involved in decision making. We have several platforms which is used for data analysis. The idea of using multiple platforms in BI will definitely increases its efficiency. Scheduling plays and important role in big data optimization, especially in reducing the time for processing. The main goal of scheduling in big data platforms is to plan the processing and completion of as many tasks as possible by handling and changing data in an efficient way with a minimum number of migrations. This paper aims to explain how multi-platform business intelligence system can be built using MSHEFT scheduling algorithm with high availability, high scalability and high capacity.

II. BUSINESS INTELLIGENCE

Business intelligence comprises of strategies and technologies used by the enterprises for the data analysis of business information. BI systems provide historical, current and predictive views of business operations. Common functions of BI include reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, bench marking, text mining, predictive analytics and prescriptive analytics. BI can handle large amount of structured and unstructured data to help, identify, develop and otherwise create new strategies business

opportunities. All these helps in taking decisions to improve business. BI system should be built in low cost and high efficiency. Thus combining multiple platforms for analysis will help in achieving this goal.

III. BIGDATA ANALYSIS PLATFORMS.

To perform analysis there are many platforms available. Tools such as Hadoop, Spark, Pentaho, Karmasphere studio etc. Most used platforms are Hadoop and Spark. They are efficient, fast and consistent platforms for analysis.

A. Hadoop

Hadoop is an open source framework that is used to process large amount of data in an inexpensive and efficient way and job scheduling is key factor for achieving high performance in big data processing. There are two components of hadoop, HDFS (hadoop distributed file system) and MapReduce. HDFS is used for data storage while MapReduce is used for data processing. MapReduce has two functions: Map and Reduce. The functions are both written by the user and the function take vales as input key value pairs and output the result as a set of key value pairs.

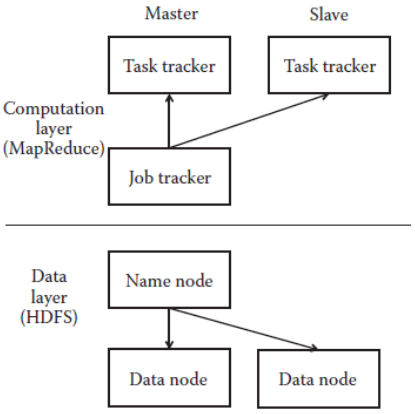

Figure 3.1.1 Hadoop general architecture

B. Apache Spark

Apache spark is an open source cluster computing framework. Spark provides an interface for programming entire clusters with implicit data parallelism and fault tolerance. Spark has Resilient distributed dataset (RDD), a read-only multiset of data items distributed over a cluster of machines. Spark is developed in response to the drawbacks of MapReduce. Spark facilitates implementation of both iterative analysis and interactive data analysis.

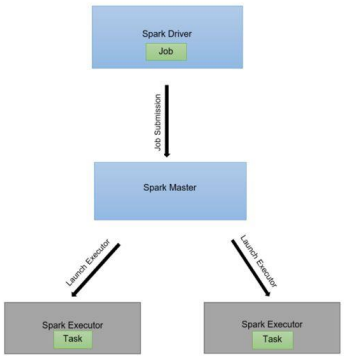

Figure 3.2.1 Spark framework

C. Comparison between hadoop and spark

Table 3.3.1. comparison between hadoop and spark

HADOOP	SPARK
• Slow in computing results. • Difficult to program • Difficult to manage	• 100 xs faster in memory and 10 xs faster in disk. • Spark is easy to program. • Easy to manage.
• Fails to process real-time data.	• Work well with real-time data.
• High latency.	• Low latency.
• More secure	• Less secure.

As it is seen from the table Spark is faster than Hadoop. But when we consider the cost, to build Spark system it costs more when compared to Hadoop. Thus to build BI systems we can use the combination of multiple platforms in order to make it cost effective. An algorithm to schedule the tasks to optimize the speed in such environment should be used.

IV. SCHEDULING ALGORITHMS

General scheduling algorithms are discussed below.

A. **First In First Out (FIFO) Scheduling** FIFO scheduling is based on queue mechanism. So in this first the job is divided into many tasks and then it will be given to those slots which are free and available TaskTracker nodes . Jobs will have to wait for the execution due to acquisition of clusters. Hence the jobs will have to wait till there turn come. All jobs need to complete in a time manner and provide better response time to every job.

B. **Fair Scheduling**

The main objective of this Fair Scheduling is to provide a fair share of cluster capacity over a time. So for every user group jobs in to job pools, there will be a guaranteed minimum number of Map and Reduce slots. It supports preemption i.e. to give the slots to the pool running under capacity, the scheduler forcefully kill tasks in job pools running over capacity. Priority is also assigned to various pools. Facebook develops the Fair Scheduler to manage the Hadoop cluster.

C. **Capacity Scheduling**

Capacity scheduler shares fair percent of cluster. It supports FIFO scheduling within every queue with the pre-emption. When a TaskTracker slot becomes free, the job with the lowest load and lowest arrival time is chosen. A task is then scheduled from that job. The Yahoo developed the capacity scheduler . The intention of Yahoo was to concentrate on the conventional situation wherein there are large number of users and the goal was to ensure a fair number of resources among the users

V. MSHEFT ALGORITHM

For multiple platform business intelligence system. Heterogeneous Earliest Finish Time (HEFT) is used for scheduling the communication time of previous set of dependent task of heterogeneous network, HEFT tries to search for local optimization and eventually makes the whole optimal. HEFT algorithm is modified to Memory-Sensitive Heterogeneous Earliest Finish Time (MSHEFT) where the priority is considered first, then the size of data file is considered as the second condition, and finally an extra factor is considered, which is "Remaining Amount of Memory". The pseudo code of MSHEFT algorithm is shown below.

- ✓ Compute rank for all the nodes by traversing graph upward starting from exit node.
- ✓ Sort the nodes in the list in increasing order of rank values.
- ✓ When there are unscheduled nodes in the list the compare priority.
- ✓ Select the first job from list and remove it.
- ✓ If the memory size is > 0.6 GB then assign the task to the processor that minimizes the(EFT) value of node else wait for the remaining memory size and again repeat.

Here priority and memory size both are considered in order to schedule the task. If the memory size is below 75% and priority is less then task will go to Hadoop platform and high priority and high volume of data which takes more time for computation will be taken care by Spark. Thus the algorithm gives optimum results in multiplatform BI systems when compared to other algorithms.

VI. CONCLUSION

Today's business is data driven. In order to make proper decisions, there is a need of business intelligence system. This system should be cost effective, efficient and fast. Using multiple platforms and suitable scheduling algorithms it is possible to build cost effective sophisticated BI systems. MSHEFT algorithm works well in such environment and provides solutions in faster way.

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5. Optimizing Load Balancing and Data-Locality with Data-aware Scheduling Ke Wang*, Xiaobing Zhou§, Tonglin Li*, Dongfang Zhao*, Michael Lang†, Ioan Raicu*‡ *Illinois Institute of Technology, §Hortonworks Inc., †Los Alamos National Laboratory, ‡Argonne National Laboratory kwang22@hawk.iit.edu, xzhou@hortonworks.com,{tli13,dzhao8}@hawk.iit.edu,mlang@lanl.gov, iraicu@cs.iit.edu.

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Development Of IoT Based Bridge Safety Monitoring System

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ABSTRACT

Bridges are one of the critical cross points of a country's transport network but they are expensive to build and maintain. Bridges suffer over all structural deterioration due to aging, overloading and lack of proper maintenance. Bridges are expected to have a higher level of reliable inspection and condition assessment to protect human lives and economic activities from unsafe bridge structures. An IoT bridge safety monitoring system is developed using the Wi-Fi technology. The system can monitor and analyse in real time the conditions of a bridge and its environment, including the bridge weight, waters levels and other safety conditions with the help of few sensors like: water level sensor and Weight sensors which are connected to the IoT device. The detected data is transmitted to the server and database for users to have real-time monitoring of the bridge conditions via mobile telecommunication devices.

Keywords: IoT, Wi-Fi technology.

I. INTRODUCTION

Engineering structures are responsible for economic growth, development, and evolution of the every nation. The engineering structure includes buildings, dams, roads, and bridges, which affect day to day life of people. Along with their own weight, the environment also affects them. In 2016, a bridge collapsing incident occurred on Savitri river in Mahad district due to sudden floods in the river[2]. Apart from this, the problem of collapsing may arise on airport boarding bridges and railway bridges also.

Among the emerging trends of industrial development, IoT and smart building are not only international trends but also the sources of competitiveness for future development. As Wireless Sensor Networks (WSNs) are evolving in the past decade and becoming more cost effective[12]. The IoT wireless sensor network and smart building technologies are adopted to solve the problems related to bridge health monitoring.Wireless sensor network(WSN) is also called as wireless sensor and actuator network. The characteristics of wireless sensors are, ability to cope with node failures, ability to withstand harsh environmental conditions and power consumption constraints for nodes using batteries[11]. Engineers dealing with the sensing and communications technologies and are seizing the opportunity to design, build and implement continuous health monitoring tools for bridge systems and for detecting statistical patterns of stress and strain that pertain to the structural health.

Traditional methods of bridge safety management have the following problems:
(1)failure to collect data or monitor on-site conditions in real time.
(2)failure to comprehensively record or analyse the collected data of on-site conditions in real time, resulting in poor disaster rescue efficiency.

(3)Data collection through visual assessments or use of large-size electronic equipment, often resulting in inaccurate monitoring results or higher costs and higher power consumption.

An IoT-based bridge safety monitoring system is developed using the Wi-Fi technology to overcome the above mentioned failures The developed system is composed of: monitoring devices installed in the bridge environment, communication devices connecting the bridge monitoring devices and the cloud-based server,
a dynamic database that stores bridge condition data, and a cloud-based server that calculates and analyses data transmitted from the monitoring devices.

II. LITERATURE SURVEY

Jin-Lian Lee, Yaw-Yauan Tyan, proposes the system which can monitor and analyse in real time the conditions of a bridge and its environment, which includes the waters levels nearby, pipelines, air and other safety conditions[1]. Varsha kusal proposed a Bridge Monitoring and alert generation system using IOT, to alert using buzzer and auto- barrier when there are signs of collapsing the bridge[2]. In the next paper, a signal processing based SHM is proposed where a simple Butterworth filter was used to remove noises. Cross-Correlation was used for damage detection. If there was any damage found, using a mathematical model, damage size and location were determined by Md Anam Mahmud, Ahmed Abdelgawad[3]. The bridge shape survey using the leveling measurement and bridge continuous shape measurement system was carried out after the earthquake. By comparing the data before and after the earthquake, the numerical values of the two method were similar. The experimental results show that the proposed system is an effective measurement method Yan YANG, Fang LIU[4].

III. DESIGN AND IMPLEMENTATION OF THE SYSTEM

The system consist of following modules:
(1)Monitoring Unit
(2)Communication System
(3)Cloud Based Server
(4)Mobile Application

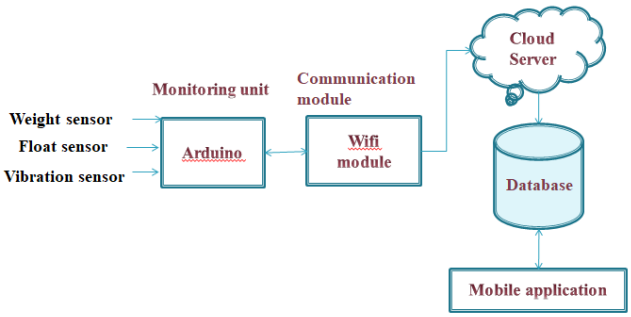


Figure 1. Bridge safety monitoring system and notification mechanism.

Monitoring unit:

The monitoring units are designed to be energy-efficient, low-cost, small-sized and capable of sensing the environment. Each monitoring unit is like a microcomputer, equipped with a sensor, a computing device and a wireless transmission device. The monitoring units include Ardinuo-uno, sensors, and comparator. These devices can monitor and collect data of bridge conditions with important factors in a bridge environment like water level, weight, and vibration on the brige and then process the data through simple computing before sending the processed data to the data storage server via wireless transmission.

Communication system:

The major function of the wireless communication system is to connect all the components in the bridge safety monitoring system, including the sensors, computing system and signal receptors. The data from the sensors is passed on to the comparator, through the comparator the analog signals are transmitted to the ardinuo-uno for convertion of the analog signals into the digital values. Further the converted digital values from monitoring units are transmitted to the cloud server using the Wi-Fi technology(ESP8266) for further computing and

decision making. The decisions made by the system, related analysis contents and alert messages are transmitted by the server system via the internet to the management center and mobile devices of management staff for them to have real-time and comprehensive understanding of the bridge's surrounding environment and keep records of the data for appropriate responses when a disaster occurs.

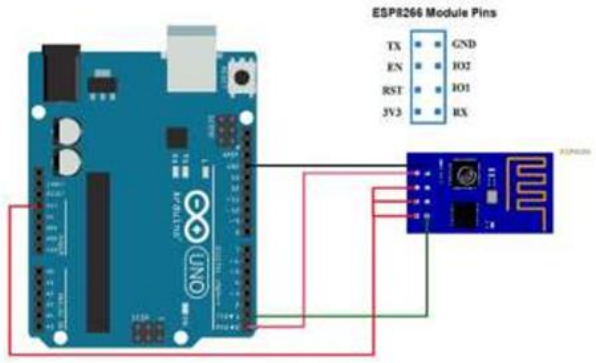


Figure 2. Interface between microcontroller and Wi-Fi module.

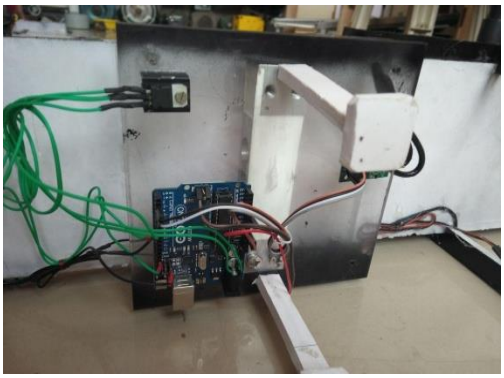
Cloud *based server:*

The cloud server will receive data from a microcontroller using Wi-Fi module(ESP8266), the received data such as water level and the weight on the bridge is stored onto the cloud server. The data is maintained on cloud database, the monitoring staff can access the data and can be compared with the master dataset for threshold match and further for evaluation purpose. The cloud server is also used to store the user's information which they provide while registering/ subscribing to our application for notification.

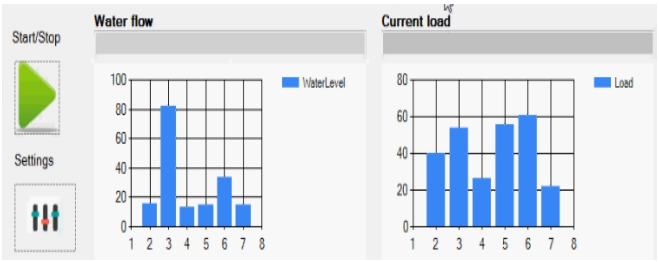
Mobile application:

The added value to the proposed system is the early warning indicators by using "Android application" using Android-Java to display the real-time status of bridge on the app. The application is made user friendly and easy to use, while subscribing to the application by providing their details. Whenever any critical or unsafe conditions are detected in the bridge environment, the alert messages are sent by the server system via mobile application to the management staff and to the users who have already subscribed to have real-time conditions of the bridge environment.

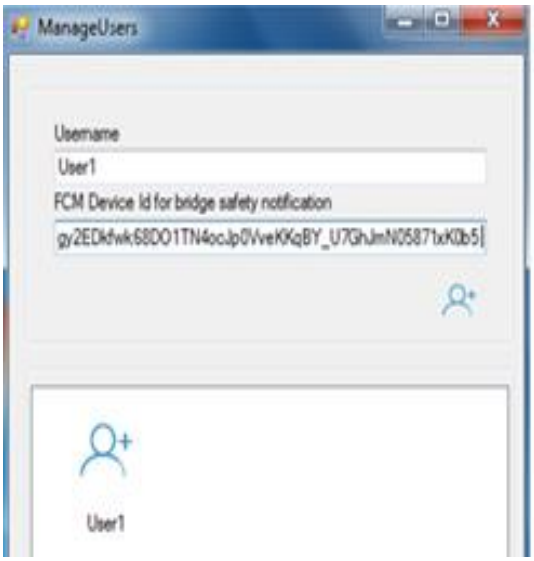
IV. RESULTS AND DISCUSSION



Snapshot 1. Bridge model along with hardware components



Snapshot 2 .Graphical representation of water and water level values



Snapshot 3. Used to store user alert information like username and device-id

Snapshot 4. Updation and Deletion in the Database

V. CONCLUSION

In this paper, an Arduino based a low cost and flexible Bridge safety system using IoT is proposed and implemented. The proposed architecture utilizes the Wi-Fi network at site and mobile notification for users/commuters to have live(24*7) updates of the bridge. This data can be further processed at Data Centers and assessment of structural integrity of bridges can be done. The resulting output can help in detecting structural damage that affects the performance of a structure. In future this can be integrated with Google Map to have safe passage through the bridges.

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Multiprotocol Rule Based Monitoring Framework on Wireless Sensor Network

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ABSTRACT

As various fields are processing towards smarter systems with rapid adaptations towards sensor network to collect precious data, a common framework accommodating multiple protocols to communicate each other acting as a M to N gateway with user-controlled logic and middleware addition feature would ease the interoperability issues and pave a way towards better integration of sensor nodes into the ecosystem leading to much efficient communication across systems. The stronger infrastructure with lower cost of wireless devices and sensors have made economical for any sized industry to adapt but due to the monopoly of certain vendors with proprietary system, smaller scale industries aren't able to invest capital due to interoperability issues with home grown products. Thus, we are focusing on creating a generic multi-protocol support framework for interoperability across the devices with data centric approach. The framework is designed in such a way that it is able to work across presence enabled devices along with backward compatibility such as HTTP for polling methods. Every data unit is processed across the different layers of the system and passed to the processor thread which applies the rules defined at prior and dispatches the notification or alerts to the respective destination as defined in the data packet.

Keywords: MQTT, SocketIO, WebSocket, Middleware Mechanism, Aedes Broker, Client, MQTT, publish, subscribe.

I. INTRODUCTION

Every network has presence and non-presence-based devices, triggering a need for implementation of multi-protocol collaboration approach making the development time prolonged. Communication across multi-protocol system is a tedious process due to non-standardization of data interchange format and packetization carried out in the protocol with varied security implementations. Always on devices such as chat applications, action oriented listening devices, actuators requiring considerable quality of service occasionally need API like calling mechanism for certain task such as background maintenance making process of communication non-standardizedleading to security hazards, thus making a team of developers meticulously design the communications and architecture.

II. DESCRIPTION

With rising requirement for smart sensors and artificially intelligent system, data is one of the most crucial parameter to be fetched, understood and converted into useful information to build an intuitive user experience. Due to the varied protocols used based on the situation such as deployment,

legacy support considerations it is hard to design multiprotocol gateway. In current market there exist many internet of things or WSN gateways, but most of them support n to 1 communication, thus we propose with the following innovations

1) Multiprotocol message passing for inter things communication
2) Low Cost bridge between M2M and Internet of things.
3) High Level packet routing using data packets itself.
4) M to N communication channel with singleton middleware.

A. System Objectives and Considerations

In this framework, we are considering data agonistic message queue telemetry transport (MQTT) for decoupled publish-subscribe model, SocketIO considering XHR long polling mechanism having protocol upgradation for web sockets, Universal Asynchronous Receiver Transmitter (UART) for hardware communications such as Zigbee, BLE etc., and HTTP, considering request-response model coveringprotocols used in different use cases. The architecture is to be designed to accommodate middleware support for all supported protocols for authentication, user defined rule matching and dynamic addition of nodes to the network. System wide adaptation of data interchange format such as JSON for inter things data compatibility. In Memory key value datastores such as REDIS, MongoDB to be used for data storage along with persistence support.

B. Architecture Overview

In this framework, as a request passes via one of the end points, it is processed using the middleware at the first stage, then the data unit is being fed into the common queue for processing where worker processes contend for the queue for the data to be processed. The data is matched against the rule specified in the in-memory database in order to quickly serve the requests. The database contains the settings of the type of data packet as decided on prior for standardization, the threshold of certain types of data for notifications or alerts. The destination address is retrieved either via data packet or via database depending on whether the request is a fresh packet or not. If the destination address is not defined, it will be placed in the cache queue until the system defined timeout crosses. If within the timeout period if the source enquires for packets, the info is being passed to retrieve the destination or it will be discarded.

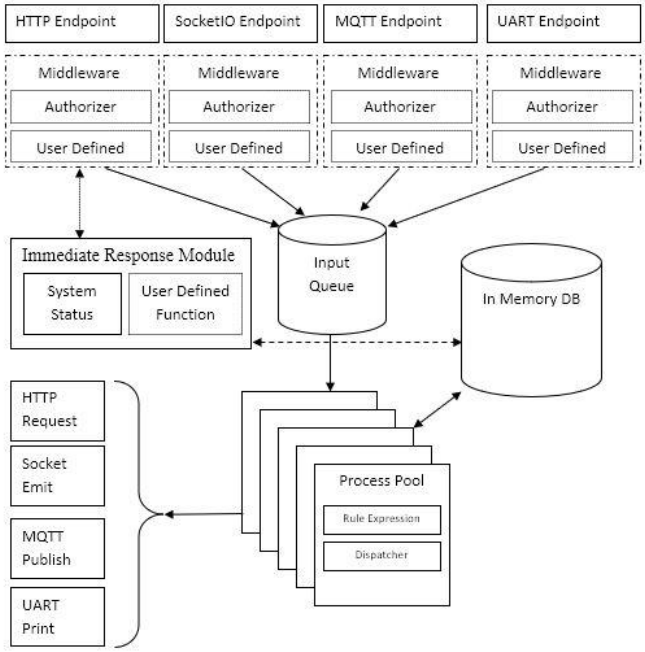

Figure 1.0 Architecture

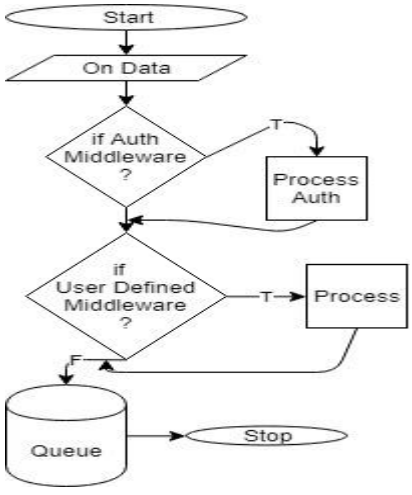

Figure 1.1 Processor Flow

DESIGN SPECIFICATION

The system uses various highly contributed opensource frameworks to allow multisource communication.

A) Message Queue Telemetry Transport:

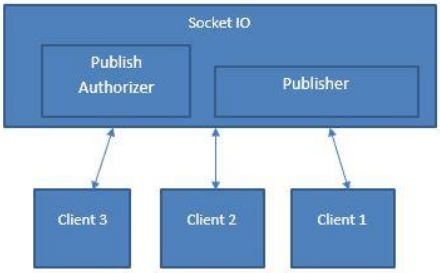

Figure 1.3. Request Section

In this design, as an instance of publish-subscribe low weight protocoli.e. MQTT. we are utilizing Aedes as a MQTT Broker which is written on highly scalable language i.e. NodeJS with Paho MQTT Client Library available for multiple platforms adhering to OASIS MQTT 3.1 Standards with backward compatibility as shown in the figure 1.5

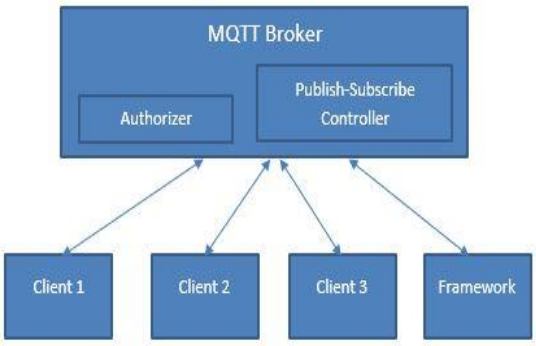

Figure 1.4. SocketIO Architecture

The broker contains authorizer which shares the credential of the framework database for client communication, it is also able to blacklist the client on either publishing and subscribing as needed.

B) SocketIO with WebSocket Support

Another widely popular protocol specifically used as a multi-platform chat application as shown in fig 1.4 is used as push notification agent in the framework named SocketIO which uses long polling mechanism on legacy system and upgrades automatically to WebSocket as available. The major benefit of SocketIO and MQTT is that, these are integrable in both Web Technologies and Application programming.

C) Immediate response module

As shown in the fig 1.0, is an administrator backend and a system application programming interface for changing settings and visualizing the logs.

D) UART Endpoint

Embedded systems are predominantly concentrated on UART since these signals can be easily be obtained by convertors available. E.g.: SPI to UART, USB to UART

E) Middleware Unit:

The Middleware unit is an addition module used mainly for authentication but is designed in such a way that users can also make a middleware wherein they get access to the raw data to be modified for further processing in the nodes. The flow chart in the fig 1.3 defines the process of acceptance of data, authorization via middleware if activated, user defined process if any, then it is placed inside the queue for further processing.

F) Rule Processor

The complete processing of data, decision making and dispatching to respective channels are carried out in this module. The rules are stored in database depending on the sensor type or data unit used. For e.g. Considering a sensor such as humidity and temperature, we give a universal ID which would be sent with the sensor to the processing node. The ID will be matched against the database for actions to be performed upon value received. The schema of the database in JSON would be as follows

```
{
  "ID": "12",
  "value_node": ["value1","value2"],
  "action": [
                {
                    "destination" : {
```

```
        "protocol_name":"mqtt",
                        "pub" : "xyz",

        "QOS" : 2
                                                }
                        }
                ],
        "condition" : [
                        {"value":"value1","
        threshold_g":23," threshold_l":18},

        {"value":"value2","threshold_g":100,"threshol
        d_l":50}
                ]
}
```

The attributes value_node, action, condition, ID are framework defined unit which are mandatory for any operations. The functionality is extendable using middleware attachment technique.

III. APPLICATIONS

The proposed framework can be applied to different industries and applications such as

- ✓ Industrial Automation and monitoring system with real-time analysis and notifications
- ✓ Hospital equipment connectivity manager to combine machines of different standards into one channel.
- ✓ Internet of things-based M to N gateway device

IV. CONCLUSION AND FUTURE SCOPE

In the recent years due to the rapid adaptations of smart systems, the use of smart sensors has flourished into the ecosystem due to the Bill of materials and better manufacturing capabilities. Inter communication of devices is the need of the hour for better integration into the ecosystem. Thus, our system fulfills these requirements to a satisfiable extent and machine learning to predict the possible sensor data if missing parameter would be future work.

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Aggression Detection in Alzheimers and Dementia Patients

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ABSTRACT

The main aim of our project is to provide a solution to patient-on-patient and patient-on-caretaker violence mainly concentrated on people suffering from Alzheimer's and Dementia. This is done by considering various parameters such as Heartbeat, EEG signals, Facial Detection, Voice Recognition and Sweat by accurately differentiating them as primary. The final product would be an application with all integrated features providing continuous updates about the patient in a well-defined manner which would further help the caretaker to carry out the required action in response to the aggressive nature of the patient.

Keywords: EEG signals, Facial Detection, Voice Recognition.

I. INTRODUCTION

Aggression can be defined as a state of mind in which an individual is subjected to uncontrollable anger or antipathy resulting in a hostile behavior causing harm to them and/or the people around them by the means of a physical or verbal attack, triggered by anxiety, depression, unrest, un-friendly environment sometimes un-controllable emotions whose occurrence may be sudden and due to apparent reasons.

There is a general misconception between aggression and violence, as in a person may indulge in a violence act with aggression, but a person with aggression need not necessarily engage in violence attack.

Aggression has been a major problem rather than disorder which exponentially has increased over the past decade not only in the adults, but even in children whose cause is stated unpredictable and mostly dependent on the vicinity of people or the environment the person is subjected to the age group of 80 above. The next age group prone to the same is in the range of 60-80. Very few cases were reported in young adults of age group15-30.

There are 3 phases in the implementation:

- First Phase: This phase includes the monitoring and detecting the parameters mentioned above from the patient and then sending the values to the database. The Alzheimer's patient's activities are notified and compared with a base value in the processing part.
- Second Phase: This is the processing part which has both front end and back end. In the backend, the received input is differentiated into different parts and then processed. They are actually compared with pre-determined values of the parameters of the patients in which it will be triggered to a text. The next step is that the text will then be divided into different variables, with each variable being measured separately.
- Final Phase: In this phase, the output will be of two stages- one output will be continuously

displayed on the UI, to make it available for those who are using the website and the other output will be given to the care-taker based upon the conditions.

A person suffering from aggression can be a harm to his self and/or to the people around him.

We hence are in a state where the use of advance technology may produce results to solve the problem in a more feasible manner and hence reduce the emotional constraint which the person may be subjected to.

I in the following report have stated reasons leading to its cause and have put forward my best to identify solutions to the same.

II. METHODS AND IMPLEMENTATION

ANALYSIS

One of the method of detection of is through Facial Expression Recognition Analysis, in which each facial movement is considered to be Action Unit (AU), so eventually all the Action Units are detected and all other facial expressions are filtered from aggression through the Local Binary Patterns and Gabor Filter, so suppose a patient's facial

Expression is detected, then the parameters for the tensed expressions are filtered out separately and are sent to the related care-taker through the base station.

Local Binary Pattern Algorithm:

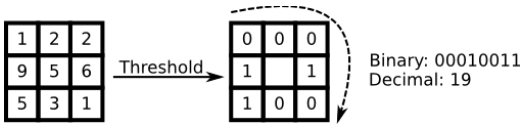
The algorithm is based on the comparison of a pre-defined algorithm with the formulated algorithm, which is got from the corresponding facial expression.

Let us consider an example by formulating a matrix.
Let us first have a center pixel, then depending upon the facial input, the successive pixels are filled, if the intensity of the pixel is greater than that of the center pixel, then 1 is entered else 0 is entered.

Once a complete matrix is completed, then it is compared to pre-defined and also constant matrix for aggressiveness.

If both of the matrices match, then a signal is sent to the care taker conveying the condition (most probably hostile) of the patient.

The following example is a similar to the above explained one, but the threshold complexities are neglected here and instead it is compared with a constant and static matrix.



The Gabor filter is basically a device which detects pattern changes and produces a corresponding result. The texture pattern is believed to be different for different expression, considering the contraction and relaxation of facial muscles.

RELATION OF AGGRESSION WITH ALZHEIMERS DISEASE

One of the most prime causes of Alzheimer's disease is anxiety, apathy, leading to deterioration of blood cells, intervening with daily activities, initially causing temporary memory loss and finally causing permanent change in the brain cell orientation, but a most important parameter to be considered are the age and the stress level of the person. Observations were made that people having extreme level of aggression, especially passive aggression are more prone to Alzheimer's disease, the reason that aggressiveness of certain high order cause changes in the brain fluid, leading to damage of brain cells prime cause to Alzheimer's and Dementia.

SYMPTOMS AND AGE RANGE

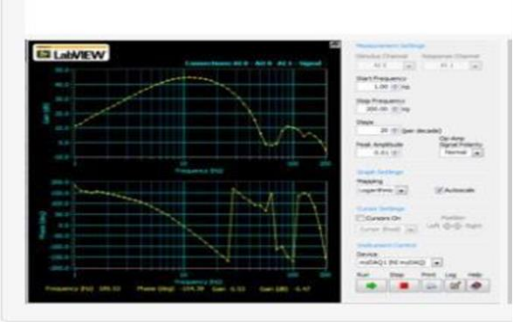
Appreciable change in day-to-day behavior is common.

Questioning of their activities and temporary memory loss.

A patient suffering from the disease will suffer from delusions, accuse others of theft and also infidelity in some causes this is most common problem of passive aggressiveness noticed.

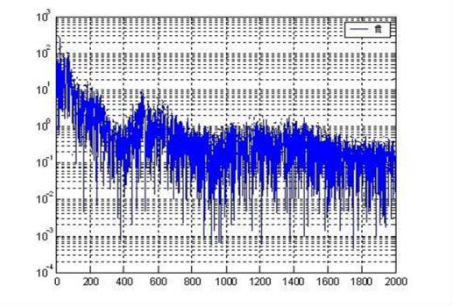
This disorder is most commonly detected individuals in the age group of 80 above. The next age group prone to the same is in the range of 60-80. Very few cases were reported in young adults of age group 15-30.

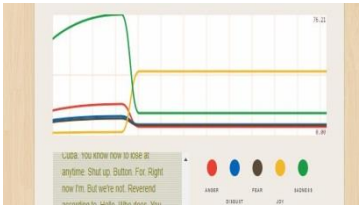
EEG SIGNALS:



- The above (FIGURE 1) graphs show a part of analysis phase of EEG signal data monitored continuously.
- The data is being received from one of our volunteer team member.
- The reading units are measured in terms of frequency response from the EEG sensors.
- Varying frequency as a result of varying beta-waves produced by brain helps in detection of aggression behaviour.
- EEG data is considered as a primary parameter for aggression detection.

VOICE SAMPLING:





- The voice recognition includes voice sampling in order to get digital data of words to be registered by the device.
- Sampling also includes scaling up the clarity of words so that precision is maintained and would also help in training the machine with words specific to a person to understand that he/she is aggressive.
- The above is generated by the initial variables from the MATLAB software fed from the Arduino board sensor connected to wireless Microphone near the person's shirt collar.
- The data is analyzed and fed to IBM SPSS software for matching the aggression tone characteristics.
- Voice data is sampled at 4000 samples/second. The above figures show the emotion of a person in terms of level of emotion based on the words that the person speaks and also on his/her tone/pitch of voice.
- The red line in the graph represents aggression. The depth of aggression is recognized by the crest of the line. The respective voltage values are recorded and fed for analysis. Voice is taken as a primary parameter.

VISUAL RECOGNITION:

Clearly we can understand that the software has identified that the person is about to get aggressive which is true to the image that it has captured.

Hence continuous input to the analyzer will help in identifying the aggressive behavior.

Facial recognition is one of the primary parameters.

III. RESULTS AND DISCUSSION

A. ALGORTIHM:

The algorithm is such that, the first stage of triggering the text is based upon the values of heart rate, blood pressure, motion detection, if these values show abnormality, then the speech detection is checked for variations, if both the conditions are satisfied, then the next level is about the level of aggression detection, as in whether the patient is under normal circumstances, person is on the verge of aggression, the patient has turned hostile.

The webpage or the UI interface in the Desktop will display, continuously, the recorded values, ready to be accessed at any time.

The android wear with the Nurse will also display these details, but in a more constrained way, such that it will be more concentrated in displaying a three-signal output, depending upon the aggression level, with taking into consideration a considerable amount of time for the care-taker to respond to the patient.

B. WORKING:

Firstly, the collection of all the patient's medical history needs to be loaded onto a database. These details will serve as the basic comparison parameter (baseline) to detect the aggression in an individual. The output from all the sensors are read and processed as follows: Any changes in the above parameters will be notified to the caretaker on an hourly basis. To detect the various level of changes in the aggression of the patients we calculate the level of aggression by multiplying the changes in each of the parameters with a predefined priority values. The value that is obtained is then checked for the range it lies in and from this the level of detection will be concluded. If the value of the levels of aggression is below the normal levels, the caretaker will not be notified. If the value of the levels of aggression is in tolerable level, then the caretaker is warned. If the value of the levels of aggression is above the tolerable level, then caretaker is alerted with an immediate assistance required message

Table 1

Expression	Expected Emotion	Actual Emotion	Score
"I am so happy that I got selected"	JOY	JOY	0.82
"What the hell"	FEAR	FEAR	0.9
"Don't you dare mess up with me"	ANGER	ANGER	0.64
"This is so disgusting"	DISGUST	FEAR	0.5
"I am very sad"	SAD	SAD	1
"I don't like dustbins"	UNCERTAIN	UNCERTAIN	0.89

IV. VOICE RECOGNITION READINGS

The above table provides the readings that were taken while using the voice recognition model, briefly explaining the expected result and the closeness to the result.

V. CONCLUSION

The above mentioned parameters for detecting aggression are large in number when compared to the number of parameters discussed in this paper, the

reason being that a lot of conditions such as the degree of intrusiveness, feasibility to both the end user and that of the patients were considered.

Though the above parameters require advancement, the baseline for considering the parameters are the same which is to have both accuracy and repeatability and also to establish a reliable connection between the cloud platforms and the end-user application.

Though the implementation of such advance technologies might question the reproducibility of the same, the use of Machine Learning Algorithms such as SVM (Support Vector Machine) provides a better approach towards the long-term solution of the problem.

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Design of A Miniature Humanoid and Perception of Objects In Space-An Effective Method of Object Localisation

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ABSTRACT

This is an autonomous robot whose main function is to perform basic tasks such as pick and place desired objects aided by computer vision and involving hand-eye coordination. It features a smart shoulder joint design whose yaw and roll movement designs are inspired by a human shoulder joint. For perception of depth and space, the robot uses an ultrasonic distance sensor in combination with a single camera.

Keywords: Humanoid; machine vision; kinematics; inverse kinematics; object detection; joint design;

I. INTRODUCTION

This is a preliminary attempt at mimicking basic human reflexes to perform simple tasks. The main functionality of the robot is to identify objects in its target location, grab and move the object to a specific drop location, while navigating through obstacles to replicate real world conditions like those found in workplaces, homes, hospitals and other such environments, with minimal human intervention. The robot identifies objects and uses a marker based hand-eye coordination technique to grab objects. The programming and hardware could potentially be made open source to allow them to evolve and advance. The hardware is 3D printed on an FDM printer and part of the software is developed in java. The control, GUI, and image processing run on a computer, and the necessary data is transferred between the robot and the computer to avoid excessive on-board hardware.

II. DESIGN

The designed is mainly aimed at mimicking human degree of movement especially the shoulder joint, to allow greater flexibility than conventional robotic joints. Mechanical parts are 3D printed with a polymer, poly-lactic acid (PLA), which has relatively low density and has suitable strength to hold the entire weight of robot. The design is such that the material used is less but at the same time, maintains structural integrity, and balance.

A. Arms

The lower arm portion consists of a 2DOF gripper with an wrist joint and an elbow joint. The upper arm however, has a 3DOF shoulder joint that resembles a human shoulder joint. The Yaw and Roll movement is controlled by two servo motors at the top. The rotation of these servo motors actuates the two push rods (shown in blue in the Figure 4). These pushrods are printed in high infill density. The calculated movements of the 2 servo motors accounts for Adduction and abduction (Figure 3), as well as circumduction/rotation.

The 3rd servo motor attached horizontally to the base of the 2 prior motors, is responsible for the rotation of the joint along its Pitch axis (Fig 5). The rod that passes through the pitch axis is affixed to a

gear (smaller gear Figure 2), and is able to rotate freely with respect to the shoulder joint. The rotation of the pitch servo causes rotation of the entire shoulder joint structure with respect to the stationary, smaller gear and the rod. The gear ratio of the 2 gears is 2:3.

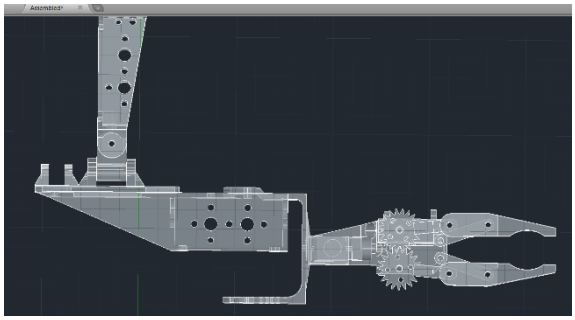

Figure 1. Arm CAD design

Thus, a 180'degree rotation of the servo causes a 270'degree rotation of the arm, much like the freedom seen in a human shoulder joint. The Smaller (stationary gear) is made thick to provide its functionality to both arms. The middle gear/neck structure is printed in high infill density and is provided with support structures since this structure bears the load of both arms.

Figure. 2 Right Arm. **Figure 3.** Adduction/Abduction

Figure 4. Shoulder top view

Figure 5. Pitch axis rotation

B. Head

The head consists of a 2DOF pan and tilt structure which will provide movement for the camera. The pan servo (9g micro servo) is accommodated in between the arms and a transmission rod connects the servo head to the tilt stricture above. This is done so as to reduce the total height contributed by the pan servo had it been placed over the neck. The ultrasonic distance sensor is placed above the camera over the pan/tilt mechanism.

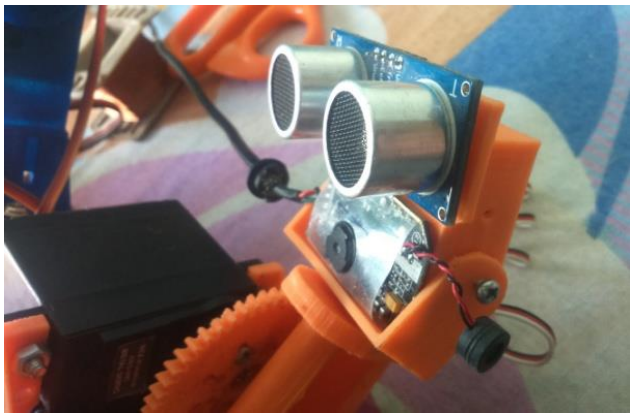

Figure 6. Ultrasonic sensor, camera

C. Lower torso and lower body design

The lower torso houses the electronics/ battery and other peripherals. As for the lower body design, a rigid longitudinal structure with wheels gives the robot very limited flexibility. Therefore, this design can provide greater flexibility of upper body movement. Three servo motors are used for this portion of the robot. This allows the robot to reach objects that are at different heights or farther away on the platform, by leaning or adjusting the height of the hips. With geometrical calculations the XZ position of the hips is adjusted through simple inverse kinematics operations.

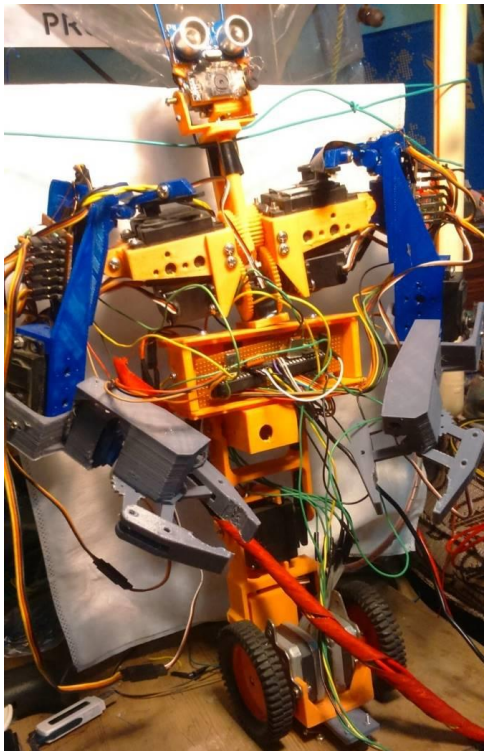

Figure 7. Assembled robot with servo motors and sensors attached

III. CONTROL AND SOFTWARE

The robot is commanded by a java program executed on a laptop. The necessary data like servo angles, sensor data, and video feed from the robot, are transferred to/from the robot and is processed by the laptop. The program is developed in Intellij Idea IDE. Image processing is done by the OpenCV package on java. The GUI is developed using the javaFX package. The microcontrollers will be having a minimum volume of code wherein it takes the angle data from the java program through the serial port, and sets the servo motors to the specified angles. Two microcontrollers control servo motors, Stepper motors for the wheels, derives input from sensors, and relates to other devices, constitutes the electronics of the robot. The microcontrollers serve as an intermediate between the java code running on a laptop/desktop, and the robot. While one microcontroller provides PWM signals for the servo motors in its arms, the other controls the rest of the constituting servo motors, sensors, and other devices. Synchronization between the two microcontrollers is done through asynchronous serial communication. The transfer of data between the computer and the two microcontrollers flows in one direction.

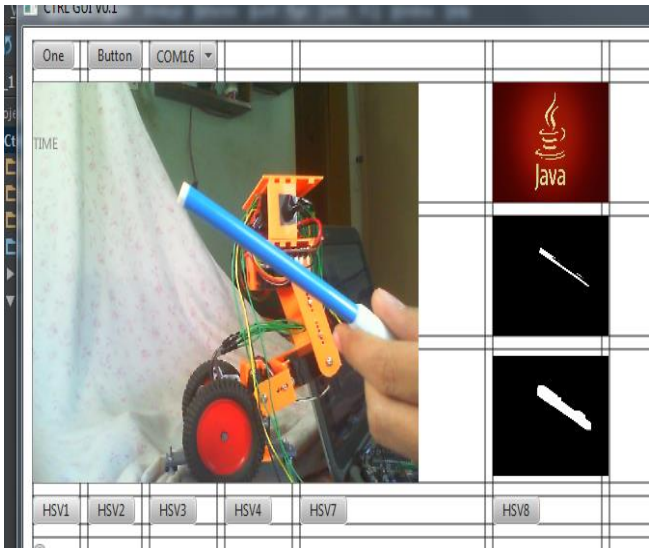

Figure 8. Identification of blue objects

The TX of the computer is connected to RX of the first microcontroller, TX of first to RX of second microcontroller, and the TX of the second back to

the RX of computer. This arrangement is done so as to avoid multiple serial terminals in any of these three devices, since the latter might cause the servo motors to twitch as they are timer driven. Baud rate of 115200bps is set for maximum transfer rate. Information such as servo angles is encoded with the servo IDs before it is transferred from the computer to the robot. Sensor data (such as the ultrasonic sensor) follows the same pattern.

The java program receives video feed from the camera, and sensor data from the robot simultaneously. Separate threads are allotted for incoming and outgoing data as well as the inverse kinematics operations and other peripheral processing like GUI. These threads are synchronized via volatile variables. The robot can navigate to the location with the help of the two independently controlled wheels, and identifies the object by image processing, and with the help of the ultrasonic sensor, the robot estimates its relative distance. The object of interest is cantered in the robot's video feed by using the pan and tilt servos.

Figure 9. Blue objects and orange markers detection.

With this information (2 pan/tilt angles and distance measured by the ultrasonic sensor), the object's location relative to the sensor is calculated. The upper body is adjusted using the 3 servo motors, so that the object is in its arms reach. The relative coordinates thus obtained is translated to a coordinate system wherein the shoulder are the origin points so that inverse kinematics can be performed on these variables, to generate servo motor angles, required to grab the object. These object coordinates are further corrected using the vision system. A marker attached to one of the claws of the gripper is also being tracked along with the object of interest on separate thread. Adjustments are made to the coordinates of the arm such that the marker is brought closest to the object, before the robot engages the gripper to grab hold of the object. Figure 9 shows the filtering operation being performed to extract blue objects. Figure 9 shows the blue object (on the left image view) and the orange marker (on the right image view) being tracked.

IV. CONCLUSION

The robot can segment a specific colored object, localize it in its field of view, and estimate the object's coordinates using motor parameters, the image and data from the ultrasonic sensor. After localization, the robot attempts to grab it by moving its arm to the calculated object location in 3D space, and then reach for it accurately by error correction using the markers on its gripper. Object recognition can be further developed by using Haar Cascades, histogram of gradients (HOG), neural networks, etc., while retaining this simple technique of localizing an object in three-dimensional space. This algorithm can be used in miniature robotics where processing power is limited. Elements such as the shoulder joint can aid to improve design of prosthetics for greater dexterity. Miniature humanoid robots in hospitals can help engage children who have cognitive conditions. Achieve cost effective production of humanoids by open-sourcing hardware and software and 3D printing mechanical elements.

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Emulation Of Associative Learning in a Humanoid Robot using Artificial Neural Networks

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ABSTRACT

The objective of this paper is to document the development, design, and implementation of a humanoid interface to a robotic implementation of the right human forelimb, the purpose of which is to interact with its environment under programmed instructions by imitating the movements of an arm and engage users in conversations. The arm has 10 Degrees of Freedom in total and weighs 2 kilograms. The software driving this interface is put to action by a microcomputer primarily in the form of a chat-bot which aids in human-robot interaction orally real-time. The areas for future application of this include human-machine interaction in industry & medical, social, & hospitality settings. The necessary mechanisms for arm control and the rest are presented in this paper.

Keywords: Humanoid robot, machine vision, face recognition, chatbot

I. INTRODUCTION

The need for robotics and automation has moved beyond the factory floor to enter relevance in almost all fields of human interest Giving an automation system a humanoid shape and function not only make their actions more comprehensible to the user, but also socially acceptable. Life-size humanoid robotics is the next avenue these field must explore. It essentially replicates the human element to complete tasks assigned to it, which the user can easily understand and exploit to the required extent. The self-funded project described in this paper attempts to do just that. Along with the arm, the robot built also boasts of a voice-driven intelligent chat-bot feature which deals with information in the aural and textual form. The service offers a conversational context-based response to make it appear more human. All this coupled with the movable camera housing modelled around a life-size human head has given the robotic interface a familiar look and feel leading the writers christening it with a relatable human name 'Charlie'. This paper outlines the design of the torso and its integration with the chat feature.

II. LITERATURE SURVEY

One of the hallmark of a humanoid design was the Honda Asimo[1] developed by the Toyota Group, debuted in 2000. Several other humanoid robots were developed since. The HRP-4 Robot [2] is a humanoid consisting of 7DOF arms weighing about 39Kgs. It uses complex mechanisms for actuating all the joints in the robot. However, we need to overcome the complexities of such designs and need to consider costs when designing these systems. We aim to achieve a focused human-robot interaction, initiated by an encounter such as eye contact, or a statement made in a tone of voice. A study [3] found that people evaluate a physical embodied social agent

more positively than a disembodied social agent. Robots are being used in factories, they are being weaponized in military, and are also being sent to outer space. Yet, we do not have them in our homes. We need to make progress in the field of social robotics and our fascination towards humanoid robots and the affect it has to people forms our motivation for this work.

III. HARDWARE DESIGN

This is the design of the humanoid torso. Each of the robot's arms consists of a 3DOF shoulder joint, an elbow joint, and the wrist rotation, giving a total of 5DOF per arm, excluding the movements of the fingers. Actuation of the robot's arm joints required high torque motors delivering over 40kg-cm force. A Johnson DC side-shaft geared motor meeting the required specifications were used in every joint. Potentiometers are used for position feedback, as a DC motor does not possess absolute positional control. 3D design is developed in Catia V5, a 3D modelling software.

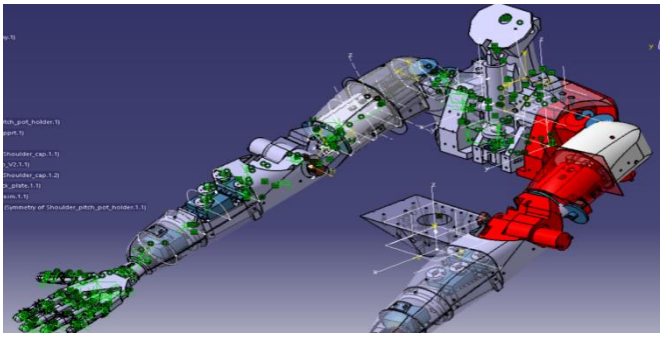

Figure 1. 3D Assembled CAD design.

A. Hand

Each finger is made of three hollow segments that act like a kinematic chain, mimicking a human finger. A tendon strand made of 3 beading wires runs over the pulleys and under the roofs of the segments. Pulling on this tendon causes the finger to fold. Another tendon runs below the pulleys and over the base of the segments. Pulling on this tendon causes the finger to undo the folding and bringing it to an open position. The tendons pass through the hollow palm, and then through the axis of the wrist gear. The wrist is actuated by a MG-995 servo motor, a common motor used in hobby robotics.

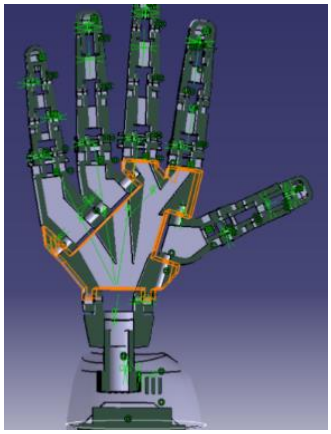

Figure 2. Channels(hollow, gray) for tendons

B. Forearm

The forearm houses 5 MG-995 servo motors that actuate the fingers independently. The tendons from the wrist gear go through individual holes at the bottom of the skeletal structure, and guides them out at the top, where they would lead to their respective servo motors. Rotation of the servo clockwise pulls the actuation tendon and relaxes the other, and the opposite is true for a counter-clockwise rotation. The elbow joint is actuated by a high torque Johnson motor, held by the bicep assembly and the shaft is held by the forearm. A potentiometer is coupled with the motor shaft, on the opposite side.

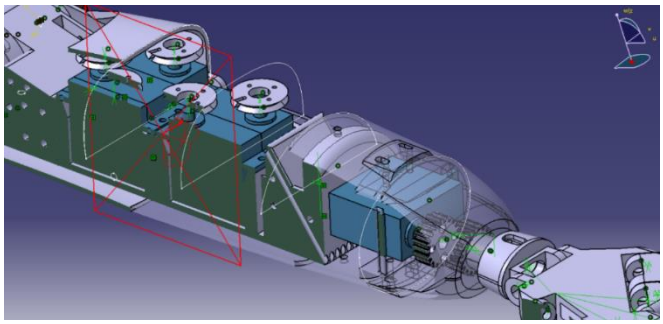

Figure 3. Cross-section of 3D model of the forearm

C. Bicep

The bicep houses the shoulder yaw-rotation DC motor. The feedback potentiometer is placed parallel with the axis of the motor shaft, coupled by gears having gear ratio 4:3. That is, a 180' rotation of the arm, causes a 270' rotation of the potentiometer shaft.

D. Shoulder

Two DC motors constitute pitch and roll motions. The roll motion and its potentiometer feedback is achieved in the same way as the elbow design, with the potentiometer placed on the opposite side, along the axis of rotation. The pitch motor is located at the robot's clavicle, with its potentiometer directly under the shaft, coupled by gears in the ratio 1:1.

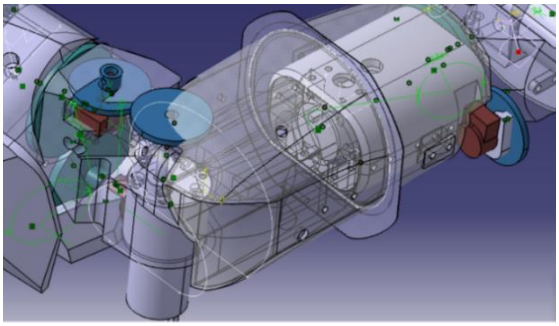

Figure 4. CAD model of the shoulder

E. Arm support and Sternum

These set of parts are printed with the highest density setting since it holds the entire arm's weight. This portion houses the shoulder pitch rotation DC motor. To prevent the motor from tilting because of the arm's weight, an additional "sleeve" is inserted after inserting the motor and is bolted in place. Screws from the back panel and from the bottom secures the assembly firmly.

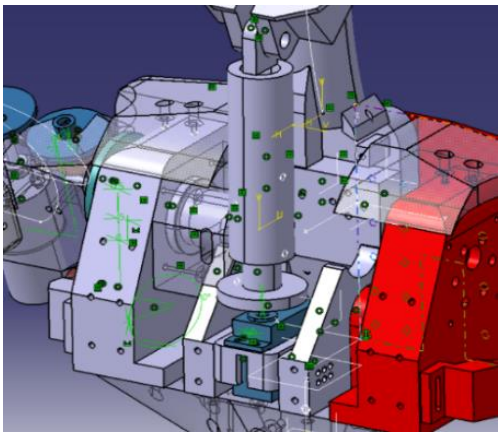

Figure 5. Sternum design

F. Face

InMoov is a robot developed for artistic purposes by French sculptor Gael Langevin in September 2011 (The first blueprint files were published in January 2012 on thingiverse.com) and its files are under Creative Commons license. The face has provisions for neck rotation servo and the jaw movements.

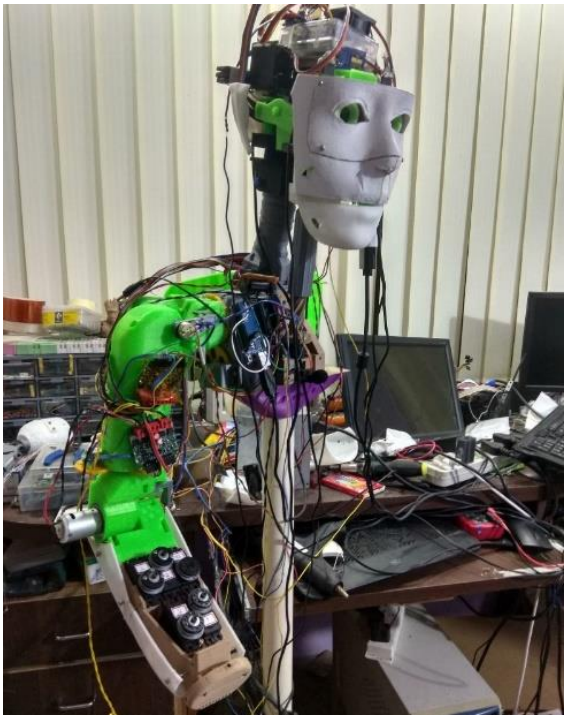

Figure 6. Assembled robot with right arm(till wrist) and Inmoov head.

G. Electronics

The two web-cams used are Microsoft HD-3000, for which the Inmoov eyes are designed. They provide superior quality images and have small form factor. The web-cams are plugged into the laptop computer where image processing takes place. The robot's on board Raspberry Pi and the laptop computer used to process images are connected to a LAN. Post image processing, necessary data like servo tilt angles for tracking, are transmitted to the Raspberry Pi through a TCP port. The RPi receives position values from the potentiometers through an Arduino Mega, an Atmel microcontroller board.

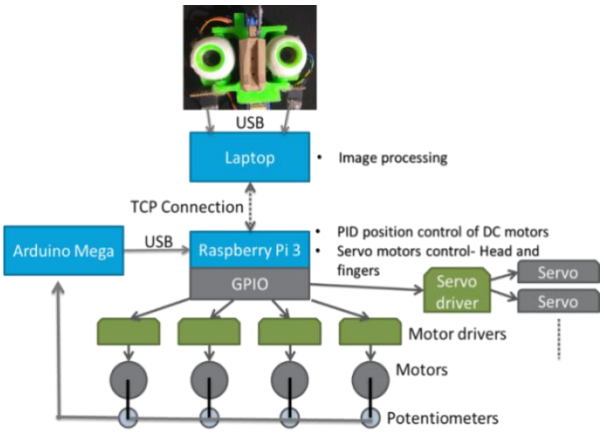

Figure 7. Electronics layout

IV. SOFTWARE DESIGN

The main function of the Arduino is to read analog values and send them to the Rpi. This goal is to send these values in fewest number of bytes as possible, as frequently as possible. Failing which, the PID position control of joints fail. The ADC on the Arduino has a resolution of 10 bits for each channel. Serial communication only allows transfer of 8 bits at a time, therefore, each channel's value must be split into 2 bytes. The first byte contains the 2 MSBs of an analog value and the second byte contains the rest of 8 bits. These two are then recombined at the RPi. The Arduino reads 8 such values from 8 potentiometers corresponding to the joint motors in both arms. All 8 values are read and split into 2 bytes, adding up to 16 bytes. A delimiting byte is added, and all 17 bytes are sent to the RPi after each cycle.

The RPi's software consists of a multi-threaded program, with each thread running on an infinite loop. This is done so because multiple independent tasks need to be executed without waiting for unrelated actions. All threads, share a set of global variables. These variables are volatile, that is, their value can be changed by any thread at any time, making them unpredictable. The main global variable is the 'setpoint', controlled by the GUI thread, and sequence thread. The GUI allows manual control of joint angles useful for testing and debugging. The sequence thread is a program snippet that can move the robot arms in a pre-recorded motion. It does so by iterating through each position in the list of target positions, assigning the setpoint to the target positions for each joint, and pausing the sequence thread for the specified amount to allow the arm to come to the set position. The PID thread takes care of bringing the arm to the setpoints as it is being continuously scanned. It receives the analog position values from the Arduino. This thread waits for 17 bytes to get queued in the serial buffer before processing them.

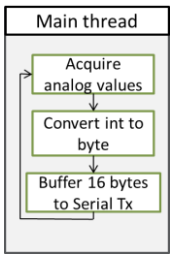

Figure 8. Flowchart of the code running on Arduino

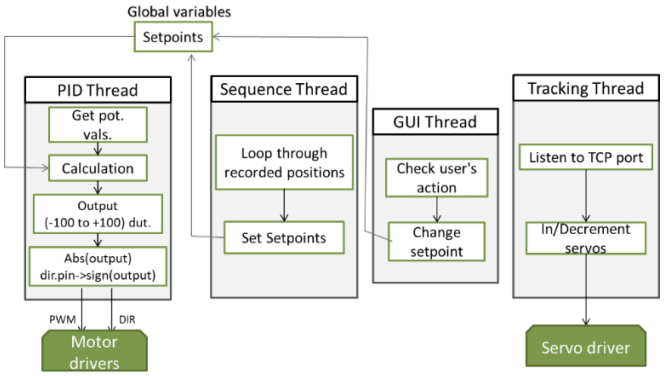

Figure 9. RPi code flow chart

These are 8 position values (2 bytes each) and a known delimiting byte, 17 bytes in total per scan. If the 17th byte is not the delimiting byte, the data is considered corrupted and the serial buffer is flushed to allow fresh data in the next cycle. The PID thread does not modify the setpoints, it only accesses it.

The tracking thread starts a TCP connection to the server on the laptop which has the cameras connected to it. From there, it listens to the port for incoming messages. The server sends JSON objects to the RPi (the client) when a specific object such as a face or a hand sign is in its field of view after processing the images from the cameras. The received JSON objects from the server contains the

percentage deviation of the object being tracked, from the center pixel (-100 to 100) both horizontally and vertically. This thread then adjusts the 2 servo motor angles of the eyes such that the deviations is zero. The 2 head servos are also adjusted such that the deviations of the eye servo motors from its mean position, is zero. The result is a tracking effect, where the eyes look at the object first, and then the head adjusts such that it is facing the object of interest, much like a human reaction.

A. Image processing thread

We use a library that utilizes HOG (Histogram of Oriented Gradients) [8], to detect faces, where each pixel is compared with the surrounding pixels. Then, an arrow id draws pointing in the direction of the change in pixel brightness. The image is broken into small squares of 16x16 pixels, each box containing the gradient pointing in the major direction. This turns the image into a simple representation. A simple pattern matching is done with a standard face HOG to find the location of the face (if any) in the image. A bounding box is drawn around it and the cropped image is sent to the face recognition program.

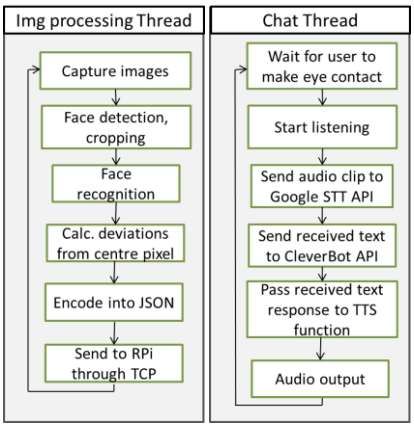

Figure 10. Off-board Python flow chart

The face recognition program uses a pretrained Deep Convolutional Neural Network that generates 128 measurements that are unique to each person[8]. These measurements are known as an encoding. Initially, a sample image of a person and the label (name) is given. The DNN produces the encoding and stores it in a database. During runtime, when a face is detected, the face is passed through the DNN and the encoding is determined. A pattern matching is performed with the produced encoding and the database of encodings. If a match occurs with the encoding, the person is labelled with the name given at the beginning. If there are no matches, the person is labelled as "unknown". Therefore, when given a person's sample image, and a label (their name), the program can identify that person. The bounding box around the person's face gives us the middle pixel location of the face. The distance between this pixel and the center pixel of the original image from the camera, is calculated in x and y directions. This x and y axis deviations are encoded and packed into a JSON object and then sent to the RPi through the TCP port, where it would be unpacked and used for adjusting the servo motors.

Figure 11: Screenshot of face recognition test showing identification of user by processing the image on the GPU on a Windows 10 platform.

B. Chatbot thread

This part of the program has 3 main steps

i) Speech to text

ii) Cleverbot API

iii) Text to speech

We use the google API for Speech to text conversion. Cleverbot is a chatterbot web application that uses an artificial intelligence (AI) algorithm to have conversations with humans. It was created by British AI scientist Rollo Carpenter. Unlike some other chatterbots, Cleverbot's responses are not pre-programmed. Instead, it learns from human input. Text generated by the STT service when an audio input is given to the robot, is passed on to the

cleverbot JSON API. The API generates a response which is a conversational response. This text response is fed through a text-to-speech service in python, using the library "pyttsx".

V. OPERATION

When a person comes in front of the robot, the robot looks for a face using the HOG algorithm. Once the face is detected, the part of the image within the bounding box of the face detection, is passed through the face landmark estimation followed by pose correction by basic image transformations. This image is now used to generate face encodings[8] by passing it through a D-CNN. The 128 measurements are then looked up in the database of previously recorded faces. If the encodings match any, the robot addresses the person with their name from the database. If the encodings do not match, a new entry is made in the database and the robot prompts the user to say their name. With the face detection, the robot is programmed to look for the user's eyes using Haar cascades[9], to indicate whether the user is making eye contact with the robot. If found so, the robot listens through its microphone. When the user says something, the average energy of audio input increases above the threshold. Listening stops when the energy falls back to the normal energy, indicating that the user has stopped speaking. This part of the audio is sent to the STT service to convert it to text. The text is then sent to the cleverbot API, whose response is converted to speech and output through the robot's speakers.

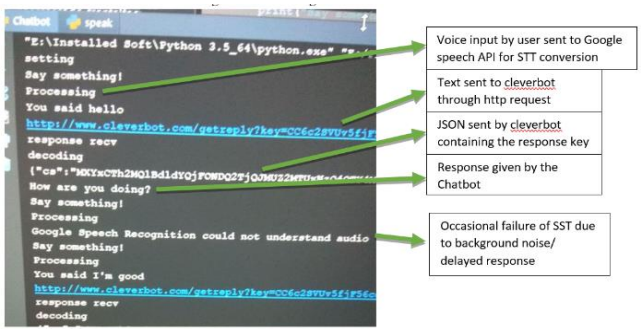

Figure 12. Screenshot of the output screen of PyCharm showing the Chatbot thread verbose.

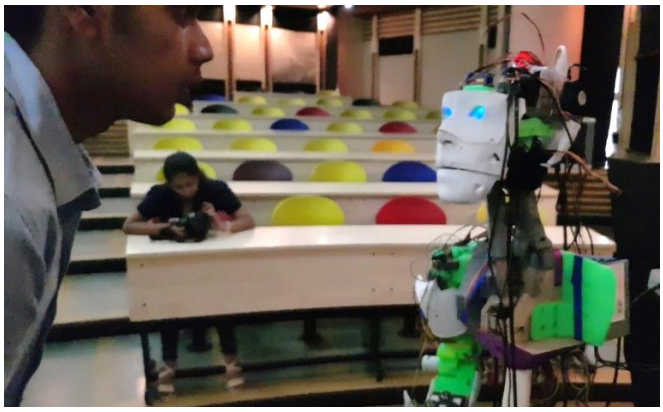

Figure 13. Charlie robot interacting with the user while maintaining eye-contact.

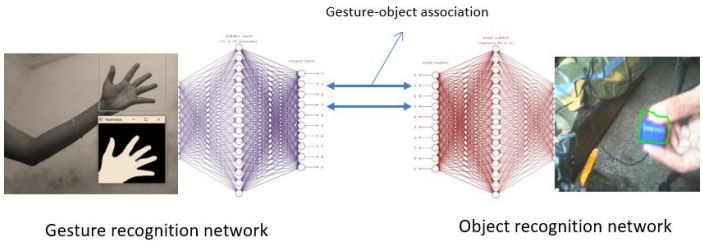

Figure 14. Associative learning

There are a series of Artificial Neural Networks that identifies objects, gestures, and helps in physical control of the movement of its arms. When the robot encounters a new object and a gesture command, its Networks are evolved through Neuro Evolution to accommodate this new information. When it is presented with a previously encountered gesture, the robot will be programmed to look for the object it is field of view. Once found, a Visual Servo-ing Network takes over, to control the robot's arm to reach for it. Training of these Neural Networks is done one after the other in the case of gesture and object identification and will be done simultaneously in the case of the servoing network and the PID motor control. The Neural Networks depicted are concerned with Gesture recognition, object recognition and mechanical control of the robot's arm, shown in purple, red and blue respectively. Each output neuron of a neural network is built to correspond to a certain predefined result. In the case of the Gesture Identification NN, each result is the inference that the input image is that of a hand-sign. For the neural network to be "trained" to infer the right result, the weight of the connections leading to the output neuron associated with the expected

result is increased, promoting this network path in the process. This method of deriving the expected result by tweaking the connections is called back-propagation. The same method is implemented in the Object Recognition NN, with the connections to the output neuron associated with the right object encouraged in a similar fashion. The association between the identified object and hand-sign is established by displaying the sign and the object consecutively, completing the training process.

VI. CONCLUSION

Our robotic platform can successfully manipulate its arm, recognizes stored faces and can learn to recognize new ones, and interact with the familiar face aurally with the ease of an average human being with an above-average amount of cheek. We expect Charlie to be able to serve as a multi-purpose platform for various interfacing operations because of the versatility of programming of his on-board microcomputer and the natural adaptability of his humanoid arm. Though various automation techniques have been developed, only a select few have been implemented in humanoid form. We plan on further developing the robot by adding more social behaviors. A Neural network implementation can greatly increase the robot's capacity of grasping information such as objects. Current work is being done on improving the Associative Learning algorithm to make it more interactive, while working on the mechanical design for greater efficiency and cost reduction.

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Artificial Inteligence Based Face Detection And Recognition For Automatic Attendance System

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ABSTRACT

A robust and reliable classroom attendance system using Artificial Intelligence, which is based on face detection and recognition is presented in this paper. Here input to the system is a live video and output is a consolidated with attendance of the students in the video. Automated attendance system can be implemented using various techniques of biometrics. Face recognition is one of them which do not involve human intervention. In this paper, attendance is registered from a live video of students. Students are identified by first performing Face Detection which separates faces from non- faces, and then Face Recognition is carried out which finds the match of the detected face from the face database (collection of student's name and images). If it is a valid match then attendance is registered to a tailored database and further status will be forwarded to parents, in case if students have attendance shortage. Face recognition is performed and matched on the basis of the accuracy by detection and recognition using Principle Component Analysis (PCA) algorithm and Viola Jones algorithm.

Keywords:Face Recognition; PCA; ViolaJones; Face Detection; Video; Attendance Management; Image Processing; Passing Attendance Status;

I. INTRODUCTION

Maintaining the attendance is essential in each and every groundwork for checking the performance of students. Each organization has its own technique. Traditionally student's attendance is taken substantially by utilizing participation sheet. The Current participation stamping techniques are monotonous and tiresome. Physically recorded participation can be effortlessly controlled. Besides, it is exceptionally hard to confirm one by one student in a substantial classroom environment with scattered branches whether the verified students are really present or not. Consequently this paper is implemented to handle each of these issues. Framework is such that it uses face detection and recognition algorithms which automatically detect and registers student attending particular class. Face detection and recognition is often referred to as, analyses characteristics of a person's face image input through a camera. It processes overall facial structure, distances between eyes, nose and mouth. Hence, this system handles all the issues which occurred in traditional system and other bio metrics methods.

II. EXISTING SYSTEM

Every organization adopts its own method for attendance monitoring, some continues with the traditional method for taking attendance manually

while some have adopted the biometric technique like iris recognition, fingerprint, and voice recognition. The traditional method makes it difficult to verify students one by one for larger strength. Using traditional method takes longer time and may not be accurate all the time, in case of biometric iris recognition and fingerprint makes it difficult to verify students one by one for larger strength, and in voice recognition technique using voiceprint of an individual to authenticate being used. Using Radio frequency Identification (RFID) helps to identify a large number of crowd using radio waves. This has high efficiency and hands-free access control.

III. LITERATURE SURVEY

In literature survey of video and image-based face recognition,

We get to know about the various face recognition techniques and also realized that it is mainly two steps methodology which involves face detection and face recognition. To get high recognition rate, detection plays a major role. In recent years researchers have developed numbers of face detection and face recognition algorithm. Huge amount of work is being carried out to implement classroom attendance system [1-6]. In [1] we came to know about the two stage methodology of automated attendance system. [4] Suggests the improvised recognition rate by enhancing the quality of the image. In [7] & [8] there are different approaches to face detection.[7] gives the study of Local Binary Pattern (LBP), Ad Boost algorithm, SMQT Features and SNOW Classifier Method and Neural Network-Based Face Detection. To get an efficient system for image /video-based face recognition, researchers proposed various algorithms like [9] [10] [11] [12] [13] & [14] using Eigen faces in Principle Component Analysis (PCA), Linear Discriminant Analysis (LDA). [15] [16] compared LDA and other methods of face recognition. [17] [18] [19] used hidden Markov model, probabilistic appearance manifold, and ARMA model respectively. [20-25] presented deep review of various proposed methods for overcoming the difficulties.

IV. ARCHITECTURE

System block diagram represents the overview of the system, registered students database will be maintained, a camera placed within the class room will take live video, gives it as input to the image processing system. Where initially face detection phase will takes place using Viola Jones algorithm, then face recognition phase will be followed by using PCA algorithm. Then identified students will be updated in student attendance database.

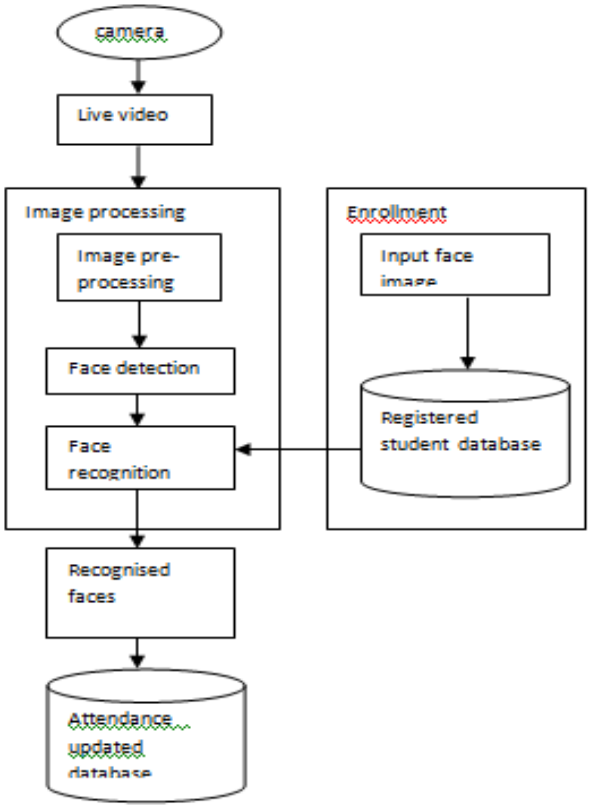

Figure 1. Block Diagram of an Automated System.

V. METHODOLOGY

In this paper, the system has to follow some particular methodologies which need to be processed in following steps:

- Creating face database
- Live Video Activation
- Face detection

- Face recognition
- Registering attendance

1. Creating face database

The database is the training set of our system and is created in such a way that it contains images of enrolled students. These images are cropped to get the region of interest which is the face of the student. In this paper, to test the working of the system it is trained with the training set which consists of 5 images per student and here, the number of students is 10. So, overall the system is trained with 50 images.

2. Video recording

As we discussed, we must have a very good quality camera to get the efficient detection and recognition. It should be connected to the PC and its drivers have to be properly installed. As we start the camera, the live video will be activated for few seconds and then will be processed further for face detection.

3. Face detection

After getting the video, the system reads the frames. Once the reading stops, it gets the frame and sends it for face detection.

- *Viola Jones Face Detection Framework*

The Viola–Jones algorithm is first object detection framework to provide competitive object detection rates in proposed by Paul Viola in 2001 and Michael Jones. It is a machine learning based Approach, this algorithm is used to differentiate face region from non face region. It includes,

a. Haar features: Haar features are similar to that of convolution kernels which are used to detect the presence of that features in the given image. Each features results in a single value which is calculated by subtracting the sum of pixels under white rectangle from the sum of pixels under black rectangle.

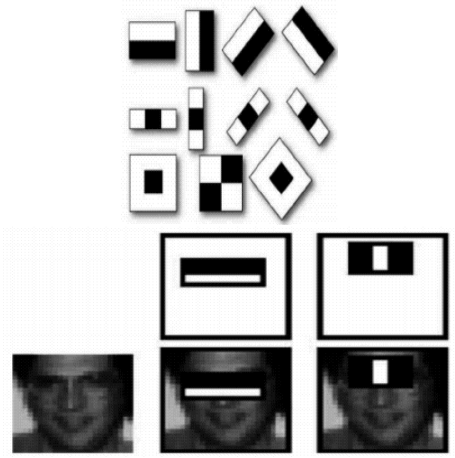

Figure 2. shows haar features which are observed in human faces

b. Integral Image: In an integral image the pixel(x, y) is the sum of pixels above and to the left. Which helps to calculate the sum of pixel value at a region.

1	1	1
1	1	1
1	1	1

Input image

1	2	3
2	4	6
3	6	9

Integral image

c. Ada Boost: Used to eliminate the redundant features, all haar feature are not relevant to detect face. So Ada Boost determines relevant and irrelevant features with respect to face detection.

d. Cascading: All features available in haar features are classified into set of classifiers including 10 or more features each, and arranged in hierarchy, which helps to eliminate non facial region easily.

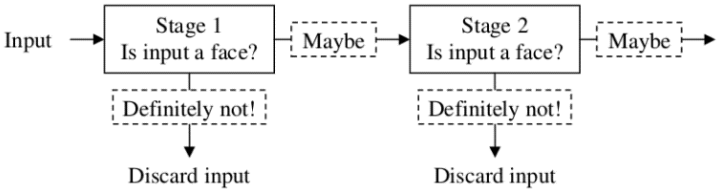

Figure 3. block diagram shows how cascading procedure

3. Face Recognition

This is the most important module of the system which is used to perform the comparison between the test images and the training images. To execute the recognition operation, there are various algorithms but here algorithm used is PCA.

- *PCA Face Recognition Framework*

PCA invented by Karl Pearson mostly used as a tool in exploratory data analysis and for making predictive models. It is the simplest of the true eigenvector-based multivariate analysis. Its operation is like revealing the internal structure of the data in a way which best explains the variance(major features/directions) in the data set.

Let us consider face image i(x,y) be a two dimensional M by N array of intensity values. An image can also be considered as a vector of dimension of M*N

Steps included in PCA are:

1. Prepare the training faces
2. Prepare the data set
3. Compute average face vector
4. Subtract the average face vector
5. Calculate the covariance matrix
6. Calculate the eigenvectors and eigen values of the covariance matrix.
7. Keep only K eigenvectors., where K will be less than the M value.

4. Registering Attendance

After completion of the face recognition module, next comes the module to register the attendance. If the detected face has been recognized, then it marks the attendance in the consolidated form. Further attendance status will be forwarded to Head of the Department and parents.

VI. RESULTS

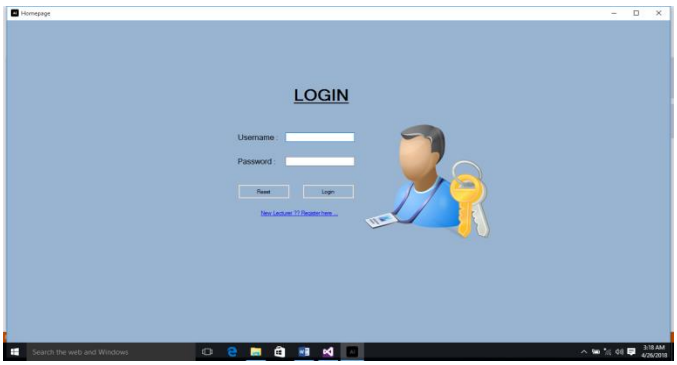

Figure 4. admin and lecturer login page

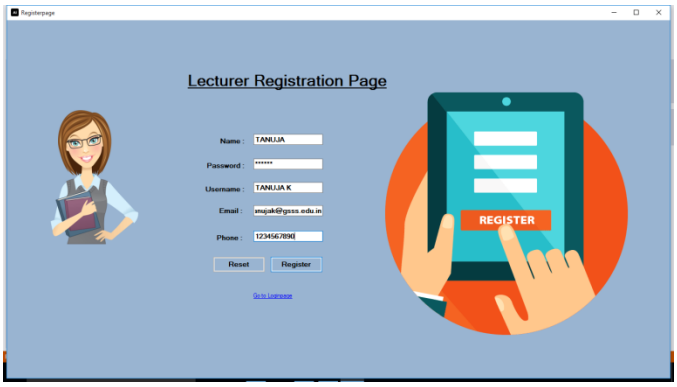

Figure 5. registration page of the lecturer

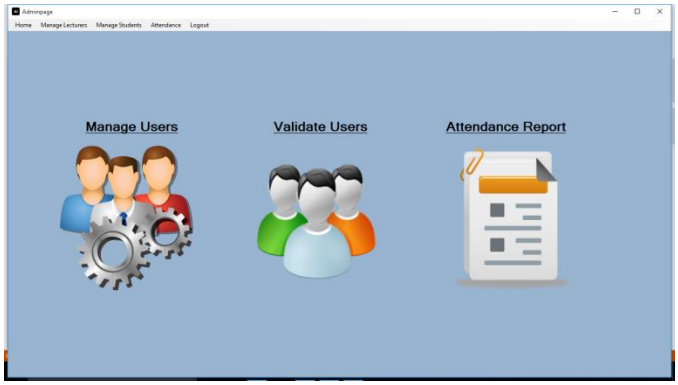

Figure admin home page where he can manage users, attendance table, student data table.

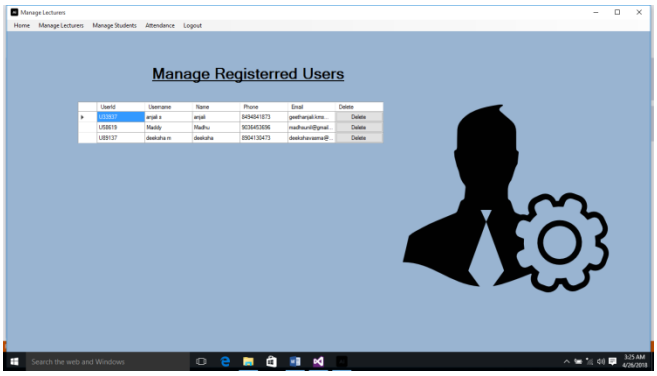

Figure 6. registered user data, which will be managed by admin

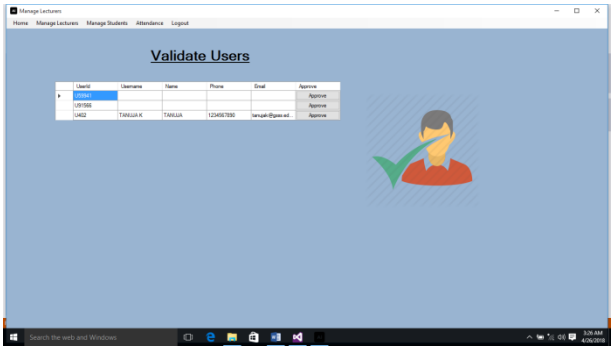

Figure 7. here admin will validating lecturer data who registers and approve there registration

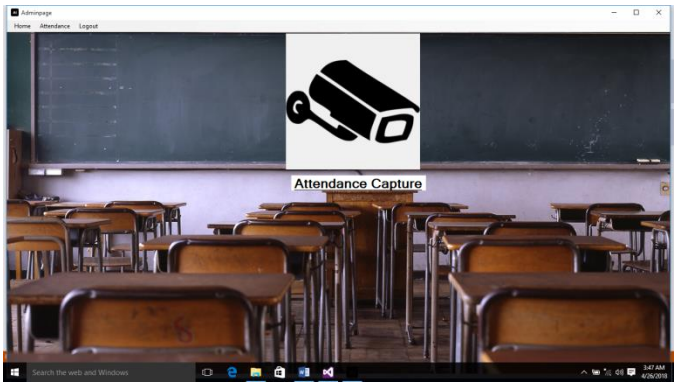

Figure 8. by selecting attendance capture option live video will start and identifies the students presence.

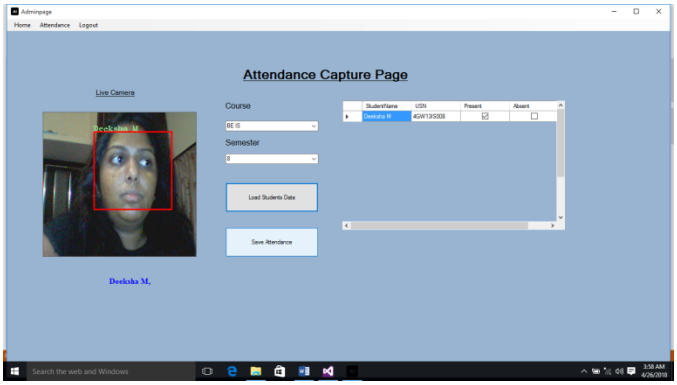

Figure 9. attendance capturing page, where students presence will be recognised and updated.

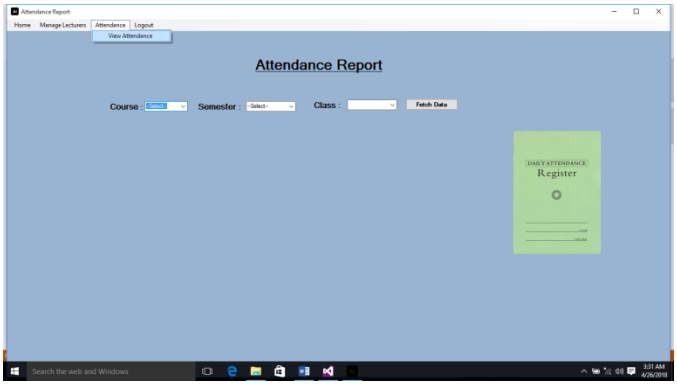

Figure 10. it shows the attendance report which can viewed by admin

VII. CONCLUSION

To eliminate the manual labor involved in recording attendance, an automated Attendance Management System based on Artificial intelligence face detection and face recognition techniques is proposed. The Viola-Jones algorithm and Principal Component Analysis (PCA) algorithm together are used for face detection and recognition. The proposed system improves the performance of existing attendance management systems in the following ways:

i) Automatic tracking of the records of the students
ii) Minimizing the manual labor and pressure on the lecturers for accurate marking of the attendance
iii) Minimizing the time required for marking attendance and maximizing the time required for actual teaching process
iv) Increase the user interface and efficiency of overall system
v) Improving the security
vi) Passing the attendance status to HOD and parents, in case of attendance shortage.

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Key Modulation Technique for Secure Data Transfer Using Image Encryption

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ABSTRACT

This work proposes a reversible image data hiding (RIDH) scheme over the encrypted domain. The confidential or important information, which sent in non-encrypted form, there might be a chance of misuse cases. To avoid this, secret data has to be encrypted while sending over network and hiding secret data into carrier so that the existence of encrypted data has to be invisible in order to convey secret message confidentially. The data embedding is achieved through a public key modulation mechanism. At the decoder side, a powerful two-class SVM classifier is designed to distinguish encrypted and non-encrypted image blocks, allowing us to jointly decode the embedded message and the original image signal. Compared with the state-of-the-art, the proposed approach provides higher embedding capacity and is able to perfectly reconstruct the original image as well as the embedded message.

Keywords: Reversible image data hiding (RIDH), Support Vector Machine(SVM) and Least Significant Bit (LSB).

I. INTRODUCTION

The image is an electronic medium for copying, playback, broadcasting, and display of moving visual media. Image security has gained importance over time in numerous applications wherein, information in the form of the image is to be secured from an unauthorized user.

The use of internet has increased tremendously over the years and the concept of data security is gaining momentum. The word steganography combines the Greek words steganos meaning "covered" and graphein meaning "writing"[6]. The art and science of hiding information by embedding messages within other is steganography. It works by replacing bits of useless or unused data. Steganography is an Encryption technique that can be used along with cryptography as an extra-secure method in which to protect data. It can be applied to images, an image file or an audio file. Steganography is used to supplement encryption[7].An encrypted file may hide information, by using steganography even if the encrypted file is deciphered; the hidden message is not seen.

Cryptography involves creating, written or generated codes that allow information to be kept secret. Cryptography converts data into a format that is unreadable for an unauthorized user, allowing it to be transmitted without unauthorized entities decoding it back into a readable format, thus compromising the data. Cryptography is the study of hiding information, While Steganography deals with composing hidden messages so that only the sender and the receiver know that the existence of message. In Steganography, only the sender and the receiver know the existence of the message, whereas in

cryptography the existence of the encrypted message is visible to the world [8]. Due to this, Steganography removes the unwanted attention coming to the hidden message. Cryptographic methods try to protect the content of a message, while Steganography uses methods that would hide both themessage as well as protect the content. By combining Steganography and Cryptography one can achieve better security.The proposed systemmakes use of least significant bit (LSB) insertion technique to hide the information. In Least significant bit (LSB) insertion technique, for hiding information, LSB of the image file is replaced with the information bits [3].LSB insertion is the simplest technique for implementing Image Steganography. The LSB method substitutes the LSBs of the hidden message with the LSB of cover image frames. Substituting data in the LSBs of any cover media is not detectable by human eyes (Human Visual System) i.e. very less change in the color[4]. Here the bits of the image from the image are directly embedded into the least significant bit plane of the cover frame in the deterministic sequence.

AES (Advanced Encryption Standard) is asymmetric encryption algorithm. The algorithm was developed by two Belgian cryptographers Joan Daemen and Vincent Rijmen.AES was designed to be efficient in both hardware and software and supports a block length of 128 bits and key lengths of 128, 192, and 256 bits[2].AES is more secure than its predecessors DES and TripleDES as the algorithm is stronger and uses longer key lengths. It also enables faster encryption than DES and TripleDES, making it ideal for software applications, firmware, and hardware that require either low latency or high throughput. We use 128 bit key for an AES algorithm which specifies the number of repetitions should be 10 cycles' transformation rounds that convert the input called plain text into final output called ciphertext. Each round consists of several processing steps that depend on the encryption key [5].

II. EXISTING SYSTEM

The majority of the existing RIDH algorithms are designed over the plaintext domain, namely, the message bits are embedded into the original, un-encrypted images. Histogram Shifting (HS)-based technique, initially designed by Zhicheng Ni *et al.*, has been achieving better embedding performance through shifting the histogram of some image features. The latest Difference Expansion (DE)-based schemes and the improved Prediction Error Expansion (PEE)-based strategies were shown to be able to offer the state-of-the-art capacity distortion performance. As the source coding with side information at the decoder requires a feedback channel, this scheme would face severe challenges in many practical scenarios, e.g., secure remote sensing, where the feedback channel could be very costly. The embedding capacity of this type of method is rather limited and the incurred distortion on the watermarked image is severe.

III. LITERATURE SURVEY

Every Software development requires the survey process. The Survey process is needed to get the requirement for the software. The Survey also consists of studying the present system. A proper understanding of the tools is very much essential. Following is an extract of the information of the material collected during literature survey.

In this paper [1], information hiding techniques and historical details is discussed. Several methods for hiding data in audio, the image is described with appropriate to the environment of each medium as well as strength and weakness of each medium. The information about the secret key, transmission protocol, computer file system, hiding techniques is discussed.

In this paper [2], the different types of steganographic methods its pros and cons are discussed in detail. It gives information about the efficient method for sending safely to this destination.

The use of steganography application is to hide different types of data within the cover file. This is done according to the embedding algorithm and a secret key that performs the actions of the embedding process.

In this paper [3], the image data embedding scheme is proposed. We can replace one or more LSB of each pixel in the image frame. It becomes very difficult for the intruder to guess the data hidden in a frame. An advanced data hiding method by using a different bit with help of LSB substitution is proposed and analysed.

In this paper [4], it explains the prime need of hiding data from eavesdroppers is accomplished by the use of steganography. It explains about the wide researches that have been carried out on image steganography due to the high capacity of information be stored in the image file.This paper presented using LSB insertion which is very efficient method to embed data into a cover medium. It has explained the LSB insertion method for image steganography and its application.

In this paper [5], the focus on the data security approachwith combined encryption and steganographic techniques for secret communication by hiding it inside a multimedia file is done. The file such as images, audio, the image contains a collection of bits that can be further translated into same. The files composed of insignificant bits or unused areas which can be used for overwriting of other data. This paper explains the proposed algorithm using image steganography for enhancing data security.

In this paper [6], the explanation on a combination of cryptography and steganography is used for data hiding in image clips. A random frame selection, pixel swapping and encryption of message have been done to enhance the security of secret information which goes under the cover of image clips. Image steganography method has been developed to transfer secret data.

In this paper [7], the modern secure image steganography presents a challenging task of transferring embedded information to destination without being detected. Here, a simple approach for embedding a message into an image or the image from the pixel of carrier image is replaced with message information so that it cannot be observed by the human visual system, therefore exploits some limitations of the human visual system.

IV. ARCHITECTURE

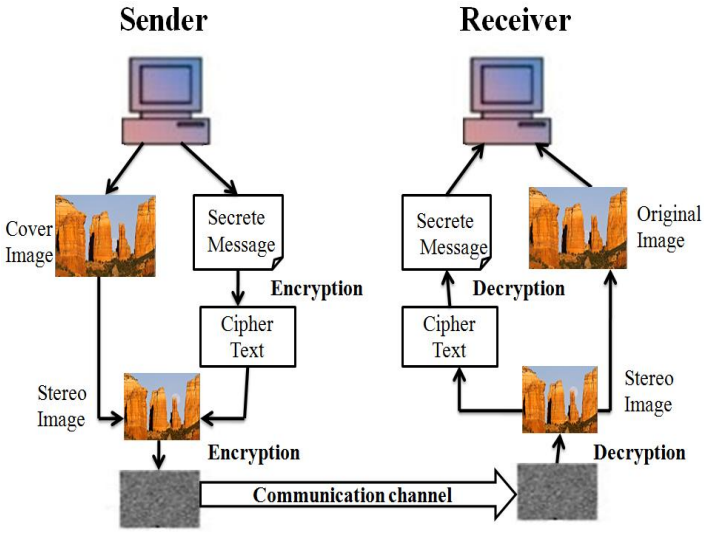

Figure 1. structure of secure transmission system.

As illustrated in Fig 1, the overall process is divided into two parts i.e. sender and receiver. When a sender wants to send the secret data, he will register for the access and extract the image file along with the secret data. The secret data will be encrypted using AES Algorithm while sending an image i.e. stego/stereo image. The Encryption key will be generated at the time of sending. The authorized receiver can only access the image file with the help of an encrypted key.

V. METHODOLOGY

An Image can be viewed as a sequence of still images. After embedding the data inside the image this image

is referred as stegano image and this stegano image seems very similar to original images. However, there are many differences between data hiding within image and image encryption, where the first important difference is the size of the host media since images contain more sample number of pixels, an image has a higher capacity than a still image and more data can be embedded in the image. After the data encryption the encrypted data is divided into a number of chunks, these chunks will be given to the LSB technique, by this technique the chunks will be placed in the marked frame.

AES is based on a design principle known as a substitution-permutation network and is fast in both software and hardware. AES operates on a 4×4 column-major order matrix of bytes, termed the state. We use 128 bit key for an AES cipher which specifies the number of repetitions should be 10 cycles' transformation rounds that convert the input, called the plaintext, into the final output, called the ciphertext.

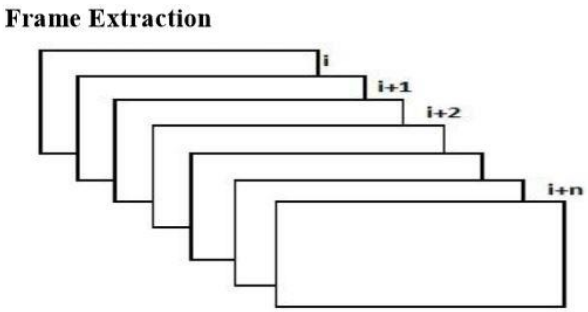

Figure 2. Frame extraction process for the image.

Least Significant Bit (LSB) insertion is a common, simple approach for embedding information in a cover image. As illustrated in Fig 2, Image is converted into a number of frames and then converts each frame into an image. Here, the bits of the image are directly embedded into least significant bit plane of the cover-frame in a deterministic sequence.

VI. RESULTS AND SCREENSHOTS

Figure 3. Homepage

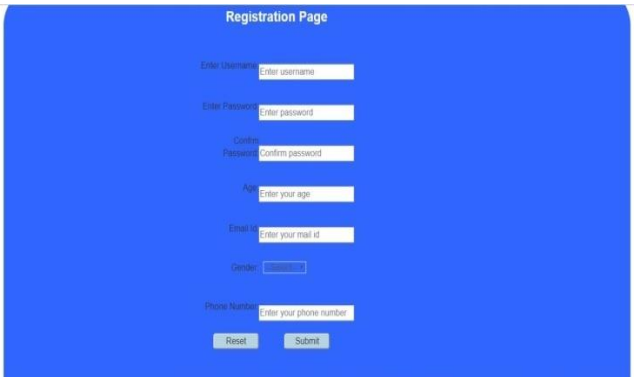

Figure 4. User Registration Page

Figure 5. sender uploading the image and inserting the data.

Figure 6. sender accepting/rejecting the receiver's request

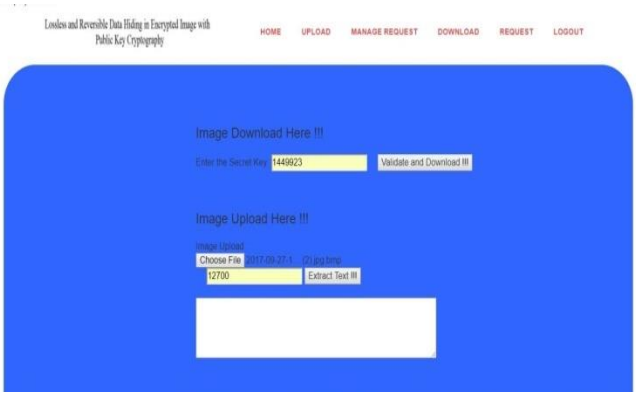

Figure 7. Receiver downloading page.

VII. CONCLUSION

This paper presents a comprehensive review ofimage steganographic technique. The proposedmechanism for secure data transfer using public key modulationallows embedding the data via LSB technique. Furthermore, popular image and image quality metrics available in the literature were discussed. Finally, steganalysis was surveyed from the point of view that improves the design of good steganographic systems.

The scope of the proposed technique can be further enhanced technique by embedding the secret data inside the audio files and video files. Based on this review, the following recommendations may help interested researchers in image steganography and also by considering two images as input and can embed secret message in both.

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CDA Generation and Integration for Efficient Health Record on Cloud Computing System

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ABSTRACT

Auspicious disposal on Electronic health record supports to develop patient protection and quality of care, but this obtain essential of interoperability between Health Information Exchange (HIE) on different hospitals. The Clinical Document Architecture (CDA) developed on Health Level7 (HL7) is a extract document standard to secure such interoperability, and circulation about this document format is risk for interoperability. Unlikely, hospitals represents, diffident towards approve interoperable Health Information System (HIS) due to its deployment cost excludes for in a few countries. A problem occurs even when more hospitals begin to using the CDA document format because the data confused in different documents on difficult to maintain. In this paper, we define our CDA document generation and integration open API service based on cloud computing system through which hospitals are facilitates to auspiciously to generate CDA document without having to buy a own software. Our CDA document integration system combines multiple CDA documents per patient by a single CDA document and physician and patient can browse the clinical data in sequential order. Our technique of CDA document generation and integration is found on cloud computing and the service provided on open API. The designer using different platforms consequently can use one system through enlarge interoperability.

Keywords: Cloud computing, Health information exchange, HL7, CDA, cloud computing, software as a service.

I. INTRODUCTION

Cloud computing

Cloud computing is a model of functional and establish a technologies for handling collection of computing assets (resources).There is a turbulent technology that the ability to add participant, quickness, measuring and availability and gives a opportunities for cost reduce through adjusted and capable compute. The cloud computing envisages a world where components can be quickly orchestrated, provisioned, implemented and designation and increase or decrease to give a required utility like model of distribution and consumption.

There are many ways to considered cloud computing. It is a technology, a collection of technologies an operational model, a business model and etc. it is at its entity, transformation and disordered. It is also moving very quickly and shows no signs of slowing down. Cloud computing offers tremendous potential agility, resiliency and economic benefits. Organization can move faster, reduce downtime and save memory.

The aim of field is to build the basis that the ease of the document, on the reference are based on- To provide a common language and understanding of cloud computing for security professionals, and to begin highlights the difference between cloud computing and traditional computing to help guide security professionals towards accept in security benefits, rather of creating more.

Cloud computing exhibits several interesting uses for business and end users. Three of the main uses of cloud computing are:

1. Self-service condition: end user can revolves to compute resources for almost any type of capacity on demand. This removes the traditional requires for IT executives to condition and maintain computer resources.
2. Flexibility: companies can measure as computing requires increase and scale down again as demand decrease. This removes are requires for huge assets in local foundation which may or may not stay active.
3. Stipend per use: compute resources are calculated at a rough level, allowing users to stipend only for the resource and capacity they use.

Health Care

Health care is the care or development of health via the analysis, treatment, and prevention, of disease, illness, injury and other natural and mental distribution in human beings. Health care is delivered by health professionals (providers or participants) in associated health professions, chiropractic, physician, associates dentistry midwifery, nursing, medicine, optometry psychology, and other health professions. It comprises the work done in providing primary care, secondary care and system care, as good as public health.

Approach to health care changes over countries, groups, and individuals, heavily impact by social and reasonable situations as good as the health approaches in place. Countries and authorities have distinct policies and plans in relation to the personal and population based health care goals within their community. Methods are associations introduced to converge the health needs of aim population. This imposes configuration changes between national and subnational subsistence. In some countries are controls, health care planning is appropriated between market participators, whereas in others, planning arises more conveniently between governments or other coordinating bodies. In all situations agree to the World Health Organization (WHO) a well-performance health care method exact a strong financing; a well-trained and sufficiently- paid capabilities; dependable information on which to establish choice and approaches; and well managed health facilities and coordination to rescue quality medicines and mechanism.

Motivation

Our project is to identifying the false information of the hospitals database. It reduces the manual work and gives the correct information of the patient records or reports. Which they treat and make a pdf form to refer the other prescribed doctor. The lab technician will send this pdf for the prescribed doctors to read a patient reports without false information. If the patient forgets their reports by carrying no worry about that reports that reports have already send to prescribed laboratory.

Once the patient can treat they can wait in a long queue to get their report in hospitals. To avoid this patient can download their reports in a website provided by the hospital. Patient can download their reports in website link without false information.

Patient view their disease related hospitals in the website. If a patient is willing to choose that hospital he wants select that hospital and fix the appointment of that doctor treatment. Patient can consult the doctor to get treatment of the patient

disease. It reduces the time and cost of the patient as well as doctor.

II. BACKGROUND

Purpose

The purpose of introducing a CDA generation and integration for health information based on cloud computing system to avoid the false information of patient reports on the hospital database to store these entire file in cloud storage. The Doctor and Patient can download the reports at any time in website link provided by the hospital tocloud storage system.

Existing Solutions

When a patient is diagnosed at a clinic, a CDA document recording the diagnosis is generated. The CDA document can be shared with other clinics if the patient agrees. The concept of family doctor does not exist in Korea; hence it is common for a patient to visit a number of different clinics. The exchange of CDA document is triggered in the following cases: when a physician needs to study a patient's medical history; when referral and reply letters are drafted for a patient cared by multiple clinics; when a patient is in emergency and the medical history needs to be reviewed. It takes increasing amount of time for the medical personnel as the amount of exchanged CDA document increases because more documents means that data are distributed in different documents. This significantly delays the medical personnel in making decisions. Hence, when all of the CDA documents are integrated into a single document, the medical personnel is empowered to review the patient's clinical history conveniently in chronological order per clinical section and the follow-up care service can be delivered more effectively. Unfortunately for now, a solution that integrates multiple CDA documents into one does not exist yet to the best of our knowledge and there is a practical limitation for individual hospitals to develop and implement a CDA document integration technology.

Disadvantages of Existing System:

- It is not time efficient

III. PROPOSED SOLUTIONS

In this paper we present (1) a CDA document generation system that generates CDA documents on different developing platforms and (2) a CDA document integration system that integrates multiple CDA documents scattered in different hospitals for each patient. The benefits of adopting this system are as follows. First, the system is accessible through an Open API and developers can continue working on their developer platforms they specialize in such as Java, .NET, or C/Cþþ. Hospital systems can simply extend their existing system rather than completely replacing it with a new system. Second, it becomes unnecessary for hospitals to train their personnel to generate, integrate, and view standard-compliant CDA documents. The cloud CDA generation service produces documents in the CDA format approved by the National Institute of Standards and Technology (NIST). Third, if this service is provided for free at low price to hospitals, existing EHR are more likely to consider adoption of CDA in their practices.

Advantages of Proposed System:

Our cloud computing based CDA generation and integration system has a few pronounced advantages over other existing projects.

1. Hospitals do not have to purchase propriety software to generate and integrate CDA documents and bear the cost as before.
2. Our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. Regardless of the type of the platform, CDA documents can be easily generated to support interoperability.
3. CDA document generation and integration

system based on cloud server is more useful over existing services for CDA document if the variety of CDA document increases.

IV. MATERIALS IMPLEMENTED

In this section, we present the necessary techniques in detail for the design, and explain the implementation of our CDA generation and integration system based on cloud computing.

The CDA Document

American Nation Standards Institute approved the HL7 Clinical Document Architecture Release 2 (CDA R2) in May 2005, where CDA is an XML-based document markup standard that specifies the structure and semantics of clinical documents and its primary purpose is to facilitate clinical document exchanges between heterogeneous software systems.

A CDA document is divided into its header and body. The header has a defined structure and it includes information about the patient, hospital, physician, etc. The body part is flexible than the header and contains various clinical data. Each piece of clinical data is allocated a section and given a code as defined in the Logical Observation Identifiers Names and Codes (LOINC). Different subcategories are inserted in a CDA document depending on the purpose of the document, and we chose the Continuity of Care Document (CCD) because it contains the health summary data for the patient and it is also widely used for interoperability. We chose the Korean Standard for CDA Referral and Reply Letters (Preliminary Version) format for CDA integration system as the number of clinical documents generated when patients are referred and replies made, is large.

Cloud Computing

Cloud computing is defined as using a network of remote servers, hosted in the Internet that helps to store, manage, and process data, rather than a local server or a personal computer. It refers to the applications delivered as services over the Internet and software in the data centres that provide those services. The user pays fee depending on the amount of resources allocated, such as network, server, storage, applications and services.

V. METHODOLOGY

The objective of our system is to generate the PDF format for the generated and integrated CDA Documents for the use of Patients. This conversion takes places in the CDA Generation and Integration Interface located in the HIS systems of the hospitals. Also, we have included another attribute in the CDA Header like Aadhar number applicable in India to generate the unique ID in the cloud to create security of information residing in the cloud.
Our cloud computing based CDA generation and integration system has a few pronounced advantages over other existing projects. First, hospitals do not have to purchase propriety software to generate and integrate CDA documents and bear the cost as before. Second, our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. Regardless of the type of the platform, CDA documents can be easily generated to support interoperability. Finally, the integrated CDA Documents is converted to PDF format.

- **Registration and Appointment**

Users in the hospital environment will have an initial registration in the web end. The server in turn stores the information in its database. Now the patient login and fix appointment to the Doctor by mentioning time and date of the appointment, disease, specialist and name of the doctor. Each Doctor views their appointment in their appointment page.

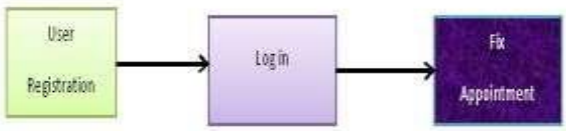

Figure 1. Registration and Appointment

- **Patient Report Generation**

Doctor view the patient information such as disease, symptoms etc. If it necessary patient is advised to take lab test. Lab Technician provides test result to patient. Based on test result, Doctor suggests prescription to the patient, and also patient health history should be maintained in appropriate hospital database. Doctor can view patient health history before he suggests prescription to the patient.

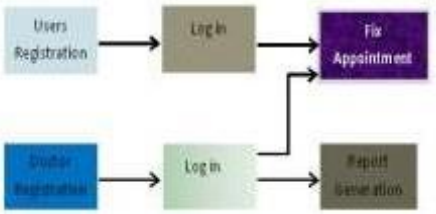

Figure 2. Patient Report Generation

- **CDA Generation**

In this module patient health information's are send to the cloud server. Now the cloud server will generate unique id for every users based on patient name, father name, date of birth and additionally Aadhar card number using PJW Hash Algorithm. If already id exists then the patient details will be appended with patient clinical history else new CDA document will be generated.

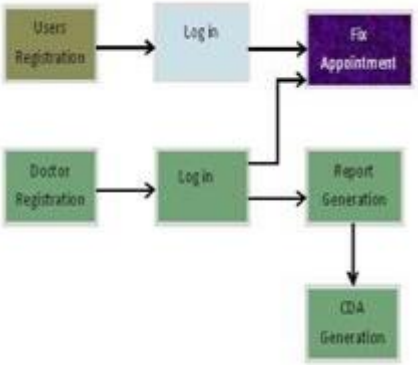

Figure 3. CDA Generation

- **Parsing CDA Document**

In this module the new patient enter into hospital no need to give details about the disease and symptoms. The patient history already maintained in cloud server so we can get the patient histories by using key it is retrieve from patient personal details. The patient histories maintained in document which is contains patient clinical histories (hospital name, disease, prescription).

- **Converting CDA Document to PDF**

The parsed CDA Documents are received at the HIS system where the documents are converted into PDF for the personal use of the patient. To do this, we need to add an application called PDF conversion interface. This can be simply extended with the existing software where the entities like CDA Document Generation and Integration resides.

VI. CONCLUSION AND FUTURE ENHANCEMENT

We establish an efficient way of generating the PDF format for the generated and integrated CDA Documents for the use of Patients. Our cloud computing based CDA generation and integration system has a few pronounced advantages over other existing projects. CDA documents increases, interoperability is achieved, but it also brings a problem where managing various CDA documents per patient becomes inconvenient as the clinical information for each patient is scattered in different documents. The CDA document integration service

from our cloud server adequately addresses this issue by integrating multiple CDA documents that have been generated for individual patients. First, Hospitals do not have to purchase propriety software to generate and integrate CDA documents and bear the cost as before. Second, our service is readily applicable to various developer platforms because an Open API is to drive our CDA document generation and integration system. Regardless of the type of the platform, CDA documents can be easily generated to

support interoperability. Also, additionally the integrated CDA Documents of the patient is converted into the PDF format for the use by Patients. Thus, the time is saved for the doctors in taking medical decisions at emergency times and delivers the correct health care as the medical records are in chronological order.

Future enhancement

In our future work, we will explore the following points. First, we will make a concrete estimation of the reduction in cost when the EHR system becomes cloud-based. Establishing a reasonable fee system is an important issue for cloud computing. There is ample evidence that cloud computing is effective and efficient in cost reduction, and the medical field seems to be no exception . Security and stability is top priority for cloud computing resources as it is used by many users . Future work will attempt to enhance security while ensuring reasonable quality of service even with multiple users logged on the system at the same time.

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Portable H2O Quality Monitoring and Cloud Reporting System

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ABSTRACT

In order to ensure the safe supply of drinking water the quality needs to be monitored in real time. For this purpose, IoT based" Portable H2O Quality Monitoring and Cloud Reporting System" has been proposed. In this paper, we present the design and development of a portable water quality monitoring system that monitor the quality of water in real time. This system consists of some sensors which are used to measure the physical parameters of water such as pH, turbidity, conductivity and temperature. The measured values from the sensors are read by the microcontroller and these values are sent to the cloud using ESP-8266 Wi-Fi module. The data from the sensors can be viewed in the GUI and reports are sent accordingly.

Keywords: pH sensor, Turbidity sensor, Temperature sensor, Conductivity sensor, Arduino Uno model, IoT, Water Quality Monitoring.

I. INTRODUCTION

Over the past decade, online water quality monitoring has been widely used in many countries known to have serious issues related to water pollution [6]. The water is limited and essential resource for industry, agriculture and all the creatures existing on the earth including human beings. Any imbalance in water quality would severely affect the health of the humans, animals and also affect the ecological balance among species [9]. The drinking water is precious and valuable for all the human beings so the quality of water must be monitored in real time. These days water quality monitoring in real time experiences difficulties because of global warming, inadequate water resources, increasing population, etc. Hence, there is a need for developing better methodologies to monitor the water quality parameters in real time.

The WHO (world health organization) estimated, in India, 844 million people are estimated to die each year from diarrhoea as a result of unsafe drinking water. WHO also estimates that 21% of diseases are related to unsafe water in India. Also, more than 1600 deaths alone cause due to diarrhoea in India daily. Therefore, various water quality parameters such as conductivity, pH, turbidity and temperature should be monitored in real time.

The water quality parameter pH measures the concentration of hydrogen ions. It shows whether water is acidic or basic. Pure water should have a pH value of 7. If it is less than 7, it indicates acidity and if it is more than 7, it indicates basicity. The normal range of pH is 6 to 8.5. In drinking water if the normal range of pH is not maintained, it causes irritation to the eyes, skin and mucous membranes. The conductivity indicates the ability of water to pass an electric current. It is the degree to which a specified material conducts electricity, calculated as

the ratio of the current density in the material to the electric field which causes the flow of current. In water it is affected by various dissolved solids such as chloride, nitrate, sulfate, sodium, calcium, etc. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrhoea, cholera. Lower the turbidity then the water is clean. It indicates the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Water temperature is one of the most important characteristics of an aquatic system, affecting dissolved oxygen levels. The solubility of oxygen decreases as water temperature increases. If the water is too warm, it will not hold enough oxygen for aquatic organisms to survive. The deterioration of water resources has become a common human problem [7]. The traditional methods of water quality monitor involve the manual collection of water samples from different locations. These water samples are tested in the laboratory manually. Such approaches are time consuming, tedious, prone to errors and hence no longer considered to be efficient. Moreover, the current methodologies include analysis of various water quality parameters such as physical and chemical parameters. Traditional methods of water quality detection have the disadvantages like complicated methodology, long waiting time for results, low measurement precision and high cost [8]. Therefore, there is a need for continuous monitoring of water quality parameters in real time.

By focusing on the above issues, we have developed and designed a low cost and portable water quality monitoring system that can monitor the water quality in real time using IoT environment. In our system water quality parameters are measured by the different water quality monitoring sensors such as pH, turbidity, conductivity and temperature. These sensor-values are processed by the microcontroller and these processed values are sent to the cloud using ESP-8266 Wi-Fi module. In this system, IoT module is used to access processed data from the core controller to the cloud. The processed data can be monitored through a GUI designed for this purpose. The overview of the following sections of this paper is as provided here: Section II provides the Iot, Section III provides Arduino Uno, Section IV provides a literature survey of existing systems, Section V provides system components, section VI provides schematic circuit diagram with its working and section VII provides result and analysis of the system.

II. INTERNET OF THINGS

In the past decade, all human life changed because of the internet. The internet of things has been heralded as one of the major development to be realized throughout the internet portfolio of technologies [15]. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other [11]. Internet of Things represents a concept in which, network devices have ability to collect and sense data from the world, and then share that data across the internet where that data can be utilized and processed for various purposes. IoT communication is quite different from the traditional human to human communication, bringing a large challenge to existing telecommunication and infrastructure [12]. Furthermore, IoT provides immediate information regarding access to physical objects with high efficiency. The concept of Internet of Things is very much helpful to achieve real time monitoring of sensor data.

Internet of Things (IoT) is a kind of network technology, which is based on information sensing equipments such as RFID, infrared sensors, GPS, laser scanners, gas sensors and so on, can make anything join the Internet to exchange information, according to the protocol, which gives intelligent identification, location and tracking, monitoring and management [13]. In proposing system we introduce cloud computing technique for monitoring sensor values on the internet. Cloud computing provides

the access of applications as utilities, over the internet. The cloud computing characteristic and development approaches are explained in [10], [11], [12]. Cloud computing is a large scale processing unit which processes in run time and it is also a very low cost Technology based on the IP. The application area of IoT includes building and home automation, smart city project, smart manufacturing of various products, wearables, health care systems and devices, automotive etc.

III. ARDUINO UNO

Arduino Uno is the platform used in this project because of its simplicity and convenience. This microcontroller board has ATmega328P microprocessor. It includes 14 digital input/output pins (among them six can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a power jack, a USB connection, an ICP header and a reset button. It is simple to connect to the computer and program it as needed by the user. It can be powered in two ways, with battery by using power socket or just simply connecting through USB. Starting from A0 through A5, there are six analog inputs, and each pin has 10 bits of resolution. In total 14 pins are the digital pins, and they can be used as an input as well as output, using pinMode(), digitalWrite(), and digitalRead() functions in programming. These pins run at 5 Volts. Providing and receiving 20 mA current by each pin which is recommended operating condition and has an internal pull-up resistor of 20 to 50K ohm. With the intention of not damaging the microcontroller, 40 mA is the maximum current which must not be surpassed on any input and output pin. The Arduino Uno is possible to programme with the Arduino software. The Arduino Uno contains ATMega328 microcontroller which is already programmed with the bootloader to help with equipping programs in the system. For communicating it uses STK500 protocol. Bypassing the bootloader and program the microcontroller through the ICSP header using Arduino ISP or similar is possible as well. The software for Arduino is free to use and is easily available in the public domain. The ATmeaga328 contains 32 kB memory plus bootloader occupies 0.5 kB of memory. This has 2 kB of SRAM and 1 kB of EEPROM.

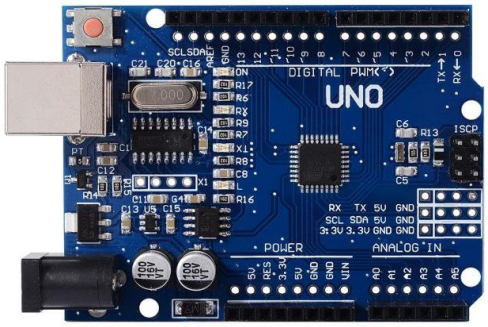

Figure 1. Arduino Uno

IV. LITERATURE SURVEY

Paper entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project" by Nikhil Kedia, published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights the entire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.[1]

Paper entitled "Real Time Water Quality Monitoring System" by Jayti Bhatt, Jignesh Patoliya This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity,

dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is raspberry pi using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing.[2]

Paper entitled "Industry 4.0 as a Part of Smart Cities" by Michal Lom, Ondrej Pribyl, Miroslav Svitek .This paper describes the conjunction of the Smart City Initiative and the concept of Industry 4.0. The term smart city has been a phenomenon of the last years, which is very inflected especially since 2008 when the world was hit by the financial crisis. The main reasons for the emergence of the Smart City Initiative are to create a sustainable model for cities and preserve quality of life of their citizens. The topic of the smart city cannot be seen only as a technical discipline, but different economic, humanitarian or legal aspects must be involved as well. In the concept of Industry 4.0, the Internet of Things (IoT) shall be used for the development of so–called smart products. Sub-components of the product are equipped with their own intelligence. Added intelligence is used both during the manufacturing of a product as well as during subsequent handling, up to continuous monitoring of the product lifecycle (smart processes). Other important aspects of the Industry 4.0 are Internet of Services (IoS), which includes especially intelligent transport and logistics (smart mobility, smart logistics), as well as Internet of Energy (IoE), which determines how the natural resources are used in proper way (electricity, water, oil, etc.). IoT, IoS, IoP and IoE can be considered as an element that can create a connection of the Smart City Initiative and Industry 4.0 – Industry 4.0 can be seen as a part of smart cities.[3]

Paper entitled "QOI-Aware Energy Management in Internet-of-Things Sensory Environments" by Zhanwei Sun,Chi Harold Li,Chatschik Bisdikian,Joel W.Branch and Bo Yang. In this paper an efficient energy management frame work to provide satisfactory QOI experience in IOT sensory environments is studied. Contrary to past efforts, it is transparent and compatible to lower protocols in use, and preserving energy-efficiency in the long run without sacrificing any attained QOI levels. Specifically, the new concept of QOI-aware "sensor-to-task relevancy" to explicitly consider the sensing capabilities offered by an sensor to the IOT sensory environments, and QOI requirements required by a task. A novel concept of the "critical covering set" of any given task in selecting the sensors to service a task over time. Energy management decision is made dynamically at runtime, as the optimum for long-term traffic statistics under the constraint of the service delay. Finally, an extensive case study based on utilizing the sensor networks to perform water level monitoring is given to demonstrate the ideas and algorithms proposed in this paper, and a simulation is made to show the performance of the proposed algorithms.[4]

Paper entitled "Adaptive Edge Analytics for Distributed Networked Control of Water Systems" by Sokratis Kartakis, Weiren Yu, Reza Akhavan, and Julie A. McCann. This paper presents the burst detection and localization scheme that combines lightweight compression and anomaly detection with graph topology analytics for water distribution networks. We show that our approach not only significantly reduces the amount of communications between sensor devices and the back end servers, but also can effectively localize water burst events by using the difference in the arrival times of the vibration variations detected at sensor locations. Our results can save up to 90% communications compared with traditional periodical reporting situations.[5]

V. SYSTEM COMPONENTS

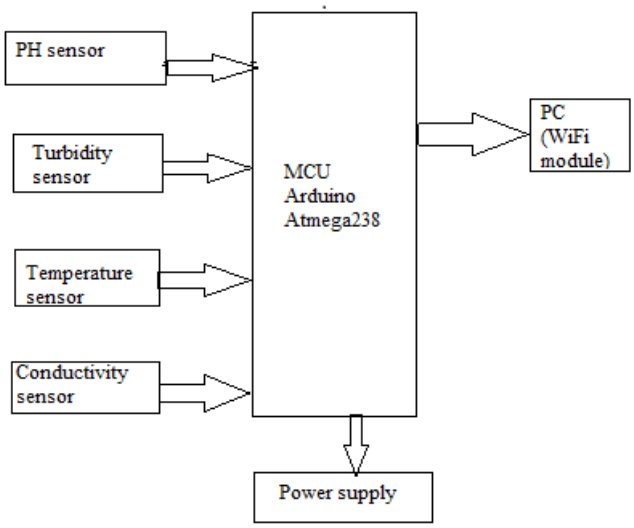

Figure 2. Block diagram of our system

Our system consists of several sensors (temperature, pH, turbidity, conductivity) is connected to microcontroller. The microcontroller access the sensor values and process them to transfer the data to the cloud using ESP-8266 Wi-Fi module. Arduino Uno is used as a core controller.

Parameters that we have chosen and their standard values are

Table 1

	PARAMETER	UNIT	QUALITY RANGE
1	pH	pH	6.5-8.5
2	Conductivity	µS/cm	500-1000
3	Turbidity	NTU	0-5
4	Temperature	^{0} C	0-100

pH sensor: The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0-14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino.The normal range of pH is 6 to 8.5. pH is defined as the negative logarithm of the hydrogen ion concentration.

$$pH = -\log_{10}(H^+)$$

Figure 3. pH sensor

Turbidity sensor: Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. Formula to measure turbidity in NTU,

NTU = a (TSS)b

NTU = Turbidity Measurement

TSS = Suspended solids measurement in mg/L

a = Regression- estimated coefficicent

b = Regression- estimated coefficicent

Figure 4. Turbidity sensor

Temperature sensor: Water Temperature indicates how water is hot or cold. The range of DS18B20 temperature sensor is -55 to +125 °C. This

temperature sensor is digital type which gives accurate reading. Arrhenius equation is used to determine temperature dependence on reaction rates.

k = Ae-Ea/(RT)

k = Rate constant

T = Absolute temperature in Kelvins

A = Pre-exponential factor, a constant for each chemical reaction

Ea = Activation energy for the reaction

R = Universal gas constant

Figure 5. Temperature sensor

Conductivity sensor: Water conductivity sensors are used in water-quality applications to measure how well a solution conducts an electrical current. This type of measurement assesses the concentration of ions in the solution. The more ions that are in the solution, the higher the conductivity. Formula to calculate electrical conductivity,

$$EC = J/e = 1/r$$

J = Current density

e = Electric field intensity

$$TDS = 0.9 * EC$$

TDS = Total dissolved salts

EC = Electrical conductivity

Figure 6. Conductivity sensor

Wi-Fi module: The ESP-8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP-8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP-8266 module comes pre-programmed with an AT command set firmware. The ESP-8266 module is an extremely cost effective board with a huge, and ever growing, community.

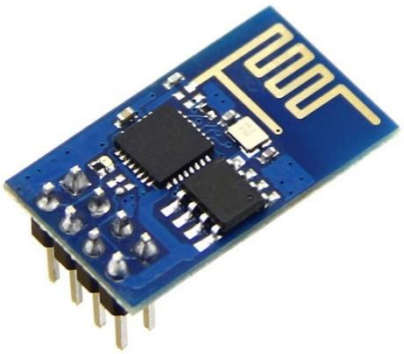

Figure 7. ESP-8266 Wi-Fi module

VI. SCHEMATIC CIRCUIT WITH ITS WORKING

The whole design of the system is based mainly on IoT. There are basically two parts included, the first one is hardware and the second one is software. The hardware part has sensors such as temperature sensor, pH sensor, turbidity sensor and conductivity sensor which help to measure the real time values, along with Arduino Uno microcontroller, ESP-8266 Wi-Fi module and LCD screen.

Each sensor is dipped in the water sample. The values read by these sensors are analog and continuous. Each sensor has its own comparator which acts as a communication medium between the sensor and the microcontroller. Since these values are analog, the Analog-to-Digital Converter(ADC) is used to convert them to digital and discrete values. The values are set and varied using Potentiometer which is present on each sensor. These digital values are displayed on the 2x16 LCD screen. ESP-8266 Wi-Fi module is used to give microcontroller access to

Wi-Fi network i.e., it gives connection between the hardware and software. When we supply AC using adapter, Arduino and Wi-Fi module turn on. There is a trigger button which when pressed pushes the values to the cloud.

Software part is designed using Microsoft Visual Studio Ultimate 2010. We have used NET framework for the GUI.

There is a dropdown menu where we select "monitoring". We get directed to another page. When the "start monitoring" is clicked, the values displayed on the LCD is shown here. If the values are not in the specified range, an email is sent to the concerned authority in PDF format. If no action is taken even after a stipulated amount of time, these details are posted on the simulated social networking site which we have created for this purpose

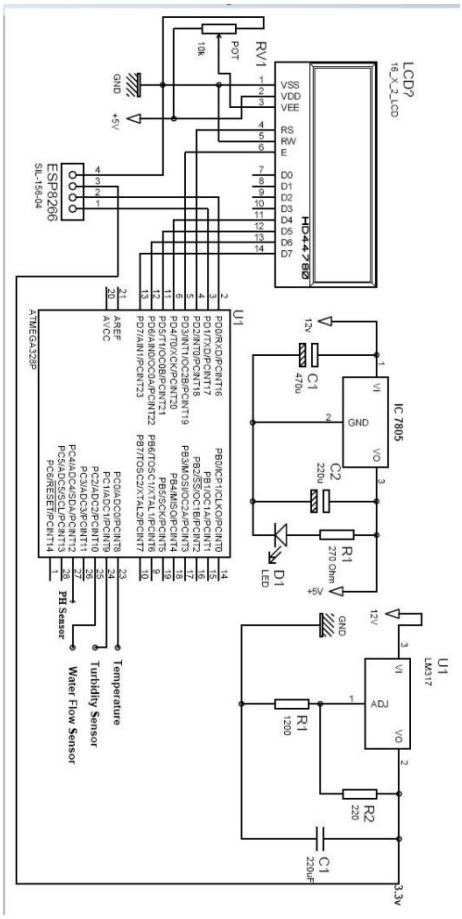

Figure 8. Schematic Circuit Diagram

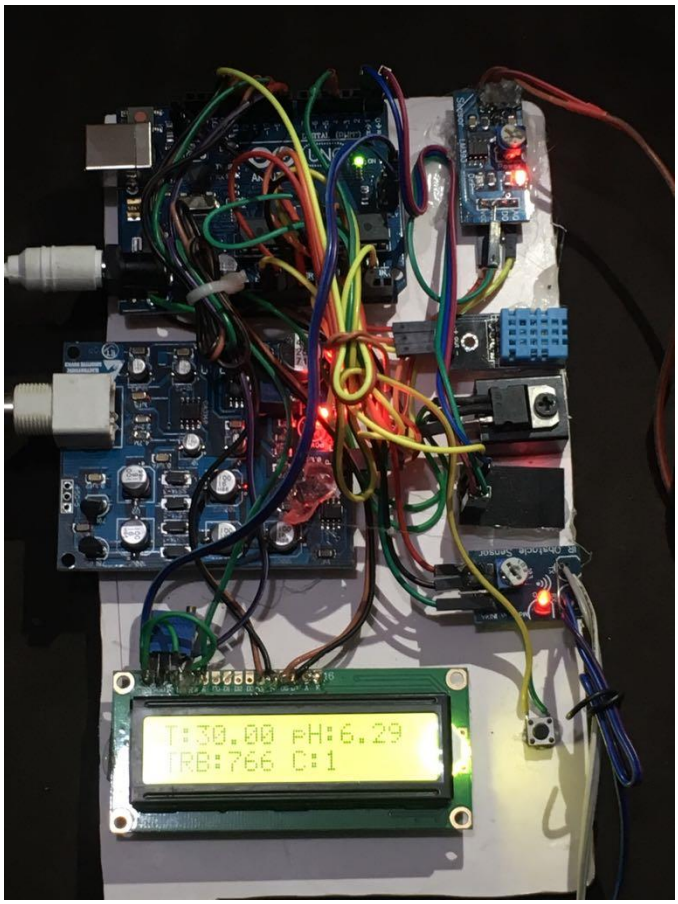

Figure 9. Hardware model

VII. RESULT AND ANALYSIS

(1) Tap water

(2) RO water

(3) Muddy water

(4) Salty water

(5) Soapy water

Figure 10. Water Samples

We took five samples of water namely tap water, RO water, muddy water, salty water and soapy water and tested each of them individually with our device. In case of first sample, we observed that the pH was less than the normal range (6.5-8.5), conductivity

was below normal range(500-1000) and turbidity was more than the specified range(1-5). Hence, this water is not suitable for drinking.

In case of second sample, we observed that the pH, conductivity and turbidity were in the normal range specified for drinking. So, this water is fit for drinking purpose.

In case of third sample, we observed that the pH was more than the normal range (6.5-8.5), conductivity was way above the normal range(500-1000) and turbidity was more than the specified range(1-5). Hence, this water is not suitable for drinking.

In case of fourth sample, we observed that the pH was above the normal range (6.5-8.5), conductivity was within the normal range(500-1000) and turbidity was slightly more than the specified range(1-5). Hence, this water is not that suitable for drinking.

In case of fifth sample, we observed that the pH was more than the normal range (6.5-8.5), conductivity was below the normal range(500-1000) and turbidity was more than the specified range(1-5). Hence, this water is not suitable for drinking.

So, our device can be used to check the quality of water and as well as monitor it in real time. Since it is not done manually, it is less likely to give erroneous values.

Operation is simple. Even a layman can operate it with ease without having any prior knowledge about it.

It reduces the total time spent in collecting the water samples, testing it and waiting for the results. Hence our system is useful for monitoring the water quality.

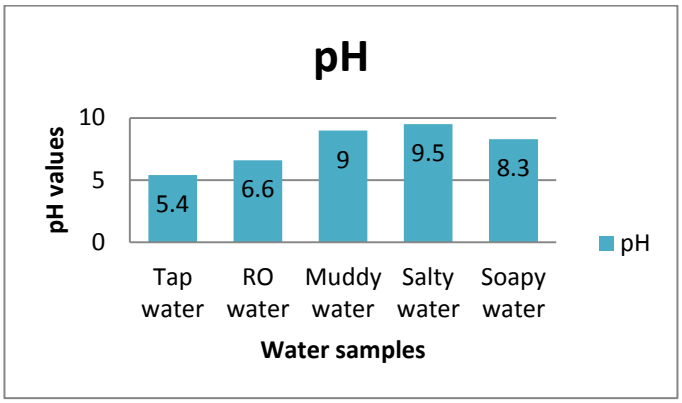

Figure 21. pH graph

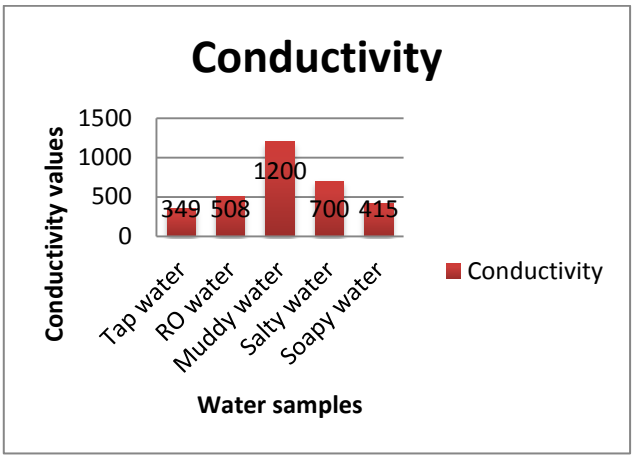

Figure 32. Conductivity graph

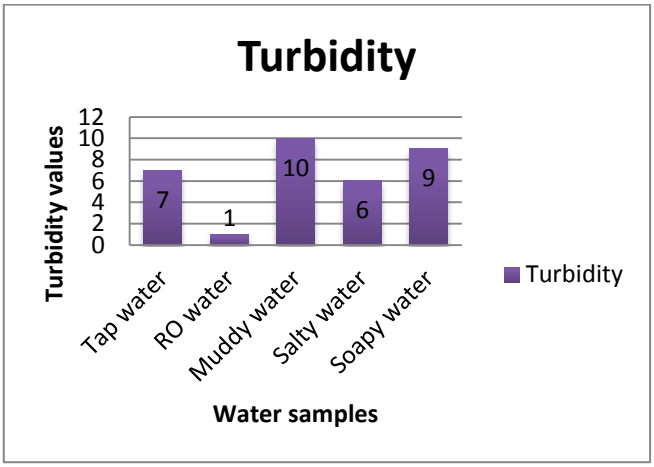

Figure 43. Turbidity graph

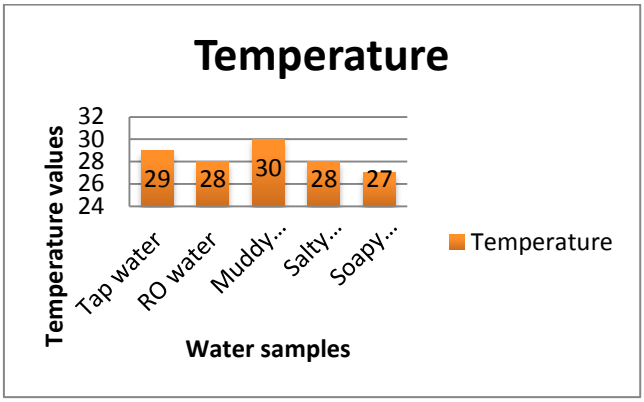

Figure 54. Temperature graph

VIII. ACKNOWLEDGEMENT

We thank KSCST for their financial support.

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A Study on Virtual Reality Applications

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ABSTRACT

In Current Social IT world, Virtual Reality (VR) has gained popularity in a last few years. All the coverage done by the media has helped it spread its presence. The problems associated with it are only known to a few. In this paper we present the whole historical outlook on virtual reality, all the important classes are listed, and also the various uses in science, work and various areas. A through study of a VR system is done.

Keywords: Virtual reality, Visual perception, Immersion

I. INTRODUCTION

With the introduction of Virtual reality all the fields such as scientists, architects, civil engineers now use this technology as a base to carry out all projects. This not only increases the precision and the quality of the project but also provides clarity on how the project turns out to be. Due to increase in demand, all the prices for these projects have also come down drastically. Thus the need and production of these devices are increasing day by day. Virtual Reality (VR) and Virtual Environments (VE) are the popular terms that are used often in this field. The words are not only limited to these but also extends to a huge amount of terms. Some important words include: Synthetic Experience, Virtual Worlds and Artificial Worlds or Artificial Reality.All these names bear the same meaning.

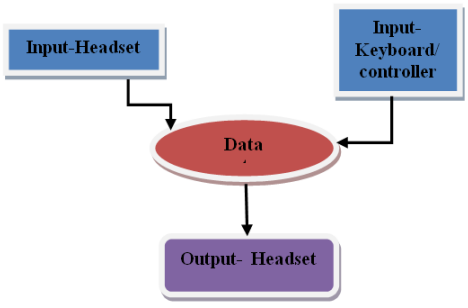

Figure 1. Data flow model

Virtual Reality Systems

Sensory information from the VR device is relayed on to the human senses. The quality of these senses are the key to determine how immersive the environment is.Since there are five senses in a human body, all the sensory information should appeal to all the senses. The second part of the experience is the environment that plays a major role. In reality it is very difficult to achieve this feat. Devices currently present can stimulate only some of the senses but not all .The types of VR systems available are directly proportional to the different quality they can offer:

World on window VR

This uses only the monitor to convey information as the output. No other output or sensory information is supported by this system as shown in Figure 1.1

Figure 1.1. World on window

Fish Tank VR

This can also be categorized as an improved version of VR. Even though this system uses the conventional monitor, it is better as it can support "Head tracking" that increases the user's immersion quality. This system does not support any other sensory output as shown in Figure 1.2

Figure 1.2. Fish tank VR

Immersive systems

This system has an HMD that supports a stereoscopic view of the perception in accordance to the user's orientation. This is known as the superior system in all respects. The functionality can be further enhanced by adding other sensory inputs as shown in Figure 1.3

Figure 1.3. Immersive Systems

Visual perception characterization

The main criteria that determines the quality of the VR is how well we can view the scene, ie the visual information. We have to generate feedback on how this can be perceived and also the extent of human vision. Unfortunately we cannot achieve such levels now. This leads to compromise on the quality of the currently available VR systems as in Figure 1.4

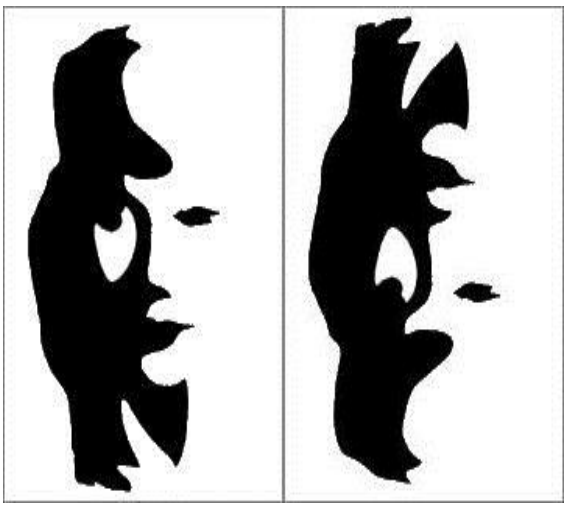

Figure 1.4. Visual perception

Field of View

The field of vision of a normal human eye is usually 180˚ which gives a clue on how to improve the visual quality. The vertical range hindered by cheeks and eyebrows to about 150˚. The horizontal vision is also limited, and equals to 150˚: 60˚ towards the nose and 90˚ to the side. This gives 180˚ of total horizontal viewing range with a 120˚ binocular overlap, when focused at infinity and it is shown in Figure 1.5

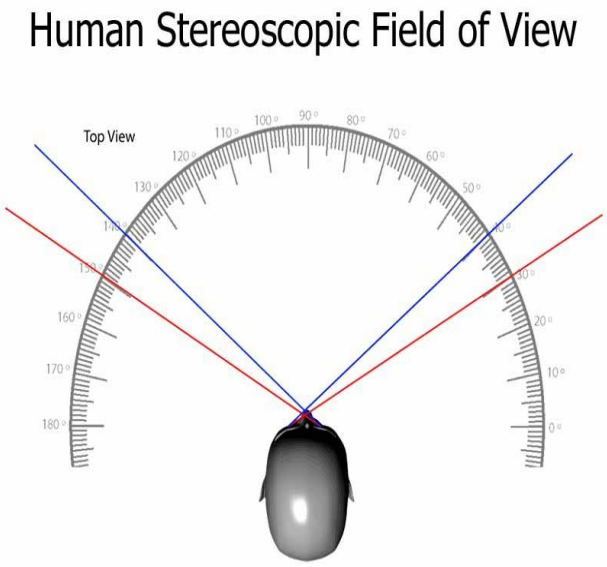

Figure 1.5. Field of view

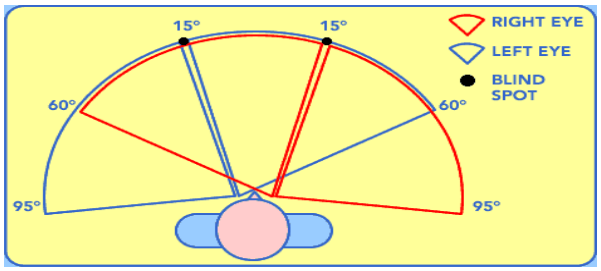

Figure 1.6. Blind spots

Applications

The various applications include:

Training

VR can be used to mimic real world spaces for workplace, safety, health, educational and training purposes. Without the fear of failing the users can learn while utilizing the virtual environment. It has been used in primary education, military Fig-2.1, astronaut training, flight simulators and driver training.

Figure 2.1. Millitary Training

Treating Disorders

The medical field uses include virtual reality exposure therapy (VRET), which is a type of exposure therapy for treating anxiety disorders such as stage fear, post-traumatic stress disorder and phobias. In some cases, patients no longer meet the criteria for PTSD after a series of treatments with VRET.

Figure 2.2. Treating Vertigo

Gaming

This is extensively used in gaming as seen in Fig-1.3.

Figure 2.3. Gaming using VR

VR case study

The sandbox was an event, started with the premise intended to drive a car in those road tracks you made in sandboxes as a kid. The solution-the experience, currently which ran running at Audi's flagship dealership in Oslo, which is also designed to be taken on tour. It invited people to enter a purpose-built sandpit and were free to create a customized track. The depth-sensing camera took the sand area which was then carefully scanned, this was the camera from which a virtual world is rendered. To be able to capture every bump and curve, the sand is bombarded with short bursts of infrared light with over 200,000 measure points captured by the infrared camera. This data is then used to create a 3-D model that informs the virtual environment. Having built the track, drivers then sit in a VR chair and don an

Oculus Rift headset to enter the virtual world they just created. The image is shown in Figure 3.1.

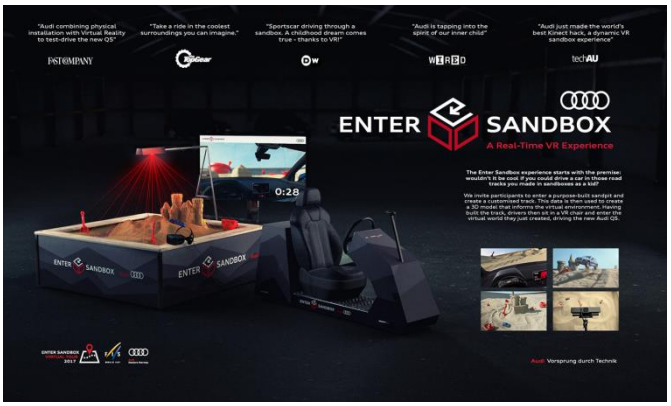

Figure 3.1. Enter the sandbox

II. CONCLUSION

VR has found already an enormous number of Applications in different areas of science It has become the go to reliable tool for designers, physicists, chemists, doctors, surgeons etc. All these practices, however, are not available for average people and therefore virtual reality is becoming some kind of myth, something extremely wonderful.

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A Study on Recent Trends in Multimedia Communication

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ABSTRACT

Nowadays image processing, computer vision and machine learning go hand in hand for many recognition tasks. These three fields are paving the way to a new future where robots can not only see everything around them with a clearer sense but can also understand how to interact with them. Through the use of highly sophisticated convolutional neural networks and advanced image processing techniques it is possible to scale technology to a new level.

Keywords: image processing, computer vision, machine learning, techniques

I. INTRODUCTION

The technique of image processing allows us to enhance images taken from cameras of sensors places on satellites or aircrafts and even any pictures taken from normal day to day life. These image processing systems have gained attraction since the availability of powerful personal computers with large memory and fast graphic software. Some of the most recent advances in technology are credited to computer vision. All the way from algorithms that detect skin cancer to self-driving cars, computer vision algorithms lay the foundation for all these feats. CV algorithms have been around since 1960's but only recently they progressed to more sophisticated levels. Machine learning is a field of artificial intelligence. In machine learning we try to learn a data model and fit new data to that model. Some new facial recognition technology has allowed for social media platforms to help users tag and share photos of friends. Recommendation engines, self-driving cars etc. are some of the examples of the power of machine learning.

II. IMAGE PROCESSING

An image is a 2D light intensity function f(x,y) where the (x,y) represents spatial coordinates and the value we get from f at any point (x,y) will be proportional to the brightness or the grey levels of the given image at that point. A digital image represents the function f(x,y) that has been discretised in both the spatial and brightness coordinates.

The elements of this digital array are called image elements or pixels.

1. A simple image model:

To be suitable for computer processing, an image f(x,y) must be digitalized both spatially and in amplitude. Digitization of the spatial coordinates (x,y) is called image sampling. Amplitude digitization is called grey-level quantization. The storage and processing requirements increase rapidly with the spatial resolution and the number of grey levels. Example: A 256 grey-level image of size 256x256 occupies 64K bytes of memory. Images of very low spatial resolution produce a checkerboard effect.

2. Basics of colour

(A) Light and spectra

Colour is the perceptual result of light in the visible region of the spectrum, having in the region of 400nm to 700nm, incident upon the retina. Visible Light is a form of electromagnetic energy consisting of a spectrum of frequencies having wavelengths range from about 400nm for violet light to about 700nm for red light. Most light we see is a combination of many wavelengths.

(B) Primaries

Any colour can be matched by proper proportions of three component colours called primaries. The most common primaries are red, blue and green. The following terms are used to define colour light:

1. Brightness or Luminance: This is the amount of light received by the eye regardless of colour.
2. Hue: This is the predominant spectral colour in the light.
3. Saturation: This indicates the spectral purity of the colour in the light.

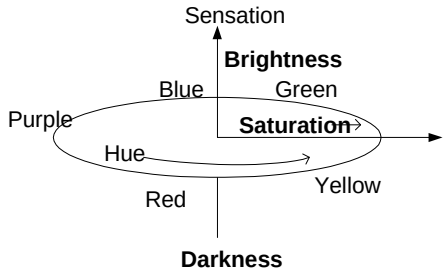

Figure 1. Saturation, Hue, Brightness Diagram

III. COMPUTER VISION

Computer Vision is a field of Artificial Intelligence and that aims at giving computers the ability to perceive objects of the world. There are three main methods involved in processing of components in computer vision as shown in Figure 2:

1. Image acquisition
2. Image processing
3. Image analysis and understanding

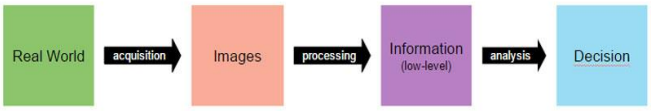

Figure 2. Steps in Computer Vision

1. Image acquisition

Image acquisition is the process of translating the analog images into binary data to get digital images. Different tools have been created to do this task as shown in Figure 3:

1. Webcams & embedded cameras
2. Digital compact cameras & DSLR
3. Consumer 3D cameras & laser range finders

Figure 3. Various Image acquisition devices

2. Image processing:

Next is the low level processing of images. In this step we apply some low level algorithms on parts of the image such as image edges, point features or segments etc. This second step usually involves advanced applied mathematics algorithms and techniques as shown in Fig-4. Low-level image processing algorithms include:

1. Edge detection
2. Segmentation
3. Classification
4. Feature detection and matching

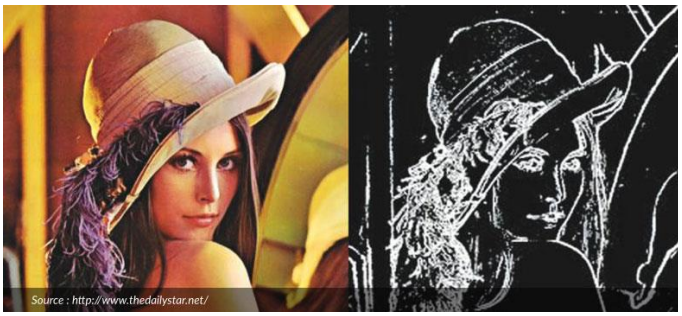

Figure 4. Edge Detection

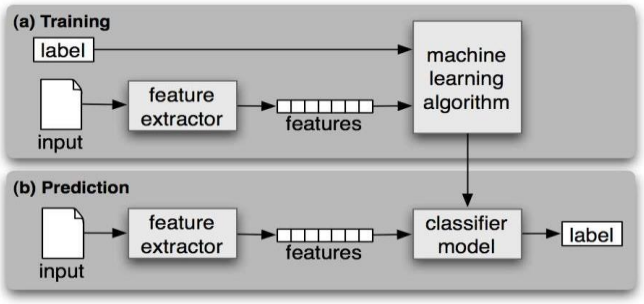

Figure 6. Steps in Machine Learning

3. Image analysis and understanding:

The last step is the actual analysis of the data, achieved using high-level algorithms, using both the image data and the low-level information computed in previous steps. Examples of high-level image analysis as shown in Fig-5 are:

1. 3D scene mapping
2. Object recognition
3. Object tracking

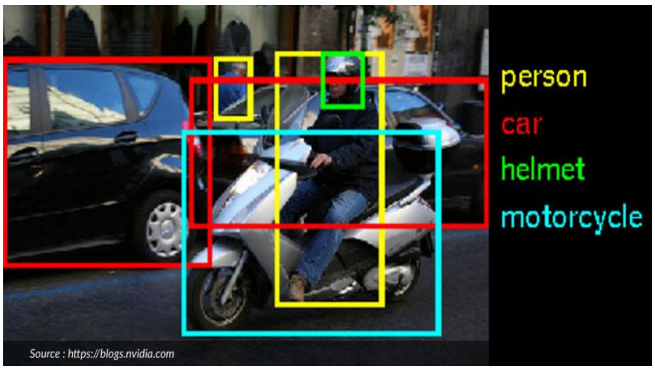

Figure 5. Object Detection

IV. MACHINE LEARNING

Machine learning is a field of computer science that gives computer systems the ability to "learn" with data, without being explicitly programmed. Figure 6 shows the steps in Machine Learning Algorithm.

Categories

The categories of machine learning are Supervised Learning, Unsupervised Learning, Semi-Supervised Learning and Reinforcement Learning.

1. Supervised Learning

The correct classes of the training data are known as shown in Figure 7.

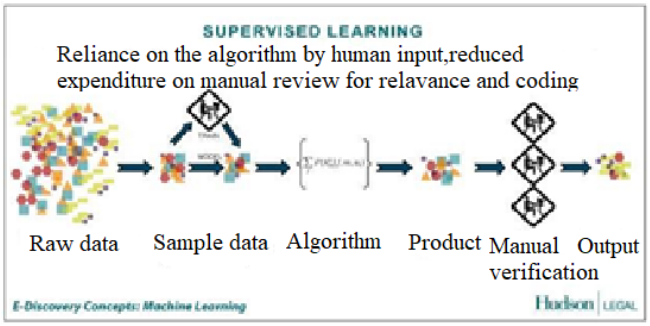

Figure 7. Supervised Learning

2. Unsupervised Learning

The correct classes of the training data are not known as shown in Figure 8.

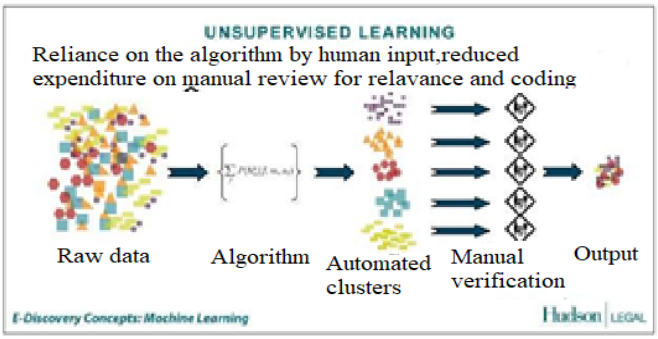

Figure 8. Unsupervised Learning

3. Semi-Supervised Learning

A Mix of Supervised and Unsupervised learning as shown in Figure 9

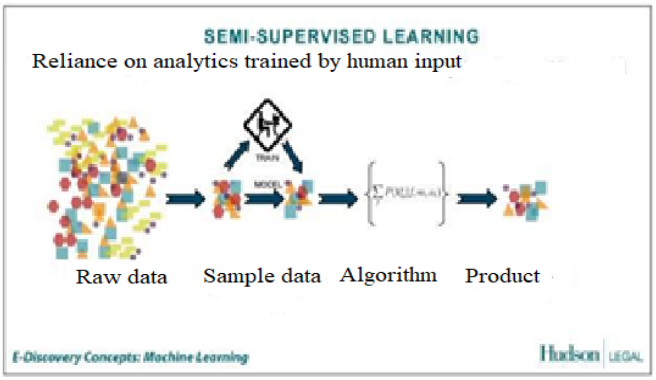

Figure 9. Semi-Supervised Learning

4. Reinforcement Learning

Allows the machine or software agent to learn its behaviour based on feedback from the environment as shown in Figure 10.

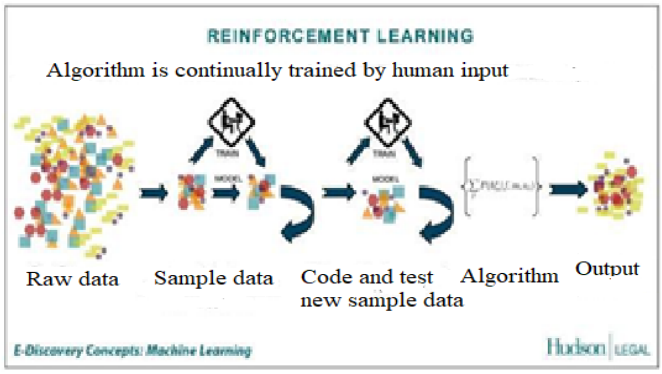

Figure 10. Reinforcement Learning

V. APPLICATIONS

1. Applications of image processing:

Digital image processing has two main application areas i.e. Improvement of pictorial information for human interpretation and Processing of scene data for autonomous machine perception. In this second area we focus on extracting information from the image that is suitable for processing. Examples include automatic character recognition, industrial machine vision for product assembly and inspection, military recognizance, automatic processing of fingerprints etc.

2. Applications of computer vision:

Few applications of computer vision are Motion recognition, Augmented reality, Autonomous cars, Domestic/service robots and Image restoration such as denoising,

3. Applications of machine learning:

Few application areas of machine learning are Spam Email Detection, Machine Translation (Language Translation), Clustering (KMeans) used in Amazon Recommendations, Classification used in Google News, Rating a Review/Comment as used in Yelp, Fraud detection used in Credit card Providers, Decision Making used in Bank/Insurance sector, Sentiment Analysis and Speech Understanding as used in iPhone with Siri.

VI. CONCLUSION

Image processing, computer vision and machine learning are nowadays concepts that are implemented in most of the technology we use today. Through advances in these fields we have been able to make breakthroughs in science and engineering to enable us all to move towards a brighter future.

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Development of Wearable Device for the Safety and Security of Women and Children

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ABSTRACT

As we know in present era everything is based on digital technology. Nowadays every person is connected with each other by many ways, where most popular communication is internet so it is internet, which connects people. The Paper proposes an SMS and E-mail based solution to aid parents to track their children in real-time. Different devices are connected with a single device through channels of internet-concerned parents to track their children in real time or for women safety can use the device. It allows the parents to get their child's location on real time by an E-mail and SMS. Here prototype model (device) is created which is simulation based. The work comprises Raspberry Pi as a microprocessor along with GPS, E-mail and SMS gateway. Python 2.7 Idle compile is used for the purpose of compilation. A server is created which will collect all the data generated by our prototype system and send the same to server using GPRS. A Raspberry Pi camera is been used to capture the surrounding area's images when the child is in trouble.

Keywords: GPS sensor, SMS gateway, microprocessor, Raspberry Pi Board, alarm buzzer, Capacitive touch sensor.

I. INTRODUCTION

Internet of Things (IOT) is the new technology that connects entire world. IOT establish connectivity (through internet) among the various devices or services or systems in order to little by little make automation development in all areas.

The Internet of Things System (loT) refers to the set of devices and systems that stay interconnected with real-world sensors and actuators to the Internet. loT has many systems such as smart cars, wearable devices and human implanted devices, home automation systems and lighting controls also smart phones which are increasingly being used to measure the world around them. Wireless sensor networks that measure weather, flood defences etc.. The motivation for wearable comes from the increasing need for safety for little children in current times as there could be scenarios of the child getting lost in the major crowded areas. The paper focus on aspect of lost child can be helped by the people around the child and can play a significant role in the child's safety. Most of the wearables available today are focused on providing the
location, activity of the child to the parents via Wi-Fi and Bluetooth. But Wi- Fi and Bluetooth are very unreliable source to transfer information. Therefore it is intended to use SMS as the mode of communication between the parent and child's wearable device. The purpose of this device is to help parents locate their children with ease way.

II. OBJECTIVES

The main objective of our system is useful for women and children security purpose. The Proposed device is for women consist of a wearable safety device which is having emergency button for sending notification and Camera for capturing the image of attacker. When women is in problem she has to press the button of that device immediately then the location of the victim track with the help of GPS and the respective images get captured then the emergency message with image link will be send to all contacts.

The objectives of our child monitoring system are:

1. To get geo coordinates of child using GPS
2. To get temperature details of area of child using Google Whether
3. To Adding authorized person who is related to child for security
4. To achieve Secure SMS module.

III. METHODS AND MATERIAL

This emergency message consist of our current location tracked by Global Positioning System (UBLOX) and sent to GSM module in which our location and our default emergency message is sent to our pre-stored contacts for every two minutes to seek help.

We are using a capacitive sensor, on long pressing it, it will capture the surrounding image around the victim and send that captured image to the particular authorized person.

IV. HARDWARE REQUIREMENTS:

- Raspberry pi 3
- 16 GB SD card
- 5 volts,2.1 A power supply
- Capacitive touch sensor
- Raspberry pi Camera
- Buzzer
- GPS Protocol

V. SOFTWARE REQUIREMENTS:

- Python 2.7 idle
- Win32 disk imager
- SD Card formatters
- Raspberry pi pixel OS

VI. SYSTEM DESIGN

The aim of our project is to develop safety wearable devices for women and child using IoT. The figure 3.1 shows architecture of our proposed system. The system has been designed using Raspberry Pi3, capacitive touch sensors, Raspberry pi camera, Buzzer.

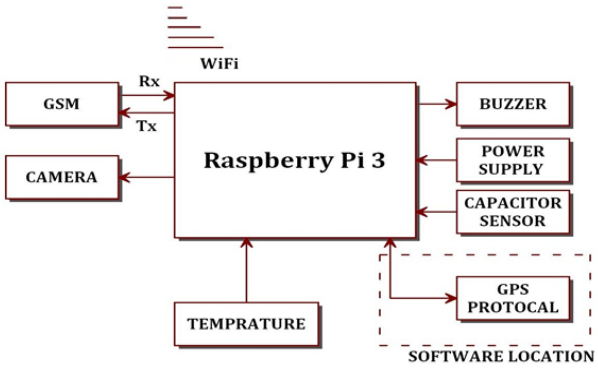


Figure 1. Block Diagram

Design of this device consists of Raspberry pi board to which camera, buzzer and capacitor sensor are connected and we are supplying 5V power. Capacitor sensor is used for taping, based on the input provided by the user, authorized person gets the notification via SMS or email. By using this parents can track the children location and ensure safety in real time. The above diagram shows the Circuit connections of the device.

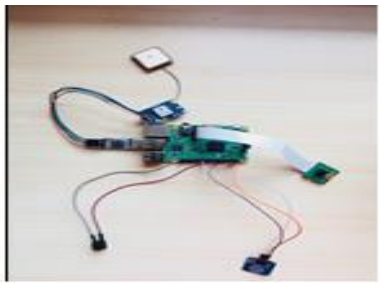
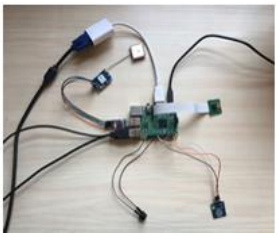


Figure 2. Circuit

VII. RESULTS



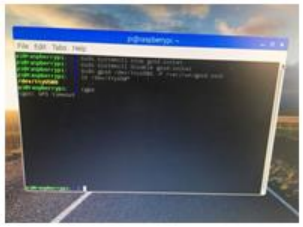


Figure 3. Circuit Connections **Figure 4.** Terminal Commands

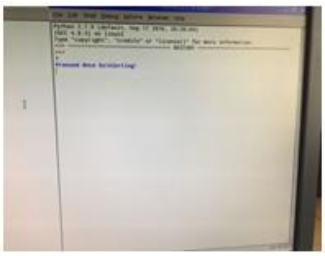


Figure 4. Single Tap **Figure 5.** Double Tap

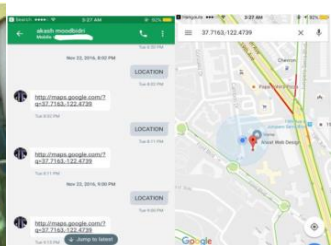


Figure 6. Rescue Image **Figure 7.** GPS location via SMS

VIII. CONCLUSION

According to the survey in India 53% of working women are not feeling safe – Women is working in night shift (Bangalore-56%, Chennai-28%, Hyderabad-35%, Mumbai-26%). In Overall, 86% women are working in India; women facing hurdles are high in Delhi, Mumbai, Hyderabad, Kolkata. A survey conducted by humanitarian aid organisation World Vision India participated in by more than 45,000 children in the 12- 18 age group, across 26 states in the country, revealed that one in every two children is a victim of child sexual abuse. The survey also revealed that one in every five do not feel safe because of the fear of being sexually abused.

Our primary goal of this paper is to ensure every woman and child in our society to feel safe and secured. Our work attempts to tackle a societal concern that has been destroying the lives of uncountable individuals and their families. The wearable device can play a major role by providing women and children a safe environment in all situations. A device like this improves the level of safety of women and girls this is achieved by our wearable device, where a message alert is sent to the parents from the device when triggered and provides viewing the location of the victim in terms of latitude and longitude, which can further be tracked using Google maps.

The wearable device can capture images in case of emergency, which can be used for further investigation. This system helps to decrease the crime rate against women and children. Women's security is a critical issue in current situation

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IoT based Solar assisted Smart Home for Old age People

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ABSTRACT

This paper elaborates the idea of using solar system for managing household electricity consumption. The proposed solution aims at reducing the overall electrical energy consumption per household, thus decreasing their monthly electricity bills. The solution is based on controlling of Smart home which includes machines such as bulb, fan, water tank etc. This system monitors the water level in the tank and automate ON/OFF by specifying the threshold value and finally an emergence alert in the form of Push notification is sent to the nearby hospital and the relatives whenever elderly and old age people are in emergence condition. Solar Power has been interfaced with microcontroller and other house hold instruments. All these instruments can be controlled and wastage of energy can be curbed. Smart home automation system particularly for old age people is proposed based on java, ardiuno, raspberry pi and android application. The instruments are controlled by the Raspberry pi server, which operates according to the surrounding temperature and brightness factor and also the threshold level set as in case of water tank and sends a push notification to the adjoining infirmary and relatives to the mobile phone when old age people are in exigency condition.

Keywords. solar power, Raspberry pi, Android application.

I. INTRODUCTION

Smart home consists of the interconnections of ubiquitous devices planted in home appliance with sensors and actuators for automation. In India, we are suffering from an electrical power scarcity because the production is not sufficient for the actual consumption. India is a developing country with limited resources, consequently economic and power saving focused solutions are needed. In this paper, a simple integrated design of a smart house is introduced as a solution for a common Indian home to save the consumed power from home instruments. This design has main pillars. A smart system that controls the power consumption through monitoring the activity in the home to save the power as much as possible and to monitor old age people in emergency condition by pressing just a button which send notification to the nearest hospital and relatives. In today's booming world, wireless technologies are also becoming advance. This rapid growth of wireless technologies influences one to use mobile phones. These days' wireless telephones are used to control as well as to monitor elderly and disabled people and reduces human labor. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers. It is very beneficial with respect to energy savings if forgotten lights and instruments on and left for the day.

II. PROBLEM STATEMENT

A.EXISITING SYSTEM

Home computerization system targets seeking luxury and trailblazed home automation platforms are using electricity for home automation that consumes more power and also it can't be reused. No fan controlling system according to the outside temperature.It does not target old age people in exigency medical issues.

B.PROPOSED SYSTEM

The proposed system includes control of lights, fans, water tank and if old age people get panic webcam captures the photo to notify the nearest hospital through mail. All these devices can automatically be powered off during hours of the day when they're not needed. This home automation system targets those with special needs like the elderly and the disabled people. This system is reasonably cheap, easy to configure, and easy to run with a good user interface.

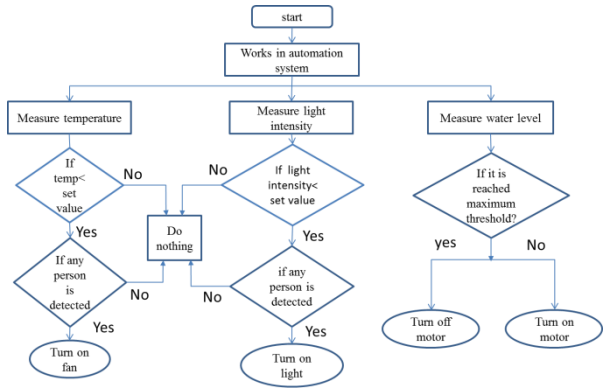

Figure 1. Flowchart

Integrants used.

1. Raspberry Pi.

It is the central core part of whole proposed system. It is used to get command from either android tablet or PC and according to the command, control the instruments connected to it on the output port. It is connected to android tablet or phone via a router by using Wi-Fi or Ethernet cable. It is also used as a webserver to store to status of instruments in the database and give it to the web application to display on the webpage. The Raspberry Pi is a credit-card-sized computer that plugs into your TV and a keyboard. The Raspberry Pi 3 features a 1.2 GHz quad-core 64-bit Arm Cortex A53 processor, Chip antenna, 4 USB ports, an Ethernet Port, a GPIO, HDMI, 3.5mm Audio Output, WIFI chip, 1GB LPDDR2 for RAM Memory, and a MicroSD slot. The MicroSD card contains the Pi3's operating system and it can also be used for file storage.

Figure 2. Raspberry Pi

2. Arduino UNO.

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

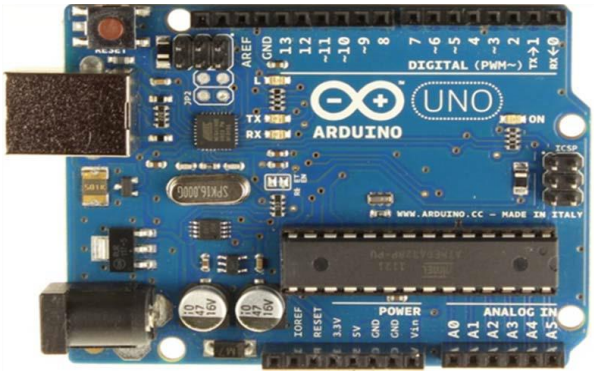

Figure 3. Arduino UNO.

3. PIR sensor

The Passive Infra-Red (PIR) sensors allow one to sense motion, almost always and is used to detect whether a human has moved in or out of the sensors

range. The PIR sensor is a pyroelectric device that detects motion by measuring changes in the infrared level emitted by surrounding objects. This

Figure 4. PIR Sensor

Motion can be detected by checking for a high signal on a signal I/O pin. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in instruments and gadgets used in homes. PIR sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves.

4. LDR sensor

A photo-resistor (or light-dependent resistor, LDR, or photo-conductive cell) is a light-controlled variable resistor. The resistance of a photo-resistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photo-resistor is made of a high resistance

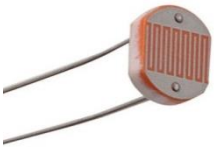

Figure 5. LDR Sensor

Semi-conductor. An LDR is a component that has a (variable) resistance that changes with the light intensity that falls upon it. This allows them to be used in light sensing circuits.

Temperature sensor

A temperature sensor is a device, typically, a thermocouple or RTD that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct proportion to changes in temperature. Contact sensors include thermocouples and thermistors that touch the object they are to measure,

And noncontact sensors measure

Figure 6. Temp Sensor

The thermal radiation a source releases to determine its temperature. The latter group measures temperature from a distance and often are used in hazardous environments.

Web Camera

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the

Figure 7. Web Camera

Internet, and emailed as an attachment.

III. LITERATURE SURVEY

This technology is focused on control household instruments like light, fan, AC, etc. automatically, our main intension is to make use of the renewable resource called solar energy[1][2],and to help old age people[3].Power supply from the solar panel is given to the arudino board[4][6].The concept of smart home has 4 modules; Controlling light. Whenever the object movement is detected by the PIR sensor[5]

and based on intensity of light in the environment automatically light will glow. Regulating fans. When a person enters the room and if temperature reaches the specified range fan gets turn on automatically. Monitoring water tank. When water level in reaches below the threshold value it will turn on the motor automatically and fills the tank, if it reaches the maximum threshold automatically turn off the motor. Emergency alert. If the old age people needs any emergency medical help by pressing the emergency alert button they can notify their relatives and nearest hospital. The notification contains person's image with their address.

System Description

Solar cells absorb the solar energy from solar panel, converts AC into DC and stores in the battery. This acts as a source of energy for the Aurdino UNO which is connected to the Raspberry Pi. A temperature sensor is connected to Aurdino UNO. The raspberry pi is connected to the PIR sensor, LDR sensor, panic button, web camera, bulb, fan, cloud and tank. Whenever a person enters into the room, based on brightness, the light bulb will get turned ON and based on temperature the fans will be controlled. When a person presses emergency button, the web camera captures a photo and sends it to nearest hospital as well as to their relatives. Water tank is monitored without intervention of any person. It will be turned on/off when tank gets empty/full based on threshold level.

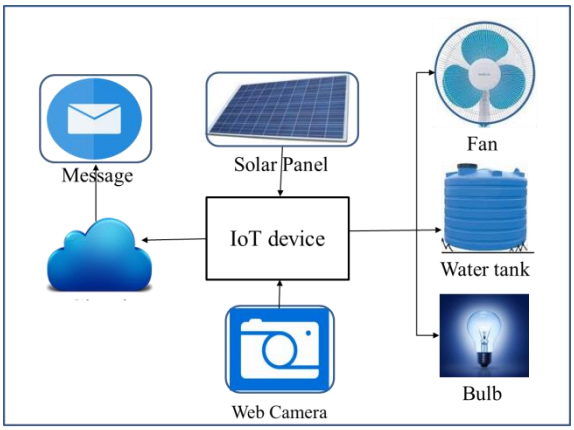

Figure 8. System Architecture

IV. METHODOLOGY

FCM.

Firebase Cloud Messaging (FCM) is a cross-platform messaging solution that lets you reliably deliver messages at no cost. Firebase serves as a module between your server and the devices that will be receiving the push notifications that you create. Your server informs Firebase that a notification has to be sent. Then Firebase does the work behind the scenes to get the notification published. In order to establish connection with Firebase, you need to create a project for your own app in the Firebase console. You must set up your project in such a way that every time a user installs it, their device is registered in Firebase with a unique token. Although this may seem complex, the setup is actually simple.

RS232 Protocol.

RS232 is one of the most widely used technique to interface external equipment with computers.RS232 is a serial Communication Standard developed by the Electronic Industry association(EIA) and Telecommunications Industry association(TIA).RS232 uses serial communication, where one bit of data is sent at a time along as a single data line. this is contrast to parallel communication, where multiple bits are sent at a time using multiple data lines.The advantage of using serial communication over parallel communication is the number of wires required to make a full duplex data transmission will be very less.

Functional Specifications. Since Rs232 is considered a complete standard, it defines more than electrical and mechanical characteristics.RS232 standard also defines the functions of different signals used in the interface.The signals are classified as. Common Data, Timing and control Singals.

Procedural Specifications. The procedural Specifications of RS232 specify the sequence of operations that must be carried out when a DTE and DCE are connected. Assume a computer (DTE) is

connected to a Modem(DCE) is connected to a Modem (DCE) through RS232 interface. In order to send data from computer to Modem.When modem(DCE) is ready to recive. it will send a DCE ready signal.When the computer (DTE) is ready to send the data. It send a Ready to Send(RTS) signals.The modem (DCE) then sends a clear to send(CTS) signals to indicate the data can be sent by computer (DTE).Finally, the Computer (DTE) send data on Transmit Data.When modem (DCE) is ready to receive. It will send a DCE ready signal.When the computer (DTE) is ready to send the data. It sends a Ready to Send (RTS) signal.The modem (DCE) then sends a clear to send (CTS) signals to indicate the data can be sent by computer(DTE).Finally the computer (DTE) sends data on Transmit Data (TD) line to the Modem(DCE).

V. RESULTS AND DISCUSSIONS

Controlling home automatically by sensors is showcased in our model where it includes monitoring the water level in the tank and to automate it to ON/OFF, controlling home instruments such as fan, light and finally an emergence alert using Push notification is sent to the nearest sickbay and the relatives when elderly and old age people are in emergence condition.

Figure 9. Layout of smart home

This figure8 convey the layout of the model which includes the integrant such as raspberry pi, Arduino UNO, Sensors like temperature, light and motion sensors, emergency button and water tank.

Push notification on exigency condition is sent to the nearest hospital and relatives whenever old age or elderly person presses emergency button.

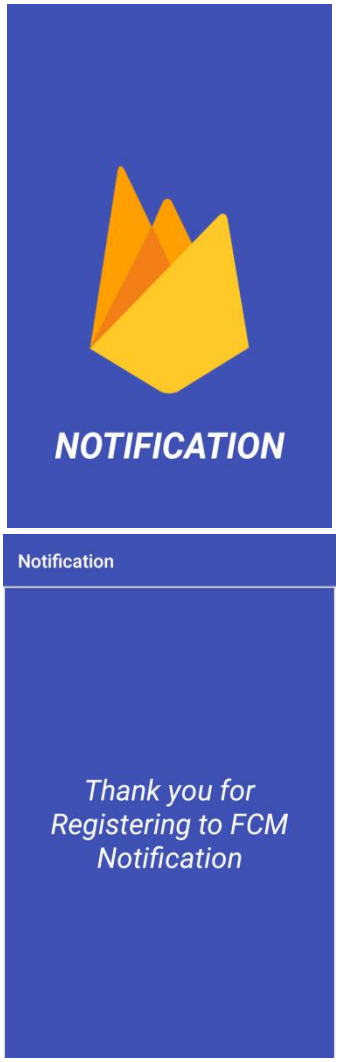

Figure 10. Android app for push notification.

When a push notification is sent to an android application the web camera will capture the photo of the old age people and sends along with the alert message.

VI. CONCLUSION

Home automation is a modern technique to control and monitor the home instruments via wireless profession. The proposed model of smart home is solar assisted. Solar power supply makes the system cost effective. This system has been proposed using Raspberry Pi module. AC Instruments like Bulb, Fan and water tank are controlled. Old age or physically challenged people are monitored by sending the push notification by capturing the photo to the

relatives and infirmary, when they are in need of medical supervision.

We can further improvise the system by implementing this to respond to voice commands and control the instruments with the unique door monitoring system based on face detection and recognition algorithms that will help elderly and disabled people from attacks.

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IOT Car Parking System

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ABSTRACT

Smart parking system overcomes the parking issues that exist in public places such as malls, multiplexes etc., by the user to find the nearest slot in the parking area and provides information about availability of parking slots in that respective parking area. As vehicular traffic increases, the lack of smart parking zones further causes problems like fuel wastage and traffic congestion. The Internet of Things has already been used to provide Smart car parking solutions. However, these solutions have the drawback of not being scalable or accessible at all times. Also, the reservation models that have also been suggested are not always practically implementable.

I. INTRODUCTION

Internet is a thing which is making our lives easier as well as faster. The internet of things allow us to connect the sensors with the internet. Hence using this we can implement many applications. The parking system is one of them. The major problem that people face today is to park their vehicles, whether it is a shopping mall, airport or railway station. If the user don't find the right place for parking. Then it leads to the problems. This type of situations may increase pollution and can waste the valuable time of users.

The IoT based car parking solutions have the drawback of not being scalable or accessible at all times. The reservation models are not always practically implementable. A solution using video sensors are expensive and short messaging services, USSD may not be available in multi store. In the earlier system presence of the person was necessary for the management of the parking lot that is for checking available parking slots and occupied parking lots all these were done manually.

Sometimes this may consume lot of time and customer has to wait for a long time for the allocation of parking lot.

The proposed Smart Parking system consists of an on- site deployment of an IOT module that is used to monitor and recognize and signalize the state of availability of each single parking space. This application also allows an end user to check the availability of parking space and book a parking slot accordingly. The system is designed in such a way that it is applicable for covered parks, open parks and street side parking. The cloud based IOT architecture for smart parking system which contains cloud storage to store information about status of parking slots. In this application we manage the slots of parking online and the money for parking is collected by automatic time calculation. Infrared sensor is one type of LED which emits infrared rays generally called as IR transmitter.

II. EXISTING SYSTEM

Short Messaging Services, USSD is also used which is dependent on signal availability However, mobile network may not also be available in multi storey buildings. Another uses a reservation system. While it may enhance productivity, it also has the drawback that slots must be reserved well in advance. A few solutions using video sensors have been pro- posed, but these are expensive and lack in ease of access or fault tolerance Manual way of identifying slots. Because of this it is hectic to manage the parking in malls and there is no efficient space utilization of parking space. A few solutions using video sensors have been proposed in existing system, but these are expensive. Other solutions lack in ease of access or fault tolerance.

III. PROPOSED SYSTEM

The proposed Smart Parking system consists of an on- site deployment of an IOT module that is used to monitor and recognize and signalize the state of availability of each single parking space.

This application also allows an end user to check the availability of parking space and book a parking slot accordingly. The system is designed in such a way that it is applicable for covered parks, open parks and street side parking. The cloud based IOT architecture for smart parking system which contains cloud storage to store information about status of parking slots. In this application we manage the slots of parking online and the money for parking is collected by automatic time calculation. Infrared sensor is one type of LED which emits infrared rays generally called as IR transmitter. The solution proposed here utilizes the Internet of Things. It may be defined as connecting things present in the physical world with sensors and then connecting them to a network through wired or wireless means Moreover, the code can be recycled for multiple boards making the proposed solution cost effective, scalable and versatile.

IV. LITERATURE SURVEY

[1] Cloud Connected Smart Car Park. IEEE International Conference on I-MAC on 2017.
Shyam Ravishankar, Theetharappan.

This paper proposes a solution which is cost effective, scalable and robust to indicate number of free parking slots in a parking area.

[2] IoT based Vehicle Parking Manager". IEEE International Conference on Cloud Computing Data Science and Engineering 2017.
Jatin Desai, Aditya Bhanje, Sneha Biradar, Dion Ferandes.

This paper proposes a feature that includes unique identification for each vehicle, display of parking slots on mobile application, making reservation and maintenance of a database for management.

[3] IoT based Smart Parking System. IEEE International Conference on IOTA 2016.
Abhirup Khanna, Rishi Anand

This paper describes high level view of system architecture and working of a system in the form of use case.

[4] A Reservation based Smart Parking System".IEEE International Conference Computer Communications 2011.
Hongwei Wang, WenboHe
This paper provides proposed reservation based parking policy that has potential to simplify the operations of parking system as well as traffic congestion caused by parking searching.

V. METHODS AND MATERIAL

The system consist of following
modules: (1)Sensor module

(2)Networking module
(3)Middleware module
(4)Mobile responsive

Application

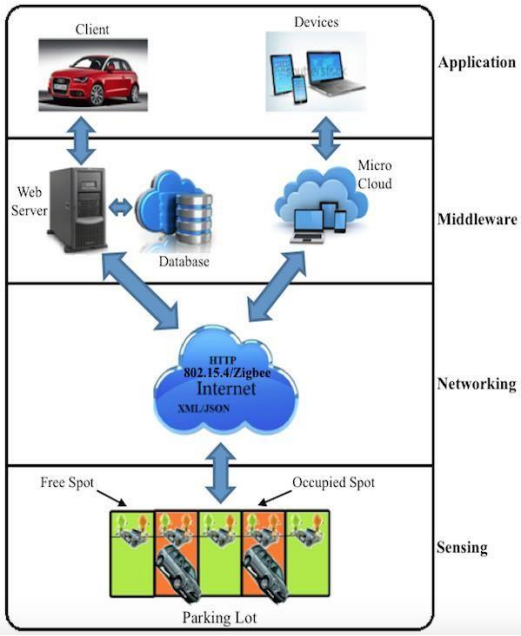


Figure 1. Smart car parking system

Sensor module

Sensors are embedded into a parking slot it will sense the car presence when the car arrives and all these information's are sent to NodeMcu IoT module.

Networking module:

In networking module, we use NodeMcu Iot module, which are connected to the sensors module. Node Mcu is a IoT platform. It includes firmware, which runs on the ESP8266 Wi-Fi module from Espressif Systems, and a hardware, which is based on ESP-12. It transfers all the data's in the form of Boolean values to web services.

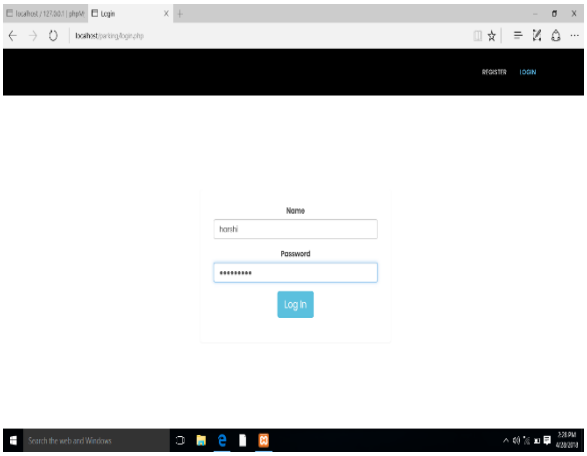
Middleware module:

In middleware module, we have web services that interacts with the IoT module and centralized server that maintains a database to store information about the parking slots. WCF web service is used to create service-oriented applications for user.

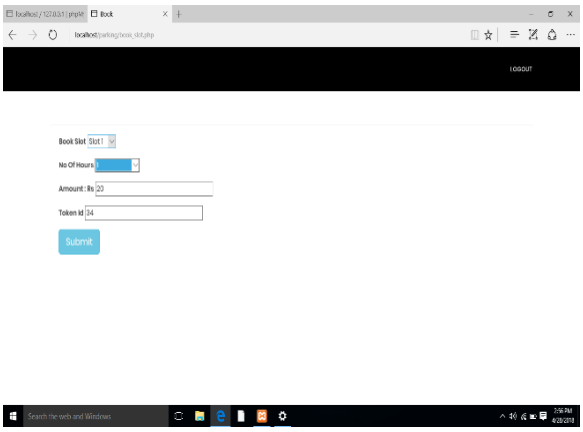
Mobile responsive application:

A monitor or a Tab is used to display the information about admin side interface. Admin is responsible for updating the parking slots details. User can access all these information and can connect with smart parking system with their smart phones or with some brows

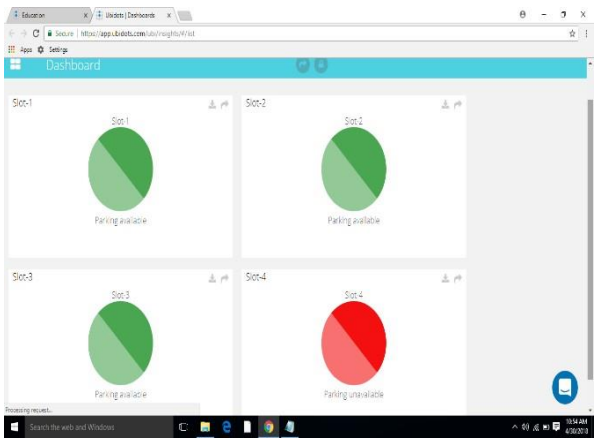
VI. RESULTS AND DISCUSSION



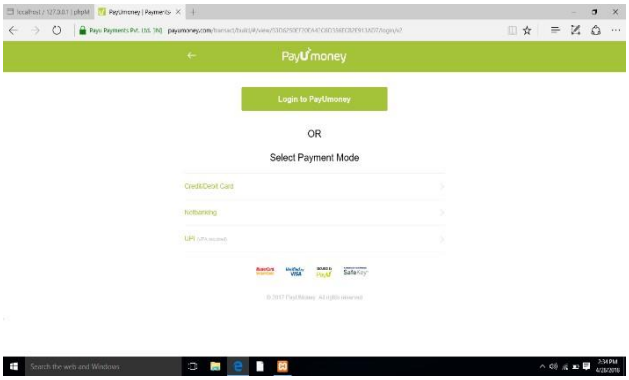
Snapshot 1. Login Page



Snapshot 2. Booking slot.



Snapshot 4. Availability and unavailability of parking slots.



Snapshot 5. Payment mode.

Snapshot 3. Parking the car in booked slot.

VII. CONCLUSION

The concept of smart parking system is designed to overcome the problems of finding parking slots for vehicles and to provide assistance to both customer as well as the management of the parking system and also to view the current status information using mobile application which is more efficient and less time consuming.

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Smart Energy Utilization On Demand Using Image Processing

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ABSTRACT

Life without electricity can never be imagined in this world, so it's every human duty to save electricity. But due to the busy schedule existing in present, often many of us forget to switch off lights and fans which increase wastage of electricity. Often we find lights and fans in the monitoring region(MR) is where we perform the operation to detect the motion of the object, will be on though the MR is empty which increases the electricity bill. This is the major issue in most of the educational institutions. Over the past decade, there has been significant advancement and innovations in the field of consumer electronics by using new technologies we can automate the control of main power supply provided to the MR which significantly reduces the power consumption. Automation provides some sort of automatic control to the electrical appliances present in the building. Proposed work demonstrates detection of motion of objects as a parameter to decide whether to switch on/off the power supply.

Keywords: Background subtraction, Image Processing, Raspberry Pi ,Relay ,Monitoring region.

I. INTRODUCTION

A Lighting control system is a network based lighting control solution that incorporates communication between various system inputs and outputs related to lighting control with the use of one or more central computing devices. It provides the right amount of light where and when it is needed. They are employed to maximize the energy savings from the lighting system and energy conservation programs. Lighting control system are often referred to as Smart Lighting. Smart lighting is a lighting technology designed for energy efficiency. It is to accurately detect object and take a proper decision of turning on/off of light, which is going to be completely automatic. Here we are using image processing technique to detect the motion and based on the result whether to turn on/off the power supply to the monitoring region(MR).Image processing is a method to convert an image into digital form and perform some operations in order to get an enhanced image. In which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Although there are a lot of products available in the market which will turn on/off lights based on the presence or absence of an object respectively. We are using image processing technique to detect the motion and based on the result whether to turn on/off the power supply in the monitoring region .When the raspberry pi boots up the passive infrared sensor(PIR) starts executing and starts detecting the motion of objects by comparing the reference image and the current image captured by the camera. If there is any motion detected then the PIR sensor sends raspberry pi a message that there is

an object present in the MR and it has to turn on the initialized GPIO pin which in turn triggers the relay and turns on the main power supply. If there is no motion detected then the GPIO pin is not turned on and so is the main power supply provided to the MR. The objective is to control the switching of power supply in Monitoring region(MR) and helps in using power supply efficiently. Design a smart automated device which controls the switching of Power supply in the MR based on presence/absence of an object.

EXISTING SYSTEM

The existing systems are operated manually. Infrared sensors can keep count of a number of objects entering /leaving the monitoring region.

a. It is a tedious job to switch on/off the light every time when an object enter/leave the monitoring region.
b. Infrared sensors are unable to detect if the monitoring region is occupied or not.
c. Infrared radiations are harmful.
d. Switchboards have to be replaced with new ones, but we use the existing switchboards and CCTV cameras, which are pre installed in most of the educational institutions.

PROPOSED SYSTEM

Control the switching of power supply in the MR. When an object is present in the MR the mains automatically switches ON. When no object is present in the MR, then mains gets switched OFF. Using electromagnetic switch at the output that triggers switching ON/OFF of the main power supply. Implementing this system using Raspberry pi. When the raspberry pi boots up the Passive infrared sensor(PIR)starts executing and detecting the motion of objects by comparing the reference image and the current image captured by the camera. If there is any motion detected then the PIR sensor sends raspberry pi a message that there is an object present in the MR and it has to turn on the initialized GPIO pin which in turn triggers the relay and turns on the main power supply. If there is no motion detected then the GPIO pin is not turned on and so is the main power supply provided to the MR.

There is no need to switch main supply on/off manually. The CCTV camera is used in almost all campuses, so there is no need to install new cameras. The device is going to be completely automatic without need of any human intervention at any stage thereby reducing the manpower. The device will be easy to handle with less maintenance. The use of Raspberry pi helps in multitasking since it is a processor and can be accessed remotely.

II. LITERATURE SURVEY

[1]"**Automatic Control of Power Supply in Classroom using Image Processing**" **by Darshan Ganiger, Kishor A Patil, [10 February 2017] ,**International Conference on Recent Advances in Electronics and Communication.

Although there are a lot of products available in the market which will turn lights on/off based on the presence or absence of an object but requires a big infrastructure.

[2] **"Automatic Lighting and Control System for Classroom" By Suresh S, H N S Anusha, J Rajath etal, SRM University, [06 April 2017],** ICT in Business Industry and Government(ICTBIG)

Most of the colleges and universities use the traditional lighting system where we have a switch to control the lighting. So, accordingly here automatic lighting and control is developed using Arduino for the efficient use of energy in class room.

[3] **"Internet of Things Enabled Smart Switch" by Vishwateja Mudian Reddy, Naresh Vinay etal Manipal, India, [21 July 2016],**Wireless and Optical Communications Networks(WOCN), 2016 Thirteenth International Conference.

Analog switches are mounted on the walls. To operate them the user needs to physically press the switch to turn on/off any appliance. The current

work makes use of a web app and a cloud to control the operation of the switches.

[4] **"Automated Energy Saving and Safety System" by Md. Kamrul Majumdar, Himel Biswas, Md. Haider Ali Shaim ,[10 April 2014],** Electrical Engineering and Information and Communication Technology(ICEEICT),2014 International Conference.

This paper reports on a system that can save electricity. Many times we leave the room without switching off lights and fans. In this work they have presented a system in which energy will be saved based on number of people entering in or leaving out of the room.

[5] "Energy Conservation using Automatic Lighting System using FPGA"

by Payal Rodi,Leena Chandrakar, S Saylee, Ginde Sivanantham.[27 Nov 2015], Green Engineering and technologies(IC-GET),2015 online international conference.

This paper proposes efficient use of solar energy for automatic street lighting system using micro controller. The main objective is to make street lighting system free from manual operation so that there would not be any unnecessary usage of light.

III. METHODS AND MATERIALS

System architecture

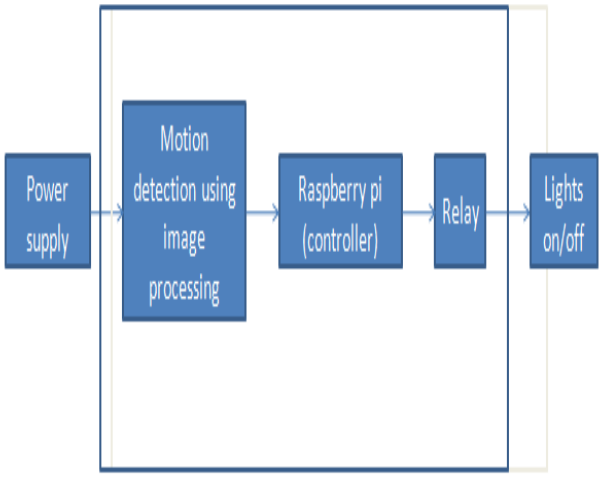

Figure 1. Block diagram of automatic control of power supply.

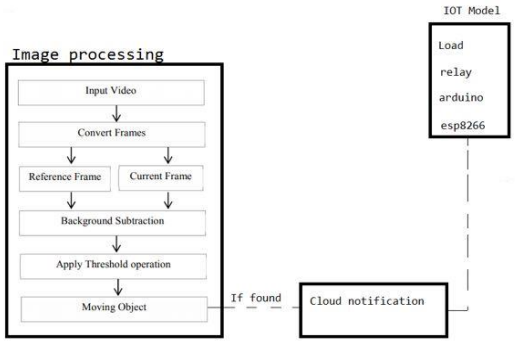

Figure 2. System architecture of automatic control of power supply

From the system architecture the process is divided into five modules

1.Cameramodule:a device for capturing a photogra hic image or recording a video,using film. Here the input video will be recorded in the camera and then it will be converted into frames.

2. **Image Processing Module**: is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image.The frames from the camera is compared with the reference frame and the current frame then

background subtraction is applied(frame difference algorithm).

3. **Cloud Notification Module**: is an information technology that enables ubiquitous access to shared pools of configurable system resources and higher-level services that can store and rapidly work with minimal management effort, often over the internet. After the background subtraction threshold operation will be applied where if the motion of the object is detected within the threshold range then the notification will be sent to the cloud.

4.**IOT Module**: is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, a ctuators, and connectivity which enables these objects to connect and exchange data. The Passive Infrared Sensor (PIR) is fixed along with the Raspberry pi where it is an additional feature which is a sensor that measures IR light radiating from objects in its field of view which is used to detect the motion of the object.

5.**Hardware Design Module**: are the physical parts or components of a computer, such as the monitor, keyboard, computer data storage, graphic card, sound card and motherboard. By contrast, software are the instructions that can be stored and ran by hardware. The hardware components used such as raspberry pi, electromagnetic switch(relay), arduino micro control and GPIO(general purpose input output) ESP8266,When motion is also detected in the PIR sensor then the bulb will glow(load).

Design

1. Raspberry pi:

The Raspberry Pi is neither a microcontroller nor a microprocessor. It is a small computer, which uses keyboard and mouse as input devices and displays on the monitor. It is a low cost, portable, small-sized computer, which has a large number of peripherals, and it has the network for communication. It is a small device that uses programming languages like Scratch, Python, and C++. Python and IDLE 3 are preloaded in Raspberry Pi. Python is the official programming language of the Raspberry Pi .

Figure 3. Raspberry pi

2. PIR Sensor

A passive infrared sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. It is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms andautomaticallyactivated lighting syste ms. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector".

Figure 4. PIR Sensor

3. Image Processing

Background subtraction is a method in image processing which helps in detecting the motion of objects. The basic principle of this method is that it compares two images or frames and gives out the difference between them at the pixel level, images considered in image

processing are normally in the form of a matrix(i.e. rows * columns). In Background subtraction method one image or frame is considered as a reference image (i.e. as a background image). This method subtracts two images that is reference image and the image captured from the current frame of the video (i.e. difference image = background image – current frame image).

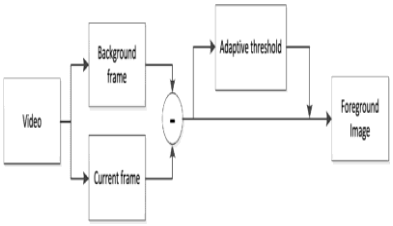

Figure 5. Background subtraction

IV. RESULTS AND DISCUSSIONS

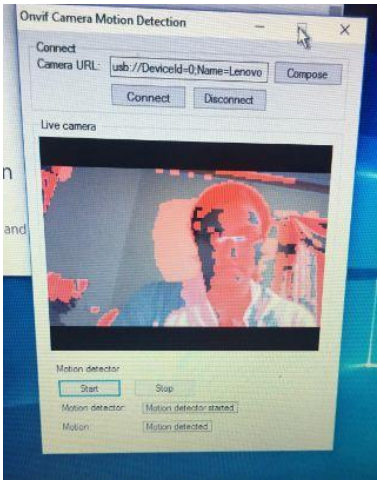

Figure 6. When image is captured from the camera then Motion will be detected in image processing module through camera to perform operation.

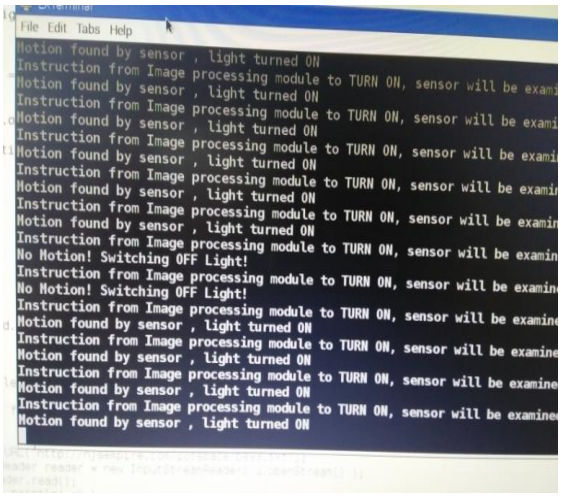

Figure 7. When motion is detected from the sensor, it gives instruction to led to turn on.

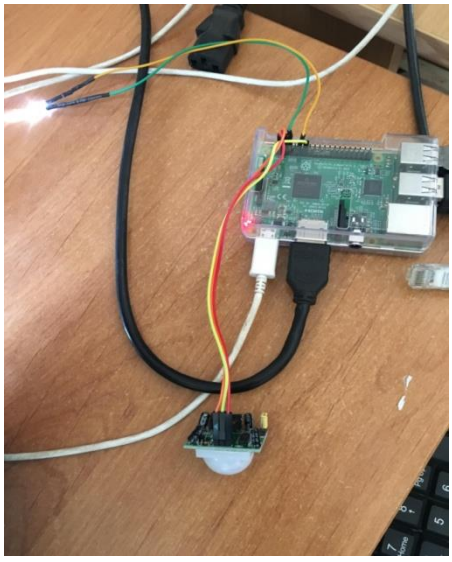

Figure 8. Led is turned on when motion is detected from the sensor.

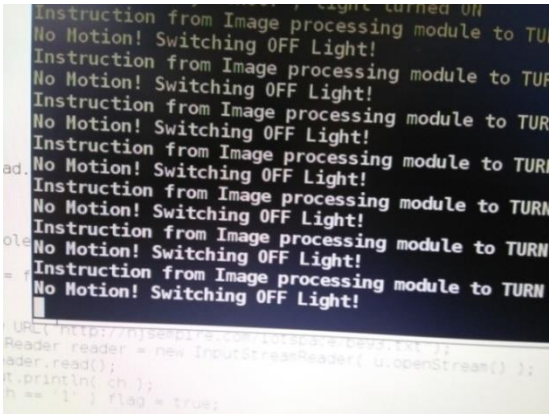

Figure 9. When no motion is detected from the sensor, it gives instruction to led to turn off.

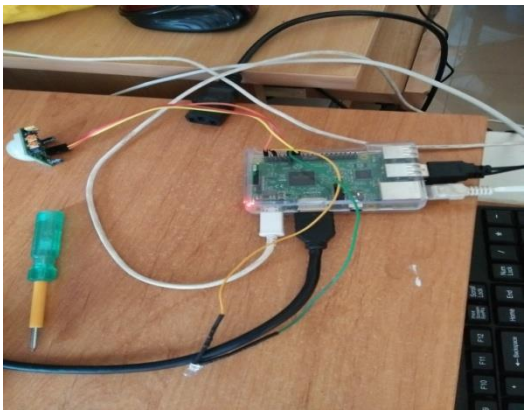

Figure 10. Led is turned off when no motion is detected from the sensor.

V. CONCLUSION

The proposed methodology can be implemented in real time and is reliable in automatic controlling of lights without any human intervention, using image processing technique like frame subtraction . A visual representation can also be captured for security purposes and stored in the cloud and viewed from the remote control.

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Predictive Data Collection and Analysis for Placement Using CodeIgniter Framework

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ABSTRACT

The purpose of the project is to replace the traditional placement management with digitized system, which helps in maintaining student database such as student list, shortlisted students list for placement, examination results and resumes which is essential for placement procedures. The application that is designed can be accessed over internet as the application is hosted on the server. The application can lead to error free, secure, reliable and fast management system. The organization can maintain computerized records with redundant entries, which will avoid manual record keeping. Basically the project describes how to manage and maintain required data for better performance and better placement procedures.

Keywords. CodeIgniter, Model-view-controller, digitized placement.

I. INTRODUCTION

The purpose of the project "Predictive Data Collection and Analysis for Placement Using CodeIgniter Framework", manual work makes the process slow and other problems such as inconsistency and ambiguity on operations. In order to avoid this web based placement managed system is proposed, where the student information in the college with regard to placement is managed efficiently. It intends to help faster access procedures in placement related activities and ensures to maintain the details of the student. Students logging should be able to upload their personal and educational information. The key feature of this project is that it is one time registration enabled. Registered students, placement officer, can access the application generated based on login credentials. The TPO of the college can use the system to manage the student information regarding placement. Students can register through their USN and can upload their information in the form of a resume after successful registration. The job details of the placed students will be provided by the administrator. The administrator plays an important role in our project. Our project provides the facility of maintaining the details of the students and gets the requested list of candidates for the company who would like to recruit the students based on given query.

II. PROBLEM STATEMENT

A. EXISTING SYSTEM

In colleges, Placement Officer enter the information of students manually. They have to sort & arrange resumes of students according to various branches and notify them according to company requirements, if any modifications or updates are required, it has to

be done manually. Existing systems lack security, are tedious and time consuming which involves more man power, consumes large volume of paper and requires huge amount of storage space to dump the data, searching individual student information was troublesome. This process becomes more difficult when the database of number of students increase.

B. PROPOSEDSYSTEM

The application provides users with a unique login after registration, it facilitates maintaining details of the students with updated marks and resumes, it can also list candidates for the companies who would like to recruit the students based on their requirement query, to aid TPO with data maintenance of students and companies. Any updates about the placement activities such as information about the companies visiting the college for recruitment will be intimated to the students via SMS and e-mail prior to a week. Student's information is maintained in the database, it gives more security to data, ensures data accuracy, reduces paper work and save time, only eligible students get chance, it makes information flow efficient and paves way for easy report generation, reduce the space, cost effective and matches the company and students with higher precision.

III. LITERATURE SURVEY

The paper presents a SMS-based recommendation system for campus recruitment, which can help college placement office to match the companies and students with higher precision. Based on profile similarity degree, the preference lists of companies and students are calculated.

[1]. The system is an application that can be accessed and effectively used throughout the organization with proper login enabled. This system can be used as an application for the Placement Officers in the college to manage the student information with regard to placement [2]. The paper focuses on managing student's information using digitized method which is easy to access rather than manually [3]. The system provides automation in all the processes like registration, update, and searching of the student data. Also, if the student is eligible for company then the student can directly apply for the company [4]. The paper aims at providing the Facility to automate and simplify the process of registration and list generation of eligible students for placement. This System do all work regarding placement like collecting student records, Authenticate & activate the student profiles, Notifying eligible students via automated E-mail message, Check the number and percentage of placed & unplaced students. Proper login with time & role based secured access is provided to Placement Officer, Company, College staff and Students. Students logging should be able to upload their information in the form of a Resume. Placement Officer can access, view information of the users and prepare schedule of all activities regarding placements. Company can give their own application procedure by providing link. College staff can see the registered students and their status. All registered users are eligible to participate in forum. [5]. The paper on Android based training and placement automation for campus drive is a System, which automates training and placement activities and provides opportunities to the students, who are eligible according to the company criteria and makes easy the process of managing information regarding students and companies automatically [6]. The paper presents the development of placement predictor system (PPS) using logistic regression model. Based on the student scores in matriculation, senior secondary, subjects in various semesters of technical education and demographics, PPS predicts the placement of a student in upcoming recruitment session [7]. The framework can be utilized as an application for the Training and Placement Officer (TPO) of the foundation to deal with the understudy data with respects to position and likewise did the position movement. Understudies logging ought to be capable to transfer their data as a CV, Individual points of interest, Academic subtle elements. TPO, Principal, HOD, Department co-ordinator logging

can get to/pursuit data set up by Students W.R.T. their power [8].

IV. METHODOLOGY

A. System architecture

The Figure 1 shows the system architecture of Placement portal which consists of three modules. The Admin, Student and Department. The Application includes database that stores and maintains Student information, Company details and Department data.

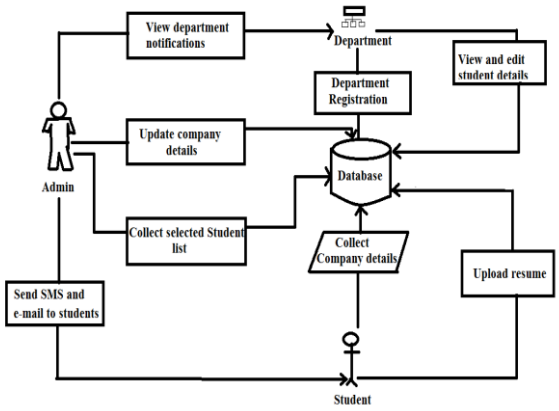


Figure 1. System architecture

B. System modules

STUDENT MODULE. In this module, creation of student input records about academic career from SSLC, PUC and all semester with facilities to modify the records and viewing changed records. The Student views the company details and verifies particular company details and provides valid details for registration.

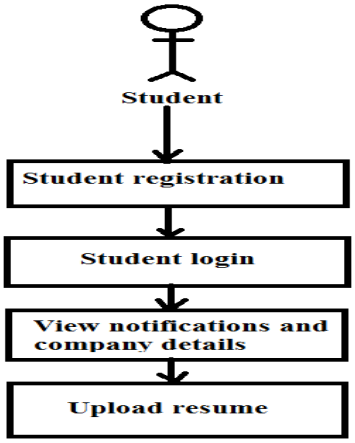


Figure 2. Student module

ADMIN MODULE. The admin is the placement officer who views the students' details and add company details and posts the selected students list. Sending email to student for complete list of information for particular campus.

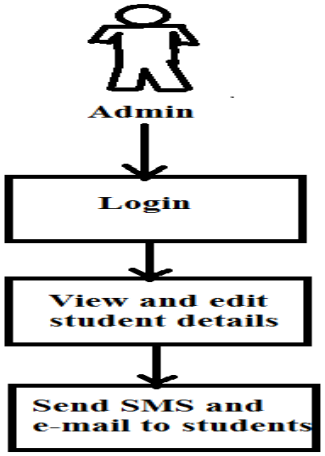


Figure 3. Admin module

DEPARTMENT MODULE. The department can view the student list, shortlisted student list of their particular department. They can also update notifications about their department activities which can be viewed by students and TPO. The department can also view the notifications put up by TPO.

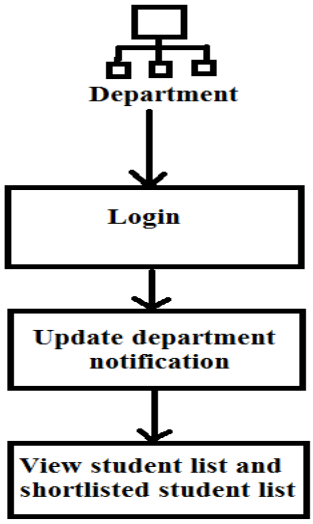
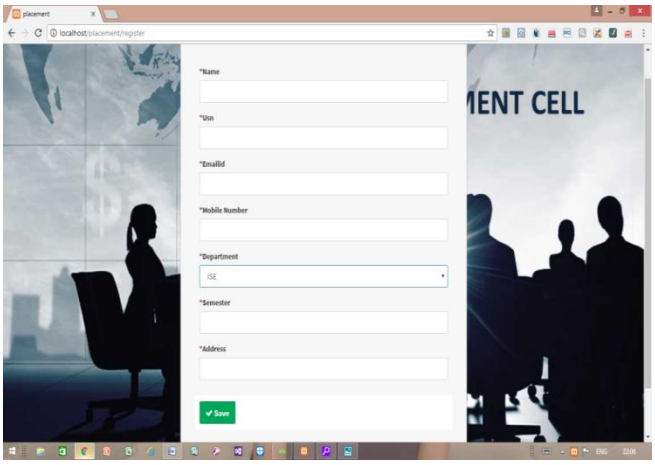


Figure 4. Department module

C. Advantages

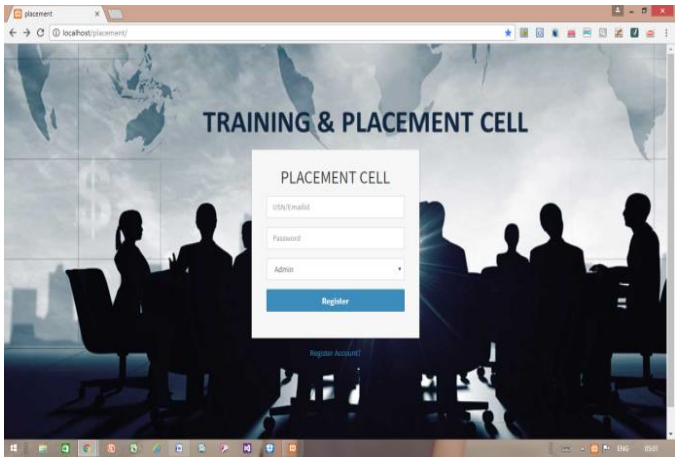
- The application gives more security to data.
- Ensures data accuracy.
- Reduces paper work and save time.
- It makes information flow efficient and paves way for easy report generation.

V. RESULTS AND DISCUSSIONS



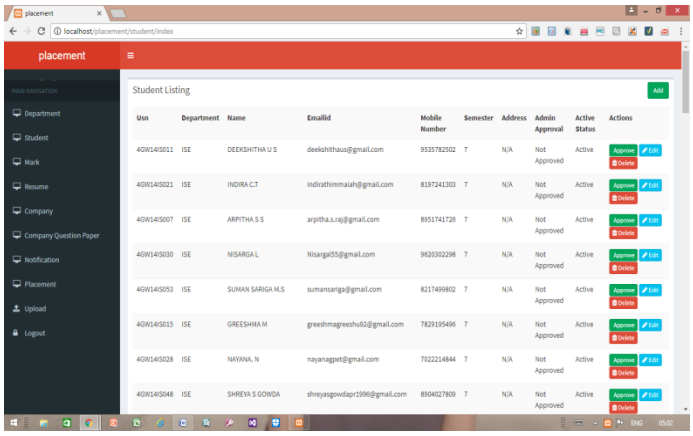
Snapshot 5.1. Registration Page

The Student can get registered through this registration page by filling their respective details in the provided fields.



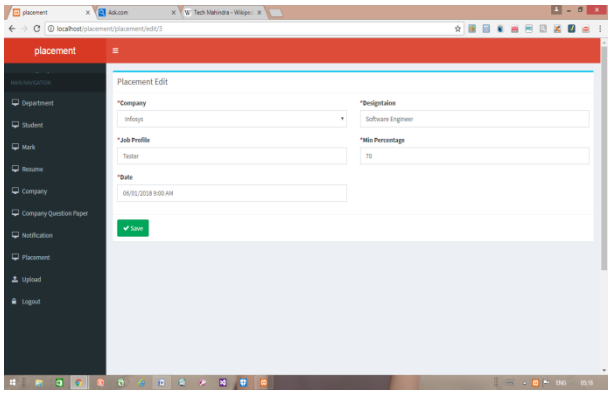
Snapshot 5.2. Login Page

After successful registration the Student can login through their USN and approved password issued by the TPO.



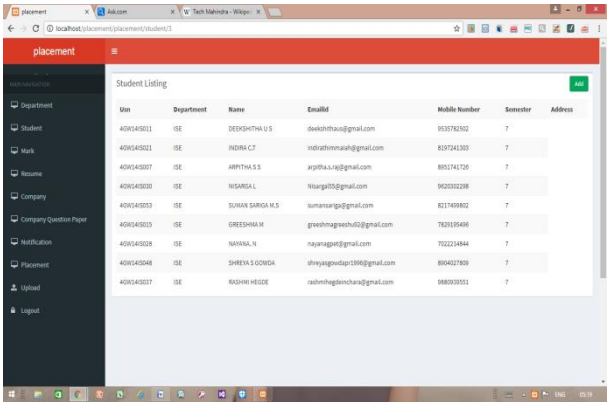
Snapshot 5.3. Students List

After the Admin logins, the list of registered students will be displayed.



Snapshot 5.4. Sorting based on Student Aggregate

Using the optimization technique, based on company requirements the students will be sorted.



Snapshot 5.5. List of Sorted Students

The list of sorted students will be displayed.

VI. ACKNOWLEDGEMENT

Dr. Reshma Banu

We would like to thank our HOD, Dr. Reshma Banu, Professor & Head, Department of Information Science & Engineering, GSSSIETW, Mysuru for her kind cooperation for successful completion of our project. At the outset, we wish to express our sincere gratitude to all those people who have helped us to complete this project in an efficient manner.

VII. CONCLUSION

The traditional way of manual placement management is replaced by the digitized placement management system, which helps in maintaining placement aspirant database and minimizing the time consumed in the placement process. The overall process of placement is more secured and automated as the marks of the student are updated through university's official result website. The application can be extended for various colleges, so that only one web portal for a city can be maintained, For pool campus conducted in the colleges, limited access to the system can also be given to other college students. The online aptitude test can also be integrated with the online placement system so the student can take the test from anywhere. Same logic can be converted in to android platform and develop a reliable application in future.

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IoT Cardiale Monitoring System

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ABSTRACT

The aim is to track the heartbeat of a particular patient and monitor it accurately to furnish the emergency message when there is an increase or decrease in the particular level of heartbeat. Life is exquisite. Many people lose their life due to heart attack. This is because of their diet, age, less physical activity and many other factors. Today, the leading cause of death in the world is heart attack. Heart attack is not easy to detect and symptoms of heart attack varies from male to female. To overcome and help the society from heart diseases and attack, Cardiale monitoring system is developed which help to decrease the death rate and early detection a heart attack.

I. INTRODUCTION

These days we have an increased number of heart diseases including increased risk of heart attacks. Our proposed system users sensors that allow to detect heart rate of a person using heartbeat sensing even if the person is at home. The sensor is then interfaced to a microcontroller that allows checking heart rate readings and transmitting them over internet. The user may set the high as well as low levels of heart beat limit. After setting these limits, the system starts monitoring and as soon as patient heart beat goes above a certain limit, the system sends an alert to the controller which then transmits this over the internet and alerts the doctors as well as concerned users. Also the system alerts for lower heartbeats. Whenever the user logs on for monitoring, the system also displays the live heart rate of the patient. Thus concerned ones may monitor heart rate as well get an alert of heart attack to the patient immediately from anywhere and the person can be saved on time. Mobile phones are one of the most common devices available with each and every individual in this world. The recent mobile phones have enough available memory, energy, and processing power. So these advantages of mobile phone technology can be utilized to overcome the constraints of wireless sensor network technology for transmission, processing, and buffering of the sensed data. This work proposes a wireless sensor network design for real-time monitoring and detection cardiovascular disease. This system incorporates wireless sensor network technology with other wireless technologies such as cellular network, wireless LAN, and broadband network, for efficient and fast delivery of health alerts. This proposed system consists of a wearable wireless sensor system, control system, heterogeneous wireless network system, two phase real-time data analysis and visualization system, and the warning system. All these together will provide the ECG signal analysis of a cardiac patient, remote monitoring, delivery of warning to a doctor, relative, and the hospital, and an extended service of transferring the ECG signals and previous records of the patient to his doctor in a remote location. This system can be used for providing enhanced healthcare services to the rural areas of the developing countries that are facing shortage of efficient specialized doctors. Thus the

cardiovascular disease causing the death of patient can be reduced immensely by the implementation of this proposed system, in both rural and urban areas.

II. METHODS AND MATERIAL

A. EXISTING SYSTEM

The existing system describes home-based mobile cardiac monitoring solution, which incorporates a design of an integrated ElectroCardioGram (ECG) beat detector, supported by the PDA version of Personal Health Information management System (PHIMS) and Facilitated Accurate Referral Management System (FARMS) through wireless network .A wearable cardiac monitor for continuous and real time monitoring of patient's cardiac condition is introduced and ECG signal is recorded according to the surface Laplacian of the body potential. WHAM shows enough feasibility and has advantages as a wearable ambulatory monitoring device ,the hardware is miniaturized to integrate on a small region, it will reduce the complexity of wired connection. This system is developed to monitor the ECG of the patient if the patient is not mobile. Whereas the proposed system is capable to continuously monitor patients in all states such as mobile or immobile.

B. PROPOSED SYSTEM

The proposed system is capable to be used for continuous monitoring of the patients at different environments such as home, hospital, work place and the rest. WWSS consists of lead chest electrodes, blood pressure sensors, respiratory sensors, interfacing and signal processing circuit, and the transmitter. Electrical signals initiated from the heart are captured by the lead chest electrodes, amplified and filtered using the interfacing and signal processing circuit. The sensor system is used to continuously sense the ECG of a patient. The ECG signals are transmitted to the mobile phone using Bluetooth technology. The blood pressure and respiratory sensors will also be incorporated with the system. The data from these sensors will be monitored when an ECG variation is noted. Correlation between a disposable electrode, a controller and personal gateway data will be used to produce an alarm and a emergency message will be sent to **Nurse practitioner** and the **Doctor**.

C.METHODOLOGY

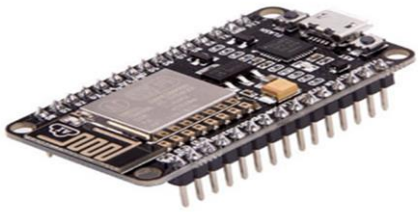
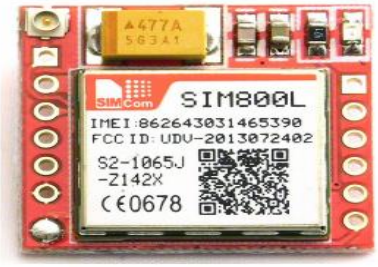


Figure 1. Ardino

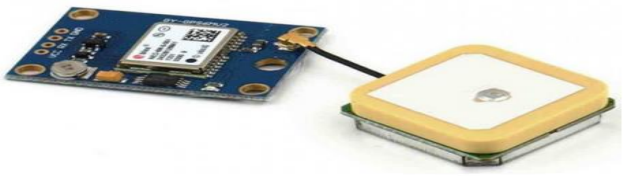
SEN-11574

Figure 2



SIM 800L

Figure 3



Ublox Neo-6M GPS Module

Figure 4

The methodology of this project is we create a IoT based hardware device to read the heartbeat rate from the patient from the body and then data is captured from the IoT device and we use web services to send and stored the data into the database located in the cloud so that the real time data can be available for doctors and other associated with the patient with real time data. when there is a variation in the heartbeat, the web services invokes the SMS module to send message to the doctor and the patient guardian and share the current location of the patient.

III. RESULTS AND DISCUSSION

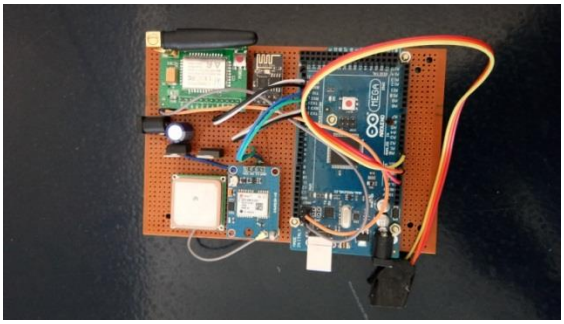


Figure 5

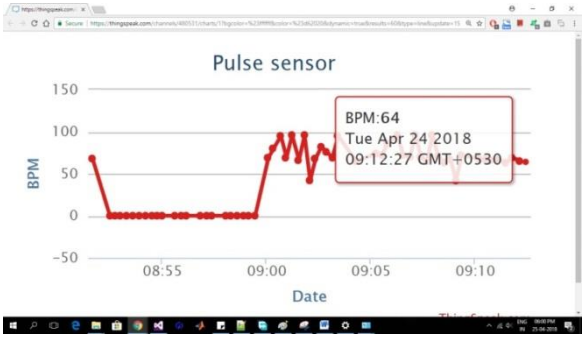


Figure 6

IV. CONCLUSION

The system is implemented successfully and in most of the cases the system behaves efficiently. Heart Rate Monitoring (HRM) system is a simple solution for real time heart rate status monitoring and abnormality alerting. The system can be used to determine and monitor the idle heart rate for each and every person which creates an emerging awareness in a secure way.

The system deals with the numeric data which is found from the experiment that helps to detect the patient's health condition as well as heart rate. It will co-relate the sensor data with the real patient's data which will help to compare the real scenario. In future some other features can be added to develop the system and make it easy to user through smart application. This system can be incorporated with cloud computing and enriched the prototype system. This noble system can be used for disabled or patient to aware about their present situation.Although a conclusion may review the main

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Automated Estimation of Emotion Analysis On Social Media

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ABSTRACT

Social media became popular where in people are willing to share their emotions and opinions or to participate in social networking. Accordingly, the understanding of social media usage became important. The emotion analysis is emerged as one of useful methods to analyze emotional stats expressed in textual data including social media data. However, this method still presents some limitations, particularly with based on accuracy, lexicon and aspect. To overcome and improve this weakness, we propose an automated estimation of emotion analysis in this paper by using the morphological sentence pattern model. Emotion analysis is the process of determining whether a opinion of writing is positive or negative.

Keywords: Emotion Analysis; Natural Language Processing, Social Media, Morphological Sentence Patterns, Aspect Based Approach

I. INTRODUCTION

In recent years, social networking sites, such as Twitter, Facebook, Instagram and YouTube is one of the most popular online media for sharing information, emotions, news and promotions. People express not only their personal feelings but also share their pleasant/unpleasant or dissatisfied experiences with movie. Also, those data provide relevant information for understanding trends, issues, and various aspects of human behaviour. Furthermore, these data can be used for identifying influential opinion leaders. As number of people using social network are growing day by day to communicate with peers so that they can share their personal feeling everyday and views are created on large scale. To evaluate the opinion of the users is not as easy as it seems to all users. For evaluating their attitude may require performing Emotional Analysis. The problem in statement analysis is classifying the polarity of given text at the document, sentences or feature/aspect level .One more is whether the expressed opinion is a document, a sentences or an entity feature/aspect is positive, negative or neutral. The letters, words or sentences used in social media are highly unstructured and non grammatical, out of vocabulary and lexical variation to solve this problem emotional analysis have been introduced which can be used to determine emotion on variety of level. It will score the entire document as positive or negative .It will help to determine the thought of speaker or writer with respect to some subject matter or the overall contextual polarity of document. It is known as opinion mining deriving the opinion or attitude of a speaker. It is defined as to identify the polarity of customer behaviour, the subjective and emotion of particular document or sentences. Emotional Analysis can be used to determine emotion on a variety of level. It will score the entire document as positive or negative. A common use case for this technology is to discover how people feel about a particular topic. Emotional analysis is extremely useful in social media monitoring as it allows us to gain an overview of wider public

opinion behind certain topics. Emotional analysis is easy to find subjective reviews on specific movie.

II. PROBLEM STATEMENT

EXISTING SYSTEM

Every day massive amount of data is generated by social media user which can be used to analyze their opinion about a particular movie by using following techniques:

Natural language processing – NLP tool is well.known for text mining because this tool provides refined and sophisticated results based on English grammar. The system requires refined and tokenized words. The system also requires part of speech tag to extract morphological sentences.

Lexicon based Sentimental Analysis – They collect the comments or reviews from social media. They built a lexicon where each word categorized as either positive or negative keywords were counted for all the messages, each message is classified as positive or negative.

Probability model based Sentimental Analysis – This method requires a train.set with human coders to build a sentiment lexicon that contain the list of words that appeared in the text message. Each message categorized as positive or negative, depending on threshold value calculated using train set.

Aspect based Sentiment Analysis: The aspect.based analysis is a lexicon.based approach because this approach uses the lexicon as a measurement. The aspect.based analysis provides a more in.depth analysis because all results are categorized into each aspect.

PROPOSED SYSTEM

Morphological Sentence Pattern Model will overcome the drawbacks of NLP, Lexicon based Sentiment Analysis, Aspect based Sentiment analysis and Probability based Sentiment analysis.

Morphological Sentence Pattern Model – In this model, the recognizer extracts which parts of speeches (POS) are surrounding aspects or expressions as shown in Fig. 1. This model also used the "Stanford Core NLP" to recognize patterns and extract lexicon. To analyze multi.social media data including YouTube and Twitter, the system builds morphological sentence patterns for each media separately because people share their opinions and emotions differently depending on the sources. It provides relatively higher accuracy than existing approaches without involving a human coding stage.

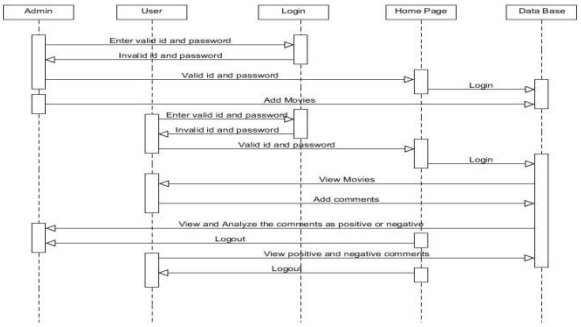


Fig1. sequence diagram of emotion analysis

III. LITERATURE SURVEY

[1] "Sentimental Analysis on Social Media using Morphological Sentence Pattern Model", Youngsub Han, Kawangmi Ko Kim, 2017

It proposes an automated sentiment analysis by using the morphological sentence pattern model. The sentiment analysis is emerged as one of useful methods to analyze emotional stats expressed in textual data including social media data.

[2] "Sentiment Analysis of Movie Review using Machine Learning Technique", Palak Baid, Apoorva Gupta, Neelam Chaplot,2017

Sentimental Analysis is the analysis of emotions and opinions from any form of text. Sentimental Analysis of data is very useful to express the opinion of the mass of group or any individual .This technique is used to find the sentiment of the person with respect to a given source of content.

[3] "A Novel Review of Various Sentiment Analysis Technique", Anchal Kathuria, Dr Saurav Upadhaya,2017

Sentiment Analysis is often obtained as a method of mining opinion, views and emotions from text, verbal speech or images taken from social media like facebook, twitter or youtube through NLP.The media is classified as positive, negative or neutral.

[4] "Aspect Based Sentimental Analysis in Social Media with Classifier Ensembles",Isidoros Perikos,Ionnis Hatzilygeroudis,2017

In social media, people have become more eager to express their opinion on web regarding almost all aspects of everyday life and express their attitude on events and entities. It analyzes the opinion given by user regarding movie whether it is positive or negative.

[5]"The Evolution of Sentiment Analysis. A Review of Research Topics, Venues, and Top Cited Papers", Mika V, Mantyla Daniel Graziotin, Mikka Kutila, 2017 Sentiment analysis is one of the fastest growing research areas in computer science, making it challenging to keep track of all activities in the area. It is a series of methods, techniques and tools about detecting and extracting subjective information such as opinion and attitude.

IV. METHODS AND MATERIALS

A. System architecture

The system architecture include four phase: Data Collector, Aspect and Expression Extractor, Sentiment Pattern Extractor and Sentiment Analyzer.

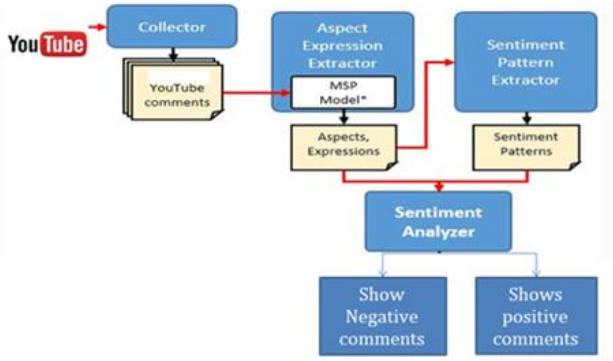


Figure 2. System Architecture And Flow Using Msp

1.Data Collector will collect the comments by data collecting tool from the YouTube which is given by the user

2.Aspects and Expressions Extractor discovers aspects and expressions of the reviews using the Morphological Sentence Pattern Model by Naive Bayes Classifier.

3.Sentiment Pattern Extractor builds all candidate morphological sentence patterns for sentiment analysis.

4.Sentiment Analyzer matches the patterns and sentimental lexicon with the collected data.

A. System modules

1. Admin.

Admin will login to the homepage and its credentials details will be stored in the database. Admin will add the movies to the database and admin will be able to view the comments posted by the user and admin will analyze the comments posted by user whether it is positive or negative. Admin can view overall opinion graph chart of a particular movie.

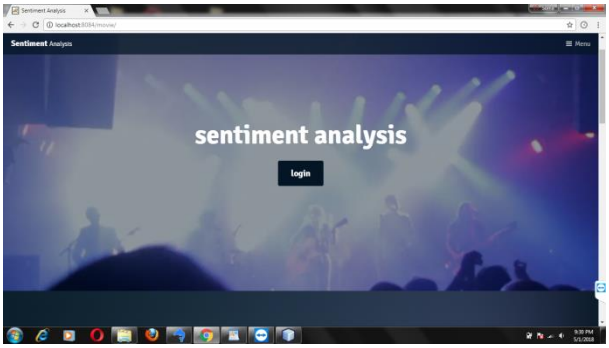
2. User.

User will login to the homepage and its credentials details will be stored in the database. User will be able to view the movies added by the admin and user can post a comment and also user can view the comments posted by the other user for that particular movie.

C. Advantages

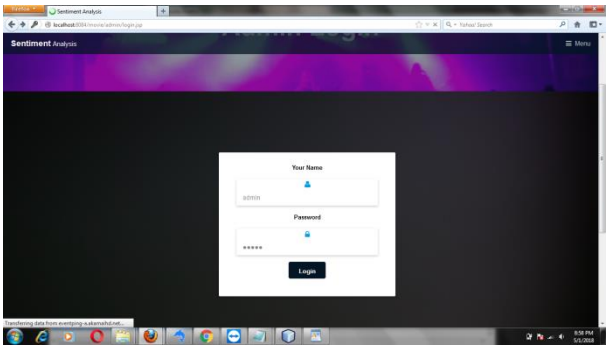
- Emotional analysis helps to complete the market research by getting to know what the viewers think.
- The positive and negative comments among the audience can be evaluated.
- Great results can be achieved to improve our campaign while the trailer is running.
- Prediction can give us insights that help to develop new ideas that are expected by the audience.

V. RESULTS AND DISCUSSIONS



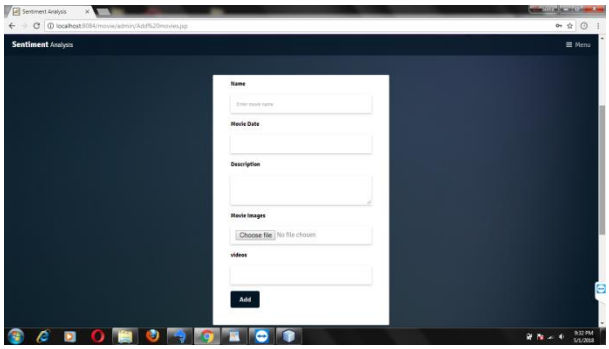
Snapshot1.Homepage

Homepage where in Admin and User can register and login to view video and upload comments.



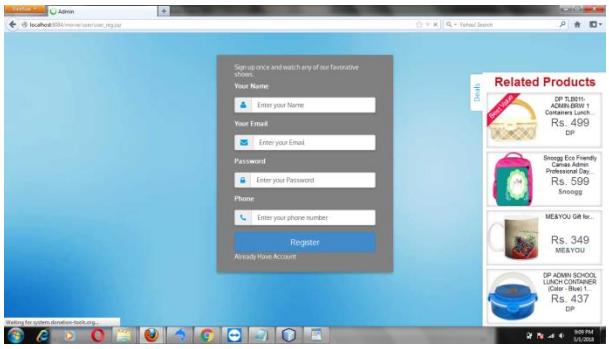
Snapshot2.Admin login page

When admin logs in it will check for the valid credential, if it is valid then admin will be able to login and the login details will be stored in the database.



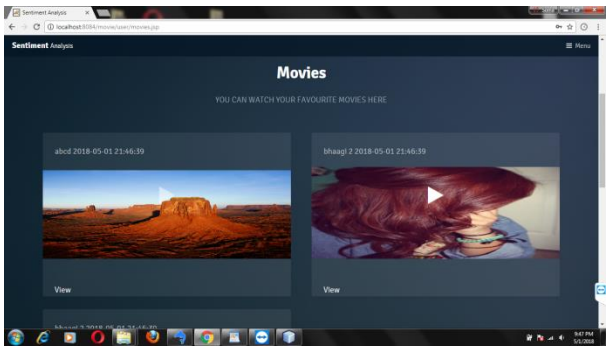
Snapshot3. Add Movies page

As soon as admin logins he/she can add the movies, movie release date and description about a movie to the database.



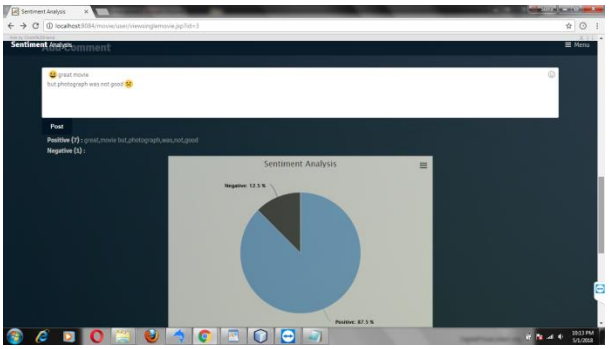
SnapShot4.User login page

User will register with name, email.id, password and contact number and details will be stored in the database.



Snapshot5.View Movie page

After user login to the page user can view the movies added by the admin.



Snapshot 6. Comment and View chart page

After watching a movie user can post a comment and can view the opinion chart of a particular movie.

VI. CONCLUSION

Social media monitoring has been growing very rapidly so there is need for various organizations to analyze customer behaviour or attitude of particular movie review. At the end of the day, Emotional Analysis is about making easier to view context around a social media. The main advantage of Morphological Sentence Pattern Model method was that no human.coded train.sets are required to achieve a higher level of accuracy. With the help of emojis we are able to detect a comment posted by the user is positive or negative and he/she will be able to view the opinion chart of the comments they posted. Admin will be able to view the overall opinion chart of multiple user for a particular movie. The future work might consider applying a Convolution Neural Network (CNN) algorithm in the Emotion Analysis which is widely used in the artificial intelligence field. In future enhancements, more categories can be introduced to classify tweets – extremely positive, mildly positive, extremely negative, mildly negative, neutral, and irrelevant.

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Employee Resource Management Portal

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ABSTRACT

Employee Resource Management Portal is to reduce the man-power and paperwork. HR can use this ERM-Portal to upload the documents to the data Centre, add employees/managers and change their designation. An employee can access the documents which are related to company project, and also they can view their subordinate's details. Employee can login to the system by using their Login ID and Password. Once the employees successfully logins then they can apply for leave or claim expenses to mangers. Managers can approve or reject leave and expense details. They can also allocate or deallocate employees using ERM portal.

Keywords: Corporate portals,Information system, self-service desk, idashboards, Employee Resource Management.

I. INTRODUCTION

Employee Resource Management (ERM) is a web-based service that provides employees with the ability to view and update information related to their employment. The ability to directly view data in System provides an excellent opportunity to ensure that the information is correct and kept up-to date. One of the major advantages of the ERM system and the resulting information is that the data is displayed in real-time. The main aim of Employee Resource Management Portal is to reduce manpower. An employee can access the documents which are related to company project and also they can view their subordinate's details. HR can upload the documents to data center, change the employee's designation and allot projects based on their specialization. The employee can login to the system by using their Login ID and Password. After successful logins they can view the details which are related to project, documents, subordinates details, salary and much of the other information. Employee Resource Management Portal allows the employees to access documents which are related to project. By using ERM-Portal project manager can view the teams and he can allot the projects to the employees, here Project Manager can include or remove any employee from team. Employees can claim their expenses reports without using paperwork, by entering some expenses details they can claim their expenditures. All the details like documents, subordinates details, expenses reports and numerous details will be displayed whenever the employee logins successfully. The ERM-Portal allows the employees to access the information which is related to project, this application has a friendly user interface so that employees can use this application effortlessly, and it is fast and secure. The ERM-Portal reduces the paperwork and one can retrieve information anytime, there is no chance of misplacement of records. The details like project, employees, and document which are related to company project are stored securely.

II. PROBLEM STATEMENT

A. EXISTING SYSTEM

The details like expense reports, project details and company related documents are handled manually, it requires much time and manpower. Assigning team members, and designating project to teams is done manually which is time consuming. All the documents related to company will be displayed in notice board by the company employees. Paperwork leads to lot of manual mistakes. Maintaining every detail in separate record is a tedious task. There is a chances of misplacements of records or documents it is a very difficult to handle data in physical medium. Currently overall process is working manually which consumes more time and it is a lengthy process to complete the work.

B.PROPOSED SYSTEM

To overcome the problem of the current system the proposed system has been evolved and aim of this project is to reduce paperwork and also manpower. Employee Resource Management Portal which allows the employees to access documents which are related to project, also it allows the HR to upload documents to the data center, so that employees can access them. By using this ERM-Portal project manager can view the teams and he can allot the projects to the employees, here Project Manager can remove or add any specified employee from team. Employees can claim their expenses reports without using paperwork, by entering expenses details they can claim their project expenditures. All the details like documents, subordinates details, expenses reports and numerous details will be displayed whenever the employee logins successfully.

This application allow the employees to access the information which is related to project, this application has a friendly user interface so that employees can use this application effortlessly, and it is fast and secure.This application also reduces the paper work, we can retrieve any information anytime there is no chances of misplacements of records. We can store details securely the details like project, employees, and document which is related to company project. Employees can view all the details in a single form.

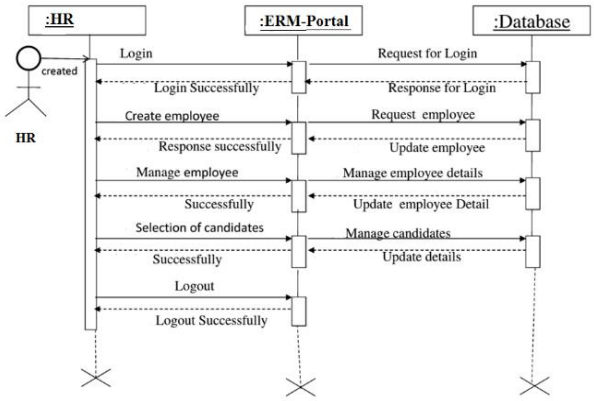

Fig 1: Sequence diagram for HR

In Fig 1 it is shown that HR logins to the portal to manage employees/managers.

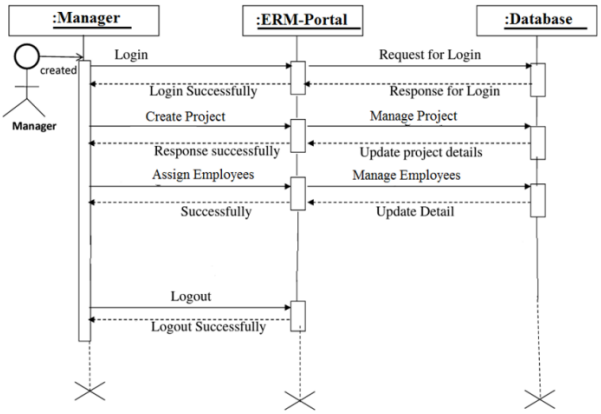

Figure 2. Sequence diagram for manager

In Figure 2 manager assigns employees to project using ERM-Portal

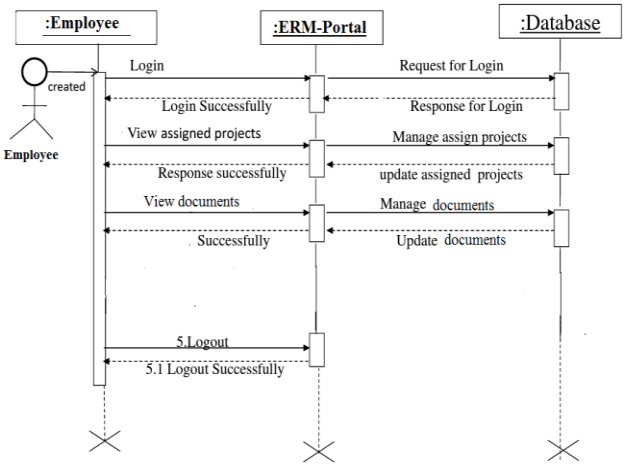

Figure 3. Sequence diagram for employee

In Figure 3 employee views the assigned project and documents using portal

III. LITERATURE SURVEY

Quanbing Yao[1] proposed a case study with a view to investigate the benefits and associated issues obtained from an implementation of employee self-service portal. Nyoman Karna [2] depicts the use of an executive dashboard, senior leaders can view company's vital information that related to business goal and make a quick decision based on this information.The implementation process of large-scale enterprises financial shared service centre information system is proposed by Quanbing Yao [3].Wikan Danar Sunindyo[4] proposed a dashboard development methodology to accommodate heterogeneous stakeholders in an information system. It gives information about real-time data utilisation. Jurgen Bernard[5] discusses a visualization technique that segments patients' histories, visualizes the aggregated `segments as static dashboards that are arranged in a dashboard network to show longitudinal changes.

A. System Description

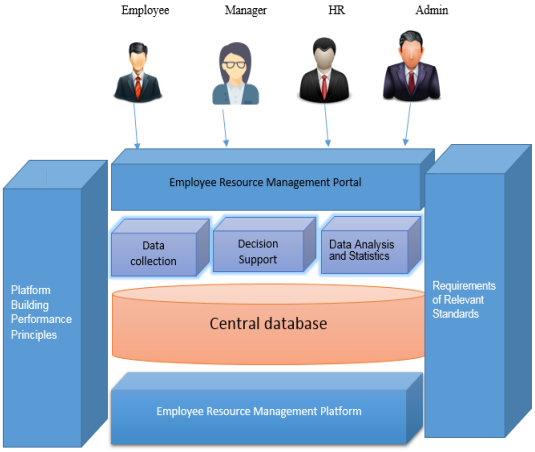

Figure 4. System Architecture

Figure 4 depicts that ERM- Portal acts as intermediary between the company and the employee. It is a tool that is used to represent the employee details and subordinates details.

B. System modules

Admin: Responsible for managing various departments, designations, leave type, holiday list and adding HRs.

HR: Adds managers and employees and assigns projects to managers.

Manager: Assigns projects to employees, approves leave and expense claims.

Employee: Can apply leave, expense details and view the project details.

C. ADVANTAGES

- All the details are viewed in a single form.
- Friendly user interface.
- Allows fast and secure access of the information.
- Reduces the paper work.
- There is no chance of misplacement of records.

IV. RESULTS AND DISCUSSIONS

A.Snapshots

Admin:

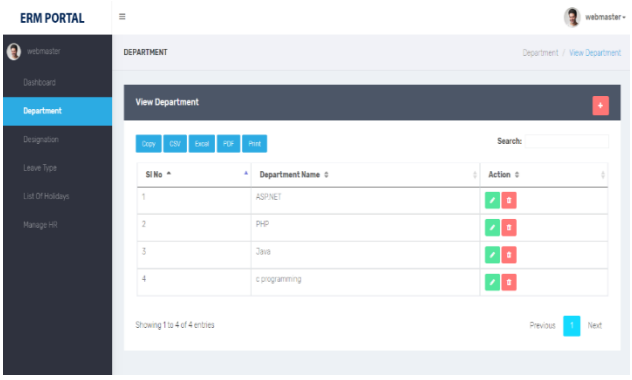

Figure 5. Adding various departments

In Figure 5 admin adds various departments to which employees will be allocated to.

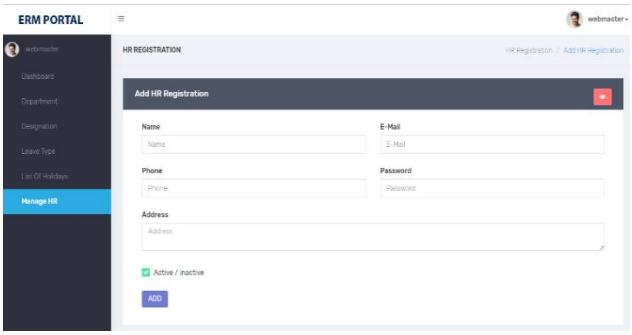

Figure 6. Managing HR

In Figure 6 Admin performs HR registration ,further adds other employees.

HR:

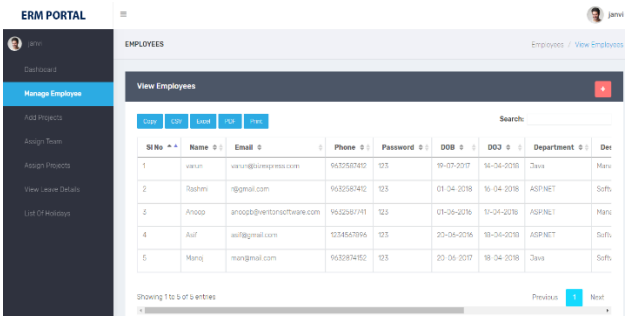

Figure 7. Adding managers/employees

In Figure 7 HR adds mangers and employees to the data center for various departments.

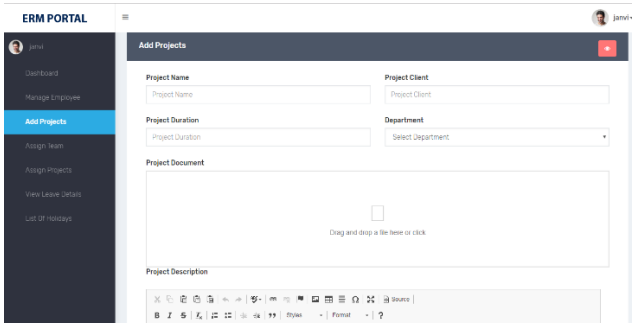

Figure 8. Adding projects

In Figure 8 HR adds projects from clients to different departments.

Manager:

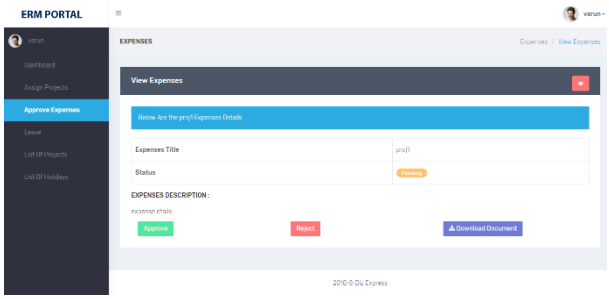

Figure 9. Approve/Reject expense claims

In Figure 9 manager approves or rejects the expense details claimed by employees.

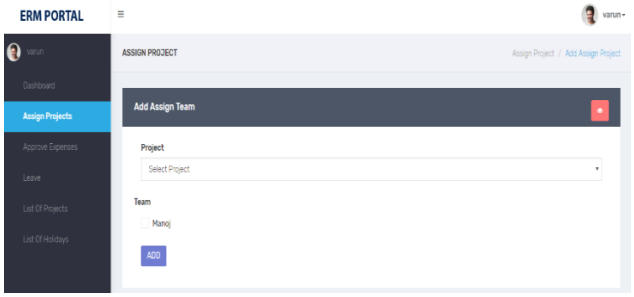

Figure 10. Assigning projects to employees

In Figure 10 manager allocates the project to employees working in the same department.

Employee:

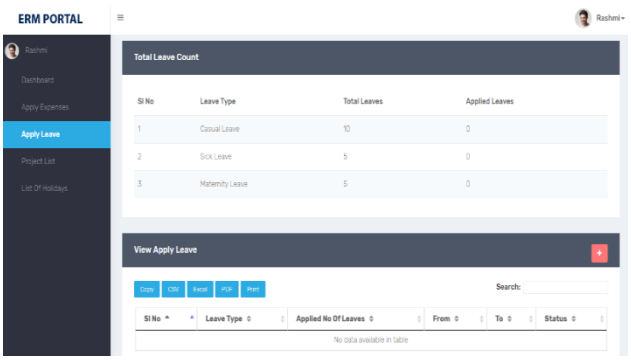

Figure 11. Applying for leave

In Fig 11 employee applies for leave to manager,he also can view the total number of leave and applied leave.

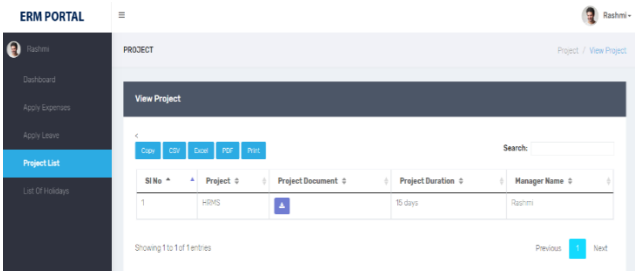

Figure 12. Viewing project details

In Figure 12 employee can view his project list,along with project documents.

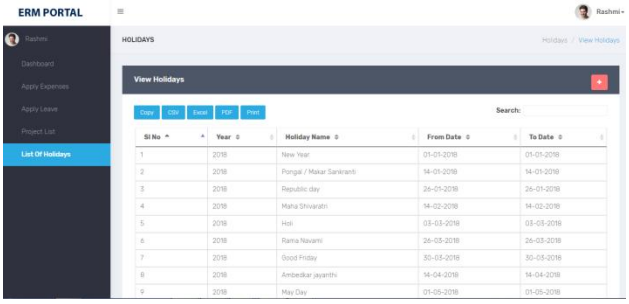

Figure 13. Viewing holiday list

In Figure 13 employee can view the list of holidays .

V. CONCLUSION

ERM-portal allows to upload the documents to data centre, which is beneficial to allot specialized person to a particular project. Further HR can also change the employee designation. By using this ERM-Portal project manager can view the teams and he can allot the projects to the employees, here Project Manager can remove or add any specified employee from team. Employees can claim their expenses reports without using paperwork, by entering expenses details they can claim their project expenditures. All the details like documents, subordinates details, expenses reports and numerous details will be displayed whenever the employee logins successfully. The portal provides user-friendly interface and reduces the manpower hence this application is deployed.

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Accident Detection and Emergency Rescue Alert System

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ABSTRACT

Smart Black Box Unit is a device to record driving history which can be used for vehicles (car, truck, and lorry) crash analysis. This device is installed in vehicles to record information related to vehicle crashes or accidents. Smart black box stores engine temperature, obstacle detection, speed of vehicle, brake status, alcohol content, time and date, Global Positioning System(GPS)/Global System for Mobile (GSM) will be used to pinpoint the exact location of the crash and send that data to an emergency rescue authority(such as hospitals, fire department, police). This reduces manpower, time and complexity over traditional system.

Keywords: Smart Black Box, Renesas Microcontroller, Rescue Alert System GSM, Smart Phone

I. INTRODUCTION

Currently traditional method of crash analysis is being used in which cops need to visit accident site and check for signs of accident. Then they need to check for evidences like skid marks, degree of damage, collision part, eye witness etc. Often, there is situation of insufficient evidences and quicker emergency rescue operation will not be there. Sometimes it may also possible that some clues got missed by police. This is very time consuming and complex process.

II. PROBLEM STATEMENT

A. Existing System

Various Architectures are proposed for evidence collection of the car like log your car where this device can also help the car owner to claim vehicle insurance from the respective insurance company. In Existing system only the Black Box will be attached to the car to record all the information and this information will be stored in server.

B. Proposed System

In Proposed system Smart Black Box will be used to collect statistically applicable crash or accident information which could construct clear picture of an accident .This collected information are send to Android mobile phone of police server via **SMTP** , which will reduce time and complexity in police verification and accident analysis process. Emergency alert system will be used to send notifications, so that it will reduce the time it takes for emergency services to arrive at the crash location in the event of an accidents thereby saving life.

Figure 1. Smart Black Box

III. LITERATURE SURVEY

"Implementation of Car Black Box for Evidence Collection and Accident Locater using Embeded System"

The background of the paper is to develop a prototype of car black box for vehicle diagnosis that can be installed into any vehicle. [1].

"Evidence Collection Car Using Android Phone, application"

The aim of the paper is to collect critical video clips from car black boxes using smart phone.[2].

"Critical Areas Detection and Estimation towards Intersection related Driving Behavior Analysis"

The vision of this paper is Smart phone based interaction related system for driving behavior. [5].

"Research Paper on Airbag Deployment and Accident Detection System"

The aim of the paper is to collect details on accident of automobile emergency alert situation for the economically low cost or old vehicle. [6]

"Tracking and Emergency Detection of Inland Vessel using GPS-GSM System".

The Background of this paper is Using GPS module, the base station will get the latitude and longitude position notification of the vessel and base station will get the exact location of vessel in the sea. [7].

"Intelligent Accident Detection and Alert System for Emergency Medical Assistance"

The aim of the paper is about the proposed system will check whether an accident has occurred and identify the seriousness of the injury to the accident victim/driver. [11].

"Car Surveillance and Driver Assistance Using Black box with the help of GSM and GPS".

The Background of this paper is about guiding unit included in the car and the base station is server. The guiding unit consists of a GPS unit and sensor. [12].

"An Embedded System for Traffic Rule Violation and Vehicle Crash Analysis Using Black Box"

The main vision of this paper is When a misadventure is detected via the trigger concerning the breeze portmanteau signal, the wi-fi fuscous box stops the statistics acquisition. [15]

IV. METHDOLOGY

Many embedded systems have substantially different designs according to their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of microcontroller, GSM, DCM, accelerometer, GPS, D.C motor, ultrasonic sensor, temperature sensor, dump switch and LCD. The microcontroller located at the centre of the block diagram forms the control unit of the entire project.

Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided by the output of the sensors. Here accelerometer represents accelerator of a car. An accelerometer generates output voltages against changes in gravitational pull. These output voltages are analogous in nature. Hence the output of accelerometer is given to the ADC unit of the microcontroller. Based on the code embedded within the microcontroller, the D.C motor speed is varied. The D.C motor in the project demo represents a vehicle. As accelerometer is varied the speed of the D.C motor is varied.

To simulate operation of seat belt, slot sensor is utilized in this demo. When anything is placed in slot sensor, it generates a logic 1 signal which is given to

the input pin of the microcontroller. As seen in the block diagram, a temperature sensor is attached to monitor temperature of the engine. This sensor generates an output voltage which is analogous in nature. This is given to the ADC unit of the microcontroller.

Ultrasonic sensor is placed in front of the vehicle. It constantly monitors the distance of the vehicle ahead of it. A toggle switch is used to simulate left and right indication switching of vehicle. LED is used to indicate left and right bulb. So when switch slides to left, LED is ON and when slides to right, LED is ON. All the details from these sensors are sent to Android mobile phone via Bluetooth. In android mobile phone, an application is created for this specific purpose. When vehicle is met with an accident, the camera in the phone captures image of the accident. GPS directly communicates with satellite thereby giving coordinates of the position of accident. These details are sent to Amazon cloud server via e-mail. Android application is created to make the application user interactive. Here LCD is used in the demonstration to display the actions taking place.

V. SYSTEM ARCHITECTURE

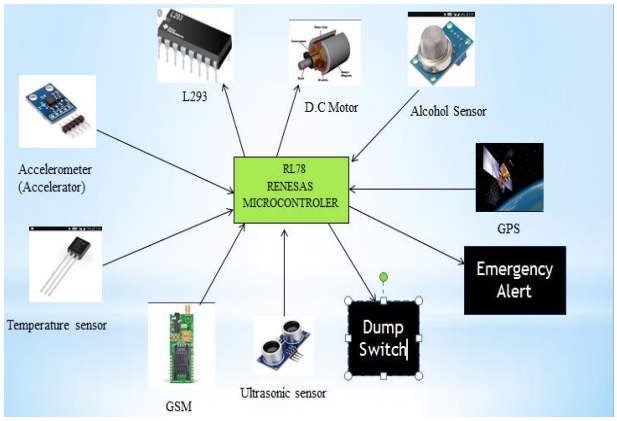

Figure 2. Sensors used in Smart Black Box

VI. RESULTS AND DISCUSSION

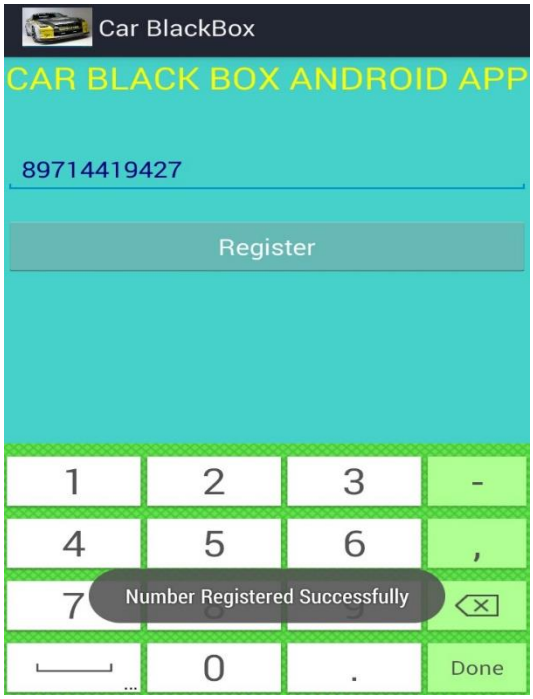

Figure 3. Snapshot for Car Black Box Android App Registeration

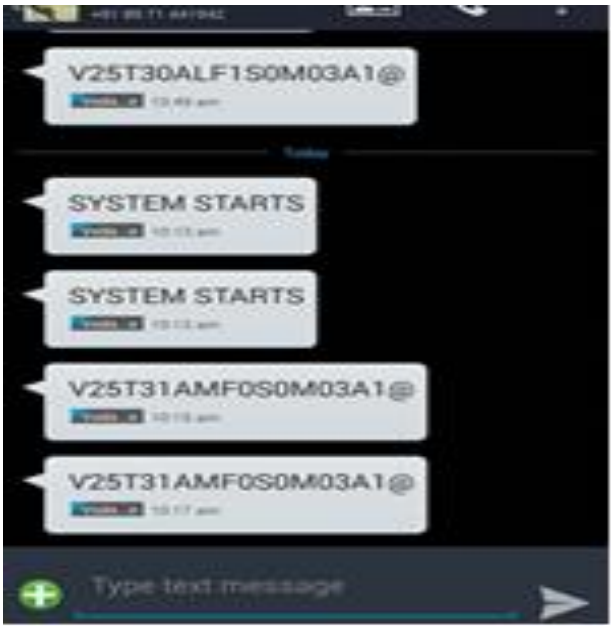

Figure 4. Confirmation Message to Registered Number

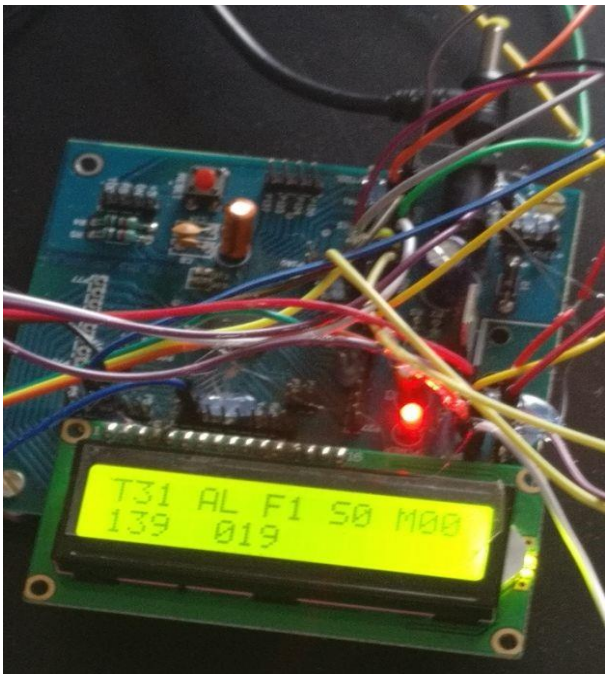

Figure 5. Recording the Information such as Speed, Engine Temperature, Presence of the obstacle, Alcohol Content,and Mistakes Done by the Driver

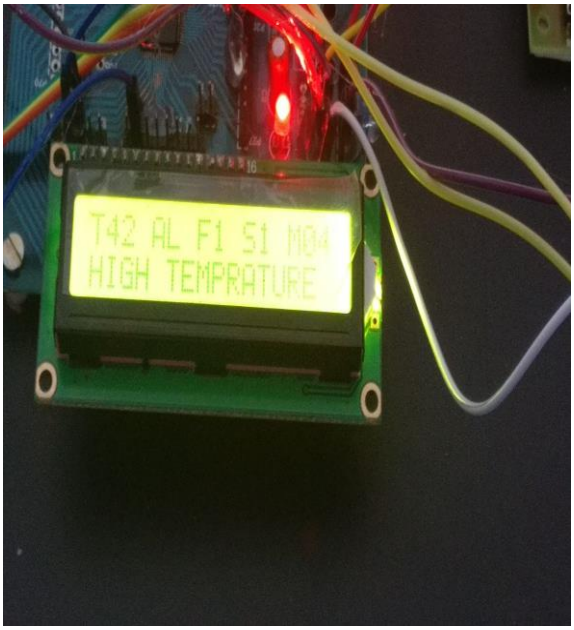

Figure 6. LCD Displays High Temperature When it reaches To Threshold Level

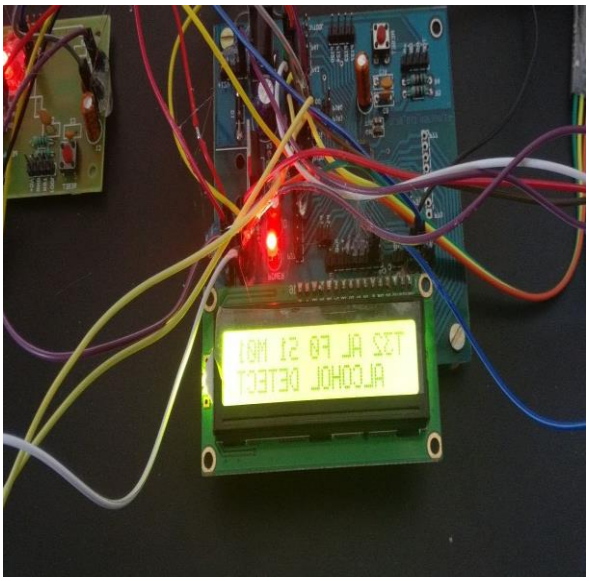

Figure 7. System Showing the Presence of Alcohol Content

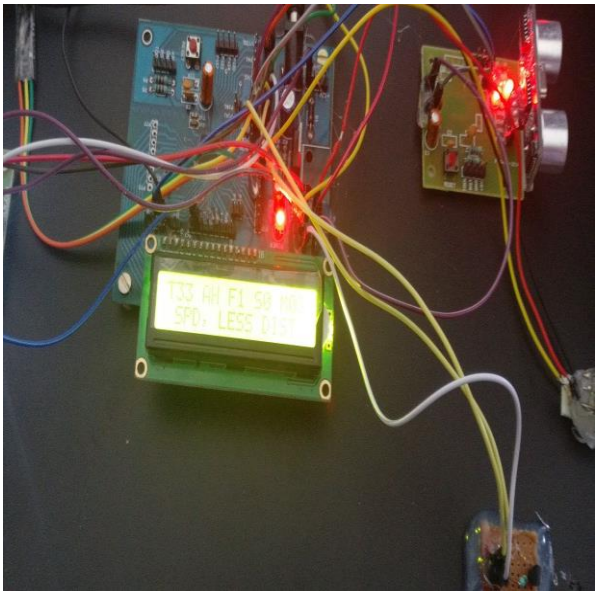

Figure 8. LCD Displays Front Obstacle Detection and Guides the Driver for Safe Driving

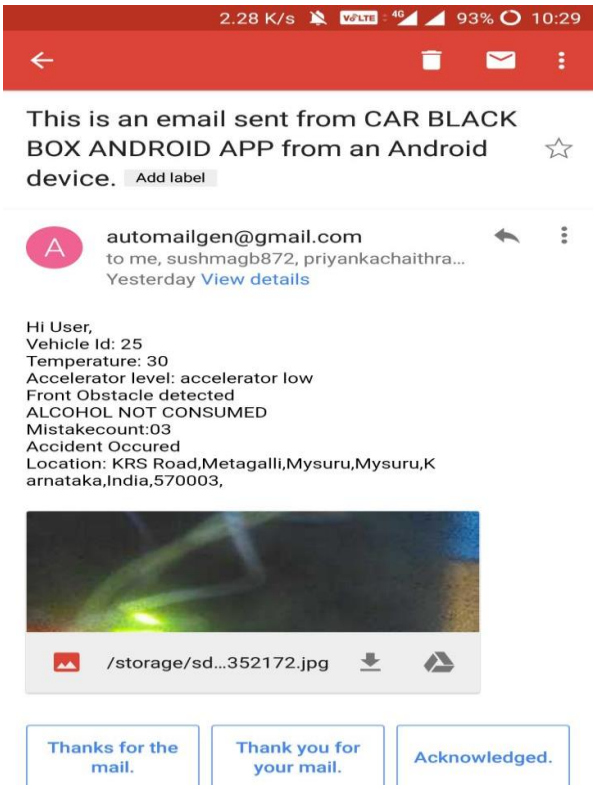

Figure 9. E-Mail Received from GSM via SMTP Showing Various Parameters and Exact Location of the Accident

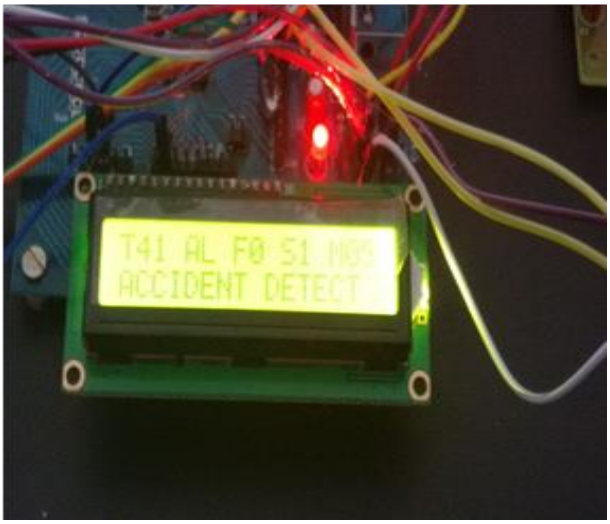

Figure 10. Snapshots which are Related to Accidents and Send This Information Along with snaps to Police Server and Emergency Centers

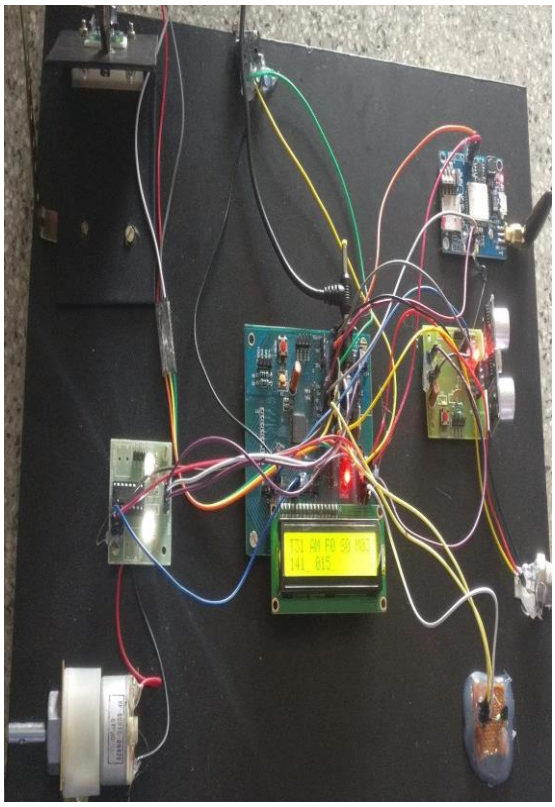

Figure 11. Model of the Smart Black Box

VI. ACKNOWLEDGEMENT

Dr. Reshma Banu

We would like to thank Dr. Reshma Banu, Professor & Head, Department of Information Science & Engineering, GSSSIETW, Mysuru for her kind cooperation for successful completion of our project. At the outset, we wish to express our sincere gratitude to all those people who have helped us to complete this project in an efficient manner.

VII. CONCLUSION

Smart black box unit controller will be used to receive and transmit the collected evidences data over wireless network by using, GSM transmission which indeed is collected at police database server using SMART BLACK BOX controller and receiver. The collected parameters are vehicle id, speed,

engine temperature and date and time of accidents are collected respectively from the prototype designed. Smart Black Box application aims to help accident investigators and medical insurance company to perceive the cause of the accidents this should help investigator to speed up their investigation process and provide fast results. Helps to alert emergency medical service team to reach at required location in shortest time as it uses the GPS and GSM it can track the current location.

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Instigation of Electrical Energy from Tiring Roads

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ABSTRACT

The extensive usage of energy has resulted in an energy crisis, and there is a need to develop methods of optimal utilization, which will not only ease the crisis but also preserve the environment. The focus now is shifting more and more towards the conventional energy, which are essentially, non-polluting. In this paper we approach a new mechanism to generate power from speed breaker, because the number of vehicles passing over the speed breaker in roads is increasing day by day. This proposed system is to extract the kinetic energy of vehicle flow in the streets entitled as generating power from speed breaker through Roller mechanism. It is more efficient than other existing models, which enable to accommodate conventional, both in terms of balancing electricity supply and demand in energy across the global. Instruction from the panel will be send to the IOT model which in-turn controls the Load. IoT based notification app developed to notify the technician about the raised issues.

Keywords: Internet Of Thing, Roller Mechanism, Rack Pinion Mechanism

I. INTRODUCTION

The world is facing electricity crisis with the difference in demand and deliver and restricted range of natural sources. So there is a need for saving energy and requirement of other non-conventional resources that is cheap and feasible. Electric energy may be generated from busy street with the use of speed breaker. In huge metro cities the quantity of automobiles will increase tremendously every year. The other way to generate the energy through tapping on the normal speed breaker with the simple mechanism. The power generated is stored for street lighting and to be used in rural areas. The attempt is to show how energy can be tapped and used at a commonly used road speed breakers. To construct a unit which is capable of producing electricity using kinetic energy of vehicles passing over the speed breakers with the help of rack and pinion arrangement beneath it. As the requirement of electricity is increasing dayby day, we have to develop an alternate conventional source of energy to tackle the problem of energy crisis and reduce the dependency on power plants to some extent. The energy obtained from it can be stored in batteries and then transmitted to nearby street lights.

II. PROBLEM STATEMENT

A. Existing System

The mechanism used in existing system is rack-pinion mechanism, which reduces the efficiency. This mechanism gives the low electric output. In a rack-pinion mechanism, the maintenance is required of the high level. Material selection is also a time consuming task for the rack-pinion type mechanism. Vehicles may slip by using pinion mechanism. Spring mechanism also used in the present system major disadvantage is low electric output.

B. Proposed System

In this Mechanism, a roller is fitted in between a speed breaker and some kind of a grip is provided on the speed breaker so that when a vehicle passes over speed breaker it rotates the roller. This movement of roller is used to rotate the shaft of D.C. generator by the help of chain drive which is there to provide different speed ratios. As the shaft of D.C. generator rotates, it produces electricity. This electricity is stored in a battery. Then the output of the battery is used to lighten the street lamps on the road using IoT. Software model gets the battery level from the source and identifies total energy stored level in a battery and sends data to the cloud and wait for the decision from the administrative console. At the console project should display energy level and allow to turn load ON/OFF based on the requirement. Instruction from the panel will be send to the IOT model which in-turn controls the Load. Later the notification is sent to the technician if any issue arises.

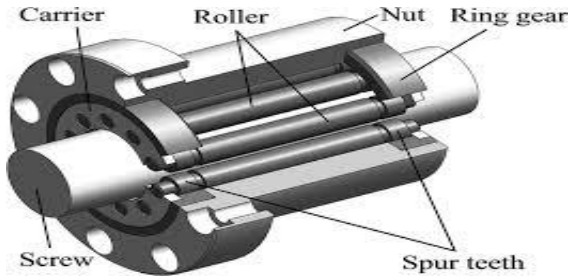

Figure 1. Roller Mechanism

III. LITERATURE SURVEY

In large metro cities, the amount of vehicles increases gradually. Another way to generate the power by tapping this energy is possible by replacing normal speed breaker with this simple mechanism. The energy generated is stored for lighting street lights [1].As vehicles pass over the speed breakers, they spin the rollers which are connected to a generator which in turn generate electricity [2].This generated power can be used for general purpose applications like streetlights, traffic signals. In addition, we could also have solar panels, which would satisfy our power needs, when there is no vehicular movement [3]. This method provides an efficient way to generate electricity from the kinetic energy of moving vehicles in roads, highways that is the very compatible with the other mechanism [4]. A prototype model of the existing system (Rack and Pinion) needs modification for large-scale electricity generation [5]. For obtaining the electricity through the flip plate mechanism a prototype model is developed and studied. This D.C. voltage is stored to the lead 12-volt battery. Electricity stored in battery is used to activate the light, fan etc. By increasing the capacity of the battery power rating is increased [6].Hydraulic mechanism is more efficient than other existing models, which enable to accommodate conventional, both in terms of balancing electricity supply and demand in energy across the global [7]. The roller is connected in between a speed breaker and some kind of grip is connected on the roller so that when a vehicle passes over it it rotates the roller. This roller rotates the shaft of dc generator by the help of chain drive in the ratio 0f 1:5. This project aims at producing the electricity using chain drive and roller mechanism [8].

IV. METHODS AND MATERIAL

A. Roller Mechanism

A mechanism converts rotational motion to linear motion. In this Mechanism, a roller is fitted in between a speed breaker and some kind of a grip is provided on the speed breaker so that when a vehicle passes over speed breaker it rotates the roller. This movement of roller is used to rotate the shaft of D.C. generator by the help of chain drive which is there to provide different speed ratios. As the shaft of D.C. generator rotates, it produces electricity. This electricity is stored in a battery. Then the output of the battery is used to lighten the street lamps on the road. Now during daytime we do not need electricity for lightening the street lamps so we are using a control switch which is manually operated .The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

B. Administrator Console

Administration Console is an interface granting access to the functions Administration Server both

locally and via net. Here the administrator have a login credential and the notification of issues send to the technician via administrator.

C. Cloud

It is a part of network through which data passes between two end points. Here the battery status from the energy source will be stored in cloud and access by the administrator.

D. Rectifier

An electrical device consisting of one or more diodes converts alternating current to direct current.

E. Control Circuit Relay

It is a computer type circuits to switch high current or voltages either ON or OFF.

F. Advantages

- Low Budget Electricity Production.
- No Obstruction to Traffic.
- Easy Maintenance.
- Charging Batteries Are Used To Light Up The Streets.
- Gear Ratio Is Used To Increase Efficiency.

V. RESULTS AND DISCUSSION

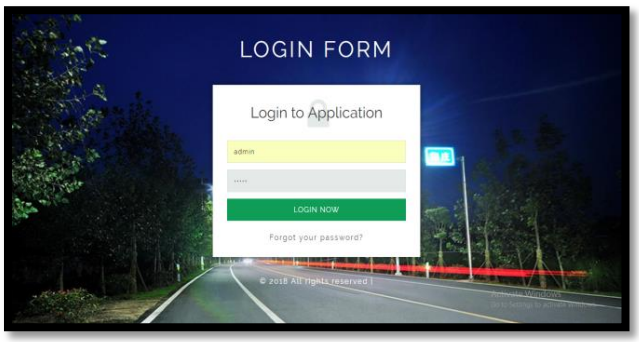

Figure 1. Admin Login Page

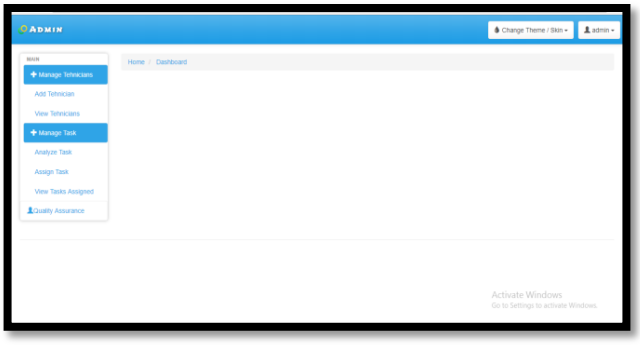

Figure 2. Home Page

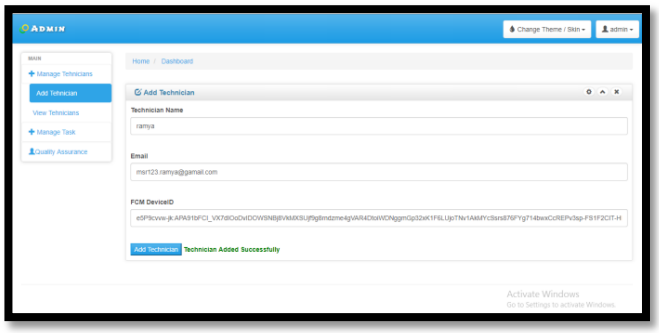

Figure 3. Adding Technician

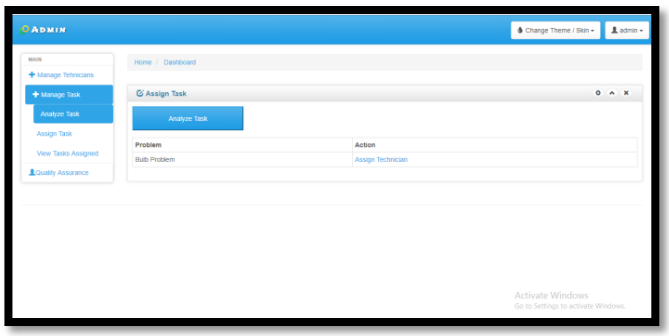

Figure 4. Analyze Task

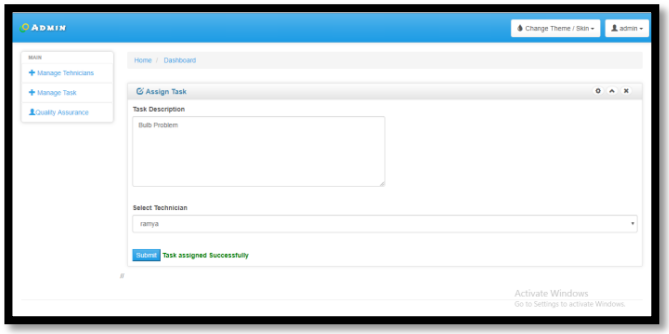

Figure 5. Assigning task to Technician

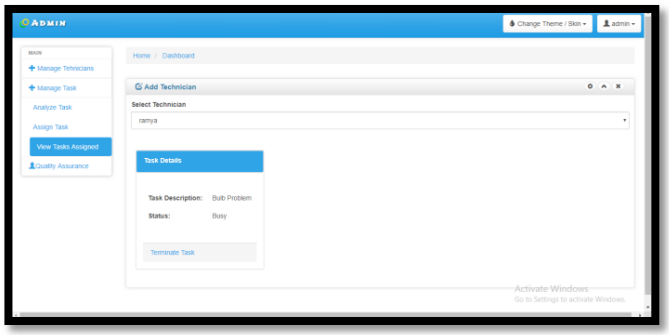

Figure 6. Quality Assurance

V. CONCLUSION

As the demand for electricity is increasing day by day due to rapid industrialization & urbanization, load on power plant is increasing rapidly. Due to this,

power plant could not meet the requirement of industries as well as domestic requirement. This has resulted in load shedding problem in many areas. There is insufficient supply of electricity. To meet this requirement, research are going on to find alternative methods of power generation by using different sources like solar, wind, thermal, tidal, kinetic energy, Geothermal energy etc. Thus, our project aims at future requirement of electricity by using non-conventional source of energy i.e. kinetic energy of vehicles passing over the speed breaker.

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IoT Based Bike Analyzer: Delivery Boys Safety Control and Mechanism

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ABSTRACT

The increase in population and the increase in number of vehicles has led to the increase in the number of accidents. Two wheelers accounts for 25% of total road crash death. Keeping in mind the safety of delivery boys who travel across the cities using two wheelers, this paper proposes an accident avoidance prototype using IoT. The prototype consists of two units namely helmet unit and vehicle unit which use sensors such as alcohol sensor, touch sensor and accelerometer sensor. The communication between the two units is established through RF signal transmission. The administrator is able to keep track of rider's status using GSM and an android application is provided as an alternative in case of helmet lost.

Keywords: Alcohol detection, GSM, Monitoring System, RF signals, Safety System, Sensors, Smart Helmet

I. INTRODUCTION

Two wheelers are widely used than other form of vehicles due to its low cost and simplicity. Most of the time rider doesn't like to wear helmet which could result in fatal accidents. Drink and drive and rash riding are the major factors for such road accidents. Some statics shows that two wheelers cause 25% of the accidents and in that 60% of the two wheeler accidents are caused due to rash riding, drunken driving and not wearing helmet. The primary concern of all riders is safety.

Taking into consideration the safety of delivery boys who works for online business travels across areas using two wheelers, where safety of bike rider counts. Hence to track the activities of such rider and to provide safe riding this project has been proposed.

II. PROBLEM STATEMENT

A. Exisiting System

A wireless telecommunication, and is connected to a smart phone. The prototype uses sensors to detect a crash or accidents and the communication hardware is used to automatically dial a predefined emergency contact. The other existing system is to control the speed in which the biker is going in. The helmet is fixed with all the components and sensors that read the status of the bike rider and accordingly instruct the rider to reduce or increase the speed based on the sensor value. Along with the speed limit sensors, the helmet also checks if the rider is drunk and driving. If the rider is drunk then the ignition of the bike is avoided and hence not letting the rider to ride the bike.

B. Proposed System

The proposed system consists of two units, helmet and vehicle. Vehicle is controlled via signals from

helmet unit. The helmet unit has sensor module to monitor whether helmet is worn or not, alcohol detection, all connected to Radio Frequency (RF) transmitter.

The vehicle unit has RF receiver. Based on RF signal received the vehicle starts and stops automatically. And every status is uploaded to database via GSM. In case of helmet lost the vehicle is ignited via android application.

III. LITERATURE SURVEY

In literature, survey we come across various methods used to improve ***"Smart Helmet".*** The helmet consists of alcohol sensor and eye blink sensor and acts as accident prevention system [1]. The intelligent helmet consists of sensors that detects the occurrence of an accident and makes provisions to sound an alert through the use of GSM system [2]. The "Smart Helmet" automatically checks whether the person is wearing the helmet and has non- alcoholic breath while driving. The relay does not ON the vehicle unit if these two conditions are not satisfied [3]. The ALCHO-LOCK function is used to prevent drink and drive scenarios and accelerometer detects accidents [4]. There is a switch used to ensure the wearing of helmet on the head. The ON condition of the switch ensures the placing of the helmet in proper manner. An alcohol sensor is placed near to the mouth of the driver in the helmet to detect the presence of alcohol [5]. The accident detection system communicates the accelerometer values to the processor which continuously monitors for erratic variations [6]. Message transmitting sensors are equipped in the speedometer of bike and also in the bike's helmet. The most important feature of the bike is that the bike's engine gets start only when the person wears helmet [7]. The system uses advance features like alcohol detection, accident identification, and uses hands free device, solar powered, fall detection. This makes not only smart helmet but also feature of smart bike [10]. The vehicle location is obtained by making use of the global positioning system. The system promises a reliable and quick delivery of information relating to the accident in real time and is appropriately named Konnect [12].

IV. METHODOLOGY

In this project there are two units namely helmet and vehicle module, helmet will have control over the vehicle start and stop.

A. Helmet Unit

In Helmet the sensor module is built using sensors like alcohol sensor, accelerometer sensor, touch sensor and all the above sensors are connected to RF transmitter which is placed on helmet unit to detect weather a person worn helmet are not, once the person wear the helmet the signals gets transmitted.

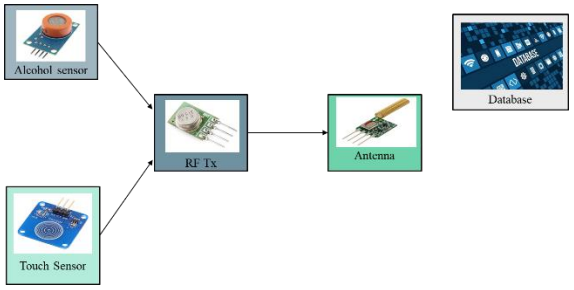

Figure 1. Block Diagram of Helmet Unit

B. Vehicle Unit

The unit in the bike allows the rider to start the vehicle once the module receives signal from helmet unit. The status of the helmet worn is uploaded to admin database via GSM. In case of alcohol consumption the vehicle remains off though helmet is worn and status is uploaded to database. The rash driving detection is done using accelerometer sensor and rash driving status is uploaded to database for further action. The android application is maintained by company authorities looking at database the rider status is tracked and required measures are taken.

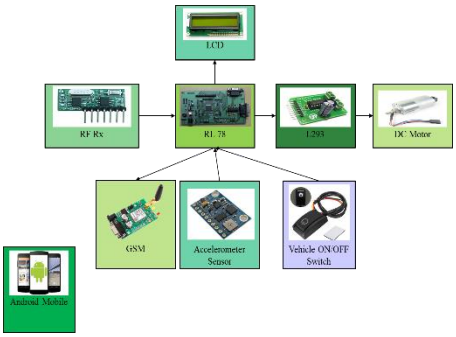

Figure 2. Block Diagram of Vehicle Unit

In case of helmet lost android app is provided to the delivery boy to ignite the vehicle through start button for 3 times. After 3 chances helmet lost is noticed to authority for further action.

V. RESULTS

Figure 1. Helmet Unit Affixed With Alcohol Sensor, Touch Sensor and RF Transmitter

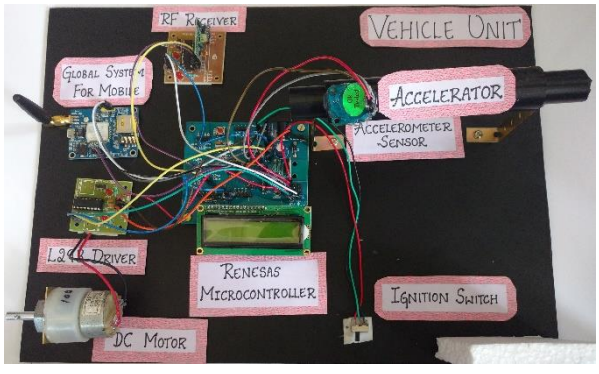

Figure 2. Vehicle unit affixed with accelerometer sensor, GSM module, DC motor, DC driver, RF receiver and Renesas microcontroller.

Figure 3. When Helmet Is Worn and No Alcohol Content Is Detected, the Vehicle Unit Starts

Figure 4. When rider exceeds the speed limit, the alert message "High Speed Continued" is displayed

Figure 5. When rider is not wearing helmet, an alert message is displayed

Figure 6. When the Rider Has Consumed Alcohol, an Alert Message is displayed

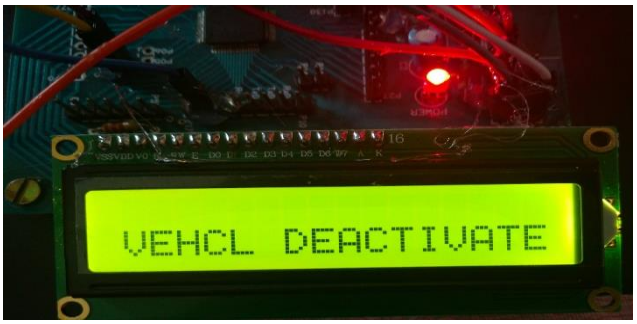

Figure 7. When rider has not worn helmet or alcohol content is detected, the vehicle unit is deactivated.

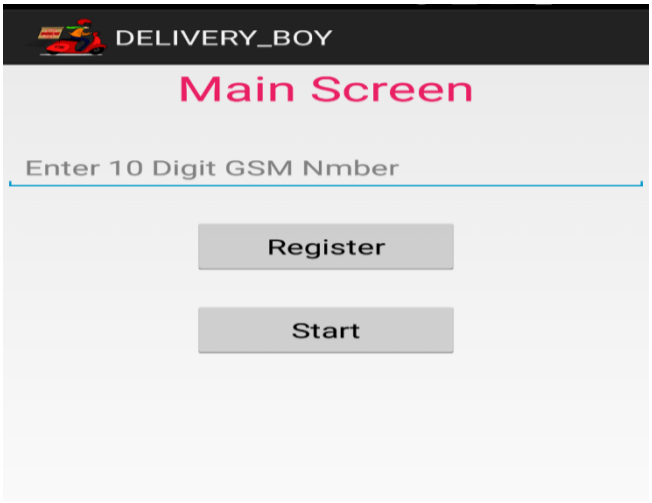

Figure 8. Android Application for Delivery Boy to Start the Vehicle In Case Of Helmet Lost or Forgotten

B. Advantages

- **"Smart Helmet"** can be used in real time safety system with less power consumption.
- It can be used to limit the speed of the vehicle.
- Protection against theft of bike.
- The whole circuit can be implemented into small unit.
- Safety system technology can further be enhanced in car.

VI. ACKNOWLEDGEMENT

We would like to express our deepest appreciation to all those who provided us the possibility to complete this project. A special gratitude we give to our final year project guide, **Dr.Reshma Banu**, **Professor & Head, Department of Information Science & Engineering** whose contribution in simulating suggestions and encouragement, helped us to coordinate our project especially in preparing this technical paper.

VII. CONCLUSION

A system for smart helmet has thus been developed which, through communication between a unit in the helmet and one on the vehicle. Smart helmet ensures the safety of the delivery boy, by making it necessary to wear helmet, and ensures that the rider hasn't consumed any alcohol. If any of these prime safety rules are violated, the system will prevent the biker from starting the vehicle unit and an android application is provided to the delivery boy to start the vehicle unit in case of helmet lost or forgotten. This system aims in providing a low cost safety system mainly focusing on the importance of human life.

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Smart Electronic Crutch Along with Android Smartphone for Visually Impaired Individuals

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ABSTRACT

The aim of this project is to detect an obstacle at a close distance in front of the visually impaired while walking outside and alert the user through a buzzer. The proposed system focuses on developing an android application to track the location of the user using GPS in case of any emergency and intimate to their caretaker when the user sends the location by pressing the switch. Aged peoples with blindness find problem while walking, such as unable to view obstacle at a close distance in front of them, which may inflict injuries to one-self. To overcome such problems faced by visually impaired, we have come up with a solution, which helps them to walk freely, detect the obstacle through ultrasonic sensor, and intimate to the person by buzzer. It also senses the intensity of light through LDR and illuminates LED Lamp when needed. All the hardware devises required are mounted on Renesas RL 78 microcontroller for programming the proposed system. Hence, the proposed system provides an intelligent device as a navigation tool for visually impaired. This device is used for both indoor and outdoor navigation. The main advantage of this project is to help visually impaired as well as aged people to navigate independently.

Keywords: Visually Impaired, Crutch, Renesas RL 78 microcontroller, Ultrasonic Sensor, GPS, LDR, LED Lamp, Buzzer, Switch

I. INTRODUCTION

According to World Health Organization [WHO], there are, about 285 million people suffer from lack of vision. It is estimated worldwide: 39 million are blind and 246 million have less vision. Around 90% of the visually impaired live in low-income conditions. 82% of people living with blindness are around 50 years of age and above. Globally, uncorrected refractive errors are the main cause of moderate and severe visual impairment; cataract is the leading cause of blindness in middle- and low-income countries. The number of people visually impaired from infectious diseases has reduced in the last 20 years according to global estimates work. 80% of the visual impairments can be prevented or cured.

In today's lifestyle, technology has become very dependable in many ways thereby simplifying day-to-day life. As age of human beings increase most of the people lose their eyesight nowadays, they face more problems in their daily routine life. Aged peoples with blindness find problem while walking, such as unable to view obstacle at a close distance in front of them, which may inflict injuries to one-self.
In this competitive world, the basic problem which every blind person faces is navigation. The most basic tools for them are walking cane and guide dogs and on kindness of fellow commuters. The most commonly used tool is still the blind stick. It suffers from drawbacks like lots of practice, range of motion, less reliability in terms of dynamic hurdles and range detection. Hence, the effort is to try to modify this

cane with electronic components, android application and sensors.

II. METHODS AND MATERIAL

A. Existing System

The existing system consists of the blind navigation system, which is very less and is not efficient. The blind traveller is dependent on other guide like white cane, information given by the people, trained dogs etc. Many visually impaired people use walking sticks or guide dogs to move from place to place. A guide dog is trained for guiding its users to avoid the accidents from objects and barriers over a fixed path or in a fixed area. When a visually impaired person uses a walking stick, waves the stick, finds the obstacle by striking the obstacles in their way. The usage of such old devices might be dangerous in some situations which cannot be relied on. Some new technologies which uses electronic travelling aid and sensors to develop a smart cane, work efficiently but even they are having disadvantages wherein they use all the recent technology which is of high cost which cannot be affordable by common people and such new devices are not user friendly as they are not been taught to the needy.

B. Proposed System

The proposed system consists of a system concept to provide a smart electronic aid for blind people. We propose to design an intelligent device which alerts the person on occurrence of obstacles. Here, this intelligent device not only alerts but also traces the location of the person and informs the current position of the person to their care taker through the use of GSM & GPS. The proposed system also glows LED Lamp with the help of LDR, when the intensity of light decreases. The main advantage of this project is to help visually impaired as well as aged people to navigate from one place to another. This system can be used for both indoor and outdoor navigation. The Figure (1) represents the architecture of smart electronic crutch.

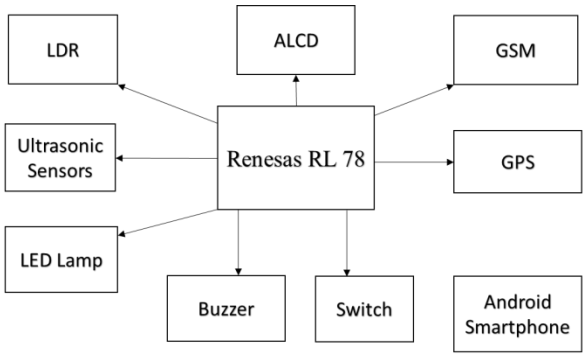

Figure 1. Typical Architecture of Smart Electronic Crutch

III. METHODOLOGY

1. **Detection of Obstacles**

   The obstacle detection circuit consists of an ultrasonic sensor interfaced to the Microcontroller Board. The sensor detects the presence of obstacle in each direction and then the range of the obstacle is calculated. If the distance is within 200cm then Buzzer will be on.

2. **Detection of Potholes**

   The pothole detection system consists of an ultrasonic sensor and a buzzer interfaced with the Microcontroller Board. The working of this circuit is based on the assumption that the height of the ultrasonic sensor mounted on the stick will remain constant in case of a plain path. But if there occurs any noticeable increase in its height from the ground above a certain threshold level (13 cm) then the buzzer will start buzzing. This will help the visually impaired person in detecting a pothole or a staircase ahead.

3. **Emergency**

   The GSM_GPS module is used in emergency situations. This module receives the information from the GPS satellite in NMEA format and transfers the latitude and longitude information as SMS message to a predefined mobile number in case of emergency.

4. **Getting latitude and longitude**

The Global Positioning System (GPS) tool is used for determining the distance between two points. The distance between two points can be found using GPS co-ordinates and earth terrestrial co-ordinate system as the GPS latitude and longitude are in terrestrial co-ordinates.

5. Create a Google Map

The link is created for calculating distance between two points. Using a DGPS (differential corrected GPS) to determine the latitude and longitudes of two points on the earth surface and determine approximate elevation measurements (feet, meters, yards, kilometres, and miles) rather than degrees, between two points is not trivial.

6. LED Lamp

When the Intensity of light decreases the LDR sensor senses and if found less than 40% then LED lamp turns ON. This provides indication to the visually impaired that they are in a darker region and it is indication to the commuters to avoid accidents.

IV. RESULTS AND DISCUSSION

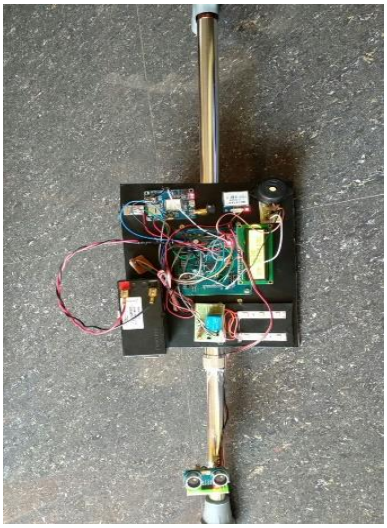

Figure 2. Working Model Of Smart Electronic Crutch

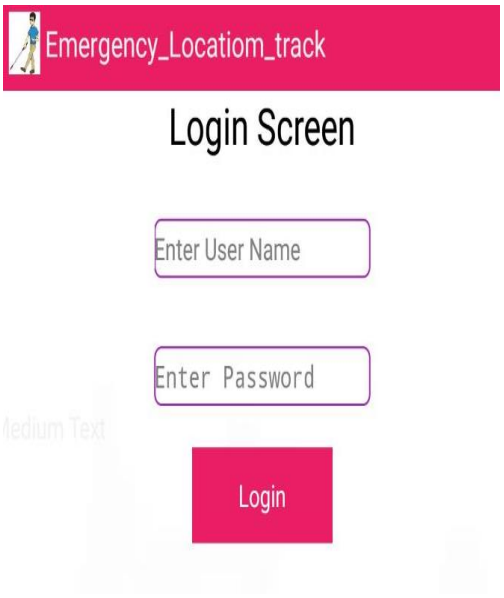

Figure 3. Care taker Login Form

The working model shown in the figure (2) gives an overview of the smart electronic crutch, which contains Ultrasonic sensor, ALCD, Buzzer, Switch, Battery, Renesas RL 78 microcontroller, GSM module, LDR and LED Lamp. The sensor is placed at the bottom of the crutch, which is placed 13cm above ground level. It will detect the obstacle, which is at the range from 13cm to 200cm. When the LUX value in LDR crosses more than 3 then the LED Lamp glows. In emergency condition, the user press the switch which is connected to GSM module which sends the location of the user through the message to the care taker.

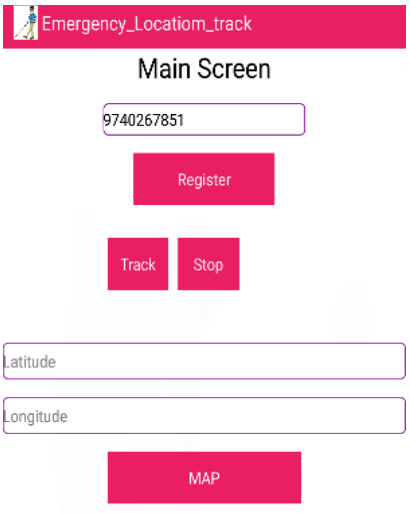

Figure 4. Registration Form

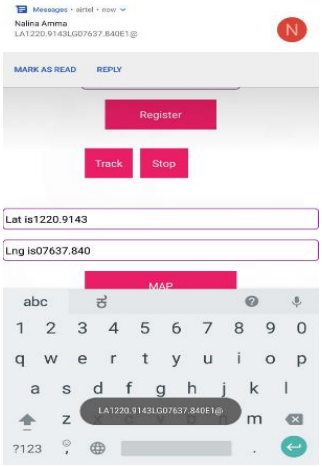

Figure 5. Fetching Latitude and Longitude

Figure 3,4,5,6 & 7 represents the snapshots of output results of an Android application been installed by the care taker. Figure (3) represents the login form for the care taker. Figure (4) represents registration form where the number used in the GSM module of the crutch is been registered. Figure (5) shows the fetching of latitude and longitude automatically through the SMS sent to care taker when the user activates the emergency switch.

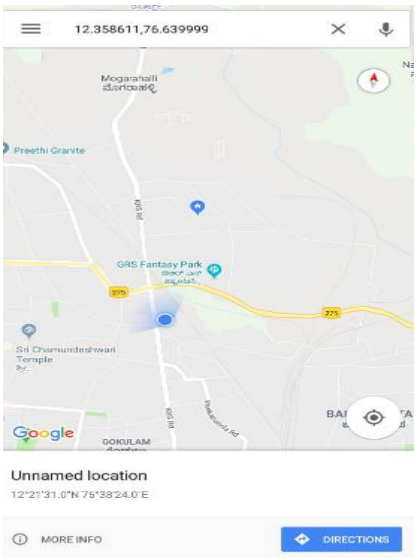

Figure 6. Location of the User

Figure 6 shows the location of the user in the google map after pressing the MAP button shown in Figure 5. The application finds the exact location of the user by using latitude and langitude data.

V. CONCLUSION

In this paper, a solution is proposed and implemented to help blind to move safely and detect obstacles in their path. Solution was composed of a stick with an ultrasonic sensor mounted on it along with an emergency switch. The proposed system contains single ultrasonic sensor through which the obstacles are detected. It also includes a two way transmission of location through GPS and it also have LEP lamp incorporated in case of emergency to protect the user. This paper can be concluded in a single sentence that is it gives an alert to the user about the obstacle using ultrasonic sensor and sends the location of the user to the care taker during emergency conditions.

With the ongoing changes taking place in today's technology the entire unit can be made into a simple and compact device. Flexible solar power developed on a plastic strip can be attached to the unit as the source of power supply.

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Non-Colluding Cloud Architecture for Privacy Preserving in Database Service

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ABSTRACT

In the present scenario, businesses and people are outsourcing database to accomplish helpful administrations and minimal effort applications. To provide sufficient functionality for SQL queries, many secure database schemes have been proposed. However, the proposed schemes are vulnerable to privacy leakage to cloud server. The main reason is that database is hosted and processed in cloud server, which is beyond the control of data owners. For the numerical range query (“>”, “<”, etc.), the schemes cannot provide sufficient privacy protection against the practical challenges. A portion of the difficulties faced are privacy leakage of statistical attributes and access patterns. Furthermore, increased number of queries will inevitably leak more information to the cloud server. In this paper, we propose a two-cloud architecture for secure database, with a series of intersection protocols that provide privacy preservation to various numeric-related range queries. Security analysis shows that privacy of numerical information is strongly protected against cloud providers in our proposed scheme.

Keywords: Cloud Computing, Database, Privacy Preserving, Range Query

I. INTRODUCTION

In the present circumstances as it can be seen cloud has taken the control over the IT business with its innumerable advantages. It holds the possibility to change an extensive segment of the IT business, making software considerably more appealing as a service. The growing industry of cloud has provide a service paradigm of storage/computation outsourcing helps to reduce users’ burden of IT infrastructure maintenance, and reduce the cost for both the enterprises and individual users. Security is the chief concern of the cloud computing. Cloud clients confront security dangers both from outside and inside the cloud. However, due to the privacy concerns that the cloud service provider is assumed semi-trust, it becomes a critical issue to put sensitive service into the cloud, so encryption or obfuscation are needed before outsourcing sensitive data to cloud.

The privacy challenge of outsourced database is two-hold.

1) Sensitive data is stored in cloud, the corresponding private information may be exposed to cloud servers.
2) The data and queries of the outsourced database should be protected against the cloud service provider.

This divide-and-conquer mechanism can know any private information from one single isolated part of the knowledge. In this paper, a secure two-cloud database service architecture is introduced, where the two clouds are non-colluding and both of them knows only part of knowledge. Based on this

architecture, a series of interaction protocols for a client to conduct numeric-related query over encrypted data from remote cloud servers is proposed. The numeric-related query includes common query statements, such as greater than, less than, and between.

II. PROBLEM STATEMENT

A. Existing System

In existing system, the perspective for privacy assurance and the data not only include permanently stored information that is the database, but also each temporary query request.

Additionally and importantly, as the assumption in some existing works, we assume that the two clouds A and B are non-colluding: Cloud A follows the protocol to add required obfuscation to protect privacy against cloud B, so that cloud B cannot obtain additional private information in the interactions with Cloud A. No private information is delivered beyond the scopes of protocols.

Disadvantages

a. While providing efficient cross server storage verification and data availability insurance, the entire focus is on static or archival data.
b. The capability of handling dynamic data remains unclear, which inevitably limits full applicability in Server storage scenarios.

B. Proposed System

In the proposed system the two-cloud scheme, the detailed interaction protocols will be provided to realize range query with privacy preservation on outsourced encrypted database. The proposed mechanism can preserve the privacy of data and query requests against each of the two clouds.

Specifically, Cloud A only knows the query request type and the final indexes, but due to dummy items appending, Cloud A cannot accurately understand the finally satisfied index set for each single request. For Cloud B, it knows the satisfied indexes of each single request, but after the proposed operations, it does not know the relationship of the corresponding items. Moreover, Cloud B can hardly distinguish whether two received columns are generated from one or more columns in the original database.

III. LITERATURE SURVEY

[1] Two- Cloud Secure Database for Numeric-Related SQL Range Queries with Privacy Preserving.
Kaiping Xue, , Shaohua Li, Jianan Hong, Yingjie Xue, Nenghai Yu, and Peilin Hong.

This paper deals withClient Module, Storage Service Module,Query Service Moduleand Cloud Service Provider Module. It also ensures the privacy preservation of data contents, statistical properties and query patternwith the support of range queries.

[2] Achieving Collaborative Cloud Data Storage byKey-Escrow-Free Multi-Authority CP-ABE Scheme with Dual-Revocation.
Nyamsuren Vaanchig, Hu Xiong, Wei Chen, and Zhiguang Qin.

The Multi-Authority Ciphertext-Policy Attribute-Based Encryption (MA-CP-ABE) is an data access control for large-scale collaborative cloud storage service is addressed in this paper.

[3] Privacy Preserving Data Storage Technique in Cloud Computing.
Dr.K.Kartheeban, A.Durai Murugan.

This paper shows how exactly the privacy is preserved and availability of information in cloud computing. The distribution of information among the multiple available Cloud service providers is done in order to preserve the privacy.

[4] RAAC: Robust and auditable access control with multiple attribute authorities for public cloud storage.

K. Xue, Y. Xue, J. Hong,W. Li, H. Yue, D. S.Wei, and P. Hong.

This paper is based on how to achieve a robust and efficient access control for public cloud storage.The Ciphertext-Policy Attribute-Based En-Cryption (CP-ABE) is the methodology used in this paper.

[5] "CryptDB: protecting confidentiality with encrypted query processing.
R. A. Popa, C. Redfield, N. Zeldovich, and H. Balakrishnan.

In this, paper the proposed CryptDB, a framework to defend the private information in databases. CryptDB fundamentally includes utilizing the range queries productively finished the encrypted information utilizing a novel SQL-aware encryption system.

IV. METHODS AND MATERIAL

This section describes the potential threats and the privacy requirements when the database is outsourced to public cloud. The stored data contents and the query processes. Although there are many data encryption schemes, some fail to provide sufficient privacy preservation after statistical analysis. Repeated and large-amount query processes not only leak the access patterns, but also disclose the stored encrypted data progressively.
The privacy issues we consider in this paper are as follows:

1. Potential Threats and Privacy Requirements.
2. Data contents Module.
3. Query pattern Module.
4. Privacy of Item Values Modules

1. Potential Threats and Privacy Requirements

This section describes the potential threats and the privacy requirements when the database is outsourced to public cloud. The stored data contents and the query processes. Although there are many data encryption schemes, some fail to provide sufficient privacy preservation after statistical analysis: Repeated and large-amount query processes not only leak the access patterns, but also disclose the stored encrypted data progressively.

2. Data contents Module

Besides the static properties can disclose the private information of data contents, such properties themselves are already sensitive and private for the client. Order Preserving Encryption (OPE), which is widely used in constructing the secure database, with support of range queries, directly exposes the statistical information in the encryption field. Furthermore, the leakage of statistic properties is part of the nature of outsourced cloud database service: the cloud can learn the statistical properties (like order) by repeated query requests. As an example, Fig. 3 describes such an attack: After two simple queries over one same column, the order relationship of some data in certain column can be determined. There are also some other direct and indirect scenarios to leak statistical properties. In this way, even though the order property is not exposed to the semi-trusted cloud at the beginning, the cloud can gradually find out the order information after many query requests.

3. Query Pattern Module

The query pattern also contains privacy information, as they can reveal the client's purpose of the query. Even worse, such pattern can leak some statistical properties, as discussed above. Based on the above discussion, we assert that an outsourced secure database providing numeric-related queries should prevent the following private information from being obtained by the honest-but-curious clouds.

4. Privacy of Item Values Modules

An ideal scheme is required to make nothing of the statistical properties be leaked to the curious clouds. However, the privacy leakage of statistical properties in a practical outsourced database system is inevitable,

as returning subset of data rather than universe requires knowledge for filtering. For instance, if the client wants to retrieve a from the outsourced database, a cloud server without any knowledge of the order can only return all items of the database to the client, which is not usable.

V. RESULT AND DISCUSSION

Figure 1. Home page

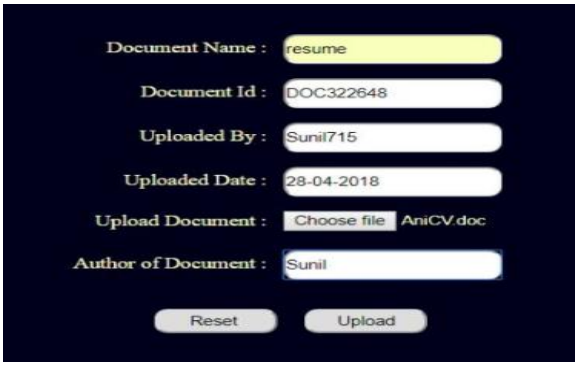

Figure 2. File upload page

Figure 3. File Request Option to the Files Uploaded By Other Users

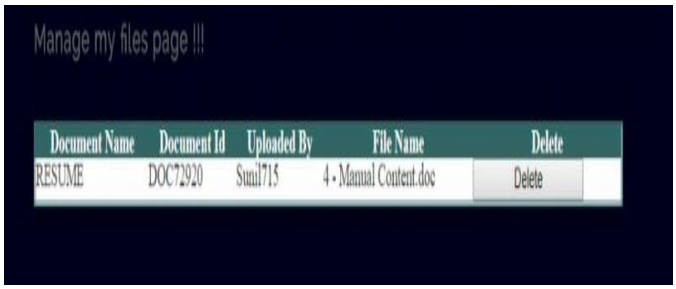

Figure 4. Manage files

Figure 5. Download File

VI. CONCLUSION

In the presented two-cloud architecture a series of interaction protocols for outsourced database service is provided, which ensures the privacy preservation of data contents, statistical properties and query pattern. At the same time, with the support of range queries, it not only protects the confidentiality of static data, but also addresses potential privacy leakage in statistical properties or after large number of query processes. Security analysis shows that it can meet the privacy-preservation requirements. Furthermore, performance evaluation result shows that the proposed scheme is efficient. In the future work, it is required to enhance the security while ensuring practicality, and to extend the proposed scheme to support more operations, such as "SUM/AVG".

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Scalabison: A Tool for Recursive Ascent-Descent Parser Generator

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ABSTRACT

ScalaBison is a parser generator accepting bison syntax and generating a parser in Scala. The generated parser uses the idea of "recursive ascent-descent parsing," that is, directly encoded generalized left corner parsing. Of interest is that fact that the parser is generated from the LALR (1) tables created by bison, thus enabling extensions such as precedence to be handled implicitly.

Keywords: LALR, Left Corner Parsing, Recursive Ascent-Descent Parsing

I. INTRODUCTION

Recursive ascent-descent parsing was proposed by Horspool [3]. The idea is to combine the power of LR parsing with the small table size and ease of inserting semantic productions available in LL parsing. Furthermore, the generated parsers can be directly encoded, in that the control is handled through executable code rather than indirectly through a table that is then interpreted. In this section we describe these concepts in greater detail.

II. METHODS AND MATERIAL

A. Left-corner parsing

Demers [2] introduced "generalized left corner parsing" which (roughly) combines the benefits of LL and LR parsing techniques. When using top-down or predictive parsing (LL) for parse the yield of a given non-terminal, one requires that the parser identify ("predict") which production will be used. Left-recursive grammars cannot be used because no bounded amount of look-ahead can determine which production should be chosen. On the other hand, bottom-up (LR) parsers can follow multiple productions as long as the ambiguity is resolved by the end of the productions. Intuitively, LL parsers require that a decision be made at the start of the productions, whereas LR can wait until the end.

Modern LL parser generators overcome some of the limitations of LL parsing by permitting the grammar writer to include code to help disambiguate cases. This is possible because the top-down parsing technique is intuitive. The disadvantage is that the grammar starts

To accrete implementation details that obscure its clarity. On the contrary, bison, especially with its precedence extensions, enables grammars to be written in a clean and clear style.

The key technique in order to perform left-corner parsing is to determine the recognition points for each production in the grammar, the points where ambiguity is resolved.

Horspool generalizes recognition points into free positions which are points where a semantic action can be inserted. The recognition point is always a free position, but not vice versa since ambiguity may arise after a free position.

B. Recursive ascent-descent parsing

Recursive descent parsing is a well-known implementation technique for predictive parsing. The parser is directly encoded as a set of mutually recursive functions each of which parses a particular non terminal.

Recursive ascent parsing uses recursive functions to directly encode a bottom- up parser. The set of mutually recursive functions consists of one function for each LR parsing state. It seems the concept was invented independently by Roberts [9] and by Kruseman Aretz [4]. Direct encoding can lead to a faster parsing for the same reason that compilation usually leads to faster execution than interpretation. Horspool [3] explains that recursive ascent parsing has not been seen as practical because of the large code size (large tables) and unintuitiveness of the technique.

C. Precedence and other extensions

The bison tool (and its forerunner yacc) includes the ability to declare the precedence and associativity of terminals enabling grammars with operators to have smaller tables. The technique gives a way to resolve shift-reduce and reduce-conflicts without the need to add new states, a new kind of parsing or any sort of indirection. Any remaining parse table conflicts are resolved in a repeatable way. Finally bison includes an error symbol that affects error recovery.

Together these extensions change the theoretical nature of the parsing problem. Thus any tool which seeks to duplicate bison's semantics of parsing cannot simply depend on generalized left-corner parsing theory.

D. Architecture of ScalaBison

The key design decision behind ScalaBison was to delegate the table construction to bison. This enables us to match the syntax and semantics of bison (including its parse table disambiguation techniques) without needing to duplicate the functionality. On the other hand, this decision is limiting in that we cannot create new parsing states arbitrarily – we can only reuse (and adapt!) the ones given to us by bison. Furthermore, it also means our tool is tied to a particular textual representation of parse tables. Fortunately, it seems the format of bison's "output" seems stable.

ScalaBison performs the following tasks:

1. Invoke the bison parser generator;
2. Read in the grammar and generated LALR(1) tables from bison;
3. Determine a recognition point for each production;
4. Identify the set of unambiguous non-terminals: non-terminals occurring after the recognition point of some production;
5. For every unambiguous non-terminal, identify a bison state to adapt into a left-corner (LC) state, and perform the adaptation;
6. Write out the parser boilerplate;
7. Write a function for each terminal (match or error) and unambiguous non-terminal (start a recursive ascent parse at its LC state);
8. Write a function for parsing each production after its recognition point using The previous functions for each symbol;
9. Write a recursive ascent function for each LC state.

In this paper, we pass over most of these tasks without comment. The interesting steps are Step iii and Step v. We briefly note however that the start symbol S will always be in the set of unambiguous non-terminals determined in Step iv because of the artificial production $S' \rightarrow S\$$ added by the generator.

E. Recognition Points

A recognition point is determined by finding the left-most position in each production which is "free" and all following positions are "free." We modify

Algorithm 2 of Purdom and Brown [8] The published algorithm does a computation over a graph for each state and each potential look ahead checking whether each relevant item dominates the action for the given look ahead symbol. We instead use a single graph for each LALR (1) state and check whether items dominate each parse action it can reach.

Precedence and associativity declarations are used by bison to resolve certain shift-reduce conflicts in favor of reductions (rather than shifts). So-called "non-associativity" declarations can even introduce parse errors. Thus with appropriate precedence declarations

a - b – c is parsed as (a-b)-c and e == f == g

is a parse error. Normally, the recognition point for binary operators is directly before the operator, but then the recursive descent part of the parser would need to be context-sensitive so that the expression starting with b terminates immediately rather than extending incorrectly through "- c" as it would normally. Thus for correctness, we force the recognition point of any rule using precedence to be put at the end.

F. Generating LC States

For each unambiguous non-terminal N , we must by definition have a production N0 → αNβ in which this non-terminal occurs after the recognition point. We wish to construct a LC state for the item N ♯ → ⊢ • N for a new artificial non-terminal N ♯. This state will be used when (predictively) parsing N . In order to avoid having to create states (and the associated parse actions) ourselves, we find an existing LALR state that contains the item N0 → α • Nβ. We use this existing state when defining the parsing actions (after the next paragraph). Figure 1 gives an example of a LALR (1) state being adapted as an LC state. The first item (for rule 7) is irrelevant to the LC state generation and is ignored. We rather use the artificial item show at the extreme right. First we "close" the new LC state, by adding new items N ′ → •α for every production N ′ → α whenever an item with N ′ immediately after the dot, provided that the recognition point occurs the dot in the item. This last condition distinguishes the process from traditional LR state generation. In Figure 1, no new items are added: the items marked REMOVED occur only in the LALR (1) state, not the LC state.

```
7 class_decl: CLASS TYPEID formals superclass '{'

  feature_list . '}'  _: |- feature_list .
12        feature_list: feature_list . feature ';'
13        | feature_list . error ';'
14        | feature_list . NATIVE ';'
15        | feature_list . '{' block '}'
16        feature: . opt_override DEF OBJECTID formals ':' TYPEID '=' expr    REMOVED
17        | . opt_override DEF OBJECTID formals ':' TYPEID NATIVE        REMOVED
18        | . VAR OBJECTID ':' TYPEID '=' expr        REMOVED
19        | . VAR OBJECTID ':' NATIVE REMOVED
20        opt_override: . OVERRIDE      REMOVED
21        | . /* empty */    REMOVED
error     shift, and go to state 49          goto 14
NATIVE    shift, and go to state 50    announce rule 14
OVERRIDE  shift, and go to state 51    announce rule 12
VAR       shift, and go to state 52 announce rule 12
'{'       shift, and go to state 53 announce rule 15
'}'       shift, and go to state 54 accept  feature_list
DEF       reduce using rule 21 (opt_override)        announce rule 12
feature   go to state 55    REMOVED
opt_override   go to state 56     REMOVED
default accept feature_list       accept  feature_list
```

Figure 1. Adapting an LALR state as an LC state.

The parsing actions of an LC state are adapted from the actions for the basic LALR state. Shift and goto actions lead to (potentially) new LC states after moving the dot over the appropriate symbol, again provided that this does not move the dot past the

recognition point. Otherwise, we need to consider whether an "announce" action is appropriate at this point. In Figure 1, the only shift/goto to remain is the one for error.

Left-corner parsing does not have reduce actions. Instead it has announce actions when the recognition point of a production is reached. If the recognition point is at the far end of a production, the announce action has the same effect as a reduce; otherwise, it means that top-down (predictive) parsing will be used for the remainder of the production.

When adapting a reduce action from the LALR state, the corresponding announce action is used if the relevant item is in the LC state. Otherwise (as seen in the example, without an item for rule 21), we are in a similar situation as we were with a shift action that does not immediately translate. There are two possibilities: one that the action corresponds to an item (or items) of the LALR state that are irrelevant to the LC state that uses it, or that it indicates parsing action beyond the recognition point of an item in the LC state. We detect the latter case by tracing the items (in the LALR state) associated with the action back to where they are generated. If we encounter an item that in the LC state is at its recognition point, we use an announce action. In this way, the reduce action on DEF is converted into an announce of rule 12. Otherwise the action is omitted from the LC state unless an "accept" action is possible (see next paragraph), in which case we use that action (as seen in Fig 1 for '}').

If the LC state contains the artificial item N♯ →⊢ N • (as in the example,

```
Private def  yystate13(yyarg1:Features): YGoto={
  Var yygoto :YYGoto = null;
yycur match {
case YYCHAR('}') => yygoto=YYNested(YYBase(YYNTfeature_list(yyarg1)));
case OVERRIDE( ) => yygoto=yynest(1,YYNTfeature_list(yyrule12(yyarg1)))

case DEF( )=> yygoto=yynest(1,YYNTfeature_list(yyrule12(yyarg1)))

case NATIVE( )=> yygoto=yynest(1,YYNTfeature_list(yyrule14(yyarg1)))

case VAR( )=> yygoto=yynest(1,YYNTfeature_list(yyrule12(yyarg1)))

case YYCHAR ('{')=> yygoto=yynest(1,YYNTfeature_list(yyrule15(yyarg1)))

case _ => yygoto =YYNested(YYBase(YYNTfeature_list(yyarg1)));
}

While(true) {
Yygoto match {
Case YYNested (g) => return g;
Case YYBase(YYNTerror(s)) =>
Yyerror(s)
Yypanic({t:YYToken=> t match {
Case YYCHAR(':')=>true
Case _ => false
}
}
)
Yygoto = yystate14(yyarg1);
Case x@YYBase(_:YYNTfeature_list) => return x;
}
}
Yygoto
}
```

Figure 2. Generated Scala code for the LC state from Figure.1.

```
/** Recursive descent parser after recognition point
 * feature_list: feature_list . feature ';'
 */
private def yyrule12(yyarg1 : Features) : Features = {
  var yyresult : Features = null;
  val yyarg2 : Feature = parse_feature();
  parse_YYCHAR(';');
  { yyresult = yyarg1 + yyarg2; }
  yyresult
}
```

Figure 3. Recognition function for Rule 12.

where N ♯ is written _ for concision), then we add the default action to "accept" the non-terminal N . Although this adaptation requires some work, by using the LALR states, we avoid the need to propagate look aheads or to negotiate parsing conflicts using precedence rules or other policies.

Figure 2 shows the generated Scala code for the LC state adapted in Figure 1. The yynest and YYNested wrappers are used to help simulate the multi-frame return instruction for recursive ascent parsing. They also catch error exceptions and convert them into error values.

Figure 3 shows the recognition function (predictive parsing routine) for rule 12. This function is called when implementing an "announce" action (as seen in Figure 2). It includes the semantic action code: in this case translated from { $$ = $1 + $2; }.

The final kind of generated function is the one that starts a recursive descent parse for a given non-terminal. Figure 4 shows the parsing function for the "feature" non-terminal. Such functions are not private so that they can be used by the code that interfaces with the generated parser.

```
def parse_feature() : Feature = {
  yystate17() match {
    case YYBase(YYNTfeature(yy)) => yy
    case YYBase(YYNTerror(s)) => throw new YYError(s)
  }
}
```

Figure 4. Parsing function for the "feature" non terminal

The generated parser has a simple interface to the scanner: the parser is started by passing it an iterator that returns the tokens.

III. RELATED WORK

The number of parser generators using LL or (LA)LR technologies is great. There are fewer tools generating recursive ascent parsers [5,10], and to our knowledge only Horspool has previously written a recursive ascent-descent parser generator.

Parser combinators

The primary mechanism for text parsing included with the Scala standard library is that of parser combinators [6]. Parser combinators are an embedded DSL in Scala for expressing EBNF-like grammars.

At a very high level, parser combinators are a representation of LL(k) parsing without using tables or explicit recursion. Instead, input is consumed by a Parser, which reduces to either Success or Failure, dependent upon whether or not the input was successfully parsed. In general, the combinator use backtracking which impacts efficiency negatively. Grammars of arbitrary complexity may be represented by combining parsers to produce a composite parser, etc.

Figures 5 and 6 compare these two radically different ways of writing parsers. The ScalaBison example is simple and clean for addition and subtraction, but much more verbose than using combinators for

actual parameters. An additional point of comparison is that the ScalaBison parsers are more efficient in time and space .

```
%left '-' '+'
...
expr    : ...
        | expr '+' expr      { $$ = add($1,$3); }
        | expr '-' expr      { $$ = sub($1,$3); }
...
actuals : '(' ')'            { $$ = Nil; }
        | '(' exp_list ')'   { $$ = $2; }
        ;
exp_list: expr               { $$ = List($1); }
        | exp_list ',' expr  { $$ = $1 + $3; }
        ;
```

Figure 5. Parsing addition/subtraction and actuals with ScalaBison.

```
def exprNoEq = exprNoAdd ~ rep(
    "+" ~> exprNoAdd ^^ { e => add(_:E, e) }
  | "-" ~> exprNoAdd ^^ { e => sub(_:E, e) }
) ^^ collapse
...
def actuals = "(" ~> repsep(expr, ",") <~ ")"
```

Figure 6. Parsing addition/subtraction and actuals with combinators

IV. CONCLUSION

ScalaBison is a practical parser generator for Scala built on recursive ascent-descent technology that accepts bison format input files. It uses bison's LALR(1) tables to build its own LC tables and thus is able to provide the same semantics of conflict resolution that bison does. The parsing speed and space usage are competitive with Scala's built-in parser combinators.

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Bottleneck Management Using Consecutive Intervention Annulment in Deeply chocked G2G Networks

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ABSTRACT

The Internet of Things (loT) and particularly Gizmo-to-Gizmo (G2G) communications are considered as major enablers for future smart cities' initiatives. While offering a wide range of applications and services, supporting such devices constitutes, however, one of the most important challenges to be faced by Network Operators (NO). Indeed, the expected huge number of devices requesting to connect to the network at the same time may result in severe Bottleneck in the access network with a high risk of Bottleneck collapse. Although there has been exploitation of the physical layer technique enhance the capability of multi-trip system, link scheduling problems still exist. Link scheduling problem addressed with a cross layer design. Cross layer design is a process of solving Bottleneck and scheduling problems in wireless systems wherever nodes capable by way of the Consecutive Intervention Annulment (CIA) capability under Signal to Interference Noise Ratio (SINR) model. CIA an efficient advance to tolerate the multiple adjacent concurrent communication to coexist, enable multi-packet reception. Cross layer design placed among the physical layer and MAC layer. The technique of both layers can support the additional difficult cross layer design intended use of improve system process. The proposed system consists of distributed link scheduling for solving the interference occurring during communications. This scheduling is an effectual process used for managing the interference relationships and with the help of advanced physical layer technique using CIA to take out the interference moreover decode the data by receivers.

Keywords: MTC, Gizmo-to-Gizmo, smart cities, IoT, LTE-A, Random Access, ACB, Bottleneck, Cross Layer Design, Interference, Physical Layer Techniques, Scheduling

I. INTRODUCTION

The "Smart Cities" initiatives have been recently pointed out by many experts as an emerging market with enormous potential, which is expected to drive the digital economy forward in the coming years [1][2]. With the potential number of applications and services based on Gizmo-to-Gizmo (G2G) communications, it is expected that this technology will play a determining role in smart cities development [3] [4]. G2G communications are expected to grow more and more during the next coming years, reaching 10.5 billion connections by 2019 (up from 3.3 billion in 2014) [5]. Supporting efficiently such huge number of devices within current and future mobile networks (i.e. 50) is of a paramount concern for mobile network operators. Indeed, enabling a full automation of sensors and actuators comes with a cost of an increased number of devices requesting simultaneously the establishment of a connection with the access network (i.e. eNB). This may result in severe

Bottlenecks, between the different terminals attempting to access the network, with a high risk of Bottleneck collapse [6]. Figure 1 illustrates a typical mobile network architecture and highlights the different locations in which there are potential risks of Bottleneck. As it can be seen, the Random Access Network (RAN) is not the only part of the mobile network concerned by the Bottleneck. However, the RAN constitutes the most challenging part since the resources at the core network can be scaled easily, as shown in some recent contributions [7]. Indeed, the number of resources at the access (i.e. opportunities to connect) is very small compared to the potential number of G2G devices willing to connect. Moreover, the diversity of both G2G applications (including prioritized G2G) and traffic patterns makes the handling of G2G devices even more complex.

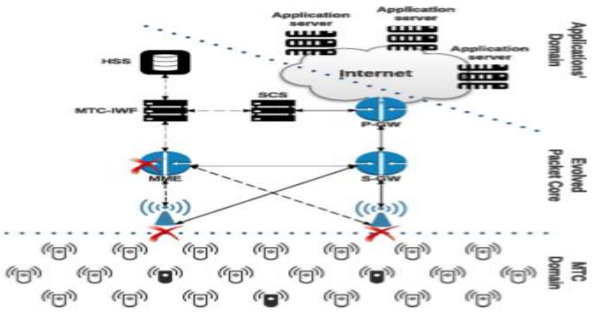


Figure 1. G2G Bottleneck Location

In this article, our main concern is to identify the risks existing in heavily chocked G2G network. Another important concern consists in highlighting some architectural lacks in the current 3GPP model.

To overcome the problem of 3GPP model we use CIA technique which can be applied to both G2G devices and other chocked networks. CIA is a technique that helps to promote the better communication and to result in increased throughput performance. During communication nodes are endowed with CIA in the context of cross layer design. Cross layer intend placed between the adjacent layers for instance physical layer and MAC layer for exploiting the dependencies between the layers and used to support the data services between the layers in the system because the physical layer is in charge for the reception of data and MAC layer is responsible for scheduling communications. Successive interference cancelation (CIA) is sophisticated physical layer technique gives a recipient the ability in the direction of decode two or extra concurrent data packets successively until the data obtained at a particular receiver. At each one step of decoding the receiver have to make certain that the signal presently enhanced meet the SINR requirement or else, no additional decode is achievable.

II. BRIEF OVERVIEW OF THE 3GPP MODEL FOR HANDLING G2G DEVICES

Among different mechanisms introduced by the 3GPP, the ACB is certainly the most popular as it tackles the Bottleneck at its root (i.e. at the access network level). The ACB mechanism handles the problem of random access Bottleneck based on two barring parameters: (1) a barring factor acBarringFactor or p and (2) a barring time ac-Barring Time. Before establishing a connection with the network, the G2G devices, arriving at the state x1 with the average rate λ, check whether they are allowed or not to apply for radio resources. At this state, the devices receive the ACB factor p from the eNB and then start checking the ACB. Thus, the devices pass to the state x2 with the probability p, where they can try to be connected with the eNB by attempting the RA procedure.

Note that the ACB mechanism can be combined with other existing approaches to address more efficiently the access network overload.

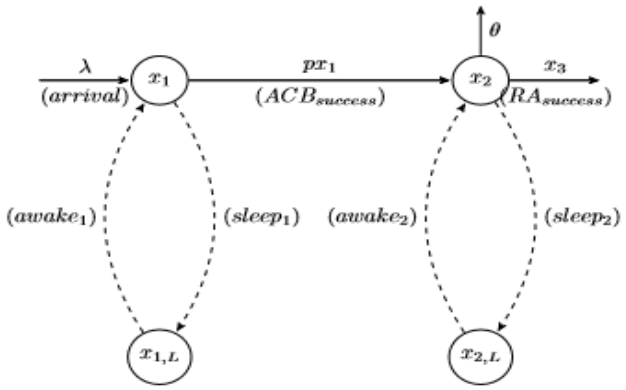


Figure 2. System Model

Otherwise, the devices go to a waiting state x1, L, in which they are blocked during a T barring time (computed based on ac-Barring Time) before retrying a new ACB check [14]. At the x2 state, the G2G devices choose randomly one of the available RACH preambles. If a preamble is chosen by only one device, the eNB indicates a successful preamble transmission 2. If a particular preamble is selected by at least two devices, a collision occurs. The collided devices go to a new waiting state labelled x2, L during a random back off time, which is calculated by each terminal. At the expiration of this latter, the different devices return to state x2 and retry the RA process as long as the maximum number of preamble re-transmissions denoted by Rmax is not reached [15]. Alternatively, the devices leave the system, with an average rate of θ, and may retry the access later on from the starting point. The whole G2G model described above, is illustrated in Fig. 2.

III. LACK OF 3GPP MODEL

Even if it was introduced to deal with the random access Bottleneck, the existing ACB schemes turn out to be ineffective in case of heavily chocked G2G networks. In fact, the ACB is efficient only when the number of devices in the states x1 and x2 is known precisely. However, in most of the overload situations, these numbers are not known accurately. Thus, even if a good network controller is applied to deduce the best blocking probability, its performance is closely related to the estimation of the number of devices in these states. For some types of G2G devices, like event-driven terminals, the devices' arrival can be at best bounded as the process of arrival is generally a mixture of diverse distributions (e.g. Poisson for credit machine in shops, Uniform for traffic lights and Beta for event driven applications). Worse, there is also no mean to know exactly the number of devices that passes the ACB check (i.e. devices passing at state x2), which makes the problem even more complicated. Indeed, even if a small ACB access probability is applied, to block more devices from attempting the access, the accumulated number of devices going to state x2, is far bigger from the limited number of available preambles during one RACH opportunity. Moreover, the number of back-logged devices at state x1 cannot decrease as there is no defined exit strategy in the 3GPP model.

IV. PROPOSED SYSTEM

Proposed system consists of Distributed Link Scheduling for managing the inference links during communication. Initially, nodes are constructed, and energy assigned to each and every node that is deploy in the system. Then find the source node and receiver node with localization process. Among the physical layer and MAC layer, the cross layer design is implemented. Cross layer design is generally used to develop the system performance. System formation achieved in the cross layer design; where nodes endowed with CIA capabilities under SINR interference model. The cross layer design used for supporting the data services between the layers and uses the functionalities of both physical and MAC layers for obtaining better performance between the protocol layers in the system. CIA is a very capable interference utilization technique due to its enable of several simultaneous communications. SINR calculated with noise power, data communication rate, and interference of other data. SINR threshold value must be maintain to hold up the successful transfer the link. If the SINR condition is not met, after that the acknowledged package cannot properly extract from the receiver node then again sender has

to retransmit packets. Cross layer design with CIA constraints provides the security against packet loss by solving the link scheduling problems develops a distributed link scheduling algorithm. The decentralized approach uses Distributed Link Scheduling algorithm for activation of interference links. By this Distributed link scheduling ability to improve the throughput performance of a system is improved.

V. SYSTEM DESIGN

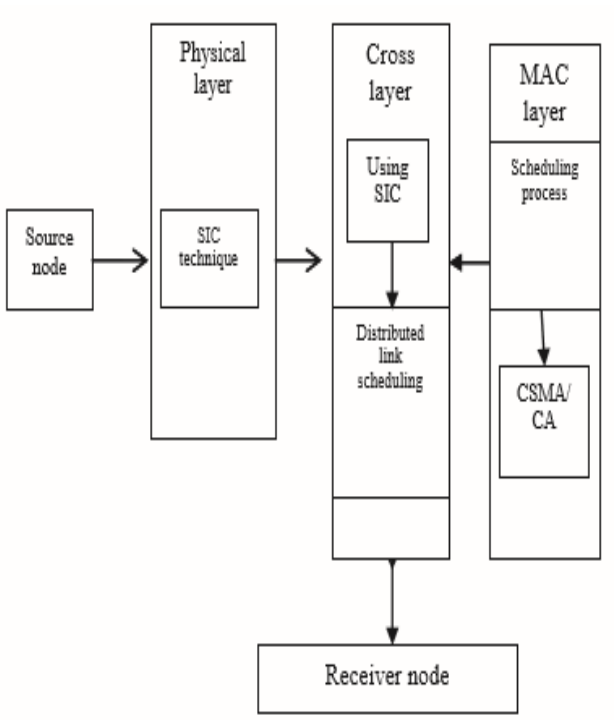


Figure 3. Block Diagram

The following diagram typically explains the wireless multi-hop system where packets are transmitted from the source node to receiver node throughout the layers. Cross layer placed between the physical and MAC layer for improving the Source system performance and uses the functionalities of both layers. Physical layer consists CIA techniques endowed with each node, and MAC layer is responsible for scheduling the communications. Manage the interference links between source nodes to receiver node using distributed link scheduling in a distributed manner and avoid data collision with CSMA/CA. When a packet arrives at receiver node checks data with CIA under SINR model. By this scheduling process, throughput performance of system increases.

VI. SYSTEM IMPLEMENTATION

A. System Formation

A group of nodes is deployed in a system and forms different type of system topologies. Set command is used to create the nodes. Location of the nodes programming with X and Y coordinates, the relation between nodes is determined by the choice of the participating nodes involved, not by an based on random choice. In system energy of each node is created and Assign IP addresses and MAC addresses and then use System Animator (NAM) tool to provide a visual interpretation of system topologies to present throughput, some packets on each link.

B. Localization Process

The goal of localization process is to determine the accurate position of nodes with the help of localization algorithm. By this process can quickly identify the source node and receiver node in the system. With these process can able to divide the system into regions such as interference area and non-interference area.

C. Cross layer Design With CIA

Initially, nodes are deployed in a system with IP address, MAC process. After the formation of a system have to identify the location of the nodes using localization algorithm because the nodes will be a static or dynamic process and after identification of sender and receiver node transmit the data packet through a link. When transferring the data there may be interference will occur so with the help of physical layer technique can able to control the interference in a system then data will send to a receiver without any disturbance. CIA method is a physical layer technique give a receiver the capability to make out two or more simultaneous data packets consecutively until data obtained at a particular receiver. Then distributed scheduling algorithm is used for problems occurring during communication in

cross layer for reducing the data collision then finally analysis the result.

D. Distributed Link Scheduling

Link scheduling is a process of determining the links for communication at a given time slots based on current traffic. During the process of scheduling, there will be some interference occurring between the neighbourhoods nodes. For solving such interference problems, in existing system GMS method is used in a centralized manner. Even in these, some utility maximization problem occurs, so GMS was developed with a decentralized approach. The main drawback of solving the interference problem is its limited region. So a distributed link scheduling algorithm is proposed with interference localization technique along with timeslots. In systems, simultaneous communications by immediate neighbourhood in the order of the receiver of a exacting link may create major increasing resistance. For these communications, a neighbourhood of each section is determined such that the interference outside the area has only a insignificant impact on its receiver node. This interference localization technique is used to localize interferences for maintaining the scheduling feasibility. With the help of this method, the scheduling process is done with CSMA/CA for avoiding the data collision with time back off the counter. In this process check links may or may not be clear. If the link is not clear then, the node has to wait for some time but if back off counter is zero then process set again and continued. By this distributed link scheduling process the system performance increases and at receiver node checks data with CIA constraints.

Simulation parameters

Number of nodes	50
Simulation time	100
Packet size	512 bytes
Data rate	1.0
Channel	Wireless channel
Traffic type	TCP
Application	FTP

TABLE 1: simulation parameters

E. ALGORITHM

Initialization: Find Na (Li) and Nb (Li) for every Implicit connection Li. Decision schedule selection m

Implicit connection Li chooses an arbitrary back-off time consistently within [1, Wt], also starts back-off.

Implicit connection li., stop the back-off timer while one of the accompanying two circumstances is legitimate: (1) Li hear an TARGET message as of Implicit connection KJ, and connection Li and K are clashing connections, or (2) other Implicit connections in V (l) send TARGET messages.

After li completes the back-off, send TARGET message to declare expectation to incorporated into choice timetable.

If "conflict" among the TARGET messages, Li will not be incorporated in m (t) in this manage slot.

Set-up of communication state

Any connection Li in m be able to alter its communication state if both of the accompanying circumstances are fulfilled:

ɣK ϵ N (l), if Implicit connection KJ dynamic past data slot, Li and K can coexist conventional SINR restraint.

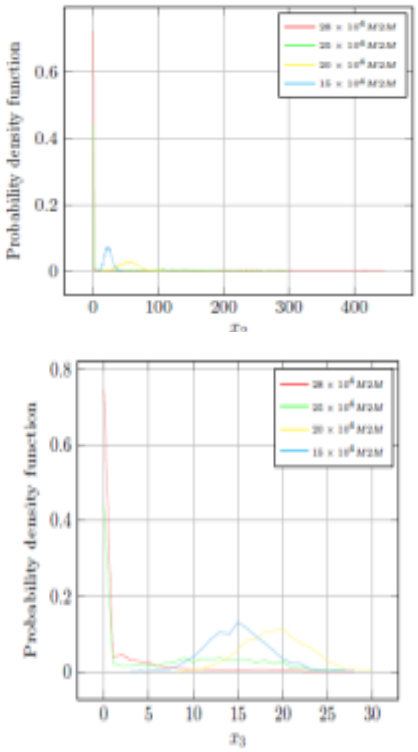
No Implicit connection in N(l) is dynamic in past information opening.

On the off chance that the above conditions are substantial, Li will alter its state as takes after: let I(t) with creation probability P Li, and Zi(t) = 0 with likelihood li =1-Pli.

On the off chance that either condition is not fulfilled,
then Zi(t) = Zi(t-1). information communication
If Zi(t) = I,l will transmitting utilizing setup I data slot.
If Zi(t) = 0, l will not transmit data.

First initialize the node links which is going to perform the communication. The links are scheduled using the back off timer. After finishing, it sends an alert message.

After the scheduling process, the communication state is set up for the nodes according to the constraints. Then the data communication is done.



VII. CONCLUSION

We addressed the problem of heavily crowded G2G network in which there is a high risk of G2G terminals' harmonization. Indeed, as identified in this paper, these networks present resources under-utilization problems and may result in a congestion collapse. We demonstrated that even when applying an efficient ACB mechanism, harmonization cannot be really avoided, which may lead to poor network performances. In fact, in case of heavily congested networks, the increased number of G2G terminals (i.e. increased number of RA attempts) goes along with a significant reduction of the number of successful RA and resources' under-utilization. Besides, we identified the origins of the congestion and proposed some remedies, which may allow relaxing the congestion at the access.

As future works, we intend to cope with the problem of synchronization. We propose to design a smart access mechanism, which estimates more accurately the number of devices attempting the RA while taking into account the structural architecture of the 3GPP model for G2G devices.

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Wireless Communication between Engine Test Cell and Console Corridor Control Panel

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ABSTRACT

Due To Development Of The Microelectronics, Wireless Communication Technology Undoubtedly Provides People With A Convenient, Fast And Effective Mode Of Communication. It Has Been Used Widely In Industrial Production For Data Acquisition And Transmission Of Complicated, Hostile Environmental Conditions And Other Places That Are Inconvenient To Reach. Utilizing This Technology We Are Establishing "Wireless Communication Between Engine Test Cell And Corridor Control Panel" For Engine Testing Department, Engine Division, Beml Mysuru. We Are Making Use Of Microcontroller That Is Based On The Arduino Uno Platform Which Is The Core Of Monitoring And Display System. Magnetic Pickups And Load Cell Together Helps To Collect Data Of Speed And Torque Of The Engine Respectively. The Acquired Data Is Transmitted Through Rf433mhz (Tx/Rx) Module And Finally Displaying The Results Of Communication On A Display.

Keywords: Arduino Uno, magnetic pickups, load cell, RF433MHZ, wireless communication.

I. INTRODUCTION

BEML Ltd Company was incorporated by Government of India as a public sector under the control of Ministry of Defence. Among many manufacturing units spread across the country, one is located at Mysuru, comprising of Equipment Division and Engine Division.

Engine Division: Engine Division manufactures heavy duty Diesel Engines for application on a wide variety of Earth Moving, Mining and Construction Machinery. BEML Engines are used on Bull Dozers, Dump Trucks, Motor Graders, Wheel Loaders, Pipe Layers, Hydraulic Excavators, Loading Shovels, C Crane, Aircraft
Towing Tractors, Backhoe Loaders, Water Sprinklers, Water Well Rigs and DG sets.

Engine Testing Department

The Engine is being assembled in the assembly shop and it is moved to the Engine Testing Department for testing. There is a reference to test the Engine called as EPTS (Engine Performance Test Standard as per ISO 9249).

Engine testing site comprises of Test Cell and Corridor. The Test Cell is equipped with Test bed (to accommodate the Engine) and Dynamometer (to load the engine to be tested on to the test bed). The control panel is installed at the console corridor which is nearly 2.5 meter height & 5 meter distance from the Test Bed.
During testing, the test cell operator and the control panel operator have to communicate with each other for adjusting different engine parameters like low idle speed, high idle speed, power and torque to satisfy the EPTS.

II. METHODS AND MATERIAL

In the existing system, during engine testing the test cell operator has to go to the control panel repeatedly to see the changes which he adjusted in the first attempt and to reiterate the process until achieving the required values.

The test cell operator has to depend on the hand gestures of the control panel operator to adjust the parameters in FIP (Fuel Injection Pump) of Engine.

This time consuming activity is because of "absence of FIP parameters display within the test cell". These primitive methods increases the total time required to test the engine (increases test bed time i.e., consumption of more resources) and also leads to miscommunication and inaccuracy.

Considering these difficulties and to decrease the engine testing time, we are displaying the engine parameters (speed, torque and power) within the test cell so that the test cell operator can see the display and adjust the FIP parameters very accurately and quickly.

In the proposed methodology, Magnetic Pulse Pickup and Strain Gauge Load Cell sensors outputs are processed in Mother Board. The processed signal from Mother Board is read by Arduino microcontroller which is installed at the console corridor end and is transmitted through RF transmitter .It is then received by RF receiver of another Arduino this is installed in the test cell area and various engine parameters are displayed on any convenient form of digital display.

The components used as shown in the block diagram (Fig 1) include the following:

1. A sensor, Magnetic Pulse Pickup that gives the output as frequency which is directly proportional to speed of engine.
2. Another sensor called strain gauge load cell which gives electrical signal as output whose magnitude is directly proportional to the force being measured.
3. In signal conditioning block the sensors outputs i.e., a frequency output from the magnetic pick up and mille volts signal from strain gauge load cell are converted into suitable form(0 to 10 v dc)for further process
4. Arduino microcontroller; very important part of the system where programming is written and also acts as a platform for conversion of data and other operations. We use 2 Arduino Uno boards; each at transmitter and receiver end.
5. RF433MHz transmitter (Fig 2) and receiver (Fig 3) pair is used for communicating the data between two Arduinos; through a wireless means.
6. A digital display system is provided inside test cell area for displaying various engine parameters (speed, torque and power) for monitoring purpose.

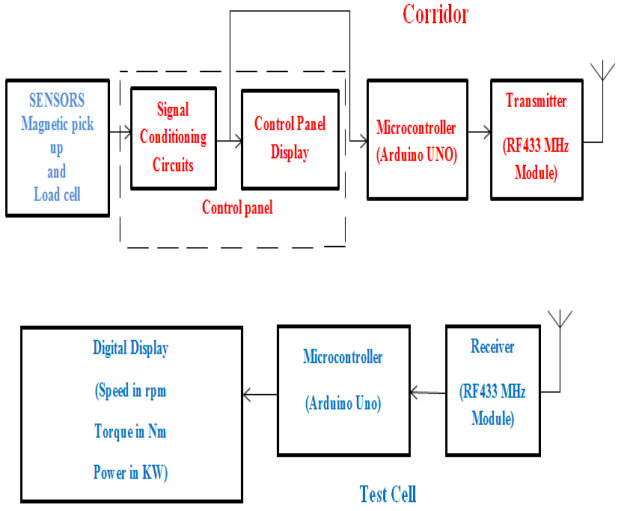

Figure 1. Block Diagram of Proposed System

III. RESULTS AND DISCUSSION

Engine parameters such as Speed and Torque are sensed by magnetic pickups and load cell respectively, corresponding Power is calculated using speed and torque values. These are read by microcontroller, transmitted wirelessly using

RF433MHz and displayed on a display for monitoring.

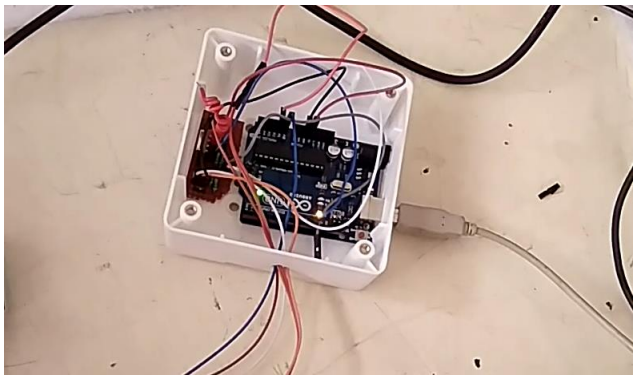

Figure 2. Transmitter

Figure 3. Receiver

IV. CONCLUSION

We have successfully completed the project and are able to transmit the data wirelessly and receive the same using arduino and display the received data (various engine parameters) on a suitable digital display for monitoring and controlling.

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Duration Prediction Using Multiple Gaussian Process Experts for GPR-Based Speech Synthesis

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ABSTRACT

This paper proposes an alternative multi-level approach to duration prediction for improving prosody generation in statistical parametric speech synthesis using multiple Gaussian process experts. We use two duration models at different levels, specifically, syllable and phone. First, individually train syllable and phone-level duration models. Then, the predictive distributions of syllable and phone duration models are combined by product of Gaussians. The means of combined predictive distributions are used as predicted durations for synthetic speech. We show objective and subjective evaluation results for the proposed technique by comparing with the conventional ones when the techniques are applied to Gaussian process regression (GPR)-based speech synthesis.

Keywords: Multi-Level Model, Duration Prediction, GPR-Based Speech Synthesis, Product Of Guassians, Multiple Gaussian Process Experts

I. INTRODUCTION

Gaussian process regression (GPR)-based speech synthesis [1] has been successfully developed to overcome the limitations of hidden Markov model (HMM)-based speech synthesis [2]. In the GPR-based technique, frame-level acoustic features and linguistic information are defined as output and input variables of a Gaussian process regression, respectively. Speech parameters are generated by means of inference from new given input variables. The main goal of speech synthesis is to generate natural sounding and intelligible speech. Duration is one of the most important prosodic features which affects naturalness and meaning of synthetic speech. Single phone duration modeling has been successfully applied to duration prediction of given text in the GPR-based framework [3]. How-ever, predicted durations are not perfect because a single phone-level model is insufficient to capture prosodic features in longer units. For example, in Thai language case, stress in the syllable layer is a cru-cial factor that affects tone contour, syllable duration, and sentence structure [4, 5].

To incorporate the characteristics of multiple layers into prosody generation, various techniques have been proposed to combine multiple models of different layers. In [6], longer unit models were integrated with a state-level model in speech parameter generation by maximizing joint probability. Speaking rate-dependent hierarchical prosodic model (SP-HPM) [7] utilized a hierarchical structure including prosodic-acoustic features, linguistic information, and prosody structure for speaking rate modeling. In [8], a product of experts framework was proposed, which jointly trains multiple acoustic models for speech synthesis. In our

previous work [9], we proposed two-stage duration modeling which utilized a syllable-level model for predicting syllable durations and using the result as an additional context for a phone-level model in GPR -based duration prediction. Although the two-stage model has shown significant improvement in duration prediction accuracy, it is still imperfect since the syllable-level model has not been used explicitly in generating duration for speech synthesis. In this paper, we propose an alternative technique for duration prediction using multiple Gaussian process (GP) experts in the GPR based speech synthesis. First, we individually train phone and syllable duration models. In duration prediction, we express syllable duration by the sum of phone durations. Then, the predictive distributions of phone and syllable models are combined by product of Gaussians. The predicted duration can be obtained by calculating model parameters of the combined model. We show performance evaluation results of the proposed technique by objective and subjective tests.

II. GPR-BASED SPEECH SYNTHESIS

Let X = [x1, x2, ..., xN]!, and y = [y1, y2, ..., yN]! be the matrix forms of frame-level contexts, and acoustic features of training data, respectively. The frame-level1 context xi contains temporal events xi,k as follows:

$$xi = (xi,1, xi,2, \ldots, xi,K)$$
$$xi,k = (pi,k, ci,k) \quad (1)$$

where each temporal event xi,k is composed of linguistic information ci,k and relative position pi,k in speech units. In GPR-based speech synthesis, y is assumed to be sampled from a Gaussian process that can be expressed by

$$y \sim N(0,KN + \sigma 2I) \quad (2)$$

where KN is a covariance matrix of training data. Let XT and yT be matrix forms for test data. Then, the predictive distribution of yT is given by

$$p(yT \mid y,X,XT) = N(yT ;\mu T ,\Sigma T) \quad (3)$$
$$\mu T = KTN[KN + \sigma 2I]{-}1y \quad (4)$$
$$\Sigma T = KT + \sigma 2I - KTN[KN + \sigma 2I]{-}1KNT \quad (5)$$

where KT and KNT are covariance matrices of test data and between training and test data. In the covariance matrices, the correlation between xm and xn can be obtained by the kernel function κ(xm, xn) as follows:

$$\kappa(xm, xn) = \sum_{k=1}^{K} \theta k \, Kk(xm,k, Xn,k) + \delta mn \theta 2 \, floor \quad (6)$$

where θ2k and θ2 floor are kernel parameters. The function κk(·) is defined for the k-th temporal event. When synthesizing speech, we generate a speech parameter sequence using the predictive distribution [3, 10]. Since GPR is a nonparametric model, the predictive mean is obtained directly from acoustic features of training data y, which would result in natural sounding speech parameter sequences.

III. DURATION PREDICTION BY MULTIPLE GP EXPERTS

Thai syllable has four components, initial consonant, vowel, final consonant, and tone [11]. Final consonant can be absent in some syllables. In studies of Thai language, prosody is often described in syllable unit where a position of stressed/unstressed syllable affects perception in sentence structure [4, 12]. Stress in Thai has two main acoustic features, F0 contour and duration, where the duration is the most dominant [5]. Furthermore, it is shown that whether a syllable is stressed/unstressed influences the durations of vowel

and final consonant in that syllable [13]. From this viewpoint, we propose an alternative multi-level model for duration prediction by using syllable- and phone-level models. In the proposed technique, we use multiple Gaussian process experts in a similar way as [14] which maximize the likelihood of product of multiple predictive distributions: syllable duration

$$p(ds_T | ds, Xs, Xs_T) \text{ and phone duration } p(dp_T | dp, Xp, Xp_T) \text{ where } Xs$$

and Xp are input variables of syllable and phone duration models, respectively. Matrix forms of syllable durations ds and phone durations dp are output variables of syllable and phone duration models, respectively. The product of distribution is expressed as

$$p(dp_T | ds, dp, X, XT) = 1Zp(ds_T | ds, Xs, Xs_T) \cdot p(dp_T | dp, Xp, Xp_T) \quad (7)$$

$$ds_T = [ds_1, ds_2, \ldots, ds$$

where ds T and dp T are matrix forms of syllable and phone durations of test data, respectively, and Z is a normalization term. Syllable duration dsi is determined by the sum of phone durations dp i,j within the syllable as follows:

$$dsi = m!(i), j=1 \; dp_{i,j} \quad (10)$$

where m(i) is the number of phones in i-th syllable, whose value is 2 or 3. Then, the relationship between syllable duration and phone duration can be written in a matrix form using a transformation matrix was follows:

$$ds_T = W dp_T . \quad (11)$$

For example, suppose that a sentence has 3 syllables and respective syllables have 3, 2, and 3 phones.

Since the predictive distribution of syllable duration is Gaussian, it can be reformulated in terms of phone duration in the same way as the formulation of trajectory HMM framework. Then, the mean and covariance of the predictive distribution are given by

$$\mu D = \Sigma D(r + \Sigma pT - 1 \mu pT) \quad (18)$$

$$\Sigma - 1$$

$$D = P - 1 + \Sigma pT - 1. \quad (19)$$

Finally, we use the mean μD as the synthetic phone duration sequence.

IV. EXPERIMENTS

We conducted experiments to evaluate the performance of the proposed technique. In the experiments, we compared three techniques: single model, multi-level model by two-stage prediction, and multiple Gaussian process (GP) experts model. Figure 1 summarizes these prediction approaches. The single model is the conventional GPR-based approach [3] that uses a single phone model for duration prediction. The two-stage model is our previous approach that was proposed in [9]. In the two-stage model, we used syllable duration as an additional context for phone duration prediction. The syllable duration context for test data can be predicted by the syllable duration model. The proposed technique, multiple GP experts model, combines phone and syllable duration models for phone duration prediction as described in Section 3.

A. Experimental condition

The speech database used in the experiments was a set of phonetically balanced sentences of Thai speech database, T-Sync-1 developed by NECTEC ([16]). The sentences were uttered by one professional female speaker with clear articulation in the reading style of standard Thai accent. We used 450 utterances and 50 utterances for training and evaluation, respectively. The training data contained 13733 syllables. The test set for evaluation was not included in the training data.

We used the conventional phone-level context of GPR-based Thai speech synthesis [9] for training and prediction. The phone based contextual factors are summarized in Table 1. The context is composed of linguistic information in phone, syllable, word, and utterance layers including their relative position in different scale units.

The phone-level context was used for training and prediction in each phone-level model of all techniques. For syllable duration model, we used syllable-level context which is composed of linguistic information in syllable, word, and utterance layers. In the syllable layer, the context includes phonetic features of phones in syllable and tone. The syllable-based contextual factors are summarized in Table 2. We used the kernel function described in [9] to calculate the distance of each temporal event.

We used speech signals sampled at a rate of 16kHz. Spectral features, aperiodicity, and F0 were extracted by STRAIGHT [17] with 5-ms frame shift. The acoustic feature vector consisted of the 0-39th melcepstral coefficients, 5-band aperiodicity, log F0, and their delta and delta-delta coefficients. In GP model training, we employed partially independent conditional (PIC) approximation [18], and the kernel function parameters were optimized by EM-based method [19].

B. Objective evaluation results

In the objective evaluation, we measured duration distortion between synthetic speech and the original one in phone and syllable units.

The RMS errors of phone and syllable durations are shown in Figs. 2 and 3, respectively. The two-stage model and proposed technique Table 1. Phone-level context based on temporal events for Thai GPR-based speech synthesis.

Figure 4 shows an example of syllable duration errors in a test sentence where each bar represents the difference between the predicted syllable duration and the original. It can be seen that the proposed technique provided smaller errors than the other techniques in almost all syllables.

C. Subjective evaluation results

We conducted MOS and forced choice preference tests to evaluate the perceptual quality in the naturalness of predicted duration. Participants were ten Thai native speakers. Each person evaluated ten speech samples that are randomly selected from 50 test samples. In the MOS test, the participants evaluated each sample on a five-point scale from 1 to 5 according to their satisfaction in the naturalness of syllable and phone duration. The definition of the rating was 1: bad, 2:poor, 3:fair, 4:good, and 5:excellent. Participants could repeat playback as many times as they required for evaluation. Figure 5 shows the resultant scores with 95% confidence intervals. It is shown that the proposed technique achieved higher score than the single model. Moreover, the two-stage model got slightly higher score than the proposed technique, but the difference is statistically insignificant.

In the forced choice preference test, the participants were asked to choose more natural one in terms of phone and syllable durations for each pair of speech samples. The participants could repeat playback as many times as they required in the same way as the MOS test. Figure 6 shows the result of forced choice preference test. It is seen that the participants preferred the proposed technique than the single-level model. When comparing the proposed technique to the two-stage model, we see that the two-stage received more preference even if the proposed technique gave lower syllable duration distortion.

One reason might be that the perception of stress intensity is highly dependent on the durations of vowel and final-consonant than that of an entire syllable. This means that even though the duration of initial consonant is very long, the participants may

not perceive it as stressed syllable if vowel and final-consonant durations are short.

Therefore, the accuracy of phone durations is more significant in the perception of naturalness than syllable durations.

V. CONCLUSION

We have proposed an alternative technique of multi-level model for GPR-based duration prediction. In the proposed technique, we firstly train phone and syllable duration models independently. In duration prediction, we explicitly express syllable duration as the sum of phone durations. Then, the predictive distributions of syllable and phone durations are combined by product of Gaussians.

The objective evaluation results showed that the proposed technique gave smaller distortion than the two-stage and single model techniques in syllable duration distortion. The subjective evaluation results showed that the proposed technique is comparable with the two-stage model. In future work, we will conduct experiments with a larger number of syllables since Thai syllables are quite complex and the current amount of syllable data might be insufficient.

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Women's safety using IOT

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ABSTRACT

Nowadays, women and children safety is a prime issue of our society. The count of the victim are increasing day by day. In this paper, We are proposing a model which will help to ensure the safety of women and children's all over the global. We have used different sensors like heartbeat sensor, temperature sensor, accelerometer sensor for detecting heartbeat, temperature and sudden change in motion of user. We have also used GPS which will help to detect location of the device. GSM used in the model is used to send alert message to guardians, relatives and police station. We have proposed IoT (internet of things) based device, which will help to continuously monitor values of different sensors and GPS used in device.

Keywords: IoT, Microcontroller, HELP, GSM, GPS, Sensors

I. INTRODUCTION

At the present scenario Women are competing with men in every prospect of society. Women contribute fifty percent to the development of our nation. But the women have fear of getting harassed and killed. All these types of women harassment cases are increasing day by day. Therefore, it is very important to ensure the safety of women.

In this paper, proposed model of a band will provide a required safety to women so that they can do late night work. Proposed model contains various sensors which will measure different parameters continually. IoT (internet of things) is relatively new and fast-developing concept. By using IoT-based technology guardians, relatives and police can monitor and track different sensors value and position of a device. A device is wearable and so it is easy to carry.

II. BLOCK DIAGRAM

Block Diagram is divided into two sections:

A. Transmitter

Power supply: 5v supply is used for Microcontroller, GSM and GPS module while 3.3v power supply is used for various sensors. Sensors will continuously send their values to microcontroller. Microcontroller will compare readings of sensors with threshold values. Microcontroller will generate "HELP" message accordingly. GPS attach to microcontroller Panic button is provided for emergency alert. When Panic button is pressed GSM will urgently send "HELP" message without comparing to the threshold values.

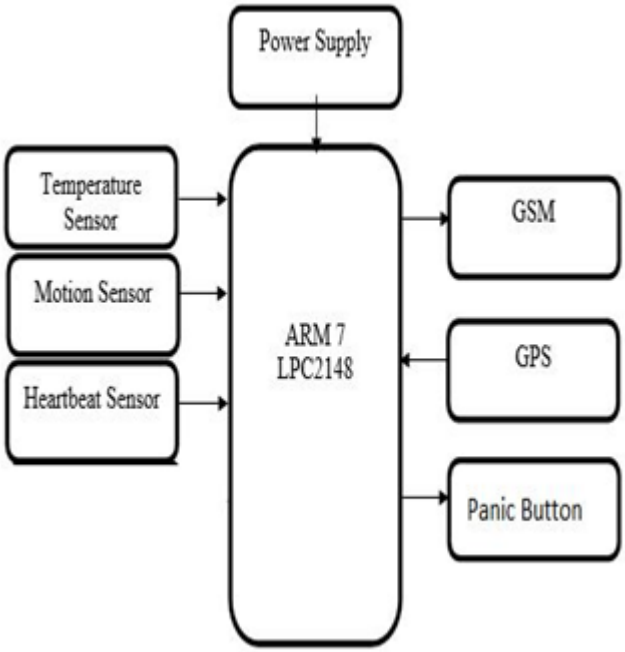

Figure 1. Transmitter Block Diagram

B. Receiver

Receiver is used for checking the values of sensors. Raspberry Pi or laptop can be used to process and display values of sensors and position of device. End device, which is being used, for display should be connected to internet.

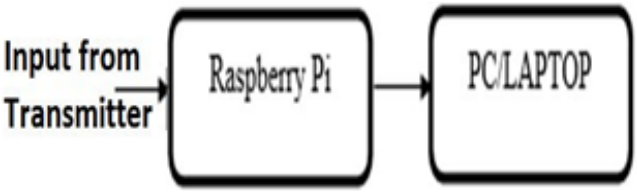

Figure 2. Receiver Block Diagram

C. Hardware

Hardware component used in device are as follows:

Microcontroller: Any ARM 7 microcontroller having two UART ports can be used. In proposed model we have used ARM 7 LPC2148. LPC 2148 is 32/16 bit RISC microcontroller. It has two 10 bit ADC with 14 channel. It also has two UART port which used for GSM and GPS systems.

Raspberry pi: Raspberry pi is single board computer. Its CPU speed ranges between 700MHZ and 1.2 GHZ. It also has on board memory between 256 MB and 1GB Ram. This is used at receiver to display values and position in terms of latitude and longitude.

GPS: GPS stands for global positioning system. GPS is used to track the device. GPS gives a position of a device in terms of latitude longitude and altitude. GPS is used to track moving device using satellite signal. When GPS is used there is communication between GPS transceiver and GPS satellite.

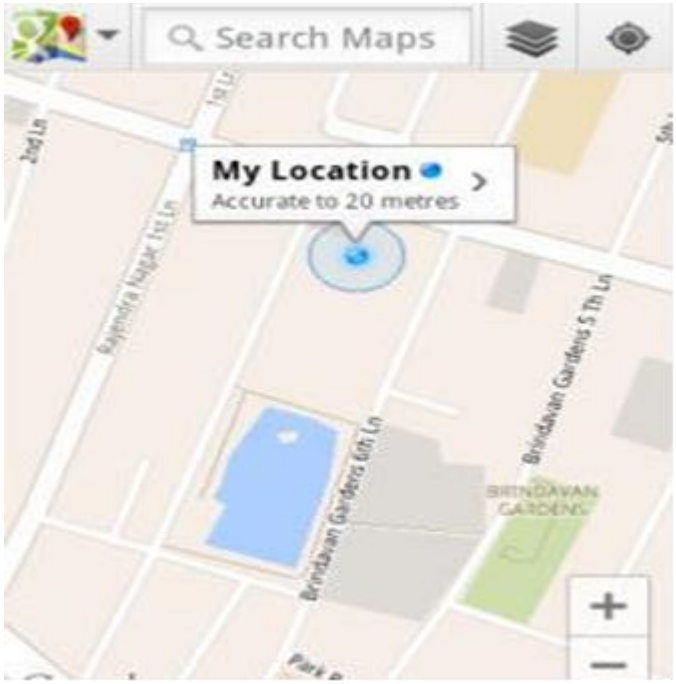

Figure 3. GPS Location on Map

Figure 4. Sample SMS

GSM: GSM stands for global system for mobile communication. GSM is a cellular technology which is used for voice and data transmission. GSM operates in-band of 900 MHZ to 1.8 GHZ. Through GSM it is possible to transmit SMS.

D. Working

Proposed Model is wearable model. After giving power supply to device , sensors on device will start taking readings. This readings are continuously sent to microcontroller. Microcontroller will compare this readings with the threshold values given to it .This threshold values can vary from person to person. After comparing this threshold values , Microcontroller will send "Help" message accordingly. GPS is used in device to continuously track device. Using IoT technology we can continuously monitor changes in sensors values. Position of device can also be track continuously. At the receiver side device like laptop, mobile phone, raspberry pi etc can be used to see sensor values and position. The device at receiver should be connected to internet in order to receive data from transmitter.

III. CONCLUSION

The proposed system is to ensure the security of the women in the society by providing automatic sensing of threats and send the "HELP&POSITION" to the relatives and the Police Station using Internet Of Things.

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Protection Safeguarding Open Evaluating For Offer Information in Cloud

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ABSTRACT

This Distributed repository administration is ordinary information to be put away inside cloud as well as information is mutual over various clients. On the other hand, open inspection for such mutual information while defending character security becomes an open Challenge. This dissertation provides protection saving system that permits open reviewing on mutual information is cleared up inside cloud. Sphere marks figure out the expected data, to review the uprightness of mutual information is done with this system, the personality of the end users on every piece in mutual information is kept confidential from an outsider evaluator (i.e., Third Party auditor), is ready to freely confirm the trustworthiness of mutual information without recovering the whole record. The adequacy and productivity of the proposed instrument is implemented by assigning sphere signature to make it secured and confidential when examining mutual information.

Keywords: Repository Administration, Sphere Signature, Character Security

I. INTRODUCTION

Cloud administration suppliers handle the action class framework that bargains a protected, solid and adaptable atmosphere for clients at much lower negligible use due to the sharing characteristic history of assets. Clients should consistently utilize the distributed storage administrations to impart information from one to many in a group to make information partaking turns into a normal component in most distributed repository.

Frankness of information in distributed repository is liable to deliver a proper message and reply to a request as information in an unsecured cloud, this sometimes make the information to be lost because of human mistakes and equipment malfunctioning. To keep the cloud information secured and authentic this p3 auditing in cloud is the best way to make open examining by presenting an outside reviewer (TPA) who offers reviewing administration with more intense processing and correspondence capabilities than standard clients. The principal provable information ownership component makes an open review that in turn used in verifying the rightness of information, is put away in unsecured servers without recovering the total information. It is intended to make an open evaluating component for cloud information, so that openly reviewing the substance of private information fitting in with the own client is not revealed to the TPA to imagine that sharing information among numerous clients is conceivably a standout amongst the most fascinating elements that motivate Cloud stockpiling.

An incomparable issue presented in the middle of the procedure of an open inspection of shared information in the cloud to safeguard the uniqueness

and security from the outside reviewer. Endorsers on shared information might potentially demonstrate that a specific client in the gathering or an extraordinary square in shared information is a higher imperative goal than others are.

A. Motivation

P3 is a Privacy Preserving Public inspecting component for mutual information in an in-secured cloud. P3 uses sphere marks to develop homomorphism authenticators, so that the TPA has the capacity to approve the unwavering quality of shared information for a gathering of clients without recovering the whole information while the appeal of the supporter on every square in mutual information is confidential.

Further extension of instrument to boost the bunch of inspecting element which can review different shared information all the while in a solitary evaluating duty. P3 depends on utilizing irregular covering to strengthen information security amid open examining, and influence record hash tables to backing completely dynamic operations on shared information. A dynamic operation demonstrates a supplement, erase or upgrade operation on a solitary square in shared information. An abnormal state judgment between Privacy Preserving Public with existing instruments this venture speaks to the first endeavor towards outlining a profitable security saving open evaluating instrument for shared information in the cloud.

B. PROBLEM STATEMENT

A solitary issue presented amid the procedure of open examining for shared information in the cloud is the way toward shield character protection from the TPA. On the grounds that the personalities of underwriters on shared information may demonstrate that a specific client in the gathering or a specific piece in shared information is an upper level critical objective than others. A novel security safeguarding (securing) component to backings open reviewing on shared information put away in the cloud.

II. METHODS AND MATERIAL

A. P3 Examining for Data repository and Security in Cloud Computing

Distributed computing is the envisioned revelation of giving out utility where clients can automatically store their information into the cloud to appreciate the on-interest great applications and administrations from mutual configurable registering assets by information outsourcing and clients can be alleviated by information stacking and records sustain.

The clients have bodily ownership of the possibly vast size of outsourced information makes in sequence respectability insurance cloud computing an extremely hard considerable assignment, especially for clients with obliged processing pluses and capacities. Consequently, empowering open review capacity for cloud information stockpiling security is of basic significance so clients can depend on outside review congregation to check the respectability of outsourced information when required.

To safely present a powerful outsider reviewer (TPA) accompanying two central requirements must be met:
1) TPA should have the capacity to fruitfully review the cloud information stocking without calling for the locality duplicate of information, and present no surplus on-line pressure to the cloud client;
2) The foreigner analyzing procedure need not to have new exposures towards client data protection and interestingly join the general population key based homomorphism authenticator with irregular covering to accomplish the security safeguarding open cloud information reviewing framework. To bolster fruitful treatment of dissimilar probing assignments, To study further the scheme of bilinear total mark to exaggerate the preliminary output into a multi-client setting, where TPA can execute

several judging tasks all the while. Execution examination and broad security shows the suggested designs are incontrovertibly secure and very efficient.

B. Accomplishing safe, expandable, and small Data access in Cloud Computing

Distributed computing is a used for developing ideal model in which assets of the processing base are given as administrations over the internet as it may be encouraging the ideal model as it yields numerous new troubles for secured data and control access when clients sourcing touchy information for over the cloud servers. The same entrusted area is not data owners. To put delicate client information private against in-secured servers, existing arrangements may normally apply cryptographic techniques by uncovering information that uses unscrambling keys to approved clients in any case of doing as such, then these arrangements unavoidably present an overwhelming processing transparency on the information proprietor for key dispersion and information administration when fine-data information access control is wanted. The issue that occurs at the same time accomplishes small data, adaptability, and information distribution of access control really still stays uncertain.

This dissertation addresses testing open issue on single hand characterizing or authorizing fetch arrangements in view of information properties and then again permitting the information proprietor to delegate the greater part of the reckoning assignments accompanied in fine data access control to unsafe cloud server without unveiling the hidden information substance. To accomplish this objective by abusing and remarkably joining methods of quality based encryption (QBE), intermediary decoding, and languid decoding proposed plan as not properties of client access benefit secrecy and client mystery key responsibility.

Broad examination demonstrates that the proposed plan is exceedingly effective and provably secures under existing security models.

C. Mountable and Resourceful Provable Data Possession

Ability outsourcing is a rising pattern which reminder various fascinating security issues that has significant number of errors that have been widely examined previously. Provable Data Possession (PDP) is a subject that has the way to identify which effectively and safely confirm that a stockpiling server is loyally putting away its customer's (conceivably expansive) outsourced information. The capacity server is thought to be in secured as far as both security and dependability is concerned it may noxiously or inadvertently eradicates facilitated information that may additionally consign it to moderate or disconnected from the net stockpiling. The issue is exacerbated by the customer being a little processing gadget with constrained assets. Former work has tended to this issue utilizing either open key cryptography or obliging the customer to outsource its information in encoded structure. This builds a profoundly productive and provably secure PDP method construct altogether with respect to symmetric key cryptography while not obliging any mass encryption. Likewise, interestingly with its ancestors that PDP procedure permits outsourcing of element information, i.e., it proficiently underpins operations, for example piece change, cancellation and attach.

III. ARCHITECTURE

A. Integrity of TPA shared data with existing mechanisms

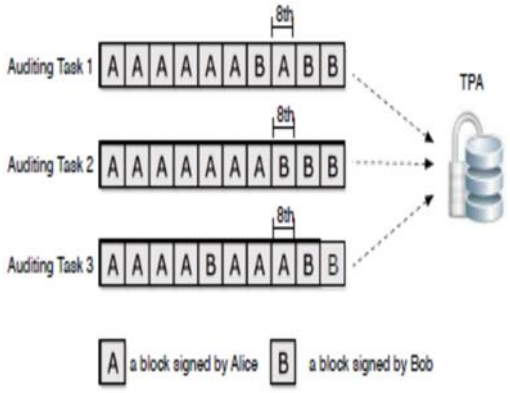

Figure 1. **Alice and B: Bob. The Veracity of TPA Mutual Data**

System Analysis is a process of assembly and interpret facts. A and B cooperate as a gathering also, parts a record inside cloud. Common document is partitioned into various little squares, which are autonomously marked by clients. When a piece in this mutual document is altered by a client, this client desires to mark the fresh square utilizing her open key pair. TPA desires know the character of the underwriter on every square mutual record, so it has the capacity review the respectability of the entire record in light of solicitations from A and B. A and B share a record in cloud. TPA reviews the trustworthiness of imparted information to evolved components. As demonstrated in Fig, in the wake of performing a few reviewing errands, some private data may uncover to TPA. A large portion of pieces in mutual record are marked by Alice, which may demonstrate that Alice is an imperative part in this gathering, for example, a gathering pioneer. Then again, the 8-th piece is as often as possible changed by diverse clients. It implies this piece may contain high value information, for example, a last offer in a closeout, that Alice IEEE TRANSACTIONS ON what's more, Bob need to talk about and transform it a few times.

The third party auditor and users

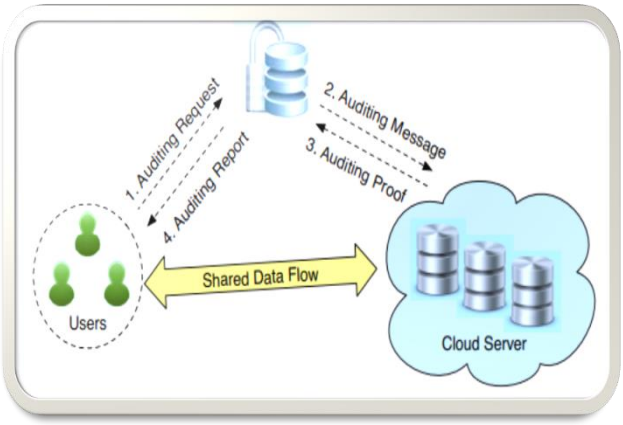

Figure 2. System Prototype Includes The Cloud Server, TPA Users

As outlined in Fig, work this dissertation includes three gatherings cloud server, outsider reviewer (third party auditor) and clients. They are two sorts of clients in bunch: first client and various gathering clients. The first client and gathering clients are both individuals. One Ring to Rule Them All. Of the assembly Bunch individuals are permitted to get to what's more, adjust shared information made by the first client in view of entrée mechanism patrols. Mutual information and its confirmation data put away in the cloud server. The outsider examiner has the capacity check the honesty of shared information in the cloud server on benefit of gathering individuals.

IV. CONCLUSION

This system ensures protection saving open examining (p3) framework for data stocking protection in Cloud Computing and it uses the homomorphic straight authenticator and arbitrary veiling to assure that the TPA would not come across any data about the information content put away on the cloud server among the efficient investigating procedure which not just consumes the weight of cloud client from the tedious and perhaps extravagant examining assignment, additionally reliefs the clients' understanding of their outsourced data release.

Looking at TPA might at the same time deal several checking from typical clients for their outsourced data documents, we further elaborate the security protecting open reviewing pattern into a number of client setting. TPA can execute dissimilar assessing tasks in great deal for better effectuality. This technic propose one ring guideline every one of them, the P3 examining instrument for shared information in the cloud.(P3= security protecting open) This technic use ring marks to build homomorphism authenticators, so the TPA has the capacity review the uprightness of shared information, can't recognize who is the underwriter on every piece, which can accomplish personality security. Improve the effectiveness of confirmation for different examining assignments; I further extend the component to bolster clump review. Another stimulating issue is the way to review the trustworthiness of imparted information in the cloud to element bunches — another client can be included into the gathering and a current gathering part can be renounced amid information sharing — while as yet safeguarding personality security. This issue will leave for future work.

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Opinion Based Learning Model in Medical Sector

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ABSTRACT

Online health communities continue to offer huge variety of medical information useful for medical practitioners, system administrators and patients alike. In this work we collect real time health posts from reputed websites, where patients express their views, including their experiences and side-effects on drugs used by them. We propose to perform Summarization of user posts per drug, and come out with useful conclusions for medical fraternity as well as patient community at a glance. Further, we propose to classify the users based on their `emotional state of mind'. Also, we shall perform knowledge discovery from user posts, whereby useful `patterns' about the triad `drugs-symptoms-medicine' is done by Association Rule Mining.

Keywords: Association, Data Mining, Summarization, Classification

I. INTRODUCTION

Online health communities offer huge variety of medical information useful for medical practitioners, system administrators and patients alike. For knowledge mining of the health posts, we propose to apply different important operations like - Association Rule Mining, Summarization and sentiment analysis on data obtained from the health forum.

Summarization is nothing but taking information from the source, extracting content from it, and presenting the most useful content to the user in a condensed form and suitable to the user's application needs.

Association rule mining is a popular and widely-known data mining task. It is used to find out interesting relations between variables in large database. Rules generated by association have two disjoint set of items having form LHS (Left Hand Side) => RHS (Right Hand Side). The rule says that RHS is likely to occur whenever the LHS set occurs. After the rules have been obtained, they are extracted and post processed.

The extracted rules from the health community dataset could take one or more of the following form

1. symptoms - disease
2. disease - disease
3. medicine - disease
4. disease – medicines

Finally Sentiment Analysis or Opinion Mining is task of finding sentiments from text. These sentiments take different forms like – opinions from people, attitudes and emotions toward an entity.

II. MOTIVATION

The doctor should give the proper treatment for the patient's disease. As multiple drugs are available for the particular disease, there is need of identifying the

popular drug. As symptoms are related to disease and diseases are related to drugs, there is a need for the system, which discovers the relationship between symptoms-diseases-drugs. In the proposed system, we are achieving this based on the patient opinions.

III. PROBLEM DEFINATION

Health communities' just collects real time health posts, where patients express their views, including their experiences and side effects on drugs used by them. These systems just collect the data, stores in database and retrieve the same in future but no extraction of useful information is done. The proposed system is performing summarization of user posts per drug, and come out with useful conclusions for medical fraternity and prediction of disease based on symptoms.

IV. SYSTEM ANALYSIS

A. Existing System

Health communities just collect real time health posts, where patients express their views, including their experiences and side-effects on drugs used by them. These systems just collect the data, stores in database and retrieve the same in future, but no extraction of useful information is done.

B. Proposed System

Proposed system is a medical sector application. It collects the posts from the users (medical practitioners, patients) related to side effects on drug and summarizes all the user posts and come out with useful conclusions. The outcome is to discover the patterns by Association Rules and also finding sentiments from the opinions.

V. METHODOLOGY

We have identified different modules like - Keyword Extraction, Association, Summarization and Classification. Details of these modules are described below.

- **Keyword Extraction**

In this module, input data is taken as user posts obtained from website. It removes the irrelevant words and retaining keywords.

- **Summarization**

We are performing on summarization of topmost drug family only. We are using WordNet dictionary to detect correct sense of word. It would help to generate better summary results.

- **Association**

We propose to determine the different types of association. These associations could be among disease, drug and symptoms.

- **Classification**

We are taking output of summarization as input for this module. We classify the users into classes like depressed and satisfied.

Apriori Algorithm

Apriori is a classic algorithm for learning association rules. Apriori is designed to operate on databases containing transactions. This algorithm is used to extract useful information from large amounts of data.

Association rule learning is a popular method for discovering relations between variables in large databases. An example of association rule learning are the rule {fever} -> {calphol} found in the health data in the health forum. The rule indicates that the patient who has fever likely to take calphol drug. Association rules are used to show the relationships between data items.

The steps are:

Step 1: Scan the opinion data set and determine the support(s) of each item.

Step 2: Generate L1 (Frequent one item set).

Step 3: Use Lk-1, join Lk-1 to generate the set of candidate k - item set.

Step 4: Scan the candidate k item set and generates the support of each candidate k – item set.

Step 5: Add to frequent item set, until C=Null Set.

Step 6: For each item in the frequent item set generate all non empty subsets.
Step 7: For each non empty subset determine the confidence. If confidence is greater than or equal to this specified confidence .Then add to Strong Association Rule.

VI. RESULT AND DISCUSSIONS

The results obtained from the given dataset are classified into two classes' i.e, "satisfied" and "depressed".

Below is a summary of results. We have performed experiments using Apriori algorithm. A confusion matrix is a table that is used to describe the performance of a classification model (or classifier) on a set of test data for which the true values are known the classifier made 200 predictions (e.g., 200 patients were being tested). Out of those 200 cases, the classifier predicted "satisfied" 100 times and "depressed" 100 times. In reality, 100 patients in the sample are belongs to the class satisfied, and 100 patients are belongs to depressed class.

Results:

Table 1

		Predicted Class	
		Depressed	Satisfied
Actual Class	Depressed	100	0
	Satisfied	100	0

VII. CONCLUSION

We proposed an approach to analyze user posts from health communities for knowledge discovery. This will help patients to find out association among different drugs, diseases and symptoms. It will help doctors to find out side-effects of different drugs so they can prescribe better drugs to other patients with similar disease. Pharmaceutical companies will be benefited as we are classifying users of particular drug into different classes like depressed and satisfied. This will be indirect input to companies to decide which drug is popular and whether to produce alternate drug. Thus our work benefit to all three parties–medical fraternity, patient community and pharmaceutical companies.

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Efficient Underwater Communication using Rechargeable Mobile Sink Node

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ABSTRACT

Underwater Wireless Sensor Networks (UWSNs) is a collection of organized and distributed wireless communication networks that comprises of enormous number of sensor nodes in underwater. The emerging wireless charging technology is a promising alternative to address the power constraint problem in sensor networks. Comparing to existing approaches, this technology can replenish energy in a more controllable manner and does not require accurate location of or physical alignment to sensor nodes. However, little work has been reported on designing and implementing a wireless charging system for sensor networks. In this paper, we design such a system, build a proof-of-concept prototype, conduct experiments on the prototype to evaluate its feasibility and performance in small-scale networks, and conduct extensive simulations to study its performance in large-scale networks. The proposed system can utilize the wireless charging technology effectively to prolong the network lifetime through delivering energy by a robot to where it is needed.

Keywords. Underwater Wireless Sensor Networks, Charging System, Energy, Performance, Mobile Sink

I. INTRODUCTION

Underwater Wireless Sensor Networks (UWSNs) is a collection of organized and distributed wireless communication networks that comprises of enormous number of sensor nodes in underwater. Although covering more than 70% of the Earth surface the oceans are not well known, due to its dimensions, difficulties of oceanographic data acquisition and the high costs of maritime operations. Nevertheless, there is an increasing interest on oceanographic data, due to its influence on the weather, fishing, navigation, biology, ecology and support for petroleum resources offshore exploration[1]. The use of such sensors is increasing rapidly in many fields. These Underwater Sensor Networks are used for water quality surveillance, gas/oil spills monitoring, oceanographic data gathering, offshore survey or examination, submarine identification and diagnosis, catastrophe interception, pollution monitoring, military surveillance etc [2][3][4].These underwater sensors resemble the terrestrial sensors. However, the UWSNs do not use radio signal or electromagnetic signals. Instead, they make use of acoustic signals [5]. Due to the usage of acoustic communication, underwater sensors face large propagation delay, refraction, multipath interference, and high error rate and low communication bandwidth. There are many differentiations between underwater sensor networks and open ground environment.

The sensors in UWSNs are the relaying devices. They simultaneously gather and transmit data. It is very important that in a network all nodes achieve an equal share of bandwidth. Thus it can be easy to receive intended and entire information regarding the area under survey. Later on the beacon node sends the accumulated information towards the users, satellite or data center through radio or wired

communication signals. There are many restrictions to the sensor nodes in underwater environment. Some of them are salinity, humidity, temperature, mobility of nodes, changing underwater environment. Due to the high attenuation which are found or sensed in electromagnetic signals in water environment, it is not at all suitable for underwater communication [6].

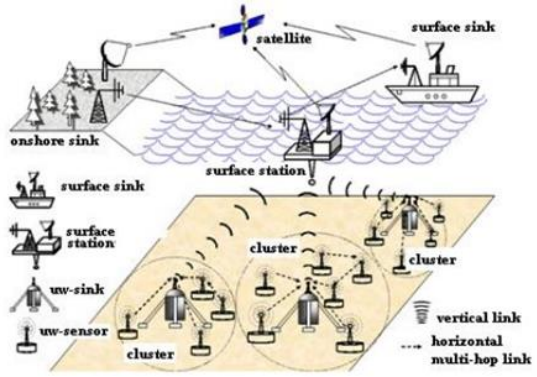

Figure 1. A View Of UWSN Environment

II. CHALLENGES

1. Propagation and Attenuation
   Underwater medium mainly uses acoustic signals for communication purpose. These signal have lower speed compared to radio waves. Some of the characteristics of communication in water medium such as scattering, absorption, refraction creates obstacle for signal propagation in underwater medium. Attenuation can be defined as the decrease in the intensity of the signal during propagation. Attenuation is high in underwater medium. [6]
2. Localization and security issues with respect to the nodes and their communication in the network
3. Synchronization of the clock time of sensor nodes
4. Management of energy inorder to secure lifetime of the network[7]
5. Available communication link/bandwidth is limited due to the lack of fair channel sharing mechanisms.

III. APPLICATIONS OF UNDERWATER SENSOR NETWORK

- Seismic Tracking – One of the advantageous application of underwater sensor are seismic-tracking/surveillance for withdrawal of oil/lubricant from subaqueous/marine areas [7]. "4 – D seismic" are widely utilized in determining the performance. It is also useful in the process of motivation intervention.
- Underwater cyborg - This supports groups of underwater autonomous cyborg which are also known as robots that can eventually sense, collect and transmit data such as chemical leakage or biological phantasm like phytoplankton flocking and also equipment managing [10].

IV. RELATED WORK

A. Location based Clustering Algorithm for Data Gathering (LCAD)

The transmission of data between sender and receiver sensor nodes depends upon the distance between them which in turn relies on the energy consumption. Due to the large number of data packets, it can lead to draining off the sensor node's energy. In Cluster based architecture for a three dimensional underwater sensor network where the sensor nodes are deployed at fixed relative depth from each other. All the sensor nodes are organized at their respective positions with the help of respective cluster heads, where the cluster heads are interlinked with each other by horizontal acoustic links, with a length restricted to a maximum of 500m for an effective communication proved in [8]. For a range of more than 500m, the use of autonomous underwater vehicle is practiced.

Phases of Communication.

a) Initial Setting Up Phase – Selection of cluster head among the ordinary sensor nodes takes place. This process is supported by an efficient and reliable algorithm.
b) Data Aggregation Phase – After the formation of clusters, the nodes initiate sensing mode. These

sensed data are forwarded to the respective cluster head. Once the data has been received by the cluster head, it aggregated all the data to form a data packet with less number of chunks in order to ensure the highest data packet delivery ratio

c) Transmission Phase – Once the data has been aggregated, it is further transmitted / collected by the autonomous vehicles. Autonomous underwater vehicles collect data packets from the cluster heads rather than every single sensor node in the network. These vehicles transfer the data to the sink/destination.

Cluster heads possess more memory and energy as compared to the member nodes as more memory and energy is consumed by the cluster heads as compared to the member nodes and retrospect, it makes the sensor network not only more reliable, but also balance the load in the network. It has formed a grid structure just like a cellular network, where the cluster head is located at the center, which helps it in communicating efficiently with the respective member nodes. Therefore, for the most optimal results, they supported a compact deployment of sensor nodes at the lower level of the structure and more dispersed at the higher level of the structure.

In accordance to the simulation results, the work has proved itself to be effective in terms of network lifetime. Though, location based clustering algorithm for data gathering has numerous advantages over other similar proposed network protocols, it has serious performance issues as well, especially that it depends completely on a grid structure, which is highly efficient when it comes to the terrestrial environment but is not feasible in underwater environments as node mobility is the prime concern as in case of the underwater sensor network. In underwater sensor networks, the nodes can move with the ocean current and can leave the network. Therefore, it could be possible that the nodes enter the neighbor grid or leave different grids frequently resulting in communication loss.

B. Distributed Minimum-Cost Clustering Protocol (MCCP)

The nature of cluster formation in terrestrial sensor network is not feasible with respect to the underwater sensor networks[5]. Thus the protocols proposed for cluster formation in the terrestrial sensor network do not hold the same reliability and efficiency in underwater sensor network due the challenges faced in underwater environment are more complicated than terrestrial networks. Distributed Minimum-Cost Clustering Protocol (MCCP) uses a cluster based approach in order to improve energy efficiency and prolong the network life. It consists of three parameters . residual energy and relative location of cluster head and sink in this approach, every node construct its neighbor set and their respective cost is calculated. Further, the average cost is computed and the minimum cost is selected as cluster head [10].

Cluster Head (CH) broadcasts an INVITE message to all the other cluster nodes to become its cluster's member, otherwise it sends a JOIN message to the specific cluster head.

Although, MCCP is an efficient centralized algorithm for data aggregation as it eschews the formation of hot spots near the underwater sink.Also, it has the ability to rebalance the traffic by clustering the sensor nodes time to time. But it has a few drawbacks as well, such as it does not support multi-hop routing. It has the ability to re-cluster the network, but re-clustering the network can take months, due to which it could be possible that the nodes can leave and enter different clusters as the underwater sensor network is assumed to be mobile.

C. Distributed Underwater Clustering Scheme (DUCS)

In underwater sensor network, sensor nodes have limited power and battery so it is not feasible to recharge or replace the nodes. Keeping this issue into concern, Domingo and Prior et al. [9], 2007 proposed

a clustering scheme which supports the node mobility and energy degradation issue, and named it as distributed underwater clustering scheme (DUCS), an adaptive self-organizing protocol where the nodes organize themselves into clusters and a cluster head is selected from each cluster. The cluster head agglomerates the data sent by the respective cluster members as shown in Figurer.

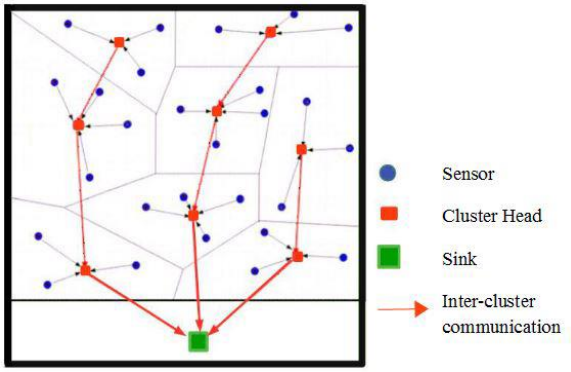

Figure 2. Network using DUCS

Data transfer between the member nodes and the cluster head takes place via a single hop. After that, the cluster head performs data aggregation on the received data and forward the data to the sink via multi-hop routing with the help of remaining cluster heads, the redundancy of data is minimized and the energy is saved[5]. Cluster heads are responsible for both inter-cluster communication as well as intra-cluster communication.

Cluster heads are selected through a randomized rotation among different nodes in order to avoid draining of the battery from a particular node. DUCS works in two rounds. (i)Set-up Phase. A network is formed by dividing the network into a number of clusters and cluster heads are formed using the respective cluster formation algorithm; (ii) Network operation phase. Transfer of the packets is completed in this phase. DUCS has turned out to be an efficient clustering and aggregation scheme as simulation results have shown increased throughput and also achieves a high packet delivery ratio.

Although this scheme is efficient, but it has some serious issues like node mobility is not considered so node movements due to ocean currents can affect the structure of clusters that it reduces the network overhead. Also, the cluster head is bound to send the data to another cluster head only. In that case, ocean currents can move two cluster head nodes far away such that, while data transfer between the two cluster head, there are a few non-cluster head nodes available between them.

D. HydroCast

Uichin et al. [10] proposed a hydraulic pressure based anycast routing protocol called HydroCast in order to overcome the limitations of geographic routing. Since geographical routing in underwater environment is quite complex and consumes more cost, there was an urge to solve routing problems. Thus the HydroCast algorithm analyzes the pressure levels by measuring and comparing the levels at different geographical locations. It uses the measured pressure levels to find the routes for forwarding packets from source to the sink/surface buoys. It is stateless and completes its task without requiring expensive distributed localization. Hydrocast nodes are designed with a low cost pressure sensor to measure their own depth locally.

Multiple mobile sinks are also deployed on water surface, which move with water flow. With regard to discovering a positive progress area toward to the sink, this protocol exploits only the information that is estimated by measuring the pressure of water in different depths.

This algorithm mainly comprises of two stages.
The forward selection set and the routing recovery mode –In the first stage an opportunistic forwarding mechanism is used to select a subset (cluster) of neighbouring nodes with higher progress toward to the sink as the next hop candidates. The neighbouring nodes that receive a packet will access their priority according to their distance to the destination; the closer to the destination the higher

priority[11]. In this subset a node will forward the packet only when all nodes with higher priority progress to the destination fail to send it. This process is scheduled with the use of a back-off timer which is set up proportional to the destination's distance. All the other sensors with lower priorities will suppress their transmissions upon receiving the transmission (data or ACK packet) of a higher priority node. By this way the possibility of collisions and redundant transmissions is minimized. In the second stage, a local maximum recovery mechanism is introduced in order to deal with the communication void. A node is considered as a local maximum node if there are no neighbours with lower pressure levels[17]. To overcome this problem it enables a void handling mechanism. According to this, each local maximum node finds and stores a recovery path to a node whose depth is lower than itself and transmits the data packet to this node.

V. CLUSTERED BASED MOBILE SINK

Mobile sink schemes improves network lifetime. However, previous studies on sink mobility either assume that global information of the network is already available or the mobile sink convey the global information through repeated network wide broadcasting. Thus the gain in network lifetime can be offset by the broadcasting which incurs extra high energy consumption.

In This scheme used following steps.

1. Initially network is initialized by sending activation packet and every node in a network assumes itself as a cluster.
2. Clusters are formed by using distance and residual energy.
3. Cluster Head are chosen from the cluster with highest energy and it changes after each round.
4. CH aggregates the data send from the cluster node and send it to the sink.
5. After each round sink changed its position randomly so that energy consumption is uniform.
6. If each round CH has not sufficient energy, then re-clustering is done.

A. Cluster Head Formation

Among that multiple CH, the present CH is selected using Sleep Wake pattern. The awake CH send CHADV message contain Node Id and an Integer Count. The NCH waits for some times ADVWT for receiving all CHADV from all the potential CH. Then the NCH choose their corresponding CH which is having minimum Integer Count. If more than a CH having minimum Integer Count then it chosen the minimum Id. After that, the CH waits for CH-JOIN for a period of JOIN-WT. After CH selection the data transfer will be done within the cluster. The NCH send the data to CH and CH send it to base station. For intra cluster communication, no need for any control information. For inter communication the route is discovered using the control information [12].

a) Route Discover

The first data packet from source to destination node due to carries the route-discovering packet
energy constraints. The source check the existing route for destination, if there is not existing route then the packet will send to destination. After getting the data packet the destination send the acknowledgement along with reverse path to the source.

b) Route Maintenance

Each path from source to destination has time property called ROUTE LIFETIME. When the lifetime exceeds the threshold denotes TIMEOUT and inform that the route is invalid. Node uses the same path before threshold the lifetime is reset to "0".

c) Route Retraction

Route lifetime in routing table exceeds the threshold value the route is discarded. If there is data to send the route rediscovery will be done.

d) Periodic Sleeping

The nodes shut down the transceiver till the next sampling or receiving will be done. [9]

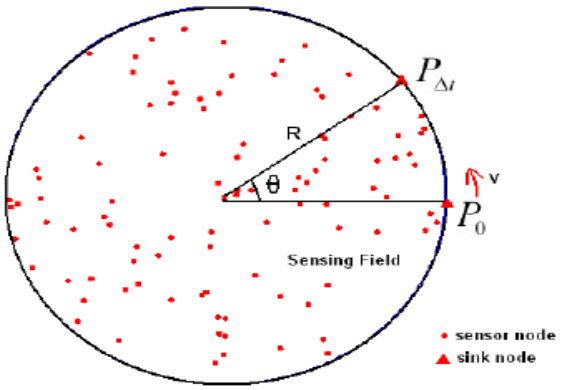

Figure 3. Sink Relocation

Therefore the sink only needs to broadcast across the network to inform all sensor nodes of its current location P_0 at the very beginning for just one time. Later on, as sensor nodes keep record of the original location of the sink, they can reduce the changed angle _ after a time interval t.

$$v = \frac{\theta * R}{\Delta t} \Rightarrow \quad \theta = \frac{v * \Delta t}{R}$$

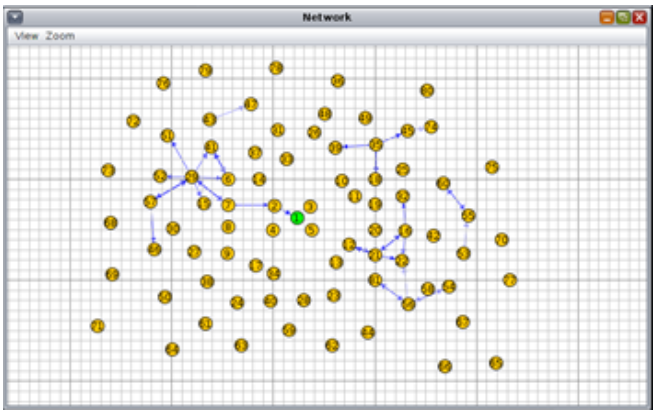

Figure 4. Cluster Interaction

e) Charging Phase

The system has three main components. a mobile charger (MC) – a mobile robot carrying a wireless power charger, a network of sensor nodes equipped with wireless power receivers, and an energy station that monitors the energy status of the network and directs the MC to charge sensor nodes.

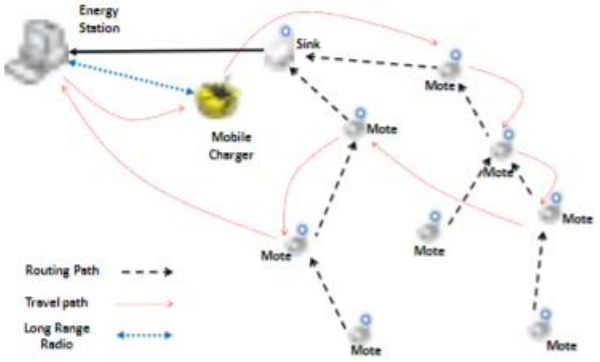

Figure 5. Charging Phase

The system works as follows. Sensor nodes perform application tasks such as environment monitoring, generate sensory data, and periodically report the data to the sink.

In addition, they also monitor the voltage readings of their own batteries, estimate energy consumption rates, based on which derive their own lifetime, and then report the information to the sink periodically. When the energy information is forwarded to the sink, it is aggregated en-route to save communication overhead. Particularly, only the energy information of the k shortest-lifetime nodes is forwarded while the information of other nodes is dropped, where k is a system parameter. Upon receiving the energy information, the sink forwards it to the energy station, which runs a charging algorithm to process the information and plan the charging activities, and then sends a command message to the MC. The command includes the charging plan that the MC should execute. Once receiving the command, the MC starts charging a selected set of sensor nodes sequentially according to the instruction. When the MC receives a new command, it adjusts its charging activities accordingly.

VI. CONCLUSION

Underwater wireless sensor network (UWSN) uses the acoustic signal which has a unique characteristics like limited bandwidth, high and variable propagation delay, transmit energy, minimum network lifetime and so on. This paper proposes a

clustering algorithm adopting a mobile sink and reducing the energy consumption of the nodes does not necessarily reduce the energy dissipation of wireless sensor network. Instead, a careful selection of the nodes and of mobility radius of the sink is required in order to achieve higher energy efficiency compare to a static sink. Moreover, conclude that in comparison to a static sink placed at the center of the wireless sensor networks, a mobile sink can reduce energy significantly, Irrespective of the mobility radius of the sink. We propose a wireless charging system for sensor networks that provides an efficient way of communication in underwater sensor networks.

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A Survey on Jamming Organization in Wireless Sensor Networks

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ABSTRACT

Jamming in wireless sensor networks creates a lot of issues like packet collision, buffer overflow, queuing delay and many to one data transference scheme. This leads to degrade the quality of service parameters like packet delivery ratio, end to end delay and Average energy consumption of the wireless nodes. In this work is used to describe some of the jamming Organization mechanisms used in the WSNs and classifies them into four major categories traffic rate Organization, supply organization, traffic rate and supply organization and priority based jamming Organization. The comparative analysis is used to compare the popular jamming Organization protocols with each other in terms of jamming detection, jamming notification and its advantages and disadvantages.

Keywords: Wireless Sensor Networks, Jamming Detection, Jamming Notifications, Jamming Organization

I. INTRODUCTION

A wireless sensor network consists of huge number of sensors, which are responsible for monitoring physical or environmental conditions like temperature, sound, vibration, pressure at various locations. In the recent centuries numbers of applications of WSN [1] are increased vigorously. Some of the applications are health monitoring, industry production, home automation and environmental monitoring. These sensors are small in size as well as limited processing and computing supply. Jamming is occurred in the sensor network at the time of a sensor node is carrying much amount of traffic than it can handle. It will creates a series issue in the network such as queuing delay, packet loss, increases response time and decrease the throughput. To handle this situation in an effective manner a number of jamming Organization protocol should be used. Any jamming Organization mechanism follows three steps i) Jamming detection ii) jamming notification iii) jamming Organization.

II. JAMMING DETECTION MECHANISMS

In literature, the authors considered more number of metrics for detecting jamming in a network such as packet loss, buffer size, channel load and delay. This paper is used to describe some of the parameters and Figure1 contains jamming detection metrics [2].

A. Packet Loss

Packet loss is an important metric to detect the jamming in the network. The packet loss is occurred in the network in the following manner.

Near source: Sensor nodes are deployed in a dense region will enerate a hot spot near a source at unexpected events. During this time the congested node generate back pressure jamming notification

to the source; the source will adjust its traffic rate consequently. The local de-synchronization of source and supply is also an effective technique to reduce jamming in a network.

Near sink: Sensor nodes are deployed in a sparse region will generate a hot spot in a sensor field but farther from source, near a sink. To handle this situation very effectively localized back pressure and packet dropping techniques can be followed. Use of multiple sinks uniformly scattered across the sensor field is an alternative solution for the above said problem.

Medium collision: In a certain area, many nodes start its transference at a same time creates interference of data leads to packet loss in the network. By using explicit local synchronization among neighbors and reduce this type losses. But this type of situation cannot be eliminated completely because non-neighboring nodes are still interfering with transference.

Buffer over follow: Generally, a queue or buffer is used to hold the packets at the time of transference. A buffer can received more number of packets than it can transmit, at that time buffer over follow will occur leads to packet loss in the network.

B. Buffer Size

Buffer size is a second important metric to detect the jamming in the network. It can be measured in 2 ways as follows.

Buffer limit: Each and every node in the WSN has limited buffer to hold the data to transmit. A buffer size is can be used as threshold, if incoming packets cross buffers threshold leads to packet loss.

Remaining Buffer: During transference of packet the buffer capacity is periodically tested and finds the remaining buffer length out of the overall size or the difference between the remaining buffer and the traffic rate can be used as the best jamming indicators.

C. Delay

Delay is a third important metric to detect the jamming in the network. It can be measured in 2 ways as follows.

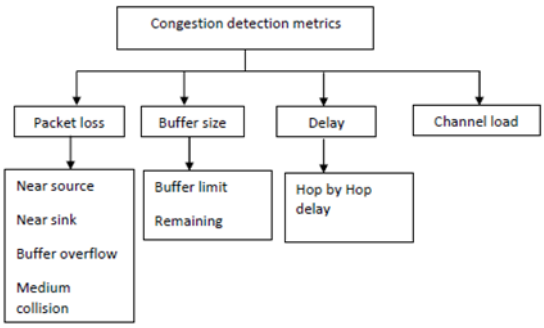

Figure 1. Jamming Detection Metrics

Hop by Hop delay: The packets are generated at the sender and forwarded to the next hop .The time is taken for transfer a packet from one hop to another hop. The one hop delay is also an important factor for detecting jamming in a network because it includes packet waiting time in a buffer, collision resolution and packet transference time at the MAC layer. The one hop delay is varied according to the channel load and buffer capacity.

End-to-End delay: The packets are generated at the sender and successful forwarded to the end point or receiver. The time is taken for transfer a packet from one end hop to another end hop.

D. Channel Load

Channel load is a fourth important metric to detect the jamming in the network Channel load is the ratio between either channel is busy for successful transference of packets collision to the total time period. If collision increases then the number of packets is dropped, consequently the buffer occupancy is decreased misleads to inference of the absence of jamming. The buffer state is used as jamming indicator here but to get accurate jamming detection the combination of both queue length and channel load should be used.

III. JAMMING NOTIFICATION

After identification of jamming, it should be intimated to the upstream nodes to take a necessary action and Organization jamming. Jamming information can be propagated by using explicit or implicit jamming notification. Some protocols notify the jamming by setting jamming notification bit in the packet header.

A. Explicit jamming notification:
In this type the Organization packets are generated at the time of jamming and which are forwarded to either source or sink to intimate jamming level. Since additional Organization packet, generate an additional load to the network. A fewer number of jamming Organization mechanism follow this method.

B. Implicit jamming notification:
Unlike explicit method, this method does not give any additional load to the congested node. During jamming the congested nodes implicitly creates piggybacking information and inform its jamming level to its upstream nodes. In some cases ACK packets are used to indicate the jamming state. A larger number of jamming Organization mechanism follows this method.

IV. JAMMING ORGANIZATION ALGORITHMS IN SENSOR NETWORKS

After notification of jamming the source or sink node take a necessary action to Organization the jamming in a network otherwise it leads to buffer overflow, packet loss, delay and supply wastage. To Organization, jamming in a network number of strategies can be followed such as traffic rate Organization, supply organization or combination of traffic Organization and supply organization and priority based jamming Organization mechanisms, which are depicted in the Figure2.

A. Traffic Rate Organization:

In the traffic rate Organization technique, jamming is Organization by reducing number of packets injected into wireless sensor networks. It is divided into additive increase multiplicative decrease AIMD or a rate based method. In AIMD verify networks available bandwidth and slowly increase size of the jamming window. During jamming the protocol decreases the jamming window significantly. In the following session is used to describing some of the traffic rate based jamming Organization methods.

1. CODA

C.Y. Wan and his team introduced Jamming detection and Avoidance in a sensor networks. This is an energy efficient jamming Organization protocol. In this method buffer length and channel load metrics are used to detect the jamming. At the time of jamming the congested node notifies its congested situation to its upstream nodes through open loop hop by hop back pressure to decrease its traffic rate. At the same time sink generates an ACK through closed loop to source to reduce its data generation rate. The CODA [4] consumes an additional energy to transfer

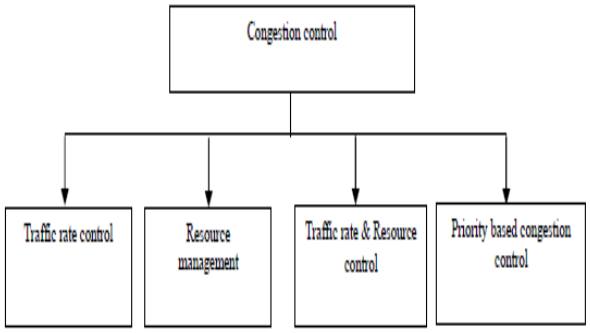

Figure2. Congestion control techniques

an ACK and backpressure.

The CODA uses AIMD concept which leads to packet loss. The CODA depends on unidirectional jamming

Organization which increases timelines and reduces reliability of the network.

2. ARC

A. Woo and his colleague introduced Adaptive Rate Organization (ARC).In ARC [5] there is no jamming detection or notification mechanism instead it uses AIMD concept. In which an intermediate node increases its data transfer rate by a constant rate „a" at the time of successful packet forwarding by its parent node otherwise multiplies its sending rate by a factor "b".In ARC two independent traffic set is maintained for giving fairness to the traffic such as factor „a" is called source traffic and „b" is called transit traffic. In ARC there is no jamming detection or implicit or explicit jamming notification mechanisms. The ARC rate adjustment scheme is also introduces a packet loss.

3. CCF

Ee and R. Bajcsy introduced jamming Organization and fairness protocol is a distributed and scalable mechanism for many to one routing in WSNs.Here jamming are detected based on packet service time and jamming Organizations through reduction of rate of traffic. CCF [6] Organization jamming in a hop by hop manner and each node adjusts its traffic rate based on its available service rate and child node number. In CCF rate adjustment is a function of packet service time leads to low utilization of sensor nodes and creates significant packet error rate. It does not includes current buffer capacity leads to queuing delay and buffer overflow as well as the number of re-transference of packet is increased.

4. CADA

Fang et al introduced CADA [7] - Jamming Avoidance Detection and Alleviation in Swanskin this algorithm the jamming is detected by an aggregation of buffer occupancy and channel load. Here considered the growing rate of buffer occupancy to a certain limit, after that limit they are considered as congested. For the moment the packet delivery ratio is decreased considerably at the time of local channel load is reaches the maximum channel utilization it leads to jamming in the channel .Jamming occurs due to the traffic emergence it will be detected instantaneously by the hotspot depends on a combination of buffer occupancy and channel utilization. Moreover, jamming is alleviated reactively by either dynamic traffic Organization or source rate regulation according to specific hotspot scenarios. CADA optimizes throughput, energy consumption and average end-to-end delay.

5. ECODA

Enhanced jamming detection and avoidance was introduced to detect jamming in WSN by using dual buffer threshold and weighted buffer difference. ECODA [8] uses the packet scheduler to detect the priority of the packet and during jamming low priority packets are dropped. ECODA is used to handle both transient and persistent jamming in a smooth manner. The transient jamming is Organization by implicit hop by hop back pressure method and reduction of data rate at source is used to Organization persistent jamming.

B. Supply Organization

The traffic Organization method is not suitable for event based application. To overcome this method an alternative method called supply Organization. Here when the network is congested data packets follow alternative paths, which are not congested, in order to be forwarded to sink. This method has the advantage that traffic Organization is avoided and all data packets have a great opportunity to reach the sink. At the same time special care needs to be taken in order to meet the performance requirement like packet travel time, avoidance of loops etc. In the following session is used to describing some of the supply organization based jamming Organization methods.

1. TARA

J. Kang et al introduced Topology Aware Supply Adaptation protocol which is used to adapt the network's additional supply at the time of jamming .A graph coloring strategy is used to find the needed topology for the adaption of additional supply. TARA [9] considers both buffer capacity and channel load to detect the jamming. TARA utilizes distributor and merger, distributor is used to distribute the traffic between the original path and detour path and merger merges two flows. During jamming, traffic is deflected from the hotspot through the distributor node along the detour and reaches the merger node. The main drawback of this protocol is not suitable for large scale sensor networks.

2. HTAP

C. Sergiou proposed Hierarchical Tree Alternative Path protocol which is scalable and distributed for reducing the jamming and assuring reliable data transferences. It is a hop by hop algorithm and implicitly informing jamming to other nodes. By using supply Organization mechanism the jamming are mitigated by choosing an alternative path from source to the sink, which are formed by using unused nodes of the network. Through simulation they prove that use of these nodes leads to balance the energy consumption and avoid the creation of holes in the network and prolonging the network life time. HTAP[10] consists of four different schemes topology Organization, hierarchical tree creation, alterative path creation and handling of powerless nodes. In topology Organization scheme, the nodes belonging to the topologies are updated in the neighbor table. In hierarchical tree creation, the tree is created and source node is act as a tree's root. The connection is created between transmitter and receiver using 2-way handshake method and which is used to indicate the jamming level from receiver node to transmitter node. In alternative path production, the transmitter node selects a node from its neighbor table that has no jamming. In the final part, if the battery of a sensor node is deplete, the neighbor table of will be updated.

3. CONSISE

Vedanta introduced an adaptive and explicit rate Organization protocol is called as Jamming Organization from Sink to Sensor (CONSISE).It deals the jamming Organization in a different manner from sink to sensors instead of sensor to sink. In CONSISE [11] the jamming is detected by the sensor node and they adjust their sending rate based on the jamming level in end of each period. Upstream nodes informed the jamming level to downstream nodes by using explicit jamming notification. The downstream nodes adjust its data rate based on information received through explicit notification. It uses the available supply in a efficient way with minimum overhead.

C. Traffic Rate Organization and Supply Organization

This is a hybrid method to combine advantages of both traffic Organization and supply organization. It is an application dependent. The traffic Organization method is suitable for transient jamming whereas supply Organization method is applied in the permanent jamming Organization situation. In the following session is used to describing some of the traffic rate based and supply organization based jamming Organization methods.

1. TALONet

Huang proposed TALONet [12] as a Power-Efficient Grid- Based Jamming Avoidance Scheme Using Multi detouring Technique. It consists of 3 schemes such as maintain 3 different power levels to reduce jamming in the data link layer, to avoid buffer overflow buffer organization techniques followed and to handle heavy traffic multi-path detouring techniques used. It also consists of three phases such as network formation phase, data dissemination phase and framework updating phase. In the network formation phase each and every node receives a Organization packet from sink and known its

location and build an imaginary square grids. The nodes in the grids are called TOLEN or normal nodes. In the data dissemination phase the data are disseminated by the TOLEN nodes. After receiving Organization packets from sink the networks are updated in the network updating phase. It gives a better result in terms of power consumption and packet drops compared to TARA.

2. TCEER

Arpita Chakraborty and their team introduced Trust integrated Jamming Aware Energy Efficient Routing algorithm. In this malicious nodes are isolated from the data path. The node potential is computed based on the trust. By using fuzzy logic Organizationler the jamming status identified with the input of residual energy and distance of the node from the base station. The source node is responsible for initiating the routing process by selecting the node with high potential in its one hop radio range. The node present in one hop radio range is light weight but more energy efficient. It is suitable for larger WSN. Through simulation results the author show that TCEER [13] is 25% more efficient than other protocol in terms of number of rounds and network performance. The major drawback in TCEER algorithm is, it has been tested against small networks.

D. Precedence Based Jamming Organization

In this section is used to discuss some of the priority based jamming Organization protocols in wireless sensor network. Also, compare their mechanisms with one another.

1. PCCP

Wang introduced Priority based jamming Organization protocol. In PCCP the author gives an equal fairness to each and every sensor nodes in a multi hop WSN. In PCCP [14] different priority indexes are maintained such as a node with higher priority utilizes higher bandwidth and node with higher data rate uses more bandwidth. It is used to measure the jamming degree as the ratio between packet arrival time and its service time along with its priority index and hop by hop cross layer based jamming Organization mechanisms followed. The implicit jamming notifications are done with the help of piggybacking the jamming information along the header of the data packet and avoid use of unnecessary Organization packets. In PCCP the energy efficiencies optimized. The PCCP gives lot of advantages such as lower buffer utilization, low packet utilization and low delay. The main draw back in PCCP as there is no packet recovery mechanisms followed.

2. DPCC

Heikalabad introduced dynamic prediction based jamming Organization algorithm. The DPCC [15] is used to dynamically predict the jamming in a sensor node and fairly broad casting the traffic to the entire network. It is used to increase the throughput and reduce the number of packet loss with low overhead. In DPCC three steps are followed backward and forward node selection, predictive jamming detection and dynamic priority based rate adjustment. In the forward and backward node selection, the forward and backward nodes are selected for data handling. In the second and third steps are used to detect the jamming and through implicit notification the rate of the packets are adjusted and jamming are eliminated at the MAC layer.

3. PASCCC

Mian Ahmad Jan introduced an energy-efficient application specific clustering jamming Organization protocol. This protocol is implemented based on queuing model. In this jamming are detected according to the mobility and heterogeneity of the nodes. This protocol is mainly used in fire detection, home automation and related applications. In which jamming spots are detected and also detect the node causes the jamming. Here each incoming packets are prioritized as high priority and low priority packets. During jamming low priority

packets are discarded. Through an experimental result the author show that the PASCCC [16] significantly improves lifetime of the network, energy consumption and data delivery between CHs and BS.The PASCCC has two disadvantages, it is an application dependent and there is no packet recovery.

V. COMPARATIVE ANALYSIS OF PROTOCOLS

In this section is used to compare the different jamming Organization protocols with each other with respect to the following factors: jamming detection metrics, jamming notification, advantages and disadvantages. Table 1, 2, 3, and 4 demonstrates these comparison according to their jamming Organizationing techniques such as traffic rate Organization(Table 1), supply organization(Table 2), traffic rate and supply organization(Table 3) and priority based jamming Organization (Table 4).

VI. CONCLUSION AND FUTURE WORK

From the discussion, it was known that jamming Organization is one of the major as well as unpredictable events of the WSNs. The jamming in the network leads to energy waste, throughput reduction and number of packet loss results in network's performance degradation. This paper is used to describe a survey of some of the popular jamming Organization protocols in wireless sensor networks. This paper clearly describes about the jamming detection metrics, jamming notification and jamming Organization mechanisms in a detailed manner. The comparative study shows that the pros and cons of the popular jamming Organization protocols. The main objective of this work as improve the life time of the WSNs by the selecting of the best jamming Organization mechanisms for the given application. The future work of this paper mainly focused on designing energy efficient and trust based jamming Organization protocol which also includes one or more features like decentralized, self-adapted, distributed, scalable, autonomous, generalized and secured jamming Organization strategies.

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A Review On- Water Quality Measurement System Using Artificial Intelligence

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ABSTRACT

Water is vitally important to every aspect of our lives. Monitoring the quality of the drinking water is essential as polluted water can cause deadly diseases. Usually in conventional water quality measurement systems, complexometric and colorimetric titration methods were being used, which yields results slowly. In this paper different physical and chemical water quality parameters like pH, turbidity, conductivity, total dissolved solids(TDS) and dissolved oxygen etc. are measured using different sensors. The data obtained from these sensors will be sent to the PC (LabVIEW) where this data is analyzed, and the water quality indicators are compared with the reference data provided by Indian Standards Institute (ISI) and Bureau of Indian Standards(BIS) and results are displayed as per the requirement. This paper proposes the technique to combine and infer the multi-sensor data to get the water quality result, by which accurate results can be obtained. As the water quality is subjective by nature and highly indeterminate, which causes uncertainties in the data. To overcome data uncertainties problem, this paper proposes fuzzy logic model for acquiring the accurate water quality.

Keywords: Water Quality, LabVIEW, Multi-Sensors and Fuzzy logic.

I. INTRODUCTION

Clean water is a human right. Pure and safe drinking water is the necessity of each human for the survival. Each human being on Earth requires at least 20 to 50 liters of clean water per day for the survival. The safety and accessibility of water is major concerns throughout the world. Health risks may arise from consumption of water contaminated with domestic effluents, industrial effluents, sewage, agricultural effluents and radioactive wastes etc. So, it is highly advisable to monitor the quality of the water, monitoring the quality of surface water will help us to protect our waterways from pollution. World Health Organization (WHO) and Indian Standards Institute (ISI) provides international and Indian norms on the water quality in the form of guidelines that are used as the basis for framing regulation and to set the water quality standard world-wide. Reference [4] provides the different water quality parameters needs to be maintained in the water, so that it can be used for the human consumption.

In this paper water quality indicators such as pH, turbidity, conductivity, total dissolved solids(TDS) and dissolved oxygen etc. are measured using different sensors. Solutions with the pH of 7 are neutral, whereas solutions with pH above 7 are referred as basic and below 7 are referred as acidic in nature. In Potable water pH of the range 6.5 to 8.5 is acceptable. Dissolved oxygen refers to gaseous oxygen that are mixed in the water, which should be around 5-6mg/l in the potable water. Turbidity is the measure of relative clarity of a liquid, which is

measured by shining a light through the water and is reported in nephelometric turbidity units (NTU). Total Dissolved Solids(TDS), are the solids or substances like minerals, salts, heavy metals etc. that are found in water and some traces of organic matter that are dissolved in water, usually TDS is the main reason for turbidity of the water. Conductivity is a measure of water's capability to pass electrical flow. This ability is directly related to the concentration of ions in the water, by which we can find the salinity of the potable water.

II. LITERATURE SURVEY

Eric et al[1] describes about developing the Autonomous ocean-sampling networks (AOSN) for providing the physical and chemical characteristics of the ocean water, which uses sensors capable of adaptive observations. This paper suggests about joining different sensors to get the unified results. Jyotirmoy et al[2] explains about detecting various water quality parameters using Bio-Sensors, Optical Sensors and Microelectronic Mechanical Systems (MEMS). This paper also explains about combining of newly available sensing technologies in an integrated system to obtain the higher-level sensitivity and also real time data analysis capability. MEMS, optical and bio-sensors provide the accurate reading about water quality parameters, however this technique requires individual power and individual transducer units, by which development of integrated water quality measurement system becomes too complicated. Huaiyu et al [3] describes about the transmitting, compressing and processing the data obtained from sensors by using data fusion method. Raman et al. [9] explains about the certain water quality parameters indication methods using fuzzy logic model and the importance of measuring water quality parameters. Muhammad et al. [5] describes about advantages of modern method of water quality measurement system over traditional method of water quality measurement techniques. Paper also explains about development of an automatic, remote, portable, real time, and low-cost water quality monitoring system using micro controllers and multiple sensors.

III. METHODS AND MATERIAL

Water quality indicators such as pH, turbidity, conductivity, salinity and dissolved oxygen etc. are measured using respective sensors and the measured data will be sent to PC with LabVIEW via DAQ (Data Acquisition) card. In LabVIEW fuzzy logic module will be developed for analysing and comparing the measured data with the reference data provided by the BIS and water quality results will be displayed as per the requirement.

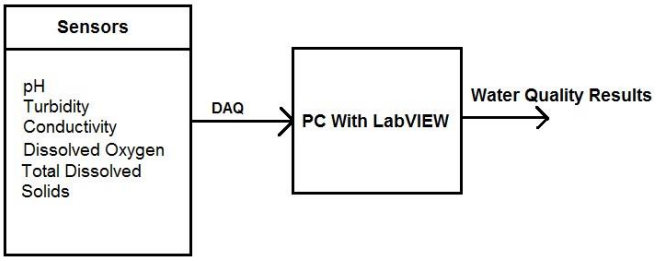

Figure 1. Block Diagram of Water Quality Measurement System

To obtain the accurate and acceptable reasoning, fuzzy logic module will be implemented. Any uncertainties in the engineering will be handled by the fuzzy module in the proposed technique. Fuzzy logic model includes, a fuzzification engine which converts crisp inputs into fuzzy inputs, knowledge-base, which stores the If-Then rules written by the designer. An inference engine will simulate the process to make the fuzzy inference based on the If-Then rules and fuzzy variables such as DO, TDS, TURB and pH. It has a defuzzification unit operative to translate the fuzzy outputs into a discrete crisp value of water quality indicating parameters.

IV. RESULTS AND DISCUSSION

Proposed technique is expected to deliver an automatic, remote, portable and real time water quality determining system. Which will provide the quality of the given water sample within very short

duration compared to titration methods. This technique will be helpful in determining contaminants in the water using different sensors. These sensors are expected to work within their intended accuracy ranges. As water quality is subjective by nature or for which the data is uncertain, wherein target non-linearity in the measured input values can be addressed effectively using fuzzy logic model system to obtain the accurate results.

V. CONCLUSION

Water quality indicating parameters like pH, turbidity, total dissolved solids (TDS), dissolved oxygen and conductivity will be measured using different sensors. In this water quality parameters are measured using multi-sensor technique; Multi-sensor data is combined and inferred to obtain the water quality, which will be more efficient and potentially more accurate than if they were achieved by means of a single sensor/ meter.

Fuzzy logic module will be implemented to overcome the data and engineering uncertainties and to obtain the accurate water quality results.

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A Review on - MRAS based Sensorless Control of Interior Permanent Magnet Synchronous motor drives using Fuzzy Logic

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ABSTRACT

Model reference adaptive system (MRAS) is typically employed for rotor position/ speed estimation in sensorless interior permanent magnet motor (IPMSM) drives. There are different ways to improve the performance of IPMSM drives. In previous research PI controller is used to control the speed of Permanent magnet synchronous motor. But in some cases when dynamics of the system varies with operating conditions and time the PI controller will not give better performance. To overcome this problem a new MRAS scheme based on fuzzy logic is proposed. In order to avoid the difficulties involved with manual tuning of the PI control parameters, fuzzy controller is implemented. Fuzzy control scheme consists of two models, namely current model of the IPMSM as the adjustable model, and the motor itself as the reference model. The difference between the outputs of the two models gives the estimated value of the rotor speed through a adaptive mechanism and position can be obtained by integrating the speed. In order to lower the motor speed ripple caused by the cyclic fluctuating load, a feed- forward compensation strategy with the load-matching motor output torque pattern is developed. The proposed system has to be implemented in MATLAB simulink.

Keywords: Fuzzy Logic, interior permanent magnet synchronous motor drives (IPMSM), sensorless control, Model reference adaptive system (MRAS).

I. INTRODUCTION

The usage of interior permanent magnet synchronous motors (IPMSM) has become widespread in industrial applications and in particular to drive compressors in air-conditioning. The characteristics of IPMSM are high performance, high efficiency and weakening of flux. Mounting of position sensor inside compressors is inconvenient due to the strong acids/bases and which also includes cost and performance of the entire drive system. To overcome this problem the sensorless control with positioning of rotor and assessment of speed has to be implemented in the present work. The rough calculation of exact rotor speed and position by the MRAS is unfavourable for IPMSM drives with regularly repeated fluctuating loads so that feed-forward compensation strategy with motor output torque is developed. In MRAS manual adjustment of control parameters of the proportional integral regulator is important in order to achieve high accuracy. When motor operates with cyclic fluctuating loads, manual adjustment of PI Parameters for the user is a difficult task. According to different load conditions the PI parameters must be determined. Several intelligent control algorithms

combined with MRAS are analysed in order to avoid the manual tuning of the control parameters so that Fuzzy controller is implemented in the present work. Fuzzy control shows excellent performance with systems which are nonlinear, time-varying and with uncertain parameters and structure variations. Manual tuning of PI parameters is avoided by implementing MRAS(Model Reference Adaptive System) based Fuzzy Control. Speed adaptive law is derived according to Popov theory.

II. LITERATURE SURVEY

D.Giaouris et al.[3] this paper describes that Model Reference Adaptive Systems (MRAS) are the most important methods due to their relative simplicity and less computational efforts and also Fuzzy logic control (FLC) has been found to be excellent in dealing with systems. Jianru Wan et al.[1] this paper explains about the problem of PI controller in which difficulty in achieving high accuracy arises due to the change of motor parameters so that fuzzy PI speed controller is proposed. Motor speed is identified based on model reference adaptive theory. Mounting of position sensor inside compressors is impractical, due to strong acids or bases or concentrated solutions of certain weak acids or weak bases. It also includes price and performing of the entire drive system so that the sensorless control with rotor speed and position estimation is a preferable approach. Antti Piippo et al.[6] This paper proposes an online method for the estimation of the stator resistance and the permanent-magnet (PM) flux in sensorless Permanent magnet synchronous motor drives. Sakorn Po-ngam et al. [8] This paper describes about Stability and good dynamic performances of adaptive full-order observers are most important for the sensorless permanent magnet synchronous motor drive. Matthias Preindl et al. [7] This paper describes about the model predictive direct current control (MPDCC) is a promising control approach for high- power converters.

III. METHODS AND MATERIAL

The Block diagram of the IPMSM drives using fuzzy logic based on MRAS method is shown in **Fig1**.Mamdani-type rule based controller is used in the present work. The voltage and current of the real motor is given as input to the speed and position estimation block. Kc and Ke are the scaling factors. These two scaling factors are multiplied to the inputs. The two dimensional fuzzy rule has to be written with the inputs so that output of the fuzzy controller is obtained then, it is multiplied by Ku (output scaling factor).Integration of estimated speed gives the position of the rotor. Based on the rotor position the load torque values are obtained through a lookup table.

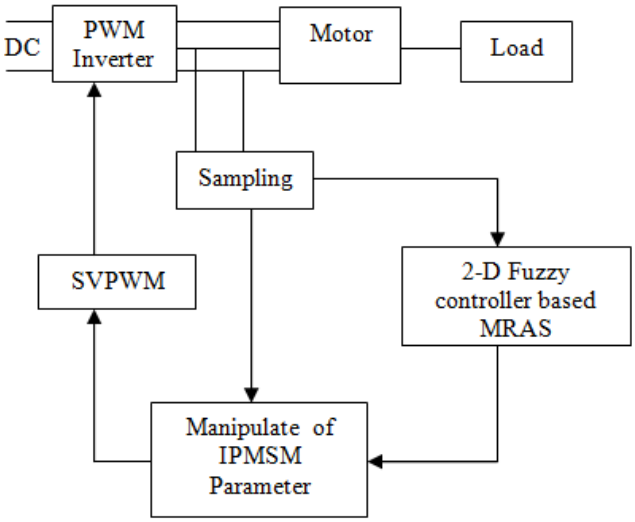

Figure 1: Block diagram of the IPMSM drives using fuzzy logic based on Model Reference Adaptive System.

IV. RESULTS AND DISCUSSION

The proposed system is suitable for speed of the rotor and position assessment of IPMSM drives with regularly fluctuating loads. By implementing MRAS scheme in the present work maximum rough calculation of error values of the rotor position can be reduced. There by improving rotor position estimation accuracy and also avoid manual tuning of PI parameters required in conventional MRAS scheme.

V. CONCLUSION

In present work based on MRAS scheme a two dimensional fuzzy logic will be implemented for the rotor speed estimation of IPMSM drives for regularly fluctuating loads. Problems faced by manual tuning of PI parameters has been handled by implementing MRAS based Fuzzy control.

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An Intelligent Flow Measurement Technique Using Neural Network

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ABSTRACT

A variable area type flow meter called rotameter, a measuring instrument in which position of the flow is indicated by the stainless steel float which is present in rotameter. In the process industries the readings will be required in control room hence the float is converted into voltage. For non-contact flow measurement a hall effect sensor is kept on the rotameter which acts as secondary sensor. To convert float into voltage the hall effect sensor sense the magnetic field created by the magnet kept on the float, as water flow through the rotameter the float increases and the magnet varies its position and the hall sensor sense the change in magnetic field created by the magnet. The hall voltage varies with different parameters which affect the hall voltage measurement. As temperature is very slow process and water flow is very fast process both are considered for our work as temperature varies non linearly with voltage. The hall sensor output is amplified by instrumentation amplifier and that is given as input to the ANN. For neural network 70% readings has to be used for training and 30% readings should be used for testing process. Error is given back to the input so back propagation algorithm is used. By weight adjustment ANN gives the required output with iterations so we will get the accurate output.

Keywords: ANN, Hall Effect Sensor, Rotameter.

I. INTRODUCTION

A liquid flow is measured by the flow meter which has wide application in process industry. There are different types of flow meters. The five basic flow meters are differential pressure flow meter, positive displacement flow meter, velocity flow meters, mass flow meters, open channel flow meters. Rotameter is a type of variable area meter that measures the flow rate of the liquid through it. It consists of a transparent glass so that one can notice the water level. The float position is transferred to an external indicator via a magnetic coupling. Sunita sinha et al. [1] has designed and tested a real time flow measurement system using hall sensor. A non contact flow measurement system is designed by placing hall sensor outside the rotameter to sense the variation of the magnetic field. The sensed value is converted to 1-5v signal conditioner unit. This is input to the PC through opto isolator and Data Acquisition System card. Lab tech note book pro software is used to indicate the flow. The same software can be used for any system to create a virtual model. But this system has limitation of the float size and the magnet and this system is accepted in the industries. Santosh et al.[2] has designed an adaptive flow measurement technique using the turbine flow meter. Here linear measurement system is designed and tested. Here the blade radius and number of blades varies with the liquid density. Input varies linearly with output for the input range and ANN is used to make output adaptive to

the various parameters. Mandal et al.[4] have also designed a modified flow meter using rotameter as a primary sensor and LVDT as a secondary sensor. The current signal before sending for the remote place the voltage is amplified and filtered. The LVDT has a drawback that it gives linear output for a particular input range then becomes non linear. This setup is reliable in the process industries. Nirupama mandal et al.[3] has designed an improved inductance bridge-type technique, here also the same procedure like above publication where float is converted into current signal. A ferromagnetic wire is kept on the float, which is a sensing element. As the water flow through the rotameter the self-inductance of the coil changes as flow rate changes. This network is used to measure the coil self-inductance. From study it is observed that the coil inductance varies linearly with transducer and transmitter. Chengli Zhang et al. [9] discussed about the flow equation of the rotameter based on water flow in it and the tapered tube inside its body is derived. The results are discussed on flow coefficient with respect to the drag coefficient, which proves the derived equation is correct.

Hall effect sensor is a transducer that varies output voltage in response to magnetic field. They are used for the proximity switching, positioning, speed detection and current sensing application. Permanent magnet is placed on the water level indicator of the flow meter so that the magnet moves upwards with the float when flow rate of a fluid increases then magnet comes near to hall effect sensor which sense its magnetic field. J. Lalnunthari et al. [10] ANN has two inputs voltage and temperature. Using signal conditioning voltage is converted into flow which is output of ANN. As temperature is non linear with hall voltage back propagation algorithm in neural network is used. It has three steps. The readings are sampled and 70% of them are used for training and remaining readings are used for the testing of the neural network. To get the required output the actual and desired output is compared and value obtained by that is back propagated to the input for weight adjustment. ANN tries to give accurate output.

II. METHODS AND MATERIAL

Water from the tank flow through the rotameter as shown in fig 1, a hand valve is used to vary the flow rate. As the flow rate increases the Hall effect sensor (SS490) sense the flux created by the magnet .The output of the hall effect sensor is given to the ANN. As various parameters affect the hall voltage like temperature, density of the liquid, viscosity etc., here temperature is taken into consideration. Temperature sensor is used to measure the varying temperature of the water. Hall voltage and temperature are non linear in nature. Experiment has to be done to analyse the behaviour of Hall effect sensor with respect to temperature. ANN has to be used to overcome this non linearity and accuracy problem. Q is the output flow taken from the ANN through data conversion unit.

Implementation of ANN:

Artificial neural network is a type of artificial intelligence technique that mimics the human brain. The feed forward network is a layered network in which neurons are organized into layers with connections in one direction from one layer to another. ANN model consists of data collection, processing data, building the network, training and testing. MATLAB NN tool is used to write script files for developing MLP. Network is created after adding data to workspace then network is trained and tested for different inputs.

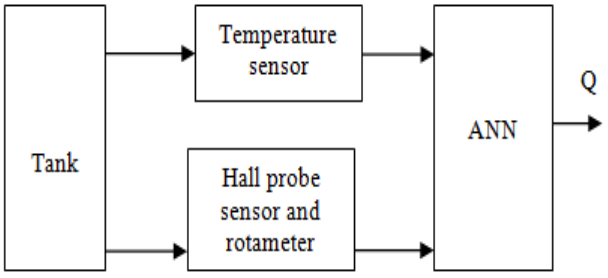

Figure 1. Block Diagram

III. RESULTS AND DISCUSSION

Objective of the project is to make the flow meter smart, the float position will be affected by the liquid density which changes the voltage which automatically varies the flow rate on the system. So ANN is used for calibration which makes flow meter smart. It is expected to monitor the flow control at remote location of the industries.

IV. CONCLUSION

Different parameters affect the flow measurement of the liquid like temperature, viscosity, liquid density are non linear in nature. As temperature is very slow process, we are considering temperature and hall voltage in our work. Temperature and voltage is non linear in nature hence ANN is used to make the flow meter smart with back propagation algorithm. The other affecting parameters can also be compensated using this techniques with the other transducers.

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Automation of Compression Testing Machine

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ABSTRACT

The main prospective of this paper is to analyze the working and testing procedure for the automation of Compression Testing Machine (CTM). Load cells of higher weights are being manufactured which needs to be calibrated and tested for their quality. Here Mitsubishi PLC are used to automate the setup. The reason for automating the setup is to reduce the human interference and to get the expected results. The data which observed during calibration and testing of the machine is then stored in the database.

Keywords: Compression Testing Machine, Load cell, PLC, Database.

I. OBJECTIVES.

- To automate the testing procedure by using PLC.
- To decrease the work time using control system.
- To store the value of the reading in HMI so we can take down the readings at any time

II. INTRODUCTION

Universal testing machine which was also know as universal tester is machine which is used to determine the tensile and compressive stress of any material. Many of the standard tensile and compressive stress can be determined because of which it is termed as “universal”. The main purpose of this machine is to test any load bearing devices like weighing systems. One of the testing machine is compression testing machine (CTM).

III. PROBLEM STATEMENT

The testing in CTM is being done manually where 2 persons are required one who will increase the pressure being applied on the test load cell and the other person to note down the reading for the corresponding weight. This requires patience as the reading has to be noted immediately as it can’t be stored in the device while testing manually.

IV. COMPRESSION TESTING MACHINE

A Compression Testing Machine (CTM) is used to determine the compressive strength of materials [1]. The reason for performing compression test is to determine the specimen behavior under compressed load conditions, to check the quality of the material, to aid in design process, etc.

CTM consists of rigid closed platform which houses a hydraulic jack powered by the hydraulic power pack[2]. The conventional jack system as shown in Fig 1.1 consists of a cylinder, where the hydraulic fluid is held around the cylinder is an oil chamber. Inside the cylinder is a ram which is moved up or down by increasing or decreasing the oil pressure inside the cylinder. On the bottom of the ram inside the cylinder is a piston, and on top of the ram a table is attached, so pumping the jack will raise the table. The jack is connected to a pumping system, which moves oil from the oil tank to the pump. The

pumping system consists of a pump cylinder, a handle socket and a pumping bar.

The working of the jack is as follows when the pumping system is activated by inserting the pumping bar into the handle socket and pumping it, the hydraulic fluid is pushed to the cylinder though port P2, applying pressure to the fluid while filling the cylinder. This exerts pressure on the piston and the hydraulic ram moves upward. When the required pressure is applied on the test load cell, the corresponding readings of the reference load cell and the test load cell is noted down. When the hydraulic fluid is pumped into the cylinder through port P1 then the pressure exerted on the piston will lower the ram. If the difference between the values exceeds a particular limit then the test load cell is defective and it is rejected

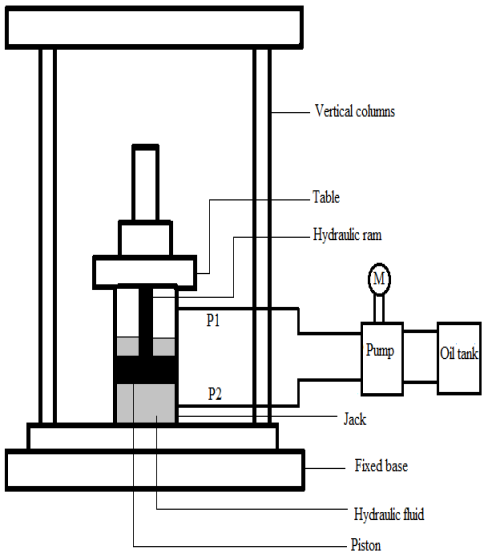

Figure 1. Schematic diagram of CTM

V. CONTROL SYSTEM

In the conventional CTM the whole procedure is done manually and the testing procedure will take almost 30 minutes and above based on the capacity of the load cell. The below tabular column shows the readings of weight against millivolt reading of 20 ton loadcell by manual testing which took about 30 minutes.

Table 1. Weight against mV reading of manual testing of 20tonne compression load cell.

Load(Ton)	mV
4.00	6.003
8.00	12.004
12.00	18.012
16.00	24.027
20.00	30.055

The control system of CTM is a closed loop mechanism [2]. Figure 1.2 shows the control principle diagram of CTM. The force applied on the test and reference load cells are converted into analog signal, which is given to an analog to digital converter whose output is given to the controller. The controller then converts the digital signal back to analog signal and given to the servo valve controller. The set value is given to the servo controller, which controls the flow rate of the hydraulic fluid. Based on the flow rate of the hydraulic fluid the servo valve functions and thereby it operates the hydraulic jack.

For example if a load cell of 50 ton is to be tested. Referring to figure 1.3 which describes the schematic diagram of the control system of CTM, the test load cell is placed above the reference load cell and the set value is given as 50 ton. The servo valve controller used is a proportional controller which produces an output signal proportional to the electronic control input. This output force is exerted on the actuators of the servo valve which then pushes the hydraulic jack up or down based on the pressure exerted. The amount of force experienced by the reference load cell and the test load cell is given out as analog output, this analog signal is converted to digital signal by ADC and given to the controller. The controller used is a PLC which is the heart of the control system to make the whole process automatic. The digital signals from the controller are then converted back to analog signal with the help of DAC. The output of DAC is given to the servo controller and the servo valve is operated. The readings taken from the reference load cell and

the test load cell are then displayed to the control panel with a HMI which communicates with the PLC using RS-485 communication.

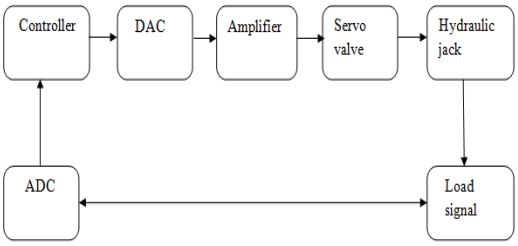

Figure 2. Control principle diagram of CTM.

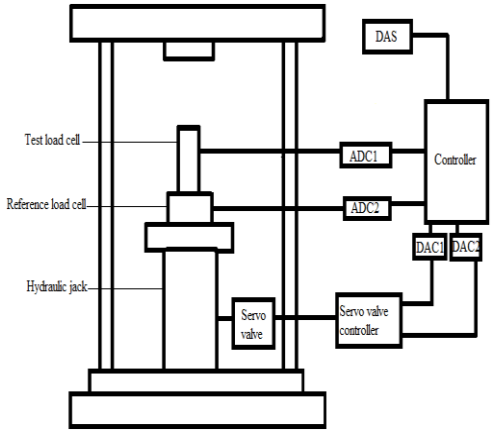

Figure 3. Schematic diagram of the control system of CTM

VI. HARDWARE

A. Servo Valve

Moog G631 series flow control servo valve is used which is a 2 stage design consisting of spool and bushing system and a torque motor. The maximum operating pressure at the ports P, A, B, T is 315 bars. The working description of the servo valve is as follows. The servo valve consists of an electrical torque motor and a two stage of hydraulic power amplification. The motor armature extends into the air gap of the magnetic flux circuit and is supported in this position by a flexure tube member. The tube member acts as a seal between the electromagnetic and hydraulic sections of the valve. The 2 motor coils surround the armature, one on each side of the flexure tube. The pilot stage in the servo valve uses a flapper nozzle mechanism. The flapper of the first stage hydraulic amplifier is rigidly attached to the armature. The flapper extends through the flexure tube and passes between the two nozzles, creating two variable orifices between the nozzle tips and the flapper. The pressure controlled by the flapper and the nozzle variable orifice is then fed to the end areas of the second stage of spool.

The second stage is a conventional four way spool design in which the output flow from the valve at a fixed valve pressure drop is proportional to spool displacement from the null displacement. A cantilever feedback spring is fixed to the flapper and engages a slot at the center of the spool. Displacement of the spool deflects the feedback spring which creates a force on the armature or flapper assembly. The spool movement continues till the feedback wire force is equal to the input signal forces.

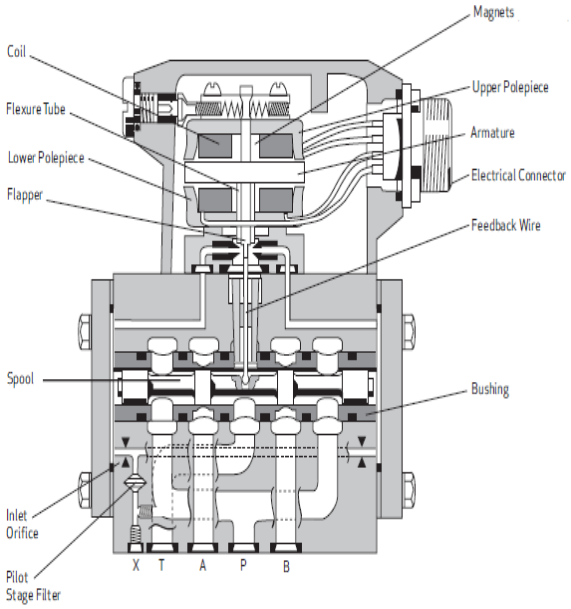

Figure 4. Schematic diagram of Moog G631 series servo valve

B. Servo valve controller

AN430 servo controller module is used for actuation of servo valves[3]. These controllers are used in control circuits and function as high dynamic adjusting elements. The controller section is being equipped with a P, I, D controller. Interchangeable input modules are available for target value and actual value signals, making possible trouble free matching of the signals by the customer. The target

value is routed via an adjustable ramp with a quadrant detector. This ramp can be deactivated. The I component of the controller can also be deactivated, permitting operation as a P or a PD controller. The target value can be adjusted via a spindle resistor relative to the actual value. Since the valve coil is operated on one side toward 0V, the control module's end stage can also be used as a current driver or U/I converter.

C. Programmable Logic Controller

Mitsubishi's Nexgenie 1000 PLC and its analog output expansion module NE02AX is used. The expansion module provides 2 non-isolated channels and 16 bit resolution ADC cum DAC which converts the 16 bit digital value into 4 types of analog outputs (0 to 10VDC,-10 to +10VDC, and 0/4 to 20mA). The expansion module has an on board processor and memory. Up to four expansion units can be interfaced to the base unit. Expansion unit has interface cable strip with polarized plug on the left side. This cable can be connected to the base unit or any expansion unit. The ladder programming for this PLC is done in Co-Desys software.

VII. SOFTWARE

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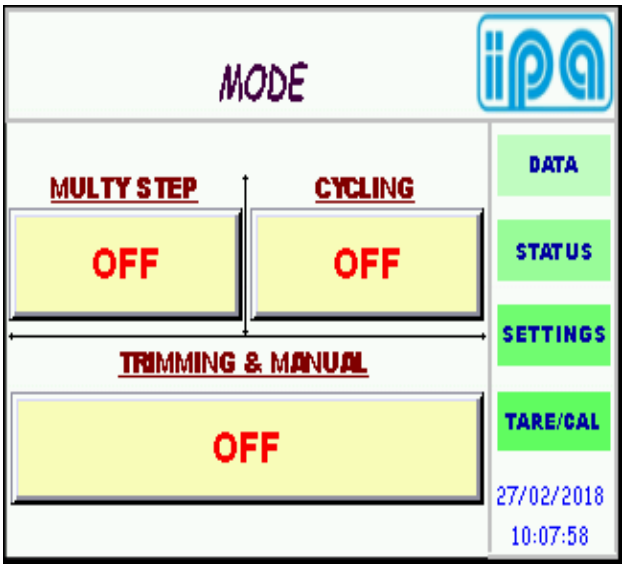
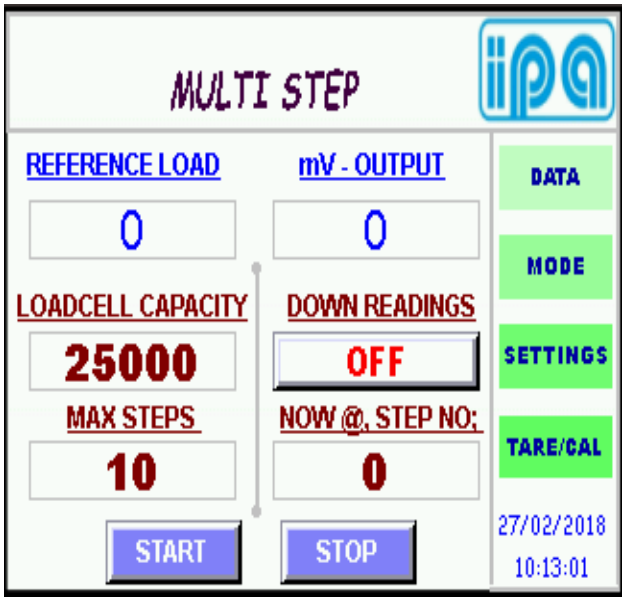
The ladder logic of Mitsubishi PLC is done is Co-Desys software with an interfacing to HMI [4].The software programming of the machine consist of 4 modes namely, Manual, Multistep, Trimming and Cycling. Manual mode is where the operator enters the required set point and waits for the machine to respond. Multistep mode allows the calibration of the load in n number of steps specified by the operator. The data after the completion of the all the steps gets stored in the HMI Trimming mode is similar to manual mode the only difference is that if the output of the test load cell is not right then the side of the load cell are trimmed to get the accurate output. Cycling mode is that the operator enters the number of cycles to be performed. and their values are taken down for each cycle and care must be taken that only +0.001 to -0.001 tolerance in the milli volt reading from both the cycles are maintained. If both values are absurd then the load cel is a rejected piece. The HMI screens of the program are shown in figure 1.5 below.



(a)



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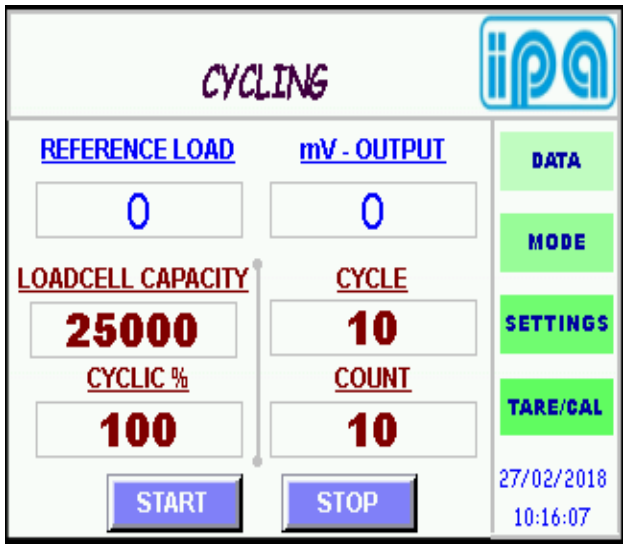

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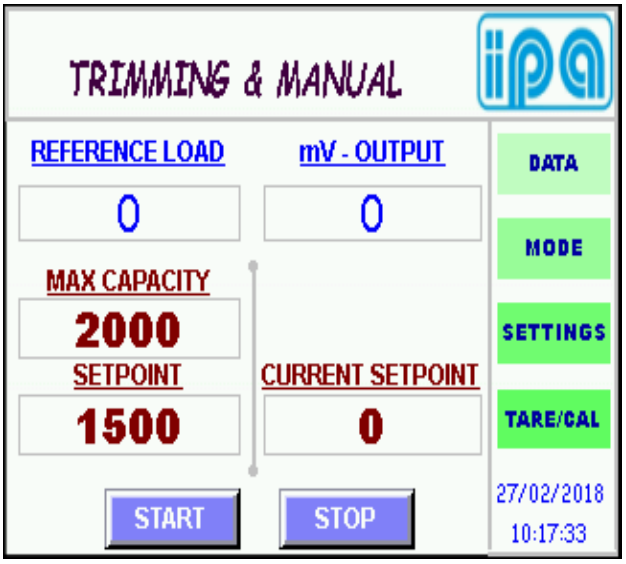

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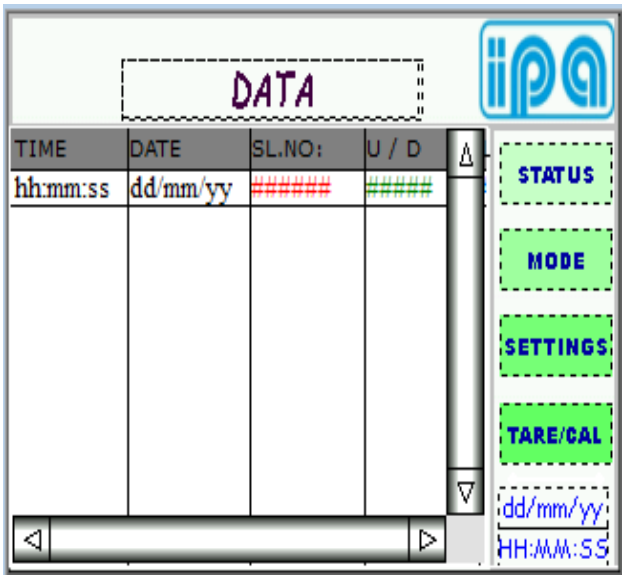
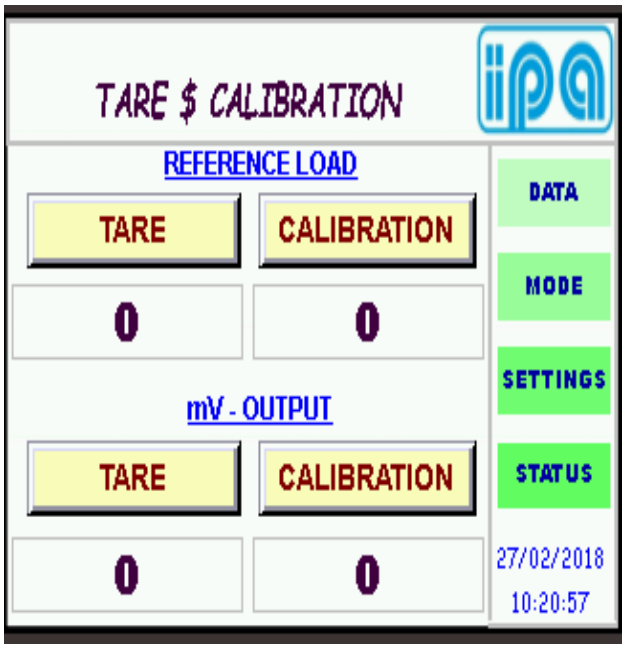


(e)



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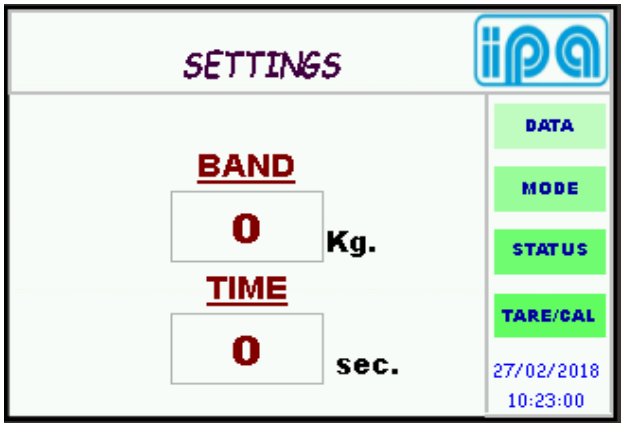

(h)

Figure 1.5 (a) HMI screen of the modes of operation.(b) HMI screen of Multi Step mode.(c) HMI screen of Cycling mode.(d) HMI screen of Trimming and Manual mode.(e) HMI screen of the values stored during multistep mode.(f) HMI screen of Tare and Calculation.(h) HMI screen of tolerance value of the reading.

VIII. EXPECTED RESULT AND CONCLUSION.

By the addition of a control, system in the compression-testing machine the time required to test the load cell will decrease drastically as compared to the conventional procedure of testing.

XI ACKNOLEDGMENT

We take this opportunity to give faithful gratitude to IPA Private Limited. for giving an excellent opportunity to carry out the project.

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Single Image High Resolution Using L2-Regularization

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ABSTRACT

Research on single image super resolution, which consists of improving a high-resolution image from its blurred, decimated and noisy version. The purpose of this review paper is to provide the knowledge of image enhancement or image scaling up and estimating a high-resolution image from a low-resolution image.

Keywords: Single Image Super-Resolution, Sparse Optimization, Single Image Super-Resolution, Deconvolution, Decimation

I. INTRODUCTION

SINGLE image super-resolution (SR), also known as image scaling up or image enhancement, aims at estimating a high-resolution (HR) image from a low-resolution (LR) observed image [1]. This resolution enhancement problem is still an ongoing research problem with applications in various fields, such as remote sensing [2], video surveillance [3], hyper spectral [4], microwave [5] or medical imaging [6].

The general approach considers the low resolution images as resulting from resampling of a high resolution image. The goal is then to recover the high resolution image which when resampled based on the input images and the imaging model will produce the low resolution observed images. Thus the accuracy of imaging model is vital for super resolution and an incorrect modelling, say of motion, can actually degrade the image further.

The goal of Super-Resolution (SR) methods is to recover a high resolution image from one or more low resolution input images. Methods for SR can be broadly classified into two families of methods: (i) The classical multi-image super-resolution, and (ii) Example-Based super-resolution. In the classical multi-image SR (e.g., to name just a few) a set of low-resolution images of the same scene are taken. Each low resolution image imposes a set of linear constraints on the unknown high resolution intensity values. If enough low-resolution images are available, then the set of equations becomes determined and can be solved to recover the high-resolution image. Practically, however, this approach is numerically limited only to small increases in resolution (by factors smaller than 2).

The methods dedicated to single image SR can be classified into three categories [7]. The first category includes the interpolation based algorithms such as nearest neighbour interpolation, bicubic interpolation or adaptive interpolation techniques. Despite their simplicity and easy implementation, it is well-known that these algorithms generally over-smooth the high frequency details. The second type of methods considers learning-based (or example-based) algorithms that learn the relations between LR and HR image patches from a given database. Note that the effectiveness of the learning-based algorithms highly depends on the training image database and these algorithms have generally a high

computational complexity. Reconstruction based approaches that are considered in this paper belong to the third category of SR approaches. These approaches formulate the image SR as an reconstruction problem, either by incorporating priors in a Bayesian framework or by introducing regularizations into the ill-posed inverse problem.

II. RELATED WORK

T. Akgun, Y. Altunbasak, and R. M. Mersereau[4] have developed an efficient total variation minimization technique based on Split Bregman deconvolution that reduces image ringing while sharpening the image and preserving information content. The model was generalized to include upsampling of deconvolved images to a higher resolution grid. Furthermore, a proposed multiframe super-resolution method is presented that is robust to image noise and noise in the point spread function, and leads to additional improvements in spatial resolution.

J. Yang, J. Wright, T. S. Huang, and Y. Ma[7] presented a novel approach toward single image SR based upon sparse representations in terms of coupled dictionaries jointly trained from high- and low-resolution image patch pairs. The compatibilities among adjacent patches are enforced both locally and globally. Experimental results demonstrate the effectiveness of the sparsity as a prior for patch-based SR both for generic and face images. However, one of the most important questions for future investigation is to determine the optimal dictionary size for natural image patches in terms of SR tasks.

D. Glasner, S. Bagon, and M. Irani[8] proposed a unified framework for combining these two families of methods. We further show how this combined approach can be applied to obtain super resolution from as little as a single image (with no database or prior examples). Our approach is based on the observation that patches in a natural image tend to redundantly recur many times inside the image, both within the same scale, as well as across different scales. Recurrence of patches within the same image scale (at subpixel misalignments) gives rise to the classical super-resolution, whereas recurrence of patches across different scales of the same image gives rise to example-based super-resolution.

This paper aims at reducing the computational cost of these methods by proposing a new approach handling the decimation and blurring operators simultaneously by exploring their intrinsic properties in the frequency domain. However, the implementation of the matrix inversions proposed are less efficient than those proposed in this work. More precisely, this paper derives a closed-form expression of the solution associated with the L2-penalized least-squares SR problem, when the observed LR image is assumed to be a noisy, subsampled and blurred version of the HR image with a spatially invariant blur. This model, referred to as L2-L2 in what follows, underlies the restoration of an image contaminated by additive Gaussian noise and has been used intensively for the single image SR problem and the references mentioned above. The proposed solution is shown to be easily embeddable into an AL framework to handle non-Gaussian priors (i.e., non-L2 regularizations), which significantly lightens the computational burdens of several existing SR algorithms.

III. CONCLUSION

This paper reviews a variety of Super Resolution methods proposed and provides some insight into, and a summary of, our recent contributions to the general Super-Resolution problem. In the process, a detailed study of several very important aspects of Super-Resolution, often ignored in the literature, is presented. Specifically, we discuss improving a high resolution image from its blurred, decimated and noisy version. Image enhancement or image scaling up and estimating a high resolution image from a low resolution image.

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Sensor Data Encryption Protocol for Wireless Network Security

(AES Data path Optimization Strategies for Low-Power Low-Energy Multi security-Level Wireless Network Security Applications)

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ABSTRACT

Network Security is one of the important concept in data security as the data to be made secure. To make data secure, there exist number of algorithm like AES (Advanced Encryption Standard). The security can be enhanced by using standardized and proven-secure block ciphers as advanced encryption standard (AES) for data encryption and authentication. However, these security functions take a large amount of processing power and power/energy consumption. In this paper, we present our hardware optimization strategies for AES for high-speed ultralow-power ultralow-energy IoT applications with multiple levels of security. Our design supports multiple security levels through different key sizes, power and energy optimization for both datapath and key expansion. The estimated power results show that our implementation may achieve an energy per bit comparable with the lightweight standardized algorithm PRESENT of less than 1 pJ/b at 10 MHz at 0.6 V with throughput of 28 Mb/s in ST FDSOI 28-nm technology. In terms of security evaluation, our proposed datapath, 32-b key out of 128 b cannot be revealed by correlation power analysis attack using less than 20 000 traces.

Keywords: Wireless Sensor Network, Wireless Network Security, Network Security,

I. INTRODUCTION

A wireless Sensor Network is simple defined as a large collection of sensor nodes, equipped with its own sensor, processor and radio transceiver. A wireless sensor network has been widely used in different application areas to know the battlefield situation data, monitoring building parameters and reports about malfunction in a system.

Cryptography, often called encryption, is the practice of creating and using a cryptosystem or cipher to prevent all but the intended recipient from reading or using the information or application encrypted. A cryptosystem is a technique usd to encode a message. The recipient can view the encrypted message only by decoding it with the correct algorithm and keys. Cryptography is used primarily for communication sensitive material across computer network. The process of encryption takes a clear text document and applies a key and a mathematical algorithm to it, converting it into crypto text. In crypto-text the document is unreadable unless the reader possesses the key that can undo the encryption. In 1997 the national Institute of Standard and Technology (NIST), a branch of the US government, started a process to identify a replacement for the Data Encryption Standard (DES). It was generally recognized that DES was not secure of advances in computer processing power. It was generally recognized that DES was not secure because of advance in computer processing

power. The goal of NIST was to define a replacement for DES that could be used for non-military information security application by US government agencies. Of course, it was recognized that commercial and other non-government users would benefit from the work of NIST and that the work would be generally adopted as a commercial standard. The NIST invited cryptography and data security specialist from around the world to participate in the discussion and selection process. Five encryption algorithms were adopted for study. Through a process of consensus the encryption algorithm proposed by the Belgium cryptographers Joan Daeman and Vincent Rijmen was selected. Prior to selection Daeman and Rijmen used the name Rijndael (derived from their names) for the algorithm. After adoption the encryption algorithm was given the name Advanced Encryption Standard (AES) which is in common use today. In 2000 the NIST formally adopted the AES encryption algorithm and published it as a federal standard under the designation FIPS-197. The full FIPS-197 standard is available on the NIST web site (see the Resources section below). As expected, many providers of encryption software and hardware have incorporated AES encryption into their products.

The AES encryption algorithm is a block cipher that uses an encryption key and a several rounds of encryption. A block cipher is an encryption algorithm that works on a single block of data at a time. In the case of standard AES encryption the block is 128 bits, or 16 bytes, in length. The term "rounds" refers to the way in which the encryption algorithm mixes the data re-encrypting it ten to fourteen times depending on the length of the key. This is described in the Wikipedia article on AES encryption. The AES algorithm itself is not a computer program or computer source code. It is a mathematical description of a process of obscuring data. A number of people have created source code implementations of AES encryption, including the original authors.

AES encryption uses a single key as a part of the encryption process. The key can be 128 bits (16 bytes), 192 bits (24 bytes), or 256 bits (32 bytes) in length. The term 128-bit encryption refers to the use of a 128-bit encryption key. With AES both the encryption and the decryption are performed using the same key. This is called a symmetric encryption algorithm. Encryption algorithms that use two different keys, a public and a private key, are called asymmetric encryption algorithms. An encryption key is simply a binary string of data used in the encryption process. Because the same encryption key is used to encrypt and decrypt data, it is important to keep the encryption key a secret and to use keys that are hard to guess. Some keys are generated by software used for this specific task. Another method is to derive a key from a pass phrase. Good encryption systems never use a pass phrase alone as an encryption key.

II. BACKGROUND

A. Preliminary on Advanced Encryption Standard

The Advanced Encryption Standard (AES) algorithm operates on plaintext block of 128 bits. The 16-byte input data is internally organized into an array of four rows by four columns, called the *state matrix* (*Ms*). The input data is encrypted by applying a sequence of transformations to the state matrix, as detailed by the pseudo code in Algorithm 1.The flow chart in Figure 1 shows the dominant resources used for the hardware implementation of each transformation module, where the gate utilization data is obtained by synthesizing the AES Verilog code from [20]. The operations performed and the resources consumed for each module are described as follows.

- SubBytes: Each byte *Si, j* of the state matrix *Ms* will be independently updated by a nonlinear transformation *f* in this module. The mapping *f* is performed by a substitution-box (S-box), which takes one byte of input from *Ms* and transforms it into another byte at the same position. The

SubBytes module accounts for half of the total gates in AES, with registers used as fixed storage elements of the look-up table (LUT). Each S-box is preconfigured with an 8-bit word in each memory location addressable by an 8-bit input. Hence the LUT size is 28 ▪ 8 = 2048 bits. The percentage of hardware resources utilized by this module may vary depending on how the S-box is implemented. If the S-box is implemented by combinational logic circuit, XOR gates become the dominant resources, which account for more than 70% of gate utilization for the AES implementation, as reported in [7].

- ShiftRows: The *nth* row of *Ms* will be cyclically shifted to the left by *n* bytes. As shown by arrows on the entries of *Ms* in Figure 1, the top row is not shifted; the second row is shifted by one byte position; the third row by two; and the fourth row by three. In ASIC design, the ShiftRows transformation can be performed in-place by storing the content of *Ms* in shift registers, hence no additional logic gate is incurred.

- MixColumns: Each column of *Ms* is multiplied by a constant matrix *Mmc* consisting of three integer values 1, 2 and 3, as shown in Figure 1. The multiplication of a variable byte by an integer 1, 2 or 3 of *Mmc* results in an unchanged byte, a 1-bit left shifted byte or the XOR of the byte with a 1-bit left shifted version of itself, respectively. Hence, this invertible linear transformation replaces all four bytes in a column of *Ms* such that each byte is mixed with all four bytes in the column. This module contains only XOR gates and it accounts for nearly half of the total number of gates.

- AddRoundKey: The 16-byte round keys are organized in a similar 4×4 array *Mk* as the state matrix. Each entry of *Mk* is denoted as *Ki, j* . In this operation, each byte *Si, j* of *Ms* will be replaced by the result of a bitwise-XOR operation with a byte *Ki, j* in the same row and column of the round key matrix *Mk* . Therefore, the AddRoundKey module is again built by merely XOR gates, which accounts for 3.3% of the total gates.

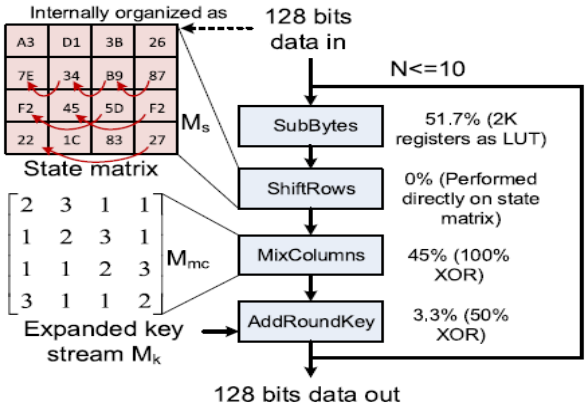

Figure 1. Flow chart of AES algorithm with gate utilization analysis.

In conclusion, the basic operations involved in AES are XOR, shift, and table look up although the percentage utilization of the logic gates used for each module may vary from design to design.

B. Non-Volatile Logic-in-Memory Architecture

Conventionally, all the data is kept in the memory separated from the processor but connected with the I/Os. During the execution, all data needs to be migrated to the processor and written back thereafter. This will cause I/O congestion and impact the system performance for data-intensive application. In addition, significant standby power will be consumed in holding the large volume of data.

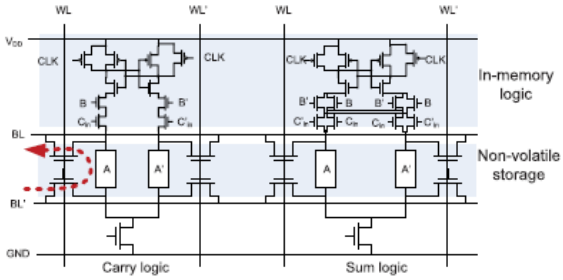

Figure 2. Conventional in-memory computing architecture at memory cell level [8].

Theoretically, the bandwidth problem can be overcome by adding more I/Os operating at higher

frequency. However, this solution is limited by the scalability of CMOS technology and has non-trivial cost penalty. Alternatively, the required data communication traffic between memory and processor can be reduced. Instead of feeding the processor with a large volume of raw data, the data can be preprocessed so that the processor needs to deal only with a smaller amount of intermediate results, thereby reducing the communication traffic. The *logic-in-memory* architecture merges logic with memory to allow some preprocessing to be done locally. Taking the leakage reduction into consideration, the logic in- memory architectures associated with NVM are presented in [8] and [9]. Figure 2 shows the cell-level circuit for the logic-in-memory architecture of [8]. The logic function realized in this example circuit is an in-memory full-adder with both *sum* logic and *carry* logic. Instead of reading out the operands, the *sum* and *carry* results can be obtained directly after the read operation, as indicated by the red arrow.

III. OUR PROPOSED ARCHITECTURE

Our proposed architecture is presented in Figure 3. The encryption path includes four parts: a state register; four S-boxes; a MixColumn; and an output register which also acts as a temporary register to store intermediate results. The key expansion consists of two key registers and a key transformation module to support all key sizes specified in AES. Our design is a 32-b datapath architecture, which means the input data and the input key are divided into 32-b chunks. Each pair of 32-b data and 32-b key is loaded together. This takes four cycles to load the 128-b key and 128-b data and XOR them into the state register.

For 192-b keys and 256-b keys, after the first 128 b are loaded, the encryption is started while the other bits of the key are continuously loaded to maximize the throughput. There are two feedback paths, on in the key expansion and the other in the encryption path. The state register needs to be updated every four cycles with new 128-b data, while the previously expanded word is sent back to the key registers to generate the new expanded key. The details of the optimizations in our proposed architecture are presented in the next sections.

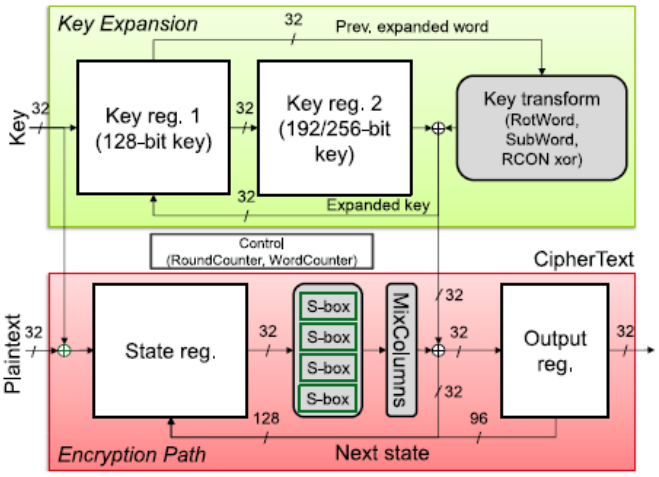

Figure 3. Our proposed AES Architecture

IV. EXPERIMENTAL RESULTS

Our proposed architecture and a lightweight cryptography algorithm PRESENT are modeled in VHDL, synthesized using Synopsys DC Compiler, and fully implemented using Cadence Innovus into the test chip SNACk using ST FDSOI 28-nm technology. The maximum target frequency is set to 60 MHz that provides the maximum throughput of 170 and 106 Mb/s for AES encryption core and PRESENT encryption core, respectively. This throughput meets the demand of mediumand high-throughput IoT applications. AES encryption module and PRESENT encryption module are combined into the block cipher module in SNACk test chip for comparison. The power consumption at different corner cases is estimated using the post signoff extraction. The following sections present our power estimation results on SNACk chip and the security evaluation that we implemented using Synopsys PrimeTime Power.

A. Configuration and Test Environment of SNACK

Figure 4 shows the interface of the encryption module in the SNACk test chip. It contains the test environment for our proposed AES encryption

architecture and also a lightweight cryptography algorithm PRESENT for comparison. It has a 32-b data interface with the possibility of selecting different key sizes and the cipher type between AES encryption core and PRESENT encryption core. AES encryption core supports all the encryption modes specified in AES standard including 128-, 192-, and 256-b keys. PRESENT encryption core with the same interface contains two modes: 80- and 128-b keys. The two designs were implemented using the same technology. The test environment for block cipher module in SNACk chip is presented in Figure 9. The plaintext and the key are loaded from the host through SPI interface. Inside SNACk chip, there is an SPI decoder with the APB-like interface to write the test data into the correct memories including the configuration registers, the key memory, the plaintext memory, and the reference memory. After loading all necessary data, the encryption test is done by activating the control finite state machine. If the encryption is done correctly, the running signal will toggle.

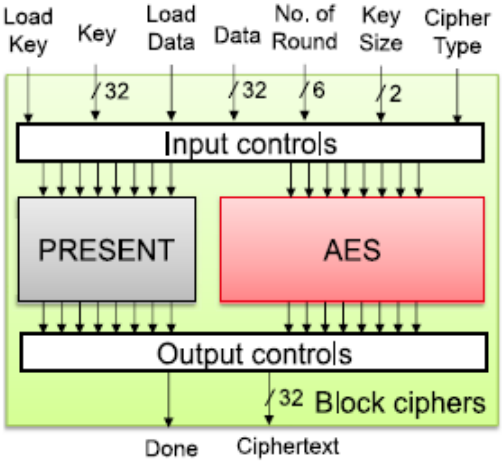

Figure 4. Block cipher module in SNACk test chip.

The encryption process continues running repeatedly until the control finite state machine receives the stop signal through the SPI interface. All the power estimation results in the next section are obtained using this test configuration.

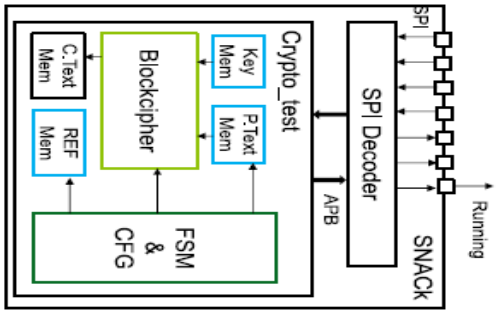

Figure 5. Block cipher module in SNACk test chip

B. Power Estimation Results

Using the test environment in SNACk chip, it is possible to test two encryption cores with different key lengths at different supply voltages and different operating frequencies. The same key and the plaintexts were sent to each encryption module The activity of the post signoff timing simulation for each encryption module was captured for the whole encryption period. Then, the activity data were used to do power estimation in PrimeTime with FDSOI 28-nm technology libraries provided by ST. The technology librarie were characterized for the supply voltage from 0.6 to 1.3 V for different working conditions. Figs. 10 and 11 show the leakage power and the dynamic power of different encryption modes at 10 MHz withthe supply voltage ranging from 0.6 up to 1.3 V at different corners at 125 °C. It is obvious that the worst case in terms of power consumption is the fast corner. Furthermore, it is clear that there are different leakage powers at different corners, while dynamic powers stay unchanged across different corners. The leakage powers increase significantly when we increase the supply voltage especially in the fast corner. Within the same algorithm, the leakage power has minor differences for different key sizes; however, the leakage power of AES module is fro 2.5 to 3 times the leakage power of PRESENT module.

This corresponds to the difference in area of two modules. AES module occupies 3.6 times more area than PRESENT module. In terms of dynamic power, because of our optimization for different configuration by using separated clock gating for

different key storage, AES module with 128-b key has 20% less dynamic power than AES module with 192- and 256-b keys, while the difference between AES 192- and AES 256-bkeys is a small margin.

The difference among three cornerstested is small. The power consumption decreases gradually when we decrease the supply voltage. The best case in our power estimation results is at 0.6 V where the leakage in different key configuration for the two algorithms is close to each other. At the supply voltage of 0.6 V at typical corner in the worst case of power consumption (at 125 °C), AESmodule consumes the power from 61.5 to 65.6 μW in total an the PRESENT module consumes the power of about 24 μW; while in the typical case at 25 °C, our AES module and our PRESENT module consumes only less than 20 and 12 μW, respectively.

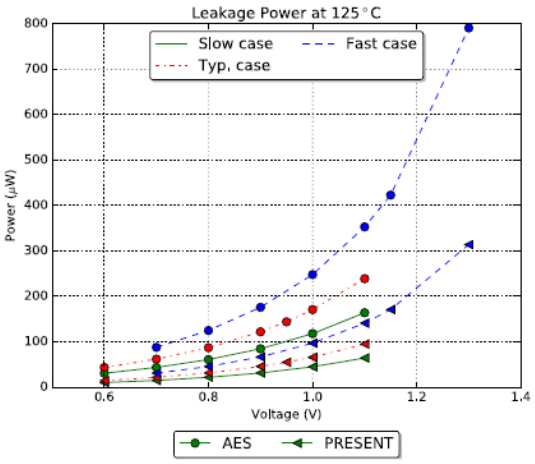

Figure 6. Leakage power at 10 MHz at different supply voltages at different corners.

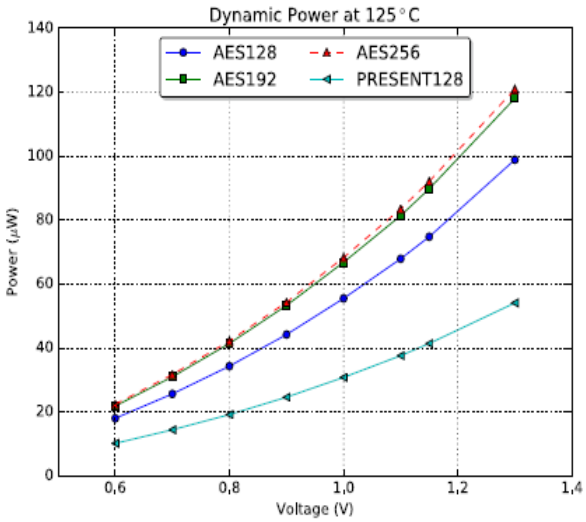

Figure 7. Dynamic power at 10 MHz at different supply voltages

C. Security Evaluation

We also perform correlation power analysis (CPA) attack, one of the most effective side channel attacks, on our design using the last round key hypothesis. The attack is based on the power trace extracted through the post signoff power estimation. A simulation of 20 000 encryptions of our design in 128-b key encryption mode is executed to capture th ciphertext and the power traces.

For comparison, we do the same hardware implementation process with a full parallel design from OpenCores. In general, the more parallel level of the datapath, the harder it is to attack the design because parallelism is one way of hiding countermeasures. 8-b datapath without protection is more exposed to this type of attack because the number of traces required to perform the attack is very small. According to DPA contest, even a round-based datapath with full 128-b parallel computation on field-programmable gate array, with good measuremenequipment, only 800 traces are required to reveal the key of the cryptographic devices.

Figure 8 presents the results of our experiment on post signoff power traces. The AES 128-b datapath needs about 4000 traces to reveal 16 B of the secrete key while with our architecture, even with 20 000 traces, only 12 B are revealed. Four bytes are hidden

because at the end of each round, the data registers are overridden with new data. This hides the correlation of the activity of the last 4 B of the key which increase the resistance of our design to the last round CPA.

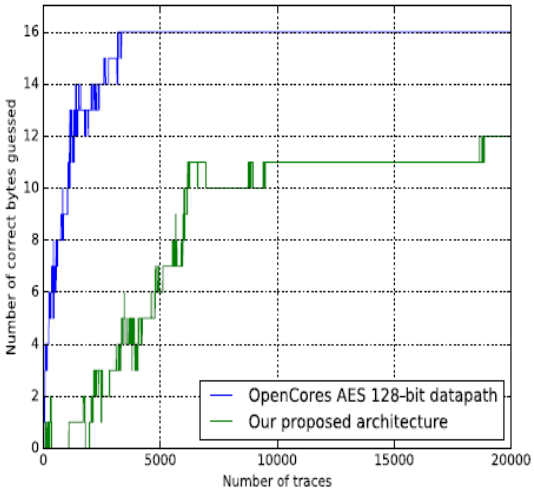

Figure 8. Number of correct guessed key bytes (in 128-b key mode) by last round CPA attack

V. CONCLUSION

In this paper, we presented multiple optimization strategies for AES 32-b datapath to achieve a low-cost high-throughput ultralow-power ultralow-energy design with multiple levels of security.

The area of our proposed architecture is saved by are organization of both datapath and key expansion to minimize the number of registers and control logics. The power consumption is reduced by choosing the S-boxes for low power, by minimizing the activity in the key expansion and in the datapath, and by applying a clock gating strategy to data storage registers. The throughput is maximized by using eight S-boxes and doing key expansion in parallel with the encryption path. Multiple key sizes of the encryption module provide different security levels which help IoT applications to adapt to a wider range of security protocols and mechanisms.

We also showed that our optimization strategies are not only beneficial for area, throughput, and power/energy consumption but also the security feature. With the optimization in the encryption datapath, 32 b of the secrete key cannot be revealed through CPA attacks with 20 000 traces using last round hypotheses. In terms of power and energy consumption, at 0.6 V at 25 °C, our design can achieve a power consumption of less than 20 μW for all key configurations with the energy consumption of less than 1 pJ/b with the throughput of 28 Mb/s at 10 MHz. In this condition, our AES implementation has nearly the same energy consumption in comparison with the lightweight cryptography algorithm PRESENT on the same technology node: ST FDSOI 28-nm technology. With high throughput ultralow-power, ultralow-energy consumption, our design is obviously suitable for future ultralow-power IoT applications.

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An Innovative Approach for Multi-Exposure Image Fusion by Optimizing A Structural Similarity Index

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ABSTRACT

Multi-exposure image fusion (MEF) is considered an effective quality enhancement technique widely adopted in consumer electronics, A single captured image of a real-world scene is usually insufficient to reveal all the details due to under- or over-exposed regions. In this paper a multi-exposure image fusion(MEF) algorithm by optimising a objective quality measure namely the MEF structural similarity index (MEF-SSIM). Specifically, first construct the MEF-SSIM index by improving upon and expanding the application scope of the existing MEF-SSIM algorithm. The final high quality image has little dependence on initial image.Experimental results demonstrate the superiority of the proposed method in terms of subjective and objective evaluation.

Keywords: Multi-Exposure Image Fusion (MEF), Structural Similarity (SSIM)

I. INTRODUCTION

Images taken by ordinary digital cameras usually suffer from a lack of details in the under-exposed and over-exposed areas if the camera has a low or high exposure setting. High dynamic range (HDR) imaging solves this problem by taking multiple images at different exposure levels and merging them together. This technique has been widely used in digital camera and mobile phone devices. Generally speaking, existing HDR imaging approaches can be divided into two categories: tone mapping based methods and image fusion based methods. Multi exposure image fusion (MEF) is a cost effective technique that bridges the gap between the high dynamic range (HDR) of luminance levels in natural scenes and the low dynamic range (LDR) of standard display devices [1]. The input sequence of an MEF algorithm consists of multiple pictures of the same scene taken at different exposure levels, each of which captures partial information of the scene. The basic assumption of most existing multi-exposure fusion methods is that the scene is static during different captures. However, while fusing images taken in dynamic scenes which contain camera movement or motion objects, the methods mentioned above may produce serious distortions. To remove the impacts of camera movement, many multi exposure image alignment methods have been proposed [2].

Moreover, all existing algorithms start by pre-defining a systematic computational structure for MEF (e.g.,multi-resolution transformation and transform domain fusion followed by image reconstruction), with weak and indirect support of the validity and optimality of such a structure. In addition, most existing MEF algorithms are demonstrated using a limited number of hand-picked examples, without subjective verifications on databases that contain sufficient variations of image content or objective assessment by well-established and subject-validated quality models [3].

Unlike existing MEF methods that employ a pre-defined computational structure, we directly explore in the space of all images, searching for the image that optimizes MEFSSIMc, which is a more a model built upon MEF-SSIM. More specifically, we first construct the MEF-SSIMc model by expanding the application scope of MEF-SSIM from grayscale to color images and by better accounting for the impact of luminance changes on image quality.We then derive an analytic form of the gradient of MEF-SSIMc in the space of all images and use it to iteratively search for the optimal MEF-SSIMc image.

For example, in order to preserve color information, the relative signal strength between multiple color channels in a color space such as RGB is contained in the structural component of the proposed color patch representation. As such, preserving patch structure will also implicitly preserve color information. By contrast, existing MEF algorithms that treat RGB channels separately do not have an appropriate mechanism to enforce color preservation and thus often produce unwanted color or luminance changes.

Multi-exposure image fusion is preferred for consumer electronic applications since it does not require the HDR image construction process which increases some computing cost. Many multi-exposure image fusion methods have been proposed.

In recent' years, multi-resolution transforms have been recognized as a very useful approach to analyse the information content of images for the purpose of image fusion. The discrete wavelet transform has become a very useful tool for fusion. These methods show a better performance in spatial and spectral quality of the fused image. The notion of multi resolution analysis was initiated by Burt and Adelson who introduced a multi resolution image representation called Gauss-Laplacian pyramid. Hence, multi resolution analysis has become a very useful tool for analysing remote sensing images. Their idea is to decompose an image into a set of bandpass filtered component images, each of which represent a different band of spatial frequency. Other researchers such as Mallat further extended this idea and Meyer, who established a multi resolution analysis for continuous functions in connection with wavelet transforms. The advantage of wavelet transforms over Fourier transforms is temporal resolution that is it captures both frequency and time information.

II. RELATED WORK

Shutao Li and Xudong Kang [5] proposes a weighted sum based multi-exposure image fusion method which consists of two main steps: three image features composed of local contrast, brightness and color dissimilarity are first measured to estimate the weight maps refined by recursive filtering. Then, the fused image is constructed by weighted sum of source images. The main advantage of the proposed method lies in a recursive filter based weight map refinement step which is able to obtain accurate weight maps for image fusion. Another advantage is that a novel histogram equalization and median filter based motion detection method is proposed for fusing multi-exposure images in dynamic scenes which contain motion objects. Furthermore, the proposed method is quite fast and thus can be directly used for most consumer cameras. Experimental results demonstrate the superiority of the proposed method in terms of subjective and objective evaluation.

Zhengguo Li, **Jinghong Zheng, Zijian Zhu, and Shiqian Wu** introduce an exposure fusion scheme for differently exposed images with moving objects. The proposed scheme comprises a ghost removal algorithm in a low dynamic range domain and a selectively detail-enhanced exposure fusion algorithm. The proposed ghost removal algorithm includes a bidirectional normalization-based method for the detection of non-consistent pixels and a two-round hybrid method for the correction of non-consistent pixels. Our detail-enhanced exposure fusion algorithm includes a content adaptive bilateral

filter, which extracts fine details from all the corrected images simultaneously in gradient domain. The final image is synthesized by selectively adding the extracted fine details to an intermediate image that is generated by fusing all the corrected images via an existing multi scale algorithm. The proposed exposure fusion algorithm allows fine details to be exaggerated while existing exposure fusion algorithms do not provide such an option. The proposed scheme usually out performs existing exposure fusion schemes when there are moving objects in real scenes. In addition, the proposed ghost removal algorithm is simpler than existing ghost removal algorithms and is suitable for mobile devices with limited computational resource.

Rui Shen, Irene Cheng, Jianbo Shi, and Anup Basu, A single captured image of a real-world scene is usually insufficient to reveal all the details due to under- or over exposed regions. To solve this problem, images of the same scene can be first captured under different exposure settings and then combined into a single image using image fusion techniques. In this paper, we propose a novel probabilistic model-based fusion technique for multi-exposure images. Unlike previous multi-exposure fusion methods, our method aims to achieve an optimal balance between two quality measures, i.e., local contrast and color consistency, while combining the scene details revealed under different exposures. A generalized random walks framework is proposed to calculate a globally optimal solution subject to the two quality measures by formulating the fusion problem as probability estimation. Experiments demonstrate that our algorithm generates high-quality images at low computational cost. Comparisons with a number of other techniques show that our method generates better results in most cases.

Many existing MEF algorithms follow a weighted summation framework,

$$\mathbf{y} = \sum_{k=1}^{K} w_k \mathbf{x}_k$$

Where K is the number of exposure levels in the source image sequence. $\mathbf{x}k$ represents a co-located pixel or patch in the k-th exposure image $\mathbf{X}k$, depending on whether the algorithm is a pixel-wise or patch-wise method. $\mathbf{y}$ denotes the corresponding pixel or patch in the fused image $\mathbf{Y}$. The weight wk carries the information about the perceptual importance of $\mathbf{x}k$ in the fusion process. In transform domain approaches, $\mathbf{x}k$ and $\mathbf{y}$ may also be co-located transform coefficients or a group of neighboring coefficients. Most existing algorithms differ in the computation of wk and how it may adapt over space or scale based on image content. Equation (1) has been taken for granted by a majority of MEF algorithms, but there has been very little discussion about why weighted summation is a good way of fusion and how far it is from optimality.

To overcome the misalignment problem caused by camera and object motion, several algorithms have been proposed. Zhang *et al.* [4] used gradient direction to differentiate the dominant background from the moving object. A median filter was used to filter out the moving object in [5]. Li *et al.* [6] enabled their two level detail enhancing image fusion scheme to account for dynamic scenes by explicitly detecting and correcting inconsistent pixels with respect to a chosen reference image. Qin *et al.* tackled camera and object motions in the source sequence by a patch-wise matching algorithm. The weight for each patch was computed using a random walker method [7].

III. CONCLUSION

The proposed approach consistently produces better quality fused images both qualitatively and quantitatively. Moreover, the optimization algorithm is well behaved in the sense that given any initial image, it is able to find a high quality fused image with both sharp structures and vivid color

appearance. the proposed algorithm is iterative, it may not be suitable for real-time applications. An efficient non-iterative algorithm with the spirit of MEF-SSIMc in mind is highly desirable. In future work, we will explore more effective quality measures and the possibility of incorporating multi-resolution technique in the fusion process to further enhance our technique for different fusion problems. We will also explore the possibility of applying the generalized random walks framework to other image processing problem.

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Design and Fabrication of Automatic Dispensing Machine

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ABSTRACT

The purpose of the project is to design a system that can handle and dispense substances (chemicals, food etc.) without human intervention. The system being developed is in relation to the problems being faced by the labours in handling accurate quantity of substances in many retail shops/manufacturing industries. The conventional method used by the labours is through hand handling the substances, which may be hazardous in case of chemicals. On successful completion of the project, this problem is sure to get solved. The system is mainly divided into 3 layers: (1) User Layer (2) Decision Making Layer (3) Action Layer. User layer consists of touch pad for the human interaction, which takes the input from the users regarding substances and its subsequent weight. Decision making layer consist of micro-controller (Arduino UNO/ MEGA), as soon as the user enters the data, the data is processed by the system. Action layer comprises of Actuator (Motor, dispensing controller). After the authentication the Automatic Dispensing Machine dispenses the required amount on to a container. The system is designed using SOLIDWORKS software package. Later, Fabrication can also be done in detail as per required dimensions.

Keywords: Automatic Dispensing Machine (ADM), Arduino Uno/Mega, Screw-Feeder, Solid Works Software, Flow Control Valve, Solid State Relay, HX 711 Converter

I. OBJECTIVES

1. To eliminate problems encountered in processing and dispensing of accurate amount of substances required for respective processes.
2. To expedite the process of weighing and dispensing
3. This system when used in various chemical and tyre manufacturing industries eliminates the direct contact of humans with dangerous chemical, thus ensuring working safety of the labour-force.
4. To increase the efficiency of the weighing and to reduce the error.

II. INTRODUCTION

Though the concept of complete automation has hit the Industry, there is still lack in the way in which the new system is designed and integration of the same with the existing system to achieve automation partially or completely. On thorough study of the design requirements, which can be feasible and affordable as well for the real time application of dispensing machine, the machine is built also keeping in consideration of space constraints. This automatic dispensing machine processes and dispenses the substances on demand of the operator.

III. LITURATURE SURVEY

S. No.	Author and Year	Title	Name of the Journal	Comments
1	Nourma Khader, Alecia Lashier and Sang Won Yoon 2016	Pharmacy Robotic Dispensing and Planogram Analysis Using Association Rule Mining with Prescription Data.	Expert Systems With Applications.	Automation in pharmacies has achieved innovative levels of effectiveness and savings. In the present day, automated pharmacies are facing extremely large demands of prescription orders specifically at the central fill pharmacies that distribute drugs to retail pharmacies. As a result, improvements are necessary to the Robotic Prescription Dispensing System (RPDS) and RPDS planogram to increase the throughput of prescriptions. RPDS planogram defines where to allocate the dispensers inside the robotic unit and how to distribute them among the multiple robotic units.
2	Kin Man Lee, Umberto Ravaioli, Shruti Vaidya September 16th, 2015	Automated Dry food Dispenser		Purpose of this project was to develop a prototype for people who cook from scratch. Measuring precise quantities of dry food items needed and dispensing the same is achieved. Typical features: Interchangeable container for different culinary seeds, Android app to communicate with the system.

3	G. Satyashankaraiah and Siva Yellampalli. 2014	Android Based Fluid Dispensing and Blending System Automation.	Fluid dispensing and blending system.	This paper discusses the development of an android based smart automated fluid dispensing and blending system. The developed system confines to juice dispensing and blending application used in food processing. The system operation is sliced into three layers of operations; user layer, decision-making layer, and an action layer.
4	David F W Yap, S.P. Koh	Artificial Immune Algorithm based Gravimetric fluid Dispensing Machine		Manufacturers in coating industry encounter difficulties in co-regulated carton paintings as number of coatings can be as high as 30000 times. The solution is blending. The effective way in achieving material mixing is by using dispensing Machine.

IV. CONCEPT DESIGN

The system consists of mainly three layers:
1. User Interface layer
2. Decision making layer
3. Action layer

A. User Interface Layer

The UI system consists of the physical part like screen, buttons and fingerprint which is used to take inputs. The entire UI is managed by managed processor. The instructions are displayed on the screen, where the user can use buttons to select the required option. Before selecting the option, the user is required to verify his identity by using RFID card or fingerprint. The system verifies the information with the database, if authentic provides him with other instruction like "required type and quantity of substance".

B. Decision Making Layer

It is the brain of the system which takes the decisions about dispensing of the material. It mainly comprises of micro-controller (Arduino Uno/Mega). The data which are provided by the user is processed and decision is taken by the controller and gives the direction to the action layer to perform the required task.

C. Action Layer

It the part of the system which executes the task obtained from the decision layer. It comprises of mechanical and electrical components to perform the work. The main components of the machine are,

1. Single phase AC Motor
2. Screw Feeder
3. Solid-State Relay
4. Flow control valve
5. Servo-motor
6. HX 711 ADC convertor

a) Single Phase AC Motor

A motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.

The driving power of the loaded screw conveyor is given by:

$$P = P_H + P_N + P_{st}$$

Where,

P_H = Power necessary for the progress of the material

P_N = Driving power of the screw conveyor at no load

P_{st} = Power requirement for the inclination of the conveyor

Power necessary for the progress of the material P_H: For a length L of the screw conveyor (feeder), the power P_H in kilo watts is the product of the mass flow rate of the material by the length L and an artificial friction coefficient λ, also called the progress resistance coefficient.

$$P_H = I_m * L * \lambda * g / 3600 \text{ (kilowatt)}$$
$$= I_m * L * \lambda / 367 \text{ (kilowatt)}$$

Where,

I_m = Mass flow rate

λ = Progress resistance coefficient = 3

Each material has its own coefficient λ. It is generally of the order of 2 to 4. For materials like rock salt etc, the mean value of λ is 2.5. For gypsum, lumpy or dry fine clay, foundry sand, cement, ash, lime, large grain ordinary sand, the mean value of λ is 4.0.

In this connection it should be noted that the sliding of the material particles against each other gives rise to internal friction. Other resistance due to grading or shape of the output discharge pattern contributes to the resistance factor. That is why the parameter λ is always higher than that due to pure friction.

Drive power of the screw conveyor at no load, P_N: This power requirement is very low and is proportional to the nominal diameter and length of the screw.

$$P_N = D_i * L / 20 \text{ (Kilowatt)}$$

Where,

D_i = Nominal diameter of screw in meter

L = Length of screw conveyor in meter

Power due to inclination: P_{st}

This power requirement will be the product of the mass flow rate by the height H and the acceleration due to gravity g.

$$P_{st} = I_m * H * g / 3600$$
$$= I_m * H / 367$$

H should be taken positive for ascending screws and will be negative for descending screws.

Total power requirement:

The total power requirement is the sum total of the above items

$$P = (I_m (\lambda.L + H) / 367) + (D_i.L / 20) \text{ (Kilowatt)}$$

b) Screw-Feeder

The screw-feeder is the important part of the mechanism, once the motor starts to rotate; it pushes the substances in between the space of the blades. Blades are designed using the empirical formulas,

$$P=0.75D_i$$

P – Pitch of the screw

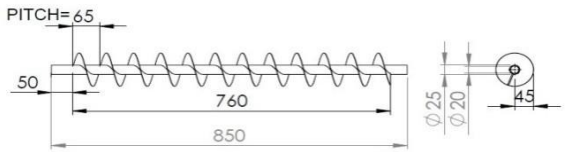
D_i – Inner Diameter of casing

$$SC = CFH*CF$$

SC – Selection Capacity

CFH – Required Capacity in cubic feet per hour

CF – Capacity factor= 1.50 (for $P=0.75D_i$)



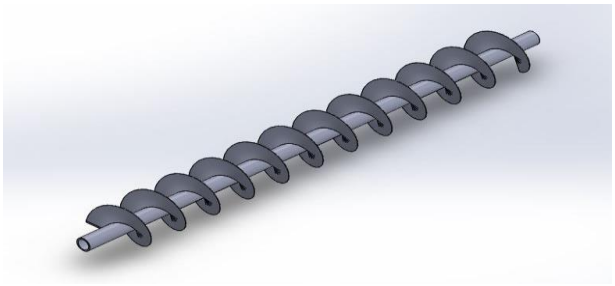


Figure 1

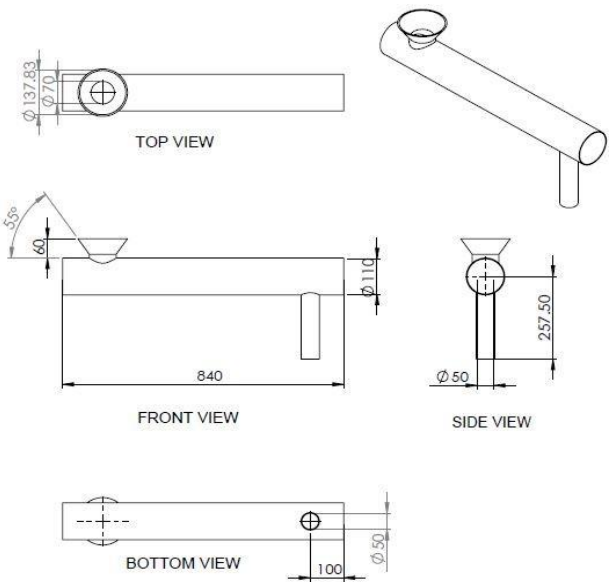


Figure 2

c) Solid State Relay

Solid State Relays (SSR's) are normally-open semiconductor equivalents of the electromechanical relay that can be used to control electrical loads without the use of moving parts. SSR's provide complete electrical isolation between their input and output contacts with its output acting like a conventional electrical switch in that it has very high, almost infinite resistance when non-conducting (open), and a very low resistance when conducting (closed). The controlling of SSR's are is done by the Micro-controller.

d) Flow Control Valve

The flow of substances into the load cell needs to be precisely controlled. This can be achieved by the incorporation of control valve. The timing of opening and closing of the valve is controlled by the micro-controller, which obtains feedback from the load cell. The development of load from various iterations is as shown below.

Load cell development:

Butter-Fly Valve:

In this, a plate is incorporated inside the cylinder as shown in the fig. 4. The Valve is controlled by the servo motor which in turn controlled by micro-controller.

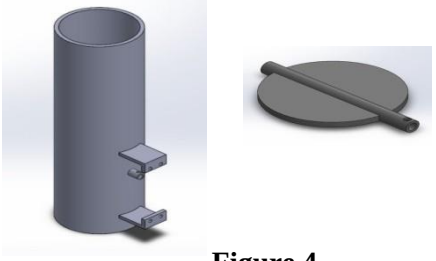


Figure 4

Limitation:

The regulation of flow was very difficult to be achieved whenever there was a demand of smaller quantity i.e., the control of discharge of chemicals to the accurate amount was not possible to achieve.

Double Plate with roller Guide ways:

In this 2 plates were installed at some angle and rollers inside the walls. The rollers support the plate while movement also acts as the load carrying agent.

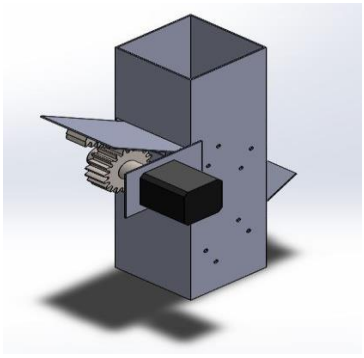


Figure 5

Limitation:

- The rollers could not sustain heavy loads.
- As the plates with chain went in chamber, grease in touch poisoned the chemicals at the outlet.

Double Plate with the guide ways inside the chamber:

This is same design with Guide ways instead Rollers. The guide ways support for the entire length of the plate.

The advantage of this type of mechanism is that when there is flow of particular chemicals from the Screwfeeder the upper plate is opened there by making the flow pass through the vertical column.

When the upper plate is opened for a while and the lower plate is already closed, there is a finite volume of the chemicals stored in the space in between the plates. This acts as reserve quantity and also eliminates the drawback that used to cause by butterfly valve mechanism. Actuating the lower plate slowly with the help of stepper/Servo motor, fixed quantity of chemicals can be made to be discharged at the outlet.

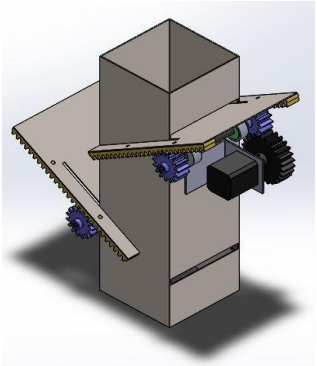


Figure 6

e) Servo motor:

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

4.3.6 HX 711:

HX711 is a precision 24-bit analog to-digital converter (ADC) designed for weigh scales and industrial control applications to interface directly with a bridge sensor. It is designed for high-precision electronic scale and design, with two analog input channels.

V. CONCLUSION

Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions. Authors are strongly encouraged not to call out multiple figures or tables in the conclusion these should be referenced in the body of the paper.

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Modelling and Analysis of Grid Connected Solar Rooftop PV System for Residential Purpose

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ABSTRACT

The main objective of this study is to explore and move forward to environmental friendly with clean energy production in India. The environmental effects of fossil fuel usage and increasing electricity demand are the main factors driving towards the renewable energy. To achieve the goal this paper proposes the Grid connected solar rooftop PV system for residential purpose first to fulfil the home loads and excess energy if generated is connected to utility grid through net metering. It is easier and cheaper than ever before to install solar panels on the roof! Falling PV module prices and very conducive policy environment has made installation of rooftop PV panels a very lucrative investment for individuals and businesses. Modelling method of system design helps to develop the required equipment's for energy harvesting from the solar system more economically. This method helps predict power interruption, the backup energy storage as they can use the energy stored from the batteries. Therefore, development of system model gives the clean energy for energy conservation and sustainable development of the society.

Keywords: Renewable Energy, Solar Rooftop PV System, Net Metering, Utility Grid Connected System

I. INTRODUCTION

There are number of factors behind the development of a country, electricity is one among them. Nowadays, the main challenge for both developed and developing countries is to produce electricity continuously to meet the demand which is massively increasing day by day. Present-day, the non renewable energy sources, which is obtain from nature as a form of coal, gas ,oil etc, are exhaustive in nature and are depleting rapidity due to increase in population. The energy which is in-exhaustive in nature known as renewable energy which is an alternative to non-renewable energy sources.

Using of fossil fuels to produce electricity causes environment problems and it has significant and harmful consequences such as climate change and greenhouse gas (GHG) emission. Utilisation of fossil fuel also one of the reasons of global warming emissions [6]. Climate change is one of the most critical challenges that mankind are facing.

It is well related to the greenhouse emissions which help to trap heat and to make earth warmer. As a result, weather patterns, people, plants and animals are directly affected [7]. In addition, it is also a concern that conventional resources for electricity generation will not last long, the depletion rate of these resource is very fast.

In contrast with fossil fuels, renewable sources are reliable, environment-friendly, affordable, free, abundant, beneficial for our climate as we as health [9]. Electricity can be produced from a number of available renewable sources such as solar [10],

biomass [11], tides [12], the wind [13], rain, biodiesel, biofuel [14], geothermal heat [15] etc. Production of electricity from different natural resources will reduce stress on conventional sources. Solar is the most promising source of energy among different renewable energy sources. Solar energy has a number of benefits over other forms of renewable energy. It is clean, available in nature, pollution free, have 20 to 30 years of life span, more reliable and can be directly converted to electricity. These advantages have made solar a favorable source of energy for future electricity generation system [16] and [17].

Due to negative impact of conventional energy sources as it leaves harmful gases on environment, Renewable energy resources become popular now a day. Solar energy sources are one of them. Now a days, energy based on photo-voltaic cell has becomes most popular as renewable energy resources Photovoltaic grid integrated system has developed rapidly due to continuous cost reduction and incentives obtained by government in past years.

II. BLOCK DIAGRAM

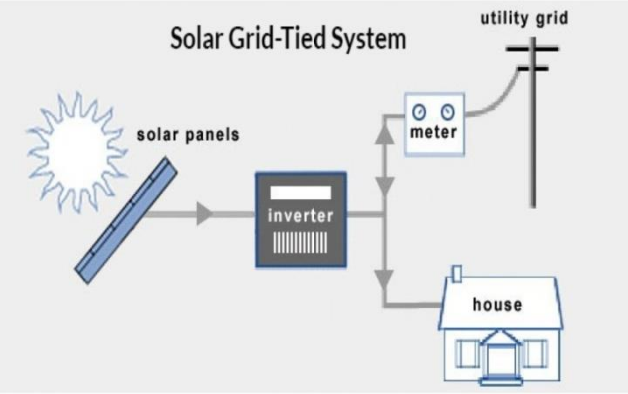

Figure 1. Grid connected solar PV system

A grid-connected photovoltaic power system is an electricity generating solar PV power system that is connected to the utility grid. A grid-connected PV system consists of solar panels, one or several inverters, a power conditioning unit, net metering and grid connection equipment. They range from small residential and commercial rooftop systems to large utility-scale solar power stations. Unlike stand-alone power systems, a grid-connected system rarely includes an integrated battery solution, as they are still very expensive.

Solar energy gathered by photovoltaic solar panels, intended for delivery to a power grid, must be conditioned, or processed for use, by a grid-connected inverter. Fundamentally, an inverter changes the DC input voltage from the PV to AC voltage for the grid. This inverter sits between the solar array and the grid, draws energy from each, and may be a large stand-alone unit or may be a collection of small inverters, each physically attached to individual solar panels. See AC Module. The inverter must monitor grid voltage, waveform, and frequency. One reason for monitoring is if the grid is dead or strays too far out of its nominal specifications, the inverter must not pass along any solar energy. An inverter connected to a malfunctioning power line will automatically disconnect in accordance with safety rules, for example UL1741, which vary by jurisdiction. Another reason for the inverter monitoring the grid is because for normal operation the inverter must synchronize with the grid waveform, and produce a voltage slightly higher than the grid itself, in order for energy to smoothly flow outward from the solar array.

When conditions are right, the grid-connected PV system supplies the excess power, beyond consumption by the connected load, to the utility grid. Residential, grid-connected rooftop systems which have a capacity more than 10 kilowatts can meet the load of most consumers. They can feed excess power to the grid where it is consumed by other users. The feedback is done through a meter to monitor power transferred. Photovoltaic wattage may be less than average consumption, in which case the consumer will continue to purchase grid energy, but a lesser amount than previously. If photovoltaic wattage substantially exceeds average consumption, the energy produced by the panels will be much in

excess of the demand. In this case, the excess power can yield revenue by selling it to the grid. Depending on their agreement with their local grid energy company, the consumer only needs to pay the cost of electricity consumed less the value of electricity generated.

III. IMPLEMENTATION

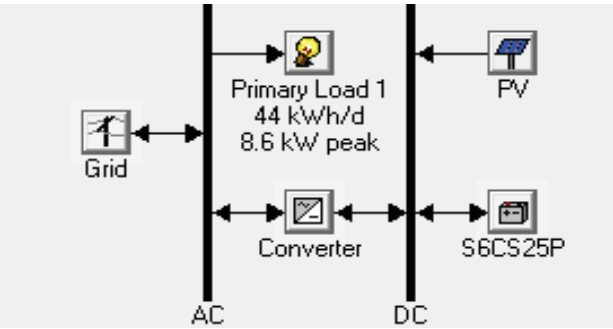

Fig.2. Implementation of On-Grid Solar System

For a case study, we have chosen a house in Kuala Lumpur with daily demand load 44 kWh. The daily load profile of the house is given in Fig.2 and it is considered that the load profile remains same for all months of the year. In this study, a SHS concept with AC grid has been proposed to meet the daily electrical demand of the house. During the bad weather when solar will not get enough sun rays, AC grid will give support to the system. The solar panel is placed at such a place so that more panels can be installed in the same place to support the increase in demand. Generated power from solar panels during day time will supply the load demand, while the excess energy will be stored in the battery bank. The stored energy in battery bank will be used to support the system at night. After satisfying own demand one can sell back the excess energy to the grid. This system is proposed for an individual house power supply. It will be driven by Smart Home Energy Controller (SHEC). If the status of the battery is less than 30% SHEC will be automatically connected to the grid to meet the electricity demand until the batteries charge status reach at 90%. Our aim is to ensure continuous power supplied to the house as required.

IV. ADVANTAGES

a) Systems such as Net Metering and Feed-in Tariff, which are offered by some system operators, can offset a customer's electricity usage costs. In some locations though, grid technologies cannot cope with distributed generation feeding into the grid, so the export of surplus electricity is not possible and that surplus is earthed.

b) Grid-connected PV systems are comparatively easier to install as they do not require a battery system.

c) Grid interconnection of photovoltaic (PV) power generation systems has the advantage of effective utilization of generated power because there are no storage losses involved.

d) A photovoltaic power system is carbon negative over its lifespan, as any energy produced over and above that to build the panel initially offsets the need for burning fossil fuels. Even though the sun does not always shine, any installation gives a reasonably predictable average reduction in carbon consumption.

V. DISADVANTAGES

a) Grid-connected PV can cause issues with voltage regulation. The traditional grid operates under the assumption of one-way, or radial, flow. But electricity injected into the grid increases voltage, and can drive levels outside the acceptable bandwidth of ±5%.

b) Grid-connected PV can compromise power quality. PV's intermittent nature means rapid changes in voltage. This not only wears out voltage regulators due to frequent adjusting, but also can result in voltage flicker.

c) Connecting to the grid poses many protection-related challenges. In addition to islanding, as mentioned above, too high levels of grid-connected PV result in problems like relay desensitization,

nuisance tripping, interference with automatic reclosers, and ferroresonance.

VI. CONCLUSION

The option of Solar PV Rooftop "Grid Connected" system looks quite lucrative for places with fairly regular and continuous supply of electricity. A majority of such places in the country are cities with higher tariffs and reliable electricity supply. It can be a great method to not only reduces electricity bills, but also the generated power can be routed to places which have a shortage of electricity.

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Calculation and Analysis of Temperature and Pressure Drop of Exhaust Gas in the Front Pipe of Engine Exhaust

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ABSTRACT

Temperature and pressure plays a critical role in the engine performance. The exhaust gases coming out of the engine needs to be treated before they are let into the atmosphere. The treatment of gases is done using various catalysts in the catalytic converter. For these catalysts to work properly the exhaust gas temperature plays a vital role. This paper deals with the creation of a tool which calculates the temperature and pressure drop of the exhaust gas in the front pipe of the exhaust system, (i.e. pipe starting from engine outlet till the gasses reach the ATS, i.e. After Treatment System) of an engine. The tool is created in visual studio using visual basis. For calculation of the temperature and pressure drop, the exhaust line is discretized into finite element of 1mm. Then the temperature and pressure drop in this finite element is calculated. The procedure is continued for the entire pipe and then the total temperature and pressure drop in the pipe is calculated.

Keywords. Heat transfer due to conduction, convection and radiation, conductive resistance, convective resistance to the heat flow, pressure loss due to friction and bend.

I. INTRODUCTION

Automobile engines derive power by burning gases and this process is known as combustion. The combustion takes place within the engine and as a result harmful gases are released to the atmosphere. Since the burnt gases contain very harmful materials, they are not released to the environments directly. The exhaust gasses are treated as they pass through the exhaust system, which eliminates the most harmful materials. Diesel engines are considered as one of the largest contributors to environmental pollution caused by exhaust emissions, and they are responsible for several health problems as well. Many policies have been imposed worldwide in recent years to reduce negative effects of diesel engine emissions on human health and environment. A lot of work has been carried out on both diesel exhaust pollutant emissions and after treatment emission control technologies. The exhaust gases from engine contain harmful gases like carbon monoxide (CO), oxides of nitrogen (NOx), hydrocarbons (HC), Diesel particulate Matter (DPF) etc. These gases needs to be treated and converted to less harmful gases before it is let into the atmosphere

Catalytic converter is the main component in engine exhaust system that converts the harmful gases so that it can be let into the atmosphere. A catalytic converter is a large metal box, present underside of the automobile. It has two pipes coming out of it. One of them (the converter's input) is connected to the engine and brings in hot, polluted gases from the engine's cylinders. The second pipe (the converter's output) is connected to the tailpipe (exhaust). As the gases from the engine fumes blow over the catalyst, chemical reactions take place on its surface, breaking

apart the pollutant gases and converting them into gases that are less harmful to the environment.

II. OBJECTIVE

1. To develop a tool to calculate the temperature and pressure drop in the exhaust front pipe.
2. Selection of the best pipe routing design depending on the temperature and pressure drop in the pipe.
3. To find the critical region in the pipe where there is more temperature and pressure drop.
4. Integration of the tool with NX design software, so that the designer can access the tool directly during design of pipe.

III. TREATMENT OF EXHAUST GAS

Catalytic converter is a ceramic or metallic honey comb structure that facilitates the reactions and converts toxic exhaust gases into harmless gases. The honeycomb structure allows the gases touch a larger area of catalyst at once, so they are converted more quickly and efficiently. The catalytic converter is preferred to locate closer to engine to utilize the exhaust gas temperature to the maximum possible extent. Due to the package constraint they can be placed away but in that case it should be provided with external source heat energy. This heat energy is very necessary for the reactions to happen inside the catalytic converter.

There are two different catalysts in a catalytic converter.

- One of them converts the nitrogen oxides using a chemical reaction called reduction (removing oxygen). This breaks up nitrogen oxides into nitrogen and oxygen gases.
- The other catalyst works by an opposite chemical process called oxidation (adding oxygen) and turns carbon monoxide into carbon dioxide. Another oxidation reaction turns unburned hydrocarbons in the exhaust into carbon dioxide and water.

Types of catalytic converter

i. Three way catalytic converter

Used in Petrol engines and it facilitates three reactions which are as follows,

1) Oxidation Reactions. Converts carbon monoxide into carbon dioxide

$$2CO + O_2 \rightarrow 2CO_2$$

2) Converts Un-burnt or partially burnt hydrocarbons into carbon dioxide and water

$$C_xH\ (2x+2) + [(3x+1)/2]\ O_2 \rightarrow xCO_2 + (x+1)H_2O$$

3) Reduction Reaction. Converts Oxides of nitrogen into Nitrogen and oxygen

$$2NO_x \rightarrow xO_2 + N_2$$

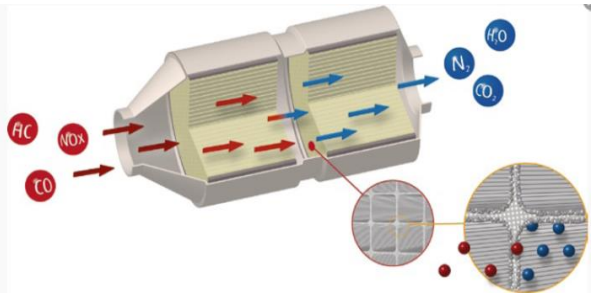


Figure 1. Three way catalytic converter

ii. Diesel Oxidation Catalyst

The diesel oxidation catalyst is designed to oxidize carbon monoxide, gas phase hydrocarbons.

1) Oxidation Reactions. Converts carbon monoxide into carbon dioxide

$2CO + O_2 \rightarrow 2CO_2$

2) Converts unburnt or partially burnt hydrocarbons into carbon dioxide and water

$C_xH\ (2x+2) + [(3x+1)/2]\ O_2 \rightarrow xCO_2 + (x+1)H_2O$

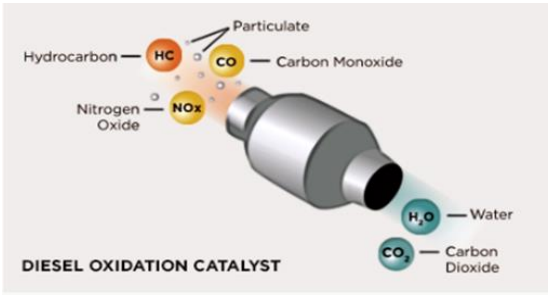


Figure 2. Diesel Oxidation Catalyst

IV. PROBLEM STATEMENT

- For the Catalytic converter to work efficiently the exhaust gasses should be maintained at higher

temperature. But as the exhaust gases flow from engine outlet to the catalytic converters inlet a great amount of heat is lost to the atmosphere.

- The designer designs the pipe and sends it to the CFD (Computational Fluid Dynamics) for the analysis, to check the temperature and pressure drop that may incur in the pipe. It takes around 3 to 4 days to get the result.

V. MODES OF HEAT TRANSFER

Temperature drop in the exhaust gas mainly occurs due to heat transfer by conduction, convection and radiation.

1. Conduction

Thermal conduction is the transfer of heat (internal energy) by microscopic collisions of particles and movement of electrons within a body. The microscopically colliding objects, that include molecules, atoms, and electrons, transfer disorganized microscopic kinetic and potential energy, jointly known as internal energy. Conduction is the most significant means of heat transfer within a solid or between solid objects in thermal contact. Conduction is greater in solids because the network of relatively close fixed spatial relationships between atoms helps to transfer energy between them by vibration.

The law of heat conduction, also known as Fourier's law, states that the time rate of heat transfer through a material is proportional to the negative gradient in the temperature and to the area, at right angles to that gradient, through which the heat flows.

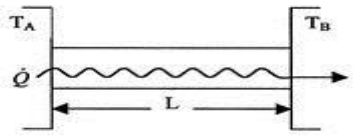


Fig 3. Heat Transfer due to conduction

$$Q = - k * A * \left(\frac{T_A - T_B}{L}\right)$$

'A' is the area, at right angles to that gradient, through which the heat flows

T_A and T_B are the temperatures at the 2 ends of the material of length L.

(-) sign indicates the gradient of temperature $\left(\frac{T_A - T_B}{L}\right)$ is negative i.e. decreases with distance.

'k' (W/m K) is known as Thermal conductivity.

The equation can be re-arranged as

$$Q_{Cond} = \frac{T_1 - T_2}{R_{wall}} \text{ (W)}$$

Where, $R_{wall} = \frac{L}{k * A}$ (°C / W)

Similarly Thermal resistance for a pipe or cylindrical element is given by,

$$R_{cylinder} = \left(\frac{\text{Ln}\left(R_2/R_1\right)}{2 * \pi * L * k}\right)$$

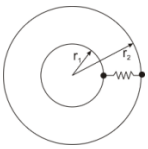


Figure 4. Thermal resistance in a cylindrical pipe

Where, R_2 is the outer radius of the pipe,

R_1 is the inner radius of the pipe,

R_{wall} is the thermal resistance to conduction

2. Convection

Convective heat transfer, often referred to simply as convection, is the transfer of heat from one place to another by the movement of fluids. Convection is usually the dominant form of heat transfer in liquids and gases. Although often discussed as a distinct method of heat transfer, convective heat transfer involves the combined processes of unknown conduction (heat diffusion) and advection (heat transfer by bulk fluid flow).

The rate of convection heat transfer is expressed by Newton's law of cooling. Newton's law states that the rate of heat loss of a body is proportional to the difference in temperatures between the body and its surroundings while under the effects of a breeze. The constant of proportionality is the heat transfer coefficient. The law applies when the coefficient is independent, or relatively independent, of the temperature difference between object and environment.

$$Q_{Conv} = h\ A\ (T_s - T_a)$$

Where, Ts is the surface temperature of the body (K),

T_a is the ambient temperature of the surrounding (K),

h is the heat transfer coefficient W/ (m2K)

The convective heat transfer coefficient 'h', depend on type of media, gas or liquid, the flow properties such as velocity, viscosity and other flow and temperature dependent properties.

Convective heat transfer coefficient is found using Nusselt number. In heat transfer at a boundary within a fluid, the Nusselt number (Nu) is the ratio of convective to conductive heat transfer across (normal to) the boundary.

$$Nu = \frac{\text{Convective heat transfer}}{\text{Conductive heat transfer}} = \frac{h}{\left(k/L\right)}$$

$$h = \frac{Nu * k}{L}$$

Where, k is the thermal conductivity of the gas,
L is the characteristic length. If the flow of gas is through the cylindrical pipe, then L is the inner diameter of the pipe.
Here the Nusselt number is calculated using Gnielinski correlation, which given by,

$$Nu = \frac{f}{8} * (Re - 1000) * \frac{Pr}{\left[1 + 12.7 * \left(\frac{f}{8}\right)^{0.5} * \left(Pr^{2/3} - 1\right)\right]}$$

Where, f is the Darcy friction factor that can be obtained from the Moody chart
Re is the Reynolds number of the gas
Pr is the Prandlt number of the gas

Convective resistance is the resistance offered to the heat flow due to convection. From Newton's law of cooling, for steady convection on a constant area A, can be written as

$$Q_{Conv} = h * A * (T_s - T_a)$$

This can be re-arranged as

$$Q_{Conv} = \frac{T_s - T_a}{R_{Conv}} (W)$$

Where, $R_{Conv} = \frac{1}{h * A}$ (°C / W)

R_{Conv} is the resistance against heat Convection.

3. Radiation

Thermal radiation is energy transfer by the emission of electromagnetic waves which carry energy away from the emitting object. All matter with a temperature greater than absolute zero emits thermal radiation. When the temperature of a body is greater than absolute zero, inter-atomic collisions cause the kinetic energy of the atoms or molecules to change. This results in charge-acceleration and dipole oscillation which produces electromagnetic radiation, and the wide spectrum of radiation reflects the wide spectrum of energies and accelerations that occur even at a single temperature. The relationship governing the net radiation from hot objects is called the Stefan-Boltzmann law.

The Stefan–Boltzmann law describes the power radiated from a black body in terms of its temperature. Stefan-Boltzmann law states that, "The thermal energy radiated by a blackbody radiator per second per unit area is proportional to the fourth power of the absolute temperature". The total intensity radiated over all wavelengths increases as the temperature increases. The amount of thermal radiation emitted increases rapidly and the principal frequency of the radiation becomes higher with increasing temperatures.

$$Q_{Rad} = \varepsilon * A * \sigma * T^4$$

Where, ε is the emissivity of the grey body,
A is the total surface area,
T is the temperature of the body (K)
σ is the Stefan-Boltzmann constant = $5.6703 * 10^{-8}$ (W $m^{-2} K^{-4}$)
If the hot object is radiating energy to its cooler surroundings at temperature Tc, the net radiation loss rate takes the form

$$Q_{Rad} = \varepsilon * A * \sigma * (T_s^4 - T_a^4)$$

Where, T_s is the surface temperature of hot body (K)
T_a is the ambient temperature (K)

VI. PRESSURE DROP IN A PIPE

Pressure loss in a pipe mainly occurs due to two factors. They are pressure loss due to friction and pressure loss due to bend in pipe.

1. Pressure loss due to friction

$$P_{loss} = \frac{f_{in} * \rho_{in} * L * V_{in}^2}{2 * D_{in}}$$

Where, f_{in} is the friction factor at the inner surface of the pipe

ρ_{in} is the density of the exhaust gas in the pipe (kg / m^3)

L is the length of the pipe (m)

V_{in} is Velocity of exhaust gas (m^3/s)

D_{in} is the inner diameter of the pipe (m)

2. Pressure loss due to bend

$$P_{bend} = \frac{k_b * \rho_{in} * V_{in}^2}{2}$$

Where, k_b is the bend loss coefficient

ρ_{in} is the density of the exhaust gas in the pipe (kg / m^3)

V_{in} is Velocity of exhaust gas (m^2 / s)

VII. TEMPERATURE AND PRESSURE DROP CALCULATOR

- First the pipe is created in NX modelling software using tube option.
- Next to calculate the temperature and pressure drop in the pipe, TPC icon (TPC stands for Temperature and Pressure drop Calculator) created in NX is clicked.

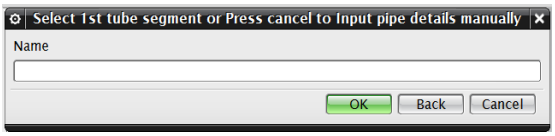


Figure 5. Dialog prompt for pipe selection

- If the pipe dimension details needs to be taken from NX, then all the pipe segments are selected and the press OK.
- Next the tool window will appear. When the tool pops up, the first page appears as shown in Fig 6.
- Next fill all the input details like Volume flow rate of the exhaust gas, ambient temperature of the outer atmosphere, inlet temperature of the exhaust gas, inlet pressure of the exhaust gas, outer air velocity and roughness of inner surface of the pipe.
- Once all the values in the first page are filled next button is pressed. This will automatically display the next page, where pipe details needs to be filled.

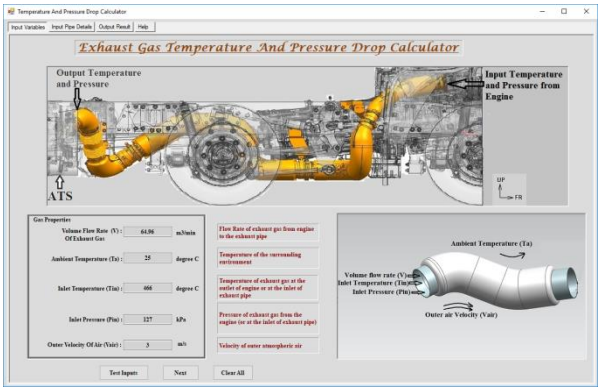


Figure 6. Tool first page

- In the 'Input Pipe Details' tab all the pipe details needs to be filled.
- Once the number of pipe set details is filled, then the values of Pipe outer diameter, Pipe Thickness, Pipe material, Insulator outer diameter, Pipe cover thickness, Insulation material are filled.

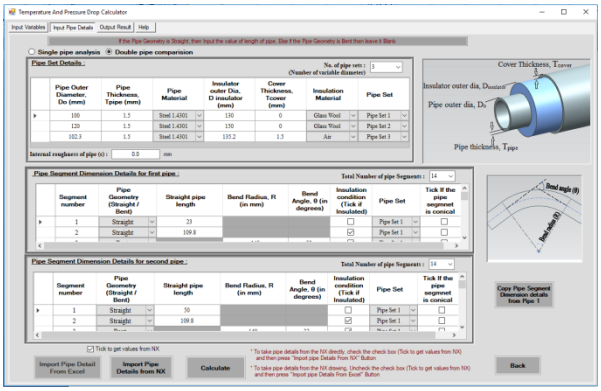


Figure 7. Tool second page

- Also the image on the right hand side of the screen will help to give a clear idea of the data that needs to be filled.
- Next the pipe segment dimensions should be filled.
- Here the details like pipe segment shape, segment length, insulation condition, and pipe set details are filled.
- The pipe segment dimension details can also be directly taken from NX model by clicking on the button 'Import pipe details from NX'.
- The inputs like pipe shape, pipe length, bend radius and bend angle of pipe can be imported directly from NX.

- After importing the values from NX Insulation condition and pipe set details needs to checked.
- Next press calculate button to get the output result.
- In the output page we will get both the pressure drop and the temperature drop graphs as shown in fig 9.
- Also we will get the details like the total length of the pipe, percentage of insulation in the pipe, total temperature and pressure drop in the entire length of the pipe, segment in which there is maximum temperature drop.
- By looking at the results the designer will come to know at which region of the pipe there is maximum temperature and pressure drop, and hence he will be able to do the modification required to reduce the temperature and pressure drops.

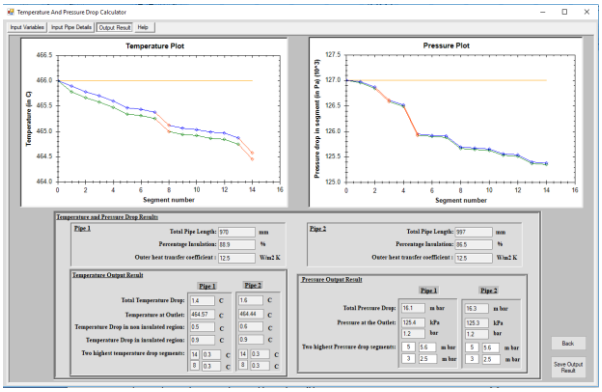


Figure 8. Tool output page

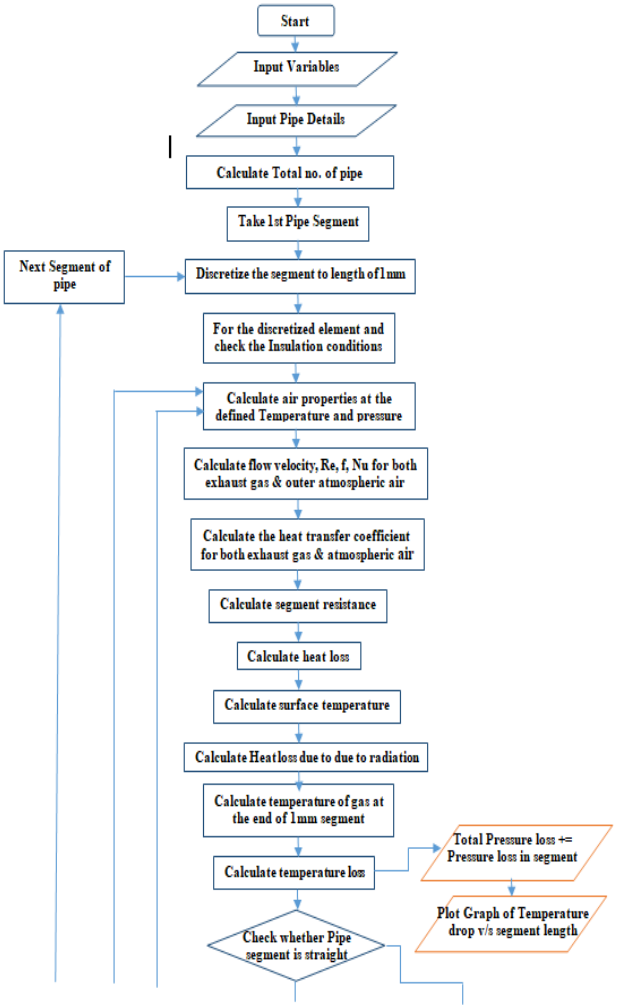
- Also if the designer has to select a pipe from two sets of pipe designs variants, then he can easily do it by checking the temperature and pressure drops in the pipe for those variants, and select the one which has least temperature and pressure drop.

VIII. METHODOLOGY

1. First all the parameters like exhaust volume flow rate, gas temperature, exhaust gas pressure, ambient temperature are given as input.
2. Next the pipe details like length of pipe, diameter of pipe, thickness of pipe, thickness of insulation, roughness of pipe are given as input and calculate button is pressed.
3. Once the calculate button is pressed the tool selects the first segment of pipe and discretize the pipe into a length of 1mm.
4. Next for the discretized 1mm segment the tool checks weather the segment is insulated or non-insulated.
5. Next the properties like specific heat, thermal conductivity, Prandlt number of ambient air and gas are calculated based on it temperature and pressure.
6. Next flow velocity, Reynolds number, friction factor, Nusselt number is calculated for both exhaust gas & outer atmospheric air.
7. Using the above values heat transfer coefficient for exhaust gas &outer atmospheric air is calculated.
8. Next for the discretized 1mm length the total resistance offered by the pipe to heat flow is calculated considering the insulation condition.
9. Next from the resistance value obtained the heat lost by the exhaust gas to the atmosphere is calculated.
10. From the value of heat lost and the segment pipe resistance, the surface temperature of the pipe is calculated.
11. From the value of surface temperature the amount of heat lost due to radiation is calculated.
12. Using the values of heat lost due to radiation and convection, the drop in temperature of the gas at the end of 1mm segment is calculated.
13. This value is stored to find the total temperature drop in the entire pipe.
14. The value is also plotted in the temperature v/s pipe length graph.
15. Next the tool identifies weather the segment is a straight or a bend segment.
16. First the friction factor of the pipe is calculated using Moody's friction factor.
17. If the pipe segment geometry is straight, the tool calculates the pressure loss due to friction i.e. the frictional pressure loss.
18. If the pipe segment geometry is bent, then the pressure loss is calculated as a sum of pressure

loss due to friction and the pressure loss due to bend.

19. The obtained pressure loss is stored to calculate the total pressure loss in the pipe.
20. Simultaneously the pressure drop is plotted in a graph of pressure drop v/s pipe length.
21. This completes the first loop. Next the same procedure is carried out for the next 1mm discretized length.
22. When the temperature and pressure drop for all the discretized elements are calculated, next pipe segment is considered.
23. If the calculation of temperature and pressure for the entire pipe segment is calculated, then the tool comes out of the loop and sum up the total temperature and pressure drop in the entire length of the pipe.



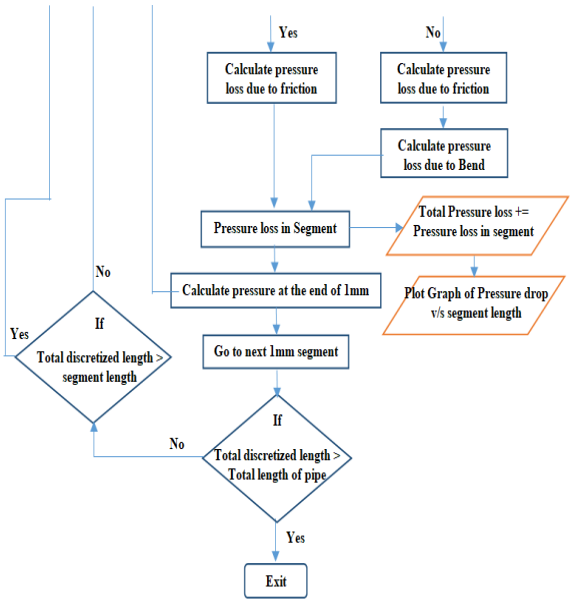


Figure 9. Temperature and Pressure drop Calculation flow chart

IX. VALIDATION OF THE TOOL RESULTS

The temperature and the pressure drop vary based on the input parameters, pipe and insulation materials, and ambient temperature and pressure. The temperature and pressure drops are calculated for various pipes having varying lengths, input parameters and varying materials. The results of temperature and pressure drops are then matched with that of a commonly used 1D tool named GT-Suite (Gamma Technology)

The results obtained from the tool are matched with that of the GT-Suite. There is a maximum deviation of 1°C in the temperature and 1.5 (m Bar) in pressure drop. The results are matched for various sets of exhaust pipes with GT-Suite and the results are matching with an approximation of 12% for both temperature and pressure drops.

The tool results are also tested with that of GT-Suite for simple straight pipes with and without insulation, and a bent pipe. The results obtained from the tool are matching with the results of GT-Suite up to two decimal places for the temperature drop and up to one decimal places for the pressure drop. The results are as shown in Figure 10 and Figure 11.

	Developed Tool Result	GT Suite Result	CFD Result	Result deviation with GT Suite	Result deviation with CFD
Temperature Drop °C	1.5	1.4	1.44	0.1	0.06
Drop (m	16.3	17.4	16.74	1.1	0.44

Figure 10. Result comparison with GT-Suite and CFD

	Pipe no.	Developed Tool Result	GT Suite result	Deviation
Temperature Drop °C	Pipe no. 1	12.16	11.4	0.76
	Pipe no. 2	11.6	10.6	1
	Pipe no. 3	4.98	5.1	-0.22
	Pipe no. 4	5.9	6.7	-0.8
	Pipe no. 5	3.5	3.8	-0.3
Pressure Drop (m bar)	Pipe no. 2	5.4	4.8	0.6
	Pipe no. 3	12.9	11.5	1.4
	Pipe no. 4	19.1	20.5	-1.4
	Pipe no. 5	18.4	19	-0.6

Figure 11. Result comparison for exhaust pipes

X. FUTURE SCOPE

1) The tool developed is a 1-D tool i.e. it calculates and provides the temperature and pressure drop of the exhaust gas in a steady state. Further development can be done to develop a 3-D tool to calculate the results in a transient state.
2) The tool can be made to select all the pipe dimensions like pipe diameter, pipe thickness Insulator diameter and cover thickness automatically from NX.
3) Checking the pipe insulation condition i.e. whether the pipe segment is insulated or non-insulated can be automated.

XI. CONCLUSION

1) Temperature and pressure drop in a pipe can be calculated in a single tool.
2) The temperature and pressure drop at any point along the pipe length can be calculated.
3) The pipe segments with maximum temperature and pressure drop can be found out.
4) Tool is integrated with UG-NX software so that the designer can directly access the tool from design software.
5) Tool can take the pipe dimensions directly from design model.
6) Tool results are compared with the GT-Suite results for validation and the results match with an average deviation of 1°C for temperature drop and 2mBar for pressure drop.

XII. ACKNOWLEDGEMENT

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Absolute Magnetic Encoder Design Based On RBF Neural Networks

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ABSTRACT

This paper proposes absolute magnetic encoder design for analog angular measurement using multi-sensor data-fusion based on Radial Basis Function (RBF) neural networks. Multiple linear Hall effect sensors and a magnet are used to realize the analog angular output. RBF neural networks are used to approximate multi-dimensional nonlinear function between the sensor values and angular position of the magnet. The parameters of the RBF network are determined by supplying the data for multiple sensor values and the corresponding angular position of the magnet. Trained RBF neural network can be used to obtain the analog angle output for the given sensor inputs and it can be implemented using 8 or 16-bit microcontroller. This design of the encoder allows flexibility in terms of placement of the sensors.

Keywords: Rotary encoder, magnetic encoder, multisensor data fusion, hall effect sensor, ANN, RBF neural networks, analog angular measurement.

I. INTRODUCTION

Rotary encoders are often used to track the angular position of the motor shaft. These are commonly used in CNC machines, robots, and other industrial equipment. Rotary encoders, whether absolute or incremental, typically use one of two measuring principles — optical or magnetic. While optical encoders were, in the past, the primary choice for high resolution applications, improvements in magnetic encoder technology now allow them to achieve better resolution. Magnetic technology is also, in many ways, more robust, rugged, having excellent shock resistance, fast, durable to unclean environment, reliable at low temperatures and immune to dust and dirt than optical technology, making magnetic encoders a popular choice in industrial environments.

An absolute rotary magnetic encoder design with multi-sensor data fusion based on radial basis function artificial neural networks is proposed for the analog angular measurement. This design makes use of multiple linear hall-effect sensors positioned at various locations around the rotating magnet.

Artificial Neural Networks (ANNs) are computing systems inspired by biological neural networks. ANNs learn by considering examples and they don't generally need task specific programming. An ANN consists of connected units called artificial neurons, which are simplified version of biological neuron. Each connection between artificial neuron can transmit signal. In common ANN implementations, signal is a real number. The output of each artificial neuron is calculated by applying nonlinear function of the sum of its inputs. Typically, ANNs are organized in layers. Different layers may perform different kinds of transformations on their inputs.

Each connection in ANN has a real value associated with it called weight that represents the signal strength. The weight values associated with connections in ANN goes on adjusting as the learning proceeds. ANNs have been successfully applied on variety of tasks such as image recognition, speech recognition, medical diagnosis etc.

Broadly speaking, ANNs can be applied for two major categories of tasks: 1. Classification 2. Function approximation. For magnetic encoder, a special type of ANN called Radial Basis Function (RBF) neural networks are used for approximating the multi-dimensional nonlinear function between sensor outputs and the angle value.

RBF network is an ANN that uses radial basis functions as activation functions. RBF networks usually consists of single hidden layer. The number of neurons in hidden layer is a design parameter. The output of the network is a linear combination of radial basis functions of the inputs and weights of the network. RBF networks have many uses such as function approximation, time series prediction, classification and system control.

The common layered ANNs use back-propagation algorithm for learning. The learning process for RBF ANNs is slightly different compared to common ANNs. As the learning proceeds, the weights in RBF network keeps on adjusting so as to output a continuous value that approximates some nonlinear function.

This design of magnetic encoder with RBF networks results in reduced hardware complexity because the sensors need not be positioned at some predetermined accurate locations. Also, the results for angle output value showed less amount of standard deviation.

The rest of this paper is arranged as follows. Section II describes Magnetic encoder architecture, RBF network architecture along with its training. In section III the trained RBF network output and its accuracy are discussed. Section IV provides the conclusion.

II. METHODOLOGY

A. Magnetic encoder architecture

Figure 1 depicts the proposed architecture for magnetic encoder. It consists of multiple linear hall-effect sensors placed around a rotating magnet. As the magnet rotates, the output from the linear hall-effect sensors varies. Minimum 3 sensors are required to uniquely identify the angular position of the magnet.

The output signals from all the sensors are sent to a microcontroller that implements RBF neural network. For training the RBF network, sensor values for various angular positions of the rotating magnet needs to be sent to the network trainer. The trainer determines the weights of the RBF network so as to approximate the multi-dimensional nonlinear function between sensor outputs and angle value with desired level of accuracy.

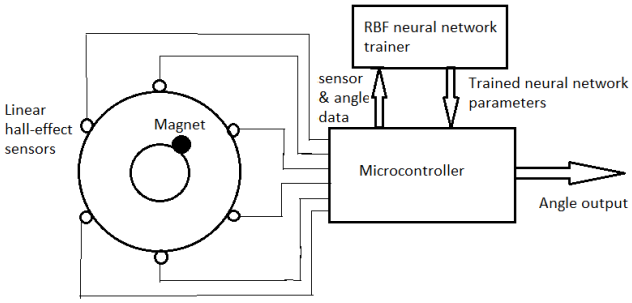

Figure 1. Magnetic encoder architecture

After completion of the training, all the weights of RBF network are sent to microcontroller. These weights are stored in nonvolatile memory of the microcontroller. With the trained weights, the microcontroller can output the analog angle value for the sensor inputs. The training needs to be performed in a machine with high computing capabilities as it requires larger memory, higher bit resolution and faster CPU. Training needs to be done

only once in the beginning for a given configuration of multiple sensors and magnet.

B. RBF network architecture

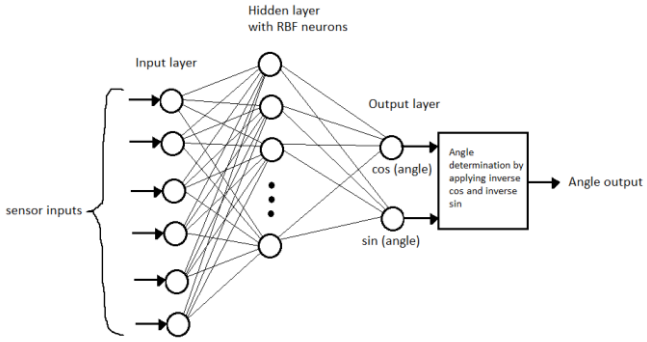

Figure 2. RBF network architecture

The above figure depicts the structure of the RBF network consisting of 3 layers:

1. Input layer consisting of nodes for each sensor.
2. Hidden layer consisting of RBF neurons.
3. Output layer with 2 nodes for cos(angle) and sin(angle).

The number of nodes in hidden layer is a design parameter of the network. For the magnetic encoder implementation, 5 to 10 RBF nodes in hidden layer are found to be sufficient. The nodes in hidden layer uses Gaussian activation function as follows:

$$e^{\left(\frac{-\beta (x - c)^2}{r^2} \right)}$$

where c is the center of the RBF neuron
r is radius associated with RBF neuron
β is parameter for controlling shape of the activation function.
x is the input i.e. multiple sensor values in this case.

Each RBF neuron has its own c, r values. β = 1 is chosen for all the RBF neurons.
The centers of the RBF neurons are chosen at equal angle intervals. And radius value chosen is the Euclidian distance between these centers.

There are no weights associated with connections from input layer neurons to RBF neurons. Weights are associated with connections between hidden layer neurons and output layer neurons.

Output layer consists of two nodes corresponding to cos(angle) and sin(angle) values. The cos and sin outputs are chosen instead of single angle value as output because of the cyclical nature of the inputs and output angle values. Both these output nodes are linear activation neurons.

One set of weights are associated with output neuron for cos(angle), second set of weights are associated with output neuron for sin(angle). The values for these weights associated with both the output neurons needs to be determined by training the RBF neural network. For training, the values for multiple sensor inputs and corresponding cos(angle) and sin(angle) values needs to be supplied to the network trainer. The training methodology is described in next section.

C. RBF network training

Let A denote a matrix with number of columns = number of sensors and number of rows = number of data points.
Let B denote a two-column matrix with values for cos(angle) and sin(angle) corresponding to the angle position for each row from matrix A.
Let W denote a two-column matrix representing weights from hidden layer to output layer. First column in this matrix consists of weights associated with cos(angle) output neuron and second column consists of weights associated with sin(angle) output neuron.
Since the output layer consists of linear activation neurons, the relationship can be expressed in matrix form as follows:

$$A W = B$$

The weights or the elements in W matrix are the unknowns. The number of these weights depends upon the number of RBF neurons in the network. And the number of equations is equal to the number

of training data available, which is usually much more than the number of RBF nodes. The more the number of training data available, better will be the accuracy of approximating the function. From linear algebra, the unknown weights can be expressed as follows:

$$W = (A^T A)^{-1} A^T B$$

III. RESULTS

The trained network outputs the cos(angle) and sin(angle) values for any given sensor inputs. The actual angle value can be obtained by applying inverse cos and inverse sin functions. Since the network consists of only one hidden layer and relatively less number of total neurons and weights in it, its response in terms of time for obtaining the angle output value will be relatively fast. Also, the memory requirements are not huge and it can be implemented using 8 or 16-bit microcontroller. However, for training the network, machine with high computational capabilities are required as it requires high memory, faster CPU and higher bit resolution.

The sensor outputs, expected angle value and actual angle value obtained are shown in Figure 3. Note that the expected and actual angle values are overlapping in below figure because of less difference between them.

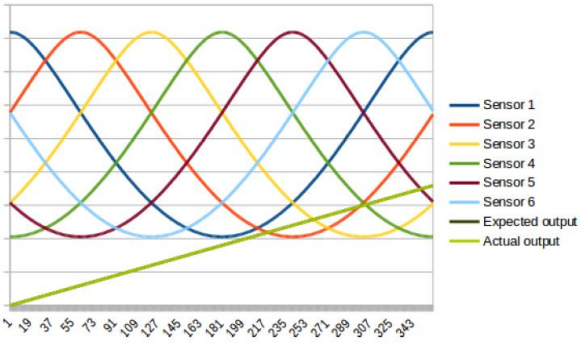

Figure 3. Angle output of RBF network

IV. CONCLUSION

This paper shows an alternative approach of analog magnetic encoder design based on RBF neural networks. With this design, accuracy of ± 0.6 degrees is obtained. Future work can be carried out to improve the accuracy further, reduce memory requirements by having less RBF network parameters, improve the frequency response.

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Extraction of Fingerprint Pore Using Convolutional Neural Networks

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ABSTRACT

Sweat pores have been recently employed for automated fingerprint recognition, in which the pores are usually extracted by using a convolutional neural networks. In this paper, however, we show that real pores are not always isotropic. To accurately and robustly extract pores, we propose an adaptive anisotropic pore model, whose parameters are adjusted adaptively according to the fingerprint ridge direction and period. The fingerprint image is partitioned into blocks and a local pore model is determined for each block. With the local pore model, a matched filter is used to extract the pores within each block. Experiments on a high resolution fingerprint dataset are performed and the results demonstrate that the proposed pore model and pore extraction method can locate pores more accurately and robustly in comparison with other state-of the-art pore extractors.

Keywords: Biometrics, Convolutional Neural Network (CNN), Fingerprint, Pore Extraction

I. INTRODUCTION

Most existing automated fingerprint recognition systems (AFRS) utilize only level one and level two fingerprint features (e.g. orientation field and minutiae) for personal identification. Level-three fingerprint features like pores, though seldom used by existing AFRS, are also very distinctive. Thanks to the advancement of imaging techniques, more and more researchers are now exploring how to extract and use level-three features in AFRS. Proposed a high resolution AFRS using features from level 1 to level 3 (i.e. orientation fields, minutiae, pores and ridge contours A common challenge to the pore-based fingerprint recognition systems is how to accurately and robustly extract pores from fingerprint images. In this paper, we present an adaptive pore model based on our investigation in real pore profiles. The model can adjust its parameters adaptively according to the local ridge direction and period. A novel pore extraction method is then proposed based on this model.

II. METHODS AND MATERIAL

Pore intensity extraction using CNN and postprocessing using PIR as presented in Fig. 1. In this section, we describe the CNN architecture for pore intensity extraction and then explain how to train the CNN. Finally, we introduce PIR, the postprocessing process.

A. Proposed Network

We use a convolutional network inspired by CNN visual geometry group (VGG) [10] and train the CNN of Pore in a supervised learning manner. The goal of training to estimate a pore intensity map where the pores are enhanced and other patterns are reduced. We design the ground truth of a pore intensity map using soft labels. That is, the closer the distance to the pore, the higher the value of the label. Let l i,j

and di,j n p denote the label value at a pixel coordinate (i, j), and the Euclidean distance between (i, j) and its nearest pore from (i, j) in the fingerprint image. If di,j n p is less than dτ , l i,j = 1 – di,j n p /dτ where dτ is the pore distance threshold. Otherwise (i, j) is a non-pore pixel.

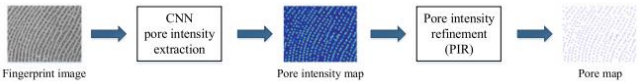

Figure 1. CNN Architecture for Pore Detection

B. Training

We now describe the process of training CNN. Let x and y denote the fingerprint image and the label of its pore intensity map, respectively. Given a training dataset {xi, yi}N i=1 , our goal is to train model f to predict y =ˆ f(x), where yˆ is the estimate of the pore intensity map and N is the batch size.

C. Pore Intensity Refinement (PIR)

The pore pixels appear as peaks in the pore intensity map. The intensity of each pore peak varies depending on the thickness of the ridge to which it belongs and its type (open or closed pore). Therefore, it is difficult to accurately detect the pores with BT over the entire pore intensity map.

We manually marked and cropped hundreds of pores in several fingerprint images, including both open and closed pores. Based on the appearance of these real pores, we summarized three types of representative pore structures as shown in Fig. 3. Among them, the last two types correspond to open pores and they are not isotropic. With more observation of the pore appearance, we found that along the ridge direction, all the three types of pores appears.

III. RESULTS AND DISCUSSION

We have presented an automated fingerprint matching system that utilizes fingerprint features in 1,000 ppi images at all three levels. To obtain discriminatory information at Level 3, we introduced algorithms based on convolutional neural networks. Our experimental results demonstrate that Level 3 features should be examined to refine the establishment of minutia correspondences provided at Level 2. More importantly, consistent performance gains were also observed in both high quality and low quality images, suggesting that automatically extracted Level 3 features can be informative and robust, especially when the fingerprint region, or the number of Level 2 features, is small. The potential of improving AFIS matching by utilizing Level 3 features at 1,000 ppi is promising and should be further investigated.

IV. CONCLUSION

Adaptive pore extraction is a difficult problem because the pore information depends on the person, region, and pore type. To solve the problem, we have presented a pore extraction method using CNN and pore intensity refinement. We have demonstrated that our CNN outperforms the state-of the-art methods by a large margin on the benchmark database. In the future, we will research various biometric systems based on pores.

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Speed Control of Three-Phase Induction Motor By V/F Method

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ABSTRACT

The electric drive systems used in industrial applications are increasingly required to meet the higher performance and reliability requirement. Today about 90% of all industrial motor applications use three phase induction motors because they are simple in design, easy to maintain, and are less costly than other designs. The paper is depend upon the batching system which is one application of weaving machine which rolls the cloth with specific tension so that it should neither slacken the cloth nor tightened it by replacing DC system with the AC system.. The motion of this loom is controlled by induction motor where in the AC drive is used to run the induction motor which rotates the drum through pulleys.

Keywords: AC Drive, Batching System, Counter Meter, Encoder, Gear Box, Encoder, Three Phase Induction Motor

I. INTRODUCTION

Induction motors are widely used in many residential, commercial, industrial and utility applications. This is because the motor have low manufacturing cost, wide speed range, high efficiency and robustness [1].But they require much more complex methods of control, more expensive and higher rated power converters than DC and permanent magnet machines [2]. Previously, the variable speed drives had various limitations such as poor efficiencies, larger space, low speed and etc. the power electronics transformed the variable speed drive into a smaller size, high efficiency and high reliability [3]. The development of speed control system using frequency control has been designed by combinations of PWM control circuit, driver circuit and H-bridge inverter which makes the system simple, robust and compact open loop PWM controller circuit to control single phase induction motor and single phase induction motor can be driven to variable speed and frequency[4].

A wavelet package for the extraction of useful information for the non stationary signals has been employed in [8]. Inter turn fault detection based on neutral voltage has been proposed in [9], but is being limited to the star connected machine with an accessible neutral.

The detection of fault in using park's transform and wavelet has been explained in [10]. In [11] the inter turn fault has been detected by d1 coefficient that is being proceed through ANN for fault classification. But it is desirable to replace the single phase induction motor drives by three phase induction motor drives in residential appliances, farming and low power industrial applications [5].Induction motors have performed the main part of many speed control systems and found usage in several industrial applications. The advances in microprocessor andpower electronics gives permission to implement modern techniques for induction machines such as field oriented control [6].slip frequency control [7].
Then a modern speed Ac machine system is equipped with adjustable frequency drive for speed control of electric machine. The speed of machine of machine

is controlled by converting fixed voltage and frequency to adjustable values on machine side. The three phase inverter circuit changes the DC input voltage to three phase variable frequency variable voltage output. The three phase Ac is rectified into DC and then filtered to minimize the ripple current. This controlled dc is converted into controlled pulses by means of voltage to frequency converter. These controlled pulses are fed to Inverter Bridge for producing variable voltage variable frequency output. This output is fed to induction motor for controlling its speed [8]

This paper gives idea about to implement variable speed drive for maintaining the constant speed of three phase induction motor as batching system requires constant speed. The synchronization is necessary between batching system and weaving machine and this can be done by using variable voltage variable frequency method with the help of AC drive. This paper explains the batching motion system as weaving application.

II. AC DRIVE

AC drives, inverters and adjustable frequency drives all terms that are used to control the speed of AC motor. AC drives receive AC power and convert it to an adjustable frequency, adjustable voltage output for controlling motor operation. The three common inverter types are current source inverter (CSI), voltage source inverter (VSI) and pulse width modulation inverter (PWM).

1) Variable Voltage Inverter

This inverter uses an SCR converter bridge to convert incoming AC voltage into Dc voltage. It controls the value of rectified DC voltage from 0 to 600 V DC. The choke and capacitor make up Dc link section and smoothened the converted DC voltage.

2) Pulse Width Modulation Drives

A basic PWM drive consist of a converter, DC link, control logic and inverter. Siemens MICROMASTER and MASTERDRIVE are like PWM drives which provide more sinusoidal current output to control voltage and frequency applied to the motor. A PWM drive is more efficient and typically provides higher level of performance. It can adjust the speed of motor by changing the frequency applied to the motor. Motor speed can adjust by adjusting the number of poles of motor, but this is physical change to the motor. It requires rewinding and result in step change in speed. Figure shows torque developing characteristics of motor: the volts per Hertz ratio. This ratio is changed to change the motor torque. A drive provides many different frequency outputs.

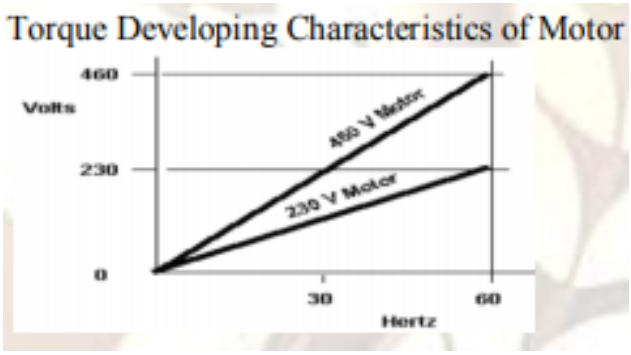

Figure 1

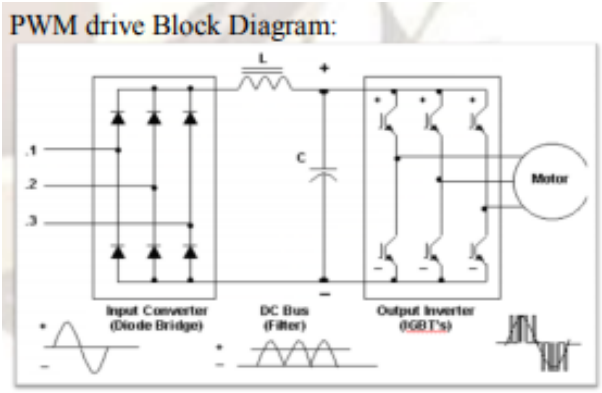

Figure 2

Although some drives accept single-phase input power, are going to focus on the 3-phase drive. The input section of the drive is the converter. It contains six diodes, arranged in an electrical bridge. These diodes convert AC power to DC power. The next section-the DC bus section sees a fixed DC voltage. The DC Bus section filters and smoothes out the waveform Ac drives, inverters and adjustable frequency drives are all terms that are used to refer to equipment designed to control the speed of AC motor.

3) Torque Boost Parameter

Acceleration and deceleration time: The acceleration time defines the time duration in which Ac drive

reaches its maximum frequency after a start signal is issued. Short acceleration times are usually for light loads and long acceleration times for heavy loads. The deceleration times defines the time duration in which the AC drive reduces the output frequency from the maximum frequency to 0 Hz after a stop signal. The deceleration time function allows the load to be stopped more quickly. When a motor is started or stopped using linear acceleration and deceleration patterns, its rate of change until it reaches full speed or comes to a complete stop is linear. When the motor is started or stopped using s shape acceleration or deceleration pattern, its rate of change gradually increases or decreases until it reaches full speed or comes to a complete stop. If the mass inertia moment of connected load is high, it may be necessary to increase the output voltage beyond the normal V/f Characteristics at low output frequencies. This compensates for the voltage drop in the motor winding and can be up to half of motors nominal voltage. The torque boost is defined as a percentage value. The ACS 550 drive has to be selected.

4) IR Compensation

When IR compensation enabled, it provides an extra voltage boost to the motor at low speed and It sets the IR compensation voltage used for 0 Hz. IR compensation factor is required when it is required to start the motor at loaded condition when any fault arises on motor and for that higher torque is required and this can be done by IR compensation which boost up the voltage and torque increases and it is necessary to keep the IR compensation as low as possible to prevent overheating.

III. OPERATION PRINCIPLE

The ACS150 is a wall or cabinet mountable drive for controlling AC induction motors. The fig below shows the simplified main circuit diagram of the drive. The rectifier converts three-phase AC voltage to DC voltage. The capacitor bank of the intermediate circuit stabilizes the DC voltage. The inverter converts the DC voltage back to AC voltage for the AC motor. The brake chopper connects the external brake resistor to the intermediate DC circuit when the voltage in the circuit exceeds its maximum limit.

Circuit Diagram of Drive:

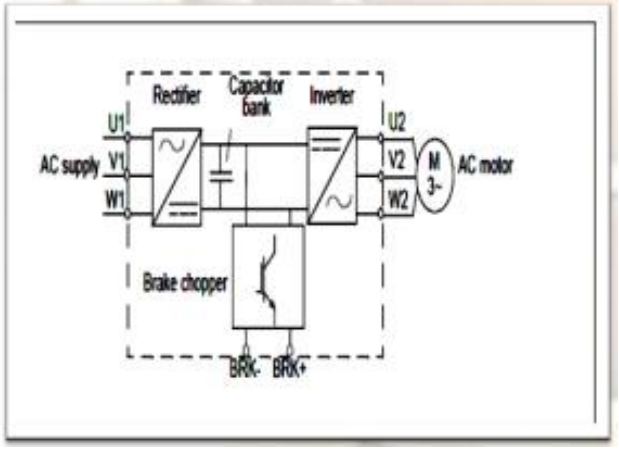

Figure 3

IV. METHODOLOGY

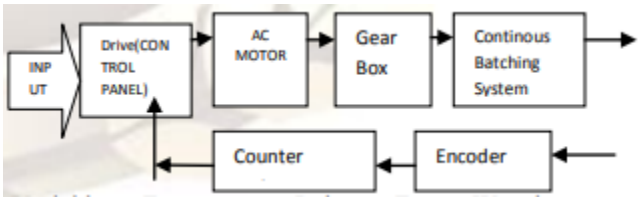

Figure 4

Variable Frequency Drive For Weaving Application

The gear ratio is calculated as

$$i = \frac{\text{speed at output shaft of motor}}{\text{Required speed}}$$

$$i = \frac{1350}{7}$$

$$i = 200$$

Gear ratio is selected as 200:1

V. CONCLUSION

Through this project we have replaced the existing DC system with the AC system and the results are as follows:

1. We are able to achieve 7 rpm which was also possible with the help of DC system. As we have used induction motor we may improve it further

2. Since we are using V/f control method we can vary voltage and frequency as per requirement of torque and speed.
3. Efficiency can be adjusted with the designed of Induction motor at required torque.

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Development of Energy Monitoring and Control System for Smart Home

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ABSTRACT

Energy saving is important because energy use effects the environment and everyone in it. When conservation of energy is done, savings on the cost of living is achieved. Energy efficiency is a goal to reduce the amount of energy required to provide products and services. The first step for saving energy is in home environment. This is possible by automating the home, so that energy saving can be done. This paper proposes a development of energy monitoring and control system for smart home. To full fill the purpose of every day energy consumption monitoring and home appliances control to full fill the purpose of prevention of energy wastage when appliances are not in use. The Data collector collects the data from energy monitoring, motion & temperature monitoring modules and the status of the home appliances from Opto-isolator TRIAC driver circuit module. The collected data is sent to the cloud through MODBUS to GPRS gateway. This data can be viewed in web application. For easy control and monitoring of the system mobile application is used, to which data is sent using Bluetooth and Wi-Fi modules. This helps in local as well as remote control of home appliances. Control of home appliances is achieved using Opto-isolator TRIAC based driver circuit with Zero Crossing Detection(ZCD) feature. This proposed system will help to improve the efficient use of electricity by monitoring the everyday consumption as well as controlling the usage of electricity by home appliances, which in turn helps in energy saving.

Keywords: Smart Home, Gateway, Wi-Fi, Bluetooth, PIR sensor, Opto-isolator TRIAC driver, Microcontroller.

I. INTRODUCTION

Home automation is a kind of automation which provides assistance to carry out the household activities through automatic solutions. Home automation may include centralized control of lighting, HVAC (Heating, Ventilation and Air Conditioning), appliances, and other systems, to provide improved convenience, comfort, energy efficiency and security. The concept of home automation has been around for a long time and products have been on the market for decades, though no one solution has broken through to the mainstream yet [1].

In this century homes will turn out to be increasingly self-controlled and robotized because of the comfort it gives, particularly when utilized in a private home. Many existing, settled home automation frameworks depend on wired communication. This does not represent an issue until the framework is arranged well ahead of time and installed during the physical development of the building. But for already existing building the usage cost goes high. Interestingly, Remote frameworks

can be of extraordinary help for automation systems. With the progression of remote technologies, for example, Wi-Fi, cloud network in the current past, remote frameworks are utilized each day and all around [2].

This paper proposes design and implementation of energy monitoring and control system for IoT based smart home. Overall system block diagram is shown in figure 1.

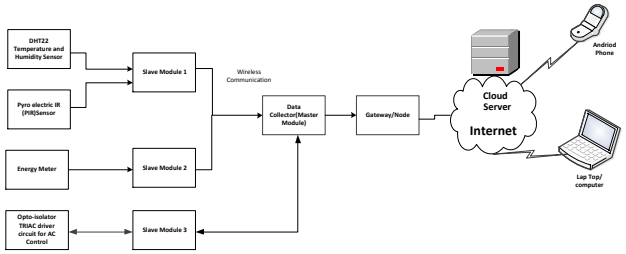

Figure 1. Block Diagram of the Overall System

It consists of (DHT 22) Temperature and Humidity sensor, Pyroelectric IR (PIR) sensor, Domestic energy meter, Opto-isolator TRIAC driver circuit which are physically connected to the Slave modules which will read sensors data and send it to the Data collector wirelessly. From the Data collector information about all the salve modules will be sent to cloud using gateway. Here temperature and humidity sensor is used to get the ambient temperature of the surrounding environment in real time. PIR sensor is used to detect the movement of human/ intruder/person. Domestic energy meters which are used mainly for billing the consumed energy is interfaced to slave module through RS 485 connection. This is done in order to get the real time electricity consumption data of the house. Control of fan, light, water pump and other home appliances is done using Opto-isolator TRIAC driver circuit.

The protocol used for communication between the modules which collects the data from all the sensors and the gateway is MODBUS protocol. The mode of communication can be Bluetooth, Wireless Radio-Frequency and Wi-Fi. The data collected by gateway is sent to cloud server with the help of GPRS connectivity. That collected data can be viewed in Web application/Mobile application from any place and at any time.

II. OBJECTIVE

1. Real time domestic energy monitoring, in order to keep track of everyday day consumption of electricity.
2. Motion detection using Pyroelectric IR sensor.
3. To design user friendly, safe system to control home appliances such as fan, lights, water pumps etc
4. Controlling all home appliances such as fan, lights, motors etc using smart phone.
5. Power saving and improving overall power efficiency.

III. PROBLEM STATEMENT

Most conventional power meters currently installed in households only display the total real time usage of power and the amount of electricity available. There is no possibility of back tracking complete energy consumption up to 6 months and often these energy meters are placed in an inconvenient location which makes regular inspection difficult. Energy consumption control along with the consumed energy tracking will help in energy saving.

IV. PROPOSED SYSTEM

The fundamental building blocks of this proposed system are Microcontroller, Sensors (DHT22, PIR), Wireless RF module, Wi-Fi module, Bluetooth module, Gateway (Modbus to GPRS). Proposed system shown in figure 2 is divided into three different modules such as: module for energy monitoring, module for detecting the motion of human or intruder and module for AC control system for home appliance control.

The three modules are explained below:

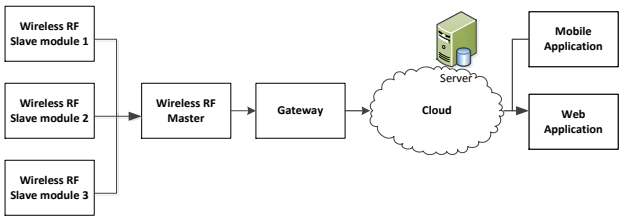

Figure 2. Proposed System

A. Domestic Energy Consumption Monitoring

This module is developed to keep track of every day consumption of energy. The user will be able to view energy parameters such as voltage, current, power factor, power (KWH), frequency. This information is extracted from the domestic energy meters using RS485 communication protocol. This will help the user to keep track of every day energy consumption there by getting to know the reason for excess of energy usage. User will also be able to know energy consumption pattern i.e, user will be able to know during which time of the day the consumption was more/less. This will help the user to manage the energy consumption during peak hours, thereby saving money.

Figure 3. Block Diagram of Energy Monitoring

As shown in the above figure 3 the Energy meter is interfaced to wireless RF slave module 1. Data collector send MODBUS command to the meter and get the response through wireless RF master and slave modules.

B. Motion Detection using PIR sensor

PIR sensor is used to detect the motion of human/ intruder/person. Pyroelectric IR (PIR) sensors belong to the class of thermal detectors. Thermal detectors can measure incident radiation by means of a change in their temperature. When an appropriate absorbing material is applied to the detectors element surface, they can be made responsive over a selected range of wavelengths. PIR sensors are designed to detect human bodies, thus the wavelengths of interest are mainly in the range of the IR window, in which the IR emission of bodies at 37°C also peaks. HC-SR501 is the PIR motion sensor that is being used in this module. This sensor can be connected to any microcontroller easily and this can also be used as standalone motion detector. DHT22 temperature and humidity sensor is also used to measure the ambient temperature and humidity of the home environment. These two sensors are interfaced to one module. This module will be continuously reading the PIR sensor data. When any motion is detected by the sensor, the module will read the change and send it to the Data collector.

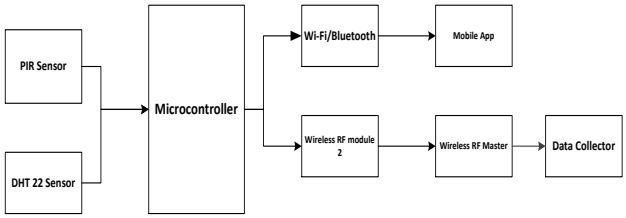

Figure 4. Block Diagram of Motion Detection Module

As shown in the above block diagram figure 4 the PIR and DHT22 sensors are interfaced to microcontroller. The sensor data from the controller is communicated to mobile application through Wi-Fi or Bluetooth. The same data is sent to Data collector with wireless RF master and slave module.

C. AC Control System for Home Appliance

This module is designed and developed for on and off control along with phase angle control of the AC voltage. On and off control is used to switch on and off the home appliances. Whereas phase angle control of the AC voltage is done in order to vary the intensity of light, controlling speed of fan and motor, controlling electric heater etc. This AC control system is designed with zero-crossing opto-isolator TRIAC driver which will drive the TRIAC for AC voltage control.

TRIAC, triode for alternating current, is a generic trademark for a three terminal electronic component that conducts current in either direction when triggered. TRIAC based AC control system is designed because of the bidirectional current

conduction characteristic of it. The circuit diagram of zero-crossing detection along with Opto-isolator TRIAC driver is shown in below figure 5.

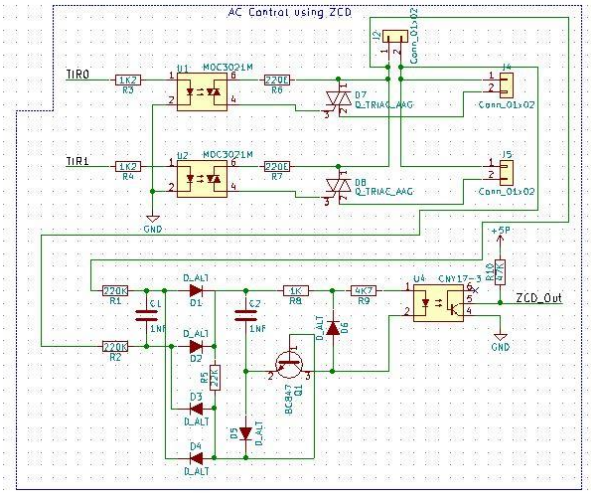

Figure 5. Zero-Crossing Detection Along With Opto-Isolator Triac Driver Circuit

Zero Crossing detection is used to synchronise the firing angle of a TRIAC (or other switching device) to achieve dimming or speed control. Zero cross switching is used so that the switch action occurs when there is no voltage across the load and thus no current through the load. This prevents fast rise time current flow as what would occur if the switch closed or opened when the voltage was high. Zero Crossing Detection will reduce EMI (Electro Magnetic Interference). In the circuit shown the "hot" side of the line is switched and the load connected to the cold or ground side.

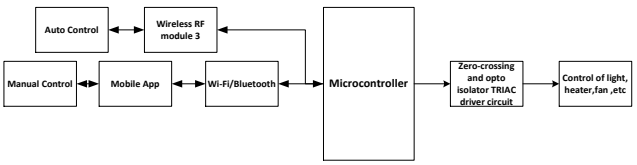

Figure 6. Block Diagram of AC Control System Module

The above figure 6 shows the details of AC Control System module. Here the controlling is done in two ways: one is manual control and one more is auto control. In manual control the user will do on off control and phase angle control using mobile app. Whereas in the auto control based on the PIR sensor data the controlling action is taken automatically. Auto control data is given to the controller through wireless RF module. For manual control, control commands are given through Wi-Fi or Bluetooth module.

V. METHODOLOGY

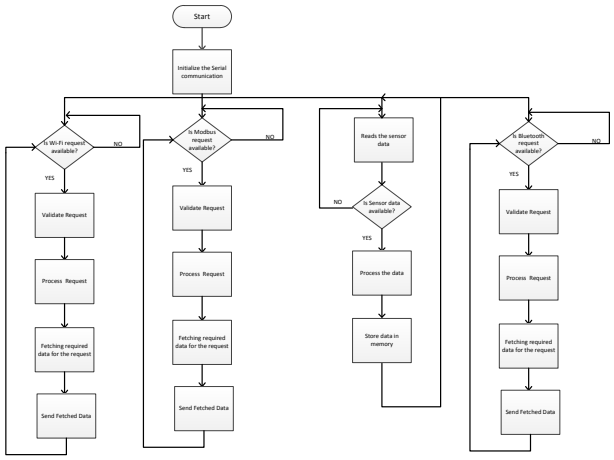

Figure 7. Flow Chart of Slave Module

Figure 7 shows the flow chart of slave module. At the start all the communication ports are initialized to defined baud rate and also the output and input pins are assigned. Processes starts working where one will check for the data availability at the serial port, whereas the other process starts reading the sensor data. In the second process PIR sensor status and the AC Control Circuit read and write operation is done. After each operation the data which is resulted from it is stored in the memory. This process is done continuously in an infinite loop.

Whenever the Modbus, Bluetooth or Wi-Fi request is available, validation of the received data is done. After validation required processing is done on the data to get the proper information. Based on the information the sensor data which is stored in the memory is fetched and sent back to the same serial port in the format defined as per the protocol (Modbus Protocol).

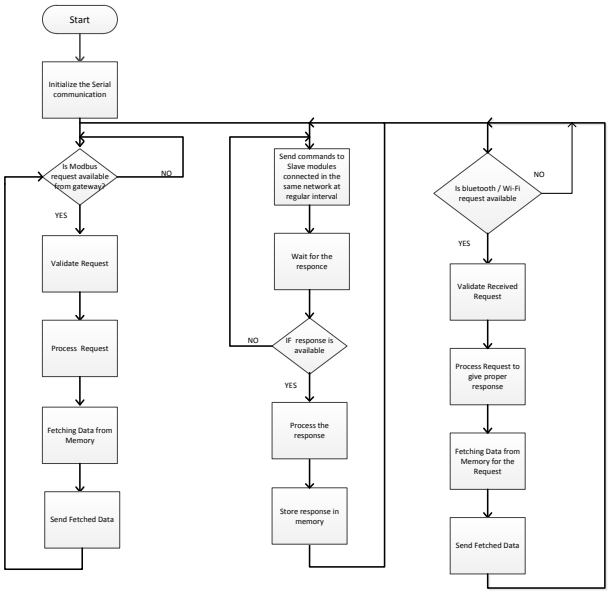

Figure 8. Flow Chart of Master Module (Data Collector)

Figure 8 shows the flow chart of Master module. At the beginning, initialization of the ports, pin assignments are being done and the Master starts sending the read command to the devices/slave modules which are connected in the same network at regular time interval. After sending the command it waits for small amount of time for the response. If the device won't respond, it sends command to the next device address. This process is also run in an infinite loop. At the same time, it keeps checking for any data available from the data availability from the server(gateway). Server data availability, will indicate the changes that has to be done by the master or the changes that occurred in the network in which the master is connected.

Master will update the changes indicated by the server and stores those changes in memory for next operation. After the operation is done it sends back confirmation of modification, by responding back to server with an acknowledgement. Suppose request is available from Bluetooth/Wi-Fi, validation of the received request is done. After validation processing of the request is carried out and based on the processing data is fetched from the memory and response is sent back.

VI. HARDWARE DESIGN

This section focus on the hardware construction of control board. The design of the hardware is done using KiCad software. It is an open source software suite for Electronic Design Automation (EDA). It facilitates the design of schematics for electronic circuits and their conversion to PCB designs. KiCad has five main parts: KiCad – the project manager, Eeschema – the schematic capture editor, Pcbnew – the PCB layout program. It also has a 3D view. GerbView – the Gerber viewer. Bitmap2Component – tool to convert images to footprints for PCB artwork. Using this software, design of all three modules which were mentioned in the previous section is carried out.

In the hardware designing single controller board is designed to which the three different module sensors are designed as add-on cards. The schematic of main controller board is shown below figure 9.

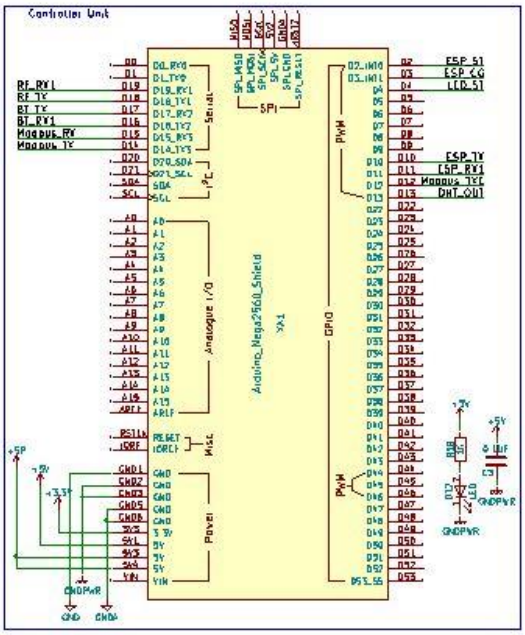

Figure 9. Schemtic view of controller

The Main Controller is interfaced to Wireless RF module, Bluetooth, Wi-Fi shield. So the pins of controller are assigned to all these interfacing devices. The three modules from which the required

information is collected, will be energy meter monitoring, motion detection and AC control system.

Next section is the wireless radio frequency module along with Wi-Fi, Bluetooth and Modbus is shown in figure 10.

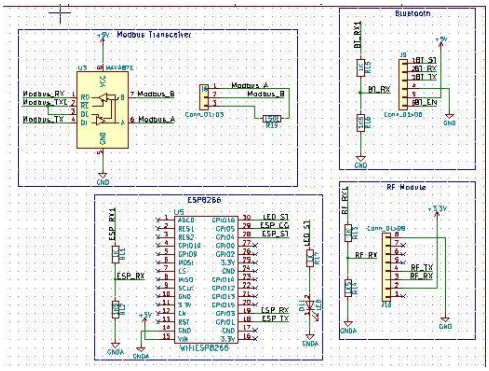

Figure 10. Schematic view of the Wireless RF, Wi-Fi, Bluetooth and Modbus Unit

The different communication modules such as Wireless RF, Bluetooth, Wi-Fi and Modbus are connected to the controller for easy accessibility of the data. These modules work at different supply voltages. So the required power supply is given by the controller.

Next section consists of sensor connection to the slave module controller. Integration of sensor module in the design is shown in figure11.

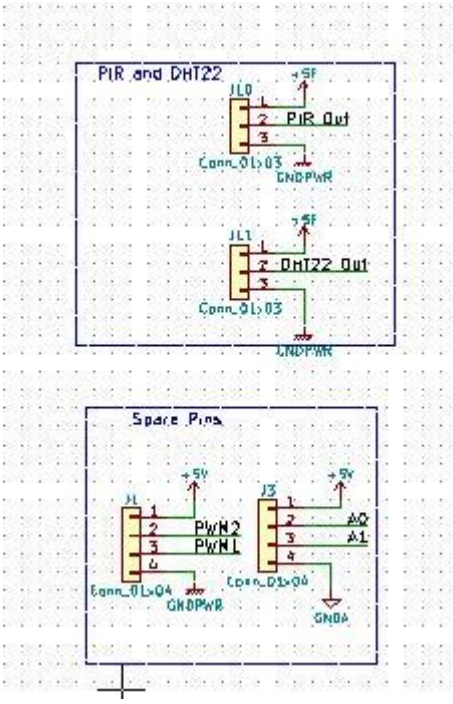

Figure 11. Schematic View of Sensor Connection

This unit also consists of spare pins for future application/use. DHT22 and PIR sensors are connected to the controller. Each sensor has three pins, which are mapped to three pins of controller. The 3D view of the PCB design is shown in figure 12 and 13.

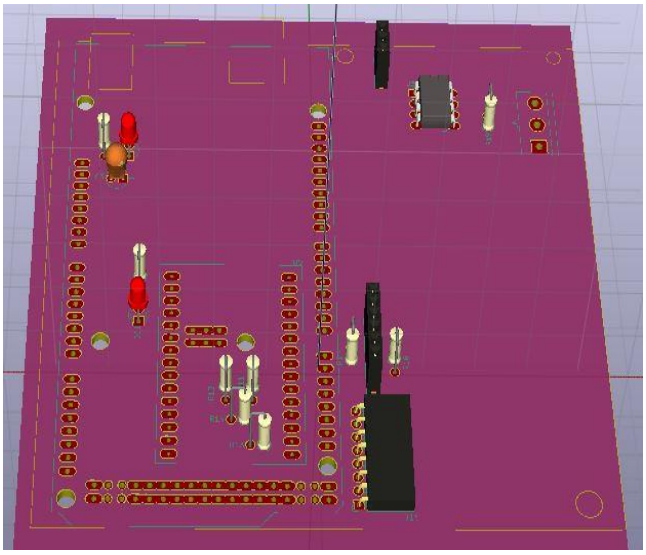

Figure 12. 3D view of the Printed Circuit Board of the Main controller board

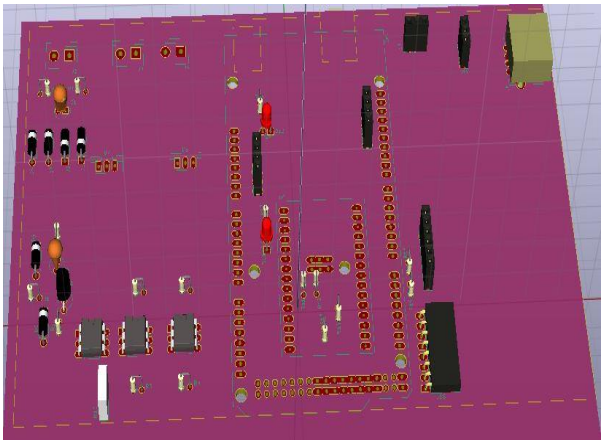

Figure 13. 3D view of the Printed Circuit Board of the slave controller board

The 3D view of the design consists of all the sections which are explained in the previous section. The hardware is designed for single layer.

VII. RESULTS

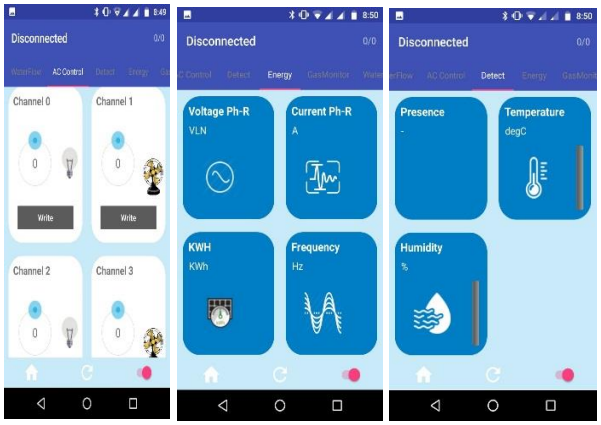

Figure 14. Mobile Application Interface for Energy Monitoring and Control System

Figure 14 shows the user interface of mobile application for energy monitoring. This data is read from the energy meter. This data can be viewed in the graphical format also for easy understanding along with timestamp. This data will be stored in the database and can be viewed at any time. The same data is viewed in the web application.

For motion detection and AC control graphical user interface is designed along with SMS alerts which indicate the user about the present condition of home.

VIII. CONCLUSIONS

This paper presents the new circuit topology for monitoring and controlling the home electrical devices by using the flexible home-based Android smart phone and implemented by wireless transceiver and customized hardware design. The Controller as well as android app is used for system control configuration. The proposed new circuit topology is used in a quiet based web services in an interoperable application layer for communication between the remote user and the home device.

This approach proves the requirement of real time monitoring of domestic energy in order to keep track of everyday consumption of electricity and also controlling of home appliances such as fans, lights, water pumps etc.

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Smart Wireless Autonomous Robot for Landmine Detection with Wireless Camera

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ABSTRACT

The tremendous recent involvement of technology in our life generates a lot of advantages and disadvantages. Nevertheless, and in order to highly augment its positive influence, at the expense of the negatives, technology most be deployed to serve humanity and society. With this objective, we highlight the importance of involving robotics, communication and data analysis in the domain of land mine detection. The main idea is to design and implement a prototype of an efficient low cost automated robot that has the aptitude to detect the buried mines and lets user control it wirelessly to avoid human causalities. This detector will wirelessly communicate with a server to transmit the detected information. The proposed system will help in significantly reducing the risk poses to the human detectors lives while they are in a field of mines.

Keywords: Arduino IDE, Autonomous Robot, Fire Sensor, IOT Device, Landmine, Metal Detector, Obstacle Detector

I. INTRODUCTION

Despite the general awareness on the amount of landmines laid down around the globe, end-user's needs for new technologies must be properly assessed in order to avoid the wastage of financial funds.

A. Autonomous Robot

Robotics is bringing innovatory changes in the world by introducing new technologies. Autonomous robots are intelligent machines capable of performing tasks in the world by themselves, without explicit human control.

B. Landmine

A mine is usually placed just below the surface of the ground and designed to be explode by the weight of vehicles or troops passing over it.

Classifications of Mines

Mines can be classified in two broad areas as Anti-Tank Mine (ATM) and Anti-Personal Mine (APM). There are also some misfired or undetonated explosives which are named as Unexploded Ordinance (UXO). These UXO can be found on battle field. These are typically bomb shells which are fired but due to some reasons did not explode.

Table 1. Gives the Details of All Three Types of Mines

Target	Unspecified	Armed personal	Human
Weight	Various	Heavy (6-11 kg)	Light (0.1-4 kg)
TYPE	UXO	ATM	APM

Size (in diameter)	Various	Large (13-40 cm)	Small (6-15 cm)
Case material	Mostly metal	Metal, plastic	Plastic
Detonation pressure	Unpredictable	120 kg	0.5 kg

II. MOTIVATION

There are nearly 50 million unexploded landmines in 60 countries around the world. These landmines kill and maim approximately 26,000 people annually of which 70% of victims are civilians and one-third die and others loose limbs. Large portions of land go unused due to fear of mines. Modern mines can be constructed with plastics and composites. The low metal content of mines makes detection extremely difficult. Despite global ban, 1 million new mines are laid annually which means 10 times more mines are laid than clear each year.

III. PROPOSED SYSTEM

The main problem in the existing system was that it doesn't detect the landmine accurately. It also doesn't have a wireless camera to monitor the surrounding environment and uses a PIC microcontroller to combine all the process.

Proposed system uses multiple sensor to detect the fire, obstacle and landmine in the field and to monitor the surrounding at safe place and also to update the status in IOT website and control the robot movement.

Every landmine ever build will have a trigger pin to trigger the landmine. These trigger pins are made up of metal device which can be easily detected. This system will focus on detecting the trigger pin using the metal detector. As this system is autonomous, it uses the ultrasonic sensor to detect the obstacle in front of the robot. Hence it can be send alone to a place without controlling. To detect the fire it uses the flame sensor. The system monitors the surrounding with the help of wireless camera. All the details and status about the landmine and environment status will be updated in a specific IOT website.

A. Metal Detector Sensor

Metal detectors use electromagnetic fields to detect the presence of metallic objects. Metal detectors use electromagnetism in two fundamentally different ways, active and passive.

*(1)*Active detection methods illuminate some detection space—the opening of a walk-through portal, for example, or the space directly in front of a hand-held unit—with a time-varying electromagnetic field. Energy reflected from or passing through the detection space is affected by the presence of conductive material in that space; the detector detects metal by measuring these effects. *(2)* Passive detection methods do not illuminate the detection space, but take advantage of the fact that every unshielded detection space is already permeated by the Earth's natural Magnetic field. Ferromagnetic objects moving through the detection space cause temporary, but detectable changes in this natural field.

B. Ultrasound Sensor

Ultrasound frequencies are frequencies above audible range i.e. 20KHz. Sound wave travel in the form of disturbance of molecules in the medium in form of waves. In a Homogeneous medium sound wave travels along the straight line as there is no change so far. But when other medium is encountered, sound waves get reflected and refracted. The reflected waves are processed to make prediction about buried object as wave travel with different speed in different material. Frequency plays major role in depth of penetration. Ultrasound wave travels

through humid conditions with less attenuation but gets attenuated in air.

C. Flame Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. A flame detector can often respond faster and more accurately than a smoke or heat detector due to the mechanisms it uses to detect the flame.

D. IOT Device

The IOT concept is simple but powerful. If all objects in daily life were equipped with identifiers and wireless connectivity, these objects could communicate with each other and be managed by computers. IOT describes a system where items in the physical world, and sensors within or attached to these items, are connected to the Internet via wireless and wired Internet connections. These sensors can use various types of local area connections such as RFID, NFC, Wi-Fi, Bluetooth, and Zigbee. Sensors can also have wide area connectivity such as GSM, GPRS, 3G, and LTE.

E. Arduino IDE

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Hardware Arduino: An Arduino board consists of an Atmel 8-, 16- or 32-bit AVR microcontroller. The boards use single-row pins or female headers that facilitate connections for programming and incorporation into other circuits.

Bringing all these important components and several supporting systems together we strive to fulfil our objective.

IV. BLOCK DIAGRAM

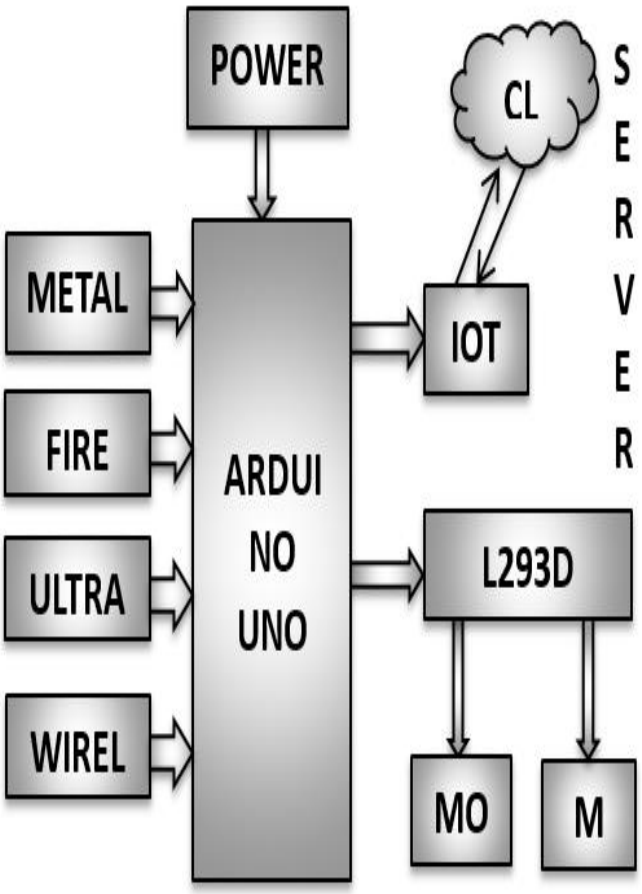

Figure 1. Block Diagram of Detecting Section

Multi sensor fusion (Decision Level fusion)

If $\sum_{i=0}^{n} P(S1) + P(S2) + P(S3) + P(S4) \geq 2$

Then the robot reverses.

P(S1) is sensor probability of mine existence by metal detector

P(S2) is sensor probability of mine existence by wireless camera

P(S3) is sensor probability of fire existence by flame detector

P(S4) is sensor probability of obstacle existence by ultrasound sensor

V. CIRCUIT DIAGRAM

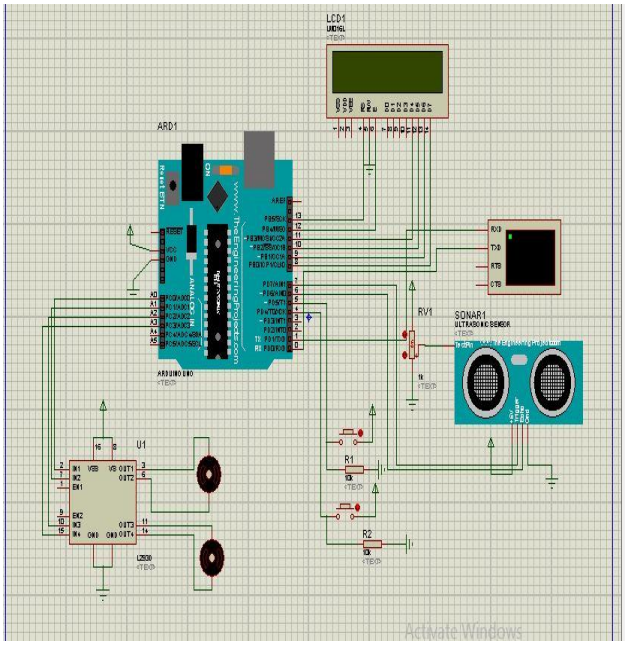

Figure 2. Circuit Diagram (Simulation of Electronic Part)

The simulation of all the electronics part like Arduino, ultrasonic sensor, DC motors etc are done using the Proteus software.

The two DC motors are connected to the output pins (9, 13), of the microcontroller board. The ultrasonic sensor is connected to the input pins (10, 11) to avoid the obstacles. The metal detector sensor are connected to the input pins (12, 13), for detecting of the mines. The LCD display connections are connected to the output pins (2, 3, 4, 5, 11, 13). For simulation, Arduino Uno library have to import first to display and then sensors and motors has to be imported. As pin configuration is stated above the connections are made in the software. Later the program is loaded in the microcontroller for simulation.

VI. APPLICATIONS

- Reconnaissance
- Bomb disposal
- Search and surveillance
- Border patrol and spying
- Active combat situations
- Stealth combat operations
- To undertake dangerous missions which involves loss of human life

VII. CONCLUSION

The main idea was to design and implement a prototype of an efficient low cost automated mine detector that will replace the current employed human detectors in the mission of detecting and extracting mines in a suspected area of land. The objective was to detect fire, obstacle and landmine in the field and to monitors the surrounding at safe place and also to update the status in IOT website and control the robot movement. Since this type of robots are mobile and operate in often communicationally challenging environments, communication systems must be both wireless and able to account for interruptions and delays.

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Online Inspection System, Data Acquisition and Processing For Fault Diagnostics Using Edge Analytics and Cloud Based Data Acquisition and Reporting System

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ABSTRACT

The cost of Data and its speed continue to follow a downward trajectory with the advent of 4G and 5G technologies. This coupled with the low cost of data storage offered by the cloud computing environment in the form of IAAS (Infrastructure as a Service) holistically provides an impetus towards making technology available for everyday use. Consider a consumer electronic equipment such as a washing machine. It contains sub systems such as Power Supply Board, Electronic control board interfaced with a number of sensors, buzzers, LCD, ADC and several other components such as Motors, relays and regulators which work in sync and perform the intended operation as a standalone device.

Providing tapping points or boundary scanning mechanism to gather data which are critical to the device functionality(such as Motor speed, its RPM, the voltage levels of the Power supply board, the sensor data, the data from the onboard controller)and introducing them to an embedded computing environment where they are analyzed onboard by an algorithm which performs edge analytics to make decisions based on the criticality of the parameter values provides a first level of defense in case of device deterioration.

The second and a more consistent approach would involve leveraging the connectivity of the embedded board on the device to a cloud computing environment through the World Wide Web. The service center accesses the individual devices present in their locality on their Web portal and can get real time information about the device performance, idle time, time for routine service check , the wear and tear undergone by an individual sub system in the device and can undertake a precautionary care by intimating the user to shut down the system in case a deviation from the normal behavior occurs thereby saving considerable amount of time and man hours spent on trouble shooting the problem. The User and the Service provider are thus in a Win all situation where in the user is exempted from being annoyed by making calls to the customer care and the Service Provider can monitor the device in real time and guarantee 100% user satisfaction.

Keywords: Cloud Computing, IAAS, Embedded Computing, Edge Analytics

I. INTRODUCTION

Data extraction from a digital device in order to get insights into the device functionality and gain competitive advantage is the new buzz word in the Industrial Internet of things But harnessing that data 'potential' from scratch isn't easy. Datasets can be fragmented and even siloed such that they can't be used elsewhere. Operational Technology (OT) and Information Technology (IT) often operate

separately, leading to duplication. And, even though there are islands of excellence that meet various Key Performance Indicators (KPIs), opportunities may be missed if those KPIs are not standardized across the business.

Tapping into the power of a software platform can help companies get the answers they need when they need them to plan ahead and optimize performance. Industrial companies need a software platform that: is machine-centric, supports heterogeneous data acquisition, storage, management, integration, and access, provides advanced predictive analytics, guides personnel with intuitive user experiences, is delivered securely in the cloud. [1]

The idea is of interconnectivity inside IoT gadgets yearning the world where billions of items can detect, convey and share data, all interconnected over open or private Internet Protocol (IP) systems. The IoT can possibly convey arrangements that drastically enhance vitality, proficiency, security, wellbeing, instruction and numerous different parts of everyday life. These interconnected items have information consistently gathered, broken down and used to start the activity, giving an abundance of insight to monitor the health of devices. All connected nodes within IoT framework are gathering information and that could be prepared at a similar hub for security and effectiveness purposes. Aggregating the data close to its source in IoT is known as edge processing/edge analytics. [2]

Industrial IoT ecosystems that connect their machines, equipment, and production systems to the digital enterprise. The embedded systems technology will provide the intelligence “at the edge.” In today’s connected factories and plants, embedded systems provide the foundation for the next generation of smart connected IoT devices and the digital enterprise. These intelligent edge devices can aggregate and analyze sensor and other data and stream information to support predictive analytics platforms and the concept of the digital twin. Adding to this is the cloud model that allows businesses to take advantage of key capabilities, including: Lower costs based on the economics of a centrally managed and shared infrastructure. Scale to meet different business and application workloads by easily adjusting capacity on-demand, Generate actionable insights into device performance, Deliver insights from analytics that can be developed and run at all levels of the process.

II. METHODOLOGY

A. System Architecture

The system architecture of the proposed method is as shown in the figure (1).The aim is to address the issue being faced by electronics manufacturers in test strategies and to enable tests to be undertaken where no other technologies could gain access. The device or the machine is integrated to a high data rate sensor which is ubiquitous in the present scheme of Industrial internet of things (IIOT). Each sensor specific to the machine parameter is interfaced to a subsystem to read the analog parameter values. The devices may include a wind turbine, a motor used for pumping oil or natural gas , a consumer electronic component such as a Heavy duty washing machine, motor vehicle etc. The analog parameters for a motor include the Motor RPM, terminal voltage, torque constant, terminal resistance, terminal inductance, and load Inertia etc.

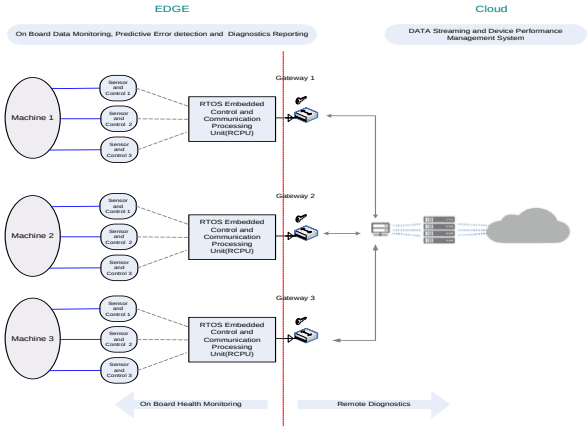

Figure 1. System Architecture

These raw parameters upon digitization by the sensor and control system are encoded and sent to

the RTOS Embedded Control and Communication Processing Unit (RCPU). Similarly, the data from other subsystems are assigned to the I/O pins of the RCPU, which performs concurrent programming and the hardware description language in the embedded system instantiates the pins to the entity blocks so that the parallel processes can perform computation in real time and optimizes the functionality of the monitoring system.

A. Embedded Control and Communication Processing Unit (RCPU)

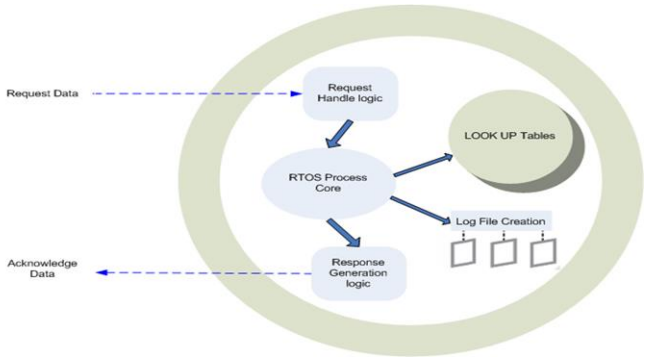

Figure 2. RCPU Core

The real time operating system in the RCPU ensures that the stream of data from the sensors are synthesized and interpolated to extract the performance parameters that are crucial to maximize the potential utilization of the resources. The operations in the System are synchronized with a common clock generation circuit using the PLL blocks in the core of the Field programmable gate arrays that from the heart of the RCPU.

The sensor data are used in not only to perform the Built in Self-test (BIST) but also to monitor the device performance. The intelligence of the edge algorithm ensures that the device performance is maintained at an optimal level and any deviation from the normal behaviour is assessed by determining the probabilistic distribution of error occurrence from the sensor output. If this happens, the RCPU then decides to shut down the system before logging the data from the sensors. This way of performing the boundary scanning not only enhances the efficiency of the every sub modules in the device but also holistically provides the information of every single module on a need to know basis when the RCPU provided with connectivity to the cloud computing environment.

B. Representational State Transfer (Rest) API's For Analysis in The Cloud

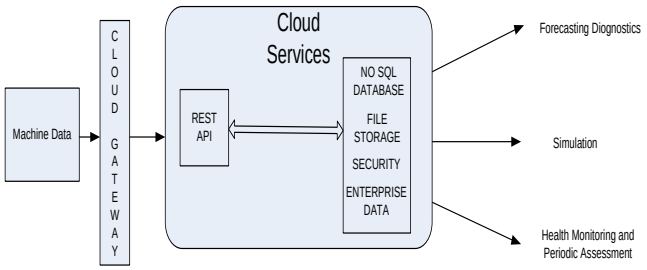

Figure 3. Representational Data Transfer (REST) API's for analysis in the Cloud

The figure 3 shows the representation of Interconnection between the cloud and the API's that form the core of the Online diagnostic system. With the availability of the open source PAAS platforms such as the Cloud Fundry, which provides the development frameworks and application services, the deployment of the Representational State Transfer(REST) API's in the cloud provides the flexibility to suit the device requirement as the data are continuously streamed from various locations. The RESTful web service is a collection of open protocols and standards used for exchanging data between applications or systems. The platforms can use web services to exchange data over networks in a manner similar to inter-process communication. The API can communicate to and from the edge devices and the data obtained are stacked by creating a NOSQL data base to maintain the record of the device characteristics .The deployment of the API's on the stored data provides the means to gather and analyze the data and do the remote monitoring and diagnostic checks.

III. CONCLUSION

As embedded systems enable intelligent edge devices for machines, equipment, and production systems, cyber security is a critical factor in software and hardware development. The secure gateway and the connectivity to the cloud must be reliable and the data that is propagated are stored in the structured data base where in multiple data set from various other devices from a common geographical location are reduced and a unified portal is used as a platform to analyze the data The data repository enables simulation of the results and optimizes the performance of the device and creates a digital twin of the machine. The efficiency of the system lies in the connectivity of the host to the network and the reliability with which the data decimation takes place from the source to the destination. The algorithm at the source to perform edge analytics and flexibility at the cloud to update and upgrade the software resources to enable mobility to deploy machine apps must be robust. This will be an enabler to a new generation of social and interoperable products.

IV. ACKNOWLEDGEMENT

I whole heartedly thank NIE College, Department of Mechanical engineering for encouraging me to submit the paper.

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Face Recognition and IoT Based Smart Lock Access System

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ABSTRACT

Smart security and remote monitoring have become vital and indispensable in recent times, and with the advent of new concepts like Internet of Things (IoT) and development of advanced authentication and security technologies, the need for smarter security systems has only been growing. The design and development of an intelligent web - based door lock control system using face recognition technology, for authentication, remote monitoring of visitors and remote control of s mart door lock has been reported in this paper. This system uses Haar-like features for face detection and Local Binary Pattern Histogram (LBPH) for face recognition. The system also includes a web- based remote accessing, an authentication module, and a bare-bones embedded IoT(Internet of Things) server, which transmits the live pictures of the visitors via email notification, and the owner can then remotely control the lock by responding to the email with predefined security codes to unlock the door. This system finds a wide application where the physical presence of the owner at all times is not possible, and where a remote authentication and control is desired. The system uses arduino controller to lock/unlock the door. Python language along with OpenCV packages and embedded C are used to program this system. The proposed system is designed by considering the physically challenged persons also.

Keywords: IoT, Face Recognition, Local Binary Pattern (LBPH)

I. INTRODUCTION

Security system plays an important role in various places like industries, banks, airports, military etc. for protection against the intruder. The current authentication systems are based on password, pattern, RFID tags, Iris detection, fingerprints etc. There are advantages and disadvantages in these systems. Since there are some disadvantages in these technologies, we have come up with a solution to overcome all these problems. Face detection is one technology which is used to get access through the secured system. But there might be a risk of entering an unauthorized person into a restricted area. So upgradation from face detection to face recognition helps to achieve good security level compared to previous technologies. Instead of detecting the face, recognition of face plays a important aspect in security system. IoT is a new technology which has made an enormous impact on the modern world. IoT is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators and connectivity which enable these objects to connect and exchange data. IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to

reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber physical systems. Using the face recognition system and IoT technology, we have come up with this paper to access the door. This system even helps for the physically handicapped people. If the system fails to recognize the person, the intruder image is sent over internet to the owner. Due to increase in number of Internet users in and around the world face detection and recognition have advantages over other technologies to establish communication between the client and the end user.

II. LITERATURE REVIEW

Since last few decades, the security systems have been configured to recognize the intruder's face and thus some of the face images at various angles and light conditions are added to the database. The system correctly recognizes the face and unlocks the door with an SMS alert. In case of an unauthorized person, the system reports non- availability of the face in the database, which in turn forwards the live snap chat of the intruder to the owner's e-mail address for authentication along with an SMS alert [1]. An USB camera captures the image to identify the intruder and unlocks the door via facial recognition over internet [2]. Various algorithms are used for Face recognition and detection to provide solution with higher accuracy and experimented results showed that LBP face recognition technology had the best results [3]. Automatic face detection and recognition is also done on MATlab. Microcontroller is used to control the door access system and door is immediately opened when recognized and closed after few seconds. Principal Component Analysis (PCA) is used to extract features of facial images [4]. GSM modules acts as both receiving and transmitting unit serving as communication device between the user at one end and the object of access i.e. the door at the receiving end[5]. RFID tags are used as security passes which contains integrated circuit that is used for storing and processing information, modulating and demodulating the radio frequency signal that is being transmitted. Card reader scans the data present in the RFID tag and compares it with the present data and access through the system if the tag is a valid [6]. Access through the door can also be attained through Bluetooth of a personal smart device which controls the electromagnetic device. When user reaches within a reading range of the system, he/she can open or close the lock by just sending a command through an application in the owner's device [7]. Some security systems use AdaBoost algorithm for face detection in OpenCV face database. Local Binary Pattern (LBP) operator extracts facial feature rapidly. PCA method is used for reducing facial feature matrix dimensionality [8]. Microsoft Face API is used for Facial Recognition for enabling through door and implementing it with the help of key research areas of Neural Networks and IoT APIs [9]. Many door locking automation systems utilize IoT for door unlocking in various fields like home, banks, MNC's through the GSM module. It uses an image capturing technique in an embedded system based on a Raspberry Pi server system which controls the camera to capture the face of the intruder and compares it with the database and provides access when recognized if not owner is notified through SMS, and relay is used for door unlocking[10].

III. METHODOLOGY

Face recognition and smart lock access system uses web camera attached to Laptop/ desktop/ Raspberry Pi3 for face recognition and an arduino board to control the door. The system is designed on the basis of simple machine learning. Initially the owner's image is captured in different angles and is stored in database. These images are trained to produce a single data set so that it helps in fast comparison and recognition.

Figure 1 shows the block diagram of the proposed system. The functionality of this system works as, firstly it captures the face of the intruder using a web camera and then the process of face detection takes

place. Fig 2 shows the face recognition. Once the face of the intruder is recognized, the person is allowed to access through the door. If the intruder face is not recognized then the owner gets notified through an e- mail, if the owner recognizes the face he/she gives command for unlocking the door and if the owner fails to recognize the intruder's face, the owner can deny the request which in turn keeps the door locked. Fig 3 shows the notification to the owner. The system also keeps a track of all the visitors by storing the date and time of visit in a database. Here, face detection and face recognition is done using Python Language. The figure 4 flowchart depicts the identification and authentication technology operation.

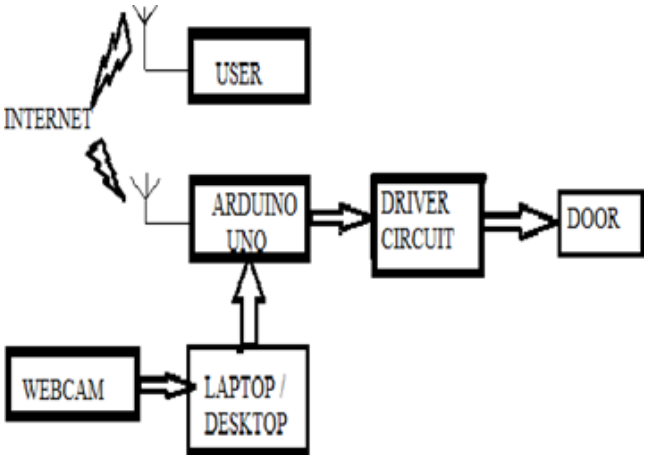

Figure 1. Block Diagram

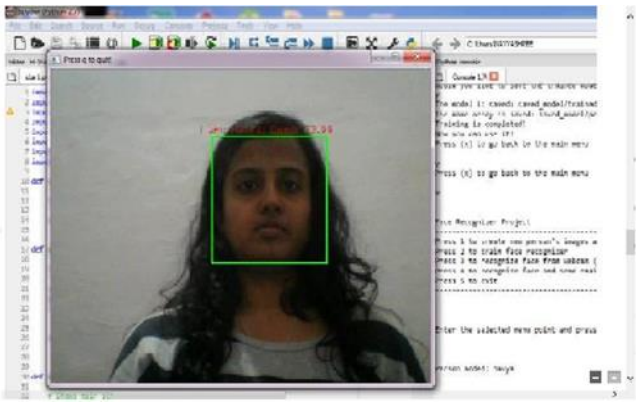

Figure 2. Face recognition

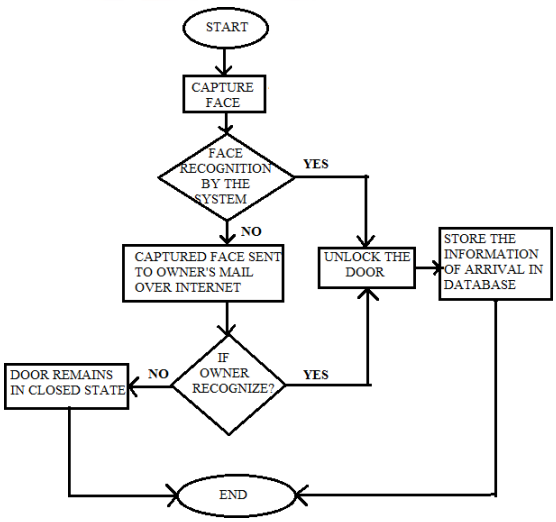

Figure 3. Intruder Image Sent To the Owner via E-Mail

IV. RESULT

This work was aimed to be a complete system for detection and recognition of human faces, which is easy to build and cost effective. Its utility is to be set as an alert for home visitors, industries, air- ports or in offices and provide information about the visitors. An automatic smart lock monitoring system using webcam, Python, OpenCV, arduino Uno controller is designed for monitoring and security purpose. Since IoT is a booming technology we can also explore the possibilities of IoT in security and automation. The system design is based on face detection and recognition from a camera installed outside the main door, which can be accessed from the phone of the owner.

V. CONCLUSION

Security systems used now-a-days require user key, passwords, patterns, ID card etc. to have a access to the system and these methods can be copied by the unauthorized person or the user may forget to bring their ID cards, user key. Some of the security system uses Bluetooth, Zigbee and wifi but it is restricted to certain ranges. The proposed system uses the current technology of face recognition and internet to access the door. The proposed system is also helps the physically challenged person to access. The system also keeps track of the visitors by storing the date and time of the visit along with their name in the database.

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Solid Waste Management Using IoT

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ABSTRACT

Recent days in India, government and companies are looking for solutions to increase the collection level of various waste types by using new technologies and devices such as smart sensors, internet of things (IoT), cloud platforms etc,. Some time bin will be overflowing by the garbage which attracts dogs and cattle's, these animals will make the garbage to spill on the road. Currently there is no bin monitored remotely so complete automation is needed. This paper mainly briefs about checking the level sensors to provide the status of the bin filled level and also provides the information like temperature, humidity, with latitude and longitude of the bin position using u-blox GPS to send the information to control centre which is used an additional feature for distributing the messages for the multiple users published by authorized person for complete automation with information exchange will be given using MQTT protocol. Therefore, waste management system aims to provide the efficient way to keep the environment clean and green.

Keywords. Internet Of Things (IoT), Cloud Platform, MQTT Protocol.

I. INTRODUCTION

The internet of things (IoT) is constantly evolving and is giving unique solutions to the everyday problems faced by human being. "Smart city" is one such implementation aimed at improving the lifestyle of human beings. One of the major hurdles in most cities is its solid waste management, and effective management of the solid waste produced becomes an integral part of a smart city. This project aims at providing an IoT based architectural solution to tackle the problems faced by the present solid waste management system. By providing a complete IoT based system, the process of tracking, collecting, and managing the solid waste can be easily automated and monitored efficiently. By taking the example of the solid waste management crisis of Bengaluru city, India, we have come up with the overall system architecture and protocol stack to give a IoT based solution to improve the reliability and efficiency of the system.

The technology can be simply explained as a connection between humans-computer–things. All equipment's we use in our day to day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. By this way we can monitor environment changes remotely from any part of the world via internet. This system architecture would be based on context of operations and processes in real-time scenario.

This includes operations like smart trash bins providing real time information on garbage content levels and cloud based scheduling. A master system with known communication channel includes GPS, level sensors and wireless. Central unit is connected to sim800L which is used for linking and internet for remote operation. Information securing and communication smart bin framework utilizes MQTT protocol to send information utilizing restricted transmission capacity for long distance communication using Amazon Web Server cloud which is set by the user through the App intended for real-time monitoring. Every time central unit sense the information to cloud through internet. A

subscription made by devices for the corresponding topics which will be received by the users.

II. METHODS AND MATERIAL

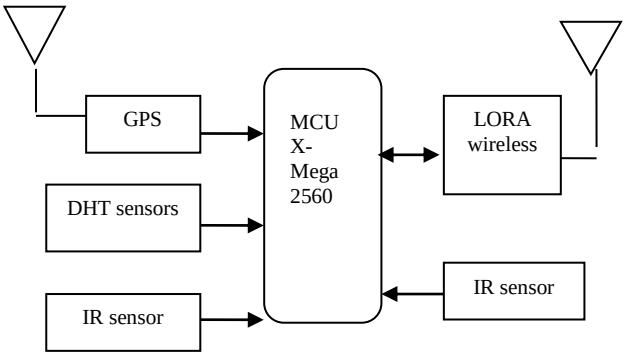


Figure 1. Block Diagram of the BIN block

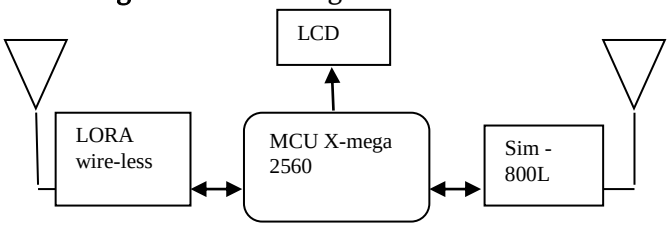


Figure 2. Block Diagram of the Sever Block

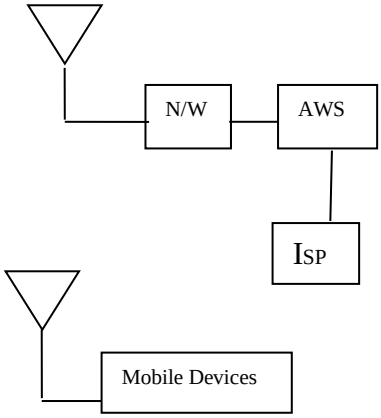


Figure 3. Block Diagram of the Communication system

A.Component of proposed system.

1) IR sensor. IR sensor emits the light, which is invisible to naked eye but the electronic components can detect it. It consists of IR transmitter and IR receiver. Both analog and digital output is produced by IR sensor. This sensor produces the output logic'1' at the digital output when it senses the object and logic'0' when it doesn't sense any object. Depending on the distance between the object and sensor, sensor produces the analog output voltage between 0-5v.

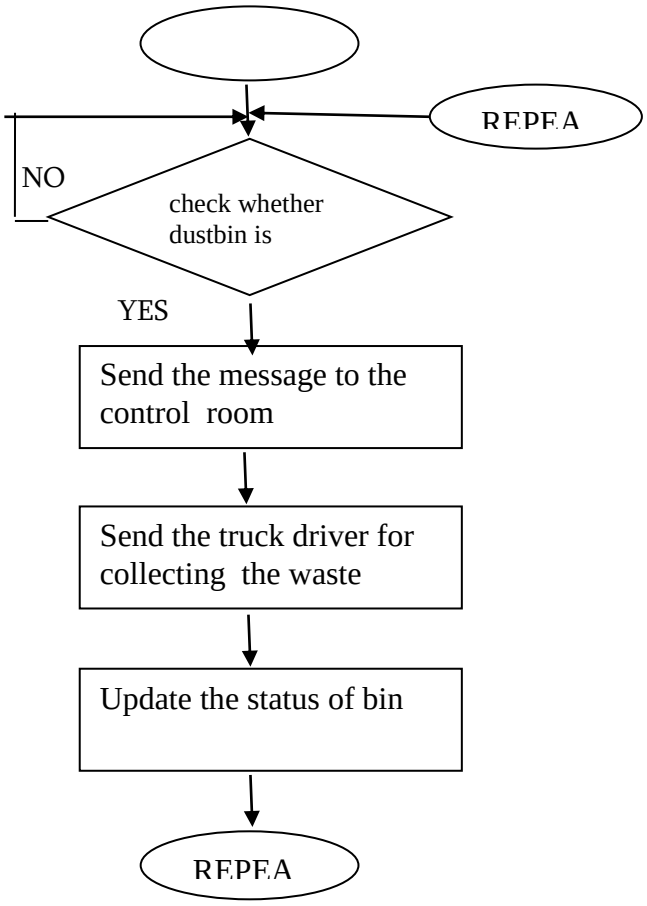
2) MQ-7 CO Sensor. The MQ-7 gas sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-7 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current. Standard measuring circuit of MQ-7 sensitive components consists of 2 parts. one is heating circuit having time control function. The second is the signal output circuit, it can accurately respond changes of surface resistance of the sensor.

3)DHT11 Sensor. DHT11is a sensor used to measure percentage of relative humidity and temperature in degree centigrade. This sensor uses 1-wire protocol for 32 bit data (16 bit each for relative humidity and temperature respectively) with additional 8 bit CRC data transmission from sensor. Conversion of 8 bit received data into relative humidity and temperature are computed by grouping binary into decimal followed by division by decimal value 10 in order to obtain the true values.

4) U-blox GPS. GPS-634R" is an exceedingly coordinated smart GPS module with a ceramic GPS fix receiving wire. The receiving wire is associated with the module by means of a LNA. The module is with 51 channel securing engine and 14 channel track engine, which be equipped for getting signals from up to 65 GPS satellites and moving them into the exact position and timing data that can be perused either UART port or RS232 serial Port. U-BLOX GPS works on NMEA (The National Marine Electronics Association) Protocol.

5) Arduino Mega 2560. The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The Mega is compatible with most shields designed for the Arduino Duemilanove. The ATmega2560 has 256 KB of flash memory for storing code 8 KB of SRAM and 4 KB of EEPROM.

B. Proposed system design



It consist of U-blox GPS to send latitude and longitude values, DHT11, carbon monoxide and IR sensor to provide levels of filled waste in the bin. Lora wireless is used to send temperature and humidity level status to the centralized unit. All these peripherals are monitored and controlled by ATmegs2560 8- bit microcontroller which has 256k byte ROM to store the program and 8k byte of RAM. These controllers can execute 16 million instructions for external oscillator.

It is considered as centralized block which received data from bin block and display it on LCD like temperature and humidity sensor status and latitude and longitude of the bin. The same information is passed to node MCU, Wi-Fi which in turn sends the data to the cloud server using MQTT protocol. User can access the information using ready app using Google play store called as MY MQTT. User need to provide specific IP with port addresses for server connection. Once the messages sent by the unit by entering receive latitude and longitude in Google app, user can view the exact position of the bin in maps.

III. RESULT

In past few years, the growth of cities is rapidly going high. And in coming few years the cities would become developed and smart one. But, the smart city is incomplete without a smart garbage management system. So, we have designing a system for proper management of garbage. The objective of the project is for the real time access of information about the dustbin .This IOT based management of waste is very useful for smart cities in many aspects. The embedded technique is enhancing the system to achieve the desired result. This system will prevent the overflow of dustbin and make the environment neat and clean. It will reduce the wastage of time, cost and energy of human. It will also prevent the occurrence of any disease. The truck drivers easily get the information about the clearing process and do their work immediately.

Figure 4

Figure 5

Figure 6

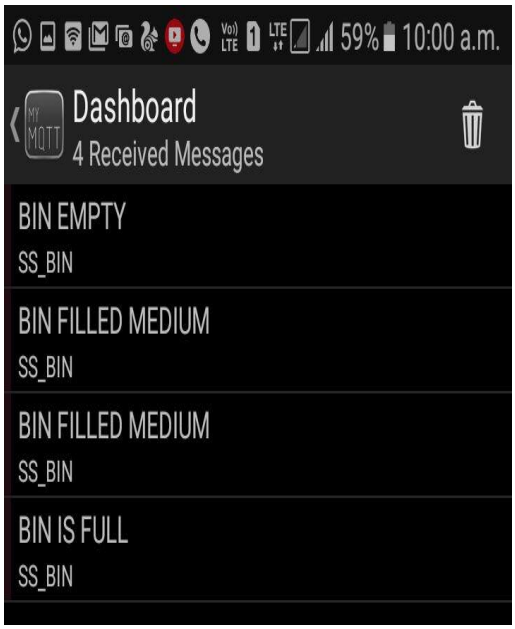


Figure 7

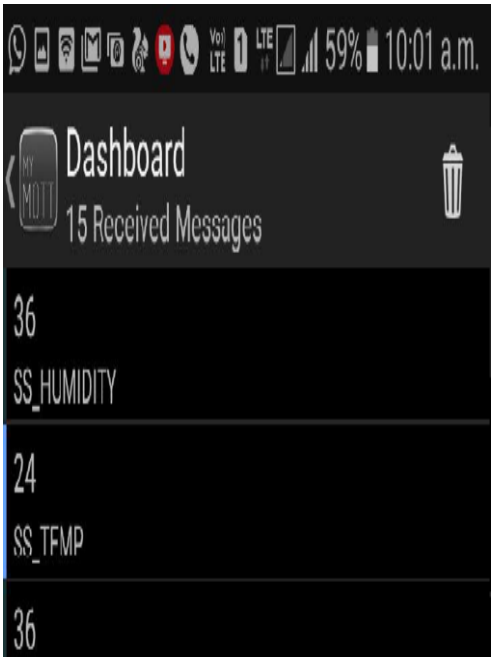


Figure 8

IV. CONCLUSION

This advanced embedded system provides bin information for the corresponding locations by taking the requirements of complex design need with minimised essentials for analysing in different places for restorative needs. This system checks corresponding intended information from different sensors to help oversee about the bin status. The proposed research enhances the smart waste management and minimal exposure to pollution. In crisis the framework cautions the personal to oversee about the dangerous levels and conditions for furthermore. It alerts to the corresponding personal in the event that he/she is checking for furthermore to make by implementing the designed work. The fundamental estimation of the exactness is inside permissible ±2% error depending on the computations, the solitary results with percentage of error gives a clear picture that the proposed system performs better and consumes minimal latency to quantify the key hazards.

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Implementation of Dumb Sign to Speech Using Mat Lab

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ABSTRACT

The aim of our project is to use computer technology to facilitate communication between two persons who cannot converse directly. A vocally disabled person using sign language will not be able to communicate effectively with other hearing members of the society. There is need of a system, which can perform translation between the two different modes of communication involved. Our project helps in bridging communication gaps between the dumb community and other people. The aim of our project is to use computer technology to facilitate communication between two persons who cannot converse directly. A vocally disabled person using sign language will not be able to communicate effectively with other hearing members of the society. There is need of a system, which can perform translation between the two different modes of communication involved. Our project helps in bridging communication gaps between the dumb community and other people.

I. INTRODUCTION

Persons who are born deaf or who lose their hearing at a very early age are unable to speak. They become dumb because, being deprived of hearing they are unable to imitate the sounds, which constitute speech. There are individuals who can hear but cannot speak. Our project is to bridge gap by introducing computer in the communication path. Therefore, for the benefit of blind people the sign language is automatically recognized and translated to speech. In the other direction, the recognized speech will be converted to text and displayed on the LCD for the benefit of the deaf.

II. LITERATURE REVIEW

In the paper[ ] recognition experiments on 16 types of gestures defined for remote work, the fine tuned composite HMM achieves the best performance of 96.88% recognition rate and also the highest reliability.

In gesture vocalize [ ] uses data glove, which can detect almost all the movements of a hand. This data glove is equipped with two types of sensors. The bend sensors and accelerometers as tilt sensors. It converts some specific gestures into human recognizable speech. This system is beneficial for dumb people and their hands will speak having worn the gesture vocalize data glove.

Flex sensors [ ] are sensors that change in resistance depending on the amount of bend on the sensor. They convert the change in bend to electrical resistance, the more the bend, and the more the resistance value. They are usually in the form of a thin strip from 1" to 5" long that vary in resistance from approximately 10 to 50 kilo ohms. They are often used in gloves to sense finger movement. Flex sensors are analog resistors.

The main objective of this paper [ ] is to develop a system that can convert sign language into speech so that deaf people are able to communicate efficiently with normal people.

III. METHODS AND MATERIAL

The main working principle of this project is conversion of the standard sign language of the dumb to a voice signal, which serves as a mouthpiece for dumb people. These gestures are the standard American gestures for the dumb and are accepted in the world today.

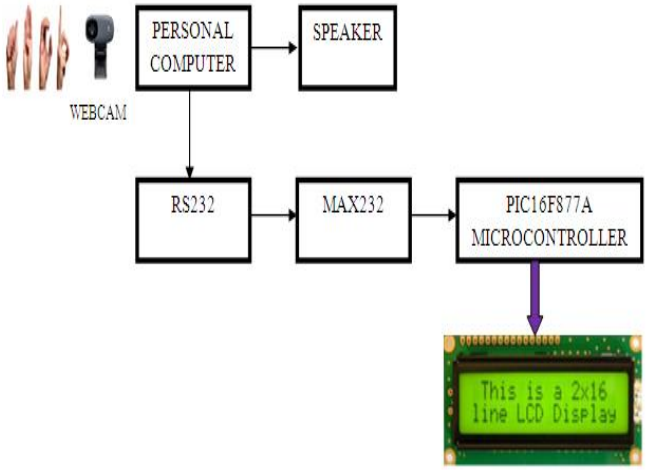

Figure 1. Block diagram of Dumb Sign System

The methodology of our project is carried out in three steps. First step is to input the real time hand gesture using web camera which captures the hand gesture made by the vocally disable person. Second step is to compare the real time hand gesture with the existing data base. The computer uses MATLAB version 7.5 for image processing. The last step is to display matched character on LCD and spell the character-using speaker.

The PIC16F877A microcontroller is connected to HD44780 LCD in 4-bit interface data, only four bus lines (DB4 to DB7) are used for data transfer. Bus lines DB0 to DB3 are having no connection with microcontroller. The data transfer between the HD44780U and the PIC16F877A is completed after the 4-bit data has been transferred twice. As for the order of data transfer, the four high order bits (for 8-bit operation, DB4 to DB7) are transferred before the four low order bits (for 8-bit operation, DB0 to DB3).Any character on HD44780 LCD is displayed by sending its respective ASCII code. Hence to display 'A' on LCD microcontroller has to send 65h as data.

IV. RESULTS AND DISCUSSION

Dumb sign system has been shown in fig2 for American Signing Language (ASL) without invoking complex hand models. The results obtained indicate that the system is able to recognize signs efficiently with a good percentage of success.

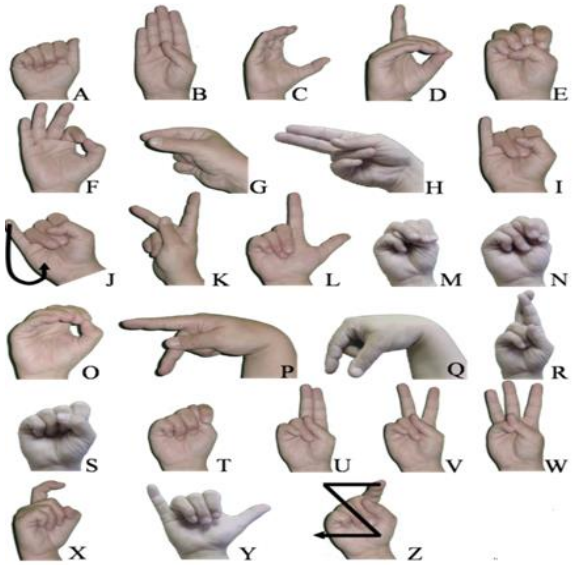

Figure 2. Hand Gestures of American Sign Language

Fig3 shows snapshot of the display unit, which displays the matched character. The experience gained from studying ASL will also contribute to the study of other sign languages and may be useful for the interpretation of a large set of virtual reality commands.

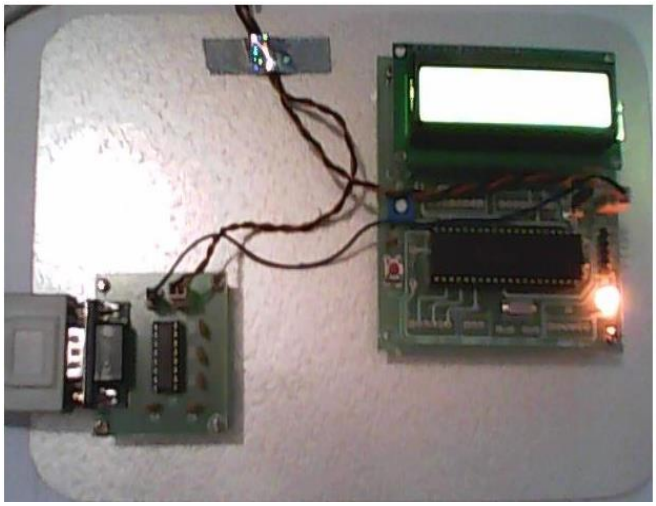

Figure 3. Snapshot of the Display Unit

The advantage of the system lies in the ease of its use. The original contributions of this work are system level techniques and optimizations for the achievement of real time gesture recognition.

Several new directions have been identified through which this work could be expanded in the near future. The techniques developed are not specific to ASL and so the system could easily be adapted to other sign languages or for other gesture recognition systems. A number of experiments will be used to evaluate and validate the proposed framework. One aspect of communication, which could not be handled in implementation of dumb sign to speech using MATLAB, is two-way communications.

V. CONCLUSION

Deaf and Dumb people rely on sign language interpreters for communication. However they cannot depend on interpreters in everyday life mainly due to the high costs and the difficulty in finding and scheduling qualified interpreters. This system has been shown for American Sign Language (ASL) without invoking complex hand models. The design and working of a system, which is useful for dumb, deaf and blind people to communicate with one another and with the normal people. The dumb people use their standard sign language, which is not easily understandable by common people, and blind people cannot see their gestures. This system converts the sign language into voice, which is easily understandable by blind and normal people. The sign language is translated into some text form, to facilitate the deaf people as well. This text is displayed on LCD.

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A Secured Vehicle Parking Management and Reservation System using Zigbee and GSM Technology

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ABSTRACT

Now a days, the main problem that the vehicle users finding is to find empty parking space to park the vehicles and security to the parked vehicle. This paper describes a solution to this problem, a secured vehicle parking management and reservation system. It includes access control unit and vehicle parking lot monitoring unit. Each parking lot is provided with infrared sensor, whose function is to monitor the parking field 24x7. The lot status is continuously monitored and transmitted to the access control unit. The user can request to reserve the parking lot by sending a SMS. Based on the status of parking lot monitoring unit the confirmation or acknowledgement SMS is sent to the user. User has to reach the parking bay within the time given or the reservation will be cancelled. A barrier gate is provided to each level of parking bay where the user has to enter the password to open the gate.

Keywords: GSM, GPS, Zigbee, Car Parking

I. INTRODUCTION

Now a day, the number of vehicles and its usage is increasing rapidly. Finding vacant parking space is becoming more and more difficult. Parking problems are growing and becoming intolerable. As the number of vehicles increasing vehicle theft is also increasing[1]. Therefore there is a need for vehicle parking management and to provide reservation to park the vehicle and security for the parked vehicle.

II. LITERATURE REVIEW

Present smart parking system uses camera and load cell based vehicle-monitoring system, which is not cost effective and does not provide full-scale security to the vehicles. This project allows the user to find vacancy in parking lots prior to entering the parking bay. The user can reserve the parking lots and also he/she can ensure his/her car safety by entering password generated by the security module of this system.

The vision-based car parking systems [4] has human supervision to find the empty parking space and total parking space available. In addition, it uses sensor-based supervision whose installation and maintenance cost is high.

A comparative study is made where Smart Parking System based on Wireless Sensor Network [5]

(WSN) technology. In this work CCTV is used for security surveillance. The camera will capture the image and it is processed by AVR microcontroller and transmitted to central computer via zigbee node. In central computer database is maintained for

parking service. Since CCTV installation is there in the system the cost to implement this is high.

Finding nearest parking space is implemented in the paper [9], demonstrates the design and implementation of Wireless Mobile-based Car Parking System (WMCPS). It uses SMS service to find the nearest parking space for the drivers. More work can be found on frameworks on parking system [10] and smart parking system [11].

III. METHODS AND MATERIAL

Figure 1 shows the secured car parking and reservation system which consists of three modules, parking lot monitoring module, parking lot reservation module and security module.

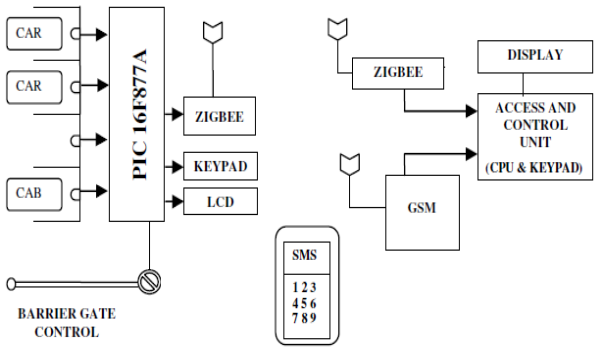


Figure 1. Block Diagram of Secured Vehicle Parking Management and Reservation System

A. Parking Lot Monitoring Module

The parking lot is provided with infrared sensors and is allowed to sense the parking area continuously 24x7. If it detects any vehicle in the parking lot, it will indicate the presence of vehicle to the microcontroller to which it is interfaced. The microcontroller will in turn send the status information to the Zigbee node which is also interfaced with the microcontroller. The Zigbee node in turn transmits the status information to the end Zigbee node which is interfaced with a coordinator system at the entrance of the parking bay when the access control requests the lot status. Then the parking lot status is updated in the database system. This scenario suits well for single level parking system. For multilevel parking system multiple Zigbee nodes will be used one for each level and a network is formed between the Zigbee nodes. In this proposed system, PIC 16F877A series controller and CC2500 RF modules are used.

B. Parking Lot Reservation Module

When the user wants to reserve a parking lot in advance, user has to send a reservation SMS. When the coordinator system receives the SMS from the user, it will start to check whether there is any vacancy in the parking lot. If lot is available means the control unit will send an acknowledgement message along with the entry password to the respective user who has requested for parking lot reservation. A timer will be started for that reservation. Before the timer expires the user has to reach and enter the password, if not the reservation will get expired and the expiration message will be sent to the user. If lot is not available, 'lot not available' SMS will be sent to the user. If user reaches on time, he has to enter the entry password in order to access the parking lot. An access system which is available at the entry of the parking bay is used to provide the password. If the password is correct means the barrier gate will get open and allow the user to enter the parking level. Once the user parked the vehicle in the respective parking lot allotted, the user has to press a key, which is available in the parking lot which enables the security monitoring of the vehicle.

C. Security Module

The user parks their vehicle in the parking lot; the sensor will sense the presence of vehicle in the parking lot. If the vehicle is taken out from the parking lot by the user means the user has to enter the exit password which is same as he entered to enter the parking bay. If the entered password is incorrect he/she is not allowed to get out of the parking bay as the barrier gate will not get open until correct exit password is entered.

D. Flowchart of Vehicle Monitoring Module

Figure 2 shows the flowchart of vehicle monitoring module. On power ON the microcontroller ports, interrupt registers, Zigbee device are initialized.

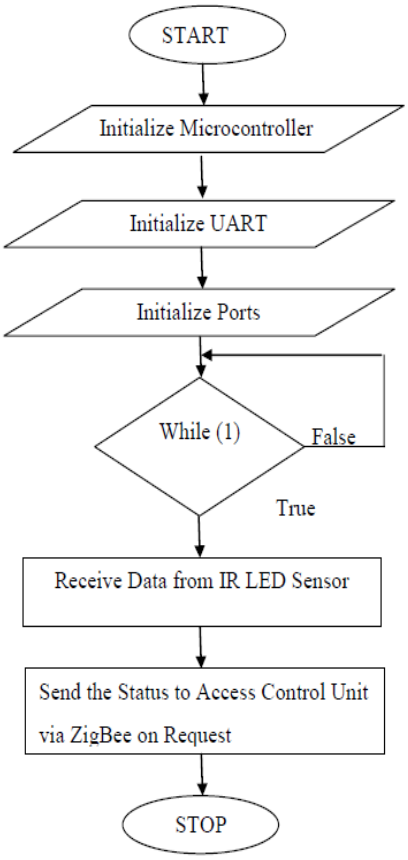
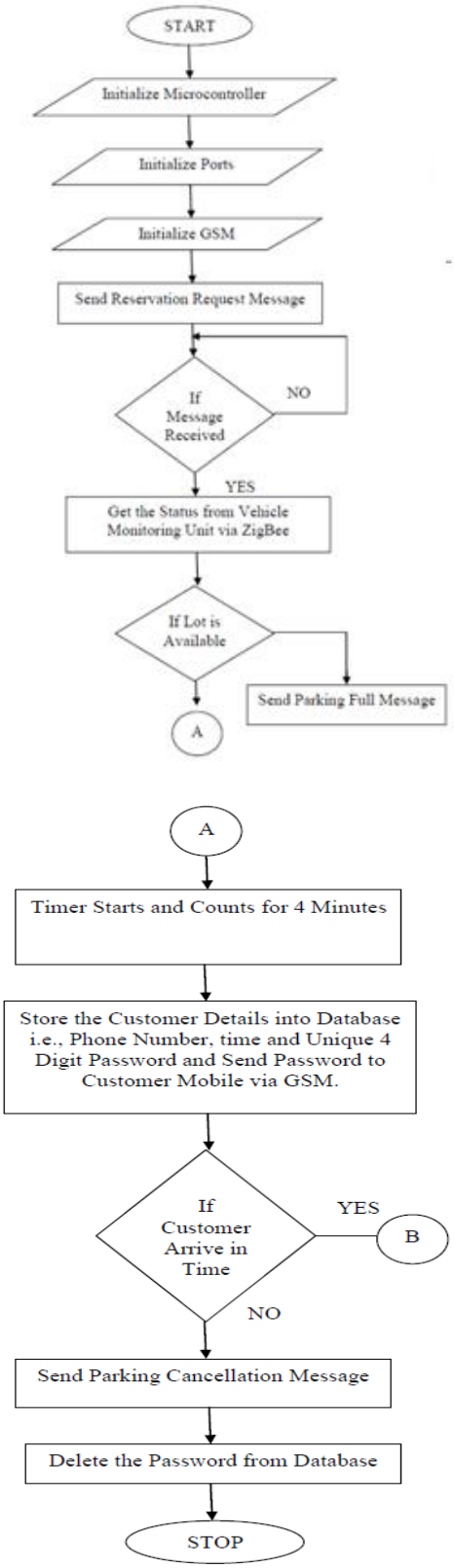


Figure 2. Flowchart of Vehicle Monitoring Module

E. Flowchart of Reservation and Security Module

Figure 3. shows the flowchart of vehicle reservation and security module. On power ON the microcontroller, UART, ports, registers and Zigbee device are initialized.



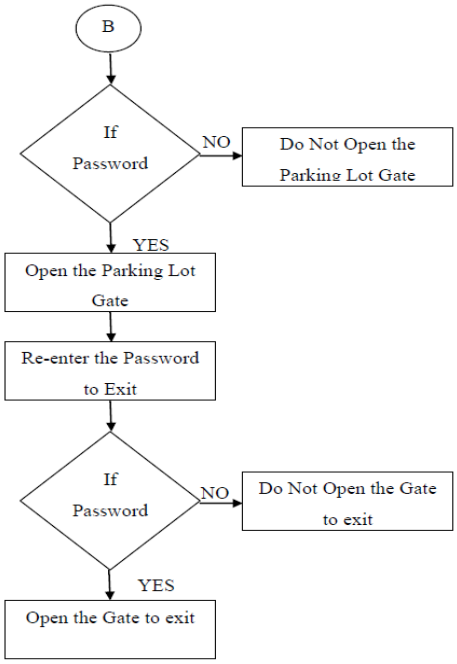


Figure 3. Flowchart of Vehicle Reservation and Security Module

IV. RESULTS AND DISCUSSION

This chapter provides details about the results obtained from the work done and output of the project under various conditions. The Figure 4a shows the snapshot of "A Secured Vehicle Parking Management and Reservation System using Zigbee and GSM Technology". The communication between vehicle monitoring unit and access control unit is through Zigbee device. On power on the Zigbee modules of both the unit, microcontroller, GSM and LCD are initialized.

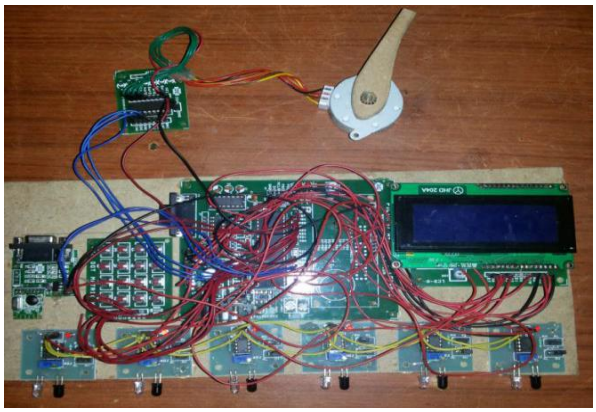


Figure 4(a). Snapshot of Vehicle Monitoring Unit

Figure 4(b). Access Control Unit

When the access control unit receives the reservation request message ("book"), it reads the parking lot status from the vehicle monitoring unit via Zigbee. If lot is available the control unit sends an acknowledgement message along with entry password i.e., "Your parking has been booked, Please enter "+password+" at the venue!" to the respective user who has requested for parking lot reservation. Four minutes of time will be allotted for that reservation. Before the timer expires, if the user reaches parking bay and enters the correct password the gate opens. It is done by use of stepper motor. To exit from the parking bay the user has to enter the same password or else the gate does not open hence the security is achieved. If the user does not reach before time expires, the "your reservation has been cancelled as you have delayed your arrival time" message will be sent. If the lot is not available, the "Parking full, Sorry for the inconvenience caused" message will be sent.

Figure 5 shows the front panel which gives the information about vacancy in the parking lot. And also it shows the unique password generated to each users, the time of message received. The flag indicates the status of user whether the user entered the parking bay or not. Shows the screenshots of mobile showing the different output of the project. Figure 6.

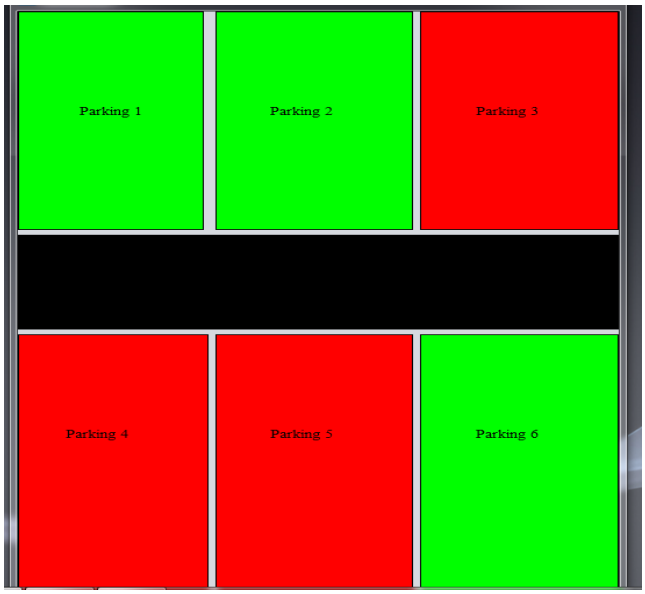


Figure 5. Front Panel of Vehicle Monitoring Unit

Table 1. shows the database of the users requested for parking lot reservation.

	phone_number character varying(15)	password character varying(5)	date_time timestamp without time z	in_flag integer	milli_second bigint
1	9731134442	4532	2014-05-19 12:24:37.594	0	1400482477672
2	9945847779	5032	2014-05-19 12:24:56.314	1	1400482496392
3	9945847779	2150	2014-05-19 12:26:08.059	0	1400482568137
4	9731134442	2415	2014-05-19 12:25:57.607	1	1400482557669
5	9945847779	1234	2014-05-19 12:26:55.187	0	1400482615265
6	9731134442	5230	2014-05-19 12:27:08.181	0	1400482628244
7	9945847779	1245	2014-05-19 12:26:31.693	1	1400482591787

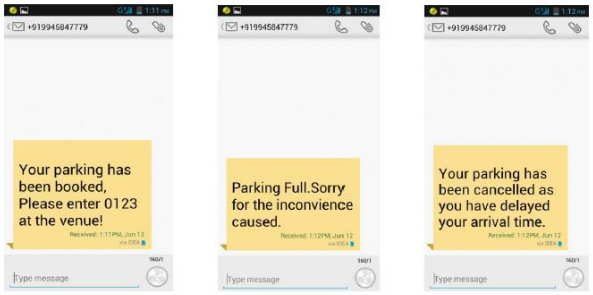


Figure 6. Screenshots of Mobile Showing the Output

The above figure describes the output of the project under three different conditions. To reserve the parking lot the user has to send the message. On receiving the SMS the access control unit requests the vehicle monitoring unit for the parking lot status. Vehicle monitoring unit checks for vacancy by the status of IR LED sensors. If there is vacancy it sends that information to access control unit via Zigbee. Then access control unit sends the confirmation message regarding the reservation with unique password. The second screen shot shows if there is no vacancy the user receives parking full message. If the reservation is done the access control unit will all some time to reach the user to parking area. If the user do not that area and enter the password then the reservation will be cancelled and he receives the acknowledgement SMS for the same as shown in third screenshot. This paper is mainly designed to make easy for the public to find empty parking lot easily in their busy schedule. This allows the user to reserve their parking lot in prior. The user sends an SMS regarding the requisition to reserve the parking lot. On receiving SMS it checks for the vacancy in the lot. In the above table first and third condition shows the result for this. The table 2 shows the results of this project under various conditions.

Table 2. Result of This Project under Various Conditions

CONDITIONS		OUTPUT
Under Dark	If vacancy available	Your parking has been booked. Pls enter **** at venue
	If timer expires	Your parking has been cancelled as you have delayed your arrival time
	If no vacancy	Parking full sorry for the inconvenience caused
	If password correct	Gate opens and allows the vehicle to enter to the bay
	If password is incorrect	Gate do not open
	Lot status	Clearly Identified
Under Light	Lot status	Cannot be seen clearly

If vacancy is available reservation is done and it allots four minutes of time. If timer expires reservation will be cancelled. When the system reserves the parking lot it generates the password and sends back to the user. When the user reaches the parking area password must be entered in the keypad. The access control unit matches this password, if it is correct it allows the user to enter into the bay. Similarly while taking out the vehicle from the bay again same password must be entered, if not the gate do not opens, hence the security is achieved. To monitor the parking lot status IR LED sensors are used. These sensors are sensitive to light. Therefore for better result the project must be carried out under dark.

V. CONCLUSION

Finding the parking space in more metropolitan areas especially during rush hours is difficult for drivers. The difficulty arises from where the available space may be at that time. It commonly results more traffic congestion and air pollution by constantly cruising in certain area only for the available parking space. If the parking is available there is always frustration for drivers from auto theft. This project overcomes these problems. The Secured Vehicle Parking Management and Reservation System were implemented successfully with the integration of Zigbee, GSM and Microcontroller. Since the reservation is done through a simple SMS technology it is not difficult for common people to reserve their parking spot. And it will not consume much time to reserve the parking lot. To know the confirmation for their booking the user get acknowledgement message in return. All these are done through GSM technology. Since GSM uses the mobile network for the communication the message delivery will be failed if no network coverage. Since the parking lot status is monitored by IR LED sensor it is sensitive to light. For better result it must be operated under dark area. This system is well suitable for underground parking system. The result indicates the accuracy in determining the presence of a vehicle in a parking lot. The system also reduces the traffic congestion in finding the available parking lots. Since password is required to exit from the parking bay, high level of security is achieved. The system proves to be cost effective and highly secure.

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Plc Based Diesel Generator Automation

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ABSTRACT

In industries, Offices, Hospitals and other large organizations for every process/operation power is necessary. If the power fails or there is a break down in the power supply, the process/operation/work stops causing a huge loss for the organizations. So it is necessary for the use of backup in the power supply. For backing up the power supply many use large capacity UPS or Inverters. The UPS and Invertors are capable of providing supply for about 20-60 minutes based on capacity. So for the continuous supply of power it is necessary to use diesel generators in large organizations. In the use of diesel generator sets, one should manually on and off the diesel generator sets. So it is necessary to automate the Diesel generators

Keywords: Programmable Logic Controller (PLC), Supervisory Control and Data Acquisition (SCADA), Diesel Generator (DG)

I. INTRODUCTION

The PLC is an industrial computer. Automation is a processing of achieving task without human intervention. The idea of automating the diesel generators is by using programmable logic controller (PLC) and supervisory control and data acquisition (SCADA).

A programmable logic controller (PLC) is a special form of microprocessor-based controller that uses programmable memory to store instructions and to implement functions such as logic, sequencing, timing, counting, and arithmetic in order to control machines and processes. It is capable of storing instructions to implement control functions such as sequencing, timing, counting, arithmetic, data manipulation and communication. The term logic is used because programming is primarily concerned with implementing logic and switching operations. Before the PLC, control, sequencing, and safety interlock logic for manufacturing automobiles was accomplished using hundreds or thousands of relays, cam timers, and drum sequencers and dedicated closed-loop controllers. The process for updating such facilities for the yearly model change-over was very time consuming and expensive, as electricians needed to individually rewire each and every relay. In the past the movements of industrial machines were controlled by relay circuits. These relay-controlled systems were replaced by PLC. The primary function of the PLC was to perform the sequential operations that were previously implemented with relays. Ladder diagram is the graphical programming language used for program.

SCADA stands for “supervisory control and data acquisition”. It generally refers to a control system: a computer system monitoring and controlling a

process. Supervisory control means monitoring & controlling the parameters of equipment. Previously without SCADA software, an industrial process was entirely controlled by PLC, CNC, PID & micro controllers having programmed in certain languages or codes. These codes were either written in assembly language or relay logic without any true animation that would explain the process running. It is always easy to understand the status of the process if it is shown with some animations rather than written codes. Hence SCADA software came to existence and with some exclusive features it became internal part of automation system.

II. METHODOLOGY AND DESCRIPTION

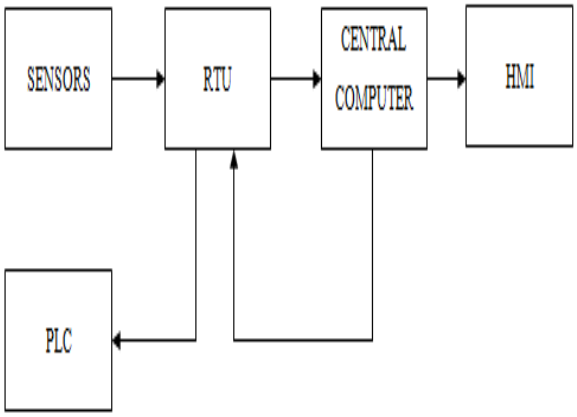

Figure 1. Block Diagram of Process Control

In the study of project for automating, the Diesel generator sets, the main idea is to identify the areas of automation i.e., identifying the areas were the automation is necessary and automation is possible.
The identified and possible areas of automation as per the study of the project:

1. Electric Board Breaker Close/Open.
2. Start and Stop of Diesel generators.
3. Bus Coupler Close/Open.
4. Neutral logic control.
5. DG Breaker Close/Open.
6. Synchronization between Diesel generators.
7. Master DG assigning.
8. Load Sharing and Management.
9. Load dependent Start and Stop of Diesel generators.

Based on the above mentioned automation areas the Ladder Logic is developed and verified.

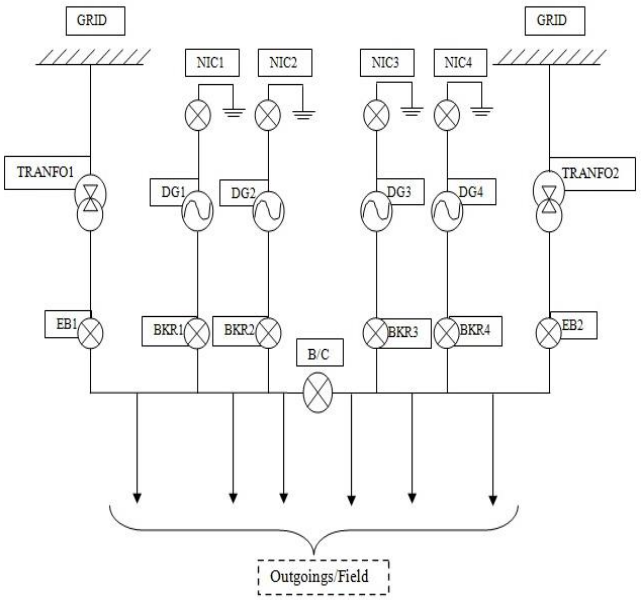

Figure 2. Single Line Diagram of 4 DG sets

The Single Line Diagram of the Diesel Generator Automation Set is shown in figure 2. The system consists of four sets of diesel generators divided into two units each with two diesel generators. The sequences of operation of diesel generators are as follows:

Condition 1: If both EB_LVM-1 and EB_LVM-2 are healthy.

1. Both EB_LVM_BKR_1 and EB_LVM_BKR_2 (incomers) are closed.
2. B/C is in closed condition.
3. All Diesel generators are in OFF condition.
4. All DG_BKR's are in OPEN condition.
5. Since all DG's are in OFF condition, no Master logic and no neutral logic.

Condition 2: When EB_LVM_1 is Unhealthy and EB_LVM_2 is Healthy.

1. EB_LVM_BKR_1 will be opened and EB_LVM_BKR_2 will be in Closed status in healthy condition.
2. B/C will get the OPEN command from PLC.
3. DG_1 and DG_2 will get START command from PLC, DG_3 and DG_4 will be in OFF state.
4. DG_BKR_1 and DG_BKR_2 will get close command from PLC and DG_BKR_3 and DG_BKR_4 will be in open condition.
5. Principle DG will be assigned based on the DG_BKR gets closed.
6. The Master DG's NIC will be closed for grounding protection.

Condition 3: When EB_LVM_2 is Unhealthy and EB_LVM_1 is Healthy.

1. EB_LVM_BKR_2 will be opened and EB_LVM_BKR_1 will be in closed status in healthy condition.
2. B/C will get the OPEN command from PLC.
3. DG_3 and DG_4 will get START command from PLC, DG_1 and DG_2 will be in OFF state.
4. DG_BKR_3 and DG_BKR_4 will get close command from PLC and DG_BKR_1 and DG_BKR_2 will be in open condition.
5. Principle DG will be assigned based on the DG_BKR gets closed.
6. The Master DG's NIC will be closed for grounding protection.

Condition 4: When both EB_LVM_1 and EB_LVM_2 is Unhealthy.

1. EB_LVM_BKR_1 and EB_LVM_BKR_2 will be opened.
2. B/C is in closed condition.
3. All 4 DGs-DG_1, DG_2, DG_3 and DG_4 will get Start command from PLC.
4. All DG_BKRs-DG_BKR_1, DG_BKR_2, DG_BKR_3 and DG_BKR_4 will get close command from PLC.
5. Principle DG will be assigned based on the DG_BKR gets closed.
6. The Master DG's NIC will be closed for grounding protection.

Special condition: In all the above mentioned conditions, Load Management and load Sharing takes place based on the amount of load required and the amount of load generated.

III. RESULTS AND CONCLUSION

The Automated DG sets will automatically Start and Stop when the Power from the grid is failed and can be electrically connected together through the process of synchronization. Bus coupler is the breaker, which divides the whole Diesel generator sets into two sections, and DG Breakers are used to connect the Diesel generators to bus for the flow of power to feeders. Master Diesel generator is the principle generator to which all the other diesel generators must synchronize and Neutral logic is for the purpose of grounding of the master Diesel generator. The PLC keeps track on the amount of load required at the feeders. If the load required is less than the load generated by the diesel generator set the PLC sends the stop command to the least generators to manage the load. If the load required is more than the generated the PLC sends the start command to the next diesel generators based on the load required and also PLC keeps track on the amount of load required and amount of load generated, the GCU's will share the load between the running generators for their higher performance.

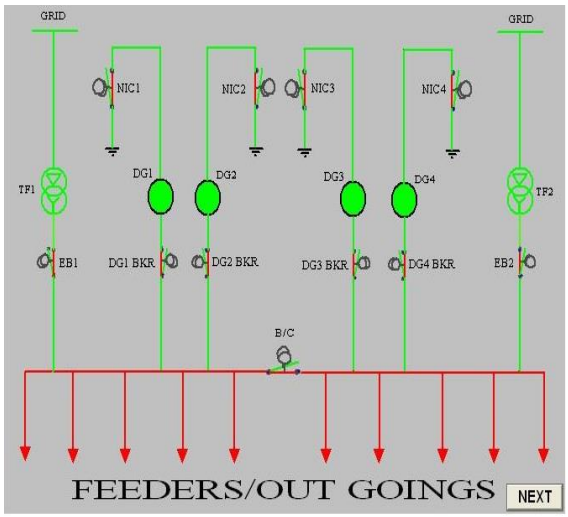

Figure 3

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Design of Smart ECU for Automobiles

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ABSTRACT

This paper aims at giving an overview of implementing safety and security systems in automobiles for today and future development. Now a day all the IC engines is controlled by microcontroller. These controllers are preprogrammed by the manufacture in according to the engine specification, design constraints, technology constraints, Implementation constraints and price constraints. So we came up with an idea to increase the efficiency and performance of the IC engine by giving the user option to choose between economy and performance by eradicating the design and calibration constraints but being with in the engine design and emission constraints. The speed control in vehicles using the RFID is used for accident prevention by taking control of the vehicle in accident prone zones like schools, hospitals etc.

Keywords: RFID-radio frequency identification, IC Engine-Internal combustion engine, ECU-electronic control unit.

I. INTRODUCTION

This paper presents autonomous accident prevention with security enabling techniques, speed control and accident detection system. The controller based engine regulates the fuel air mixture intake to the engine by sensing the amount of accelerator input given by the user and releases that amount of pre calibrated fuel air mixture to the engine cylinder. In predecessor carburetor engine the same process is done mechanically. Here as the user pushes the accelerator the corresponding pre calibrated amount of fuel and air is released this enters into an intermediate chamber between carburetor and intake valve called resonating chamber and then moves to the cylinder whose intake valve is opened in both the cases the amount of fuel intake to the IC engine for its full range of RPM is controlled by the comprises of GPS and GSM in cell phones. As collision occurs, piezoelectric sensor will detect the signal and sends it to microcontroller. Then, the user but limited by the design and calibration of the manufacture so the user is limited by the design constraint of the manufacture for is vehicle performance and efficiency. The main objective is to design a controller to monitor the zones, which can run on an embedded system and to automatically locate the site of accident and alert concerned people. It should be done automatically as the person involved in the accident may not be in a circumstance to send the information. The proposed system is composed of two separate design units: transmitter unit and receiver unit .Just before the vehicle is in the transmitter zone, the vehicle speed is controlled by receiving the signal from the RF transmitter. For this, RF transmitter can be kept at a few meters before the zone. Security system includes Seatbelt sensor. Accident detection system

GPS available in the smart phone will start communicate with the satellite and get the latitude and longitude values and name of place of accident

will be send to the previously set phone numbers of relatives, ambulance services etc.

II. METHODS AND MATERIAL

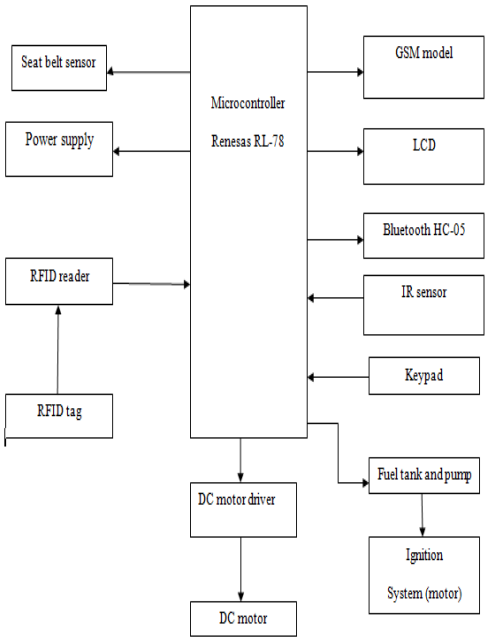

Figure 1. Block Diagram of Smart ECU

The speed and flow of fuel to the engine can be incremented / decremented manually with the help of keypad. Based on the key pressed the mode will be selected.

Button1: Economy Mode

Button2: Normal Mode

Button3: Power mode

When button1 is pressed it selects the injector1. Similarly for button2 and 3 it selects injector2 and 3 respectively.The design and model of this robot have greatly helped us understand how this system can be implemented in a vehicle. An RFID system consists of a set of tags which periodically transmit radio signals. These signals contain a unique identification code for the tag as well as some data stored in the tag's memory. This data is received using an RFID card reader which is to be fitted in the vehicle. Besides reading the tag ID, the card reader will also measure the received signal strength of the radio frequency signal. This indicates the range of the tag from the card reader. This receiver end of the transceiver is connected to controller (renesas microcontroller) of our robot. The encoded signal from the transmitter is first decoded in the microcontroller and the microcontroller then sends the decoded signals to be displayed on the LCD and to the motors to control the speed of the motor.

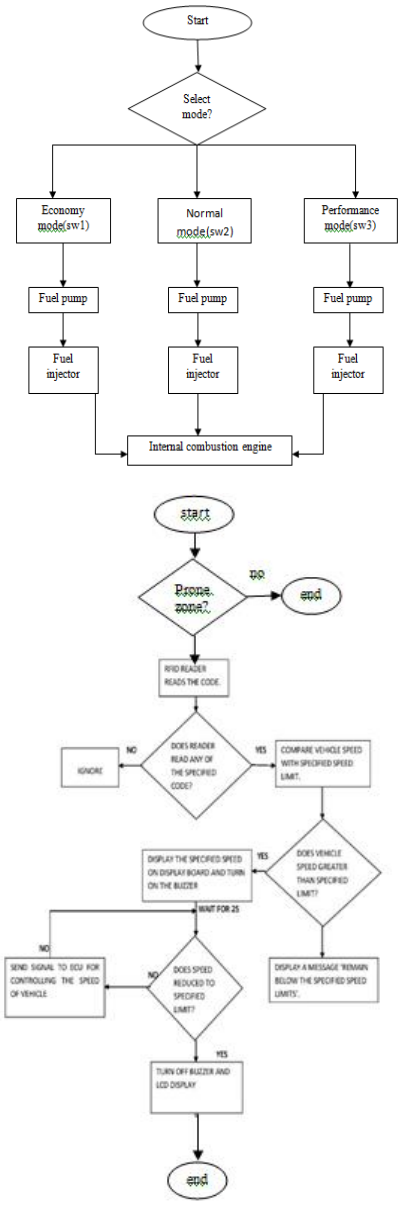

Figure 2. Flow Chart

III. RESULTS AND DISCUSSION

This section discusses the results based on the hardware and software as described. Here the RFID reader read the speed limit from the tag and then send it to the controller, hence the microcontroller initiates to control the speed of the vehicle and depending on the mode selected by the user it also controls the fuel to the engine. And the switch initiates to control the flow of fuel to IC engine.

.

IV. CONCLUSION

The output of the project is tested successfully. The design of smart ECU for automobiles is carried out using Microcontroller. Where Speed and flow of fuel to the engine was controlled using push button depending upon the modes and Speed of the car at different zones was controlled using the RFID technology.

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Monitoring Of FMS Machine Coolant Motors Using Microcontroller and Bluetooth Module for Easy Troubleshooting

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ABSTRACT

In this paper the FMS machine cooling motor status is monitored using contactors, and Arduino Uno. Further the status of the cooling motors will be displayed on a LCD screen and also on an Android mobile via Bluetooth application. In Conventional method, some system equipments or processes are monitored by visual inspection and manual maintenance which has many disadvantages. To avoid the human artifacts we have designed an automatic monitoring of the processes, equipment and installations and the development of human-machine communication.

Keywords: Coolant motors, Contactors, LCD screen, Bluetooth module

I. INTRODUCTION

The use of FMS Machines is still growing in many industry processes where it is required to do different tasks. Every day there are more industries implementing these machines to produce their own products with low cost, high quality and less environmental impact. Connection through parallel port is still the most used connection port in these machines, because of allowing control devices to divine continuous tasks in parallel process controlling. Extinguishing of Parallel port in nowadays computers, has caused the need to emulate it by using some adaptors to operate those machines. This allow developers to make new designs using USB technology for FMS machines' communication, leading us to develop embedded applications using microcontrollers that allows do parallel processes, but connecting with emergent connection such as Bluetooth, Wi-Fi.

For developing an algorithm which its structures work simultaneously, is necessary to consider that traditional MCUs (Microcontrollers) operation is by using serial connection, limiting to execute just one instruction at a time. MCUs (Microcontrollers) are more than a CPU (central process unit) which execute code sequences.

These are equipped with modules like: comparators, input and outputs ports, analog-digital convertor, timers and memories. Each module works individually doing specific tasks waiting for CPU instructions, letting programmers to use interrupts to attend a subroutine and then return to the function that was in execution. To make parallel processes using MCUs, is need to build a star network

configuration where different MCUs make various tasks (slaves).

A person far away from the process area can also monitor the system via Bluetooth device using smart phones. The results of monitoring system can be displayed on a LCD display screen which can be personally monitored by observer.

II. LITERATURE SURVEY

The paper[1] gives overall idea how to design a system to control and monitor a flexible manufacturing system.It also uses intelligent algorithm's for controlling and monitoring of FMS. Since it uses Intelligent algorithm for monitoring it becomes a rigid phenomenon.

This paper[2] deals with the reconfiguration of flexible manufacturing systems. It presents a methodology which deals with the failure regarding the reaction loop. Methodology deals only with the failure regarding the reaction loop.

The primary objective of this paper[3] is to achieve a capability for dynamic reconfiguration to the change of FMS configuration, scheduling and control logic and communication platform, for the control of FMS. Entire control of FMS configuration cannot be studied.

This paper[4] presents the first results of an ongoing research activity towards an inter disciplinary modeling approach to validate the quality of multi agent system (MAS) architectures for the implementation of flexible control systems. Latest research in the field of MAS architecture cannot be obtained.

The author of this paper[5] addresses the optimal deadlock control problem of FMS's. Based on their Petrinet models, it introduces the concept of K-resources and proves that an FMS containing no K resources has only two types of reachable states: Safe ones and dead locks. Depends only on the concept of K-resources.

This paper[6] deals with the design and implementation of the Bluetooth protocol stack. It also describe a functional overview and applications of Bluetooth. We have explained Industrial automation via Bluetooth using IISS (Intelligent Informative Switching System). Industrial automation only through Bluetooth can be studied.

This paper[7] presents an experimental setup was created to emulate the Industrial environment and evaluate the performance of the communication infrastructure for successful deployment of intelligent condition monitoring. Intelligent condition monitoring has only been stressed.

III. METHODS AND MATERIAL

Arduino microcontroller serves as the brain of the whole series. The microcontroller can be linked with the other circuits to perform certain functions. Microcontroller is the central data in processing system. Microcontroller arduino has been equipped with as internal EEPROM, flash memory, etc. Bluetooth module consist of pins which transmits or receives the data from the microcontroller.

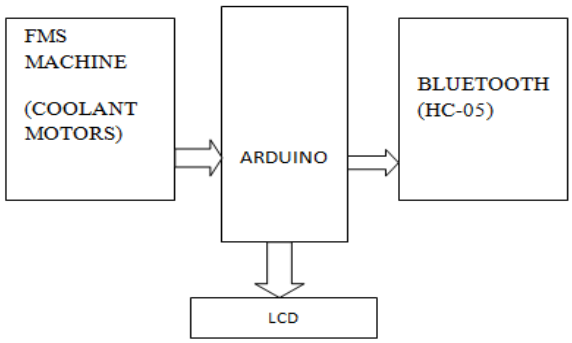

Figure 1(a). Block Diagram of Arduino Interfacing with Bluetooth

The resultant output will be displayed on the Liquid Crystal Display and if connected with a Bluetooth device(HC05) through the application it displays the output. Therefore the FMS motor status can

efficiently monitored for easy troubleshooting. FMS machine will be continuously filtering the dirty coolant using filters at different stages using coolant motors. The motor status needs to be monitored continuously which is very difficult for a human observer. Hence in our project we will be easily monitoring the status of coolant motors by accepting the digital data. This data will be fed as an input to the Arduino microcontroller where it will check for the motor ON or OFF status.

A. Hardware and Software Components

i) Microcontroller:

This project will make use of an arduino microcontroller as shown in figure(b).Arduino Uno is a microcontroller board based on the ATmega 328. It has 14 digital input-output pins(of which can be used as PWM outputs), 6 analog inputs. It has flash memory of 32KB. It contains everything needed to support the microcontroller.

Figure 2. Arduino Microcontroller

ii) Bluetooth Module HC-05

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup as shown in figure(c). The HC-05 Bluetooth module can be used in Master or Slave configuration, making it a great solution for wireless communication.

Figure 3. Bluetooth module

iii) Contactors

A Contactors is an electrically controlled switch used for switching an electrical power circuit as shown in figure(d). A Contactor is typically controlled by a circuit which has a much lower power level than the switch circuit, such as a 24v coil electromagnet controlling a 230-volt motor switch.

Figure 4. Contactors

iv) LCD Display

A liquid crystal display is a flat panel display as shown in figure(e).Liquid crystals donot emit light,they use a reflector to produce images in color.LCD screen is energy efficient and consumes very less power.

Figure 5. Liquid crystal display

v) Bluetooth Electronics Application

This application can be used to control the electronic project with an android device. This app communicates using Bluetooth HC-05 module. Large selection of control to Bluetooth includes buttons, switches, graphs that can be dragged and droped to design a new panel. This panel can be designed as per the requirement.

IV. RESULTS AND CONCLUSION

Arduino is a open source platform which allows the beginners code using embedded C. The interfacing process of the software and hardware is carried out for monitoring motor status on the FMS. The areas which are prohibited due to security reasons for the human observers can monitor the motor status using Bluetooth in the range of 10 to 100 meters.

The FMS machine coolant motors will be monitored using arduino microcontroller for its on/off status and the result will be displayed on the LCD screen as well as the human observer can keep track of the process by the observing the variations indicated in the smartphone which has an in-built Bluetooth .Hence,appropriate control procedures and suppliers management are crucial to the effectiveness of the ongoing process.

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Terrain Surveillance & Autonomous Docking Robot

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ABSTRACT

This paper presents the development and characterization of a surveillance robot with automatic docking and recharging capabilities for terrain area. The proposed system is composed of a surveillance robot and docking station .These robots communicates with PC through Bluetooth device. The robot design has partitioned into sensor, control and planning subsystem. Our project is about developing a wireless surveillance robot which can navigate through obstacles with the help of sensor, embedded system and programming, it will be able to capture the footage of area with its camera and send them back using wireless transmission technology using Bluetooth .The docking station has a trapezoid structure with an arc shaped docking interface A docking method is based on self localization of the robot. The robot can return to the docking station when the on board battery is below threshold level.

Keywords: Robot, Surveillance, Docking, Terrain

I. INTRODUCTION

This project is aimed at developing a surveillance system which can be controlled remotely by using an Android App. It includes a robot with a Wireless Camera attach to it. This robot captures the high resolution video feed and transmits it to the connected Android device which is used to control robot. Surveillance is the process of monitoring a situation, an area or a person.. It is possibly to remotely monitor areas of importance by using robots in place of humans. By equipping them with high resolution cameras and various sensors. Building a small robot for testing and research purposes proves to be extremely expensive. It has a monitoring camera on front of it, so that we can even see everything through Remote server On the other hand the robot is capable of detecting the low threshold battery level and search the docking point for recharging the battery so as to provide the uninterrupted services. When the threshold battery voltage is low then it should navigate back to the docking region and join through the docking station.

The suggested network has a docking approach whichever is predicated on the self localization of the robot. It is observed that the robot can come back to the docking station when the on-board threshold battery is too low. Monitoring is easily done through the Computer. Automatic recharging has to be done to the robot to deliver uninterrupted surveillance.

Thus, it is our aim to build a fully-featured surveillance robot using an easily available Android phone, which can be remotely controlled by the Bluetooth.

II. METHODOLOGY

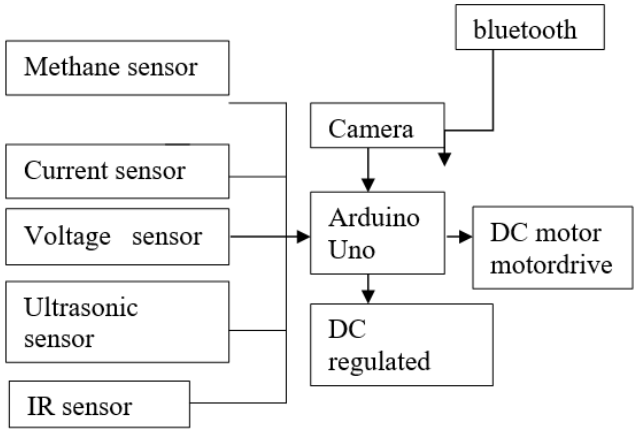

Figure 1. Block Diagram of Terrain Surveillance & Automatic Docking Robot

In that figure we can see that Bluetooth will send commands to Arduino Uno by decoding it first, then Uno will perform operations on the basis of commands provided by the user & will give the output to Motor Driver Shield which will drive the respective DC motors. To make more useful & efficient surveillance system, we are using one transmission modules i.e., Bluetooth .We are using Bluetooth Module to communicate with the system by using commands with the help of an Android Application. As we know to transmit data such as pictures & videos through live field requires more bandwidth, for that only reason we are using Bluetooth module. Robot consists of different module such as microcontroller, camera, RF transceiver; DC motor, DC motor driver circuit etc. Microcontroller controls the angle of rotation of two Servo Motors. The cannon is positioned aiming at the intruding object. At last cannon will get fired. DC motor is used for the movement of the robot in left, right, forward, backward direction. DC motor driver IC is IC L293D.Digital section includes the ARM – LPC2148 Controller along with required interfaces like Display Keypad and communication drivers.

The Power section include the power supply, design required for various parts of machine like controller, motors etc. The Firmware part include writing the software, which required controlling various operation, also it helps to program various parameters and setting of machine. Also it covers the communication with PC.

Docking system

If the surveillance robot wish to recharge with its individual and the battery voltage is low then it should navigate back to the docking region and join through the docking station repeatedly. Various key methods include local and global lane planning, self-localization, docking and charging status recognition, and fault-tolerant proceeding. In docking system, we are using ultrasonic locker to set place of robot at docking as shown in Figure 1.

III. CONCLUSION

We have presented the design and implementation of a surveillance robot with automatic docking and recharging capabilities for terrain. A docking method based on the self-localization of the robot and the infrared detectors of the docking station is proposed. The robot can navigate back to the docking station for recharging operations when the on-board battery is too low. The prototype robot achieved a success rate of 90% after 60 different docking attempts. In a nutshell we can conclude that wireless surveillance robot can certainly be a future market for many mining areas ,surveillance in hot spots, search and rescue operations or maneuvering in hazardous environment. This can save valuable human lives as well as time and resources need for such operations. We can use both Bluetooth for manual control and transmission of video footage depending on the purpose of the surveillance. Further enhancements can be added to improve functionality and features, which will further reduce human efforts and resource.

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Robotic Arm Manipulation Using Shape and Color Based On Visual Servoing

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ABSTRACT

The robot arm is an ongoing computer vision project for which many enhancements have been done during the last years; the aim of the paper is to present a system for controlling a robot arm, based on image processing and recognition. One of the common task performed in an industries are picking and placing of the object from one place to another place, hence the aim of our project is to pick and place the object by vision system. Vision system determines the random scattered object on the plane and picks the object by the gripper of the Robotic Arm and places it in a particular location. Without the vision system, it is difficult for the Robotic Arm to detect the colored object. The Arm Edge robot arm is made to pick and place the object based on color thresholding and shape analysis based on Principal Component analysis (PCA).

Keywords: Robot Arm, Pick And Place, PCA, Color And Shape

I. INTRODUCTION

In recent years, manipulation tasks for service robot have attracted many researches along the world to these topics. The manipulation is a hard problem that has been tackled in different ways. For example, in industry, the manipulation tasks are programmed by a human and only work in a structured environment. In the other hand, service robots use a different approach: compute positions a robotic arm using planning algorithms under unstructured environments where there is uncertainty, illumination conditions, errors on localization, cumulative errors, etc. This ways to solve the same problem, create the main difference between these two fields of robotics. In order to have a robust service robot, it must have the ability to grasp and manipulate different objects. To solve these tasks, it is required to have an accurate kinematic model of the manipulator. With this model and a motion planning module, it is possible to move the manipulator from one position to another in a free-collision path. However, as many research institutes have showed it, in order to have a robust module for manipulation task it is necessary to have a verification process that includes a position error feedback. Commonly visual feedback is used in order to do servoing. Many of the works reported in visual servoing, use a visual tracking system which compute the position of the object based on segment able features (with low computational processing) most of them in very well structured ambient, making no real difference from the approaches proposes in manufacturing robotics. In this work, we present a robust and very fast method for detection, tracking and pose estimation of a robotic arm end effector planned to be used on a service robot.

II. PROBLEM DEFNITION AND RESTRICTIONS

We need to calculate the center of mass representative of the end effector (gripper) of a manipulator arm of 7 degrees of freedom because this center is important to create a region of interest related to the gripper position and for visual servoing purposes it will be used for compute the error between one desired position to reach and the gripper position. The end effector has a specific color that is different from other objects in the scene. It is assumed that the position and color of the gripper in the real world is in the field of view of the camera. Once detected the gripper is necessary to calculate local features such as borders and points of interest that will be the basis for more complex calculations such as the homography between the camera and the end effector.

A. System Classification

The system can be classified accordingly to [13]. The figure 1 shows the elements like camera, manipulator, objects and the table that is the common plane for vision and manipulator system. In this way, the system has a binocular stand-alone configuration. Is important to mention that the camera has the stereo function, but we only use the left camera.

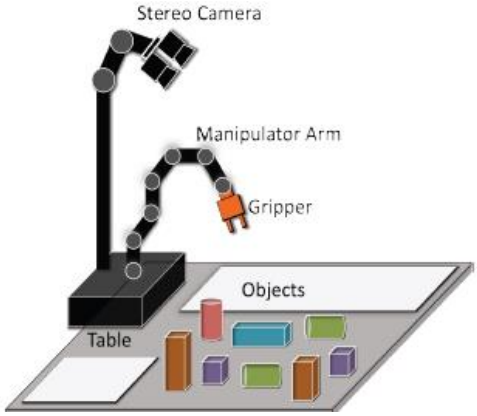

Figure 1. View of the System Elements

III. COLOR SEGMENTATION

A. Color Space

Before to the image processing is important to define the color space. One of the main problems in dynamic environments is lighting conditions. In this sense, it is necessary to isolate or control the lighting. Theoretically, one of the color spaces that can control lighting of brightness is HSV (Hue Saturation and Value). In this case, the conversion from RGB to HSV is performed by the equations (1), (2) and (3) [14].

$$V = \max(R,G,B)$$

$$S = \begin{cases} \dfrac{V - \min(R,G,B)}{V}, & if\ V \neq 0 \\ 0, & if\ V = 0 \end{cases}$$

$$H = \begin{cases} \dfrac{60(G-B)}{S}, & if\ V = R \\ 120 + \dfrac{60(B-R)}{S}, & if\ V = G \\ 240 + \dfrac{60(R-G)}{S}, & if\ V = B \end{cases}$$

B. Pixel Classification

Segmentation is the process of divides the image into regions [14]. For doing this exist different techniques (based on thresholds, line detection, etc), but here we present a scheme inspired by the classification of pixels in an image given a specific color in HSV and using the Euclidean distance (4) as a measure for similarity.

$$d = \sqrt{\sum_{i=1}^{n} (x_i - y_i)^2}$$

The variables xi and yi define two points in the Euclidean Space so they are H and S parameters from HSV (without considering the Value component V, because is the brightness of the scene). As mentioned before, the problem of image segmentation can be presented as pixel classification, where the pixels are features in the Euclidean Space. In the literature [15], this problem has been solved by using unsupervised learning (KMeans). For the case of supervised learning, the KNN-like methods are used.

We used a variant of Euclidean classifiers [20] by considering a fixed radius r. Namely, given a color

in Equation (5) and a set of pixels, if the Euclidean distance of the pixels to the Centriod is less than or equal to r, is considered that these pixels are in that color. A start criterion for assigning r is a visual inspection of the space of H and S values for a set of colors, considering that the end effector has a specific color. Section VI considers the value of this parameter.

color = (H,S)

In this implementation, only HSV is considered. For future work is desirable compare the performance of different color spaces.

IV. CENTRIOD CALCULATION

The first stage for compute the Centriod (centre of mass) of an object is the isolation of this object from others and then using the mean of the x,y positions forget the centre. These steps are discussed below.

A. Connected Components

Connectivity between pixels is a basis concept in digital image processing and allows defining limits and regions. Two pixels are connected if they have: common neighbors (using 4- or 8- neighbor test), similar intensity values, and if exists a path between them [16]. In [17] is considered the fact of a connected component in binary images has a topological structure. The regions inside of limits and its correspondence with limits is 1 to 1. This process it also allows know which components are in others.

This process can understand as labelling. Once the segmentation has been performed, the labelling of every isolated region is calculated. In this step we maintain only the larger area in the sense that this area is the more representative structure from gripper.

B. Using mean for Centriod calculation

Once that the connected components algorithm and the larger area is maintain, the next step is perform the calculation for get the centre of using equation (6), where f(x,y) is binary image and x,y are the pixel positions.

$$c(\overline{x},\overline{y}) = c\left(\frac{\sum_{i=1}^{n} x}{\sum_{x=1}^{n}\sum_{y=1}^{n} f(x,y)}, \frac{\sum_{i=1}^{n} y}{\sum_{x=1}^{n}\sum_{y=1}^{n} f(x,y)}\right)$$

V. LOCAL FEATURES

A. Corners

Corners or interest point's detection is previous process for homography estimation. This process is only applied in the segmentation image (only on largest area of the segmented color on the end effector). One of the most popular methods for corner detection is the Harris Algorithm [18]. This technique implements invariance to any corner and its response will be positive in region with corners, negative unregions with borders and small in flat regions.

In addition, to bring robustness to the current method, Shi- Tomasi in [19] also, consider the pyramidal approach to ensure good corners for tracking. The input parameters are in the Table 1. The feature tracking is other important issue related to homography estimation, because for getting good pose estimation the same points must be the same on every frame taken from the camera. This process internally uses a matching points calculation for getting similar points in every frame taken from camera.

VI. POSE ESTIMATION

This chapter only presents theoretically results using the concepts discussed below. For getting the pose estimation of the gripper one previous calculus is the homography. The homography or projective transformation is any transformation, which is linear in projective coordinates and invertible [21].

A general procedure for estimate the homography between two images is described in [22]. The main stages are:

a) Compute the interest points in each image.

b) Calculate a set of interest points matches based on proximity and similarity.

c) The homography is estimated using this matching.

However, we need to find the homography H between a set of points in image plane and a set of points in world frame, this relationship is given in equation (7).

$$\begin{bmatrix} x_1 \\ y_1 \\ 1 \end{bmatrix} = H \begin{bmatrix} x_2 \\ y_2 \\ 1 \end{bmatrix}$$

Where x1, y1 are the coordinates related to the image frame IFr and x2, y2 are for the world frame WFr. In figure 2, we can see the largest area taken from the gripper (marked with a green rectangle).

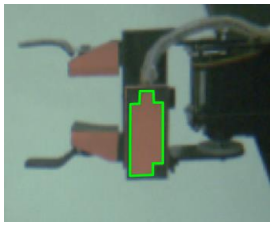

Figure 2. The largest area of gripper is marked with a green rectangle.

VI. IMPLEMENTATION

The results reported in this document were performed using the OpenCV libraries [14] in python language running on a Linux (Ubuntu 8.04) platform on a PC Intel Centrino with 512 MB of RAM. We obtain only the left image from a stereo camera with a resolution of 320x240 pixels and the average image processing for each image was 0.05 seconds. Figure 3 shows the real system and we can see the camera, manipulator arm, end effector (gripper), the objects and the table (common plane for the system).

A. Color Set

The color set is shown in Figure 4 and is delimitated by the elements in the equation (8).

UT = yellow, blue, brown, {purple, red, green, orange}

In this set the end effector color is orange. This color can be changed but is important that has enough linear separability from other colors. We pick up 100 samples from every element of the color (using the mouse and the clicking in the object). For every color we get the mean (or color Centriod) using only HS components. Equation (9) shows this.

$$color_i = \frac{\sum_{k=1}^{n} H_k S_k}{n}$$

Where colori is the i-th representative color (or color mean), HkSk are the samples and n is the total of samples.

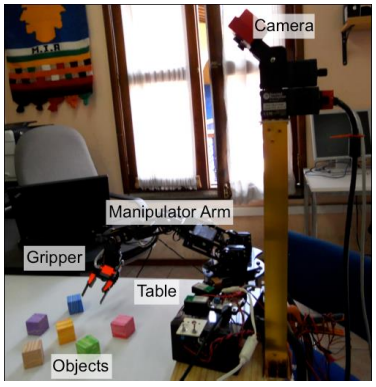

Figure 3. Real system and its elements

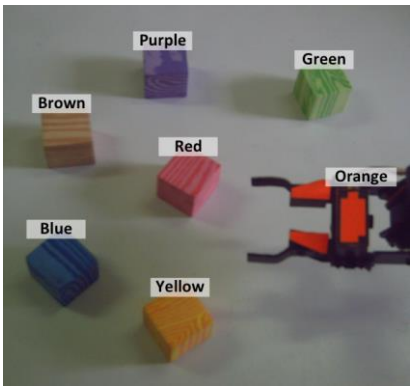

Figure 4. Colors Set

B. Segmentation and Local Features

Although the color space defined is linearly separable and the colors in (8) do not interfere with the end effector color segmentation there is some

noise that comes in the form of misclassified pixels or bad segmentation.

This noise increment as the radius r increases. We are not consider the V value because theoretically is the brightness of the scene, but depending on the hour of the day and lighting conditions is necessary adjust r to reject or accept more colors for better segmentation.

One way to not consider the noise for the calculus of the end effector Centriod is eliminate all small areas (areas that do not exceed a threshold) in the contour extraction step.

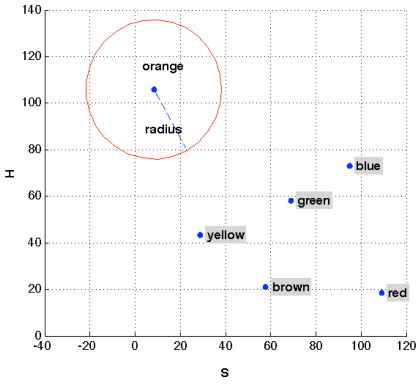

Figure 5: Centriod of object

The specific Centriod for end effector color is shown in equation 10.

Gripper _ color = (8,105)

Considering different values in r the noise increments. For example, in r=50 we can see in that some pixels related to yellow color are bad classified like orange pixels. For avoiding this bad calculus on feature extraction step, we only calculate features on the larger area segmented from the gripper. The corners calculation is performed in the binary image related to larger area and which has been filtered from noise.

VII. RESULTS

The theoretical analysis and implementation results involve the detection and monitoring of the gripper of a manipulator arm. This section demonstrates the application of these concepts using real time images based on shape and color.

This Performed using the Euclidean distance from the Centriod and maintain only the larger distance and finally apply this to the roi calculation, because the largest distance is related to get the circular mask.

The Figure 6 shows images related to:

- Figure 6a shows the binary image after the segmentation.
- Figure 6b shows how to dump the code to robot arm and to terminal the code.
- Figure 6c shows the picking of the object based on color and shape.
- Figure 6d shows the placing of the object to the particular location.

Figure 6(a). Binary Image

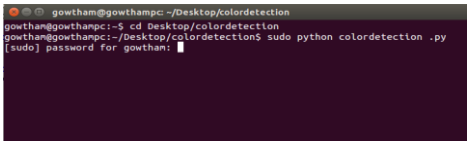

Figure 6(b). Terminal of code.

Figure 6(c). Picking of Object

Figure 6(d). Placing Of Object

For a better validation of results, we can obtain the ground truth mask. Typically, for creating a ground truth mask is necessary in a visual inspection of the

object in the image and then a human selects a set of vertices that represents a specific form. These vertices are used to build a polygonal region of interest that filters out those pixels outside from the vertices and create a binary image.

VIII. CONCLUSION

This work presented a fast scheme for compute the tracking and feature extraction for an end effector of a manipulator arm. The current vision system is not susceptible to errors, for example, in cases when the gripper is too far from camera or there is bright light in the scene, the segmentation fails. After segmentation, the process continues to calculate the interest points in the gripper because these features are intrinsic properties of the gripper that will perform more complex calculations, such as the homography and determining a rotation of the gripper with respect to the camera. In future work, it is desirable to compare the detection process using a scheme based on pattern matching, object classification and even other color spaces in order to make it more robust to noise.

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Process Control Automation Of Paper Pulp Using Plc

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ABSTRACT

Process control automation using PLC is the continuous process that takes over the task of controlling the required process variable parameters of conducting fluid i.e. paper pulp using PLC. The process variables that are controlled are level of the tank, temperature and flow rate of the fluid in the tank. All these variable parameters are continuously controlled using programmable logic controller [PLC]. Process control automation using PLC in a tank of automation plant is implemented by using ladder diagram. Desired set point is set by the user using Human Machine Interface [HMI]. All the operations will be programmed in ABB PLC and programming tool is ABB Automation builder.

Keywords : PLC, Paper pulp, Process variables, Process tank

I. INTRODUCTION

Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector of power plants. Power plants requires continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also the lack of few features of microcontrollers.

Instrumentation is the art of measuring the value of some plant parameters like level, temperature, flow etc. Among the various parameters, control of liquid level, temperature, flow is a prime factor in many process stations such as pulp and paper industries, power plant, water treatment industries etc. The output signals are the standard signals and can then be processed by other equipment to provide indication.

The need for accurate and reliable level, temperature, flow measurement system is increased by the demands of advanced automated processing systems, more. stringent process control and strict regulatory requirements. By improving the accuracy of level, temperature, flow measurement, the variability in chemical processes can be reduced, which, in turn, helps to improve product quality and reduced costs and wastages. The purpose of a temperature controller unit is to heat up a particular solution to be desire temperature with minimum overshoot and quickest time constant. The system operates in a closed loop system to ensure that temperature will be obtained accurately.

II. METHODS AND MATERIAL

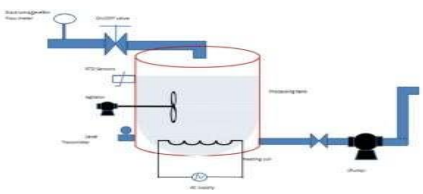


Figure 1. Block diagram of process control automation

The project is to implement the automation for the process tank to control the process variables like temperature, level and flow. PLC is used as controller for controlling action. All the signals from the sensors are given to the PLC as an input signal. According to set point mentioned in the PLC programming and the measured value from the process tank the controlling of process parameters take place. The conducting fluid (paper pulp) flows into the open process tank through the inlet valve where the flow meter is mounted across it and its flow rate is measured continuously. Accordingly, level is measured and once the level and flow reaches the set point the inlet valve gets closed. Then the temperature of the fluid is measured by using the head mounted RTD temperature sensor, if the measured value is less than the set point heater is turned on, at the same time agitator also turns on and continuous mixing of the of the fluid takes place for equal distribution of heat. Heater and agitator both contain induction motor with DOL starter with supply voltage 230V AC. Induction motor draws more current when it is started, so to prevent damage to the windings due to high current flow, the DOL starter is used. Once the fluid reaches desired temperature set point, fluid in the process tank is pumped out using the pump. To drive the pump induction motor with DOL starter is used. When level of the tank becomes zero, the pump and agitator gets off and as it's a batch process inlet valve gets open and next batch of fluid flows into the tank and controlling of process parameters takes place. All the above mentioned operations will be programmed in ABB PLC and programming tool is ABB Automation builder.

A. Hardware Used

1. Electromagnetic flow meter:

In an electromagnetic flowmeter, a magnetic field is generated and channelled to a fluid flowing through pipe. Following Faraday's law, flow of conductive fluid through the magnetic field will cause a voltage signal to be sensed by electrodes located on the flow tube. The paper pulp is conductive fluid hence electromagnetic flow meter is chosen for fluid measurement.

Model: AXF025G

Fluid temperature: 40 to 130 deg C Ambient temperature: 40 to 60 deg C Accuracy: 0.35% of rate Output signal: 4to 20 mA

2. Gauge type flange mounted level transmitter:

Gauge pressure transmitters are ideal for application ranging from high pressure measurement in boilers and fuel feeds to tank level measurement applications with relatively high process temperature.

Model: EJA210A

Accuracy: +/- 0.2%

Process temperature: -40 to 120 deg C Measurement range: 0-5000mm of water Output signal: 4 to 20 mA

3. Head mounted R To I RTD-PT100:

RTD is a temperature sensor that operates on the measurement principle that a material electrical resistance changes with temperature. Here Head Mounted R to I RTD is used in which resistance output from the RTD is converted into suitable current signal, the head mounted temperature transmitter converts the liberalized temperature to a 4 to 20 mA signal. Range: -200 to 850 deg C

Accuracy: +/- 0.05% of reading Output range: 4 to 20 mA Power supply: 10 to 30 V dc

Ambient operating range -40 to 85 deg C

4. Heater:

Heater contains an induction motor. Heater works on the principle of heating an electrically conducting object (usually a metal) by electromagnetic induction, through heat generated in the object by eddy currents. An induction heater consists of an electromagnet, and an electronic oscillator that passes a high-frequency alternating current (AC) through the electromagnet. The rapidly alternating magnetic field penetrates the object, generating electric currents inside the conductor called eddy currents. The eddy currents flowing through the resistance of the material heat it by Joule heating. The frequency of current used depends on the object

size, material type, coupling (between the work coil and the object to be heated) and the penetration depth.

5. Agitator:

The agitation is achieved by movement of the heterogeneous mass (liquid-solid phase), to the impeller. This is due to mechanical agitators, to the rotation of an impeller. The bulk can be composed of different substances and the aim of the operation is to blend it or to improve the efficiency of a reaction by a better contact between reactive products. Or the bulk is already blended and the aim of agitation is to increase a heat transfer or to maintain particles in suspension to avoid any deposit.

6. Pump:

A pump is a device or an apparatus used for conveying a fluid from one point to other, usually through a pipe. A pump may, therefore, be defined as a mechanical device which translates the mechanical energy imparted to it from an external source (electric motor, diesel engine or even manual energy) into hydraulic energy in the fluid handled by it. As a consequence, the energy level of fluid handled by the pump or flowing through the pump is augmented, making it possible for the fluid to move from a lower level to a higher level, against gravity and friction.

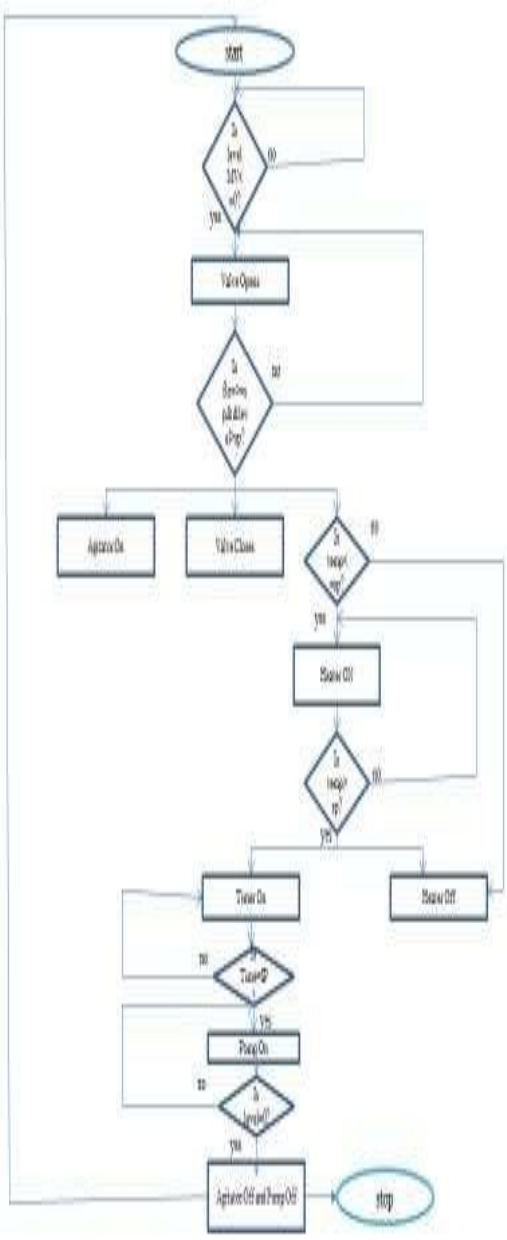
B. **Software Used**:

ABB PLC:

PLC introduces a better solution in accurate level and temperature measurements. Not only that, smooth transition of level control can be controlled by the PLC. PLC is more suitable for real time applications. With the AC500 PLC a reliable and powerful platform to design and create scalable, cost-effective and flexible automation solutions. The scalability of the AC500 PLCs is achieved by offering a large variety of devices to design and implement configurations suitable for simple control tasks or complex automation solutions.

The AC500 PLC provides action flexibility with one integrated software.

Flow of the Program:



III. RESULT AND DISCUSSION

We have implemented automation builder to the process tank consisting of paper pulp where its process variable parameters i.e. level, temperature and flow have been controlled and measured according to the user requirement using ABB PLC.

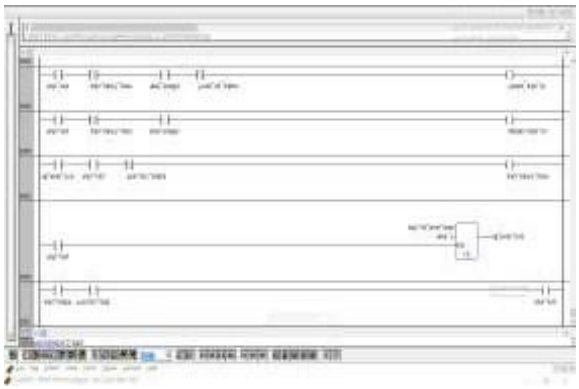


Figure 2

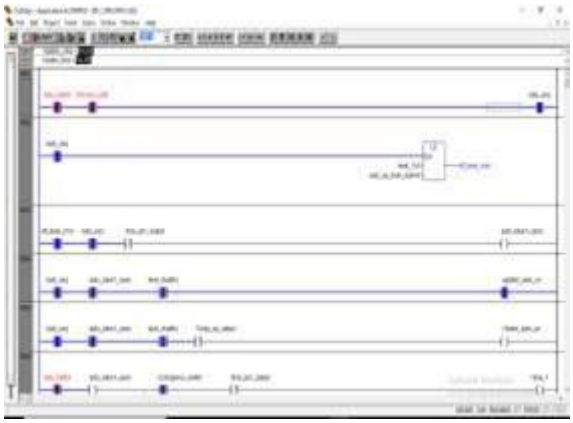


Figure 3

IV. CONCLUSION

In this paper, a PLC based automation control system is proposed and implemented. The proposed architecture utilizes a HMI communications and the data can be processed in the PLC. The resulting output helps in controlling of process parameters i.e. flow, level and temperature according to the user requirements.

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Gesture Based Human Robot Interaction System Using Raspberry Pi

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ABSTRACT

Even after more than decades of input devices development, many people still find the interaction with the computers and robots an uncomfortable experience. Efforts should be made to adapt computers and robots to our natural means of communication. speech and body language. The aim of our project is to implement a real time command system through hand gesture recognition, using general purpose hardware and low costing sensor like a simple Raspberry-pie and an USB webcam, so any user can make use of it in industries or at home. The basis of our approach is a fast segmentation process to obtain the hand gesture from the whole image which is able to deal with large number of hand shapes against different backgrounds and lightening conditions, and a recognition process that identifies the hand posture for different control application.

Keywords . Raspberry-Pie, DC motors, Arduino

I. INTRODUCTION

Gestures can originate from any bodily motion or state but commonly originate from the face or hand. Many approaches have been made using cameras and computer vision algorithms to interpret sign language. However, the identification and recognition of posture, gait, proxemics, and human behaviors is also the subject of gesture recognition techniques. Gesture recognition seen as a way for computers to begin to understand human body language, thus there's a need of building a richer bridge between machines and humans than primitive text user interfaces or even GUIs (graphical user interfaces), which still limit the majority of input to keyboard and mouse. This could potentially make conventional input device such as mouse, keyboards and even touch-screens redundant. The project is an application for live motion gesture recognition using raspberry-pie camera module and performs the action corresponding to it. In our case we have controlled the motion of a mobile robot according to the gesture of the user.

II. PROPOSED METHODOLOGY

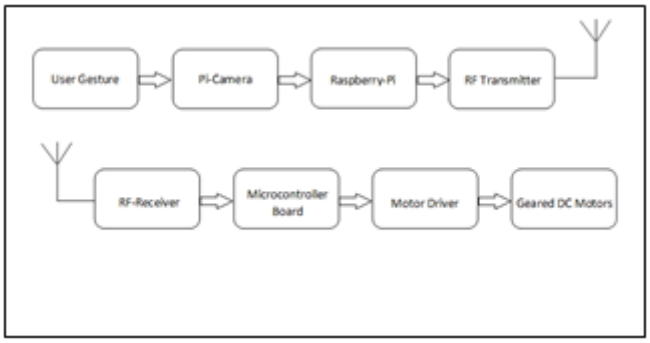

Figure 1.1. Block Diagram

Implementing image processing using hardware is a cumbersome and difficult task thus selection of the proper development board becomes an important issue. The most commonly used boards with which we all are familiar are the Ardiuno, Raspberry Pi and we choose to work on raspberry pi due to its high

clock speed and cost-effectiveness. Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SOC), which includes an ARM1176JZF- S700 MHz Processor, Video Core IV GPU, and has 512 MB of RAM. It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB. The Foundation provides Debian and Arch Linux ARM distributions for download. Tools are available for Python as the main programming language, with C, C++, Java, Perl and Ruby.

Communication

We have used RF-module, WIR-1186 available on robotics India Pvt.Ltd. For transmitting data from laptop to robot as RF has long communication range. This module integrates RF69, an extreme low-power sub-GHz transceiver, an MCU for wireless network control, data handling and hardware interface, a PCB antenna and matching circuit. It supports UART communication protocol and baud rate ranging from 9600bps to 115200bps.

Driving Of Robot

We have used two single channel motor driver (model no. RKI- 1340) available at Robotics India Pvt. Ltd. for controlling the speed of the motors used in robot. This driver is 6v-24v compatible 20A capable DC motor driver. It comes with a simple TTL/CMOS based interface that can be connected directly to I/Os of a MCU. Speed of the motor can be controlled by PWM signals generated by any MCU.

III. HARDWARE AND SOFTWARE DETAILS

HARDWARE USED.

1. ATmega328P microcontroller (Arduino UNO).

Figure 2. Arduino Uno microcontroller based development board

Fig 1.2 shows the arduino Uno board. Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller

2. ZigBee

ZigBee is an emerging technology designed for lowdata-rate, low power consumption and low cost applications. ZigBee technology is a wireless networking protocol with advantages like. low data rate, low power consumption, low cost, shorter time delay, and larger network capacity, high reliablity targeted towards automation and remote control applications.

3. Raspberry Pie

Figure 3. Raspberry Pi-2 model development board

The Raspberry Pi has a Broadcom BCM2835 system on a chip, which includes an ARM1176JZF-S 700 MHz processor, Video core IV GPU and was originally shipped with 256 megabytes of RAM, later upgraded to 512MB.It does not include a built-in hard disk or solid-state drive, but it uses an SD card for booting and persistent storage.

The components present in the raspberry pi module are

i) Processor/SOC (System on Chip).- The Raspberry Pi has a Broadcom BCM2835System on Chip module. It has an ARM1176JZF-S processor.

ii) Power source. The Pi is a device which consumes 700mA or 3W power.

iii) SD Card.

The Raspberry Pi does not have any on board storage available.

iv) GPIO General Purpose Input Output.

General purpose input/output(GPIO) is a generic pin on an integrated Circuit whose behavior, including whether it is an input or output pin, can be controlled by the user at runtime.

v) DSI Connector.

It defines a serial bus and a communication protocol between the host (source of the image data) and the device (destination of the image data).

vii) Audio Jack.

A standard3.5mm TRS connector is available on the RPI for stereo audio output.

4. DC Motors.

In this project we use simple DC motor for the rotation of the wheel which is responsible for the movement of the robot. Usually DC motors convert electrical energy into mechanical energy.

5. Motor Drivers.

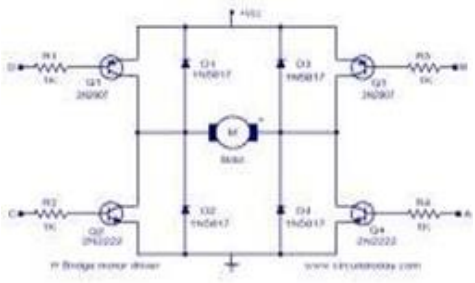

Figure 4. H Bridge Circuit

Motor drivers are used to describe the direction of movement of the robot. It is used to give high voltage and high current as an output to run the motors which are used in the project for the movement of the robot. Fig 1.4 is the circuit of the H Bridge which is used for the motor driving in the IC l293D and also provides bidirectional motor control. Bidirectional motor control.

6. RF Module

RF module is a small size electronic device that is used to transmit or receive radio signals between two devices. The main application of RF module is an embedded system to communicate wirelessly. The communication may be accomplished through radio frequency communication. RF communications incorporate a transmitter and receiver.

Types of RF Modules

1. Transmitter Module. A Transmitter module is capable of transmitting a radio wave and modulating wave to carry data.

2. Receiver Module. An RF Receiver module receives the modulated RF signal and demodulates it.

3. Transceiver Modules. An RF transceiver module incorporates both a transmitter and receiver.

4. SOC Module. An SOC module is the same as transceiver module, but it is often made with an on board microcontroller.

SOFTWARE USED.

1. Arduino IDE 1.6.7

For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages, C and C++.The open source Arduino IDE makes it easy to write code and upload it to the board.s

IV. RESULT AND DISCUSSION

The complete setup of the gesture control was carried out in the robotics and satisfactory gesture control are obtained which are illustrated in the below table.

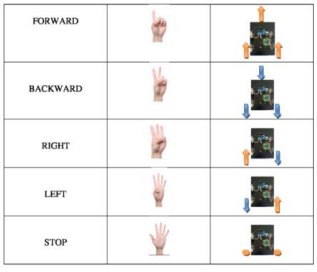

Figure. 5 Gesture control

V. CONCLUSION

We have implemented Convex-Hull detection method to recognize the gesture in raspberry-pi. There are many algorithms available to detect gesture like Haar Cascade method where we need a lot of positive and negative images to train the filter which is very time consuming and adding a new gesture would be thus very cumbersome. However, In the Convex- Hull detection algorithm we can easily add a gesture and since this algorithm uses adaptive thresholding, there is no effect of light intensity and it sets the threshold dynamically with the amount of light present. The drawback of this method is the limited number of gesture as gestures depend on the number of fingers.

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Automatic Multi-Level Car Parking System

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ABSTRACT

In the modern world, where parking space has become a very big problem, it has become very important to avoid the wastage of space which helps to minimize the car parking area. In this paper, the basic multi-level car parking system with two floors is designed. The system developed is able to sense the presence of vehicles through an IR sensor. The RFID module provides security as users who have authority can swap the RFID cards. The project is designed for automatically parking car into the parking spot in a multi floor parking lot using elevators which is controlled by Arduino Uno controller along with XY plotter.

Keywords . IR sensors, XY plotter, stepper motor, RFID, automatic parking system.

I. INTRODUCTION

The advancement and progress of nation is measured by the possibility of their use and application of latest invented technologies in all aspects of life. Vehicle parking is becoming a major problem nowadays. Car parking has been, and still is, a growing problem with increasing vehicle sizes in the luxury segment. This is especially true when bearing in mind the confined parking spaces in parking lots and cities. As the population is increasing, the number of vehicles on the roads is also increasing leading to an insufficient area to park these vehicles. This project is devoted to the use of control system in parking system. Control engineering is one of the aspects which have been given a great deal by many researchers. The control system plays a major role in organizing the entry to and exit from the parking lots. It also presents the design of multi-level parking lots which occupies less need on the ground and contains the large number of cars. Therefore, the need of using technologies becomes inevitable.

Multi-level car parking system enables the parking of vehicles, floor after floor and thus reducing the space used and it will helps in less manual intervention. Automatic multi-level car parking system helps to minimize the car parking areas in companies, mall, and apartments etc. and it reduces the pollution. In automatic car parking system mechanized lifts transports the car to different levels at a certain position. The driver leaves the car in an entrance module. It is then transported to a parking spot by a robot trolley. For the driver, the process of parking is reducing to leaving the car inside an entrance module.

Automated multi-level car parking offers greatest possible flexibility or the realization of optimum parking solution. Drivers' does not have to manoeuvre his cars on each level. If there is no vacant space on the ground floor, the lift automatically goes to first floor. Such a system has been proposed and designed in this project by making additions for existing system. Implementation of the design is carried out in Arduino Uno and XY plotter.

In this paper [3], proposes the development of a mathematical model for automated car parking system. Where LCD shows the number of autos stopped in a given parking space. When the auto

arrives it will send signal to the controller. The android is interfacing with LCD and GSM. GSM is utilized for sending and getting message to and from microcontroller. Radio recurrence is used to transmit the correspondence between stopping range of the auto. Now the messages will be decoded by android application and accordingly future will take place.

This paper [4] has introduced intelligent automated car parking system and developed the hacking intimation feature for the car owners. An automated slider system provides the motion for the overall system with the help of IR sensors, limit switches and flame sensors to initiate alarm signals if there is a fire inside the parking area. Where the IR sensor is used to record the position of the robot slider and its movement is controlled by microcontroller using DC motors. IR sensor will also detect weather the car is parked or not and intimate to the microcontroller. Here also GSM technique is used to receive the status of the car and send a feedback to the car owner.

The paper [5] is devoted to the function of control system in parking system. It is designed and constructed it by using PLC. The mechanized lift is used to transport the car to different levels by DC motor. PLC will control the movement of elevator and working of pneumatic mechanism, relays are used for forward and reverse direction control. Programming is done by ladder logic which uses symbols. Thus control and manage parking system with effective utilization of area and reducing time to park the car.

In this paper [6] it aims for parking space detection based on image processing technique where the capture and process of brown round is done by MATLAB. The first module is to initialization the system to automatically identify the location of parking lot in the image. The second is image acquisition module, which captures and stores the digital images. The acquired signal is given to MATLAB program. The third module is image segmentation, which separate the objects from the background and differentiate the pixels nearby values. The fourth module is image enhancement where the noise is removed by morphology functions and the last module is image detection, which is used to determine the rounded brown image drawn at each the parking lot.

In his paper [7], the system has two main modules. First the identification module identifies the visitor and then lot checking module checks the slot status. The model is done by HDL and implemented on FPGA. The working of parking system is given by describing the output that depends upon past state as well as present input. At the entrance of parking area, LCD displays the status of parking system. According to space status motor rotates in clockwise direction and then identification unit identifies the person. After identification, slot status is checked. Status can be filled, empty or reserved. RF sensors are used here.

II. METHODS AND MATERIAL

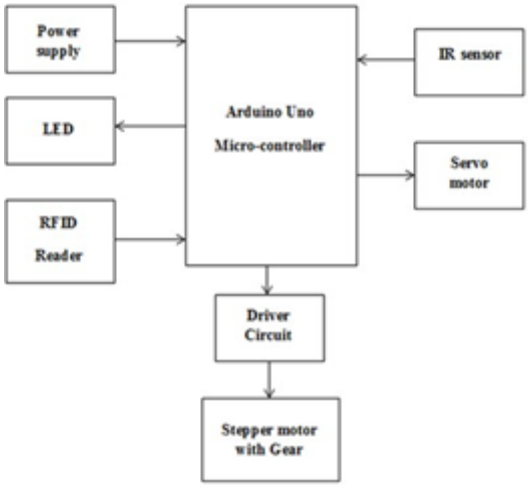

Figure 1. Block Diagram of Automated Multilevel Car Parking System

The Automated Multilevel Car Parking System consist of

1. Arduino microcontroller is the heart of the system where the programming is written.
2. Power supply is regulated power supply of 5v.
3. H Bridge is used for current amplification and to control motor in clockwise and anti clockwise.

4. IR sensor is used as interrupter sensor to check the slot is free or not.
5. Servo motor is used for controlling gate. RFID reader is used to read the card.

As shown in Figure 1, the elevator carries the car to each floor and the elevator comes in front of the floors to allow the car get in or get out. First the cars will be parked in one floor and then in other floor. The green LED will be ON if the slot is free. When the car approaches near the front/enter gate the user will be given an ID card. The elevator will work automatically and goes to the slot with respect to priority given and the car will be parked. If there is no vacant space on all floors the red light will be ON in front of the parking to indicate the driver that there is no empty space to park and the front gate will be closed automatically.
In the case, the car is inside and wants the car to come out, then the user has to show the ID card which is given and the elevator will automatically go to that particular car and picks the car from respected floor, then it comes to the exit gate to allow the car to go out. The main objectives of the car parking system are-to design and fabricate a multilevel car parking system and to design and fabricate a cost-effective model, to develop a fully automated control system and to prevent illegally parked vehicles.
The system will first check for login ID and the data received will be sent to microcontroller. If it is valid then the front gate will be operated and the controller will check for empty space. If there is no space left for parking then the control will go back to login stage. If there is space left for parking the vehicle then a signal will be sent to the stepper motor to move the elevator to the empty space for parking.

III. RESULT AND DISCUSSION

Case 1. A lift mechanism is used to park the car on the first floor which is implemented using motor. Motor is rotated clockwise it stops when it reaches on the first floor. The car is parked on the first floor successfully.
Case 2. The car which was parked on the first floor, was successfully retrieved.
Case 3. A user tried retrieving a car which was never parked in actual or a wrong RFID card was swapped up, in both the cases, an error signal was indicated on the LED.
The prototype of the proposed system is shown in Figure 2.

Figure 2. Prototype of the proposed system

IV. CONCLUSION

Automatic multi-stored car parking system is very good substitute for car parking area. This design is an efficient one because compared to other existing design it can handle more cars in a limited space. The lifting mechanism is also simpler and cost effective. Two IR sensors TX RX pairs are used in this project to identify the vacant spaces. It is a versatile project with application in almost every field, be it residential or industrial.

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Design and Development of Cyclist Jacket

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ABSTRACT

One of the thing that is of most concern to the cyclists is safety. Sometimes, it can be serious cycling during night. Studies have shown that cyclists are chronically bad at estimating how visible they are on the road, especially during night time. An Abetment Cyclist Jacket is introduced to solve this issue and to make sure that the cyclists are better visible especially by indicating the directions before making any turn. The jacket also measures the heart rate of the cyclist on a continuous basis. Once the heart rate falls below or rises above a particular value, the cyclist jacket is responsible for sending the location of the cyclist to the specified phone numbers thereby alerting the akin that the cyclist needs help.

Keywords . GSM technology, GPS technology, Arduino, Heart rate sensor.

I. INTRODUCTION

In recent years, cycle riding has become more popular to people. It can not only save energy resources, but also protect the environment from air pollution. For these advantages, more people prefer cycling on the road. However, there are also other vehicles, such as buses, cars and motorcycles, and passengers on the road. In this situation, if a cycle does not mount any indication sign to indicate their instantaneous moving actions to surrounding bikes, vehicles and passengers, the rider will be at a risk of traffic accident. As a result, it is necessary to mount an indication sign on a cycle to indicate its instantaneous moving actions for reducing the risk of traffic accident [1]. Unfortunately, a cycle is usually small and lightweight and hence it is not easy to mount an indication sign, such as a brake sign, a left-turn sign and a right-turn sign, to indicate its instantaneous moving action. Thus, an abetment cyclist jacket is designed as a solution to efficiently reduce the risk of accidents of cyclists on the road. This jacket is also meant to work as a heart rate monitoring system where the cyclist can view his/her heart rate [2]. The jacket also alerts the concerned person of the cyclist for medical help through a message that shows the current location of the cyclist [3]. An application that has access to GPS and messaging services such that whenever it receives emergency signal, it can send help request along with the location co-ordinates to the nearest police station, relatives and the people in near radius who have the application was developed [4]. This system enables instantaneous help from the police and public who can reach the victim with great accuracy. In addition, since everyone's pulse rate goes high at the time of any dangerous situation, a pulse rate sensor was incorporated to sense the pulse rate and send help request along with the location. An auto- defender mechanism constituting of a buzzer, a sprinkler and shock mechanism was also provided. Only a button had to be pressed, when in danger on the developed device [5]. In such case, GPS tracks the location of the needy and sends emergency message using GSM to saved contacts and police control room. Also, the audio and video recorder will start to capture the live incident. If the pressure sensor senses the physical pressure, the

message will be sent to the contacts with live recording through GSM. A buzzer is also provided in the device, wherein when the device is activated the buzzer produces high sound to alert the people nearby.

A system that notified the other vehicles and by passers about the intensions of the cyclist was developed by [6]. It enabled the wearer to observe a rear view to identify the approaching traffic, thus improving safety of the cyclist. The cyclist can avoid turning their head to see the approaching traffic from behind. Also, the cyclist can avoid signalling their intended direction of turn by lifting their arm. This device was helpful especially in case of child rider or old person by providing greater stability.The indication light can be triggered using a mechanical switch or an accelerometer or capacitance screen or pressure sensor on strap or audio sensor or from a remote device such as a smart phone or based on GPS.

Here, the sensor interfaced to the microcontroller allowed checking heart rate readings and transmitting them over internet [7]. The user can set the high and low limits of heart rate. The system monitors the heartbeat and once it goes beyond the limits, the system sends an alert to the controller which then transmits this over the internet to alert the doctors and concerned users. The user himself and the concerned users can also monitor the heart rate whenever they wish to.

The developed system was meant to remotely monitor the real-time heart rate of a patient. It uses simple infrared light and photo detectors mounted on the fingertips of the patient to detect and pick up the rate of heart beat signal and send the measured data wirelessly to the MQTT broker, which may be the doctor or relative. With the help of ESP8266 module, the Arduino is able to publish the heart rate measured every minute, so that the doctor or the user can monitor the heart rate provided they are connected on the same network [8].

The prototype of the wearable jacket that included two independent system controlled using two switches was developed by [9]. When first switch is pressed the device would get activated, immediately the location of the victim would be tracked with the help of GPS and emergency message along with latitude and longitude value was sent to stored contacts every one minute with updated location. When second switch is pressed the system would only send the location. The receiver then receives victim's updated location in form of coordinates that can be used to find exact location using Google Maps. A brake light control system was designed to be attached to a vehicle and to correspond with the vehicle's turn signal lights and brake lights. The middle sensor detected red light and send a signal to the processing unit; then it issues an activation command to the brake indicator. The left-hand and the right-hand sensor detect yellow orange light and when it detected yellow-orange light, it sends a signal to the said processing unit. When the intensity of signal obtained from the left-hand sensor is greater than that obtained from the right hand sensor, the processing unit issued an activation command for the left turn indicator, and same is the case with the right turn indicator [10].

The proposed system of [11] consisted of a simple wearable heart rate monitoring device that helped to continuously keep track of their heart rate and share the data with their physician through an SMS any time for medical attention using GSM technology and LPC2148 microcontroller. The circuit measured the pulse impulses of the person for 30 seconds using heart rate pulse sensor and was sent to the Microcontroller that counted the number of pulses received with the help of an inbuilt timer and then multiplies the counted value by 2 as per the program and displayed the value on the LCD in beats per minute. This value was then sent automatically to the GSM circuit containing a SIM card and sends the value received as an SMS to doctor's number as specified in the program.

A system consisting of front and rear turn signal lights and rear alert light for braking was proposed by [12]. The left and right turn signal button was conveniently mounted to the handlebar proximate to the handle grip so that the rider can actuate the front and rear left and right turn signals by thumb or finger without having to release the handgrip. Using a timer incorporated, the signals would remain illuminated and blink for a predetermined period and then shut off automatically. Rear alert light, which is red in color, located between the left and right rear turn signal indicators, which are orange in color. The rear alert light includes a running mode that remains illuminated continuously or in a predetermined blinking pattern as long as the system is turned on. When in a running mode, the rear alert light is less bright than the alert mode.

A humidity sensor SHT-75, temperature sensors LM35 and heart rate sensor was used along with microcontroller to measure humidity, temperature and heart rate [13-15]. The humidity sensor was placed on the neck of jacket, and temperature sensor was placed inner layer next to skin and the other temperature sensor was placed on the outer side of the jacket. The heart beat sensor was attached with cuff of the jacket close to hand and LCD was placed on right arm placed in the upper layer of the jacket. Digital results were displayed on the LCD installed on left arm.

II. METHODS AND MATERIAL

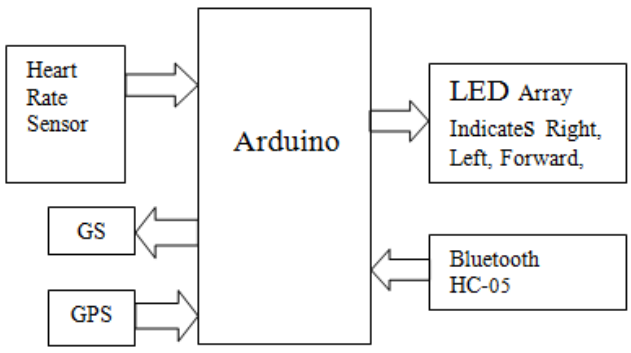

Figure 1. Block diagram of abetment cyclist jacket

Figure 1 shows the block diagram of the abetment cyclist jacket which consists of.

1. Arduino Mega
2. Bluetooth module
3. GPS module
4. GSM module
5. LED arrays

The basic theme of this paper is to enable the cyclist to indicate any instantaneous movement with the help of an application "Bluetooth Controller" on one's Android smart phone via Bluetooth communication. Selecting the soft keys of the application as shown in Figure 2 turns on the respective LED arrays attached to the jacket, thereby indicating the directions.

The jacket is also designed to monitor the heart rate of the cyclist on a continuous basis using a heart rate sensor and the cyclist can track or view his/her heart rate over the "Bluetooth Controller" application on the Android smart phone.

A predetermined value for the maximum and minimum heart rate is fixed as the threshold. As soon as the heart rate goes above or below the set threshold, the controller sends an alert message which includes the current location of the cyclist using GSM and GPS technology, to the concerned people that the cyclist needs help. Your paper must be in two column format with a space of 1.27 cm between columns.

III. RESULT AND DISCUSSION

Figure 2. Simulation Results of the Abetment Cyclist Jacket

The Abetment Cyclist Jacket is designed and built such that it enables the cyclist to indicate his instantaneous moving actions/directions in a more convenient manner, makes the cyclist more visible especially during night rides, monitors and displays the heart rate of the cyclist and also alerts the people concerned that the cyclist needs medical help.

IV. CONCLUSION

Travelling by cycles is the current trend. Cycling trips are fast gaining popularity. But bicycle safety is a serious issue especially during night rides. A user friendly cyclist jacket with direction indication and heart rate monitoring facility is developed for the comfort of the cyclists.

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Soldier Tracking And Information Gathering System Using Gps ,Gsm and Smart Phone

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ABSTRACT

One of the important and vital role is played by army soldiers for the security purpose of our country, many instruments are mounted on them to view their health status by using bio-sensor systems comprising various types of small physiological sensors, transmission modules .GPS used to log the longitude and latitude of soldier and GSM module can be used for wireless communications that will be required to relay information on situational awareness .So by using these equipment's we are trying to implement the life- guarding system for soldier in low cost and higher reliability, if soldier is in unconscious state the visual alerts are generated in the soldiers wearable materials.

Keywords . Renasis RL78 Microcontroller, biomedical sensor, GPS and GSM

I. INTRODUCTION

There are many concern regarding the safety of the soldiers .As soon as any soldier enter the enemy line it is very vital for the army base station to know the location as well as health status of soldiers. This system is mainly designed for soldier tracking by GPS along with finding the health status by using biomedical sensors and this information is send through sms to the base station by GSM .Both GPS and GSM is to provide the wireless communication and biomedical sensor measuring body temperature, pulse rate. We are using LM35 temperature sensor and it does not require any signal conditioning.If heart beat goes low send the sms to the base station. SIM300 is a Tri-band GSM/GPRS engine that works on frequencies is used in this project.

II. LITERATURE SURVEY

This paper has an idea of tracking the soldier and navigation between soldier to soldier such as knowing their speed, distance, height as well as health status to Base station, gets location of soldier from GPS. The base station can access the current status of the soldier which is displayed on the PC[1].

The system work on two way communication. Firstly there can be query from the receiver side to know the status of the soldier. Secondly there can be the automatic response from the system side to know when the heartbeat of the soldier stops that is when the soldier is dead[2]

The purpose of the project is to measure the temperature, heart beat rate and updating this information in PC via ZigBee. The existing system is based on Bluetooth communication which is also reliable but the range of communication is very low of about 10 meter[3].

In this (WBANS) monitor the health status of the soldier. Using oxygen level sensor environmental

conditions are monitored. Any abnormalities in the reading of wireless body area sensor network WBANS is considered as a trigger for GSM to establish the connection between the soldier and base unit[4].

In this project we have come up with an idea of tracking the soldier as well as to give the health status of the soldier during the war, which enables the army personnel to plan the war strategies. Also the soldier can ask for directions to the army base unit in case he feels that he is lost. By using the location sent by the GPS, the base station can guide the soldier to safearea[5].

GPS and a GSM, temperature sensor and heart beat sensor. To design a soldier tracking system using GSM and GPS to provide wireless system for monitoring the parameters of soldier are as – Body temperature & Blood pressure. To find the health status of soldier biomedical sensors are used, a body temp sensor to measure body temperature as well as pulse rate sensor to measure the blood pressure. These parameters are then signal conditioned and will be stored in the memory[6].

One of the fundamental challenges in military operations lays in that the Soldier not able to communicate with control room administrator. In addition, each organization needs to enforce certain administrative and operational work when they interact over the network owned and operated by other organizations. Thus, without careful planning and coordination, one troop cannot communicate with the troops or leverage the communication infrastructure operated by the country troops in the same region[7].

In this project idea of tracking the soldier as well as to give the health status of the soldier during the war, which enables the army personnel to plan the war strategies. Also the soldier can ask for directions to the army base unit in case he feels that he is lost. By using the location sent by the GPS, the base station can guide the soldier to safe area. The system is composed of two parts, which are portable remote soldier unit and the monitoring centre. The portable remote soldier unit consists of Advanced RISC Machines (ARM) with the embedded operating system, GPS and a GSM, temperature sensor and heart beat sensor[8].

III. METHODOLOGY

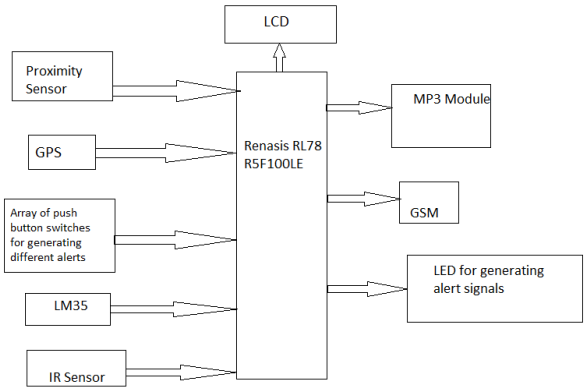

Figure 1. Block diagram of soldier and base unit

This sytem consists of Biomedical sensors. Here to find the health status of soldier we are using LM35 temp sensor as well as pulse rate sensor. These sensors will measure the body temperature and the pulse rate of soldier is measured using IR sensor and will be stored in microcontroller memory. proximity sensor.Here the solider is Equipped with the Explosive detection Sensor which may helpful for solider in suspicious places.

4 x1 Keypad. Here we are giving 4 keys as a facility to the soldier where he can send 4 pre-determined values to the base camp,4keys are pressed when there is danger,explosive detected or when weapons are required.

RL-78[R5F100LE] Microcontroller. 16bit,64pin microcontroller the heart of the proposed system which will coordinate all the control actions. Also provides necessary in the necessary formats. It receives informations from the sensors and GPS ,controller store that in the memory and decodes it and send in the required form to the base station.

GPS Receiver. The GPS is used to log the longitude and the latitude of soldier, which is stored in the microcontroller memory. GPS-634R" is a highly integrated smart GPS module with a ceramic GPS patch antenna which we are using in our project.
GSM Modem. The GSM unit sends the SMS to the army base camp containing the health parameters and the location of soldier.

Mp3 Module. the Mp3 module is used to generate the Audio signals to play the required Audio Templates LED Indicators. Here we are using the High Brightness LED Array which will get triggered whenever the solider is under the danger situation.

Android Smart Phone. here the android application installed in the phone will automatically get triggered when the alert trigger SMS is received from the Solider.The android application can be configure for N Number of soldiers based on the soldiers Identity.

IV. RESULTS

In our project we have acquired signals using various physiological sensors ,soldier body temperature is measured with the help of LM35 and heart rate is acquired with the help of IR sensor .Various switches which is present in soldier system is used by soldier to give alerts to base station when they are in danger, require weapons and when explosive is detected. The location is fetched using GPS and send via GSM in the form of messages and display on LCD.MP3 module is to generate alert signal.

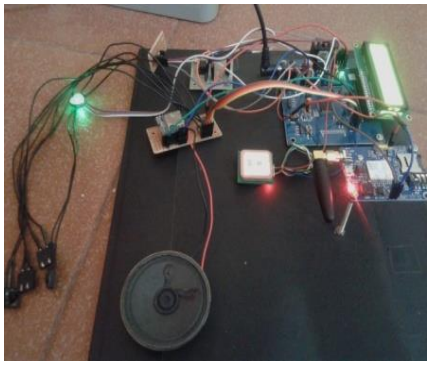

Figure 2. soldier tracking and information gathering system

V. CONCLUSION

The main aim is to help the military soldiers in critical time and soldier security purpose. By using GPS,GSM and sensors to measure the heart rate, temperature and pulse rate in real time. Very compact device which can be fit easily on soldier is designed.

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Efficient Techniques for Reducing Web Page Complexity

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ABSTRACT

Users being frustrated due to high page load times. Because page load times are directly effects user satisfaction, providers would like to distinguish if and how the complexity of their Web sites affects the user experience. Although there is an extensive literature on measuring Web graphs, Website popularity, and the nature of Web traffic, there has been little work in understanding how difficult individual Web sites are, and how this complexity impacts the client's experience. We proposed a system that can identify a set of metrics to characterize the complexity of Web sites both at a content level and service level. Also the impact of complexity on the user performance and recommending what control measures should take to reduce the complexity.

Keywords : Browsers, Websites, World Wide Web, Internet.

I. INTRODUCTION

Since many years, Web pages have become expressively more complex. At first web site used to host text and images, To rich media like Flash and Silverlight now the web pages contain several content type, ranging from video to script performed on the client's device. Additionally, a Web site today fetches content from servers hosted by its providers, and also from a range of third-party services such as advertising agencies, content distribution networks (CDNs), and analytics services. In combination, representation of a single Web page today involves fetching several objects with varying characteristics from multiple servers under different administrative domains.

In contrast, the poor effects of slow Web sites are well known. Users will discard or switch a Web Site due to performance issues. According to recent surveys, out of whole two thirds of users encounter slow Web Site. While abundance of anecdotal proof is that a key factor in slowing down Web Page is the increase in Web page complexity. Official studies on this topic have been limited. Most previous work on Web measurement concentrations on characterizing the Web graph [7], study the network footprint of Web traffic [2]-[5], also studying the rate of change of content on the Web [8]. Although these have contributed to a well understanding of Web usage, they do not examine the Web sites themselves.

In this paper we focuses on two broad question. First, we count the complexity, called content level complexity of a Web page by means of a broad spectrum of metrics, and we characterize a Web page by the content in rendering like-the number of objects fetched, the sizes of these objects, and the types of content. Also we study the complexity of Web pages relating to the services they build upon. In addition to these we find number of bytes fetched and non-origin content accounts in place of a significant fraction of the number of objects.

Our second and the main focus is on the time to download and render a Web page. We find that the total number of bytes fetched to render a Web site is the most dominant indicator of client-perceived load times than the number of objects fetched.

II. LITERATURE SURVEY

Michael Butkiewicz, Harsha V. Madhyastha, and VyasSekar [1] are focuse in these paper on finding the gap in understanding how complex individual Web sites are and how this complexity impacts on the usersperformance. Also characterize the Web site both at content level (like, number and size of images) and service level (like, number of servers/origins). It may happen that some categories are more complex than other such as 'News'. Out of hundred 60% of Web sites fetched content from minimum five non-origin sources, and these give more than 35% of the bytes downloaded. In addition, they examine which metrics are most suitable for predicting page render and load times and catch that the number of objects requested is the most important factor. With respect to variability in load times, however, they also find number of servers is the best indicator.

Y. Zhang, H. Zhu, and S. Greenwood [6] discuss about navigability. Navigability has become the axis of website designs. Existing mechanism have problem into two types. The major is to assess and measure a website's navigability in contrast to a set of principles. Another is to evaluate usage data of the Website. A metric methodology to Website navigability measurement is studies in this paper. Objectiveness and the probability of using automated tools to assess extensive websites are advantages of navigability metrics as far the existing valuation and analysis techniques.

Axiomatic assessment

Weyuker's axioms of software complexity have been frequently applied in place of a method to authorizing A logically the measurement of software complexity .In this section, they measure the metrics well-defined in the prior section compared to Weyuker's axioms of software complexity. Weyuker's axioms are established on a number of operators and relations on programs. According to the features of websites these operators and relations must be modified.

M. Lee, R. R. Kompella, and S. Singh[3],in this paper discuss on Cloud-based Web applications driven through new knowledge such as Asynchronous JavaScript and XML (Ajax) place an important load on network operators and creativities to effectively manage traffic. Problem happen is that there is no systematic technique to produce their workloads, notice their network performance today and possess track of the varying trends of these applications. They develop a tool, called AJAXTRACKER, that automatically impersonators a human interface with a cloud application and gathers associated network traces.

Ajax tracker

The main workings of AJAXTRACKER contain an event generator, a Web browser, a packet sniffer, and a traffic shaper. The event generator procedures the bulk of the tool.AJAXTRACKER is agnostic to the select of the Web browser and can work through any browser. The aim is to collect representative traces of a client session; packet sniffer captures the packets proceeding the client machine.

B. Krishnamurthy, C. E. Willis, and Y. Zhang [2], focuses on Content Distribution Network (CDNs). This is a tool to distribute contents just before and users. In content distribution origin server serves some or all the content of web pages. The technique like DNS resending and URL rewriting are balance the load among their servers. After the observation of results some CDNs provide better results as compare to other. In particular network the dramatic growth in the number of distinct server is gives best performance of one CDN company that can be improved between two testing periods. Either in

average or worst case conditions the results shows that the case of DNS in the critical path of resource retrieval is not better than that of server choices related to client response. 2.5. Understanding Online Social Network Usage from a Network Perspective
F. Schneider, A. Feldmann, B. Krishnamurthy, and W.Willinger,focues in this paper study of Online Social Networks is discussed. Also, they understand which OSN feature inters and which one keep in consideration of poor users. Additionally the topics like friendship graph and sample crawls are studied on surveys. Extracting clickstreams as of inactively observed network traffic these are the techniques using these they study how users are interact with OSN.

III. PROPOSED SYSTEM

By using the "Characterizing Web Page Complexity and Its Impact" we are finding the complexity of web page. After the complexity has been calculated we can show the analytical reports in text as well as graphical format using graphs.

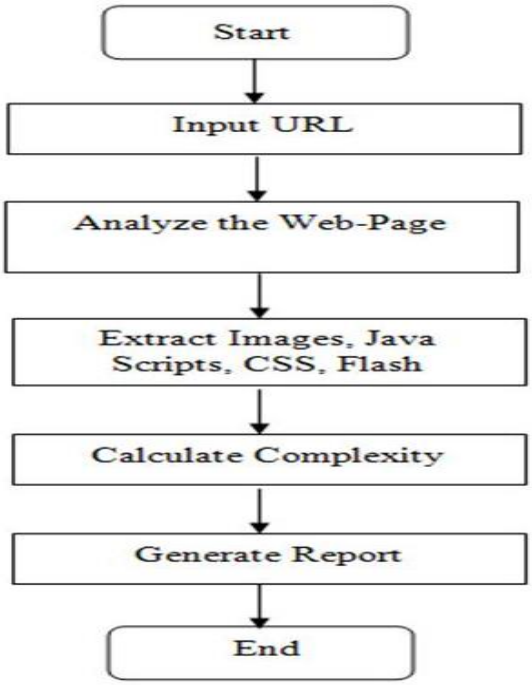

Figure1. Content Flow Architecture

We are starting with entering url after that the page is load. After the loading of page complexity of that web page can be determine using parameter such as content complexity and service complexity.

HTML5

HTML5 is a new standard for HTML which allows us to build rich and interactive web pages which bring HTML into the world of application development started in the year 2004. HTML moves from simply describing the basics of a text based web for presenting audio, video and animations to enabling offline functionality, geo location and local storage in client side databases.

With the development of HTML5 it has wide range of applications in multimedia direction [3]. It can play audio and video and supports animations from the browser without the need of the proprietary technologies. The features of HTML5 would add up value for web designers and developers.

With the development of HTML5 it has wide range of applications in multimedia direction [3]. It can play audio and video and supports animations from the browser without the need of the proprietary technologies. The features of HTML5 would add up value for web designers and developers.

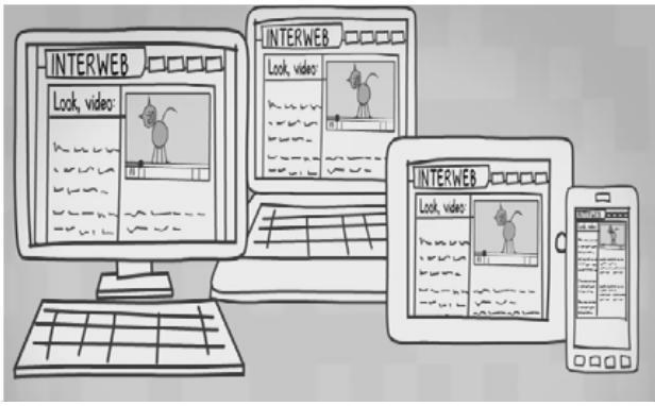

Figure 2. HTML5 cross-platform

HTML5 also support location based services open formats such as Scalable Vector Graphics (SVG), open XML file formats and high quality graphics.

The basic advantage for the developers and browsers is that they would be able to do more without the need of mastering or licensing multiple proprietary

technologies that can develop rich web pages, enhanced forms and web based applications.

HTML5 FEATURES

HTML5 provides new features that include

1. Canvas – 2D/3D Graphics
2. Audio & Video
3. Location based Services
4. Working Offline
5. Web Workers
1. Drag & Drop
2. New Input Types
3. New Elements
4. Form Elements

HTML5 supports cross platform, designed to display web pages on a PC, or a Tablet, a Smartphone, or a Smart TV (Fig-1). HTML5 is been a working draft and some browser designers and websites are already adopting HML5 elements.

IV. CONCLUSION

We will develop an efficient system that will calculate the complexity of the webpage and identify the components of web pages which requires more time to load.

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Queue Supervision in Computer Networks for Improved QoS

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ABSTRACT

This paper describes an architecture for Queue supervision (QS). Global refers to the set of all queues in routers present in some network flow path. The main idea of the architecture is the detection of some anomaly somewhere downstream and the propagation of the local decision to a set of upstream routers or switches. The upstream devices are free to act as they wish. QS is useful to boost some QoS configuration, save network resources, and to provide some mechanism to mitigate network attacks. It's also possible to integrate QS with SDN, specially with OpenFlow that provides a Controller that can act upon anomaly detection.

Keywords: Network anomaly detection framework, Stochastic Fair Blue, Queue Supervision, QoS.

I. INTRODUCTION

Quality of service (QoS) is an old subject and several mechanisms and two main architectures (Differentiated Ser- vices [1] and Integrated Services [2]) are very well-known. In order to provide the mechanisms necessary to provide QoS, several schedulers, filters, and classifiers are offered by network equipment (routers, switches). These equipments offer specialized hardware to provide some features, which allows them to operate at line rates.

The great majority of equipment deployed today operate with an integrated control, management and forward planes. A trend in computer networks is to decouple these planes from network equipments and to offer them by different elements. That's the proposal of SDN (Software Defined Networks) [3].

Different network vendors offer different SDN solutions. In this context, OpenFlow [4] specification is considered to be an SDN solution that is vendor independent and nonproprietary. OpenFlow delegates the control plane to an element called Controller, which tries to configure each L2/L3 switch under its control. This configuration is everything from VLAN port assignments to rule filters to QoS. In this context, any element that can help collect infonnation is useful.

Non-SDN solutions tend to solve problems locally, i.e., upstream equipment are usually unware of, for instance, downstream queue exhaustion. This is a common problem of core network routers. In order to provide a way to detect local anomaly and to propagate local decisions upstream, this paper proposes a new architecture to manage router queues globally. This global nature is in sync with SDN trend, which tries to operate a set of equipment in a global fashion, but differs in a fundamental aspect, it's a joint effort of local and global decisions - while a global action decision is not made, a local one is applied. The proposed architecture is called Queue Supervision (QS) and can operate with the existent architectures and even as an SDN (partial) solution

as well as alongside SDN deployments. QS can be used as a framework that allows one to plug any kind of anomaly detector that suits it's needs. The use of QS in this paper offers an approach to deal with misbehaving flows globally and aims to provide a way to improve quality of service for selected flows.

Besides the use of QS to boost some QoS configuration, it's also useful as a solution to save network resources, and to provide some mechanism to mitigate network attacks by acting as close as possible to the source of the problem.

The remaining of this paper is organized as follows. Sec- tion II presents related work. Section III provides an overview of the architecture. Section IV provides infonnation about the environment used for tests and some implementation details. Section V provides two experiments to show some QS architecture features: one that boosts some flow quality of ser- vice and another that mitigates a misbehaved flow. Section V also presents some test results, and finally, Section VI provides some concluding remarks and future work.

II. RELATED WORK

Farzaneh et.al. [5] proposes the use of intennediary nodes to detect congestion. In order to accomplish this, TCP was modified to provide QTCP (Queue management support TCP) that is used for mutimedia services and relies on the flow source to handle congestion. Also, a new Active Queue Management (AQM) [6], called OBQ (Optimization Based active Queue management), was developed to handle QTCP.

Google's QCNCE (Quantized Congestion Notification for Computing Environments) [7] tries to detect a congestion downstream and act upstream using elements called Reaction Points. A congestion is notified to both a Reaction Point and to an OpenFlow/SDN Controller. Yet another solution that uses intennediary nodes (upstream and/or downstream) as part of it's architecture to deal with some specific kind of network problem, TDFA (Traceback-based Defense against Distributed Denial of Service Flooding Attacks) [8] tries to mitigate distributed denial of service attacks by placing the packet filtering as close as possible to the attack source.

In a sense, OpenFlow [4] can be considered a related work. In SDN solutions, nonnally, when a switch or other network equipment receives a packet, it tries to match the packet to some rule. In case no rule matches the incoming packet, this packet is sent to a Controller. The Controller then inspects it and inserts a rule into the switch for the matching of the next packets with the same characteristics. In contrast, QS doesn't need a central element to operate, but one can be used, and still QS acts globally when a local decision is shared with other network elements.

At first impression QS offers the very same services offered by some other technologies. In particular it sometimes gives an impression that it is used solely to avoid congestion, as it is the case in Google's QCNCE and also in QTCP. In order do avoid any misinterpretation of the purpose of the QS architecture, which is used here also to boost some QoS for a specific flow, the next three works, even though outdated, shows how older technologies used to deal with congestion and shows the related shortcomings, i.e., to trust the source of the flow to behave as expected. QS solves this trust issue by not depending on source behavior to operate correctly.

The already deprecated mechanism of ICMPv4 Source Quench message (nonexistent in ICMPv6) was used to tell the sender to slow down it's transmission rate. A well-behaved sender would slow down it's transmission rate, but, for in- stance, an attacker would not. Other kind of problems with the ICMP Source Quench message can be seen at RFC6633 [9].

Another similar solution to slow down a packet transmission rate is the ECN (Explicit Congestion Notification) [10]. But it suffers from the very same problem related to a misbehaved sender or attacker.

Yet another (very old) solution to congestion is the slow- start mechanism of TCP, which works only for TCP and when a sender is well-behaved (again). TCP offers several (more than 20) congestion avoidance algorithms, such as Hybla, BIC and CUBIC.

These three above mentioned mechanisms only deal with congestion, whereas QS can be used to provide any kind of network control and does not depend on a well-behaved sender. So, the very same architecture and solution (QS) can be used to solve all the above mention problems. QS pro- vides some means to inform other relevant network equipment about network problems. Supposedly, these relevant network equipment is not as busy as core network equipment and, whithout QS, wouldn't otherwise be aware of downstream problems. Eventually, these other equipment could help solve the problem.

III. QUEUE SUPERVISION

The main purpose of the Queue Supervision(QS) is to offer a framework that can be used to globally manage all the router queues that compose the path of a given network flow. In computer networks, every equipment is able to detect some kind of anomaly. In this paper, an anomaly can be de- fined as any behavior that is not expected to occur in a normal operation, such as a router queue exhaustion, a misbehaving flow, a non-conforming flow spec, several attempts to establish a connection to a site - syn flood - (or any other kind of denial of service attack or network intrusion). Thottan and Ji [11] give a broad taxonomy of network anomaly and detection techniques.

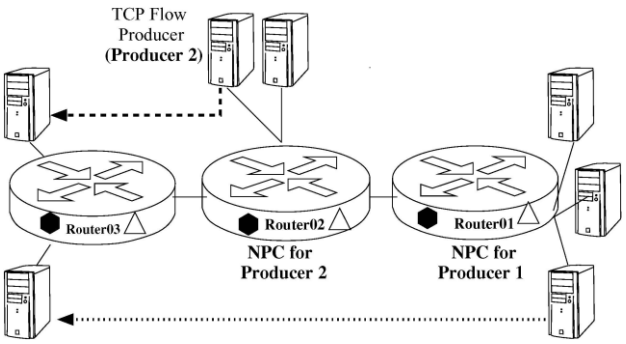

Figure 1. Queue Supervision architecture

Network equipment is configured to deal with some com- mon cases of anomalies, such as queue exhaustion. A common countermeasure to this anomaly is to monitor queue size and try to discard some packets before queue exhaustion. This is the behavior offered by the RED (Random Early Discard) [12] mechanism and several others (see [6]). One problem of these local mechanisms is that they act locally. Imagine four routers in a row. If a packet traverses the first three routers and is discarded at the last one, the work done by the first three is completely wasted. So, if one provides a means to inform a local decision to the nearest router of the source of the flow, that router could also adopt the same decision of the fourth router and save queue space downstream. This is the main idea of the QS architecture: propagate local decisions to upstream routers (or to a Controller of an OpenFlow solution). The anomalies used in this paper to describe the QS are not the only ones possible to be detected. Any anomaly detector can be used to provide the desired effect.

Figure 1 shows the main elements of the QS architecture: QS Daemon, Anomaly Detector (AD), and Nearest Point of Control (NPC). In order to explain the architecture, a really common anomaly is used as an example, which is the router queue exhaustion. This anomaly shouldn't be confused with the main purpose of the QS and is used here only with a didactic purpose and as a proof of concept.

A. Anomaly Detector The Anomaly Detector (AD) element, represented by the black hexagon at Figure 1, is responsible for the detection of anomalies in network flows or router queues. The contribution of this element in the architecture is the propagation of a local decision to a local QS Daemon. As mentioned before, QS can make use of any anomaly detector, not only this particular example of a queue exhaustion AD. It's worth mentioning that QS does not propose any new anomaly detector algorithm, it uses already established ones.

- **QS Daemon**

The QS Daemon, represented by the white triangle at Figure 1, is responsible for the propagation of a local decision to an upstream router that also owns a QS Daemon. So, every router that aims to participate in the architecture MUST have a QS Daemon (except when the QS Architecture is operating in Monitor Mode - Section III-D). This upstream router that receives a downstream router message is the one that is nearest to the origin of the flow, or, as it's known in QS architecture, the Nearest Point of Control (NPC) - Section III-C.

Considering Figure 1, if the AD at Router03 detects a queue exhaustion, it can make a decision, using some criteria, to discard packets from the flow originated at Producer 1. In this particular case, the NPC for the flow is RouterO 1. This router can act as an NPC because it runs a QS Daemon, otherwise it wouldn't have been considered as an NPC for that particular flow. When an NPC receives a message from a downstream router it can act as it wishes. It can copycat the decision, it can ignore the decision, or it can decide to do whatever action is suitable for its current goals (for instance, provide some QoS for the flow). If routers should operate as a single entity to provide a global behavior, and the network operates under the control of an OpenFlow solution, a QS Daemon can send a message to an OpenFlow Controller instead of sending it to an NPC (or both). A QS Daemon message exchanged between pairs, and also between the AD and QS Daemon, has the following fields: 1) PROTO - Transport protocol (usually TCP or UDP) of the flow that was acted upon; 2) SIP - Source IP of the flow that was acted upon; 3) SPORT - Source PORT of the flow that was acted upon; 4) DIP - Destination IP of the flow that was acted upon; 5) DPORT - Destination PORT of the flow that was acted upon; 6) TDC - Total Drop Count of packets at the message originated router; 7) LA - Local Action at the message originated router. Current defined actions are: DROP, DELAY and RECLASSIFY; 8) FDC - Flow Drop Count of packets at the message originated router; 9) CUSTOM - Anomaly Detector free field.

The first five fields (PROTO, SIP, SPORT, DIP, DPORT) of the message represents the common five identifiers for a microflow [13] description, i.e., they identify a flow. As the drop count information of a router is always useful for a network control mechanism, TDC and FDC are always present in a message. LA information is important as a means to inform upstream routers about downstream actions. Some anomalies countermeasures require a custom information con- cerning local actions, so a CUSTOM field is specified for this purpose.

C. NPC

The NPC, which is a QS Daemon present at a router or switch, is responsible for the insertion or deletion of rules concerning some flow. The idea of Nearest (Nearest Point of Control - NPC) is that of an equipment that has a QS Daemon closest to the origin of the flow and not that of an equipment closest to the equipment that detected the anomaly. In order to employ this mode, a holistic view of the network is necessary. In the case of limited view of the network, other modes of operation are offered to tackle the problem - see FLM and MM in Section III-D.

In a particular implementation of an NPC, which deals with queue exhaustion, an algorithm to deal with the problem in a global fashion was created: DGF (Discard Greatest First). The idea of DGF is to

try to gradually discard flows. It starts discarding flows that have the greatest Flow Drop Count and awaits for some other messages from downstream routers. If situation is not better after a while, DGF continues inserting rules of drop for other flows. DGF is necessary because an upstream router doesn't know the behavior of a downstream router. This algorithm allows the upstream router to continuously update it's table of discardable packets.

It seems counterintuitive to discard packets from a severely affected flow. But this particular AD present at the downstream affected router, and used as a proof of concept in this paper, uses a detector that tries to classify flows into two categories: responsive flows and non-responsive flows. These two categories classify TCP and UDP flows. If a TCP flow has a packet discarded, a well-behaved sender would lower it's transmission rate whereas a packet discarded from a UDP flow would not (that's why one should not depend solely on the behavior of the flow producer). So, usually, a Flow Drop Count for UDP tends to be greater than that of a TCP flow.

D. QS Architecture Operating Modes

The default operating mode of the QS is the NPC, explained earlier. There are three other modes of operation: FPC (Furthest Point of Control), FLM (FLood Mode), and MM (Monitor Mode).

The FPC mode allows the local decision to be forwarded to the furthest QS Daemon of the flow origin, i.e., to the QS Daemon that is closest to the AD that detected the anomaly. The next upstream element can further send the very same message to the next upstream element and so on and so forth. This mode can be compared to the Hop-by-Hop Backpressure [14] when used for congestion control.

In FLM mode, the local QS Daemon forwards the local decision, preferably, to every QS Daemon that is upstream to it, or to every QS Daemon that has a neighbor relation to the local QS Daemon when it's not possible to identify which ones are "upstream".

Finally, in MM mode, the local QS Daemon does not forward the local decision to an NPC or FPC, but to a third element, that could be an Open Flow Controller or any other interested element. Both FLM and FPC are useful when a holistic view of the network is not available. The lack of a holistic view of the network can, for instance, make it difficult to determine the NPC for a flow.

E. Interaction Among QS Elements

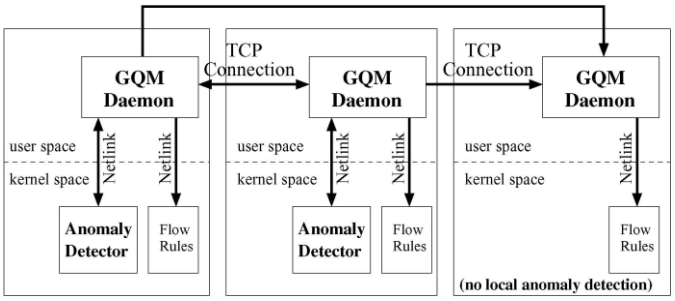

Figure 2. Message exchange among QS elements.

Figure 2 shows the interaction among elements of the QS architecture. To better explain the architecture, two kinds of network routers are presented. Routers A and B can both detect anomalies and receive notifications from other network elements, whereas Router C does not offer a local anomaly detector and can only receive notifications. AD, which runs in kernel space in this particular implementation, but could be implemented in userspace for some anomaly detection, forwards anomaly mitigation decisions to a local QS Daemon, which runs in userspace. Communication between QS Daemons is established with on-demand TCP connections, i.e., they aren't connected all the time nor use full mesh connection, and can use out-of-band paths, which is configurable. QS Daemons that frequently communicate can use some kind of connection persistency mechanism to avoid unnecessary reestablishment of TCP connections. To assure trusted communication, a mechanism of authentication is used between QS Daemons that guarantees correct identification of parties. Three authentication mechanisms were

tested and seems to work properly: MIT Kerberos 5 ticketing (TGS) [15], IPSec [16] (AH with out-of-band connections) and a cus- tomized key exchange using asymmetric cryptography from the OpenSSL [17] libraries.

In MM mode, the QS Daemon acting as an NPC can be replaced or complemented by a third-party element, for instance, an OpenFlow Controller. There is an AD call that allows one to register itself to receive AD messages.

The NPC or FPC of a flow can take any action that suits it's needs, including the act of completely ignoring the down- stream message and take no action. In the case of choosing to execute some action, NPC/FPC (a QS Daemon) sends a message to a local Flow Rules element present in kernel space. This completes the action flow and further actions are fired by another cycle of messages from downstream QS Daemons to upstream NPCs/FPCs.

IV. ENVIRONMENT USED FOR EXPERIMENTS

All routers, flow producers and consumers are based on the Slackware Linux distribution, modified to work with Kerberos. Linux was chosen because it is open source and can be easily modified to offer the QS architecture functionality, and already offers several scheduling and filters modules that can be modified to act as ADs. Another motivation is that some wireless routers, and other related devices, can use OpenWRT [18] (a Linux distribution for embedded devices

1. typically wireless routers) which is ready to receive QS architecture in it's current implementation.

Figure 2 shows both the

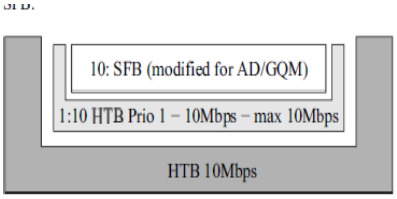

Figure 3. Testbed for QS experiments - TCP and UDP flows competing for network resources.

interaction and the distribution of the QS architecture elements. The dashed lines in Figure 2 divides userspace components from the kernel space ones. So, it can be seen that the AD is a kernel space component. The AD used in this paper is a modified version of the SFB (Stochastic Fair Blue) [19] network packet scheduler already present in the Linux kernel version 3.16.1. The modification made in this module was related to two features: gathering of information of interest and the insertion of a mechanism to send these information to userspace. The gathered information from SFB were flow drop count, flow classification into responsive and non-responsive, and total drop count. SFB already classifies flows into the two categories mentioned (responsive and non- responsive) and take related actions. The mechanism to send a message to userspace was based on the netlink [20], [21] Linux kernel feature. This feature is largely used by several routing daemons (for instance, Zebra/Quagga [22] and related daemons).

The box "Flow Rules", present at Figure 2, uses netfilter [23] as a packet flow control, which can be used to drop, delay, prioritize, etc.. , packets. Also, some queuing disciplines other than SFB are used to implement the architecture in Linux. The use of other queuing disciplines is necessary because SFB, in this implementation, is used only to detect network anomalies

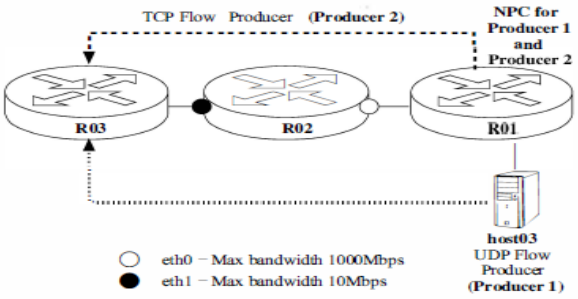

Figure 4. Adapted SFB for AD/QS queues at router r02.

and to drop non-conforming packets. So, to provide QoS and other controls, other queuing disciplines are used. The testbed used for the experiments is presented by Figure 3.

Figure 3 shows four equipments: three routers (R03, R02, R01) and one host (host03). Both experiments use the following actors and roles: Machine host03 is the Producer 1, which is the source of a UDP flow. RO 1 is both a router and the Producer 2, which is the source of a TCP flow. R03 is the destination (consumer) of both flows. R02 is a router that is part of the path of both flows. R02 owns an ingress interface of 1Gbps and an egress interface of 10Mbps.

The network for the testbed presented by Figure 3 uses IPv6. IPv6 was chosen because of the QoS classification mechanism, which is based on the flowlabel field matching. In order to produce and consume both TCP and UDP flows, iperf3 was used at both the producers and consumers.

A. Queues used for Experiment 1

The specific queues present at R02 for experiment 1 (with a DROP action) can be seen at Figure 4. The default Linux queue discipline for Ethernet interfaces (pfifo_fast) was replaced by
two queue disciplines: HTB (Hierarchical Token Bucket) and SFB.

As can be seen at Figure 4, HTB is used as a parent queue discipline for SFB. This particular configuration was used in order to allow the interface to have it's transmission rate decreased from 100Mbps to lOMbps (which was much easier to test using the equipment available during the experiments). These queues are created with the command TC (traffic control) [24].

B. Queues used for Experiment 2

For experiment 2 (with a QoS reclassification action), the specific queues present at R02 can be seen at Figure 5. The de- fault Linux queue discipline for Ethernet interfaces (pfifojast) was replaced by three queue disciplines: HTB (Hierarchical Token Bucket), SFB and PIE [25] (Proportional Integral controller-Enhanced AQM algorithm - a queue discipline to deal with bufferbloat [26], [27] problem).

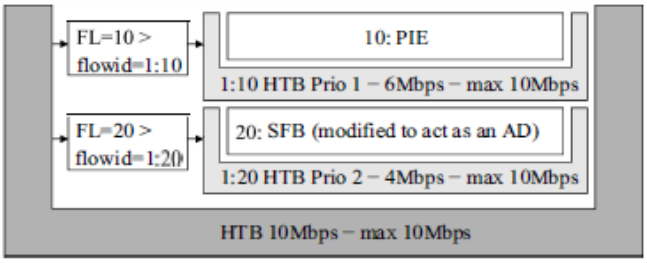

Figure 6. Adapted SFB for AD/QS queues at router r02 in a DiffServ like domain.

The queue discipline SFB, indexed by the name "20:" in Figure 5, is the default queue, i.e., if no mark is present at the IPv6 flowlabel field of a packet, then it is directed at that queue.

V. EXPERIM ENTS

This section offers two experiments that show some QS architecture features as proofs of concept.

In both experiments, Producer 1 generates a UDP flow to R03 with a fixed rate of 9Mbps for 60 seconds. At the same time, Producer 2 generates a TCP flow to the same destination. TCP flows try to use as much bandwidth as possible and steadily increases it's transmission rate (slow start mechanism). In this case, TCP will try to reach a lOMbps transmission rate and at some point, along with the UDP flow, will exhaust R02 egress queue.

A. Misbehaved flow

This experiment explores the global action of packet drops using the DGF algorithm of an NPC. R02 uses a queue discipline that tries to reduce misbehaved UDP flows to IMbps[1]. Figure 6 shows a graph that presents the arrival rates of both flows at R02.

Figure 6 shows that at dT=2, packets from both flows arrive at R02. TCP flow starts with a rate of 10Kbps and UDP flow with 9Mbps. Because of the constraint imposed by R02, some packets from the TCP flow are discarded, which fires the TCP transmission rate reduction. During this short period of time both flows were correctly classified into their categories, i.e., TCP flow into a responsive flow and the UDP flow into a non-responsive flow. The AD present at R02 detects the queue exhaustion anomaly, acts accordingly (dropping packets), and sends a message to the local QS Daemon. The local QS Daemon discovers that RO 1 is the

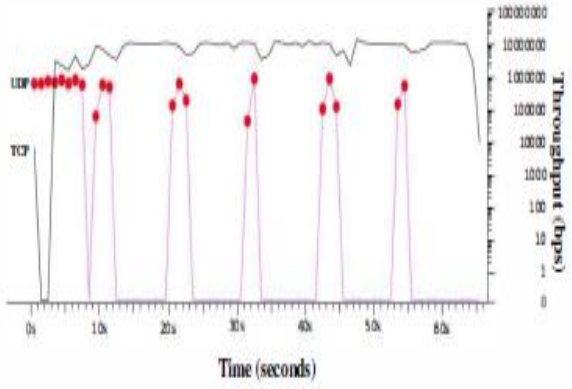

Figure 6. TCP and UDP flows behavior under QS operation of an NPC that imitates an AD local decision.

NPC for the target flow. The local QS Daemon then sends the following two messages (each line is a message) to NPC (R01):

17,2001:db8:1000:1::20,33007,2001:db8:2000:1::2
,\ 5202,65281,DROP,22583,
6,2001:db8:1000:2::1,41701,2001:db8:4000:1::1,\
5201,65370,DROP,334,

Count" of the two messages (65281 and 65370). The first in this paper, a misbehaved UDP flow is simply the one that consumes a great deal of the available bandwidth. message can be interpreted as follows: "This is a UDP flow from host03, identified by an IPv6 address, port 33007 to host R03, identified by an IPv6 address, port 5202; The Flow Drop Count is 22583; The Total Drop Count is 65281; Local action (downstream action) was DROP."

The second message can be interpreted as follows: "This is a TCP flow from RO 1, identified by an IPv6 address, port 41701 to host R03, identified by an IPv6 address, port 5201; The Flow Drop Count is 334; The Total Drop Count is 65370; Local action (downstream action) was DROP."

The NPC (R01) receives the message from R02 and decides to apply the same decision taken by AD (R02), which is to DROP packets from both flows. But NPC adopts the DGF algorithm and tries to discard packets from the flow with the greatest Flow Drop Count, in this case, the UDP flow. This can be observed at Figure 6. The graph shows a rate drop to 0 bps for periods of 10 seconds for the UDP flow. This occurs because NPC was programmed to flush any rules that are older than 10 seconds. This 10 seconds value was randomly chosen just as a proof of concept. After each 10 seconds period, the UDP flow starts to fill R02 egress queue again, some packets are dropped and the whole cycle starts again, as shown in the graph during a period of 60 seconds.

SFB, acting as an AD algorithm at R02, offers the behaviour of reducing UDP misbehaved flows to a fixed rate (param- eter penalty_rate). SFB is not supposed to offer fair schedulling to misbehaved flows, as other queue disciplines do. As shown, DGF acts at the NPC and not at the producer. The flow producer could be an attacker and it is not supposed to reduce it's rate, but penalized instead. This was an extreme case scenario, where SFB was used by router R02 alongside a rule of DROP at router ROI (instead of a traffic shaping to, for instance, IMbps at R01).

B. QoS for a specific flow

This experiment explores the global action of packet class reclassification in a DiffServ like domain. Instead of the usual DSCP (DiffServ Code Point) markings, which uses the field Traffic Class of the IPv6 header to mark packets, this experiment uses the flowlabel field of the IPv6 header to classify/prioritize a flow. R02 uses two queue disciplines: one that offers 6Mbps of bandwidth and another that offers 4Mbps of bandwidth (this is also the default queue), as shown at Figure 5 in Section IV-B. Each queue discipline can borrow bandwidth from each other when it's available. The default queue discipline offers the same AD described in experiment one, which also tries to reduce misbehaved UDP flows to IMbps (this causes a huge amount of packet drops).

The idea in this experiment is to try to revert a misclassified UDP flow by downstream routers, adopting a different action between AD and NPC. In experiment one, the UDP flow was classified as a misbehaved flow. In this experiment, the UDP flow must be prioritized, but the downstream AD at R02 does not know it and, as in experiment one, drops several packets from that flow. So when the NPC of the UDP flow originated at host03 receives a message from R02 indicating a DROP action, NPC, which knows that this flow must be prioritized, takes the action of marking packets with a high priority mark. With this mark, packets enters the 6Mbps bandwidth queue of R02 instead of the low priority 4Mbps one.

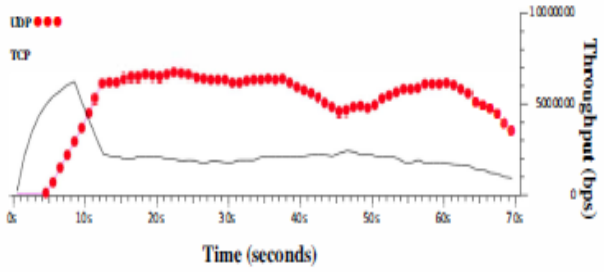

Figure 7. Reclassify an UDP flow into a higher priority queue (M.avg 8 for smoothness).

As can be seen, both UDP and TCP flows start at dTO. TCP flow steadily increases it's transmission rate. Between dT=O and dT7.5 R02 classifies both flows as in experiment ne and sends a local decision message to R01, indicating that the UDP flow is being dropped - shaped to 1Mbps. At dT13 UDP flow arrives at a rate of around 6Mbps, the maximum allowed by one of the R02 queues. This shows that R02 correctly interpreted the priority mark of the UDP packets set by R01, reverting the first decision of droping packets.

This second experiment shows that QS architecture can also be used as a QoS solution.

VI. CONCLUDING REMARKS

As far as this author knows, Queue Supervision architecture can be considered an original contribution, but QS can't be considered the only solution to the problems it tries to solve. QS can be used to deal with a variety of network problems, such as equipment queue exhaustion, misbehaving flows, denial of service attacks, and others, as well as to improve some QoS for specific flows. For each kind of network problem, a great variety of individual tools and services to deal with the problem already exists, some of them were presented at Section II.

QS unique features are: 1) QS distributes local decisions to remote entities using standard queue disciplines present at the Linux Kernel (but the idea can be adopted by other systems); 2) QS tries to control queues globally but does not enforce any local decision to remote entities, and tries to use any AD already present at a network element;

1. DGF algorithm was created to be used by an NPC to gradually, and on-demand, discard flows until downstream network equipment can handle traffic. This feature allows an active (instead of passive) cooperation between downstream and upstream

equipment, i.e., upstream equipment acts in behalf of the downstream equipment.

Some may argue that the use of kernel space code as AD is not portable and is hard to maintain. But it's also true that it's far way faster than userspace code. But an AD can also be implemented in user space (it depends on what one wishes to detect). QS architecture adoption depends on the ability to collect local equipment information and send it to a remote entity. This remote entity must be able to, eventually, enforce any rule related to the received message. So, in order to be able to adopt QS as a solution, a network operator must comply with that.

A. Future work

QS does not send an unmatched packet to an OpenFlow Controller. However, if it's necessary to do so, an AD can be used to redirect a packet to any network element. It's straightforward to do it using the current version because it's implemented using a kernel space approach (the very same Linux module - SFB - can be modified to redirect a packet to anywhere). Also, messages among QS elements can be formatted according to OpenFlow.

Another modification in SFB module is under way, which is the ability to receive some parameters from userspace. This mechanism allows a userspace program to insert an action directly into the SFB queue discipline kernel module. Today the parameters of SFB are not altered at the upstream routers. The rules are enforced using netfilter. This modification could offer a smoother behavior in comparison to DGF. An investigation on the possibility of inserting some decisions into the SFB module is so far the chosen approach to allow a direct intervention from remote modules into a local one. The effectiveness of this modification is under evaluation.

It's worth mentioning that no scalability tests were con- ducted. However, it's believed that QS offers the same scalability properties of SDN solutions because it operates using the same principles of communication, i.e., a router sends a message to only one external entity at the best-case scenario (holistic view of the network). This external entity in SDN is the Controller whereas in QS it's the NPc. There are plans to use a bigger testbed to confirm the belief.

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Long Term Forecasting of Solar Power Using Artificial Neural Network

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ABSTRACT

The rapid growth of solar Photovoltaic (PV) technology has been very visible over the past decade. Such increase in the integration of solar generation has brought attention to the forecasting issues. This paper presents a new approach to tackle the long-term forecasting challenge and accordingly reduce the uncertainty of the PV forecast, which would accordingly help facilitate its integration into the electric power grid. This paper presents a solar power forecasting using artificial neural networks (ANNs). The neural network structures, namely, feed forward back propagation (FFBP), have been used to forecast a photovoltaic panel output power and approximate the generated power. The neural networks have four inputs and one output. The inputs are solar radiation, ambient temperature, humidity and wind speed; the output is the Solar power. The data used in this paper started from January 1,2013 ,until December 31,2017. The five years of data were split into two parts: 2006–2008 and 2009 2010; the first part was used for training and the second part was used for testing the neural networks. A mathematical equation is used to estimate the generated power.

Keywords: Photovoltaic, Artificial neural network,solar forecasting.

I. INTRODUCTION

Variable energy generations, particularly from renewable energy resources such as wind and solar energy plants have created operational challenges for the electric power grid because of the uncertainty involved in their output in the short term. When the penetration level of the variable generation is high, the intermittency of these resources may adversely affect the operation of the electric grid. Thus, wherever the variable generation resources are used, it becomes highly desirable to maintain higher than normal operating reserves and efficient energy storage systems to manage the power balance in the system. The operating reserves that use fossil fuel generating units should be kept as low as possible to get the highest benefit from the deployment of the variable generations [1]. Therefore, forecasting these renewable resources takes on a vital role in the operation of power systems and electricity markets.

II. RELATED WORK

Forecasting solar power output from PV systems is a relatively new topic that is receiving significant attention due to the growing production and use of solar energy. In this section we briefly review the previous work on PV power prediction. Most of the

existing approaches predict the solar irradiance and use it to estimate the power output (indirect prediction) but there are also some recent approaches that directly predict the PV power output. Inman et al. [4] reviewed methods for solar power forecasting and classified them into five main groups: statistical (regressive) methods (e.g. auto regressive, moving average, and combinations of them such as ARIMA, methods based on artificial intelligence techniques (e.g. NNs, nearest neighbor), numerical weather prediction methods, remote sensing methods (e.g. satellite and statistical satellite) and local sensing methods (e.g. sky-imager).

Pedro and Coimbra [5] predicted the solar power 1 and 2 hours ahead from a time series of previous solar power values only, without using any exogenous variables. They compared the performance of four methods: ARIMA, k nearest neighbor, NN trained with the backpropagation algorithm and NN trained with a genetic algorithm. They conducted an evaluation using data for two full years and found that the two NN based methods outperformed the other methods, and that the NN trained with the genetic algorithm prediction model. The two NN approaches obtained Mean Absolute Error (MAE) in the range of 42.96 - 61.92 kW for 1 hour ahead prediction and 62.53 - 87.76 kW for 2 hours ahead prediction for a 1 MW PV power plant.

Chen et al. [2] introduced a new approach for 1 to 24 hours ahead solar power prediction based on Radial Basis Function NN (RBFNN). At first, they categorized the days into sunny, cloudy and rainy using self-organizing map NNs and based on the weather predictions of solar irradiance and cloudiness. Then, a separate RBFNN prediction model for each group was trained to predict the 24 hourly PV power outputs for the next day.

Shi et al. [9] proposed a similar approach the days were clustered into four groups (clear-sky, cloudy, and rainy) and a separate SVR prediction model was built for each group. The obtained Mean Relative Error (MRE) was between 4.85% (for sunny day) and 12.42% (for cloudy day).

Chow et al. [8] applied NNs for predicting the PV power output 10 and 20 minutes ahead. As inputs to the NNs they used solar irradiation, temperature, solar elevation angle and solar azimuth angle. They developed multi-layer perceptron with one hidden layer, trained with the backpropagation algorithm, with early stopping criterion based on validation set to avoid overtraining. The results were promising and showed that NNs can successfully model the nonlinear relationship between the meteorological parameters and the PV solar power output.

Mandal et al. [7] used wavelet transform in conjunction with RBFNNs. They firstly decomposed the highly fluctuating PV power time series data into multiple time-frequency components. The one hour ahead decomposed PV power output was then predicted using the decomposed components, as well as previous solar irradiation and temperature data. The final prediction was generated by applying the inversed wavelet transform. The results showed good accuracy, with the combination of wavelet transform and RBFNN outperforming RBFNN without wavelets.

Mellit et al. [6] presented a different wavelet based approach, called wavelet network. Instead of decomposing the data and applying NNs to predict each component, they used wavelets as activation functions in the NNs. The approach was effective, achieving Mean Absolute Percentage Error (MAPE) of about 6%.

Zeng and Qjao [10] studied the application of SVR for solar power forecasting. They applied SVR to predict the atmospheric transmissivity using historical transmissivity and other meteorological data. The predicted transmissivity was then converted back to solar power according to the latitude of the PV site and time of the day. The

evaluation showed that SVR was more accurate compared to ARIMA and RBFNN. Approaches based on fuzzy logic were also proposed.

Jararzadeh et al. in [13] investigated the application of interval type-2 Takagi-Sugeno-Kang fuzzy systems. Using temperature and solar irradiance as inputs, they predicted the output of PV plants under different operating conditions, and showed better results than ARIMA.

Yona et al. [3] proposed a hybrid approach by combing NNs and fuzzy theory. They first applied a fuzzy model to estimate the hourly insolation using different weather variables such as clouds, humidity and temperature. The output of the fuzzy model was then fed to a recurrent NN, to predict the hourly power output of the PV plant.

Yang et al. [11] integrated SOM, SVR, and fuzzy inference to develop a hybrid approach for one day ahead solar power prediction. SOM and SVR were applied to classify the historical input data and to develop the prediction model, respectively. The fuzzy inference was used to select the best model from a group of trained SVRs, depending on the available weather predictions. An evaluation using one year of solar data showed that the hybrid method outperformed NN and SVR.

III. STATISTICAL VARIABLE GENERATION FORECASTING MODELS

Forecasting models are continuously being improved to generate more accurate forecasts of solar and wind power. In this section, the statistical models that use both non-learning and learning approaches are described.

A. Statistical Non-Learning Approach Models

These models describe the connection between predicted solar irradiance from numerical weather predictions (NWP) and solar power production directly by statistical analysis of time series from historical data without considering the physics of the system. This connection can be used for forecasts in the future plant outcomes. Plenty of regression models are already implemented as time-series forecasting models, some of which include autoregressive integrated moving averages (ARIMA), and multiple linear regression (MLR) analysis model [2] to name just two types.

B.Statistical Learning Approach Models

Artificial intelligence (AI) methods are used to learn the relationship between predicted weather conditions and the power output generated as historical time series. Unlike statistical approaches, AI methods use algorithms that are able to implicitly describe nonlinear and highly complex relationship between input data (NWP predictions) and output power instead of an explicit statistical analysis. For both the statistical and AI approaches, high quality time series data consisting of weather predictions and power outputs from the past are very important [3], [4]. One of the most common statistical learning models is the artificial neural network.

IV. PROPOSED APPROACHES

The ANN is loosely a simple biological analogy of the brain. They are implemented in widespread applications with different AI approaches such as supervised, unsupervised, and reinforcement learning approaches. In the supervised learning approach, the ANN learns from the data by training them to approximate and estimate the function or the relationship between the input and the output variables.

With the help of applied mathematics, the back propagation algorithm helps train the ANN to recognize similar patterns. In the back propagation concept, information flows in one direction between the neurons (nodes) and the errors back propagate in the opposite direction, changing the strength (weights) of the synapses (links) between the nodes

while attempting to minimize the errors by using an appropriate optimization technique such as the gradient descent method. After sufficient training iterations with known input data, the weights between the nodes are adjusted until they give a correct response. Then, the ANN will give the correct response to the (unknown) input data that it has never seen before. The ANN can learn to generalize in this fashion. More sophisticated algorithms are introduced for training ANNs with different optimization methods to improve the performance.

In this paper, ANN model uses the most widely used "vanilla" feed-forward neural networks, sometimes called the single hidden layer network. The ANN model is used as a nonlinear statistical tool to forecast solar power.

Multi-layered Perceptrons has been applied successfully to solve some difficult and diverse problems basing on a preliminary supervised training with error back propagation algorithm using an error correction learning rule. Basically, error back learning consists in two pass through the different layers of the network, a forward pass and backward pass. In the forward pass an activity pattern (input vector) is applied to the sensory nodes of the network, its effect propagates through the network layer by layer to produce an output as actual response.

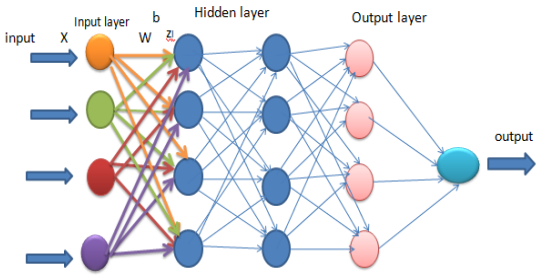

Figure 1. Architecture graph of a MLPNN with 50 hidden layers

During the backward pass synaptic weights are adjusted in accordance to an error correction-rule. The error signal (subtracted from a desired value) is then propagated backward through the network against the direction of the synaptic connections [9]. In general MLPNN's can have several hidden layers (Figure 1), however according to K.M.Hornik [10] a neural network with single hidden layer is able to approximate a function of any complexity. If we consider a MLPNN with one hidden layer, tanh as an activation function and a linear output unit, the equation describing the network structure can be expressed as:

$$O_k = V_{Ok} \sum_{j=1}^{q} V_{jk} \tanh(W_{oj} + \sum_{i=1}^{p} W_{ij} X_i) \quad (1)$$

Where O_k is the output of the K_{th} output unit, v_{jk} and W_{oj} are the network weights, p is the number of network inputs, and q is the number of hidden units. During the training process, weights are adjusted in such a way that the difference between the obtained outputs O_k and the desired outputs d_k is minimized, which is usually done by minimizing the following error function

$$E = \sum_{k=1}^{r} \sum_{e=1}^{n} (d_{e,k} - o_{e,k})^2 \quad (2)$$

Where r is the number of network outputs and n is the number of training examples. The minimization of the error function is usually done by gradient descent methods

The mean squared error (MSE) is used for evaluation of predictive power as follows;

$$MSE = \frac{1}{N} \sum_{t=1}^{N} (Z_t - \overline{Z_t})^2 \quad (3)$$

Where $\overline{Z_t}$ is a vector of the N prediction and Z_t is the vector of the real values.

V. THE DATA

A. Data Source

The data is derived from the Karnataka power Corporation Limited Shivanasamudram.

B. Data Description

The objective is to determine the solar Power forecasts in hourly steps through a month of forecast horizon. The target variable is the solar power. There

are 4 independent variables, these are solar radiation, ambient temperature, humidity and wind speed.

A. Data Preparation

It is always a good idea to get the analysis of the historical data before setting up the forecasting model. The available historical data contains the solar power and 3 weather variables

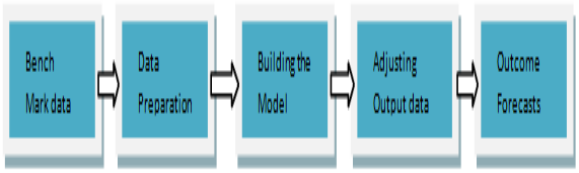

Figure 2. Flowchart diagram of the solar forecasting modeling

The data preparation is an important step for treating the data to be ready for the analysis and modeling steps. The various steps of the data preparation are shown in Figure 2.

B. The Model Building

The main steps of building the forecasting model are shown in Figure 3. MATLAB is used for building the ANN model as shown in Fig 4. It is a feed-forward curve fitting type, which works well when it is not necessary to use the past delayed values of the output as a feedback variable, also several available inputs are applied to extract a better regression. The ANN has the input layer, a hidden layer, and the output layer. The hidden layer has 70 nodes besides the bias node, which is feeding into every node in the hidden and output layers. The bias node is for shifting the activation function left or right, because sometimes the variation in the weights is not enough to minimize the errors and enhance the model performance.

Figure 3. Flowchart diagram for building the ANN model

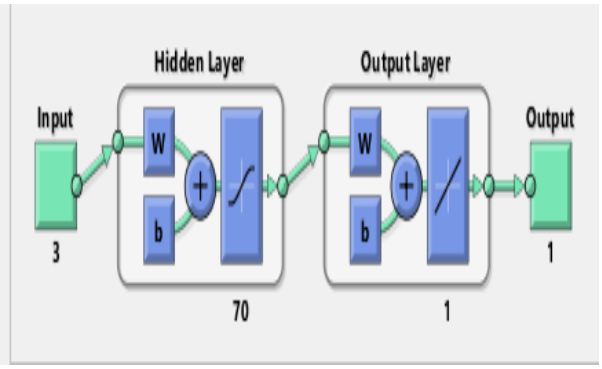

Figure 4. Block diagram of the ANN topology.

When the predictor variables interact with each other and grouped in the ANN's input layer, they could lose some of their correlation power. Therefore, in the total mix of selected variables, the best candidate model is needed. So every time a new weather variable is added as a new input to the existing list of inputs, the ANN must be run several times to calculate the MSE until the best group of input variables is found. By carrying out the three main steps of building the model, training, and testing to reduce the dimension of inputs variables, we arrive at the candidate model with most efficient performance.

The ANN model with 3 input variables was found to have the least MSE as shown in the Figure 6 An ANN model with a large number of input variables and nodes could lead to the overfitting issue, which is the situation where the model performs well in the training stage, but produces inaccurate forecasts in the testing stage. For the purpose of solar forecasting, we found the candidate model with 4 input variables to have the least MSE,the hidden layer of the ANN had 15 nodes.

The training stage includes all the historical data except for the last month before the testing month. The last month of the historical data is used for the validation stage. The validation stage is required to avoid the overfitting issue since the ANN has parameters that are changing their values at the validation stage. Meanwhile, the testing is conducted for two cases, to generate the solar power forecasts by an day resolution for September 2013 and May

2014. Keep in mind, the training of each case is carried out separately, May 2014 has more historical data than in September 2013 case. Next, an investigation of the ultimate performance of the model and comparisons with other models is done.

Multilayer feed-forward with backpropagation neural networks (MFFNNBP) is an MLPNN that passes the inputs and the weights from one layer to the next one through the feed forward process and then it performs the weights update to be back-propagated to the previous layers in order to recalculate the weight. In MLPNN, the output of a layer will be an input for the next layer passing from the input layer to the output layer; the equations used for this procedure are illustrated as follows:

$$\text{Output} = f^2 \sum_{j=1}^{n} (out_1 * w_{jk}) \quad (4)$$

Where the output of the first hidden layer out_1,which calculated using the following expression:

$$out_1 = f^1 \sum_{j=1}^{n} (in_i * w_{ij}) \quad (5)$$

Where f^1 and f^2 are the activation functions for output layer and hidden layer, which calculated as in the following expressions:

$$f^1 = \frac{1}{1+e^{-x}} \quad (6)$$

$$f^2 = \text{x} \quad (7)$$

Where, x = input vector. Depending on equations above, the weights are updated use as the following expression:

$$\Delta w_{jk}^n = -\mu \frac{dEw_{jk}^n}{dw_{jk}} \quad (8)$$

Where μ is the learning rate (normally between 0 and 1).The final output depends on all earlier layer's output, weights, and the algorithm of learning used.

The backpropagation process calculates the gradient decent error between the desired and the predicted output considering the new weights each time, this gradient is almost always used in a simple stochastic gradient descent algorithm to find the weights that minimize the error. Different algorithms are used for training the feed forward with backpropagation neural networks, which train the NN and reduce the error values by adjusting and updating the weights and the biases of the connections that form the neural network, two kinds of training algorithms are available to slow convergence according to steepest descent methods with better generalization, and fast convergence according to newton's method, but these

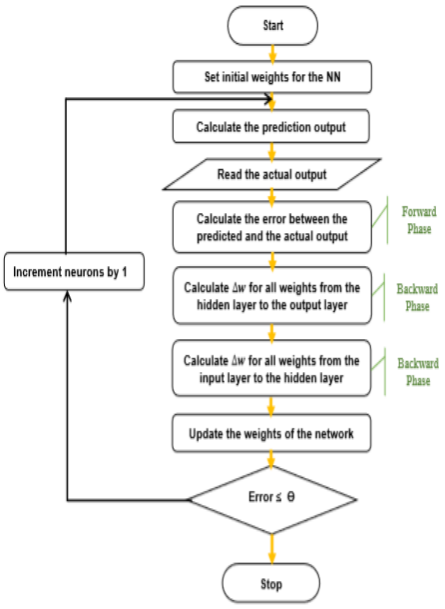

Figure 5. Flow chart of the FFBP model

methods are complex because of the complex matrix calculations [9]. In our paper, we use one of the fast convergence algorithms, which is the Levenberg Marquardt Algorithm (LM) training algorithms [2], implemented by Matlab, and we use it in two steps; one is the training of time series using the time as input and the power generated by solar energy points as output, and the second step is to train the data produced by the factors that affect the energy production along the time.

VI. MODEL RESULTS AND EVALUATION

The following measures are used to evaluate the accuracy of the forecasts and the model performance plots and graphs, Mean Square Error (MSE), the correlation coefficient (R) between the forecasts and the actual measured solar power, and a comparison with other models. For comparison purposes, the Multiple Linear Regression (MLR) Analysis model [2], and the persistence forecasts model are used. The persistence model as its name implies, is obtained by keeping the actual solar power output at the current hour and using it as a solar power forecast for the next future hour.

The line plots are shown in Figure 6 for the actual solar power and its corresponding forecasts from ANN model and compared with MLR and persistence forecasts models. The day-ahead weather variables forecasts are used as input variables for the ANN and they are periodically generated and updated daily to forecast the next days. Therefore, the output of the forecasting model, which is the solar power forecasts, doesn't change much by increasing the horizon time. The zoomed in plot on the right is for a sample day with a lower spike in the solar power generation. The forecasts from the ANN model have tracked the actual power better than the other models.

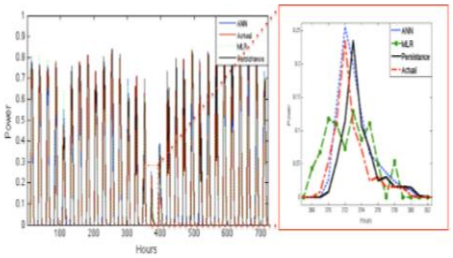

Figure 6. The line plots for actual solar power and the forecasts from ANN, MLR, and Persistence models

As shown in Figure 7, the actual and the forecasts are plotted with residuals plot. The residuals plot has both positive and negative values. There appear to be many residuals of the ANN that are lying at or near the zero value as shown on the top right plot which indicates that the generated forecasts are unbiased. The correlation coefficients R between the actual power and the forecasts for all models are also plotted. Table I summarizes the evaluation results of both test cases: September 2013 and May 2014 of the ANN and other model performance. It is obvious that the ANN outperforms other models. In addition, the May 2014 case has accurate forecasts because there are more historical data included in the training and validation stages of the model.

Table 1. The summary of Forecasts for both test months

Model	MSE	R	MSE	R
ANN	0.0697	0.9665	0.0554	0.97097
MLR	0.0738	0.9622	0.0571	0.96987
Persistent	0.1306	0.8812	0.1125	0.8750

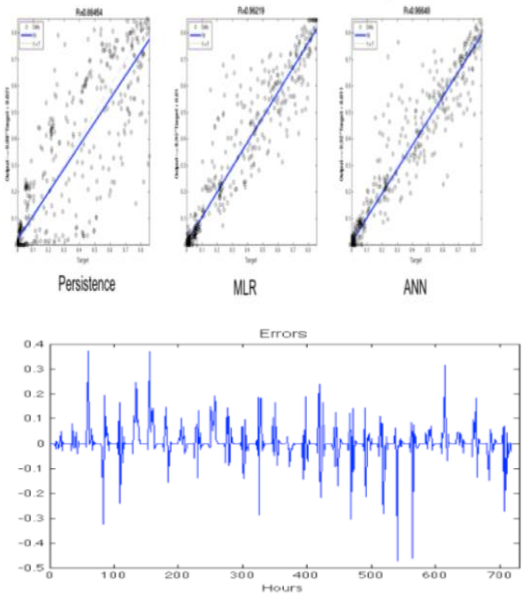

Figure 7. The residuals plot of ANN model and the correlation coefficient plots for solar power forecasts of ANN, MLR and Persistence models

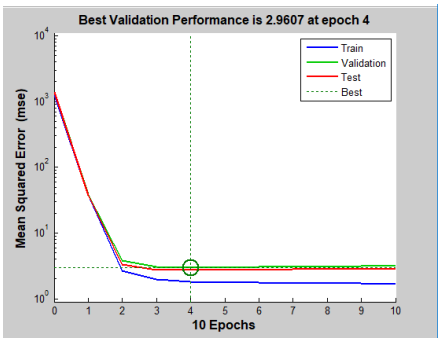

Figure 8. Best validation performance

Figure 8. shows the best validation performance is 2.9607 at epoch 4

VII. CONCLUSION

The artificial neural networks model outperforms the multiple linear regression analysis MLR model and the persistence model. The performance of the ANN depends on how well it is trained and on the quality of the data that is used. The feed-forward ANN with 3 weather variables and with step size for forecasts performed better than the other The residuals plot of ANN model and the correlation coefficient plots for solar power forecasts of ANN, MLR and Persistence models recursive neural networks. The normalized input data doesn't improve the performance, but removing the night hours slightly improves the model performance. Plotting the data, investigating the correlation and sensitivity analysis between the variables, as well as data cleansing of outliers are essential data preparation steps before building the forecasting model. In the clear sky hours, the model produces more accurate forecasts than cloudy hours. The more accurate weather forecasts we use, the more accurate solar power forecasts will be produced. Using the classification variables and the interactions between the variables enhances the performance of the MLR model significantly but this is not the case for the ANN model. With additional historical data, the model performance will improve.

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A Novel Solution for Clearance of High Resistive Faults in High Voltage Transmission Lines

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ABSTRACT

As per grid code (CEA – Central Electric Authority) EHV & UHV faults should be cleared in 100ms for better power system stability and availability. Generally EHV and UHV line will be longer enough to give Distance protection to clear any type of fault in the line with numerical relay within 100ms using scheme communication. But single phase faults can be high resistive in nature and frequent also. Failure of Distance protection relay for such High Resistive Faults (HRF's) is observed in many places at Indian substations. In this paper, reasons for failure of Distance protection relay during HRF's are explained using simulations carried out in Mipower software with low, medium and high resistive faults in a 400kV transmission line. Distance protection fails even if fault resistance is equal to load resistance. At present, protection system in India is depending on Directional earth fault protection for HRF's and load resistive faults by compromising on the delayed trip since fault current cannot be very high during HRF's. But delayed trip in 400kV and above systems is generally not a good practice because of higher voltages in healthy phases with HRF in one phase. A novel solution is prepared in PCM (Protection and Control Manager) software using Directional earth fault protection and scheme communication of Directional earth fault protection to clear HRF's and load resistive faults instantaneously without no major wiring and scheme changes for easy implementation. Prepared logic in PCM is tested in the laboratory using ABB REL670 numerical relay and omicron injection unit. This testing is carried out for a disturbance took place in a 400kV transmission line HRF where Distance protection failed to clear the fault instantaneously.

Keywords. CEA, EHV & UHV lines, HRF, REL670, and PCM.

I. INTRODUCTION

The electric power system is divided into many different sections, one of which is the transmission system. The electric energy produced at generating stations is transported over high voltage transmission lines to utilization points. Transmission lines could encounter various types of malfunctions usually referred as faults. Fault is simply defined as a number of undesirable but unavoidable incidents that can temporarily disturb the stable condition of the power system that occurs when the insulation of the system fails at any point. Moreover if a conducting object comes in contact with a bare power conductor, short-circuit (or) fault is said to have occurred.

Transmission network protection is an important issue in power system because around 85-87% of

power system faults occur in transmission lines. The highest occurring faults in transmission lines are single line to ground faults. The causes for these faults are lightning, fires, bird pollution and a tree touching the power line. In most of the cases the single line-ground faults occur due to tree falling (or) bird shooting which are high resistive in nature, such HRF detection is difficult due to low fault current which is much lower than the normal rated current carried by the transmission lines.

Many papers have been published related to effects of High Resistive Faults on the Distance protection schemes, new methods and algorithms for detection of high resistive faults. But no solution is provided yet to instantaneously clear the HRF without longer time delay to maintain the system stability at higher voltage levels.

II. EFFECT OF HIGH RESISTIVE FAULTS ON DISTANCE PROTECTION

1) High Resistive Single Line to Ground fault

When a HRF occurs on a transmission line, the Distance protection relay fails to operate due to fault impedance locus originating outside the Distance protection characteristics in R-X plane. For example, if a High Resistive Fault occurs on a 400kV transmission line with fault resistance of R_f (Ω) and the fault resistance set in the distance relay is R_{relay}(Ω) in line with the power system protection standards, the location of the fault resistance lies outside the resistive reach of the Distance relay when $R_f > R_{relay}$. Hence the Distance protection relay fails to operate for High Resistive faults. This scenario is shown in R-X distance characteristics given in Figure 1.

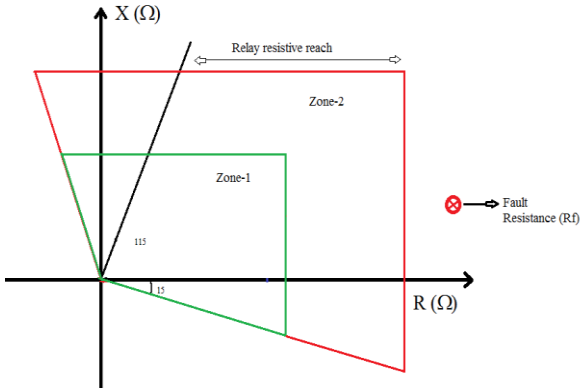
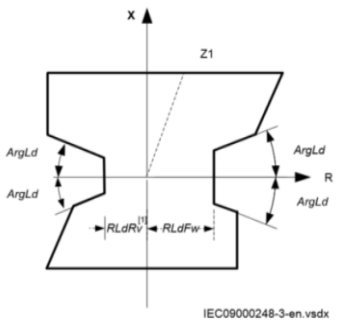


Figure 1. R-X diagram of Distance protection characteristics with HRF location

2) Load Encroachment

Load current may also affect the Distance relay characteristics and for Mho relays with significant cross polarizing, the source impedance conditions further complicate the issue.

In some cases the load impedance might enter the zone characteristics without any fault on the protected line. The phenomenon is called load encroachment and it might occur when an external fault is cleared and high emergency load is transferred on the protected line [2]. The effect of load encroachment is illustrated in the Figure 2. Since the Distance protection should not operate during maximum allowable loads, resistive reach in Distance protection should be chopped in the load area as shown in Figure 2. But this load encroachment will reduce the sensitivity of the protection, that is, the ability to detect resistive faults in the load area.



Figutr 2. Load encroachment phenomena and shaped load encroachment characteristics

3) Infeed effect

Distance relay failure due to infeed effect is explained in this section. Resistive fault in a transmission line fed from both sides is shown in Figure 3.

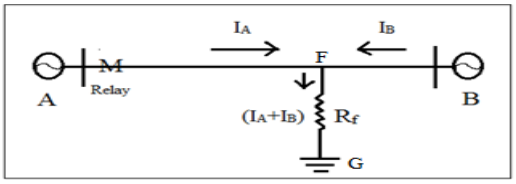


Figure 3. Effect of Infeed effect on Distance protection

The voltage drop in R_f will be $R_f(I_A+I_B)$ which will influence the bus voltage at the relaying point while the current supplied to the relay will be only I_A at A end.

Voltage seen by relay at A= Voltage across AF+ Voltage across FG

i.e. $V_A = (I_A*Z_{AF})+ \{(I_A+I_B)*R_F\}$ ……. (1)

Where Z_{AF} is line impedance between point A and F.
Current seen by the relay at A = I_A,
Hence impedance seen by the relay $Zf = V_A / I_A$ … (2)

Higher impedance seen by the relay than actual fault impedance is $(I_A / I_B)*R_F$.

Thus the relay will under reach. that is the fault will appear to be electrically "further away" and may be outside the reach of Distance relay. In such cases the sequence components of voltage and current applicable at the relaying point have to be calculated and the impedance seen by the relay is determined from the formula of

$$Z_k = V_A \div (I_A + 3K_0I_0) \text{ ……. (3)}$$

Where I_0 is the zero sequence current at the relay end.

III. POWER SYSTEM NETWORK DESIGN AND SIMULATION OF FAULT CASES FOR A 400KV PRACTICAL SYSTEM

The network line diagram of the practical system showing 400kV protected line along with adjacent associated elements is considered as shown in Figure 4. The network diagram will indicate the voltage level, transformer /generator rated MVA & fault contributions of each element for 3-ph fault at station-A and for 3-ph fault at station-B [1]

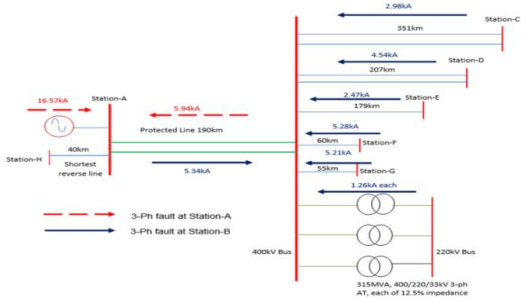


Figure 4. Network line diagram of the protected line.

Equivalent representation of the protected line shown in Figure 4 is simplified and indicated in Figure 5 with equivalent source fault impedances at station-A and station-B, positive and zero sequence impedance of the protected line.

Line parameters

Line. Substation-A to Substation-B
Frequency. 50Hz
Line data. R1 + jX1 = 0.0288 + j0.307 Ω/km
R0 + jX0 = 0.2689 + j1.072 Ω/km
R0M + jX0M = 0.228 + j0.662 Ω/km
Line length. 190km
CT ratio. 1000/1A
CVT ratio. 400/0.11kV

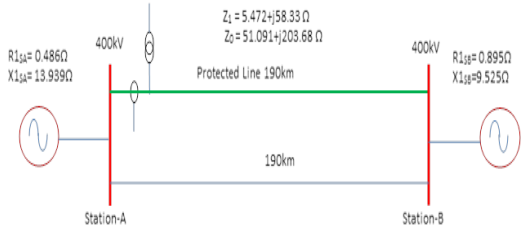


Figure 5. Equivalent representation of the protected line with source impedance

Maximum expected load on line both import and export. this shall be obtained from the load flow analysis of the power system under all possible contingency. From the load flow studies 1500MVA is the maximum expected load under worst contingency on this line at 90% system voltage.

Distance relay behavior during different types of single phase faults are simulated in Mipower software and explained below

1) Case-1. SLG Fault at 10% distance of the protected line with zero fault resistance

The equivalent system shown in Figure 5 is designed using Mipower tool, the line parameters used to design the model have been given. A SLG fault with zero fault resistance at 10% distance of the protected line is simulated using short circuit analysis as shown in Figure 6.

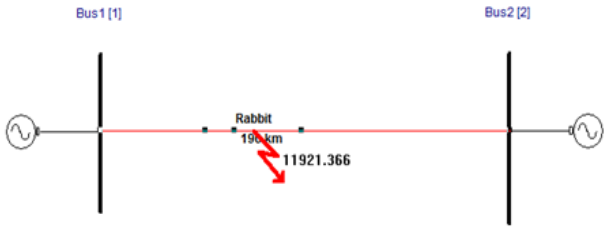


Figure 6. SLG fault at 10% distance of protected line with zero fault resistance

The quadrilateral characteristics of Zone-1 and Zone-2 with load encroachment and location of the fault impedance are indicated in R-X impedance diagram in below Figure 7.

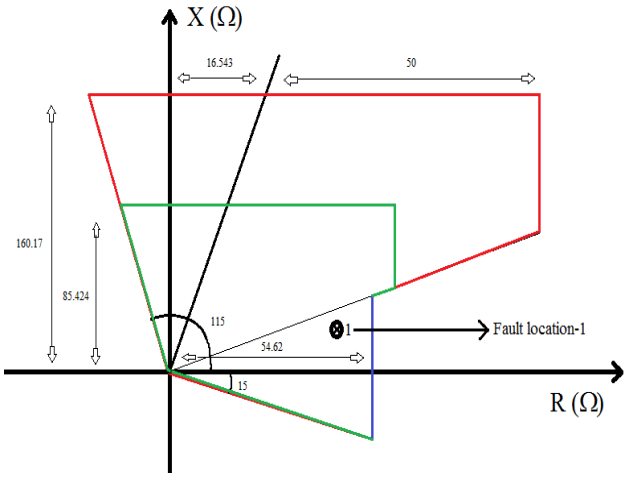


Figure 7. Fault impedance location with distance protection characteristics - case 1

The location of the fault lies inside the operating region of quadrilateral characteristics and Distance protection trips effectively with no time delay for this case.

2) Case-2. SLG Fault at 10% distance with fault resistance of 50 ohm on the protected line

A SLG fault at 10% distance from bus-1 with fault resistance of 50Ω on the protected line is simulated using short circuit analysis and shown in Figure 8.

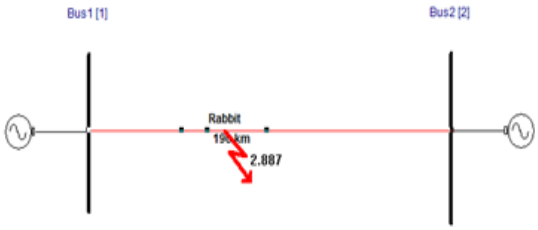


Figure 8. SLG fault at 10% distance with RF=50Ω

In this case, the fault impedance calculated using the fault current and post fault voltage at bus-1 should lie inside the operating region of Distance protection characteristics. But in present case, relay measured impedance location is lying in the maximum load area where load encroachment characteristics are chopping the Distance protection area practically as shown in Figure 9. I.e. the Distance protection scheme fails to provide protection for the line when the fault resistance value is equal to the load resistance value at maximum load condition.

The quadrilateral characteristics of Zone-1 and Zone-2 with load encroachment and location of the fault impedance for SLG HRF with fault resistance value of 50(Ω) are indicated in R-X impedance diagram in below Figure 9.

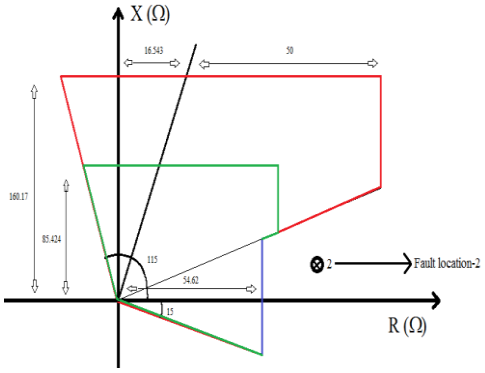


Figure 9. Fault impedance location with distance protection characteristics - case 2

3) Case-3. SLG Fault at 10% distance with fault resistance of 150 ohm on the protected line

A SLG fault at 10% distance at bus-1 with fault resistance of 150Ω on the protected line is simulated using short circuit analysis and shown in Figure 10.

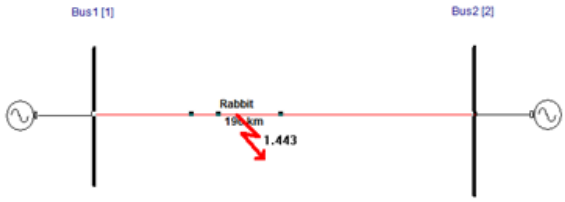


Figure 10. SLG fault at 10% Distance with RF=150Ω

In this case the fault impedance calculated using the fault current and post fault voltage at bus-1 lies far away from the operating region of Distance protection scheme, i.e. the relay fails to detect the high resistive faults. The quadrilateral characteristics of Zone-1 and Zone-2 with load encroachment and location of the fault impedance for SLG HRF with fault resistance value of 150(Ω) are indicated in R-X impedance diagram in below Figure 11.

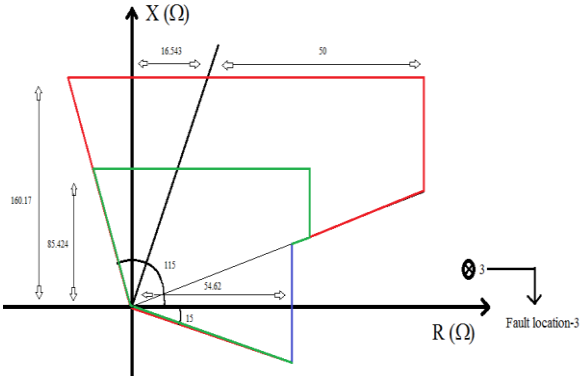


Figure 11. Fault impedance location with distance protection characteristics - case 3

Table 1 gives the overall comparison of the SLG faults simulated in 3 cases to determine the operating characteristics of the Distance protection relay.

Table 1. Comparison of SLG faults in above 3 cases

SL.NO	Rf (Ω)	Location of fault impedance		
		Operating region	Load encroachment region	Non operating region
Case-1	0	✓		
Case-2	50		✓	
Case-3	100			✓

Distance protection operates only in case-1

IV. FAILURE OF SCHEME COMMUNICATION TO DETECT HIGH RESISTIVE FAULTS

PLCC (Power Line Carrier Communication) is an approach to utilize the existing power lines for the communication of data and voice signal as well as protection of transmission lines. Scheme communication is used in power system protection for communication between the two end relays. The main purpose of PLCC communication in Distance protection is to clear the fault in all the locations of protected line by opening the breakers at both ends instantaneously

Below are the scheme communications generally used in Distance protection of UHV and EHV transmission lines.

1) Direct Under-reach Transfer Tripping Scheme

The simplest way of reducing the fault clearance time at the terminal that clears an end zone fault in Zone 2 time is to adopt a direct transfer trip or intertrip technique, the logic of which is shown in Figure 12. A contact operated by the Zone 1 relay element is arranged to send a signal to the remote relay requesting a trip. The scheme may be called a 'direct under-reach transfer tripping scheme', 'transfer trip under-reaching scheme', or 'intertripping under reach Distance protection scheme', as the Zone 1 relay elements do not cover the whole of the line. [4]

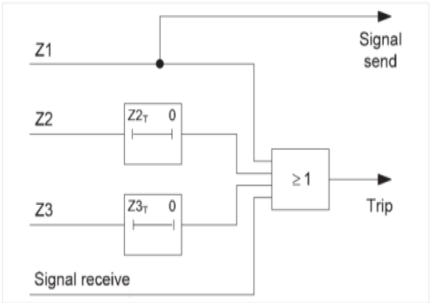


Figure 12. Logic for direct under reach transfer tripping scheme

2) Permissive Under-reach Transfer Tripping (PUP) Scheme

The direct under-reach transfer tripping scheme described above is made more secure by supervising the received signal with the operation of the Zone 2 relay element before allowing an instantaneous trip, as shown in Figure 13. The scheme is then known as a 'permissive under-reach transfer tripping scheme' (sometimes abbreviated as a PUTT, PUR or PUP Z2 scheme) or 'permissive under reach Distance protection', as both relays must detect a fault before the remote end relay is permitted to trip in Zone 1 time. [4]

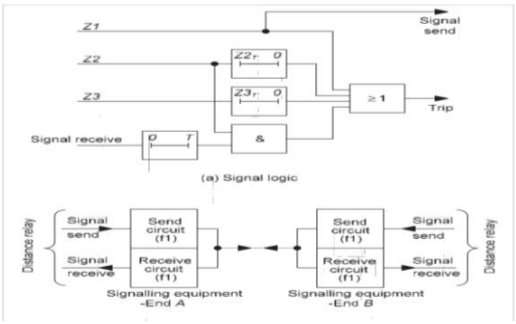


Figure 13. Permissive under-reach transfer tripping scheme

3) Permissive Over-reach Transfer Tripping (POP) Scheme

In this scheme, a Distance relay element set to reach beyond the remote end of the protected line is used to send an intertripping signal to the remote end. However, it is essential that the receive relay contact is monitored by a Directional relay contact to ensure that tripping does not take place unless the fault is within the protected section; see Figure 14. The instantaneous contacts of the Zone 2 unit are arranged to send the signal, and the received signal, supervised by Zone 2 operation, is used to energize the trip circuit. The scheme is then known as a 'permissive over-reach transfer tripping scheme' (sometimes abbreviated to POTT, POR or POP), 'Directional comparison scheme', or 'permissive overreach Distance protection scheme'. [4]

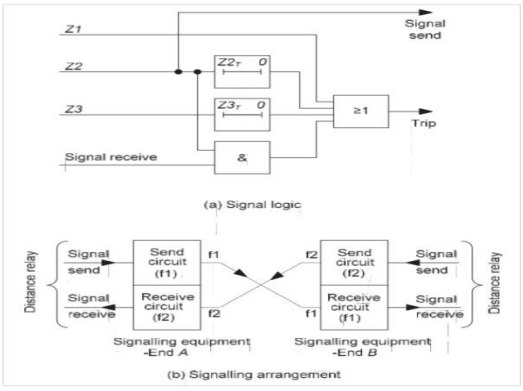


Figure 14. Permissive over-reach transfer tripping scheme

All these scheme communication types are used to clear the fault in all location of protected line with

minimum time delay for improved protection of the transmission lines by reducing the fault clearance time at terminals to maintain the system stability. But all these scheme communication types fail to detect the high resistive faults on the transmission line because of the fault resistance location lying outside the operating zones of the Distance protection relay which doesn't initiate a carrier send signal as no zone starts in quadrilateral characteristics.

V. DIRECTIONAL EARTH FAULT PROTECTION FOR HIGH RESISTIVE FAULTS

As evident from the previous section of the paper, High resistive faults which occur frequently on transmission line are not able to be detected by Distance protection relay due to its condition for high resistance values in its R-X impedance diagram. Hence an alternative protection should be used for detection and clearance of high resistive faults on lines.

The alternative protection used in power system is Directional earth fault protection based on zero sequence currents in EHV and UHV transmission lines. It can also be used to provide a system back-up protection, for example, in case of the primary protection being out of service due to communication or voltage transformer circuit failure. The Directional earth fault relays can have an inverse or definite time delay characteristics and it can be set to Directional or non-Directional mode as per requirements. But as per grid standards it is recommended to use directional mode.

But the Directional earth fault protection is not a unit type protection which clears the fault without any time delay, i.e. the relay doesn't trip instantaneously. The time delay of Directional earth fault protection is generally coordinated with Zone-3 time delay of Distance protection and hence minimum time delay of Directional earth fault protection is 1.1sec as per power system protection standards. But the Directional earth fault protection for high resistive faults will be much higher than 1.1 sec since fault current will be very low, which is not acceptable in high voltage transmission systems as high resistive fault in single phase imposes an increased voltage on other 2 healthy phases and

4) Effects of increased voltage on the 2 phases of HV transmission system

The effect of increase in other 2 phase voltages during HRF SLG fault in one phase may increase the air ionizing area around each phase of the line, which in turn increases the chance of arcing between the 2 phases or power conductor to ground. This effect is not acceptable in high voltage transmission systems as it may cause huge damage to the power line.

For HV transmission systems the insulator discs used are high in number based on voltage rating of the lines, for example. 400kV lines will have 25 insulator discs for providing proper insulation for the line. If the voltage rating of any phase increases above the maximum limit, the insulators on the line will be stressed and breakdown occurs which destroys the whole insulation system of the transmission line which is not acceptable for the power transmission line and causes a huge capital loss. In addition to the transmission line, other associated elements connected to the same substation may also get damage due to overvoltage, i.e. transformers, bus bars , reactors etc.

In this context, considering both the effects mentioned above, the high voltage line cannot be stressed with voltages exceeding the maximum level of the voltage prescribed by the design limits or international standards. Hence the high resistive faults cannot be allowed to in the HV transmission systems. For good power system/grid stability the high resistive faults should be cleared instantaneously without any time delay in EHV and UHV lines.

VI. A NOVEL SOLUTION USING DIRECTIONAL EARTH FAULT PROTECTION AND SCHEME COMMUNICATION OF DIRECTIONAL EARTH FAULT PROTECTION

From the discussion in the earlier sections, it is evident that Distance protection relay fails to detect the HRF and load resistive faults. **The present protection system in India is compromised on Directional earth fault protection to clear HRF and load resistive fault which is a delayed protection and the fault cannot be cleared instantaneously.**

A solution using Directional earth fault protection and scheme communication of Directional earth protection is an effective scheme to clear the HRF's and load resistive faults instantaneously. In this scheme if a SLG HRF occurs on one phase of the transmission line, start of Directional earth fault protection (67N) at one end will send carrier to remote end and vice-versa.

In the next step, local end Directional earth fault start is going to be ANDed with carrier received (Directional earth fault carrier) from remote end will be issued trip instantaneously as shown in Figure 16(a) & (b). Trip from both side Directional earth fault protections will be delayed based on fault current magnitude and relay settings but start of Directional earth fault at both ends will be instantaneous. Hence total time delay for trip during HRF's will be only PLCC communication delay (10 to 20ms)

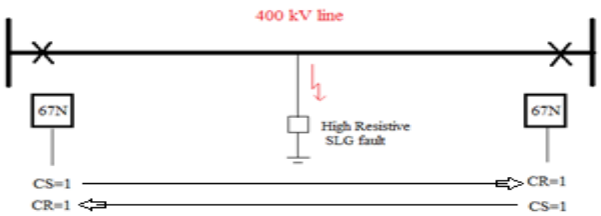


Figure 15. Scheme communication of Directional earth fault protection

To incorporate this function in PCM software the local end Directional earth fault protection start and remote end Directional earth fault protection start signal (CR=1) is given to AND logic, when both the input signals are high the Directional earth fault protection goes to instantaneous trip without any time delay at both the ends of the transmission line as shown in Figure 16.

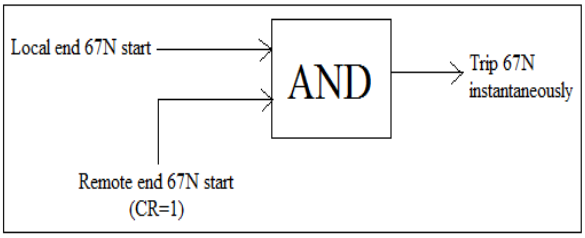


Figure 16. (a) Logic block for scheme communication of Directional earth fault protection

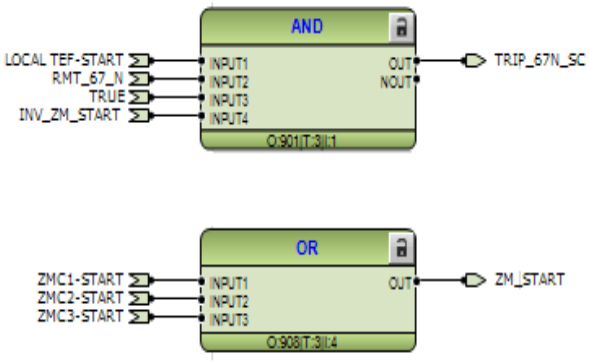


Figure 16. (b) Logic block for scheme communication of Directional earth fault protection in PCM software

The prepared logic in PCM software is tested in the laboratory using ABB REL670 numerical relay and omicron injection unit which is used to inject the voltage and current values to the relay for testing as shown in Figure 17.

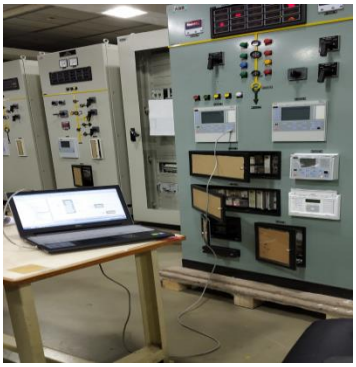


Figure 17. Testing arrangements at ABB laboratory

In present case the voltage and current values for injection are taken from a real disturbance at a 400kV transmission line where the Distance protection failed to operate. When the DR file received from the site is transplayed in laboratory, omicron injects the voltages and currents corresponding to disturbance took place in substation. Hence the behavior of numerical relay REL670 will be same as that of relay available at site.

The high resistive single line to ground fault was not cleared by Distance protection and hence Directional earth fault protection cleared this fault with a time delay of 750ms at the site. The test results were studied after the completion of testing process with the proposed solution. The study proved that the SLG HRF is instantaneously cleared by operation of Directional earth fault protection with scheme communication at both terminals of the transmission line.

The phase currents and voltages of three phases and zero sequence currents during the incident at site where Directional earth fault protection cleared the fault in 750ms are shown in Figs 18 (a, b, c). The phase currents and voltages of three phases and zero sequence currents arrived during DR Transplay at laboratory are shown in Figs 19 (a, b, c).

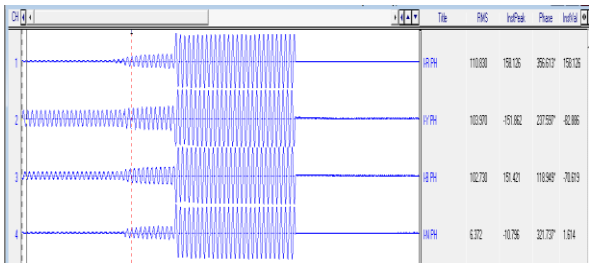


Figure 18. (a) 3 phase analog current waveforms for SLG HRF

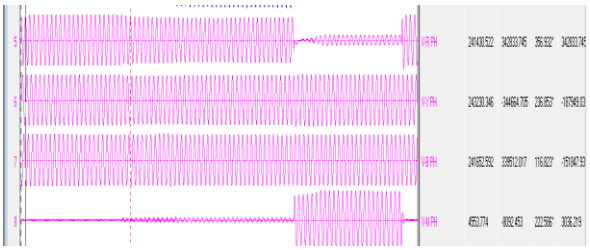


Figure 18. (b) 3 phase analog voltage waveforms for SLG HRF

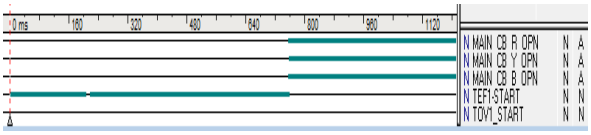


Figure 18. (c) Binary trip signals initiated at SLG HRF

From Figure 18(c), it is evident that the Distance protection didn't start and the backup Directional earth fault protection started at 0s and issued trip command after 750ms which is generally not acceptable in 400kV transmission system.

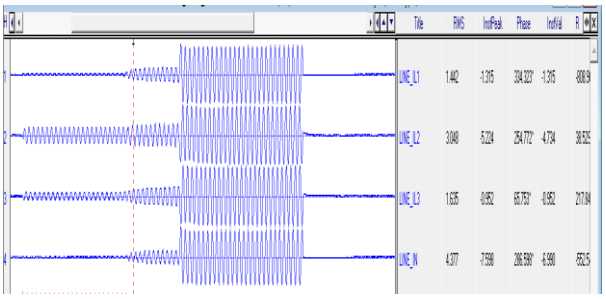


Figure 19. (a) 3 phase analog current waveforms for SLG HRF with logic

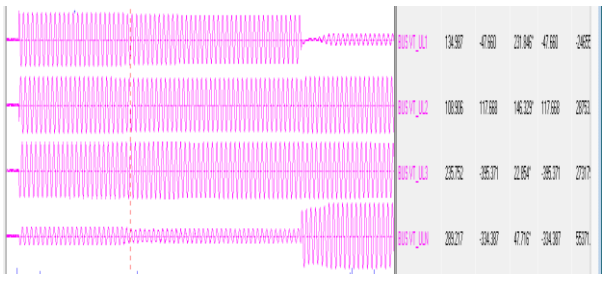


Figure 19. (b) 3 phase analog Voltage waveforms for SLG HRF with logic

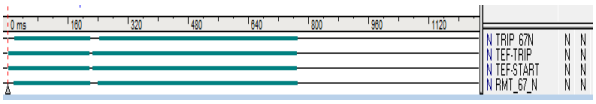


Figure 19. (c) Binary trip signals triggered at SLG HRF with logic

Figure 19(c) shows the trip signals initiated at the occurrence of SLG HRF, the Directional earth fault protection at local end starts instantaneously and sends a signal through PLCC to the remote end Directional earth fault protection. Both the start signals from local end and remote end gives a trip instantaneously to clear the SLG high resistive faults and load resistive faults to maintain the power system/grid stability in High voltage transmission lines.

VII. CONCLUSION

A novel solution for clearance of High Resistive Faults in High Voltage transmission lines has been presented to detect and clear the single phase to ground HRF's instantaneously. Directional earth fault protection and scheme communication of Directional earth fault protection were used to develop the proposed logic to clear HRF's and load resistive faults. The proposed solution doesn't require any modification of panel wirings and cabling in field at substations and hence cost in-effective. This method is not affected by variations in fault location, fault inception angle, fault resistance, pre-fault load angle and line parameters. The solution is applicable for only SLG high resistive faults which are frequent and more in number. The proposed solution can be effectively used in national grids to clear single phase high resistive faults instantaneously with Directional earth fault protection and scheme communication.

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Solution for Effect of Zero Sequence Currents on Y-Y Transformer Differential Protection

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ABSTRACT

In this paper, Transformer Differential protection mal-operations during external faults due to zero sequence current circulation on one side of the transformer is described with an example 132/33kV 60MVA Y-Y transformer. A simplest and modern solution is recommended with the comparison of conventional technology. Differential protection is a unit protection, which should not issue trip for external faults.
When a single phase fault occurred in a transmission line, a small part of zero sequence current feeding from remote end will take a path from one side of the transformer connected to this line. Generally this current is higher than minimum pick-up of Transformer Differential protection. Since there will be no reflected current on other side of the transformer corresponding to this fault current, transformer differential protection can issue trip when this zero sequence current is higher than pick-up value. This scenario is simulated in MiPower software by considering HV side of the transformer connected to the grid via a transmission line and LV side is connected to strong, weak and no source cases to observe zero sequence current flow in transformer. These results are verified with manual calculations also.
Generally zero sequence currents during external faults will cause mal operations of transformer differential protection for Yd and Dy type transformers. But this paper explains a different scenario with Y-Y transformers differential protection mal operation for eternal transmission line faults. Recently this problem is facing by many of the solar plant substations even with YN-yn transformers and generating plants. Hence a solution is prepared with numerical relay of ABB make RET670 and prepared solution is tested in the laboratory for the disturbance took place in a 132kV substation using Omicron injection unit. Conventional solution during electromechanical and static relays with interposing delta connected CT to filter zero sequence currents for external faults is also described in this paper.

I. INTRODUCTION

Power system has evolved from many years and it is increasing day to day. There are many components orequipments in power system which are provided with proper protection such as Generators, Transformers, Reactors, Lines, Busbars and Capacitors. So in this paper detailed explanation of transformer differential protection is given. Transformer differential protection is a unit type protection. It serves as the main protection for transformers in case of any internal faults. The protective zone of a differential protection includes the transformer itself, the cables between the current

transformers and the power transformer. Internal electrical faults are very serious and will cause immediate damage. Short circuits and earth faults in windings and terminals will normally be detected by the differential protection. Interturn faults are flashovers between conductors within the same physical winding. It is possible to detect interturn faults differential protection if sufficient number of turns is short-circuited. Interturn faults are the most difficult transformer winding fault to detect with electrical protections. A small interturn fault including just a few turns will result in an undetectable amount of current until it develops into an earth or phase fault. For this reason it is important that the differential protection has a high level of sensitivity and that it is possible to use a sensitive setting without causing unwanted operations during external faults. It is important that the faulty transformer be disconnected as fast as possible. As the differential protection is a unit protection it can be designed for fast tripping, thus providing selective disconnection of the faulty transformer. The differential protection should never operate on faults outside the protective zone.

II. MALOPERATION OF TRANSFORMER DIFFERNTIAL PROTECTION

A Transformer Differential protection compares the current flowing into the transformer with the current leaving the transformer [1]. A correct analysis of fault conditions by the differential protection must take into consideration changes due to the voltage, current and phase angle caused by the protected transformer. Traditional transformer differential protection functions required auxiliary transformers for correction of the phase shift and ratio. The numerical microprocessor based differential algorithm ass implemented in the IED compensates for both turn-ratio and the phase shift internally in the software. No auxiliary current transformer is necessary.

The differential current should theoretically be zero during normal or external faults if the turn-ratio and the phase shift are correctly compensated. However, there are several different phenomena other than internal fault that will cause unwanted and false differential currents. The main reason for unwanted differential current may be.

- ✓ Mismatch due to varying tap changer position
- ✓ Different characteristics, loads and operating conditions of the current transformers
- ✓ Zero sequence currents that only flow on one side of the power transformer
- ✓ Normal magnetizing currents
- ✓ Magnetizing currents
- ✓ Overexcitation magnetizing currents

A proper connection of the CTs or emulation of such a connection in a digital relay addresses the phase shift problem. A very complex problem is that of discriminating internal fault currents from the false differential currents caused by magnetizing inrush and the transformer Overexcitation.

1) INRUSH CURRENTS

Magnetizing inrush current in transformers comes about because of any sudden difference in the magnetizing voltage. Although typically considered because of energizing a transformer, the magnetizing inrush might be likewise caused by

• Event of an external fault,
• Voltage recuperation in the wake of clearing an external fault,
• Change of the character of a fault (for instance when a phase to-ground fault develops into a phase to- phase to-ground fault).
• Out-of-stage synchronizing of an associated generator.

Since the magnetizing branch speaking deeply shows up as a shunt component in the transformer identical circuit, the polarizing current surprises the harmony between the streams at the transformer terminals,

and is in this way experienced by the differential hand-off as a "false" differential current. The hand-off, be that as it may, must stay stable amid inrush conditions. Also, from the stance of the transformer life-time, stumbling out amid inrush conditions is an extremely unwanted circumstance (breaking a current of an unadulterated inductive nature produces high overvoltage that may risk the protection of a transformer and be a circuitous reason for an internal fault).

The main characteristics of inrush currents are followed by

- Generally inrush currents contains dc offset, odd harmonics, and even harmonics
- Regularly made out of unipolar or bipolar pulses, isolated by interims of low current values.
- High values of unipolar inrush current pulses diminish gradually.
- Time constant is regularly considerably more prominent than that of the exponentially decaying Dc offset of fault currents.
- A second harmonic content begins with a low value and increases as the inrush current reduce.

2) OVER EXCITATION CONDITION

Over excitation of a transformer could cause unnecessary operation of transformer differential relays. This situation may occur in generating plants when a unit-connected generator is separated while exporting VARs [2]. The resulting sudden voltage rise impressed on the unit transformer windings from the loss of VAR load can cause a higher than nominal volts per hertz condition and, therefore, an Over excitation event. This could also occur in transmission systems where large reactive load is tripped from a transformer with the primary winding remaining energized.

When the primary winding of a transformer is overexcited and driven into saturation, more power appears to be flowing into the primary of the transformer than is flowing out of the secondary. A differential relay, with its inputs supplied by properly selected CTs to accommodate ratio and phase shift, will perceive this as a current differential between the primary and secondary windings and, therefore, will operate. This would be an undesirable operation, as no internal fault would exist, with the current imbalance being created from the Over excitation condition.

Since Over excitation manifests itself with the production of odd harmonics, and since the third harmonic (and other

triples) may be effectively cancelled in transformer windings, then, the fifth harmonic can be used as a restraining or a blocking quantity in the differential relay in order to discriminate between the over-excitation and the faulty state.

3) CT SATURATION

The effect of CT saturation on transformer differential protection is double-edged. For external faults, the resulting false differential current may produce relay mis-operation. In some cases, the percentage restraint in the relay addresses this false differential current. For internal faults, the harmonics resulting from CT saturation could delay the operation of differential relays having harmonic restraint or blocking.

The main characteristics of CT saturation are the following.

1. CTs reproduce faithfully the primary current for a given time after fault inception. The time to CT saturation depends on several factors, but is typically one cycle or longer.

2. The worst CT saturation is produced by the d.c. component of the primary current. During this d.c. saturation period, the secondary current may contain DC offset and odd and even harmonics.

3. When the DC offset dies out, the CT has only AC saturation, characterized by the presence of odd harmonics in the secondary current.

Differential relays perform well for external faults, as long as the CTs reproduce the primary currents correctly. When one of the CTs saturates, or if both CTs saturate at different levels, false operating current appears in the differential relay and could cause relay maloperation. Some differential relays use the harmonics caused by CT saturation for added restraint and to avoid maloperation.

4) ZERO SEQUENCE CURRENTS

A Differential protection may operate undesirably due to external earth-faults in cases where the zero sequence current can flow on only one side of the power transformer, but not on the other side. This is the case when zero sequence current cannot be properly transformed to the other side of the power transformer. Power transformer connection groups of the Yd or Dy type cannot transform zero sequence current. If a delta winding of a power transformer is earthed via an earthing transformer inside the zone protected by the differential protection there will be an unwanted differential current in case of an external earth-fault. The same is true for an earthed star winding. Even if both the star and delta winding are earthed, the zero sequence current is usually limited by the earthing transformer on the delta side of the power transformer, which may result in differential current as well.

The above mentioned zero sequence current flow generally occur in Yd or Dy type transformers which cannot transform the zero sequence currents from one side to other side and causes the operation of transformer Differential relay for the faults external to the transformer protected zone. But in this paper, a special scenario is discussed where the zero sequence currents flow only on one side of the transformer in Yn-yn type transformer for SLG fault on the transmission line.

When a SLG fault occurred in a transmission line connected to transformer HV side, portion of the fault current fed from the remote end of the transmission line will take a path from transformer HV side. During this situation there will be no reflected current on LV side of the transformer. This current on HV side generally be higher than transformer Differential protection pick-up ($0.2*I_n$ = 20% rated current) hence Differential protection will issue a trip.

Below simulations can give clear understanding of zero sequence current flow on only one side of the Yn-yn

transformer for the fault near to the transformer and far away from the transformer

1. SIMULATION OF ZERO SEQUENCE CURRENT IN A PRACTICAL NETWORK

The single line diagram of the practical system with source of 60MW connected to the 132/33kV, 60MVA (YN-yn) grounded transformer through a 132kV transmission line of length 19km. The LV side of the transformer is connected to a lumped load of 30MVA as shown in fig1. Mipower simulation tool is used for the network construction.

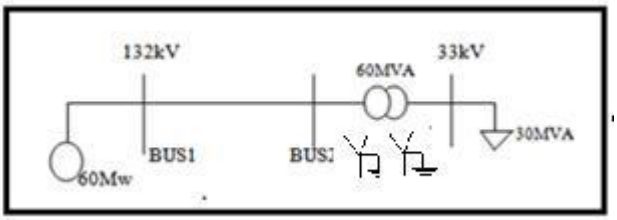

Figure 1. Single line diagram

1) **Case1**. SLG Fault at bus 1(Far from the transformer)

A Single Line Diagram showing SLG fault at bus1 is as shown in Figure2.

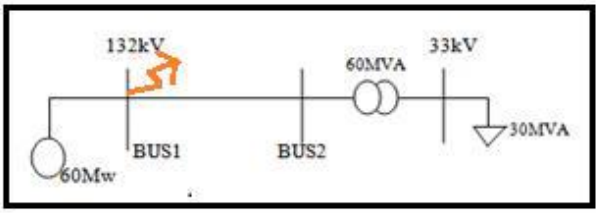

Figure 2. SLD showing SLG fault at bus 1

A SLG fault at bus-1 is simulated using short circuit analysis with results of fault current is shown in Figure3.

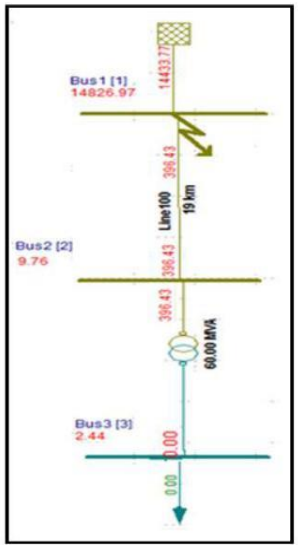

Figure3. Simulation result for SLG fault at bus-1

Total fault current = 14.826kA

Fault current flow in transformer 132kV winding = 0.396kA 132kV side rated current at 60MVA = 262A

Differential protection pick up = 20% of (I_{rated} at 132kV side)

= 52.5 A

Hence Differential protection goes to trip

Sequence network of the above simulation study is drawn and shown in Figure4. In this Figuretotal fault current is I_f and the fault current flowing through the transformer is I_{f2} and balance current I_{f1} is completed the path without the transformer.

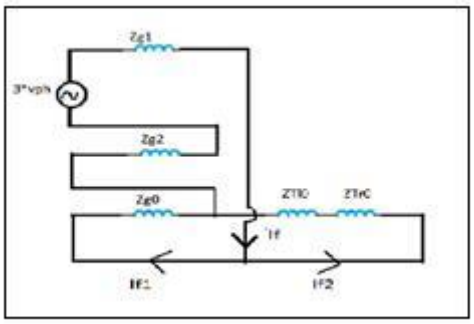

Figure4. Sequence network for SLG fault at bus-1

Total fault current (I_f) and fault current via transformer (I_{f2}) calculations are shown below. These calculations are given in support of above simulation

$$I_f = \frac{3 * h}{1 + g2 + \quad 0 * \{ \quad 0 + \quad 0\}} \quad \ldots\ldots (1)$$

$$+ \qquad 0 + \quad 0$$

$I_f = 0.0395 - j14.8227$

$I_f = 14.822kA$ at an angle -89.8

Fault current fed from the transformer

$$If2 = If * \{ \quad \overline{+ TL0 + TR0}\}$$

$I_{f2} = 0.3711kA$ at an angle 1.6982

2) Case**2.** SLG Fault at bus 2 (near to the transformer)

A SLG fault at bus 2 is simulated using the short circuit analysis as shown in Figure5.

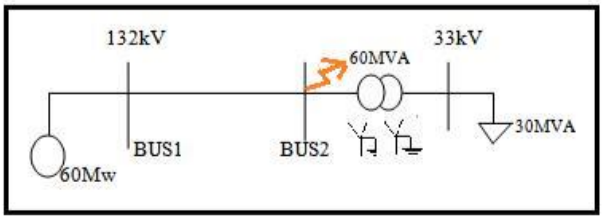

Figure 5. SLG fault at bus 2

he fault current at bus 2 is calculated by considering the fault current feeding from the source and the fault current from the HV side of the transformer as shown in the Figure6.

.Theoretically when SLG fault is simulated on bus 2, fault current should complete the path through the transmission line and source but in practical

simulation small amount of fault current completes the path through the transformer HV winding. The fault current for practical case is calculated from the sequence network diagram as shown in Figure6.

Figure 6. Simulation result for SLG fault at bus-2

Total fault current = 5.394kA

Fault current flow in transformer 132kV winding = 0.812kA 132kV side rated current at 60MVA = 262A
Differential protection pick up = 20% of (I_{rated} at 132kV side)=52.5 A
Hence Differential protection goes to trip

Sequence network of the above simulation study is drawn and shown in Figure4. In this Figuretotal fault current is I_f and the fault current flowing through the transformer is I_{f2} and balance current I_{f1} is completed the path without the transformer.

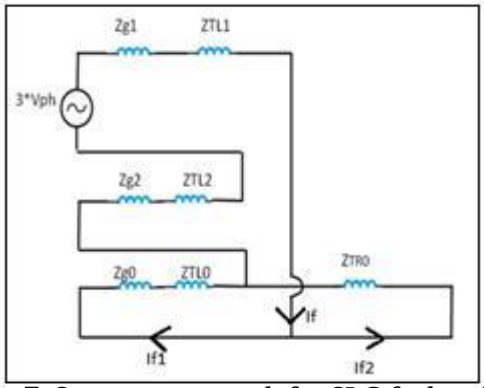

Figure 7. Sequence network for SLG fault at bus-1

Total fault current (I_f) and fault current via transformer (I_{f2}) calculations are shown below. These calculations are given in support of above simulation.

$$I_f = \frac{3* \ h}{1+ \quad 1+ \quad 2+ \quad 2+ \quad 0+ \quad 0 \ (\quad 0)} \quad \ldots\ldots (2)$$

$$0+ \quad 0+ \quad 0$$

I_f = 1.177-j5.269
I_f = 5.398kA at an angle -77.40

Fault current fed from the transformer

$$I_{f2} = I_f * \{ \frac{+}{\quad + TL0+ TR0} \}$$

I_{f2} = 0.7625kA at an angle -10.8089

3) Comparison table

The above cases can be summarized with a comparison table giving the information about the fault current by manual calculation and simulation result for practical case.

Table 1. comparison table of fault current contributions at Bus-1 & Bus-2

CASE	Manual calculation	Simulation Results
Total fault current at bus-1	I_F =14.822kA	I_F =14.826kA
Total fault current at bus-2	I_F =5.398kA	I_F =5.394kA
Fault current on HV side of transformer(case-1)	I_F =371.1A	I_F =396.43A
Fault current on HV side of transformer(case-2)	I_F =762.5A	I_F =812.93A

From the above section it is proved by the simulation result and manual calculations that zero sequence current flow on HV side of the transformer only, which does not have reflected value on the LV side of transformer. This differential current seen by the relay is higher than then pickup value set and transformer differential protection issues trip signal for the fault external to the protected area.

III. ELIMINATION OF ZERO SEQUENCE CURRENTS

To avoid unwanted trips for external earth-faults, the zero sequence currents should be subtracted on both side of the protected power transformer even for Y-Y grounded transformers. This will avoid mal operation of differential protection wherever the zero sequence currents can flow at external earth -faults. The zero sequence currents can be explicitly eliminated from the differential currents and common bias current calculation by special, dedicated parameter settings, which are available for every individual winding.

Elimination of the zero sequence component of current is necessary whenever.

1. The protected power transformer cannot transform the zero sequence currents to the other side.
2. The zero sequence currents can only flow on one side of the protected power transformer

In most cases, power transformers do not properly transform the zero sequence current to the other side. A typical example is a power transformer of the star-delta type, for example YNd1. Transformers of this type do not transform the zero sequence quantities, but zero sequence currents can flow in the earthed star connected winding. In such cases, an external earth-fault on the star-side causes zero sequence current to flow on the star-side of the power transformer, but not on the other side. This results in false differential currents consisting exclusively of the zero sequence currents. If high enough, these false differential currents can cause an unwanted disconnection of the healthy power transformer. They must therefore be subtracted from the fundamental frequency differential currents if an unwanted trip is to be avoided.

For delta windings this feature shall be enabled only if an earthing transformer exists within the differential zone on the delta side of the protected power transformer. Removing the zero sequence current from the differential currents decreases to some extent the sensitivity of the differential protection for internal earth -faults. In order to counteract this effect to some degree, the zero sequence current is subtracted not only from the three fundamental frequency differential currents, but from the bias current as well. It shall be noted that if the zero-sequence currents are subtracted from the separate contributions to the total differential current, then the zero-sequence component is automatically eliminated from the bias current as well.

1. Algorithm to eliminate zero sequence currents in numerical relays

The fundamental frequency differential current is a vectorial sum (sum of fundamental frequency phasors) of the individual phase currents from the different sides of the protected power transformer.

Before any differential current can be calculated, the power transformer phase shift, and its transformation ratio, must be accounted for. Conversion of all currents to a common reference is performed in two steps.

- ✓ all current phasors are phase-shifted to (referred to) the phase-reference side, (whenever possible the first winding with star connection)
- ✓ all currents magnitudes are always referred to the first winding of the power transformer (typically transformer high-voltage side)

$$\underbrace{\begin{bmatrix} IDL1 \\ IDL2 \\ IDL3 \end{bmatrix}}_{1} = \underbrace{A \cdot \begin{bmatrix} IL1\_W1 \\ IL2\_W1 \\ IL3\_W1 \end{bmatrix}}_{2} + \underbrace{\frac{Un\_W2}{Un\_W1} \cdot B \cdot \begin{bmatrix} IL1\_W2 \\ IL2\_W2 \\ IL3\_W2 \end{bmatrix}}_{3}$$

Where.

1. is the resulting Differential Currents
2. is the current contribution from the W1 side
3. is the current contribution from the W2 side

Values of the matrix A, B and C coefficients depend on.

1. The Power transformer winding connection type, such as star (Y/y) or delta (D/d)
2. The Transformer vector group such as Yd1, Dy11, YNautod5, Yy0d5 and so on, which introduce phase displacement between individual windings currents in multiples of 30°.
3. The Settings for elimination of zero sequence currents for the individual windings.

The fundamental frequency differential currents are in general composed of currents of all sequences, that is, the positive-, the negative-, and the zero-sequence currents. If the zero-sequence currents are eliminated, then the differential currents can consist only of the positive-, and the negative-sequence currents. When the zero-sequence current is subtracted on one side of the power transformer, then it is subtracted from each individual phase current.

The site DR is transplayed in the lab as inputs to the omicron kit to the relay. The results of testing without and with solution are shown in below Figs 9, 10.

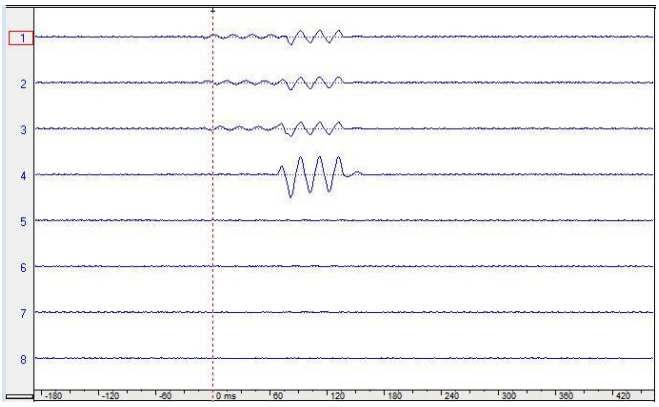

Figure 8. RET670 numerical relay Differential protection settings

To confirm the trip form transformer differential protection numerical relay, a Disturbance recorder file is taken form 132/33kV substation exactly matching to above simulation studies. The DR file is transplayed in laboratory using ABB RET670 (Transformer Differential relay) Numerical relay and omicron injection kit which is used to inject the voltage and current values to the relay for testing. In present case the HV and LV current values for injection are taken from a real disturbance at 132/33kV substation where the transformer Differential protection tripped. When the DR file received from the site is transplayed in laboratory, omicron injects the HV and LV current values corresponding to Disturbance took place in substation. Hence the behavior of numerical relay RET670 will be same as that of relay available at site. The recorded disturbance contained flow of zero sequence currents in HV side of the transformer which tripped differential relay for the fault on the transmission line which was external to the protected zone.

In PCM software settings, the differential relay with zero sequence current elimination is activated as shown in Fig 8.

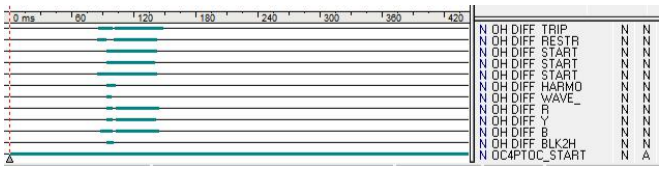

Figure 9(a). 3 phase analog current waveform from site DR (Before solution)

Group / Parameter Name	IED Value	PC Value	Unit
DIFFERENTIAL_PROTECTION			
Differential protection			
TransformerDiff2Wind(PDIF,87T			
T2WPDIF: 1			
RatedVoltageW1		132.00	kV
RatedVoltageW2		33.00	kV
RatedCurrentW1		262	A
RatedCurrentW2		1048	A
ConnectTypeW1		WYE (Y)	
ConnectTypeW2		WYE (Y)	
ClockNumberW2		0 [0 deg]	
ZSCurrSubtrW1		On	
ZSCurrSubtrW2		On	

Figure 9(b). Binary signals triggered for the disturbance at site (After solution)

From the figure 8(a) & 8(b), it is observed that the zero sequence currents flows on HV side of the transformer and no reflected current flows on LV side of the transformer. Hence differential relay trips as it sees a differential current higher than pick-up value of relay.

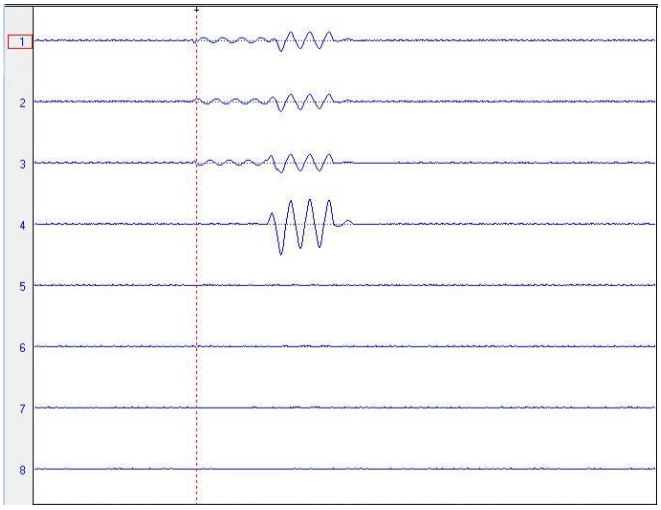

Fig 10(a). 3 phase current waveform after elimination of zero sequence currents (After solution)

Figure 10(b). Binary signals triggered for the DR Transplayed at lab (After solution)

Referring to the figs-9(a) & 9(b), it can be verified that the zero sequence currents are eliminated from the fundamental frequency differential currents of 3 phases and the differential protection relay doesn't trip for the external faults outside the protected zone due to the zero sequence current contribution. Solution for conventional electromechanical/static relays to eliminate zero sequence currents will be achieved by using Interposing CT's

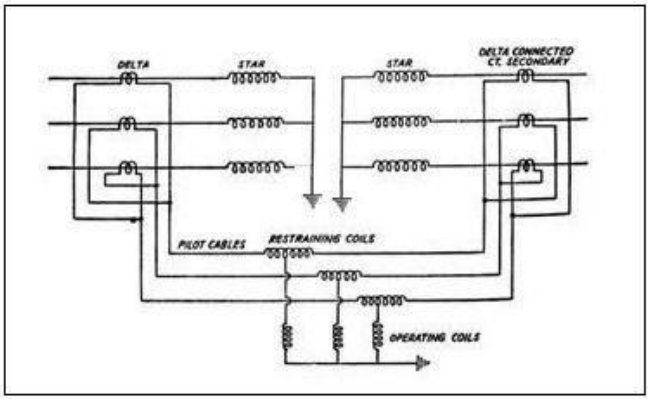

Figure 11. Interposing CT

In the above Figure 11, CT's are connected in delta, otherwise interposing CT's are used which will be connected in delta to remove zero sequence current.

IV. CONCLUSION

Transformer Differential protection is a unit protection which should operate for the faults between the HV side CT and LV side CT used for Differential protection. One of the frequent reason of transformer Differential undesired operation is elimination of zero sequence currents on star side of the transformer for Yd and Dy type of transformers as per the recommendations from most of the relay manufacturers but in this paper a different concept is taken with Yn-yn transformer where zero sequence currents can be easily transformed from one side of the transformer to the other side. Simulations and manual calculations are carried out for an external fault to the transformer and shown that there is a possibility of zero sequence currents on only one side of the transformer, which can be resulted in Differential protection trip.

A solution is made with the subtraction of zero sequence currents on both sides of Yn-yn type transformer by using setting parameters in numerical relays or delta connected main CT/Delta connected interposing CT on both sides in conventional method. This solution for numerical relay is tested by using a

Disturbance Recorder file, RET670 (ABB transformer protection numerical relay and omicron kit) to confirm the satisfactory of solution suggested in this paper.

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Eco Smart Decomposer

Abdul Rahman Khasdar, Sadaf Rakshan, Supriya swati, Prof. Mahadevi Biradar

ABSTRACT

As urbanization grips the booming cities of India, the problem of waste is rapidly becoming an enormous, vicious repercussion. In a country as vast as India, with cities as spread out as Mumbai, decentralization is the most effective solution for a fast approaching waste management crisis. Treating the household organic waste at source can help reduce the problem of waste drastically. This paper discusses the research and development of a decomposer designed for city households, which can manage, dispose and utilize the organic kitchen and food waste at the source of waste generation. This automatic, composter ensures easy usage, easy maintenance and user friendly interface. The output compost is free flowing, earthy smelling and ready to use for plant application. The home composter hence effectively replaces the kitchen waste bin with significant value addition.

Keywords: waste management, composting, organic waste, decomposers.

I. INTRODUCTION

About one third of the total food produced in the world for human consumption is discarded on an annual basis. In India, 300 to 400 grams of solid food waste per person per day is generated in a town of normal size. The figure is almost 500 to 800 grams per person per day in cities like Delhi and Bombay. The situation in other countries is relatively similar or even worse. Food waste if utilized can be a boon in producing many useful products such as renewable energy (RE), cooking gas and good manure. In domestic environment such as individual houses, apartments, markets, malls, hotels etc., indeed food waste is simply being wasted and thrown into garbage then to landfill, which in turn act as open sources of anaerobic digestion causing the emission of greenhouse gases which has an impact of global warming.

Recycling food waste at a household level would represent a convenient and economical solution to divert a substantial portion of food waste from landfills at source. Composting is a naturally occurring decomposition process which breaks down organic matter into simpler chemical components in the absence of oxygen to produce compost .The project aims at developing a solution to efficiently manage, dispose and reuse the organic waste generated in the kitchens of city households and further proposes to develop a Home Use Domestic Composter which converts organic kitchen waste into usable compost, a good manure for plants and crops.

II. DESCRIPTION

Composting is a natural process; it occurs by using microorganism under specific condition which leads to decomposition of organic waste. There are two common types of composting process that can be used,

One of the types called “Aerobic composting” that uses air in composting.

The second type called “Anaerobic composting” and this uses no oxygen.

We are using anaerobic process for decomposition. The designed machine is fully automatic and highly compact composting machine which converts the organic waste into compost within 24 hrs, with volume reduction of 85% to 90%. The entire process is natural and biological. The microorganism we use thrice in high temperature and are effective even in high acidic or salty condition.

A tank made of metallic sheets whose dimensions are 2*1*1.5 feet is used having a capacity of 5-10 kg of organic waste. It consist of shaft with blades run by motor, humidity and temperature controller, heater at the bottom, motor for mixing, cutting and exhaust fan at the outlet

III. BLOCK DIAGRAM

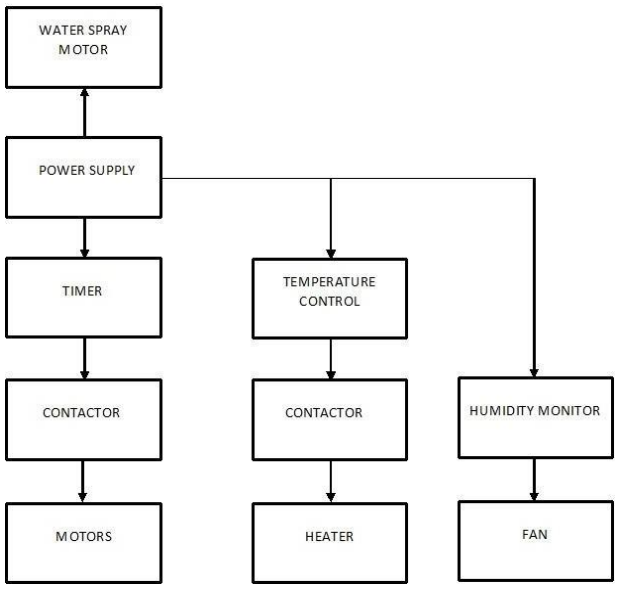

Figure 1. Block Diagram

IV. WORKING

The main part is composting tank in which the organic waste substance is loaded through lid of the tank till the waste reaches the appropriate level.

Initially when waste is added the mixing blades with the help of induction motor at center of the tank, starts mixing and cuts the waste uniformly. The water is sprinkled on the waste through water spray. The moisture conduction in the waste is sensed by the humidity sensor due to which heater turns ON and composting tank gets heated. The appropriate value of temperature is applied (above 50 degree centigrade approx.) by the heater. The tanks temperature and humidity is continuously sensed by the temperature and humidity sensor and is maintained at preset values. Due to this the water content in the organic waste is evaporated and it goes out into water tank through exhaust system. Switching of heater, motors and exhaust fan is done with the help of AC contactor which is controlled by preset timer. The values of temperature, humidity are displayed on the LCD. As any organic waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself.

At the same time microorganisms decomposes the waste into compost and this happens within 24 hours. The microorganism used here is a thermopile bacteria, which thrives in high temperature. This is how we achieve 85- 90% of volume reduction. The machine is fully automatic and highly compact an able to decompose organic waste in a time frame of 38- 50 hours, with minimum harmful gases emissions and odors and it is almost a plug play machine with less power consumption.

V. METHODOLOGY

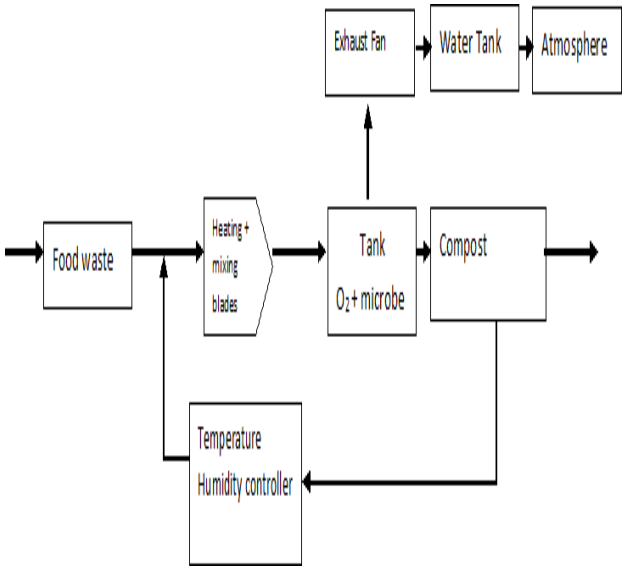

Figure 2. Methodology

This figure shows the block diagram of our designed composting machine. It shows how the machine works, it also shows main component of the machine and parameters controlling the machine

VI. ADVANTAGES

- Compost is a valuable soil amendment as the compost feeds soil.
- It can be used for bioremediation of soil, pollution prevention, reduce erosion, nutrient run off and alleviate soil compaction.
- It retains needed moisture.
- It is an effective way to reduce greenhouse gases.
- Decentralize waste management solution.
- Reduce transport costs.
- Negligible odor, long term solution, maintenance/ support.
- Reduction of solids to be handled (ex. less excess sludge).
- Minimum electricity cost.
- The research has also shown that composting can also assist in enhancing the disease resistance of some plant like tomatoes and vegetable.

VII. APPLICATIONS

- This machine provides food waste solutions for variety domestic uses, from restaurants to households.
- Reduce garbage volume and disposal costs.
- Houses, Hotels, Restaurants, Supermarkets, Municipalities, Canteen, Shopping centers, Food processing sites.

VIII. CONCLUSION

In this project we presented a composting system that allows remote unsupervised composting, monitoring and management throughout the entire procedure. The study found significant portion of the generated wastes are compostable which is very useful to promote decentralized composting and associated marketing. Electricity generation is very much possible if we produce biogas from organic portion of the waste. It provides an effective way to reduce greenhouse gases with minimum electricity cost. As a future endeavor, the current project aims to expand on other activities of agricultural interest which now required human intervention.

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Ultrasonic Blind Stick with GPS Tracking System and Vibration Feature

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ABSTRACT

God has gifted five important sense organs to lead a convenient life. Of which vision plays a very important aspect of our life. But there are many people who lack this visualizing ability. In recent survey it is clear that out of 39 million blind people across the globe 12 million blind people are from India. The blind people use conventional white cane to move from one place to another. These blind sticks are capable of finding obstacle when the stick touches them physically. Hence blind people face a major problem when they walk on stairs using white cane. Using advanced technology we propose an ultrasonic blind stick with GPS tracking feature along with vibration for blind people for their more convenient means of life. Here in this project we have designed the blind stick with five important advanced features. The blind person can sense the object before the stick touches the object physically using ultrasonic sensor. The blind person can know whether there is water in front of him/her which is one of the important features. Also the person can know whether there is light or darkness around them. If the person loses the stick it can be found by using RF remote. Since we are using vibration motor there are various patterns of vibration along with different beep signals for individual features. The most important feature is that we are using GPS tracking system so that the person can be found whenever he/she is in trouble or being lost.

Keywords: Ultrasonic sensor, LDR, Atmega328 Microcontroller, RF Module, GPS and GSM Module.

I. INTRODUCTION

The most common tool that the blind currently use to navigate is the standard white cane. We decided to modify and enhance the walking cane, since blind are only able to detect objects by touch or by cane. The user sweeps the cane back and forth in front of them. When the cane hits an object or falls off of the edge of a stair, the user then becomes aware of the obstacle – sometimes too late. We accomplished this goal by adding ultrasonic sensors at specific positions to the cane that provided information about the environment to the user through audio feedback. The main component of this system is the Radio-Frequency module which is used to find the stick if it is misplaced around. The main aim of this project is to contribute our knowledge and services to the blind people by providing an electronic walking stick for their more convenient means of life. Blind stick is an innovative stick designed for visually disabled people for improved navigation. Here, we propose an advanced blind stick that allows visually challenged people to navigate with ease using advanced technology.

II. METHODOLOGY

1. The system uses ultrasonic sensor (HC-SR04) to sense objects within certain range (1cm to 15cm) of the person and there will be a beep sound of particular type to signal obstacles.
2. We are using the concept of short circuit to detect water in front of the person. As soon as the wires of the system dip in water, the system signals the blind person by different beep pattern with increase in frequency.
3. The light sensor (LDR) gives the information to the blind person if there is light or darkness so that the person can know if it is night or has entered a very dark room, so that he/she gets a beep sound of different frequency.
4. If the blind person loses the stick, the person can use an RF remote so that the stick starts beeping with a different pattern with increase in the counts and the person can find it.
5. The most important feature of the system is that the system allows the blind person to send a message with his or her GPS location to the caretaker in case of trouble or being lost.

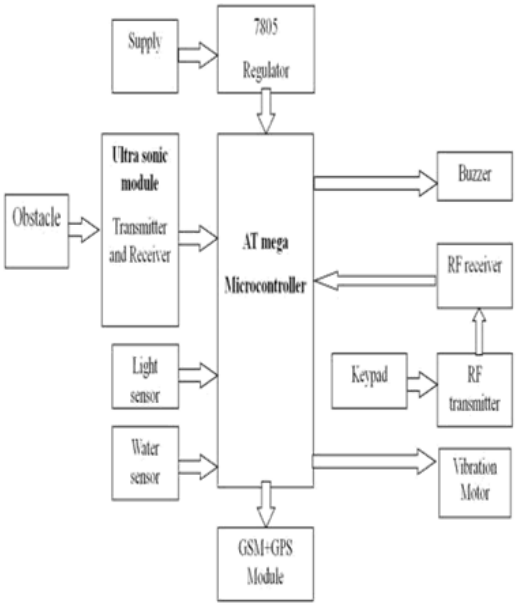

Figure 1. Block diagram

A. POWER SUPPLY

The circuit uses standard power supply comprising of a step-down transformer from 230V to 12V and 4 diodes forming a bridge rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of about 470μF to 1000μF. The filtered dc being unregulated, IC LM7805 is used to get 5V DC constant at its pin no 3 irrespective of input DC varying from 7V to 15V. The input dc shall be varying in the event of input ac at 230volts section varies from 160V to 270V in the ratio of the transformer primary voltage V1 to secondary voltage V2 governed by the formula V1/V2=N1/N2. As N1/N2 i.e. no. of turns in the primary to the no. of turns in the secondary remains unchanged V2 is directly proportional to V1.Thus if the transformer delivers 12V at 220V input it will give 8.72V at 160V.Similarly at 270V it will give 14.72V. Thus the dc voltage at the input of the regulator changes from about 8V to 15V because of A.C voltage variation from 160V to 270V the regulator output will remain constant at 5V.

B. VOLTAGE REGULATOR 7805

A voltage regulator is a three-terminal positive regulators that are available with several fixed output voltages, making them useful in a Wide range of applications. Each type employs internal current limiting, thermal shutdown and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output Current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

C. ULTRASONIC MODULE

Ultrasonic sensors work on a principle similar to which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. Here it is more easy use serial ultrasonic module. It will auto output the distance information via serial port after power

on, you don't need to do any trigger and calculated, just need to read the serial pin and get the distance information.

D. RF MODULES

Radio Frequency Module is an integral part with a control module or unit and an antenna it is used for wireless identification. Main tasks of the RF module are to send an energizing signal via the antenna. The RF module delivers a digital data stream and a clock signal for further processing to its control unit or module. Furthermore a field strength dependent digital output is available for synchronization purposes. The RFM is tuned to resonance with the antenna by adjusting the inductance of the tuning coil at the RFM's output stage. RF Module can be categorized into two parts:

1. RF TRANSMITTER

This wireless data is the easiest to use with lowest cost. Use these components to transmit position data, temperature data, and even current program register values wirelessly to the receiver. These modules have up to 500 ft range in open space. The transmitter operates from 2-12V. The higher the Voltage, the greater the range. We have used these modules extensively and have been very impressed with their ease of use and direct interface to an MCU. The theory of operation is very simple. What the transmitter 'sees' on its data pin is what the receiver outputs on its data pin. If you can configure the UART module on a uC, you have an instant wireless data connection. The typical range is 500ft for open area.

2. RF RECEIVER

This receiver type is good for data rates up to 4800bps and will only work with the 434MHz or 315 MHz transmitter. Multiple 434MHz or 315MHz receivers can listen to one 434MHz transmitter or 315 MHz transmitter. This wireless data is the easiest to use, lowest cost RF link. Use these components to transmit position data, temperature data, and even current program register values wirelessly to the receiver. These modules have up to 500 ft range in open space. The receiver is operated at 5V. We have used these modules extensively and have been very impressed with their ease of use and direct interface to an MCU.

E. LDR

A photoresistor or light dependent resistor (LDR) is a resistor whose resistance decreases with increasing incident light intensity. It can also be referred to as a photoconductor. A photoresistor is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. A photoelectric device can be either intrinsic or extrinsic.

F. BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

G. LED

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices, and are increasingly used for lighting. When a light-emitting diode is forward biased (switched on), electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the colour of the light (corresponding to the energy of the photon) is determined by the energy gap of the semiconductor. An LED is often small in area (less than 1 mm^2), and integrated optical components may be used to shape its radiation pattern.

H. GPS MODULE

Regulated power for the SKG11B is required. The input voltage Vcc should be 3.0V to 4.2V range, current is no less than 100mA. Suitable decoupling must be provided by external decoupling circuitry (10uF and 1uF). It can reduce the Noise from power supply and increase power stability. The SKG11B is a complete GPS engine module that features super sensitivity and ultra low power. The SKG11B GPS receiver is designed for supporting the active antenna or passive antenna connected with pin RF_IN. The gain of active antenna should be no more than 35dB. The maximum noise figure should be no more than 1.5dB and output impedance is at 50 Ohm.

I. GSM MODEM

GSM (Global System for Mobile Communications) is the most popular standard for mobile telephony systems in the world. GSM differs from its predecessor technologies in that both signalling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system. GSM also pioneered low-cost implementation of the short message service (SMS), also called text messaging, which has since been supported on other mobile phone standards as well. The standard includes a worldwide emergency telephone number feature. GSM is a cellular network, which means that mobile phones connect to it by searching for cells in the immediate vicinity. There are five different cell sizes in a GSM network-macro, micro, pico, femto and umbrella cells. The coverage area of each cell varies according to the implementation environment.

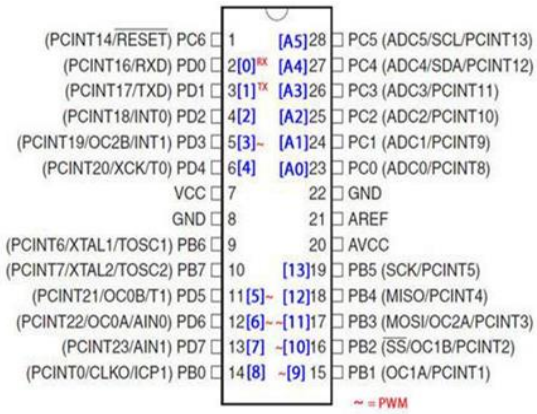

Figure 2. Pin Diagram

The Atmel ATmega328P is a 32K 8-bit microcontroller based on the AVR architecture. Many instructions are executed in a single clock cycle providing a throughput of almost 20 MIPS at 20MHz. The ATMEGA328-PU comes in an PDIP 28 pin package and is suitable for use on our 28 pin AVR Development Board.

III. REFERENCES

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A study of Power Quality issues in IEEE 33 bus system and its mitigation using DSTATCOM

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ABSTRACT

The main objective of this project is to determine the Power Quality disturbances at distribution levels. This paper presents the design, modeling and simulation of DSTATCOM to improve the THD and voltage sag in IEEE 33 bus system. Rapidly, increasing the use of non-linear loads has increased the Power Quality problems such as voltage sag, voltage swell, voltage notch, and harmonics. To maintain the power quality regulations and compensation is becoming an important factor. Here, MATLAB/Simulink is used to develop the model.
Keywords. Power Quality, Power Quality Problems, DSTATCOM overview, SRF theory, Voltage sag, %THD Simulation model, Matlab Simulation.

I. INTRODUCTION

Power quality is an essential part of power system engineering. Power Quality is communication between of electrical power with electrical equipments. If the electrical equipment operates correctly, accurately, reliably without being any interruption and damaged, we would say that Quality of Power is good.

The electrical energy is one of the easily used forms of energy. Electrical energy can be converted from one form of energy into another form of energy. Electric energy demand has been greatly increased. Along with this, the techniques of electric power production have greatly improved. The electrical system is effect by various non linear switching devices. In this project, the frequently occurring power quality problem like voltage sag, voltage swell, voltage notch, voltage flicker, harmonic, voltage variation at distribution level are discussed. This is very important aspect to look for Quality of power before serving the consumers. There are several methods to improve the Power Quality. This project contains design, analysis and simulation of IEEE33 bus by using MATLAB/Simulink. In IEEE33 bus system, the design, simulation and modelling of DSTATCOM has been shown. This paper object is solving voltage sag and THD problems by improving the Power Quality using DSTATCOM.

II. LITERATURE REVIEW

Power Quality plays an important role which is related with the amplitude, phase and frequency of the voltage and current. It is very important to deliver the quality of power to the end user as the performance of the consumer's equipment is heavily dependent on it. Nowadays, Ac distribution systems are facing power quality problems, especially the use

of sensitive equipment in most of the industrial, commercial, residential and traction applications. These power quality issues can be classified as voltage and current quality problem in distribution system [2]. Power Quality influenced by the several factors like voltage sag caused by fault and disturbances in transmission or distribution level. This Power Quality problem may leads to economic crisis in the industries [1]. Power Quality Problems are categorized as voltage sag, voltage swell, transient, voltage notch, flicker, frequency variation, presence of harmonics etc. So many Facts device are present to mitigate the power quality problems such as custom power devices (CPDs), namely, DSTATCOMs (distribution static compensators), DVRs (dynamic voltage restorers), and UPQCs (unified power quality conditioners). Out of these fact devices CPDs, STATCOM are used to mitigate current based problem such as poor power factor, or poor voltage regulation, unbalanced currents, and increased neutral current. The most effective device is DSTATCOM which is used to reduce current variation and harmonics from the distributed network. DSTATCOM is the best technology for providing reactive power compensation, load balancing and/or neutral current and harmonic current compensation in Ac distribution network. This device is also used to regulate terminal voltage, suppress voltage flicker, and improve voltage balance. The major advantage of DSTATCOM is fast and self-communicating solid-state device [2].The basic structure or design of DSTATCOM is explained by Elango in [8]. DSTATCOM is capable mitigate voltage sags without injecting active power.

According to the Hingorani the custom power devices will increase the quality and reliability of power which is delivered to the customers [3].

Parag Nijhawan and Rajan Sharma [11] presents on improvement of power quality on feeders feeding with nonlinear loads and DTC induction motor drive with DSTATCOM. This paper main objective is to shows the effectiveness of DSTATCOM to compensate the harmonics, power quality problems and unbalance load in distribution network under various operating and fault conditions is discussed.

Parag Nijhawan et. al. [12] evaluated the performance of a carrier phase shifted pulse-width modulation (PWM) multilevel inverter (five-level)-based distribution static synchronous compensator (DSTATCOM) and compared with a PWM inverter based-DSTATCOM with induction furnace load. This Simulink is used to elaborate the multilevel inverter based DSTATCOM in the load current with induction furnace load in the distribution network to reducing harmonic distortion and power quality problems.

H. Prasad, T. D. Sudhakar [14] presents in the paper, "Power Quality Improvement by Mitigation of Current Harmonics using STATCOM" a STATCOM is connected with PCC to improve the power quality. STATCOM is designed with the VSI and connected with charging capacitor on DC side.

Sabha Raj Arya presents in the paper "Power Quality Improvement in Isolated Distributed Power Generating System Using STATCOM" a three-leg voltage source converter (VSC) based distribution static compensator (DSTATCOM) is implemented for harmonics suppression, load balancing and voltage regulation in three-phase Synchronous Reluctance Generator system with a battery energy storage system (BESS) [4].

Sabha Raj Arya also presents in the paper "Power Quality Improvement in Distributed Power Generating System Using DSTATCOM" an induction generator is used as a source with a three-leg voltage source converter (VSC) based distribution static compensator (DSTATCOM) to mitigate the power quality problems [5].

III. POWER QUALITY PROBLEMS

"Power Quality" can be defined as the combination of voltage and current. The terminology of electric Power Quality is mainly used at the level of generation, distribution and utilization to maintain the good quality of the power. Power Quality also maintained the sinusoidal waveform of current and voltage at rated magnitude and frequency. Power Quality disturbances can be classify into voltage sag, voltage swell, transient, harmonic distortion, voltage notch, and flicker.

There are several numbers of reasons for the power quality problems of the AC power system, around 60% problems are natural ones such as lightning, flashover, equipment failures and others 40% problems are forced ones such as voltage distortions and notch. The causes of power quality disturbances are failure of capacitor banks, line faults, transformer energizing, non-linear loads (furnaces, uninterruptable power supply (UPS) , and adjustable speed drives (ASD)), negative sequence current in generators and motors, increased the losses in the distribution system and machines, noise, vibration, over voltages, excessive current due to resonance, rotor heating, dielectric breakdown, relay and breaker failure, false metering, Communication and signal interference and so on. There are various type of definition related to amplitude and duration. It can defined as follows

Voltage sag. Voltage sag or voltage dip can be defined by IEEE 1159-1995 as the decrease in RMS voltage or current 10% to 90% (0.1pu to 0.9pu) of nominal value for durations of half cycle to one minute at the power frequency. Voltage sag can be divided by three categories. They are

1. Instantaneous (1/2 cycle to 30 cycles)
2. Momentary (30 cycles to 3 seconds)
3. Temporary (3 seconds to 1 minute)

Voltage Swell. Voltage swell can be defined by IEEE 1159-1995 as the increase in RMS voltage or current 110% to 180% (1.1pu to 1.8pu) of nominal value for durations of half cycle to one minute at the power frequency.

Notch. Any type of disturbances at the normal power voltage waveform which is lasting less than a 1/2 cycle. Initially, it is opposite polarity of the waveform. It's subtracted from the normal waveform in terms of the peak value of the disturbance voltage. It includes complete loss of voltage for up to 1/2 cycle.

Flicker. Voltage flicker is a visible sensation in brightness of the lamp or variation in voltage waveforms induced by the fluctuation in voltage or spectral distribution fluctuates with time.

Total Harmonic Distortion (THD). THD is the ratio between the RMS value of harmonic component and the RMS value of fundamental quantities. It is expressed in percentage. % THD = (RMS value of harmonic components) / (RMS value of fundamental quantities)

IV. DSTATCOM OVERVIEW

DSTATCOM is known as Distribution STATCOM or Distribution Static Compensator. STATCOM technology has a significant aspect in the field of Power Quality improvement. The advantages of DSTATCOM technology is the advent of fast, solid state device, self-communicating device. In 1976, the concept of DSTATCOM was proposed by Gyugyi. To reduce the cost, size, loses and light weight of DSTATCOM, the PWM based VSCs are preferred. To improve the voltage profile and to eliminate the higher order harmonics, a small ripple filter is used at PCC (Point of common coupling) of DSTATCOM. Here, DSTATCOM has been used to improve the power quality. DSTATCOM providing reactive power compensation, load balancing, neutral current and harmonic current compensation in AC distribution networks. DSTATCOM Topology includes a voltage source inverter with a capacitor of DC sides as energy saving material.

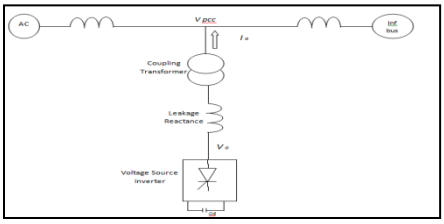

Figure 1.1. Schematic configuration of a DSTATCOM

This Custom power device is extremely used to mitigate the current based Power Quality problems. The current based power quality problems are poor power factor, poor voltage regulation, and unbalanced current and increased neutral current. These disturbances are aggravated in the voltage and current by the presence of harmonics. DSTATCOM providing reactive power compensation, load balancing, neutral current and harmonic current compensation, suppress the voltage flicker in AC distribution networks. Synchronous Reference frame theory (SRF) based algorithms is implemented in this project.

V. SYNCHRONOUS REFERENCE FRAME THEORY

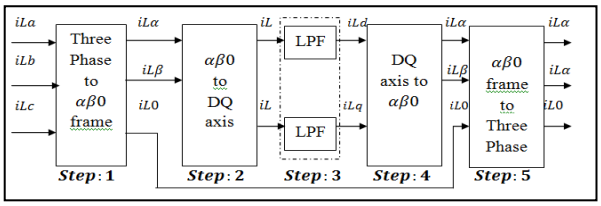

Figure 1.2. Synchronous Reference Frame theory of Reference current extraction

Bus ID	V_LF (pu)	Vangle_LF (deg)	P_LF (MW)	Q_LF (Mvar)	Block Name
BUS_1	0.0254	19.83	0.00	0.00	Load Flow Bus
BUS_2	0.4631	38.96	8.38	0.42	RLLoad
BUS_11	0.7329	5.14	20.98	1.06	RLLoad9
BUS_12	0.8839	4.31	30.52	1.53	RLLoad10
BUS_13	0.8839	3.71	30.49	1.52	RLLoad11
BUS_14	0.9994	-0.01	0.00	0.00	Load Flow Bus13
BUS_15	0.9502	2.35	35.27	1.76	RLLoad13
BUS_16	0.8978	2.43	31.48	1.57	1
BUS_17	0.9377	1.43	34.35	1.72	1
BUS_18	0.9605	0.27	36.04	1.80	2
BUS_19	0.9991	-0.02	0.00	0.00	Load Flow Bus18
BUS_20	0.9636	1.13	35.61	1.78	4
BUS_3	0.6309	14.08	11.01	0.55	RLLoad1
BUS_21	0.9524	0.85	35.43	1.77	5
BUS_22	0.9608	0.20	36.06	1.80	6
BUS_23	0.9997	-0.01	0.00	0.00	Load Flow Bus22
BUS_24	0.9731	-0.59	36.39	1.85	8
BUS_25	0.9776	-1.40	37.33	1.87	17
BUS_26	0.9523	-3.77	35.43	1.77	9
BUS_27	0.9993	-0.02	0.00	0.00	Load Flow Bus26
BUS_28	0.6280	4.75	15.41	0.77	11
BUS_29	0.9591	-3.56	35.94	1.80	12
BUS_30	0.9534	-4.11	35.51	1.78	13
BUS_5	0.9978	-0.53	0.00	0.00	Load Flow Bus3
BUS_31	0.9492	-4.30	35.19	1.76	14
BUS_32	0.9642	-3.99	35.57	1.78	15
BUS_33	0.9408	-5.31	34.67	1.73	16
BUS_4	0.5493	10.95	11.79	0.59	RLLoad2
BUS_6	0.6157	8.92	14.81	0.74	RLLoad4
BUS_7	0.7435	4.15	21.59	1.08	RLLoad5
BUS_8	0.6187	7.76	14.95	0.75	RLLoad6
BUS_9	0.7387	6.04	21.03	1.05	RLLoad7
BUS_10	0.7368	5.74	24.80	1.24	RLLoad8

Synchronous reference frame theory (SRF) is one of time-domain control algorithms widely used for the control of DSTATCOM. A block diagram of the control algorithms is shown in figure

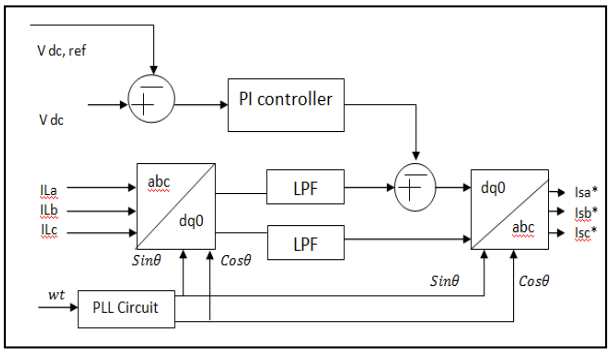

Figure 1.3. Block diagram of SRF theory based algorithms of DSTATCOM

Step 1. Convert three-phase load current (iLa, iLb, iLc) into the αβ frame using Clark's transformation.

$$\begin{bmatrix} I\alpha \\ I\beta \\ I0 \end{bmatrix} = \sqrt{\frac{2}{3}} \begin{bmatrix} 1 & -\frac{1}{2} & -\frac{1}{\sqrt{2}} \\ 0 & \sqrt{\frac{3}{2}} & -\sqrt{\frac{3}{2}} \\ \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{2}} \end{bmatrix} \begin{bmatrix} Ia \\ Ib \\ Ic \end{bmatrix}.$$

Step 2. Convert αβ0 frame (Clark's variables) into dqo variables of rotating reference frame theory with frequency w in rad/s. The transformation can be written as follows

$$\begin{bmatrix} Id \\ Iq \end{bmatrix} = \begin{bmatrix} coswt & sinwt \\ -sinwt & coswt \end{bmatrix} \begin{bmatrix} I\alpha \\ I\beta \end{bmatrix}.$$

Step 3. In this step, low pass filter (LPF) techniques is used extract the fundamental component.

Step 4. Convert dqo to αβ frame using inverse transformation.

Step 5. Convert αβ (Clark's variables) into the abc variables.

VI. SIMULATION MODEL

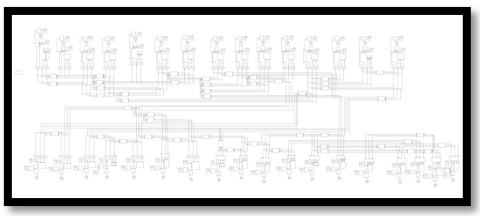

Figure 1.4. IEEE33 Bus Network Topology (MATLAB/SIMULINK)

The simulation models were developed by using MATLAB/Simulink. It is used to simulate various types of power quality disturbances and observe how it distorts the sinusoidal waveforms of the system. Simulation model includes IEEE33 bus system, DSTATCOM model. The DSTATCOM modelled with Synchronous reference frame (SRF) control techniques. Here, supply voltage is 500 and 60Hz and R=0.02 ohm, L=0.06 H and C=0.0528 F. DC voltage is 300V.

Table 1. LOAD FLOW RESULT

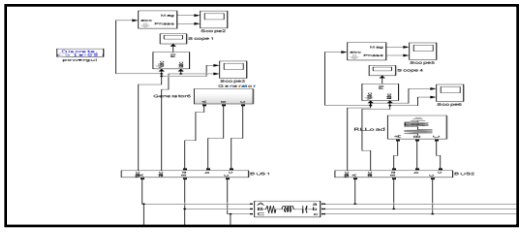

Figure 1.5. Bus 1 and Bus 2 circuit of IEEE 33 bus system

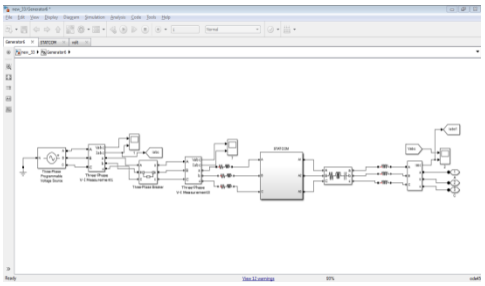

Figure 1.6. Placement of DSTATCOM at Bus 1(gen5)

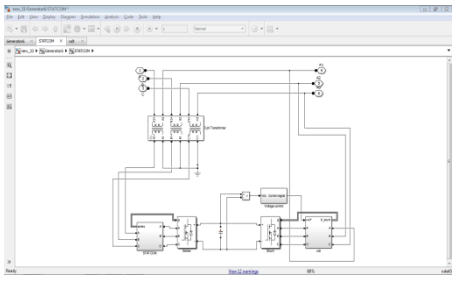

Figure 1.7. DSTATCOM

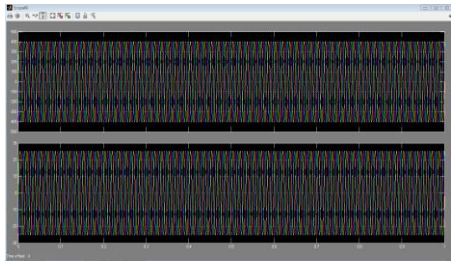

Figure 1.8. Bus 1 Voltage and current waveform

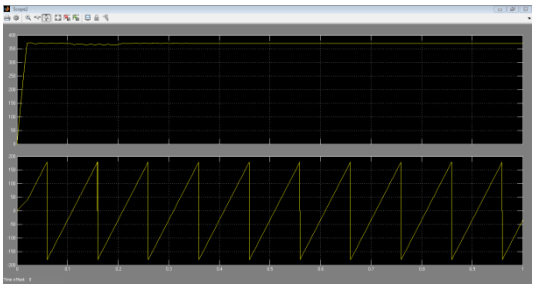

Figure 1.9. Bus 1 voltage magnitude and phase angle

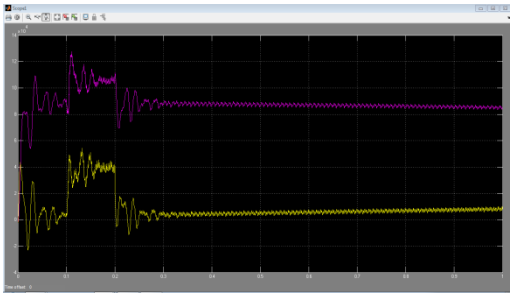

Figure 1.10. Bus 1 active and reactive power waveforms

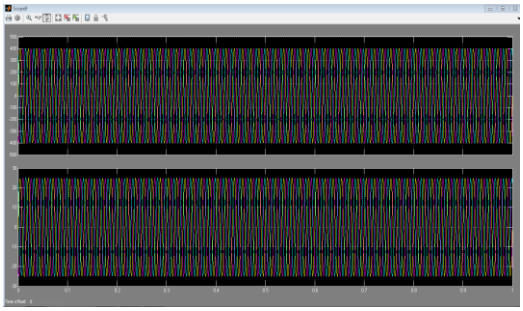

Figure 1.11. Bus 2 voltage and current waveforms

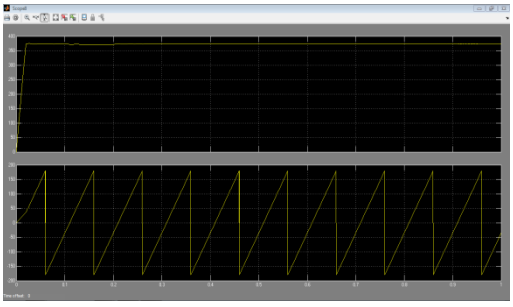

Figure 1.12. Bus 2 voltage magnitude and phase angle waveforms

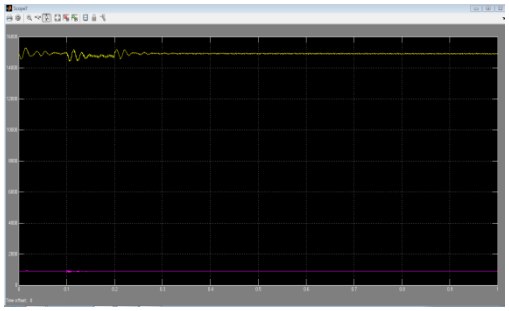

Figure 1.13. Bus 2 active and reactive power waveforms

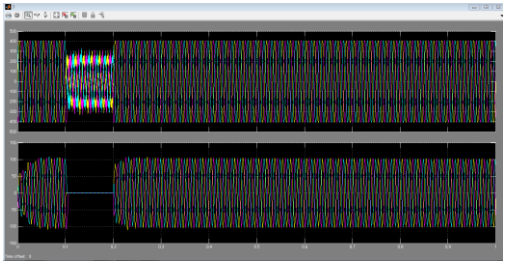

Figure 1.14. Voltage sag at Bus 1(25% voltage sag)

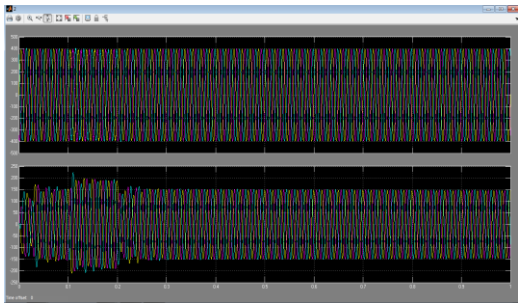

Figure 1.15. Voltage waveform after connecting DSTATCOM

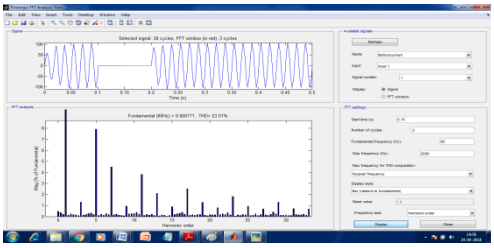

Figure 1.16. FFT analysis of current in Phase A before filtering

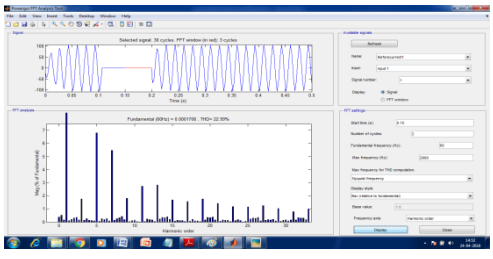

Figure 1.17. FFT analysis of current in Phase B before filtering

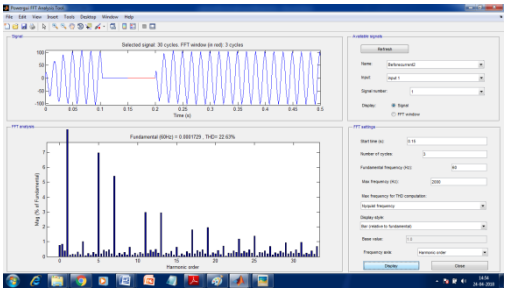

Figure 1.18. FFT analysis of current in Phase C before filtering

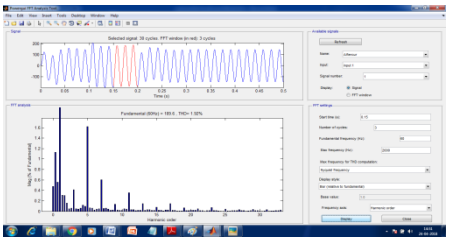

Figure 1.19. FFT analysis of current in Phase A after filtering

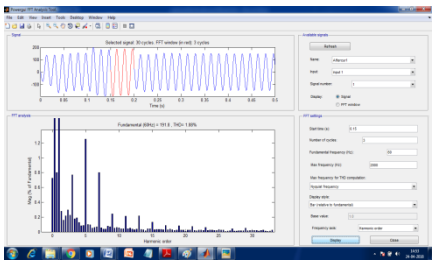

Figure 1.20. FFT analysis of current in Phase B after filtering

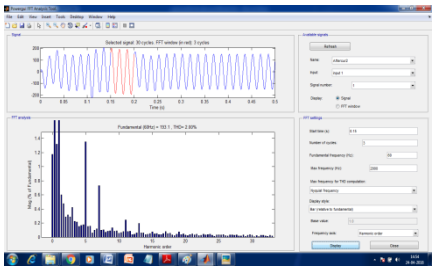

Figure 1.21. FFT analysis of current in Phase C after filtering

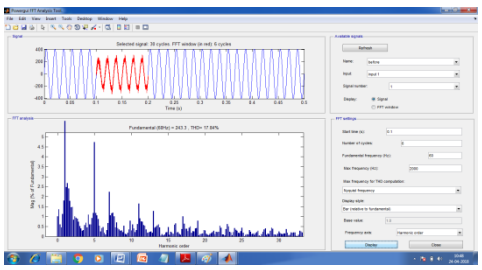

Figure 1.22 FFT analysis of voltage in Phase A before filtering

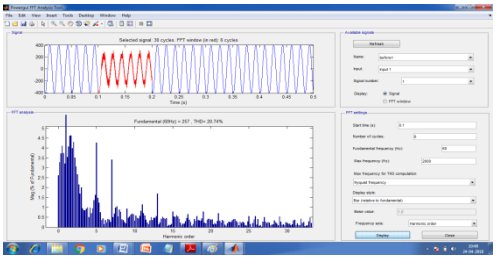

Figure 1.23 FFT analysis of voltage in Phase B before filtering

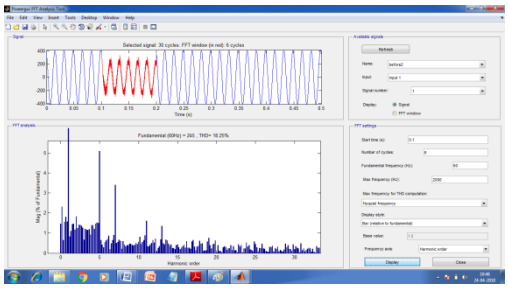

Figure 1.24. FFT analysis of voltage in Phase C before filtering

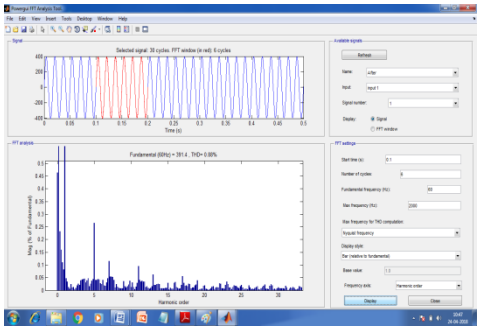

Figure 1.25 FFT analysis of voltage in Phase A after filtering

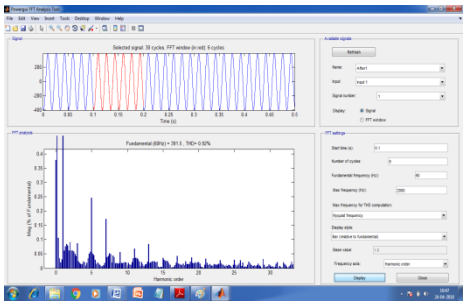

Figure 1.26 FFT analysis of voltage in Phase B after filtering

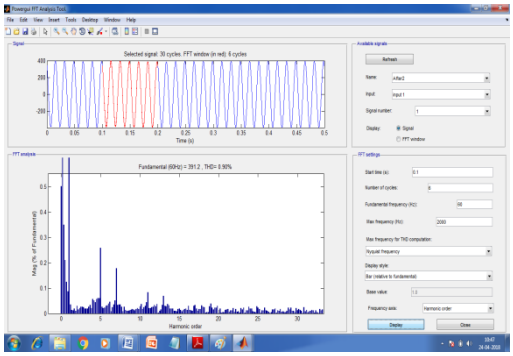

Figure 1.27 FFT analysis of voltage in Phase C after filtering

Table 2. Current and voltage THD value before and after filtering

Signals		THD before filtering (%)	THD after filtering (%)
Current	*Phase A*	23.01	1.92
	Phase B	22.99	1.88
	Phase C	22.63	2.00
Voltage	*Phase A*	17.84	0.88
	Phase B	20.74	0.92
	Phase C	18.25	0.90

VII. CONCLUSION

This paper presents the power quality disturbances such as voltage sag, THD and its mitigation using DSTATCOM. The IEEE 33 bus system and DSTATCOM model has been done by using MATLAB/SIMULINK. Here, DSTATCOM is used to design to mitigate the THD, voltage sag and current

compensation. In the figure 1.15 shown that the current waveform is being compensated after 0.25 sec. %THD is being reduced due to compensation provided which is shown in table 2.

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Development of Electric Bicycle by Harnessing Solar Energy

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ABSTRACT

In present scenario a Solar Bicycle system will help to solve the major problems of fuel and pollution. There is no doubt that the emission of carbon-dioxide from an automobile exhaust is a concern for the increasing rate of global warming. The fuel prices in India and around the world is increasing day by day thus there is a tremendous need to search for an alternative to conserve these natural resources. Promoting use of solar vehicles can reduce CO2 emission and the fuel costs. Thus a solar bicycle is an electric vehicle which provides alternative by utilizing solar energy to run the motor. India is blessed with nine months of sunny climate thus concept of solar bicycle will be very useful in India. The bicycle has the most feasible solar/electric power generation system mounted on the vehicle to charge the battery during all durations. Solar panels can be mounted on the backside of bicycle to capture the sun rays. For controlling speed of the motor, an accelerator is given which controls the supply. This type of technique is to reduce the running cost and increasing the running efficiency of the vehicle. The speed of the Solar Bicycle can go up to 15 – 20 km/hr carrying a load of a person of average weight. Thus solar bicycle can become a vital and cheap alternative against the use of automobile and thus its manufacturing is essential.

Keywords: Solar Bicycle, Brushless DC motor (BLDC), Solar Panel, Motor Controller, Accelerator (Throttle).

I. INTRODUCTION

The working of the Solar Bicycle is as follows; They are four stages of working mechanism, in the first stage the solar panel play a key role, as we are running on solar energy, the sun rays contains of photons come and directly hits the solar panel which consists of schematic arrangement of solar cells, convert the photons into electrical energy using photovoltaic effect.

The second stage consists of motor controller, DC-DC boost converter, in which the electrical energy from panel is in form of uncontrolled stage which in turns converts it into controlled state and input voltage is converted into higher regulated voltage.

In the third stage the energy from the boost converter is stored in the battery and then it is supplied to the brushless direct current motor which contains a permanent magnet and provides high torque and smooth noiseless operation which is fitted into the rear end of the cycle.

Finally in the fourth stage, the sprocket and chain drive mechanism takes place. The power from motor is transferred to the chain which is fitted in the rear end off the wheel and the chain turns moving the person in required direction.

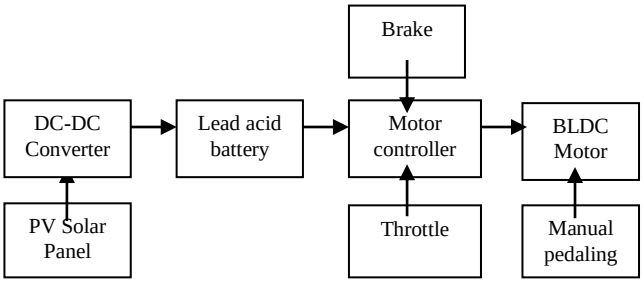

Figure 1. Block diagram

A. BLDC Motor

They are very reliable and have very long life. The main characteristic of Brushless DC Machines is that they may be controlled to give wide constant power speed ranges.A 250 watt motors are the most used motor on commercially available electric bikes. They are popular in Europe (and Asia) where in many countries there is a 250 watt power limit on E-bikes.

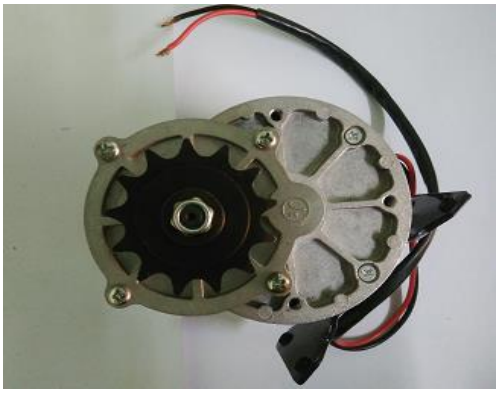

Figure 2. BLDC Motor

Table 1: Specification of BLDC Motor

Type of Motor	Hub Motor
Design of Motor	BLDC Motor
Model	MY1016Z
Output	250W
Rated voltage	24V DC
Rated current	14A
Rated speed	2700RPM

B. Solar panels

The solar bicycle is operated by solar energy. The lead acid battery is charged with voltage generated due to solar energy with the help of a photovoltaic cell. Solar cells convert the solar energy directly into electricity using photovoltaic effect. The photovoltaic effect involves conversion of electromagnetic radiation into electrical energy.The photovoltaic effect involves conversion of electromagnetic radiation into electrical energy. The photoelectric and photovoltaic effects are related to sunlight, but are different in that electrons are ejected from a material's surface upon exposure to electromagnetic radiation of sufficient energy in photoelectric, and thus the electrons that are generated are transferred to different bands of valence to conduction within the material thus this results into build-up of voltage between two electrodes in photovoltaic.Solar cells are connected electrically and manufactured as a module with a sheet of glass on top to allow light to pass and protect the semiconductor from the weather.

Figure 3. Solar Panel

C. Boost Converter

It is essential to regulate the voltage output from the solar panel before it is supplied to the motor. A Boost Converter is a power converter with an output DC voltage greater than the input DC voltage. This is used to regulate an input voltage to a higher regulated voltage. Because the output of the solar panel will be varying constantly, we need a voltage regulator/boost converter that will take an input from a wide range of voltages and output a specific, constant voltage value.We have used DC-DC Boost 2A-MT3608 converter.

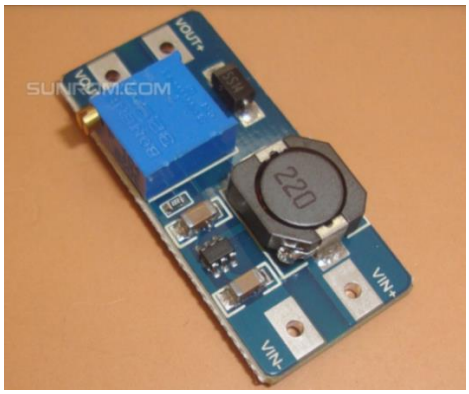

Figure 4. Boost converter

Table 2: Specification of Boost converter

Model	MT3608
Input voltage	2-24V
Output voltage	5-28V
Output current	2A
Efficiency	>93%

D. Motor Controller

A motor controller is an important element of the solar bicycle or can be called as the brain of the vehicle. It controls the amount of power supplied to the hub motor and also to the lights and horn if required.

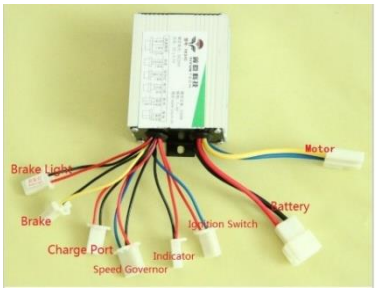

Figure 5. Motor controller

Table 3: Specification of Motor controller

Model	YK31C
Rated voltage	24V
Rated power	Up to 350W
Maximum current	25A
Size	102*65*38 mm
Conversion efficiency	95%
Under voltage protection	20Volts

E. Accelerator (Throttle)

Figure 6. Acceleraton

The maximum speed of a bicycle is 20 kmph. It is required to vary the speed depending upon the road conditions & traffic. Therefore an accelerator or a throttle (Figure 6) is necessary. Throttle allows us to drive the motor from zero speed to full speed. The throttle is fitted on right side of the handle bar and is connected to controller.

F. Lead acid battery

Lead acid batteries (Figure 7) are one of the most popular types of battery in electronics. Although slightly lower in energy density than lithium metal, lead acid is safe, provided certain precautions are met when charging and discharging. This have a many advantages over other conventional types of batteries, the lead acid battery is the optimum choice for a solar assisted bicycle.

Figure 7. Lead acid battery

Two Lead acid battery of 12V, 12Ah are used. They are connected in series to get 24V.

Table 4: Specification of Lead acid battery

Type of battery	Sealed Lead acid battery
Number of batteries	Two batteries in series
Voltage	12V
Amp-Hour rating	12 Ah
Charging time	7-8 hours
Safety	Good
Cycle life	400

G. Solar bicycle

The solar assisted bicycle (Figure 8) is driven by DC motor fitted in rear axle housing & operated by solar energy. The solar panel mounted on the carriage is used to charge the battery & which in turn drive the BLDC motor. When the bicycle is idle during the day, the solar panel will charge the battery. The system will make bicycle operate more efficiently.

Figure 8. Solar bicycle

II. RESULTS AND DISCUSSIONS

Table 5: Cost analysis

Part	Unit cost	Number	Cost (Rs)
Bicycle	3000	1	3000
Solar panel	3000	1	3000
Accelerator	750	1	750
Motor	3500	1	3500
Boost converter	700	1	700
Battery	1500	2	3000
Total cost			13950

Table 6: Comparison of various types of vehicles

Parameter	Solar bicycle	Moped	Ordinary bicycle
Max. Speed limit(km/h)	25-30	45-50	10-15
Initial unit cost	13000	35000	3000
Weight	40	80	15
Type of energy used	Solar	Petrol	Muscle power
Driving noise	noiseless	65-70 db	Noiseless
Driver's licence required	No	Yes	No

III. CONCLUSION

Solar bicycle is modification of existing bicycle and driven by solar energy. It is suitable for both city and country roads, that are made of cement, asphalt, or mud. This bicycle is cheaper, simpler in construction & can be widely used for short distance travelling especially by school children, college students, office goers, villagers, postmen etc. It is very much suitable for young, aged people and caters the need of economically poor class of society. It can be operated throughout the year free of cost. The most important feature of this bicycle is that it does not consume valuable fossil fuels thereby saving crores of foreign currencies. It is ecofriendly & pollution free, as it does not have any emissions.

Moreover it is noiseless and can be pedaled in case of emergency and cloudy weather. It can be driven by manual pedaling in case of any problem with the solar system. It has fewer components, can be easily mounted or dismounted, thus needs less maintenance.

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Application of Electric Springs for Reactive Power Compensation on Load Side

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ABSTRACT

The use of renewable energy sources is gaining a vital role in the recent years. But due to their intermittent nature, they cause disturbance or voltage fluctuations. The simple control of electric spring is a new smart grid technology for mitigating variations caused by renewable energy sources. The stabilization of the voltage at the load side is the main aim which can be obtained through electric springs. The simulation results built by MATLAB/SIMULINK show the voltage waveform on power grids with or without electric spring.

Keywords: Electric Spring, Power Grid, Critical Loads, Reactive Power Compensation.

I. INTRODUCTION

The increasing awareness about climatic changes has let the Governments worldwide to call for the implementation of renewable energy sources. Renewable energy sources have many advantages for environment and the society by providing energy security. The wind, solar power have become the pillars of energy systems and they are more reliable and affordable sources of electricity. Many countries have proposed increasing renewable energy power plant's share in future power systems. The effect of renewable energy sources due to their intermittent nature is the destabilization of electric grids, causing potential blackouts and damage to the critical loads. Hence the power quality problems arise in the power systems. The load management, where load demand follows power generation is the main concern. Electric spring, which is based on power electronics technology can control the voltage fluctuations caused by the renewable energy sources without any need for communication. It is autonomous (no need for centralized control systems). Thus it can be distributed over the power grids (Eg.: Households, industrial sites etc.) to stabilize the supply voltage in real-time. Although it is a small power devices, many "small" but distributed electric springs provide a collectivelyrobust stabilizing effect. In future power systems where renewable energy sources will be connected to the power grids in a distributed manner, decentralized power compensators in numerous small capacities at the load side can be more favorable than the centralized approach. Thus the electric springs help to achieve voltage stability and power compensation.

II. PRINCIPLE OF ELECTRIC SPRING

Electric spring has the similar operational functions as that of the mechanical springs. As mechanical spring is an elastic device that provides mechanical support, store mechanical energy and damp mechanical oscillations. Analogous to a mechanical spring, an electric spring is an electric device that

can be used to provide electric voltage support, store electric energy and damp electric oscillations. Efficient integrated approach for voltage control and aggregated demand action can be achieved by categorizing loads into critical loads requiring constant voltage and non-critical loads. Electric spring, a new smart grid technology is the reactive power controller of input voltage control instead of the traditional output voltage control. It is a power electronics technology which can stabilize the voltage of critical load, through modulating the voltage of non-critical load. Critical loads like medical and sophisticated loads are sensitive to the change of voltage are connected to the power grid directly. They require constant and reliable power supply (power quality). Non-critical loads like water heaters, lighting system, fan loads etc. tolerate the fluctuations in voltage to certain extent without causing much inconvenience to the consumers. The non-critical loads are connected in series with electric spring. For stabilizing the voltage of critical loads, electric spring injects the compensated voltage to the coupling point of critical load and power grid. The block diagram of the network is shown in Figure 1.

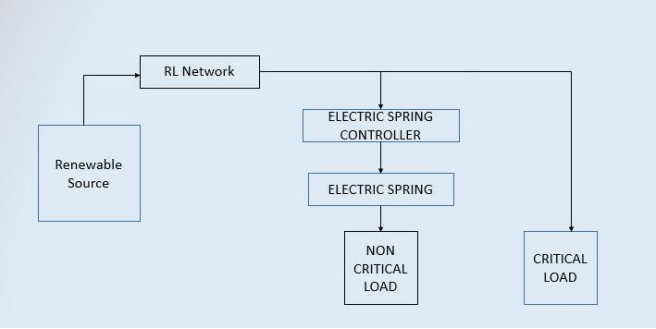


Figure 1

III. ELECTRIC SPRING OPERATION AND REALIZATION

Electric spring can be realized through the full bridge inverter shown in Figure 2.

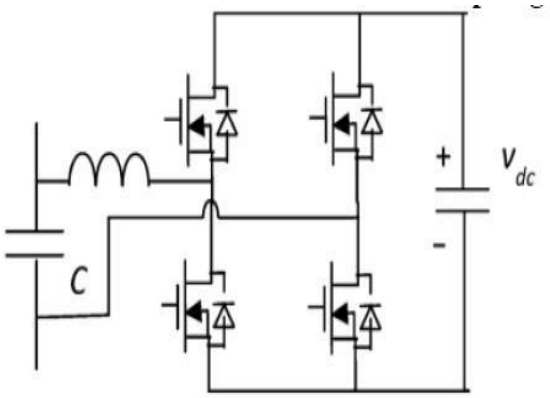
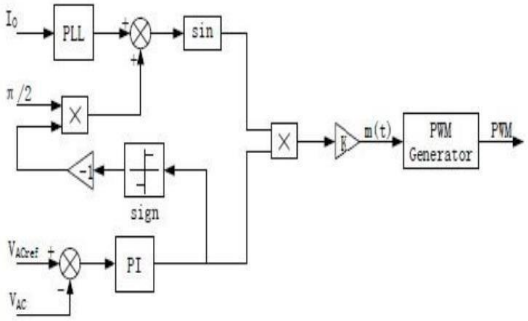


Figure 2

The full bridge inverter reduces switching currents and helps in attaining maximum voltage twice that of half bridge topology. The LC filter connected across the AC side helps in keeping the output voltage of electric spring as the sinusoidal wave. The electric spring controller consists of the PLL, PI controller and the PWM generator as shown in Figure 3.



The PLL (Phase locked Loop) tracks the phase angle and the frequency of the sinusoidal signal. The PI controller always sets the error voltage to be less based on the reference voltage. The PWM generator generates the pulses and the output is given to the electric spring, which comprises of Inverter, storage components Lf and Cf, which also act as filters an RCD snubber circuit to prevent the main circuit to resonate effectively. The pulses from the electric spring controller when fed to the electric spring, the inverter operation takes place which leads to injection of the voltage to the coupling point of the critical load and power grid.

IV. SIMULATION OF ELECTRIC SPRING

The simulation of overall network is shown in Fig.4. The frequency of the network is 50 Hz. The resistance and inductance of the lines are taken as 0.1 ohm and 2.5 mH respectively. The non-critical load resistance is 35 ohm and critical load resistance is 85 ohm respectively. The AC supply from renewable energy source is given with a disturbance to the line. After the operation of electric spring, the waveforms of voltage across critical load without and with electric spring are shown in Figure 5 and Figure 6 respectively.

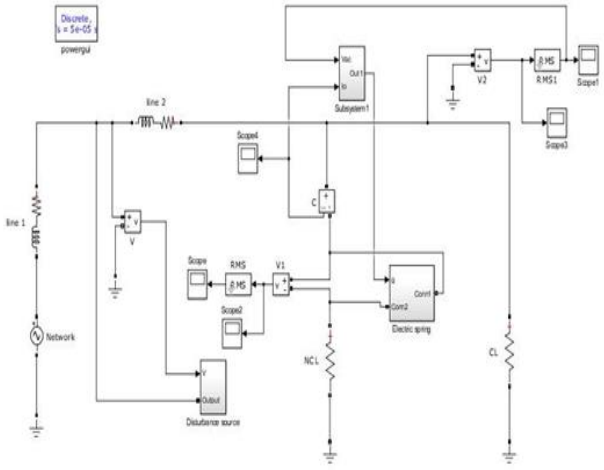


Figure 4

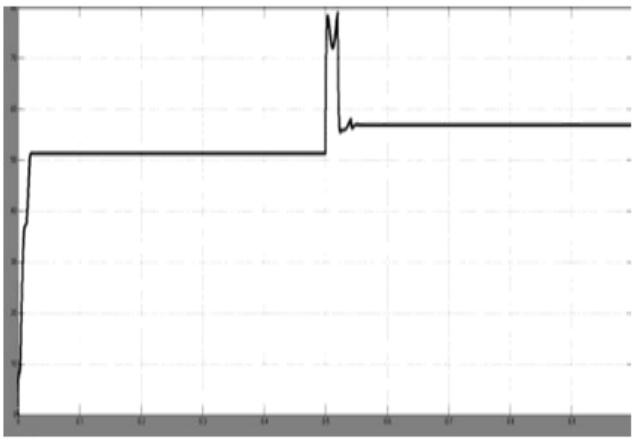


Figure 5. Critical Load voltage without Electric Spring

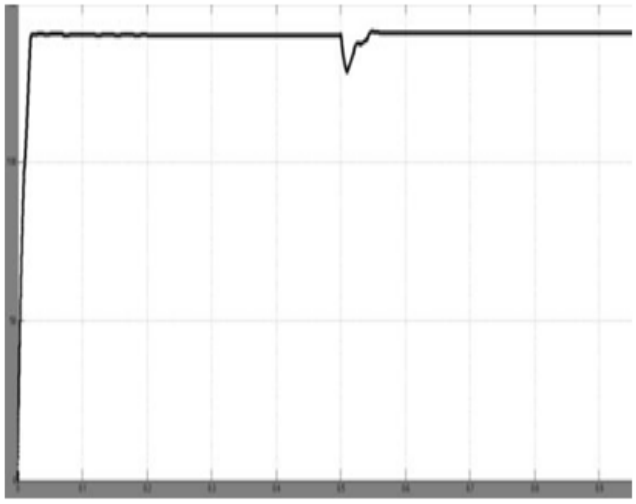


Figure 6 . Critical Load voltage with Electric Spring

V. CONCLUSION

The new smart-grid technology for the load side management is proposed to tame the intermittent nature of renewable energy sources which causes power quality problem in power systems. The simulation of electric spring successfully shows the stabilization of voltage across the critical load. The results confirm that electric spring can be incorporated in the future power systems with renewable energy sources to perform voltage regulation and power balancing.

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Arduino Based Embedded System In Cars For Road Safety

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ABSTRACT

Road accidents are one of the world's major public health and injury prevention problems. According to the World Health Organization (WHO), more than a million children are killed in road accidents each year, all over the world. The motivation behind this work is an attempt to make an Arduino based embedded system which makes the passenger's journey even safer and more secure. This paper handles the road discipline such as speed control in different areas and horn control in horn prohibited zones. The features included in this paper are Vehicle Speed Control in school Zone and also controlling the speed of the vehicle in different zones such as bridges, highways, cities and suburbs. It also includes Horn Control of Vehicle in No Honking Zone- Control horn disturbances in horn prohibited zones such as hospitals, public libraries, courts, schools and Alcohol detection to detect drunken driving.

Security in travel is primary concern for every one. This Project describes a design of effective alarm system that can monitor an automotive / vehicle / car condition in traveling. This project is designed to inform about an accident that is occurred to a vehicle to the family members of the traveling persons. This Project presents an automatic vehicle accident detection system using GPS and GSM modems. The system can be interconnected with the Alcohol detection, and alert the owner on his mobile phone. This detection and messaging system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude.

I. INTRODUCTION

Road traffic crashes are one of the world's largest public health and injury prevention problems. According to the World Health Organization (WHO), more people die on roads in India than anywhere else in the world [1] At least 13 people die every hour in road accidents in our country; the latest report of the National Crime Records Bureau reveals [1]. In 2007, 1.14 lakh people in India lost their lives in road mishaps

[2]. improper road infrastructure, failure to follow the speed limits, an increase in drinking and driving habits are among the major factors contributing to deaths from road crashes, WHO said in its report on 'Decade of Action for Road Safety 2011-2010' [2]. Currently Road safety systems are available in high end luxury cars such as Audi, Mercedes Benz etc. to name a few. Example: OnStar Corporation provides subscription-based communications, in-vehicle security, hands free calling, turn- by-turn navigation, and remote diagnostics systems throughout the United States, Canada and China Turnby-Turn Navigation, and Roadside Assistance.

The motivation behind the project Travolution is an attempt to make an embedded system to bring a

Positive difference in the field of road safety and road discipline. The project tackles some major causes of road accidents such as breaking traffic signals and drunken driving. It also has a major objective of exercising road discipline such as speed control in different areas and horn control in horn prohibited zones.

This paper presents Vehicle Speed Control in Variable Zone- in this feature; speed of the vehicle is controlled in different areas such as flyovers, bridges, highways, schools, cities and suburbs. Horn Control of Vehicle in No Honking Zone- Controlling unwanted disturbances in horn prohibited zones such as hospitals, public libraries, courts, schools etc. Alcohol detection- The alcohol sensor prevents the ignition key from working if the driver breathes into it and a significant quantity of alcohol is detected.

II. OVERVIEW

World Health Organization's , first ever Global Status Report on Road Safety reveals that 90% of deaths on the world's roads occur in low and middle income countries (21.5 and 19.5 per lakh of population, respectively) though they have just 48% of all registered vehicles. India has the second largest road network in the world with over 3 million km of roads of which 60% are paved. These roads make a vital contribution to the India's economy. According to a government report, road accidents in India killed 1,34,000 people in 2010 (an average of 336 a day). Accidents due to drunken driving are a major problem in India. The problem is unrecognized and hidden due to lack of good quality research data. A study conducted by Alcohol & drug Information Centre (AIDC), India revealed that around 40% of the road accidents have occurred under the influence of alcohol.

Young male drivers are at a high risk of such accidents. Though some efforts are being taken to reduce the Road Accidents due to drunken driving, considering the gravity of the situation it is important to change strategies and mechanisms with foresight and effective implementation. Alcohol is a depressant drug that Slows down the activity of the brain Contains absolutely no nutrients Does not help to relieve tension, induce sleep or solve problems.

III. LITERATURE SURVEY

This Project presents an alcohol detection and vehicle accident detection system using GPS and GSM modems. The system can be interconnected with the car alarm system and alert the owner on his mobile phone. The Microcontroller processes this information and this processed information is sent to the user/owner using GSM modem A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number and informs about this accident. This enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the location of accident.

Block diagram

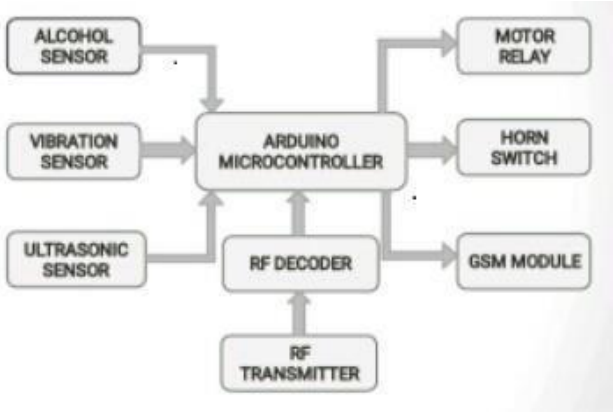

Figure 1

Hardware Components:

1. Arduino Microcontroller
2. Alcohol sensor
3. Vibration Sensor
4. Ultrasonic sensor
5. RF txr and RF Decoder
6. Motor Drive

7. Horn Switch
8. GSM Module

Software Tools:

1. Arduino IDE
2. Embedded C

IV. BLOCK DESCRIPTION

1) Arduino Microcontroller: The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one . Power : The Arduino Nano can be powered via the Mini-B USB connection, 6-20V unregulated external power supply (pin 30), or 5V regulated external power supply (pin 27). The power source is automatically selected to the highest voltage source. The FTDI FT232RL chip on the Nano is only powered if the board is being powered over USB. As a result, when running on external (non-USB) power, the 3.3V output (which is supplied by the FTDI chip) is not available and the RX and TX LEDs will flicker if digital pins 0 or 1 are high. Memory The ATmega168 has 16 KB of flash memory for storing code (of which 2 KB is used for the bootloader); the ATmega328 has 32 KB, (also with 2 KB used for the bootloader). The ATmega168 has 1 KB of SRAM and 512 bytes of EEPROM (which can be read and written with the EEPROM library); the ATmega328 has 2 KB of SRAM and 1 KB of EEPROM.

2) HT12E encoder: HT12E encoder is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits [5]. HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

3) HT12D Decoder: HT12D Decoder is a decoder integrated circuit that belongs to 212 series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 212 series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format. In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin.

4) RF TX/RX Module: The transmitter/receiver (TX/RX) pair operates at a frequency of 433 MHz. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter

5) MQ3 Alcohol sensor: This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time Sensor provides an analog resistive output based on alcohol concentration Contactor:

6) Relay Contactor: Relays necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be

controlled by one signal. A type of relay that can handle the high power required to directly control an electric motor is called a contactor.

7) UltraSonic Sensor: An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

8) GSM Module: This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded applications.Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mmx24mmx3mm, SIM900A can fit in almost all the space requirements in user applications, especially for slim and compact demand of design.

V. CONCLUSION

With this prototype, a cost effective embedded system has been successfully implemented which helps in curbing road accidents and flouting of traffic rules while also providing security for the vehicle. Since speed plays a crucial role while travelling, using the concept of Safety, which include the technology of Arduino the passenger's journey will become even more safe and secure.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

VI. ACKNOWLEDGMENT

I Kashyap M. Joshi would like to thank everyone, including: parents, teachers, family, friends, and in essence, all sentient beings for their help and support this paper would not have been possible. Especially, I dedicate my acknowledgment of

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Electric Vehicle Charging Station with an Energy Storage Stage for Bipolar DC Bus

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ABSTRACT

This paper proposes a balancing approach for an electric vehicle bipolar dc charging station at the megawatt level, enabled by a grid-tied neutral point clamped converter. The work uses the presence of an energy storage stage with access to both of the dc buses to perform the complementary balance. This is aiming to reduce the hardware requirements of the system and maximize the usage of the ESS, whose main function is to perform the energy management related tasks. To meet this purpose, a three-level dc-dc interface is employed, allowing tocompensate the dc currents with a single ESS. In order to prevent the appearance of even-order harmonics in the input current during asymmetrical operation, an alternative switching sequence for the central converter is proposed. Results indicate that, without altering dramatically the charging process of the ESS, it is possible to cover the whole load scenario without the need of a balancing circuit. This allows the use of off-the-shelf products both for the rectifier and the fast chargers. In this paper, simulation and experimental results are presented to validate the proposed balancing strategy.

Keywords: Bipolar dc bus, electric vehicles, energy storage stage, fast charger, power balance management, three-level dc-dc converter.

I. INTRODUCTION

PLUG-IN ELECTRIC VEHICLESare considered under this category. Plug-in Hybrid Electric and BatteryElectric Vehicles, have emerged as the most probable successorfor conventional internal combustion engine vehicles. Despite of the increasing electricvehicle (EV) fleet, these vehicles still have to solve some shortcomingsbefore becoming a real alternative to transportation. The long recharging process of the batteries, limited mileagecapacity (typically below 200 km) and the lack of public fastcharging infrastructure are the main barriers to its widespread usage. To allow a large-scale penetration ofthis technology changes are required also from the grid pointof view, as the electricity demand will grow accordingly.

Nowadays, there is no real threat to the utility grid, as still the automotive industry is mainly sourced by the gasoline supply chain, but this will gradually will shift to a larger electricity consumption with transportation purposes, and if it is not addressed properly, the actual electric system will be unable to satisfy this demand.

In order to address the impacts of large-scale adoption of these vehicles in the utility systems, several studies have beencarried out, mostly based on the conventional slowcharging process of the batteries. This is mainly because,conventional charging is expected to remain as the

preferredcharging method, and also the fast charging process ofthe EV batteries is still not a widespread practice amongthe owners, due to the lack of facilities and misconceptionsregarding the impact of this process to the battery pack.However, fast charging methods are still essential for a large-scaleadoption of EVs, as it will provide more flexibility to thedrivers, occasional longer trips addressing range anxiety. Additionally, in order to reduce power consumption fromthe utility grid during peak consumption hours, the presenceof ESS in these stations is gaining attention.

An alternative to enable fast charging is in the form of fastcharging stations, which refers to the concept of having high powerfast chargers installed off-board, similar to gas stationslocated in public places. The structure of these chargingstations can either be with an ac-bus, where each charging unitis fed by its independent ac-dc stage, or each unit connectedto a common dc bus enabled by a single ac-dc stage with higher power ratings. Currently, fast charging is onlyenabled by standalone units, each one with its independentrectifier stage using the ac-bus concept.

However, considering the dc nature of the loads, the commonDC-bus configuration appears as the viable solution, andalso presents advantages in terms of cost, efficiency and size,as fewer power conversion stages are needed.Moreover, this structure facilitates the integration of distributedgenerators or energy storage systems (ESS).

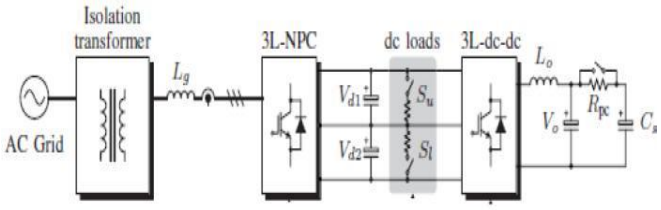

Figure 1.1 Proposed charging station architecture with balancing ESS

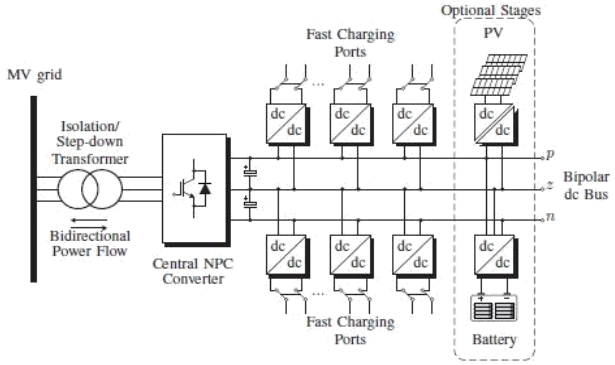

Figure 1.2 Proposed charging station architecture with balancing ESS

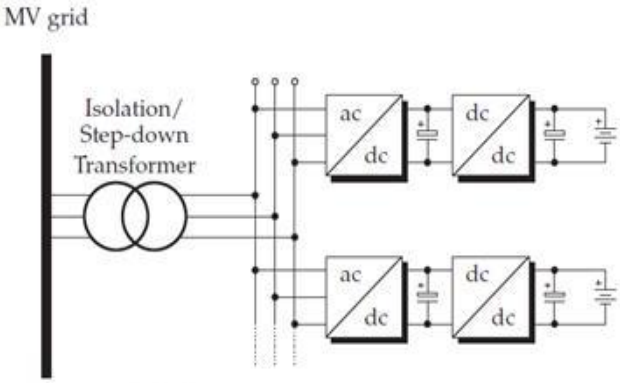

Figure 1.3 Common AC bus Charging Station architectures

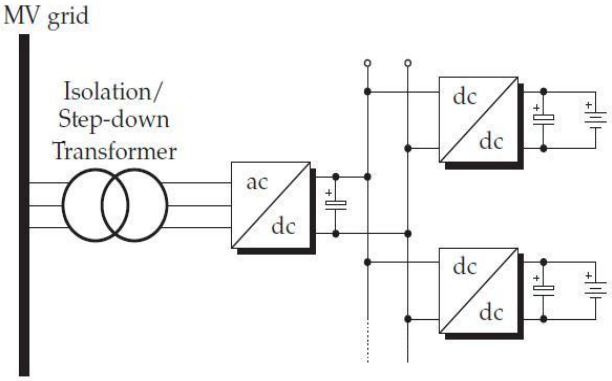

Figure 1.4 Common DC bus Charging Station architectures

II. THREE LEVEL NEUTRAL POINT CLAMPED CONVERTER/INVERTER

The diode-clamped inverter/converter was also called the neutral-point clamped (NPC) inverter because when it wasfirst used in a three-level

inverter the mid-voltage level was defined as the neutral point level.A three-level diode-clamped inverter is shown in Figure 2.1 and Phase-A three-level diode-clamped inverter is shown in Figure 2.2.

Some of the important features of diode clamped inverter are given below:

Low voltage power semiconductor devices: The m-level diode clamped inverter requires (m+1) active devices(GTO and IGBT's etc.) per phase and each active device will see a blocking voltage of (Vdc / (m-1)).Duty cycle of switching devices: The duty cycle of the power switches is different. So switches of differentcurrent rating have to be used for optimal design.

(a) Rating for clamping diodes: For five and higher level inverters, the voltage blocking capability of thediodes are different. So the diodes will have different voltage ratings. Assuming that the characteristics ofdiodes are identical, then multiple diodes of same voltage rating have to be used to achieve requiredvoltage-blocking capacity. Hence, for asufficiently large number of levels, the number of diodes requiredwill become too large and will make the circuit less reliable. Also power circuit layout and packaging becomes difficult.

(b) Capacitor voltage unbalance: The midpoint voltage is derived using capacitors and these carry load current. Unequal loading of the capacitors leads to imbalance in the dc bus capacitor voltages and this will cause the dc mid pint voltage to drift. This is not a serious problem for utility applications such as, static VARgenerators (SVG), active power filters, etc., where the inverters need to supply only the reactive power.

(c) High voltage surge: During turn off, the devices will experience a high transient over voltage and alsosnubbers are required to distribute the voltage across clamping diodes in a uniform fashion. The design ofsnubbers is complicated, as the current through these snubbers is bi-directional.

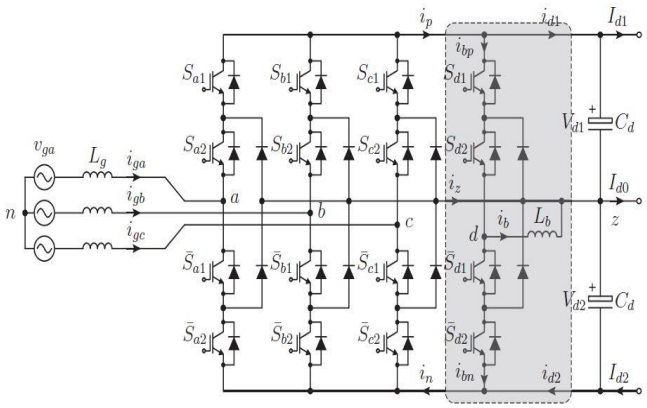

Figure 2.1 A three-level diode-clamped inverter(NPC)

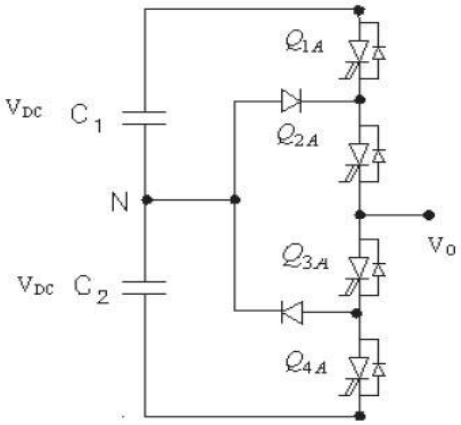

Figure 2.2 Phase-A three-level diode-clamped inverter (NPC)

Table 2. Switching sequence of the semi-conductor devices

Switches on	Switches off	Output voltage
Q1A, Q2A	Q3A, Q4A	+Vdc
Q2A, Q3A	Q1A, Q4A	0
Q3A, Q4A	Q1A, Q2A	-Vdc

A four leg three-phase NPC converter that acts as the grid interface is selected,because it offers superior harmonic performance and higher powerhandling capabilities. An additional leg is incorporated to act as abalancing circuit. The scaling of the system is thus made possible, which

inturn allows the extension the power level if needed.According to the correct performance of the NPC is guaranteed onlywith the accurate control of its midpoint voltage. Hence, multiple solutionscan be found, which usually solve the problem inthe modulation stage with the implementation of a simple balancing mechanism.It is important to note that these schemes are mostly designed consideringthat the system is being used as a unipolar dc bus, either as a rectifieror in back-to-back configuration. Consequently they are not able to keep this voltage controlled under the bipolar structure. Therefore, a balancing techniquemust be developed. Then, the system provides a bipolar dc bus, andeach voltage feeds different loads. As such, unbalanced operation is inherentin the system, given the selected dc architecture and the nature of theintended application. This is explained as follows, as a result of the circulationof current through the neutral point of the converter the dc voltages maybecome unbalanced. Such circulation is imposed by the asymmetrical loadof the dc buses. This effect can be mitigated by alternating the connection ofthe loads to the dc buses. Nevertheless, even if this connection is promoted,unbalance operation still occurs because of the random arrival of the vehiclesto be charged, different battery characteristic, different charging powers,and so on. Therefore, despite the modulation stage performs the balancingcorrections to keep the voltage controlled, the unbalanced scenarios that thesystemis able to overcome.

III. THREE LEVEL DC-DC STAGE FOR ESS

As stated earlier, in order to perform the balancing complementto the grid-tied converter, the ESS must have accessto both dc buses. Considering this requirement, a threeleveldc-dc converter will be used as the dc-dc stage. Thischoice is further justified by the reduced voltage stress onthe switching devices, allowing the use of conventional lowvoltage-rated switches; improved output current waveform andimproved efficiency in comparison to conventional two-levelbased topologies. Finally, for this particular application,it will only require the inclusion of a single energy storagestage, as it will be able to compensate currents in both of thedc buses as it will be demonstrated.

The power circuit of the selected topology is presented in Figure 2.1, where it can be seen that can has three input terminals that can be directly connected to the bipolar charging station.The converter is composed of four switching devices alongwith their corresponding freewheeling diodes, the input filtercapacitors Cd1 and Cd2, and an output inductor Lo andcapacitor Co for filtering purposes.

Considering its structure, the basic requirement thatVd1 = Vd2

= Vd, and the valid combinations of its switchingsignals, the converter generates four voltage states, which areresumed in Table I. Each state results in a different equivalentcircuit, as presented in Figure 3. These states are depicted asfollows: when the switches Sk1 and Sk4 are turned on, theoutput voltage Vo is equal to the total input voltage 2Vd;then when Sk1 and Sk3 are on, Vo becomes Vd; the same output voltage is generated when the switches that are on are Sk2 and Sk4; finally, when the inner switches Sk2 andSk3 are turned on, the output voltage is equal to zero. Pleasenote that the switching states V1P and V1N generate opposite neutral-point currents, revealing the balancing capabilities ofthe converter. For the remainder of the paper, these states willbe denominated mid-states.

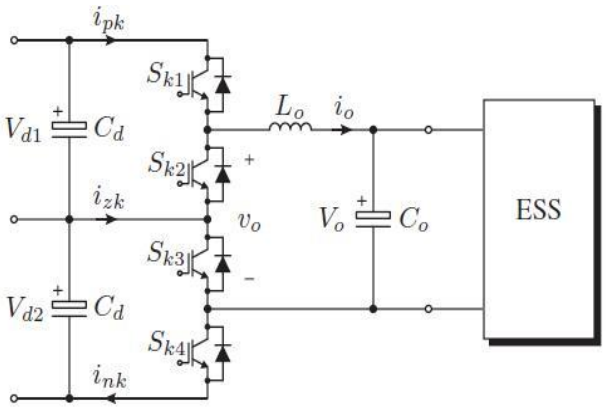

Figure 3.1 Circuit diagram for three-level dc-dc stage for ESS

Table 3. Switching sequence of semi-conductor devices

States	Switching State	Output Voltage	Neutral Current
V0	OO	0	izk = 0
V1P	PO	Vd1	izk < 0
V1N	ON	Vd2	izk > 0
V2	PN	2Vd	izk = 0

A. Operation Principle

From the circuit diagram in Figure 3.1, the operation of the outer switches Sk1 and Sk4 must be complementary to the inner switches Sk2 and Sk3, respectively, in order to avoid short-circuiting the input voltage sources. This means that the operation of the converter is regulated through two independent gating signals g1 and g4. The generation of these signals is usually done by the use of PWM modulators with phase shifted carriers. However, taking into account the generated switching sequence, it can also be synthesized by the single phase space vector modulation (SVM) approach.

The sequence will vary whether d ≤0.5 and d >0.5. Whereas, the duty cycle d is defined as usual, by the ratio between the output and input voltages, according to:

$$D = \frac{V0}{2Vi}$$

Where,

D= Duty Cycle

V0= output Voltage

Vi= Input Voltage

IV. SIMULATION CIRCUIT AND OUTPUT

The Simulation circuit for the electric vehicle charging station is shown in the below Figure 4.1.

Is important to highlight that despite the ESS converter is dramatically its operation, allowing to keep its main functionwhich is the charging and discharging of the energy bufferaccording to the selected energy management strategy. Furthermore,given the features of the three-level dc-dc converter,the minimal load condition does not impose a heavy restrictionon the ESS sizing, which means that its ratings are still setby the selected energy management approach. Experimentalresults using an ultra-capacitor stage have been carried out forthe validation of the method, but the concept can be extendedto different kinds of ESSs.Similar to the balancing method presented in, theproposed solution allows to keep high quality input signals,even under the presence of severe imbalances at the dc side.In addition, the alternate switching sequence allows to performthe complementary balancing while keeping the current freeof even-order harmonics.

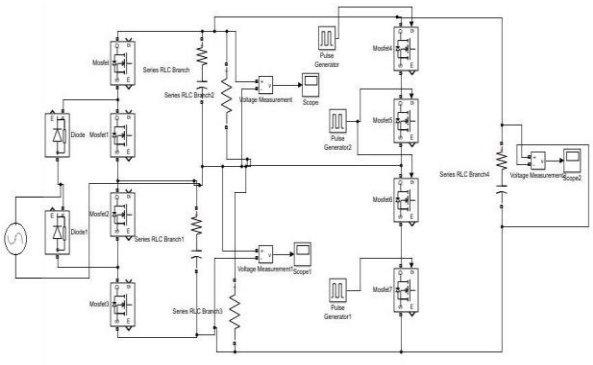

Figure 4. Simulation Circuit diagram forEV Station

Table 4. Expected Output as per Simulation Circuit
And Experimental Parameters

Parameter	Symbol	Value
Gird applied voltage	Vi	110V AC
Grid Frequency	Fg	50Hz
Output of the NPC Converter	Vd1	100V DC
	Vd2	100V DC
Input to 3Level DC-DC Converter	Vd	100+100V DC
Output of the 3Level DC-DC Converter	V0	200V DC

V. CONCLUSION

A different complementary balancing approach has beendeveloped and successfully validated, which takes advantagesfrom the optional stages that the distributed dc bus architecture allows. In this case, the presences of an energy storage stage, interfaced with a three-level dc-dc converter, allow the elimination of the balancing leg and provide the supplementarybalancing ability required. This leads to a reduction in theoverall cost of the charging architecture, as the requirementsfor the rectifier stage has been reduced, allowing to use off the-shelf equipment.

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Optimal Allocation of D-Statcom for Voltage Sag Mitigation Using an Anfis Based Approach For Ieee 30-Bus System to Improve Quality Enhancement

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ABSTRACT

DSTATCOM is one of the equipments for voltage sag mitigation in power systems. Voltage sag has been considered as one of the most harmful power quality problem as it may significantly affect industrial production. This paper presents an Artificial Neuro fuzzy inference system (ANFIS) based approach for optimal placement of Distribution Static Compensator (DSTATCOM) to mitigate voltage sag under faults. Voltage sag under different type of short circuits has been estimated using MATLAB/SIMULINK software. Optimal location of DSTATCOM has been obtained using a feed forward neural network trained by post-fault voltage magnitude of three phases at different buses. Case studies have been performed on IEEE 30-bus system and effectiveness of proposed approach of DSTATCOM placement has been established.

Keywords. Power quality, Voltage sag mitigation, DSTATCOM, ANFIS.

I. INTRODUCTION

Power quality is one of the most important topics that electrical engineers have been noticed in recent years. Voltage sag is one of the problems related to power quality. This phenomenon happens continuously in transmission and distribution systems. During a voltage sag event, amplitude of the effective load voltage decrease from 0.9 of the nominal load voltage to 0.1 in very short time [1] (less than one minute). Short circuit, transformer energizing, capacitor bank charging etc are causes of voltage sag. Most industries and companies prefer electrical energy with high quality.If delivered energy to these loads has poor quality, products and equipment of these loads such as microcontrollers, computers, motor drives etc are damaged. Hurt of this phenomenon in companies that dealing with information technology systems is serious. According to a study in U.S., total damage by voltage sag amounts to 400 Billion Dollars. For these reasons Power quality mitigation in power systems is necessary. Nowadays, Custom Power equipments are used for this purpose. DSTATCOM is one of these equipments which can be installed in parallel with Consumer awareness regarding reliable power supply has been growing day by day. Power quality is most common concern for power utilities as well as for consumers. Today, the world needs increased amount of quality power for its growing population and industrial growth. Voltage sag is a frequently occurring power quality problem. Voltage sag has been defined as reduction in the root mean square (RMS) voltage in the range of 0.1 to 0.9 per unit (p.u.) for duration greater than half a cycle and less than one minute. It may be caused by faults, increased load demand and transitional events such as large motor switching [2], [3]. Voltage sags (also known as voltage dips) can cause loss of production in automated processes, since a voltage sag can trip a

motor or cause its controller to malfunction. Such a loss can be substantial for semiconductor industries. Voltage sag can also force a computer system or data processing system to crash [4]. An outage is worse than a voltage sag for an industry, but voltage sag occurs more often and cause severe problems and economical losses. The voltage sags cause adverse effects on the performance of sensitive loads. Development of compensator to enhance power quality has been an area of active interest for the past few decades [4]-[7]. Passive compensators like shunt reactors and capacitors are uncontrolled devices and incapable of continuous variation in parameters. The emergence of custom power devices has led to development of new and fast compensators [4]. The custom power devices include compensators like Distribution Static Compensator (DSTATCOM), Dynamic Voltage Restorer (DVR), Unified Power Quality Conditioner (UPQC), Battery Energy Storage System (BESS), and many more such controllers. These devices may be quite helpful in solving power quality problems. However, due to high cost, and for effective control, they are to be optimally placed in the system. Graphics based models of DSTATCOM, DVR and Solid State Transfer Switch (SSTS) were developed using software packages PSCAD/EMTDC to study power quality enhancement and voltage sag mitigation [8]. Placement of DVR to mitigate voltage sag caused by source side imbalance and harmonics was considered [9]. A phase advance compensation strategy to inject optimum amount of energy from DVR to correct voltage sag has been considered [10]. Design of a 12-pulse DSTATCOM with feed forward compensation scheme was proposed in [11] to mitigate voltage sag and improve power factor. Adaptive perceptron technique to control voltage harmonics, unbalance and voltage sag using DVR has been suggested. Placement of DSTATCOM for mitigation of voltage sag and voltage flicker using Kalman filter and its derivatives has been considered. Phase adjustment in voltage injected by DVR has been proposed in to mitigate voltage sag and swell. Combined operation of UPQC and Distributed Generation (DG) has been suggested in [12] to mitigate voltage sag and other power quality disturbances. Placement of DSTATCOM and DVR has been considered in [13] to mitigate voltage sag and swell. A pulse width modulation (PWM) based scheme has been considered in [14] this work to control electronic valves used in DSTATCOM and DVR. A cascade converter based DVR has been considered [15], for mitigation of voltage sag. Implementation of discrete wavelet transforms using LC filters has been suggested [16] for operation of DVR to mitigate voltage sag [17], [18]. A DVR based on a five-level flying-capacitor operated by a repetitive control scheme has been suggested [19]. Placement of DVR in a small radial distribution system was considered [20]. In phase voltage injection by DVR was considered in this work [21]. A novel sag detection method for the line-interactive DVR has been presented [22]. Placement of UPQC with minimum active power injection has been considered [23]. A novel compensation and control strategy for Series Power Quality Regulator (SPQR) for voltage sag/swell and steady-state voltage variation reduction has been proposed [24]. Two topologies for DVR based on direct converters without direct current (DC) link have been presented. These topologies are effective in control of voltage disturbances such as sag/swell. The works presented have considered placement of custom power devices in small radial distribution systems. Very limited attempt seems to be made in optimal placement of custom power devices in interconnected power systems. Placement of Static VAR Compensator (SVC), Static Compensator (STATCOM) and DVR for voltage sag mitigation in a predominantly meshed sub-transmission network and a predominantly radial distribution network has been considered. However, placement of Flexible AC Transmission System (FACTS) controllers have been considered at an arbitrarily selected bus and no specific criterion has been suggested to determine optimal location of such controllers. Optimal placement of FACTS devices based on Nichiang Genetic Algorithm (NGA) has been suggested to minimize financial losses in the network due to

voltage sag. Optimal placement of FACTS controllers using genetic algorithm (GA) based optimization has been suggested to mitigate voltage sag in a meshed distribution system.

The Artificial Neural Network (ANN) based methodologies have been successfully applied in several areas of the Electrical Engineering, including detection of voltage disturbances, voltage and reactive power control, fault detections. In this paper, the ANN based approach has been applied to find the optimal location of DSTATCOM for voltage sag mitigation. The ANN was trained with Levenberg Marquardt back propagation algorithm. Since most of the sags in the power system are caused by shortcircuit faults in transmission and distribution network, fault simulations/studies have been historically the most popular tool for voltage sag estimation. Classical symmetrical component analysis, phase variable approaches, and complete time domain simulations are among widely used methods for fault simulation in power system. In the present work, time domain simulations have been done using MATLAB/SIMULINK software and voltage sags have been estimated under different type of faults. Case studies have been performed on IEEE 30-bus system.

II. DSTATCOM CONFIGURATION MODEL

In the present work, the DSTATCOM has been represented as three independentlycontrollable single phase current sources injecting reactive current in the three phases at the point of coupling. The proposed DSTATCOM model has been shown in Fig. 1. The control scheme consists of three control switches which can be set on/off as per compensation requirement. The maximum and minimum reactive power injection limit of DSTATCOM has been taken as +50 MVAR and -50 MVAR, respectively.

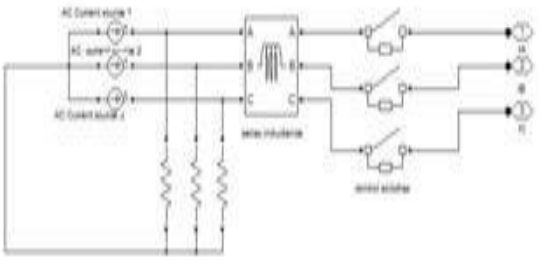


Figure 1. Proposed DSTATCOM configuration model

III. METHODOLOGY

The simulation model of the power system network under study is developed using MATLAB/SIMULINK. This model is used to find the three phase per unit (p.u.) voltages of all the buses of the network under different type of short-circuits viz. single line to ground (L-G), line to line (L-L), double line to ground (L-L-G) and three phase (L-L-L or L-L-L-G) faults. Post-fault voltages have been used to train a feed forward neural network with back-propagation algorithm. The training process is carried out with large no. of input and output target data. The normal p.u. voltages of the different buses have been considered as output target data. Once the network is trained, some data are used to test the network. The testing result provides information about most insecure bus of the system based on highest deviation from the target. The bus having highest deviation from the target data has been considered as the optimal location for the placement of DSTATCOM to mitigate the voltage sag problem.

IV. SIMULATION CASE STUDIES

The simulation model of IEEE-30 bus system composed of 30 buses and 37 lines was developed using MATLAB /SIMULINK software. The system consists of 6 generator buses including 2 shunts 4 transformers and 24 load buses. The total real and reactive power demand of the system are 283.40 MW and 126.20 MVAR, respectively.

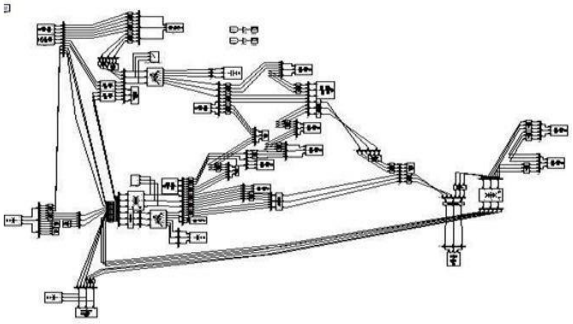
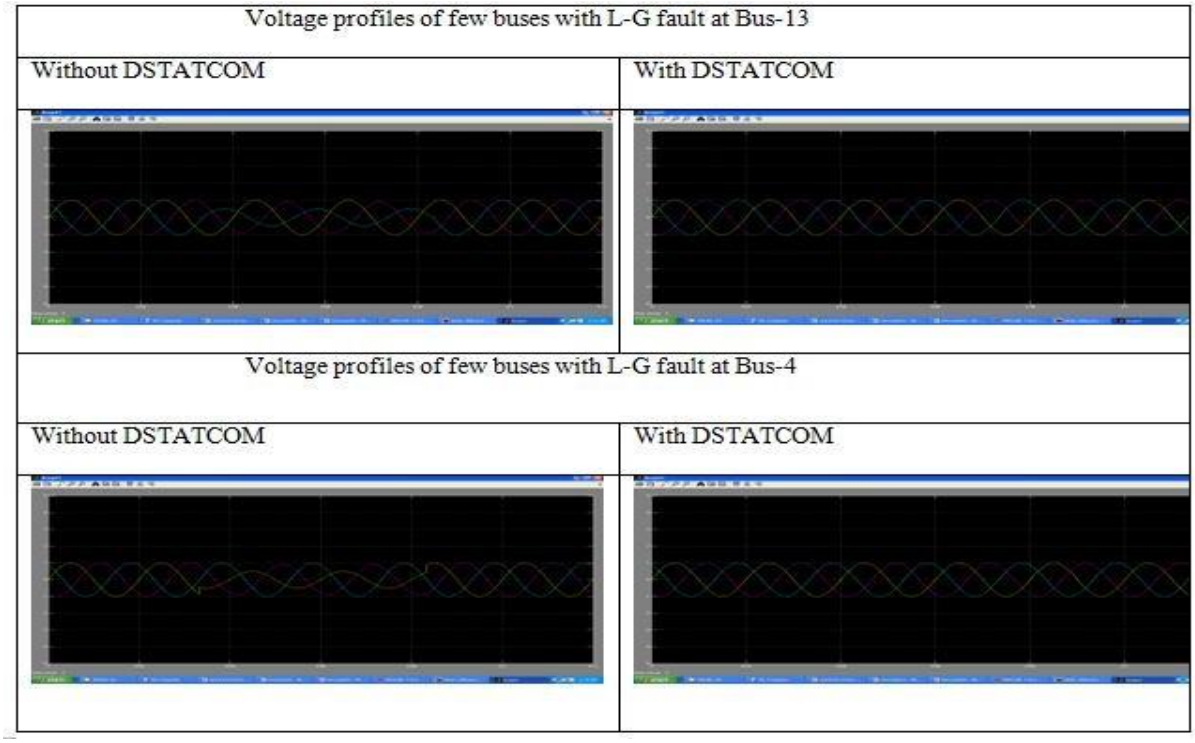
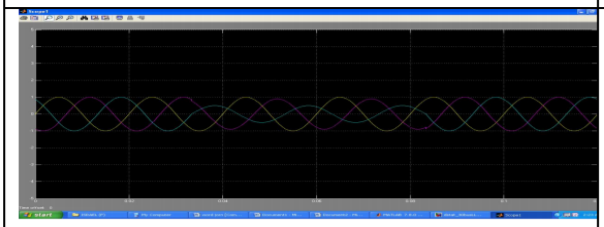
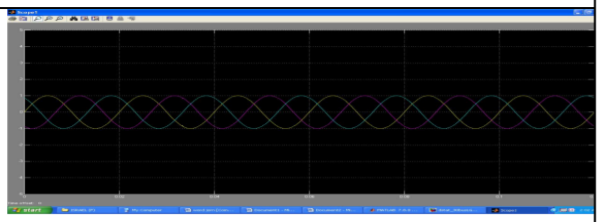
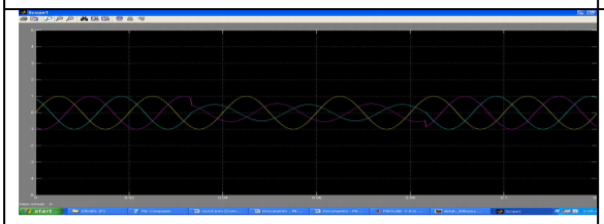
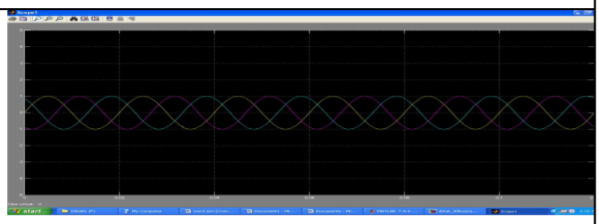


Figure 2. IEEE-30 BUS system (MATLAB/SIMULINK) model with DSTATCOM

The simulation block diagram of the system has been shown in Fig. 2. This plant model has been used for finding three phase bus voltages under different type of faults, and for the database collection to train the artificial neural network. The voltage database was prepared by creating L-G, L-L, L-L-G and L-LL- G fault at different buses during the period 33.33 milliseconds to 83.33 milliseconds.

The normal p.u. voltages of different buses (taken as 1.0 p.u. in this work) were considered as output target data. Some data were used to test the network and mean square errors (mean of squared deviation of post-fault bus voltages from target value) were calculated at different buses. The ANN training performance has been shown in Table 1. It is observed from Table 1 that bus-10 has the highest value of mean square error. Hence, bus-10 was considered as the optimal location for the placement of DSTATCOM. The DSTATCOM model proposed in section-2 of this paper was considered and its SIMULINK model was developed. Post-fault three phase voltages were plotted using MATLAB/SIMULINK software without DSTATCOM and with DSTATCOM at the optimal location (i.e. bus-10). Plots of voltage vs. time at some of the buses with faults at bus-4 and at bus-13, respectively, have been shown in figures 3, 4, 5 and 6 for L-G, L-L, L-L-G and L-L-L-G fault, respectively. It is observed from figures 3, 4, 5, 6 that placement ofDSTATCOM at bus-10 results in significant reduction of voltage sag under all type of short circuits.



Voltage profiles of few buses with LL-G fault at Bus-13	
Without DSTATCOM	With DSTATCOM
	
Voltage profiles of few buses with LL-G fault at Bus-4	
Without DSTATCOM	With DSTATCOM
	

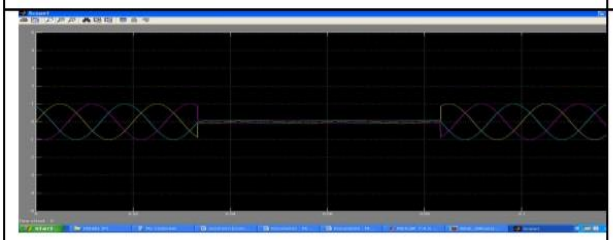
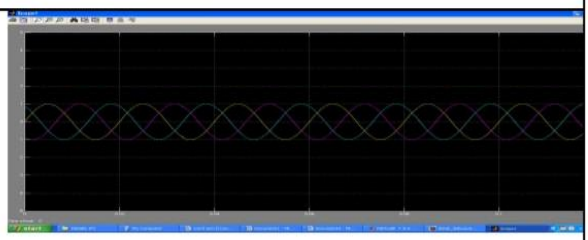
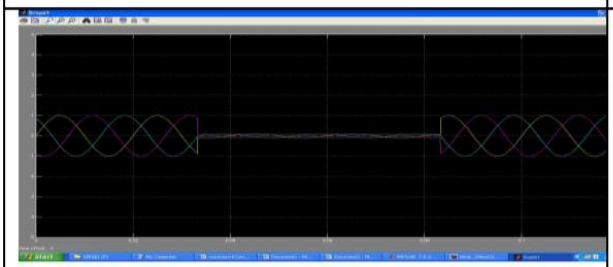
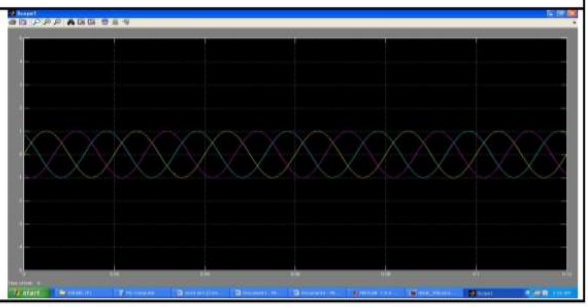
Voltage profiles of few buses with LLL-G fault at Bus-13	
Without DSTATCOM	With DSTATCOM
	
Voltage profiles of few buses with LLL- G fault at Bus-4	
Without DSTATCOM	With DSTATCOM
	

Table 1. Training performance of ANFIS at different buses

Bus No.	Mean Square Error
1	0.000006577
2	0.000002449
3	0.00001339
4	0.00004428
5	0.00002929
6	0.00001276
7	0.00007176
8	0.00001476
9	0.00004193
10	0.00001719
11	0.00000006025
12	0.00001329
13	0.00009752
14	0.00001339
15	0.0000005709
16	0.000005358
17	0.00007652
18	0.00004202
19	0.00001503
20	0.00007138
21	0.00001519
22	0.00000006143
23	0.00007649
24	0.0000001583
25	0.000009893
26	0.00000004603
27	0.00009498
28	0.00007325
29	0.00006018
30	0.00007178

V. CONCLUSION

In this paper, an ANFIS based approach has been presented for optimal placement of DSTATCOM controller to mitigate voltage sag in an interconnected power system. Case studies have been performed on IEEE 30-bus system with the help of MATLAB/SIMULINK software. The time domain simulations of post-fault voltages have been obtained with and without DSTATCOM. The optimal location of DSTATCOM has been obtained using proposed ANFIS based approach. The simulation results show that proposed approach of placement of DSTATCOM is quite effective in voltage sag mitigation under short-circuits. This approach is quite simple and easy to adopt.

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Energy Management System with Theft Monitoring Using GSM

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ABSTRACT

Electricity is one of the most popular forms of energy used in the modern society. Nowadays, electricity energy demands are increasing constantly. The availability electrical energy is also serious issue since demand is greater than generation. This paper proposes the Automatic energy meter reading with indication using GSM. It developed to decrease the electricity consumption bill by providing the energy meter reading to the user with an alert message before increasing of unit charge. By using this system save the time required for conventional billing system and minimized human work load. User and service provider both are get correct reading and bill amount. Theft of electricity also avoids late bill payment. By apply this system data security improve. Due to this system service provider quickly find out illegal and late bill paying customer by accessing database. So GSM based AEMR system is more efficient that conventional billing system.

Keywords: GSM, AEMR

I. INTRODUCTION

Traditional electricity billing process is very length and erroneous. Now a day energy meter reader goes to every premise and takes the reading manually then issues the bill. This requires huge number of labours and long working hours for billing. Visiting every consumer's home is something that causes a bit of inconvenience. For manual reading in different houses conditions vary leading to somewhat erratic results, especially when the meter is inside the home or in a hard-to- access place. All these lead to not so accurate billing. Which have some disadvantages like erroneous reading, easy manipulation, manual labour and time consuming. To avoid this difficult task, Automatic Energy Meter Reading (AEMR) system is introduced. In this paper we propose a method which uses GSM Network which eliminates the need of internet. "GSM Based Prepaid Energy Meter" system consists of Energy Meter and the GSM Network. The system provides efficient power meter reading, usage notification and consumers maximum demand using GSM network. GSM modem utilizes the GSM network to send equivalent unit for the recharge amount to the Microcontroller and send message to the customers also. The message consists of details of energy required to the customers in the terms of the unit. In the energy provider side this system is used to update the consumer account and the database.

1.1 Need for Automatic Energy Meter Reading Technology:

The meter reading data is sent by the home unit to the Electricity Board (EB) office through power lines. This saves lot of manual data entry needed for entering the data of meter reading into the central system. The power line communication used here is bi-directional. Sometimes the power lines may be

noisy due to interference of external disturbances. During such cases the data transmission may be interrupted and error may get introduce in data. To avoid this noise a dedicated micro controller is used to enable data transmission even in the noisiest power line and also at any weather condition. Also Automatic supply tripping and restoring is done under case of failure in bill settlement by customer. The automated EB billing procedure fulfills a set of needs for the user and the EB workers.

1. Automatic generation of Electricity Bill, consumed by the consumer.
2. Allow the user to get updated regarding the details of power used in his house.
3. The automated EB billing system eliminates the need to pay the bills at the EB office.
4. Automatic supply tripping and restoring under the case of failure in bill settlement by the customer.

II. SYSTEM DESIGN

2.1 Automatic Energy Meter Reading Technology:

In a developed system AT89S52 Microcontroller is used . The AT89S52 is programmed such that power supply will be switched off by using relay when the recharged amount get used up. A 16X2 LCD is providing to read units available. Main power supply is connected to the load with the help of the Relay when recharge message given to the controller through the GSM. When consumer sends a message for recharge a meter to the GSM, Microcontroller checks the number and turn on the relay. The main function microcontroller is to compute the power with help of energy meter and turn the Relay ON/OFF. Number of Units is displayed on the LCD screen. As the Units are low a SMS message will send out to the consumer registered number through GSM modem.

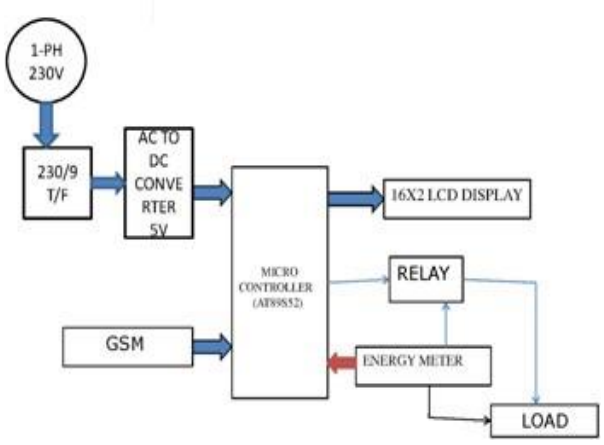

Figure 1

The first customer section consists of digital energy meter and control system. The output of the processor IC is a digital pulse, which depends upon the load used. These digital pulses are given as the input to the second section through the optocoupler. For every 100 pulse the micro controller receives it increases the number of units consumed by the consumer which is stored in the EEPROM. This is then displayed in LCD. The modem receives the input from the microcontroller and transmits it to the EB side. These are received by the modem placed in the EB side and sent to the PC. Hence the number of units consumed and the amount is displayed in the LCD. The GSM communication module is used to send a message to the consumer about the units of power consumed and their balance and also LCD display is used to display the balance amount.

III. HARDWARE ORIENTATION

The components of hardware implementation are as follows:

3.1 Power supply:

Power supply is main component of the meter. Power supply is provided to microcontroller and other device from direct ac lines or from AC to DC adapter.

3.2 AT89S52:

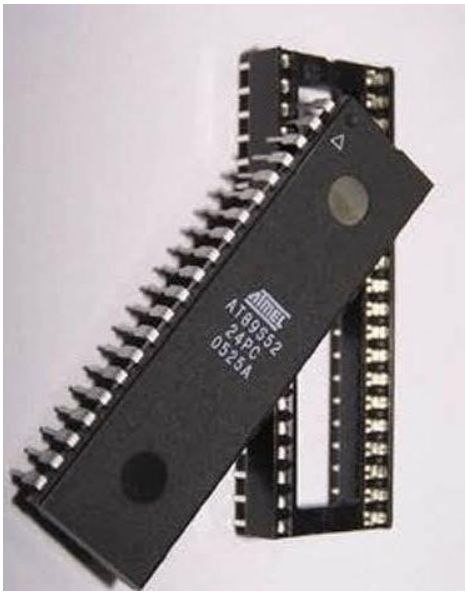

Figure 2

The AT89S52 is the heart of the system. It has low-power, high-performance 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. It controls the LCD display, generate interrupts, and the power line communication unit. Microcontroller is connected with optocoupler, EEPROM, power line MODEM and LCD. The EEPROM is used to store the output of the microcontroller permanently. The MAX232 interface is used to control the speed of data transfer between MODEM and the microcontroller.

3.3 Energy meter:

Figure 3

The ADE7751 is a high-accuracy, fault-tolerant electrical energy measurement IC that is intended for use with 2- wire distribution systems. It is electrically fed and composed of electronic controllers. It incorporates an interface which allows data to be transmitted from the remote terminal to the isolator block.

3.4 LCD Display [2*16]:

Figure 4

LCD means Liquid Crystal Display. It is a display device which displays the information provided to it. Its shape and size varies from application to application.

3.3 EEPROM AT24C04:

AT24C04 provides 4096 bits of Serial electrically erasable and programmable read-only memory (EEPROM). It is two-wire Serial Interface. Filtered Inputs are present for Noise Suppression.

3.4 Relay

Figure 5

Relays are used to control a circuit by a low power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults.

Figure 6

GSM

The term GSM stands for Global System for Mobile application. A GSM Modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator. When GSM Modem is connected to a computer to use the GSM Modem to communicate over the mobile network. While these GSM Modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages.

IV. SOFTWARE REQUIREMENTS

4.1 KEIL Compiler:

KEIL an ARM Company makes C Compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards. Compilers are programs used to convert a High Level Language to object code. Desktop compilers produce an output object code for the underlying microprocessor, but not for other microprocessors.

4.2 AT Commands:

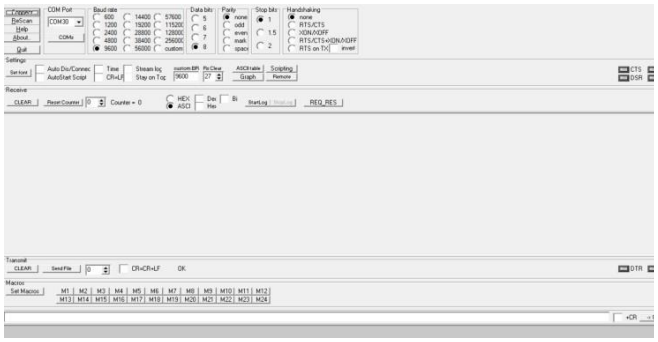

Figure 7

AT Commands are instructions used to control a modem. AT is the abbreviation of Attention. Every command lines start with "AT" or "at". That is the reason, modem commands are called AT Commands. Besides this common AT command set, GSM modems and mobile phones support an AT command set that is specific to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages).

V. RESULTS

When power supply is given to the controller and controller take the readings from meter and send SMS to the user after every month. Below snaps are taken before utility off and on and when power supply on it will sends bill and consumed units to the user. When user not paid the counter will reaches to zero and power will off that is shown in below snap shot.

Figure 8

Figure: Sending messages to the user when supply is on and sends alert message before increasing unit charge.

VI. CONCLUSION

Smart energy meter with reading indication has been developed by using GSM. Which is more useful to consumer for billing and maintaining less

bill payment and it decreases the human needs for paying and other issues related to billing. We can extend it for industrial purposes also by interfacing three phase meters but the circuit have to modify for getting proper voltage to the controller.

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An Uncertainty Model Approach for Detection Of Power Quality Disturbances

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ABSTRACT

Now a days, the analysis and detection of various power quality disturbances are widely required due to increasing use of sensitive control in most of the devices at all consumer levels. The various power quality disturbances that occur in distribution and transmission systems are voltage sag, voltage swell, harmonics, interruption, transients, spikes, notch etc. these disturbances can occur due to switching off large loads, use of solid state switching device, arc furnaces, transformer energization, capacitor switching, lightning strikes and use of electronically switched loads such as rectifiers or invertors. Poor power quality can cause malfunctioning of protective relays, can affect the accuracy of utility metering, loss of data and can result in equipment damage resulting in a loss of productivity. In order to improve power quality, these disturbances need to be identified before taking appropriate mitigating action. In this paper we have created the power quality disturbances using uncertainty model approach in MATLAB/SIMULINK. Then the detection of disturbances is one using RMS method.

Keywords: power quality, Disturbances, Detection, uncertainty model approach, RMS method.

I. INTRODUCTION

IEEE Standard 1100 (IEEE 1999) defines power quality as the concept of powering and grounding sensitive electronic equipment in a manner suitable for the equipment.

The Power Quality requirement is one of the most important issues for electrical utilities of consumers. The equipment used in modem industrial and

commercial plants such as process controllers, programmable logic controllers ,Adjustable speed drives ,robotics ,computers etc. are actually becoming more sensitive to PQ disturbances such as outages, voltage sag, voltage swell, harmonics, transients as the complexity of the equipment increases[1]. voltage notch. The causes and effects of other PQ disturbances are discussed in chapter

Occurrence of these power quality disturbances can lead to loss of information, can cause malfunctioning of data and protective relays, can damage sensitive equipments, cause problems with electromagnetic compatibility (EMC) and noise.

This gives rise to implementation of Power Quality analysis and detection methods. For analyzing various disturbances it is necessary to first generate the PQ disturbances which can give results similar to that of real time waveforms. This can be done either by using simulation blocks in SIMULINK or by programming mathematical equations for each and every fault in MATLAB/SIMULINK.

After creating the PQ disturbances the SIMULINK model should be able to detect the particular disturbance occurring in the system and should also classify it based on the conditions prescribed. For this purpose RMS technique, S transform, wavelet transform technique, etc can be used.

In this paper we have used numerical equations of uncertainty model approach for creating the disturbances like voltage sag, voltage swell, transients, harmonics, flicker and interruption. RMS technique has been used for detection and classification of disturbances in MATLAB/SIMULINK.

II. PQ DISTURBANCES

PQ disturbances can be described either in terms of voltage or current. These disturbances are characterized by system voltage and frequency. The various power quality disturbances are voltage sag or voltage dip, voltage swell or over voltage, harmonics, flickers, transients, voltage fluctuations, notch, spike, etc.

Faults taking place due to sudden switching of large loads on consumer side and the faults in transmission lines of network cause voltage sags and voltage swells. Lightning strikes on the network cause transients in the system which is a sudden momentary rise in voltage magnitude.

The simultaneous operation of switches in converter during commutation cause two phase short circuit which lead to voltage loss. This loss in voltage result in disturbances called

A. Voltage Sag

According to IEEE Standards 1159-1995 sag can be defined as a decrease to between 0.1 and 0.9 p.u in root mean square (RMS) voltage at the power frequency for durations of 0.5 cycles to 1 min.

Voltage sags can be caused in transmission systems due to weather, construction accidents, transportation accidents, due to nesting habits of birds which introduce phase to ground Faults.

Voltage sags in distribution systems are caused due to sudden opening and closing of circuit breaker contacts. These faults can be three phase, line-to-line, or single line-to-ground. These three phase faults are relatively unusual but can be most severe when occurred.

Some of the effects of sag on equipment are malfunction of programmable logic controllers, disconnection of adjustable speed drives with subsequent shutdown and production losses, tripping of under voltage relays. The voltage dip condition can last until the large current demand decreases, or till the fault is cleared by any of the switchgear equipment [2].

B. Voltage Swell

According to IEEE Standards 1159 it is defined as an increase to between 1.1 pu and 1.8 pu in RMS voltage or current at the power frequency durations from 0.5 to 1 minute. The swell can be divided into three main classes namely; instantaneous swell, momentary swell and temporary swell.

Single line-to-ground faults lead to occurrence of voltage swell in system which can also result in a temporary rise in voltage in other unfaulted phases. Swells can also be caused due to switching on large capacitor banks, or by sudden decrease in load.

The occurrence of voltage sag can cause immediate or long-term breakdown of components because of overheating, can damage the different lightings, sensitive loads which in turn cause shut down of the equipment.

C. Harmonics

Harmonics are sinusoidal voltages or currents having frequencies that are integral multiples of the

fundamental frequency. They are mainly caused by the non-linear loads such as rectifiers and other power conversion equipment.

Other sources of harmonics are rapid use of energy conversion devices such as electronic chokes for tube lights, supply system converters and tractions regulators for electronic fan, etc. These lead to occurrence of harmonics in domestic and industrial sectors. The major effects of harmonics are: heating effects in power handling equipment, disruption of operation of electronically controlled equipment [3].

D. Transients

Transients are undesirable and momentary events in power system. They can be classified as oscillatory and impulsive transients.

Impulsive transients are sudden non power frequency change in the steady state condition of voltage, current or both that is unidirectional in polarity. These have very fast rise and decaying time. Oscillator transients are sudden non power frequency change in the steady state condition of voltage, current or both that include both polarity values. The causes of these transients are lightning, load switching and capacitor switching.

These transients are of large voltage magnitude which may spoil the normal operation of sensitive electronic devices.

E. Flicker

Voltage fluctuations also called as flicker is much defined problem as it is related to human eye perception and luminous light bulbs.

The major causes of flicker in transmission and distribution systems are arc furnaces and welding machines. As human beings are very sensitive to flash caused by flickering, it is important to analyze this disturbance and use necessary methods for reducing it.

F. Interruption

A voltage interruption is defined as a large decrease in RMS voltage to less than a small percentile of the nominal voltage, or a complete loss of voltage.

Voltage interruptions may be caused due to accidents like faults and component malfunctions, improper maintenance and continuous operation of circuit breakers and fuses. They can also occur due to scheduled downtime. The power system faults, equipment failure, and control functions are the consequences of interruption.

III. UNCERTAINTY MODEL APPROACH

Modeling uncertainty conditions in utility calculations can be done using either of the two approaches. The first approach is a probabilistic approach and the second is called as "Unknown but Bounded". In probabilistic approach assumption of probability distributions is required whereas in the second approach assumption of upper and lower limits on the uncertainties without a probability structure is required [4].

In probabilistic method all the values are assumed to be equally distributed between given limits. This is assumed so, because no particular distribution is known.

Interval mathematics provides a tool for the practical implementation and extension of the unknown but bounded concept. Mathematical equations are used to generate Power Quality signals so that the real time signals are represented accurately [5]. The software programs for generation of PQ disturbances are governed by standard definitions for events as given in Table 1.

In this paper numerical models are used for creating various disturbances. The advantage of using this method is that the results obtained from this closely depict the real-time disturbances. These disturbances are characterized by their magnitude,

duration and frequency and are simulated over the defined parameters range.

IV. DETECTION METHODS

After the disturbances are created using numerical models, a SIMULINK model should be created for classification and detection of these disturbances. RMS measurement, Peak Detection Method, Point to Point Comparison, Fast Fourier Transform, Wavelet Transform and S Transform techniques can be applied for the purpose of detection of PQ disturbances.

Fast Fourier transform (FFT) technique can correctly identify the magnitudes and phase of harmonic components present in the voltage signal. But the disadvantage of this technique is that it does not give the time information of the harmonics in the signal. RMS value technique is applied to overcome this drawback. But measuring of RMS of the signals is affected by the instant at which the disturbances occur thus introducing an error in the calculated duration of disturbance.

Wavelet Transform (WT) and S-Transform (ST) techniques can detect these disturbances accurately with accurate magnitude and time information. Depending on the types of signal, continuous wavelet transform (CWT) and discrete wavelet transform (DWT) can be employed. For simplicity, RMS value technique is used for detection and classification of the PQ disturbances in MATLAB/SIMULINK.

Root mean square (RMS) is commonly used in power systems as it is an easy way of accessing and describing variables like voltage, current, etc. The discrete RMS voltage within a window is calculated as:

$$= \sqrt{}_N{}^1 \underline{\sum^N{}_{i=1} x_i{}^2}$$

Where, Xi sample value at i^{th} instant and N is the number of sample per window length. The window length is generally a cycle or half a cycle.

The RMS values can be continuous type or discrete type. If the values are updated every time a new sample is obtained, then the series is called continuous RMS series. If the values are updated with certain time interval, then the obtained RMS series is called discrete. Advantage of RMS value method is its simplicity, speed of calculation and less requirement of memory, therefore it is the most commonly used tool. The RMS values can be stored periodically instead of sample per sample. Dependence on window length is the disadvantage of this method [6].

V. MATHEMATICAL MODELLING

Real-time PQ disturbances are difficult to capture. Usually, signals of these disturbances are produced by simulation for analyzing them. In this paper six types of PQ disturbances are produced by using mathematical modelling i.e. by using uncertainty equations. The advantages of using uncertainty equations are we can vary signal parameters over a wide range in a controlled manner.

Also it is very easy to obtain the samples in a large extent. All uncertainty equations are numerically solved and an algorithm is developed to solve the problem by making use of MATLAB programming. These disturbances can be modeled by considering either transmission system or distribution system. In this paper we have considered distribution system of 230V corresponding to 1 pu for duration of 500 to 700ms.

The numerical models and range of parameters used for creating disturbances are given below:

Table 1. Numerical Modelling Of Pq Disturbances

PQ Disturbance	Numerical Model	Parameters
Pure Sine	V(t)=A sin(ωt)	A=1(pu);ω=2π50 rad/sec
Voltage Sag	V(t)=(1-α(u(t-t1)-u(t-t2)))sinωt	0.1 ≤ α ≤ 0.9, T ≤ t2-t1 ≤ 9T
Voltage Swell	V(t)=(1+α(u(t-t1)-u(t-t2)))sinωt	0.1 ≤ α ≤ 0.8, T ≤ t2-t1 ≤ 9T
Harmonics	V(t)=α1sin(ωt)+α3sin(3ωt)+α5 sin(5ωt)+α7sin(7ωt)	0.05 ≤ α3, α5, α7 ≤ 0.15, $\Sigma\alpha i^2$-1
Flicker	V(t)=(1+αsin(βωt))sin ωt	0.1 ≤ α ≤ 0.2, 5 ≤ β ≤ 20 Hz
Interruption	V(t)=(1-α(u(t-t1)-u(t-t2)))sinωt	0.9 ≤ α ≤ 1.0, T ≤ t2-t1 ≤ 9T
Transients	V(t)=0.5*((1-A1*(u(t-t1)-u(t-t2))).*sin(2*pi*f/Fs*t)+(1-A2*(u(t-t3)-u(t-t4))).*sin(2*pi*f/Fs*t))	0.1 ≤ α ≤ 0.8, 0.5T ≤ t2-t1 ≤ 3T, 8ms ≤ ≤ 40ms, 300 ≤ fm ≤ 900 Hz

VI. SIMULINK MODEL

As mentioned above, simulation is necessary for the detection and classification of PQ disturbances like sag, swell, transients, flicker, harmonics and interruption. In this paper RMS value technique is employed for this purpose. It

is implemented in MATLAB/SIMULINK by interconnecting if else blocks, if else subsystems and RMS blocks. This makes the implementation of RMS method simple and can be understood easily.

If block, along with If Action Subsystem blocks containing an Action Port block, implements if-else logic to control subsystem execution. Logical operands should be given to input port and the output should be connected to action port of If Action Subsystem block.

The RMS block computes the true root mean square (RMS) value of the input signal and the value is calculated over a running average window of one cycle of the specified fundamental frequency. The initial RMS value is assumed to be zero.

At first, the if else block is fed with two input values one of which is the RMS value of sine wave that is 0.707 and the RMS value of any disturbance obtained for a duration of to 700 msec is given as the second input. The blocks mentioned above are interconnected in such a manner that they perform continuous, iterative looping thus comparing the reference RMS value with the input values continuously.

At the end of this iterative comparison the disturbances are classified based on their RMS values and the RMS value of the disturbance occurring in the system will be displayed in the display unit. The Display block shows the value of its input and the display format can be short, long, short_e , long_e or bank. The SIMULINK model is as shown in fig 1

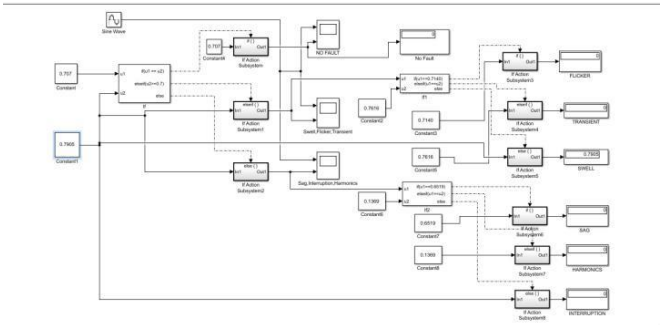

Figure 1. Model for classification of PQ disturbances using RMS values

VII. RESULTS

The resulting waveforms of the PQ disturbances obtained by using numerical modeled equations in MATLAB/SIMULINK are shown in below. The disturbances are modeled for duration of 500 to 700ms

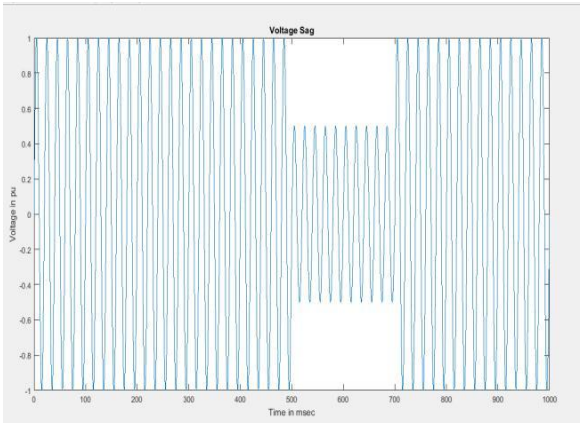

Figure 2. Voltage Sag

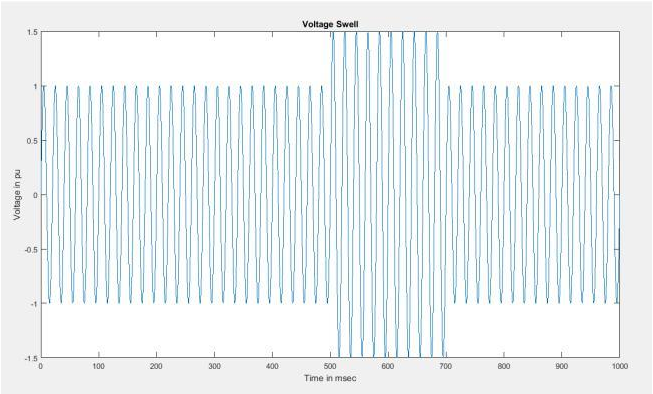

Figure 3. Voltage Swell

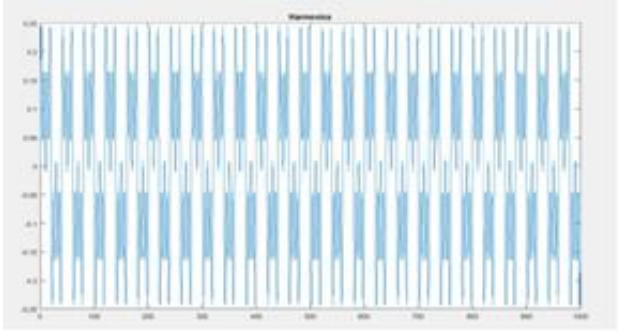

Figure 4. Harmonics

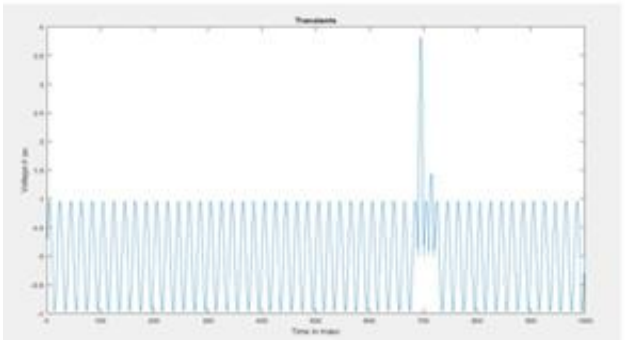

Figure 5. Transient

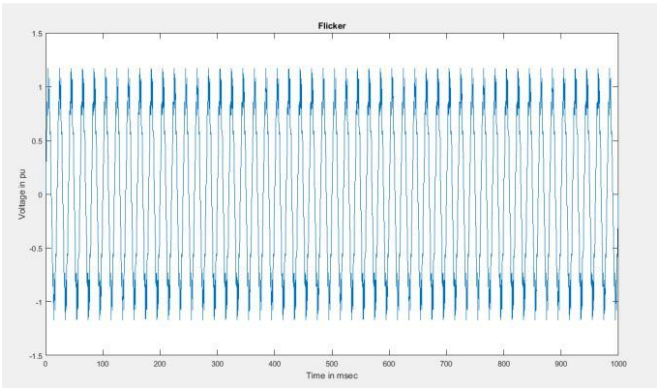

Figure 6. Flicker

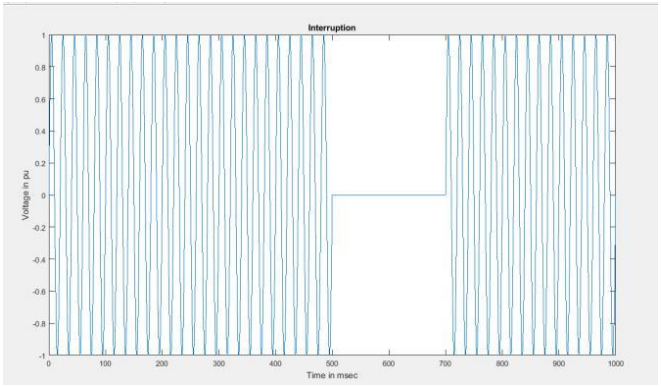

Figure 7. Interruption

VIII. CONCLUSION

Due to increasing use of sensitive electronic equipment in almost all applications, the necessity of analyzing and detecting the various Power Quality disturbances has gained more importance.

Faults occurring in transmission line due to natural calamities like lightning, felling of trees, nesting of large birds etc introduce certain PQ disturbances like interruption, voltage flicker, etc. Faults in distribution systems are caused due to sudden switching on large loads, continuous opening and closing of circuit breaker contacts, etc.

These PQ disturbances are uncertain and can occur anytime at any location in the power grid and can lead to severe damage to equipment and loss of data. Therefore, it is important to use different methods for analyzing and detecting the disturbances based on which corresponding mitigation techniques can be applied. For better accuracy in detection of PQ disturbances other techniques like s-transform and wavelet transform can be used

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Hybrid Filters for Power Quality Improvement

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ABSTRACT

The power quality problems would reduce the lifetime and efficiency of the equipment. The highly dependent end user equipment will be affected by quality of power delivered. However, the various external and internal factors have an effect on the eminence of power distributed to the end user. They are like voltage and frequency variations, faults, harmonics, outages etc. Thus, to improve the performance of end consumer equipment and the system these problems should be minimized or completely cancelled out. The main affect caused by these problems is the existence of harmonics (both current and voltage harmonics).The solution to overthrow these problems is to filter out the harmonics. In this paper a hybrid filter of shunt active filter and shunt passive filter configuration is used. And also the paper confers the hysteresis control strategy to control the filter in such a way that the harmonics are reduced. The proposed control strategy and overall power quality improvement technique is simulated in MATLAB SIMULINK and the results are presented.

Keywords: Harmonics, Non-linear load, Active power filters, Hybrid filters.

I. INTRODUCTION

Power quality improvement is one of the major analyzed case in modern power distribution system. Around twenty years ago, only passive loads and loads which are linear in nature were only installed in industries and at consumers end. The impact on power system due to non-linear loads was low due to their less usage. By means of introduction and advancement of semiconductor as well as power electronic appliances and their easy controlling techniques has resulted in wide use of nonlinear loads for example chopper, inverter, switched mode power supply(SMPS), rectifier, etc. The power in the circuit is high when modern power electronics apparatus like silicon controlled rectifier (SCR). Insulated gate bipolar transistor (IGBT), power diode, Metal oxide semiconductor field effect transistor (MOSFET) be used, which endorses their industrialized and domestic applications. Along with that, in order to increase the power factor and efficiency of wind solar and other non-conventional sources of energy different kinds of power electronic apparatus are used. While the benefits of using above devices are undoubtedly good but there also exists few disadvantages that arise due to enormous utilization of such power electronic devices. The usage of above mentioned semiconductor devices would result in harmonics and reactive power disturbances. And causes diversified problems that include excessive heating of transformers, immeasurable neutral current, low power factor, and distortion of feeder voltage problems to power electronic appliances and defects in sensitive equipment. To reduce or cancel out the harmonics in the power system, active power filters (APF) are equipped by the side of Point of common coupling (PCC). APF introduces compensating current at PCC

to reduce the harmonics and to keep the current from source to be sinusoidal in nature. By installation of active power filter, harmonic pollution and power factor at lower value in the power system can be enhanced. Although APFS are extensively used in three phase system, with some alteration in the control strategy it could be enabled in the single phase system, thus harmonic problems can be minimized for low voltage system. Figure 1 depicts the general block diagram oh hybrid filter with SAPF and shunt passive filter connected at PCC of a 3 phase system.

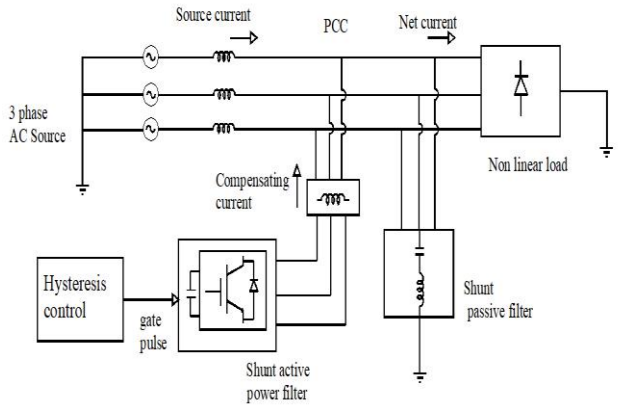

Figure 1. Block diagram of Hybrid filter connected to a System

II. PROBLEM DEFINITION

Harmonic problems in low voltage side is more important compared to high voltage side which is because of wide use of nonlinear loads (Computers, battery charger, Printers , SMPS, Inverters etc.), which is disagreeable. It would be necessary and also a challenge to reduce or completely invalidate the inadmissible current harmonics and satisfy the reactive power fulfillment in the power system. As the presence of harmonics or any other power quality problems in a system causes severe problems such as increase in losses and consequent heating of transformer and rotating machines, errors in energy meter[1]. The works of conventional proceedings i.e., the use of LC filter are not satisfactory due to its deliberate demerits. The hybrid filter contributes encouraging outcomes compared to prescribe one based upon suitable control system. The control strategy used plays an important job for enhanced dynamic performances of the SAPF in the hybrid filter.

III. OBJECTIVES

- ✓ To discuss about harmonics and its disadvantages that arises due to operation of non-linear loads.
- ✓ To study different control strategies that has been estimated for controlling a 3 phase SAPF.
- ✓ Design of hysteresis current controller.
- ✓ To model and simulate three phase APF in MATLAB/SIMULINK software.
- ✓ To model and simulate hybrid filter in MATLAB/SIMULINK environment.

IV. METHODOLOGY

The influence of voltage or current harmonics will affect characteristic of power distributed to end user. Consecutively to minimize the current harmonics, filters is used at PCC, where the load is associated to the supply. Different types of filters are available to serve this purpose.

A. Passive Filters

These filters mainly comprise of passive elements like-capacitor, inductor and resistor. These are generally utilized for the reason that their low cost and simplicity in control. The passive filters also afford reactive power despite of only filtering the harmonics. The operation of these filters is mainly depends on the system impedance. These are categorized into two types- low pass and high pass. Usage of passive filters is limited due to origin of resonance and not suitable for variable loads. They provide low impedance path to the harmonic current to flow so that high order harmonics will be reduced.

B. Active Filters

To overcome or to completely reduce the negative aspect of passive filter, active compensation known

as Active Power Filter is prominently employed. VSI or SAPF would inject the compensating current or voltage based on the network configuration. But it increases the cost of the project while using high rated active filters. The injected compensating current will be phase reversal with the harmonic current so that it cancels out the harmonics [4].

C. Hybrid Filters

On using both active and passive filters, both of its advantages can be obtained simultaneously. Among different configurations hybrid filters, a shunt active and shunt passive filter configuration is used [5]. The SAPF insisted for the power quality improvement is admitted as a Voltage Source Inverter (VSI). Either a three-phase VSI or a three single-phase VSI can be used. The VSI will be connected in parallel with the source impedance. A capacitor is used at the input of the voltage source inverter or active power filter to provide constant input voltage to VSI. A high order passive filter is also allied at the PCC. In some definite instance there may be two or more LC branches adjusted to eradicate some of the specific harmonic order (say 5th and 7th order harmonics). Thus, with a proficient control strategy, the APF counterbalances the current distortion. The control strategy is designed or premeditated such that the SAPF along with the passive filter acts as a balanced resistive load on the overall system. In a four-wire system, the harmonic currents distributed in the neutral wire are also diminished due to shunt active power filter. Figure 2 illustrates the circuit diagram of hybrid filter connected to the system which is also employed for modeling and simulation.

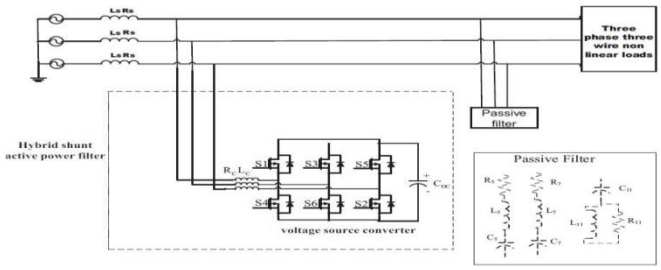

Figure 2. Circuit diagram of Hybrid filter connected to a System

D. Hysteresis Current Controller

The controlling pattern of the inverter is generated by the hysteresis band current controller. There is abundant current restrain technique, but fast current controlling ability and effortless implementation formulate the hysteresis current control method much more advanced or better quality than any other current control routine. The injection of compensating current by SAPF is controlled by providing gate pulses to the switches in the inverter. The controller compares between the reference current and actual current in the SAPF and generates gate pulses [3]. The accuracy of the controller will be enhanced if the operated band width is smaller. When current happen to be higher than the scheduled high limit of the hysteresis band (+h), then switch in the top part of the inverter arm happen to be turned off and the switch assigned in the lower arm turns on. Hence, the current initiates to decline. While reducing if the current reduces below the lower limit of the hysteresis band (-h), the lower switch of the inverter arm turns to off condition and the other switch goes into on condition. As a result, the current returns back into the hysteresis band. So, the actual current would compulsorily go after the reference current within the hysteresis band. Variable switching frequency is the drawback of this technique.

E. Instantaneous Reactive Power Theory

The "Generalized Theory of the Instantaneous Reactive Power in Three-phase Circuits", also recognized as the p-q hypothesis, is an appealing method to be used to be in command of APF, and also to examine 3 phase power systems in sequence to become aware of tribulations associated to harmonics, reactive power and unbalance. The p-q theory can be employed to 3 phase system either balanced or unbalanced , being lesser in complexity it does not require phase angle of the system to calculate the reference current or to calculate active and reactive power components of the load[2]. The main aim of using power theory is to generate the reference current which is to be supplied to

controller. The p-q theory executes a conversion of voltage and current from a stationary reference system i.e., a-b-c coordinate to a system with co-ordinates α-β-0 corresponds by an algebraic transformation, well-known as **Clarke transformation,** even which engenders a stationary reference system, in where coordinates α-β are at 90° to each other and coordinate 0 is the zero-sequence component. The zero sequence component computed at this point fluctuates from the one gained by the symmetrical components transformation by a √3 factor.

V. MODELLING AND SIMULATION

Simulink model of a 3 phase system supplying a non-linear load is as shown in Figure 3. The nonlinear load selected here is a three phase full way rectifier as it seen in every electronic device which we use in day to day life. The model i.e., without connecting any filter to PCC or without usage of any power quality technique has been run for 0.2 seconds in MATLAB/SIMULINK software. By using FFT analysis the THD of a system can be obtained as shown in Figure 4, here which can be observed as 30.26%.

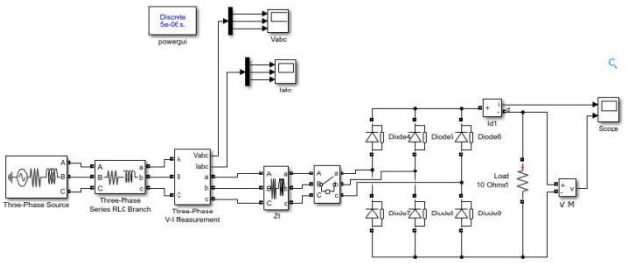

Figure 3. Simulink model of a 3 phase system with a non linear load

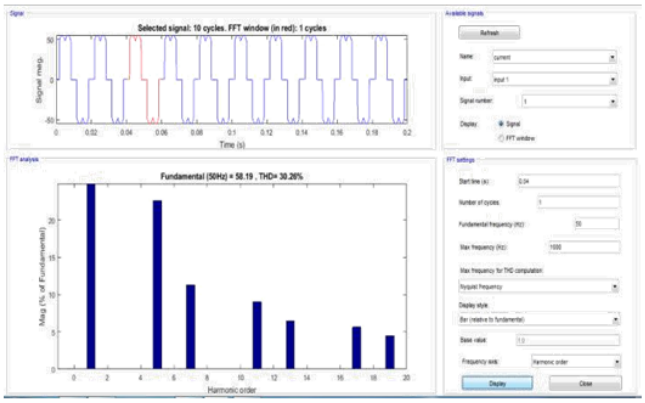

Figure 4. FFT analysis of the system without any filter

When the 3 phase shunt active filter is connected to the circuit then there will be large inrush current which is minimized by the DC link capacitor. The controller used is system current controlling the principle is explained by graph when the current should not run the upper or lower bend it should be within reference current. The shunt active filter connected to the circuit will inject a current such that it is in phase reversal with the source current. The THD of the system when active filter was connected would reduce to 5.10% for phase A. The Simulink model of the system with SAPF is as shown in Figure 5. The PQ theory and hysteresis current controller block is as shown inFigure 6. Through FFT analysis, the THD of the source current when only SAPF assisted to the system is shown inFigure 7.

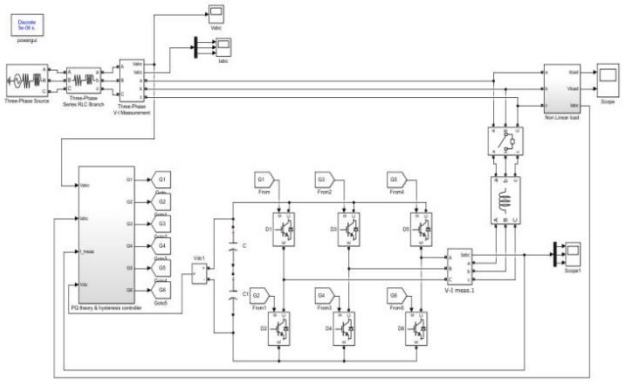

Figure 5. Simulink model of a SAPF connected to 3 phase system

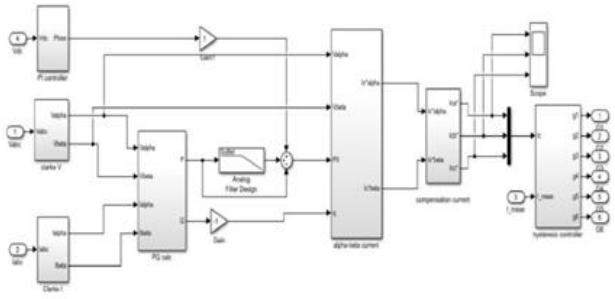

Figure 6. P-Q Theory and Hysteresis controller block

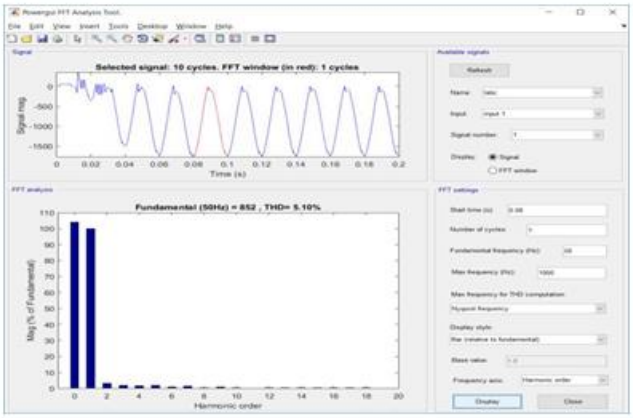

Figure 7. FFT analysis of the system with only SAPF

Later, a well-designed passive filter is introduced in shunt to the system. Here a second order high pass filter is connected to the system. The block consists of a 3 phase rectifier as load which is a nonlinear load, IGBT based VSI and a hysteresis controller as subsystem which control the gate pulse of the VSI. The control subsystem also contains PI controller which has definite values in it. Simulink model of hybrid filter with shunt active filter and shunt passive filter configuration is as shown in Figure 8 is connected to the system and is run for 0.2 seconds in MATLAB/SIMULINK software. The THD of the system is obtained through FFT analysis and is found to be 1.96% as in Figure 9.

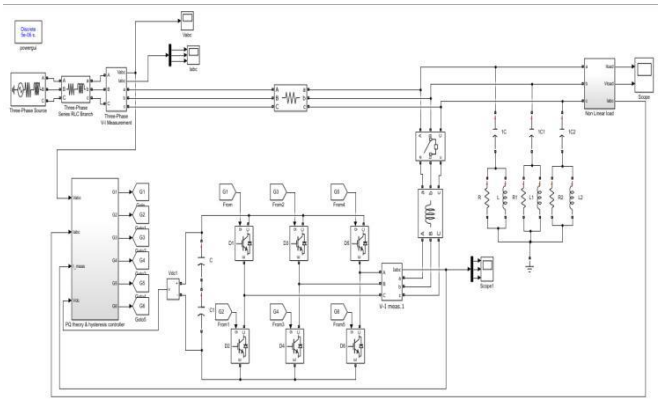

Figure 8. Simulink model of Hybrid filter connected to 3 phase system

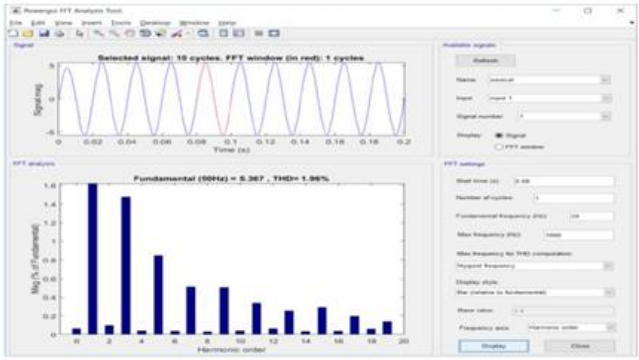

Figure 9. FFT analysis of the system with hybrid filter

Overall result: The main concept here is to improve the power quality using hybrid filter consisting of both passive filter and active filter with a hysteresis controller. THD being the measurement of harmonics in a system. Table 1 depicts the overall THD of the system for different connections of filters.

Table 1. Hd Of The Sysytem

Particulars	Phases of the Balanced 3 Phase System		
	Phase A	*Phase B*	*Phase C*
Without any Filter	30.26%	30.26%	30.26%
With SAPF	5.10%	5.36%	3.60

			%
With Hybrid Filter	1.96%	1.09%	1.58 %

Applications

- ✓ TRAIC based controller for heating applications.
- ✓ High power factor pre regulator.
- ✓ UPS based applications.

VI.CONCLUSION

Herein, the paper provides a way out to further enrich the electric power quality by making use of Hybrid Filter. On or after the analyze of Hybrid Filter for power quality improvement the following conclusions are drawn-

- The majority of the loads associated to the system are non-linear in nature, which is the foremost cause of harmonics in the system. The non-linear load entices non-linear current from the supply. Thus, the voltage at PCC is also non-linear, which badly affects the operation of end user Equipment
- A filter at the PCC is to recompense the load harmonics and also which injects the compensating current. In order to achieve this, a Hybrid power filter of SAPF and shunt connected passive filter configuration is used.
- The APF is controlled on basis of Instantaneous Reactive Power Theory to compensate the load harmonics. On simulation of hysteresis current controller based shunt APF, it was originated that the THD of source current was decreased to 5.10% from 30.26% after utilizing filter in the system.
- On simulation of Hybrid filter involving a shunt APF and a shunt passive filter. It was established that THD of source current is demoted to 1.96% from 30.26% after connection of filter to the system.

As a result, it can be concluded that the hybrid filter comprising shunt APF and a shunt passive filter is a reasonable financial explanation or the answer for advancing the power quality in electric power system.

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Speed Control of BLDC Motor-A Fuzzy Logic Approach

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ABSTRACT

The main objective of this paper is to apply the principle and technology of fuzzy logic controller (FLC) using PID controller for the speed control of brushless direct current (BLDC) permanent magnet motor drive. The controller is designed to track variations of speed references and to stabilize the output speed during load variations. The BLDC has some advantages compare to the other type of motors, because of its nonlinear drive characteristics, it is difficult to handle by using conventional PID controller. The BLDC motor is fed from the inverter where the rotor position and current controller are the inputs. Tuning parameters and its computation using conventional controller is difficult and also it does not give satisfied control characteristics. In order to overcome this here it is proposed to use FLC, it gives better control performance compared to conventional controller. The effectiveness of the proposed scheme is verified by simulating the model in MATLAB-simulink, which says that the proposed scheme gives a significant improvement in control performance compared to the conventional controller.

Keywords: Brushless DC motor (BLDC), Fuzzy logic controller (FLC), PID controller.

I. INTRODUCTION

In heavy industries there are two types of DC motors are mainly used, one is Conventional DC motor where current produces the flux through the stationary pole structure's field coil and another one is Brushless DC motor where instead of wire wound field poles, permanent magnet produces the air gap flux. Definition of BLDC motor can be conventionally given as Permanent magnet synchronous motor with Trapezoidal Back Emf wave form shape. BLDC motor do not have brushes instead of it commutation is done electronically. The most recognizable improvement of the brushless arrangement is the elimination of the brushes, which excludes brush maintenance and the sparking allied with them. Ensuring the armature windings on the stator supports the transmission of heat from the windings. Because there are no windings on the rotor, electrical losses in the rotor are minimal [1].

In recent days BLDC motors with high performance were used in variable speed drive systems of the industrial applications and electric vehicles.

Now a day for the speed control design of BLDC motor different modern control solutions are proposed [2]. However, speed control system used in conventional PID controller has simple, stable and highly reliable algorithm. Achieving the optimal state under field conditions is difficult due to poor robustness and complexity in tuning PID controller parameters[3].

In this paper fuzzy PID controller is designed for speed regulation of BLDC motor. T o keep the motor speed constant even when the load varies and to

show the dynamic response of speed. Number of inputs and membership functions are framed and also set of rules are formulated owing to different conditions[4] [5].

II. SPEED CONTROL OF BLDC MOTOR

The Fig.1 shows the block diagram for the speed control of BLDC motor having two control loops. The inner loop is used to synchronize the system based on the status of motor and outer loop is used to provide a feedback.

Two phases of BLDC motor are energized concurrently using the six power transistors which are in three phase power converter of driving circuit of speed control. In stator of BLDC motor three Hall sensors are placed to sense the rotor position which is used to find the switching sequence of MOSFET transistors. Reference current is produced by reference current generator and with the hall sensor information signal vector of back EMF is produced by decoder block. To run the motor in opposite direction we have to give opposite current. Based on that, we have Table I for clockwise rotation to calculate back EMF and Table II for gate logic to transform EMF to 6 signals on the gates.

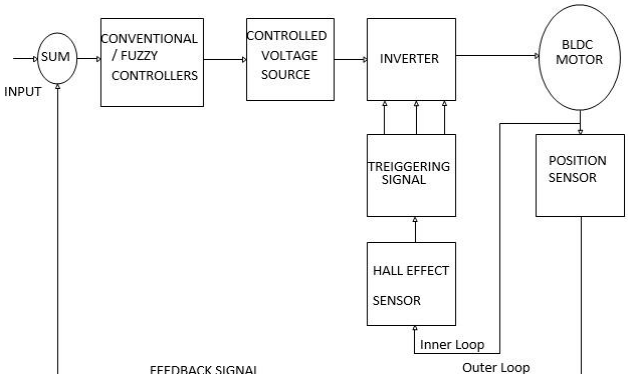


Figure 1. Speed control of BLDC motor.

Table 1. Truth table for clockwise rotation

Hall sensor A	Hall Sensor B	Hall Sensor C	EMF A	EMF B	EMF C
0	0	0	0	0	0
0	0	1	0	-1	1
0	1	0	-1	1	0
0	1	1	-1	0	1
1	0	0	1	0	-1
1	0	1	1	-1	0
1	1	0	0	1	-1
1	1	1	0	0	0

III. CONTROLLER CIRCUIT

A. Modeling of Conventional PID Controller

A PID controller is a standard control loop feedback mechanism to correct the error between a measured process variable and a desired value. The best control system demands small rise time, small settling time, small peak time, small maximum overshoot percentage and minute steady state error. To attain significant values of time domain specifications, a PID controller utilizes the conception of proportional controller, Integral controller and/or derivative controller.

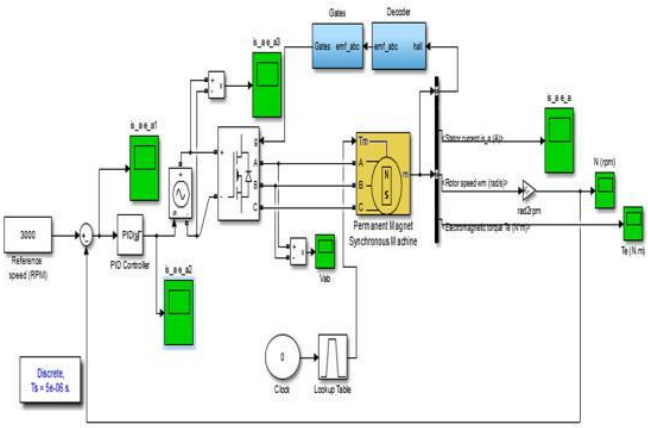


Figure 2. Simulation model of conventional PID controller

Table 2. Truth table for Gate logic

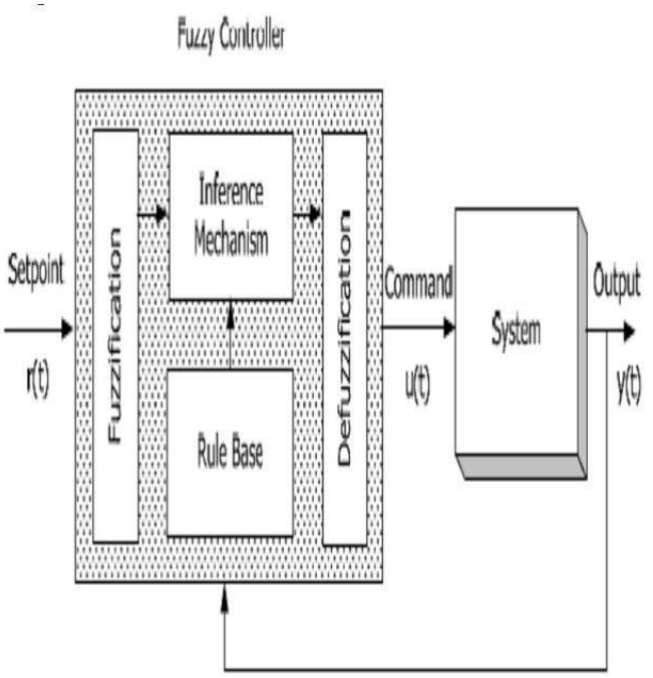
EMF A	EMF B	EMF C	Q1	Q2	Q3	Q4	Q5	Q6
0	0	0	0	0	0	0	0	0
0	-1	1	0	0	0	1	1	0
-1	1	0	0	1	1	0	0	0
-1	0	1	0	1	0	0	1	0
1	0	-1	1	0	0	0	0	1
1	-1	0	1	0	0	1	0	0
0	1	-1	0	0	1	0	0	1
0	0	0	0	0	0	0	0	0

The model developed to study the performance of the motor on sudden change in load with PID controller is shown in Fig.2. The motor speed, sent through the feedback path, is compared with a reference speed of 3000 rpm with the help of comparator which is fed to the PID controller. Thiscontroller improves the transient performance of the motor. The output of controller is fed to the controlled voltage source. The inverter circuit is fed by this voltage source. The firing (gate pulse) of MOSFET/Diode inverter circuit are decided by Gate/Decoder (Hall Sensor) which are activated by

the rotor's position. The output of inverter circuit is fed to Permanent Magnet Synchronous Motor (PMSM). The output of PMSM in terms of back emf, rotor speed and electromagnetic torque are taken out for measurements. One set of the outputs of PMSM is fed to Decoder/Gate block so that it decides the gate pattern of inverter circuit. The simulation is carried out under the different operating conditions such as starting and load application.

B. Modeling of Fuzzy PID Controller

Fuzzy logic control is a control algorithm based on a linguistic control strategy, which is derived from expert knowledge into an automatic control strategy. A block diagram for a fuzzy control system is given in Fig.3. The fuzzy controller consists of the following four components:



Figuew 3. Structure of Fuzzy Logic

Fuzzification: The first block inside the controller is fuzzificationwhich converts each piece of input data to degrees of membership by a lookup in one or several membership functions. The fuzzification block matches the input data with the conditions of the rules to determine. There is degree of membership for each linguistic term that applies to the input variable.

Defuzzification: The reverse of Fuzzification is called Defuzzification. The useof Fuzzy Logic Controller produces required output in alinguistic variable (fuzzy number). According to real worldrequirements, the linguistic variables have to be transformedto crisp output.

Inference Mechanism: Inference mechanism is defined as the Software code whichprocesses the rules, cases, objects or other type of knowledgeand expertise based on the facts of a given situation. Whenthere is a problem to be solved that involves logic rather thanfencing skills, we take a series of inference steps that mayinclude deduction, association, recognition, and decision making. An inference engine is an information processingsystem

that systematicallyemploys inference steps similar to that of a human brain.

Rule Base:A decision making logic which is, simulating a human decision process, inters fuzzy control action from theknowledge of the control rules and linguistic variabledefinitions. The rules are in the "If Then" format andformally the If side is called the conditions and the Then sideis called the conclusion. In a rule-based controller the controlstrategy is stored in a more or less natural language. A rulebase controller is easy to understand and easy to maintain for anon- specialist end user and an equivalent controller could beimplemented using conventional techniques. The rules areillustrated in Table III (7*7=49).The linguistic variables that isused in the rules are:

1. LN Large Negative
2. MN Medium Negative
3. SN Small Negative
4. ZE Zero
5. SP Small Positive
6. MP Medium Positive
7. LP Large Positive

Table 3. Fuzzy Rules

CE / E	NB	NM	NS	ZE	PS	PM	PB
NB	NB	NB	NB	NB	NM	NS	ZE
NM	NB	NB	NB	NM	NS	ZE	PS
NS	NB	NB	NM	NS	ZE	PS	PM
ZE	NB	NM	NS	ZE	PS	PM	PB
PS	NM	NS	ZE	PS	PM	PB	PB
PM	NS	ZE	PS	PM	PB	PB	PB
PB	ZE	PS	PM	PB	PB	PB	PB

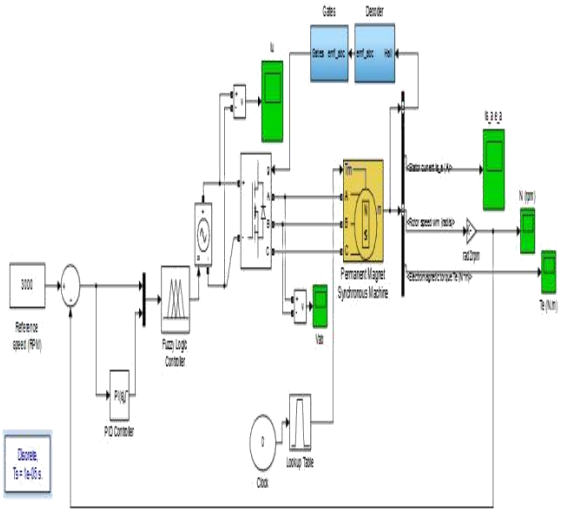


Figure 4. Simulation model of Fuzzy PID Controller

The simulation model of Fuzzy PID controller is shown in Fig4. The Fuzzy PID controller consists of two portions, one is Fuzzy controller and another is Conventional PID controller. Fuzzy PID controller is fed by two controlled inputs such as error(E), change in error(CE) and one output.

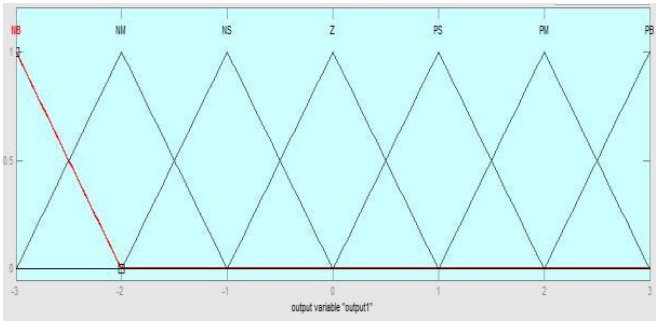


Figure 5. Membership Function

IV. SIMULATION RESULTS

The output responses obtained by running the simulation of the models developed for BLDC motorunder applied load at 0.2sec with PID controller and Fuzzy PID controller are shown in Fig 6and Fig 7respectively.

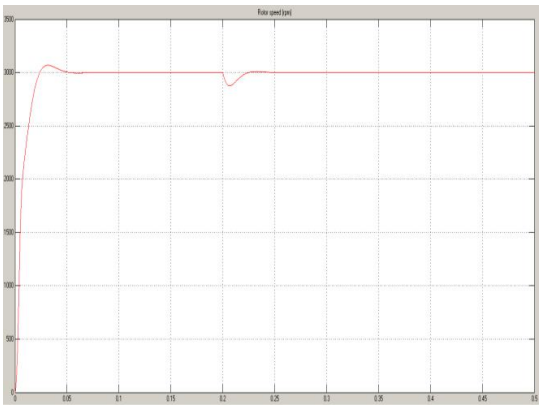


Figure 6. Speed Response Curve of PID Controller

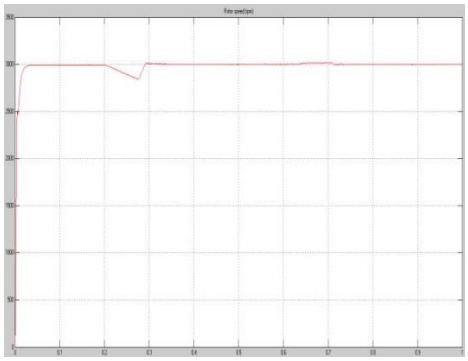


Figure 7. Speed Response Curve of Fuzzy PID Controller

Under applied load, it is observed that in Fuzzy PID Controller, the percentage overshoot, rise time, transient errors and steady state error are lower when compared with PID controller.

Table 4. Comparison between PID controller and Fuzzy PID controller

Controller	PID	Fuzzy PID
Tuning parameters		
Percentage Overshoot	2.27%	0%
Transient Error	0.04	0
Rise Time	0.023	0.034
Steady state error	0.27	0.35

V. CONCLUSION

An evaluation of Fuzzy Logic Techniques applied to the control of electrical machines is presented. As an example, a PID control scheme for BLDC motor is presented. Simulation results confirmed that the fuzzy logic approach is feasible and can be an interesting alternative to conventional control, even when the system model is known and linear.The proposed fuzzy logic control presented a slightly superior dynamic performance when compared with a conventional scheme (PID controller), namely in terms of percentage overshoot, rise time, transient error and steady state error. The MATLAB/Simulink, software tool is used for simulation and controller design.

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Power Quality Improvement Using Dynamic Voltage Restorer

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ABSTRACT

Power system consist of large number of non linear load which causes power quality issues. Sensitive components like electronic devices, medical equipment working on power supply are vulnerable to power quality problems. Voltage sag ,Swell ,harmonics ,noise are considered to be some important power quality issues .Voltage dips are the major disturbance affecting the power system .On load tap changers can be used to compensate voltage dip but it is not economical. Dynamic voltage restorer (DVR) is an alternate to conventional method of compensating the voltage .These are custom power devices. The main applications of DVR is to protect sensitive loads that are severely affected by fluctuations in system voltage.

I. INTRODUCTION

A Power system is having number of components which are to be operated in such a way to satisfy certain criteria. One such criteria is power quality. It plays a very important role in determining efficiency and performance of a power system. As the number of consumers increase, the demand for the power also increasing drastically .Along with its quality, continuity of supply has to be ensured for good economy. The power quality issues that are most likely to occur in a power system are voltage sag, voltage swell, flickering and harmonics. These causes malfunctioning in electrical equipment. Due to large and complex power system voltage sag/swell became important power quality issues . The electronic device like oscilloscope are used in hospitals are affected due to harmonics created in the system and flicker causes an irritation to the eyes. All these problems can be overcome by making use of FACT devices which are easy to design and control. Some FACT devices are D-STATCOM, DVR etc. Here in our paper we are making use of a DVR i.e Dynamic voltage restorer to reduce power quality problems.

DVR is used to reduce voltage sags/swells by injecting required amount of voltages in series with the supply voltage and load point, and maintains reliability of power supply. In steady state condition, DVR will not absorbs/delivers real power. But, whenever voltage sag/swell or unbalance in supply voltage arises in the power system, DVR will operate.

POWER QUALITY PROBLEMS

A. Voltage sag

A drop in the voltage level to 10-90% of its rated value is known as voltage sag as shown in Figure 3.1. Voltage sag is also referred to as under voltage condition. The causes of voltage sag are faults in power system, overloading of the electrical equipment and high starting currents drawn. Voltage sag results in failure of relays and contactor, dim light and fluctuating power.

B. Voltage Swell

A rise in the voltage level to 110%-180% of its rated value is known as voltage swell as shown in Figure 3.2. Voltage swell is also referred as over voltage condition.The causes of Swell are sudden disconnection of large load, LG fault.It results in breakdown of insulation, overheating of electrical equipment and damage to electronic equipment.

C. Voltage interruptions

Reduction in rms voltage by below 0.1 pu of rated or complete failure of supply voltage is known as Voltage interruptions. It can be further divided into two classes based on interruption time period:

1) Short interruption
2) Long interruption

D. Waveform distortion

The voltage and current waveform should be sinusoidal in nature .The change in the waveform pattern is called Distortion. These are caused due to:

1. Harmonics: Integral multiple of fundamental frequency is called Harmonics. This is caused due to non-linear loads.
2. Noise: Unwanted signal that causes distortion of main signal is called as Noise.
3. Transients: Transients induces oscillations which are undesirable. These are the short duration and they are caused by internal or external faults.

II. DYNAMIC VOLTAGE RESTORER

A DVR is a custom power device which is connected in series to inject the required voltage to the load bus in order to maintain the voltage level. The compensating voltage is injected by three single phase transformer. These voltages are in synchronism with the load voltage.

The basic structure of DVR shown in Figure 1consists of following blocks: VSI , Injection transformer, Passive filter , Energy storage unit , Control circuit.

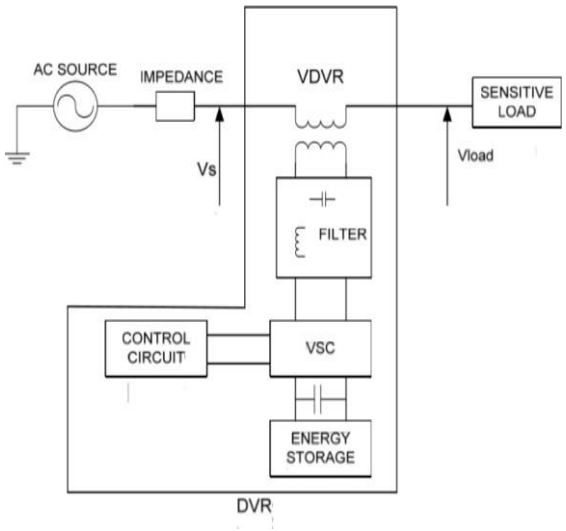

Figure 1. Schematic diagram of a DVR connected distribution system

1. Voltage Source Inverter (VSI): A circuits which can create AC voltage from DC source is called VSI.
2. Voltage injection transformer: The AC voltage generated by VSI is stepped up by an transformer called injection transformer to the to nominal voltage level. The amount of voltage sag/swell compensated by DVR depends upon the rating of injection transformer and inverter.
3. Passive filter: The harmonics present in the output of the VSI should be eliminated before injecting it to line. It can be done by using the passive filter which can be connected either side of the transformer.
4. Energy storage unit: During compensation,the required injection voltage is supplied by this unit.The Energy storage devices are lead acid batteries.
5. Control circuit: Control circuit monitors performance of the system. It detects/observes the disturbances in the system voltage by comparing the supply voltage with reference voltage . It generates the gate signals for the gate circuit of converter which in turn develop the compensating voltage .

The Simulink model for the DVR is as shown in Figure 2

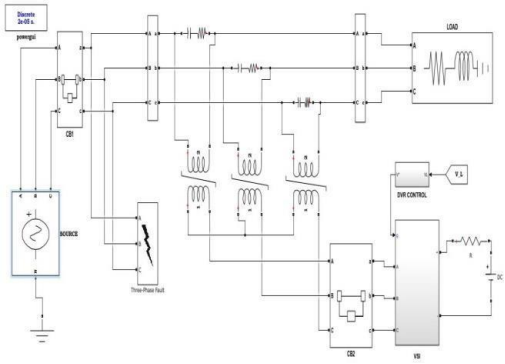

Figure 2. Simulink model of DVR

III. MODELING AND SIMULATION

A. Voltage sag compensation

1) .Compensation of voltage sag: The voltage sag is created for a time duration of 0.1 to 0.2s as shown in Figure 3. DVR will inject the re quired voltage in this duration. The compensating voltage is shown in Figure 4. After the operation of DVR the load voltage is shown in Figure 5

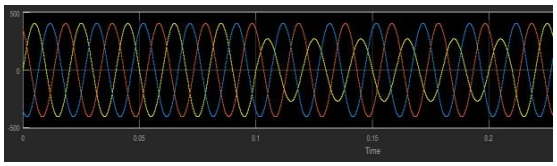

Figure 3. Voltage sag

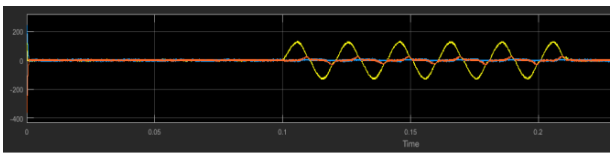

Figure 4. Compensating voltage

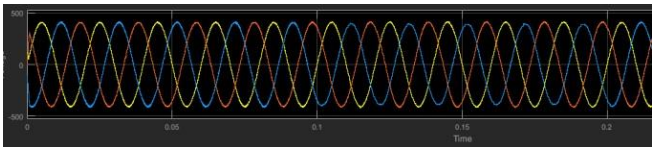

Figure 5. Load voltage

B. Voltage swell compensation

1) Compensation of voltage swell: A voltage swell is created in the network in the time of 0.1 to 0.2s. as shown in figure 6 .The compensating voltage injected by DVR is shown in Figure 7. After compensation, the load voltage is shown in Figure 8.

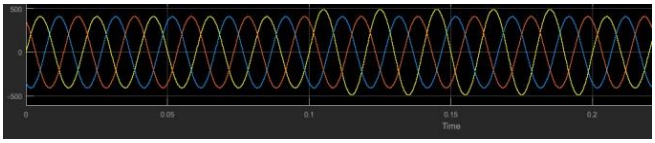

Figure 6. Voltage swell

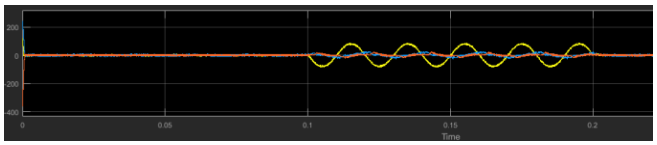

Figure 7. Compensating voltage

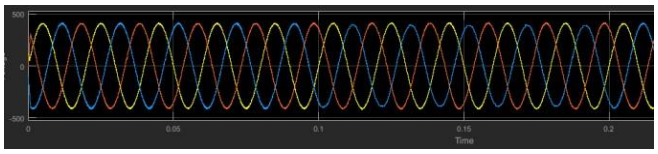

Figure 8. Load voltage

IV. CONCLUSION

Power quality plays a vital role in performance of power system. The power quality gets affected due to sag, swell, distortion. In these, voltage unbalance is considered to be major problem . Flexible AC Transmission devices are used to overcome these problems. Among which DVR is considered as most reliable one. Voltage sag, swell are simulated and results are shown in figures. The above waveforms shows compensation results of sag/swell by DVR. The DVR performance is found to be satisfactory .

THD value after simulation in power system is found 2% - 4%.

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Real Time Embedded System for Accident Prevention

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ABSTRACT

This Paper presents automatic accident prevention with security enable technique, speed control and accident detection system. .The main objective is to design an Renasis RL-78 controller to monitor the zones, which can run on an embedded system and to automatically locate the site of accident and alert concerned people. It should be done automatically as the person involved in the accident may not be in the position to send the information [7].The proposed system is composed of two separate design units: transmitter unit and receiver unit .Just before the vehicle to enter the transmitter zone, the vehicle speed is controlled by receiving the signal from the RF transmitter. For this, RF transmitter can be kept at a few meters before the zone, where the speed has to be controlled such as school zone, hospital zone etc. Security system includes alcohol sensor and seatbelt sensor (only for car). Accident detection system consists of GPS and GSM in cell phones [12].As accident occurs, accident switch will go high and sends the signal to the Renasis Rl-78 controller[6].Then, the GPS available in the smart phone will start communicate with the satellite and get the latitude and longitude values and name of place of accident will be send to the previously set phone numbers of relatives and concerned authority [5].

Keywords: RF Transmitter and Receiver, Renasis RL-78 controller, GPS(Global Positioning System), GSM(Global System for Mobile Communication)

I. INTRODUCTION

According to a news report, eighty percentages of road accidents are occurred by human error. Based on the report of 2006 and 2012 statistics, collected from 178 participating countries, globally over 1.2 million people die in road accidents every year and 20-25 million people suffer injuries. Pedestrians age above 65 are more than 5 times more likely to die in accidents than pedestrians age 14 or less, and the likelihood of death increases steadily for ages in between .For vehicle which travels at speeds above 45mph,pedestrians above age 65 die in about 5 of 8 accidents[12].

The main motive behind this paper is to reduce accidents for which we propose a system that controls the speed of the vehicle without any inconvenience to the driver. There are circumstances where the speed of the vehicle is beyond the expected speed limit or the driver does not obey traffic signals. Therefore we are using RF technology[1].Where it is used to detect the ambiguities in the vehicle premises especially when it is moving too and pro where driver cannot see. If the obstacle is detected in the too and pro direction of the vehicle then alert voice is played using the voice play back module. If the vehicle moves into the school zone, hospital zone etc automatically the speed of the vehicle reduces. Whenever accident

occurs to the vehicle automatically the SMS is sent to the authority about the Location of the accident.

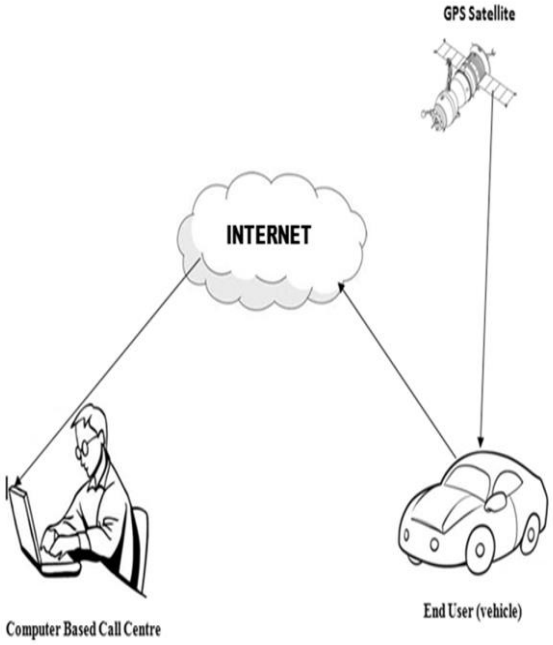

Figure 1. simple demonstration of wireless system structure for the proposed system

II. LITERATURE REVIEW

Review on the automatic speed control of vehicle using RFID Technology" [10] describes about Cruise control system (CC) and Adaptive Cruise Control (ACC) which have already been developed to avoid accidents.

Cruise Control System: In this system the driver bring the vehicle up to speed manually and use a switch to set the cruise control to the current speed. The cruise control usually used to control the speed of the vehicle to predefine value.

Autonomous Cruise Control: In this system the sensors are designed in such a way that which keeps the vehicle at pre-defined distance from the preceding vehicle.

But these systems are not able to reduce the vehicle speed automatically if driver doesn't respond [10].

III. BLOCK DIAGRAM

Transmitter and Receiver Design:

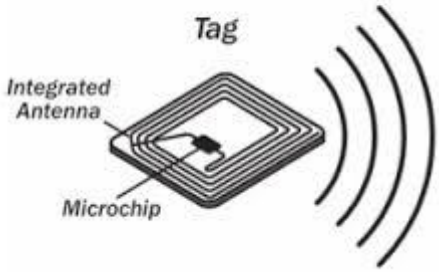

Figure 2. Transmitter Design

The Radio Frequency (RF) module consists of RF transmitter and RF receiver. Transmitter module is placed in the specific zone, where we need to control the speed such as school zone, hospital zone, college zone etc. Both the Transmitter and Receiver should operate with same frequency. Transmitter receives data serially and sends the data to the receiver continuously [9]. The RF receiver is connected with Renasis RL-78 microcontroller. The RF receiver will be always in listening state, if it receives any signal of same frequency as of receiver, it will automatically indicate the micro controller which in turn reduces or limits the speed of the vehicle until the vehicle leaves that particular zone [12].From this, the accid which keeps the vehicle at pre-defined distance from the preceding vehicle. But these systems are not able to reduce the vehicle speed automatically if driver doesn't respond [16]. ent in school and college zone will get reduced.

The three main steps are identifying the accident, locating the position and transmitting the information for help. There are certain parameters that change during accidents which can be detected using sensors that measure these changing parameters .The position of the accident is located using Bluetooth module and android mobile phones .GPS data as it is freely available with the help of satellites, and this information about the

location of the vehicle is sent through the GSM network to the android phones [9].

Alcohol sensor, seat belt sensor and IR obstacle sensors are connected to the microcontroller. RF receiver is connected to the microcontroller. The speed is controlled in the particular zone by using RF transmitter, which is placed in the road and RF receiver, which is placed in the vehicle.

From Renasis RL-78 connection goes to the blue tooth module. From Bluetooth Module data is transmitted to the android mobile phone. Data is transmitted to the RX pin of the mobile phone. Cell phone is having both GPS and GSM in it. So that whenever the accident occurs the information is send to the authority.

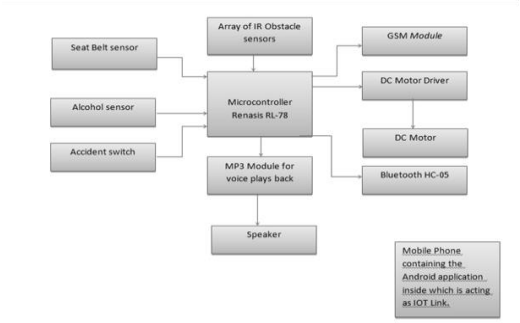

Figure 3. Block Diagram

The IR obstacle sensors are used at the corners of the vehicle to indicate that there is a danger from that side.

By interfacing the speaker and MP3 Module to the microcontroller we can get the play back voice messages. DC motor driver circuit is used to drive the dc motor which is interfaced to the motor.

IV. WORKING OF THE SYSTEM

Whenever a person sits in driver seat of a vehicle, the system checks for following parameters with the driver. The alcohol sensor - checks if the person has consumed alcohol or not.MQ3 sensor is suitable for detecting alcohol concentration from driver's breath. It has high sensitivity and fast response time. It provides an analog output based on alcohol concentration [2].If a drunk driver tries to sit on a driver seat, then the alcohol sensor MQ3 detects the presence of alcohol and blow the buzzer and unless the alcoholic person is replaced by a normal person, the vehicle wouldn't ignite [3].The seat belt sensor MOC7811 – checks if the person has wear the seat belt or not. The IR obstacle sensors are used at the corners of the vehicle to indicate that there is a danger from that side. It will be displayed by using LCD JHD162A and voice message by using FN-M16P MP3 Module and a speaker.

When the vehicle reaches the particular zone, it will reduce the speed. If an accident has occurred, the accident switch provides a high value and it indicates the occurrence of an accident [9].Location of motor cycle is acquired using the Bluetooth module. It connects wirelessly to mobile phone. When accident is occurred message will be displayed in the android phones having GPS and GSM in it. GSM is a globally accepted standard for digital mobile communication [4].

V. SOFTWARE REQUIRED

Mainly this project uses two software's namely

a. Cube suite +
b. Android app

A Cube suite +

The Cube Suite + integrated software provides simple, safe and ease of use in developing software through iterative cycles of editing, making and debugging.

It can be used to the basic software for Renasis hardware tools debugging emulators, which facilitates advanced debugging. It creates an extensions and functions for user support ensure a friendly environment for all users.

B Android App

Android is a software used for the mobile devices that includes an operating system, middleware and key applications.

It is an open source web application. Android hardware will be basically designed for the consumers use, but the real win is for developers. It allows us to computer programming to create software applications for the android operating system (OS).It allows users to drag-and-drop visual objects to create an application that run on android devices .

The Android SDK provides the tools and APIs necessary to develop an applications on the Android platform using the Java language for programming.

VI. CONCLUSION

This paper has been mainly designed in order to avoid accidents. It can be utilized in special areas with sudden sharp & high curved roads. Accidents are prevented in bridges and Ghats sections. Thus speed of the vehicle in school, work zones is reduced. Accidents due to over speed, drowsy and drunken conditions of the driver are prevented. In heavy traffic zone, speed is controlled automatically without the interference of the driver. Thus we can reduce alcohol and drowsy related road accidents [11].Thus we can bring down the alarming rate of road accidents. Because of the flexibility of the embedded system, this system is compatible to any type of vehicle and is affordable to common man [8].

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Series Hybrid Configuration Based Proposed Architecture Model for Hybrid Electric Aircraft Using Simulink\Matlab

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ABSTRACT

Due to demand for optimization of various aircraft performance parameters, decrease in operating and maintenance cost and to reduce gas emission Hybrid Electric Aircraft (HEA) concept has been put forward. Rapid growth in the field of power electronics, electric motor and conversion system has made Hybrid Electric Aircraft possible. Being more advantageous series hybrid configuration is used to build basic architecture model. Architecture consists of two power sources one is engine driven generator other is the battery. Electric motor drive plays an very important role in series hybrid configuration as it is the only torque source to meet the aircraft performance such as acceleration. The proposed system presents groundwork of the hybrid electric system architecture and reduced fuel consumption compared to existing convention aircraft system.

MATLAB software is used to design the basic structure of hybrid electric aircraft architecture and the simulation results shown and analysis of overall system performance is done accordingly.

Keywords: Hybrid Electric Aircraft.

I. INTRODUCTION

THE increase of petrol consumption causes the problem of greenhouse effect and the energy crises. The transport burns most of the world's petrol and is a major source of pollution. A strategy for energy economy is to use alternative propulsions in order to reduce the petrol consumption and the emissions of greenhouse gas. Increasing the energy efficiency of transport and recycling the energy which have been dissipated are the feasible solutions.

In this context, Hybrid Electric Aircraft (HEA) have been put forward.

The flight controls of the conventional aircraft are moved by multiple redundant hydraulic actuators that are heavy and consume large amounts of power. For the HEV, one or several electric motors have been installed to participate in the propulsion force with the Internal Combustion Engine (ICE). This alternative propulsion configuration makes it possible to recycle the energy and control the ICE in optimal operation points in order to increase the global efficiency [1][2][5].

The objective of this paper is to design the basic model of HEA architecture using Simulink\Matlab. In section II, comparisons of conventional aircraft and hybrid electrical aircraft is presented. In section III, components used to build architecture and there parameter calculations are discussed. The components include generator, rectifier, converter,

storage system and electric motor. The simulation results and conclusions will be discussed respectively in sections IV and V.

Comparison of conventional and HEA

(a) Comparison

In a conventional vehicle, the internal combustion engine (ICE) drives an electric machine to charge the battery and supply the electrical loads of the vehicle. In most cases, this electric machine only starts the ICE but does not participate in the propulsion. Figure 1 shows the architecture of conventional aircraft.

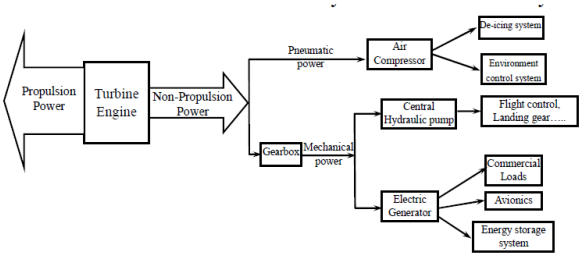


Figure 1. Conventional aircraft power distribution system [1]

An HEA is a vehicle which involves multiple sources of propulsions. A traditional vehicle has propulsion by ICE or diesel engine. Energy source can be battery, fuel cells, fly wheel, solar panel etc. As compared to ICE vehicles, HEVs have low energy consumption:

resources, independent of foreign oil, low emission, air pollution, global warming, low maintenance cost & environmental hazards & less noisy. Environmental Impacts of HEVs are Reduced air pollution including nitrogen oxides, Carbon monoxide, Unburned hydrocarbons, and Sulfur oxides due to less fuel needed in HEVs, reduce global warming effect by burning less fuel and emitting less carbon oxides & reduce oil dependence on foreign oil and leave room for the future. Key advantage of HEA's is low initial cost & wide driving range.

The revolution of HEV is mainly based on this electric machine. Thanks to the development of energy storage, power electronic and electric machine, the electric machine joins in the propulsion of the vehicle. According to the drive train configuration, the HEV can be classified in series-hybrid, parallel-hybrid or series parallel hybrid [4][5][6]. Figure 2 shows the power distribution architecture of Series Hybrid Electric aircraft.

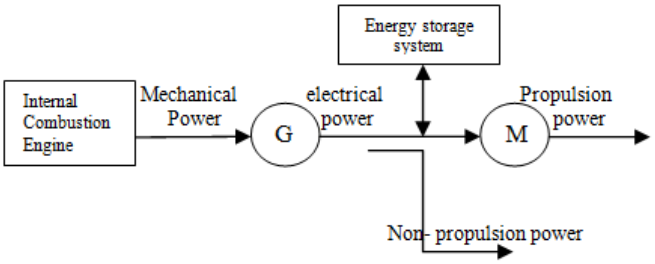


Figure 2. Power distribution architecture of Series Hybrid Electric aircraft.

In HEA, the propulsion power can be distributed by DC network. The electric propulsion motor is connected with DC bus by power electronic equipments. The propulsion power can also be distributed by a power split device in mechanical or electromagnetic form. The typical mechanical power split device is planetary gear unit.[7]

The secondary source should be bidirectional to recover the returned power and supply the electrical loads in order to reach optimum energy efficiency. The techniques of energy storage system which exist as battery, super capacitor and flywheel can be used in aircraft.

In HEV, the main electric load is the propulsion force. The electric energy is transformed to kinetic energy of vehicle via the electric motor. In the conventional vehicle, when it is braking, the kinetic energy is dissipated on the brake disk.

(a) Operation Mode of Series Architecture

* Battery alone mode: engine is off; vehicle is powered by the battery only.
* Engine alone mode: power from ICE/G
*Combined mode: both ICE/G set and battery provides power to the traction motor.
* Power split mode: ICE/G power split to drive the vehicle and charge the battery.

(b) Phases of aircraft operation

1. Taxiing: Taxiing refers to the movement of an aircraft on the ground, under its own power. The aircraft moves on wheels. An airplane uses taxiways to taxi from one place on an airport to another; for example, when moving from a terminal to the runway.

2. Takeoff: Takeoff is the phase of flight in which an aircraft goes through a transition from moving along the ground (taxiing) to flying in the air, usually starting on a runway.

3. Cruise: Cruise is the level portion of aircraft travel where flight is most fuel efficient. It occurs between ascent and descent phases and is usually the majority of a journey. It ends as the aircraft approaches the destination where the descent phase of flight commences in preparation for landing. This phase of flight consumes the majority of fuel.

4. Descent: A descent during air travel is any portion where an aircraft decreases altitude.

5. Landing: Landing is the last part of a flight, where the aircraft returns to the ground.

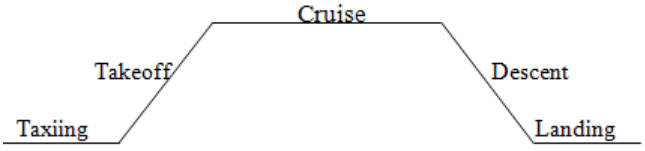


Figure 3. Flight phases

II. SYSTEM DESCRIPTION

As mentioned earlier in this paper, the main advantage of hybrid electric aircraft is reduction in the consumption of fuel. Batteries have a high specific power and their power output has a rapid dynamic response time. These complimentary advantages make hybrid systems very attractive. A block diagram of HEA architecture proposed in this study is presented in Figure 4.

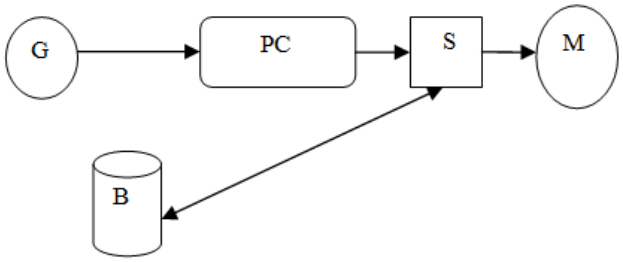


Figure 4. Block diagram of the proposed hybrid electric aircraft architecture power supply

As said earlier it consist of two power source, primary source is an engine driven generator and secondary source is a battery. It consist of a rectifier which is a AC to DC converter, a boost converter and an electric motor.

A. Design and modeling of a Generator

The primary electric sources in both MEA and HEV are the engines – either turbine engine or internal combustion engine. These sources are unidirectional. However, for the sustainable development, some energy can be recycled and reused and a bidirectional energy storage system should then be introduced in this system as secondary source.[1] An alternator is an electrical machine which converts mechanical energy into alternating electric energy. They are also known as synchronous generators.

TECHNICAL DATA OF GENERATOR MODELED IN MATLAB\SIMULINK

Table 1

ATTRIBUTES	VALUE
V(rms)	115-118 v
Frequency (Hz)	400Hz

B. Design and modeling of a Rectifier

Power electronics are the link between electric power generation and electric power consumers; power converters therefore cannot be viewed outside their interface with power sources (generators, batteries, fuel cell) and loads [2]. Power electronics in general, and power converters in particular, are integral parts of the whole electrical system.

TECHNICAL DATA OF RECTIFIER MODELED IN MATLAB\SIMULINK

Table 2

ATTRIBUTES	VALUE
V(rms)	118v(rms)
Switching frequency(fs)	25000Hz
A	45◦
Vdc	165.3v

$$Vdc = 6/2\pi \int_{\pi/3}^{2/3\pi} \sqrt{3}\, Vs.\sin \omega t\, dt$$

$$Vdc = \frac{3\sqrt{3}}{\pi}.Vs$$

$$Vdc = 1.645Vs$$

C. Design and modeling of a Battery

The lithium-ion battery has been proven to have excellent performance in portable electronics and medical devices. The lithium-ion battery has high energy density, has good high temperature performance, and is recyclable. A lithium-ion type battery was simulated. The battery output voltage is given by [6].

$$Vbatt = Eo - k\frac{Q}{Q - \int i\, di} - R.i + Aexp(-B\int i\, dt)$$

where: Vbatt is battery no load voltage [V]; Eo is battery constant voltage [V]; the k is polarization voltage in [V]; the Q is the battery capacity in [Ah]; $\int i\, dt$ is the actual battery charge [Ah]; A is the exponential zone amplitude [V]; B is the exponential zone time constant inverse [Ahrl; R is the internal resistance [Ω]; and i is the battery current [A].[6] The state-of-charge (SOC) of the battery is between 0 and 100%.

TECHNICAL DATA OF LITHIUM-ION BATTERY MODELED IN SIMULINK

Table 3

ATTRIBUTES	VALUE
Nominal voltage V	200v
Rated capacity	105AH
Initial state of charge	90%

Required AH of the battery is given by,

$$A.Hr = \frac{watt.Hr}{V}$$

C. Design and modeling of a DC motor

Electric powered aircraft has gained popularity, mainly because the electric motors are more quiet, clean and often easier to start and operate than the combustion motors. A DC motor converts the electric current into Torque and the voltage into rotations per minute (RPM). Torque is a twisting force measured at a certain radial distance from the shaft's centre line.

$$\text{Motors o\p power(W)} = \text{Torque(Nm)} * 2\pi * \text{RPM\60}$$

The power consumption of a DC motor (Input Power) is equal to the voltage at its terminals times the current.

$$Pi = Vin * Io$$

However, every motor has losses, which means that the motor consumes more power than it delivers at its shaft.

The motor's Output Power is equal to the Input Power minus the Power Loss. Most of Power Loss is equal to the sum of the Copper Loss plus Iron Loss.

$$\text{Copper loss} = \text{coil resistance Rm} * \text{Current Iin}^2$$

$$\text{Iron loss} = Vin * Io$$

The following equation can also be used to calculate the motor's Output Power:

$$Pout = (Vin - Iin * Rm) * (Iin - Io)$$

The motor's Efficiency is the ratio of the Output Power to the Input Power .Efficiency is a measure of how much of the Input Power is actually used to turn the propeller (Output Power) and how much is wasted as heat.

$$\text{Efficiency}(\%) = 100 * \frac{Pout}{Pin}$$

Input to the motor is given through a speed control drive.[5]

TECHNICAL DATA OF DC MOTOR MODELED IN SIMULINK

Armature resistance	2.4Ω
Load torque	0.001(Nm)

Table 4

ATTRIBUTES	VALUE
DC voltage	240V

III. SIMULATION RESULTS

Overall HEA architecture is shown in the fig below

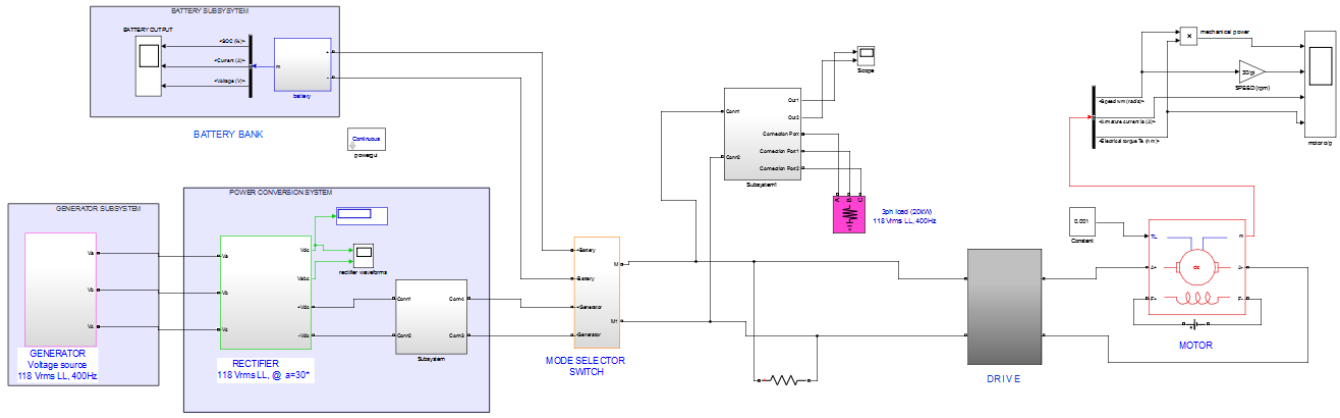


Figure 5. Overall system of HEA architecture

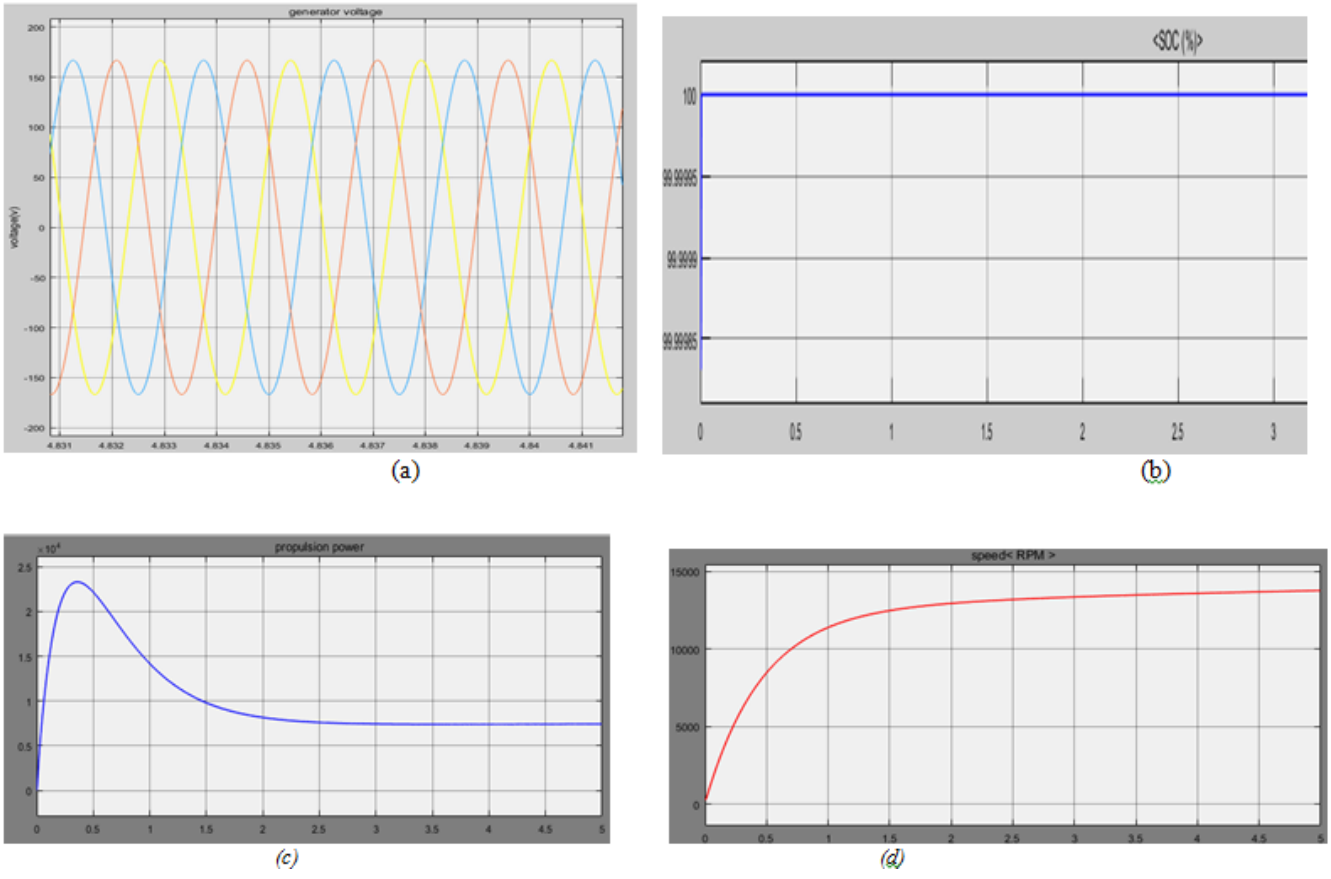
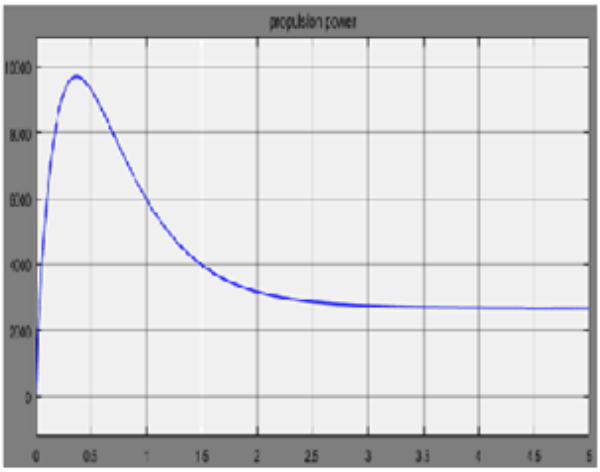


Figure 6. Battery, motor and generator o\p during engine alone mode



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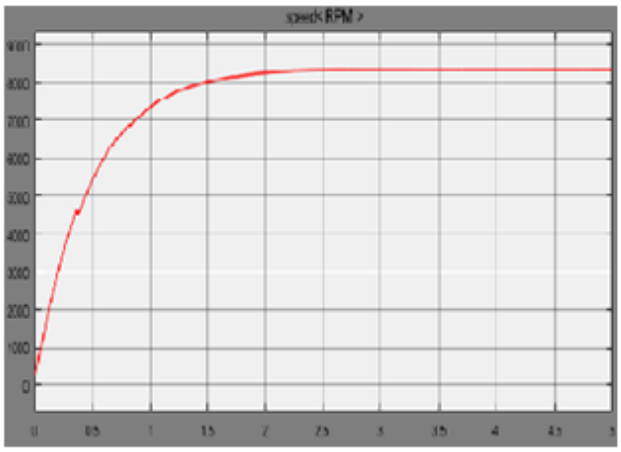

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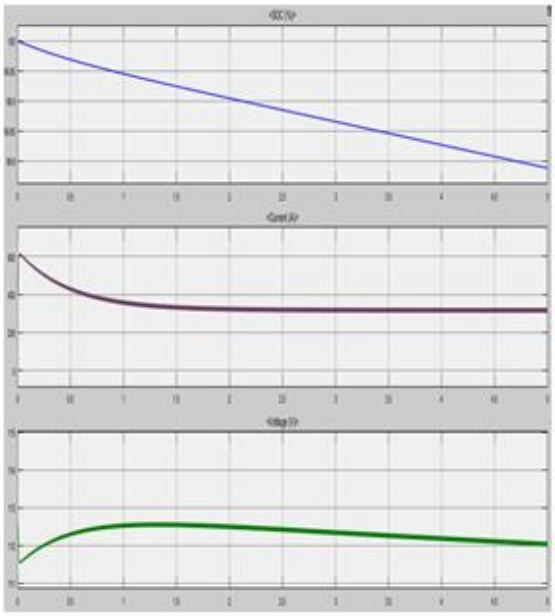

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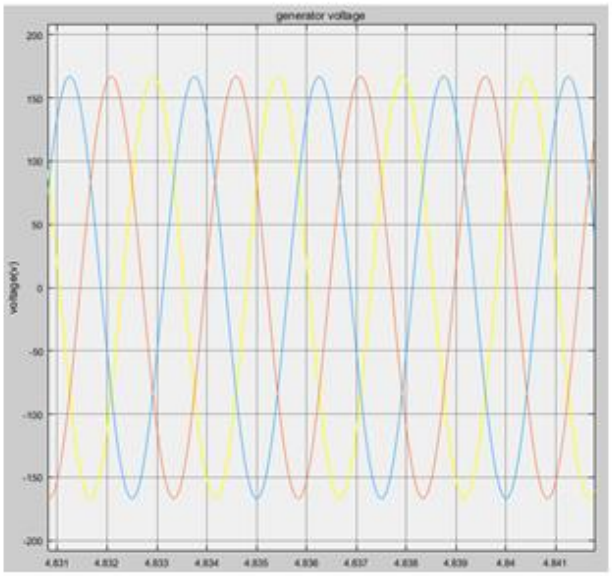
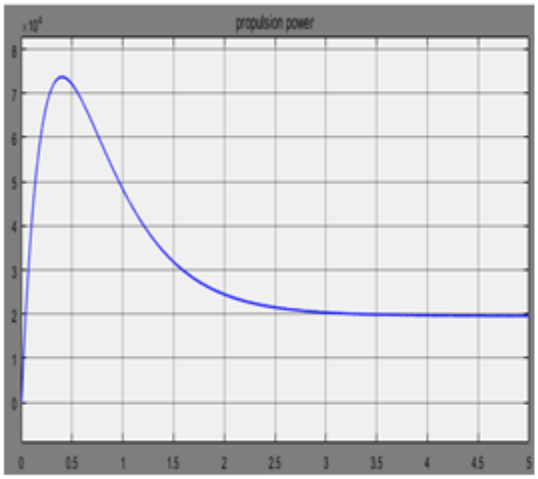


(d)

Figure 7. Battery, motor and generator o\p during battery alone mode



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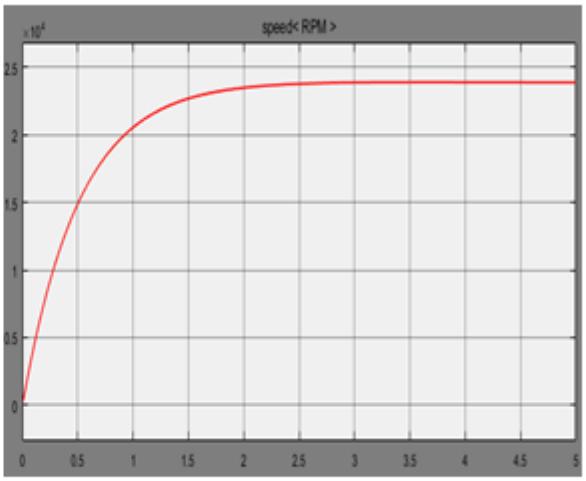

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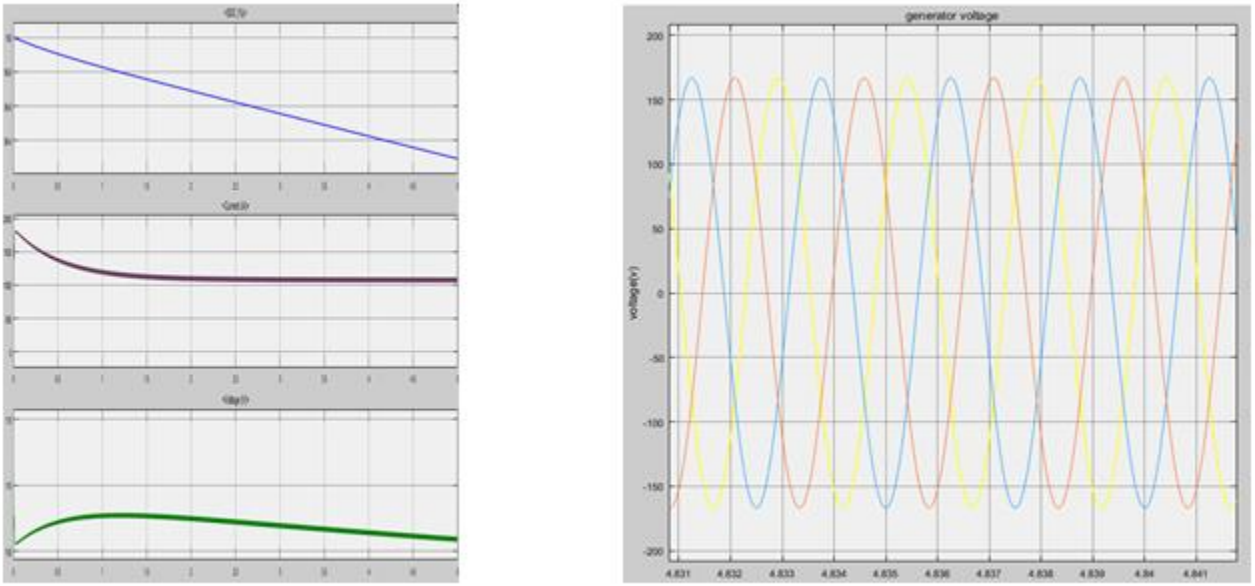

Figure 8. Battery, motor and generator o\p during combined mode

IV. CONCLUSION

The paper presented the simulation and analysis of series hybrid electric aircraft architecture. This topology uses a two power sources i.e. a generator and a battery. The advantage we have most fully exploited is reduction in fuel consumption during cruise mode. Simulation was conducted using Matlab/Simulink-based models. The simulation results show the overall system performance during engine alone mode, battery alone mode, and combined mode.

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Smart Energy Metering Using GSM And IOT

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ABSTRACT

We can see a person standing in front of ourhouse from electricity board, whose duty is to read the energy meter and handover the bills to the owner of that house every month. This is nothing but meter reading. According to that reading we have to pay the bills. The main drawback of this system is that person has to go area by area and he has to read the meter of every house and handover the bills. Many times errors like extra bill amount or notification from electric board even though the bills are paid are common errors. To overcome this drawback we have come up with an idea which will eliminate the third party between the consumer and service provider, even the errors will be overcome.

In this paper the idea of smart energy meter using IOT and Arduino have been introduced. In this method we are using Arduino because it is energy efficient i.e. it consume less power, it is fastest and has two UARTS. In this paper, an energy meter which is already installed at our houses is not replaced, but a small modification on the already installed meters can change the existing meters into smart meters. The use of GSM module provides a feature of notification through SMS. One can easily access the meter working through web page that we designed. Current reading with cost can be seen on web page. Automatic ON & OFF of meter is possible. Threshold value setting and sending of notification is the additional task that we are performing.

Keywords. Smart Energy Meter, Electric board,UARTS, IOT, GSM, Wi-Fi, Webpage,MQTT.

I. INTRODUCTION

It has become a trend to integrate automatic systems via wireless applications over network. Along with the advancement of technology development, research on wireless applications and remote control has become significant and popular today. An electricity meter, electric meter, or energy meter is a device that measures the amount of electric energy consumed by a residence, business, or an electrically powered device. A smart energy meter (SEM) is electric device having energy meter chip for electric energy consumed measurement, wireless protocol for data communication (such as GSMModem) and peripheral devices for security purpose, datashowing, meter controlling etc. Energy meter systems [1-2] can be incorporated with embedded controllers such as GSM modem to transmit the data over the mobile network. Such data can be then fed and integrated into existing Energy Management Systems located at power companies and organizations. The problem of efficiently collecting data from alarge number of distributed GSM Modems in the energymeters is still a challenging problem. GSM modem should needs the terminal to control that part. Our Embedded

controller interfaced with energy meter reading systems and GSM modem to control both.

The Energy Monitoring System is appropriate forIndustries, manufacturing plants, commercial buildings or anysituation where an electrical system is used. The systemprovides the centralized energy monitoring and control. The Energy Management System leads to savings in the overall cost. These savings may be come from better utilization of manpower, servicing cost, savings in the energy consumption and non-breakdowns in the system. The smart energy meter Contains an energy meter, a GSM modem, a microcontroller (Arduino) and a relay circuit, which is connected between the energy meter and the load. The proposed smart energy meter is able to provide all the metering and billing services like Counting the consumed energy, sending the generated bill by the SMS (short message service) over the GSM network as well as the security services. Factually at present, the meteringand billing system of our country is totally conventional and it is very much slowed, faulty and corrupted so our proposed Smart energy meter is highly deserved for national implementation. The overall operation of the proposed systemis discussed in the next section.

In the present billing system the distribution companies are unable to keep track of the changing maximum demand of consumers. The consumer is facing problems like receiving due bills for bills that have already been paid as well as poor reliability of electricity supply and quality even if bills are paid regularly. The remedy for all these problems is to keep track of the consumers load on timely basis, which will held to assure accurate billing, track maximum demand and to detect threshold value. These are all the features to be taken into account for designing an efficient energy billing system.

The present project "IOT Based Smart Energy Meter" addresses the problems faced by both the consumers and thedistribution companies. The paper mainly deals with smart energy meter, which utilizes the features of embedded systems i.e. combination of hardware and software in order to implement desired functionality. The paper discusses comparison of Arduino and other controllers, and the application of GSM and Wi-Fi modems to introduce 'Smart' concept. With the use of GSM modem the consumer as well as service provider will get the used energy reading with the respective amount, Consumers will even get notification in the form text through GSM when they are about to reach their threshold value, that they have set. Also with the help of Wi-Fi modem the consumer can monitor his consumed reading and can set the threshold value through webpage.

II. ARCHITECHURAL MODEL

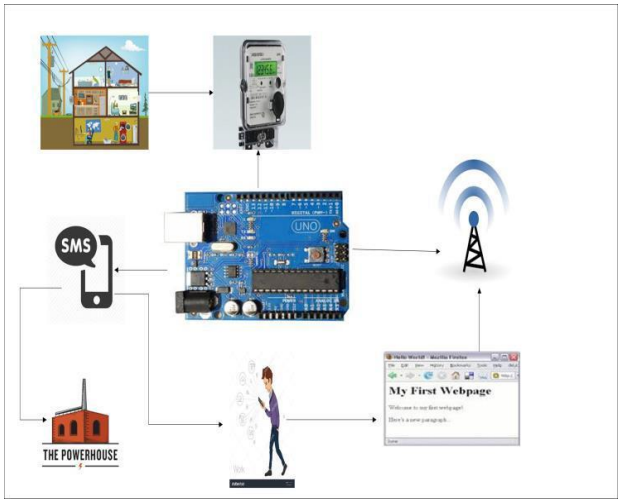

Figure 1. Architectural Diagram

The explanation of the above architectural model is as follows

1. When the various appliances of the household consume energy the energy meter reads the reading continuously and this consumed load can be seen on meter.
2. The measured reading with the calculation of the cost will be continuously displayed on web page that we have designed.
3. Threshold value can be set on webpage with the help of Wi-Fi, as per the consumer's requirement. When the consumers reading will be near about to the set threshold value it will send a notification value to the consumer.

4. This threshold value notification will increase the awareness amongst the consumer about the energy.
5. When the consumer gets the notification he can visit the webpage and change the threshold value.
6. If the consumer is not aware with the threshold notification, then the meter will automatically get off. Then the consumer has to visit the webpage again and increment the threshold value. By the incrementation, the meter will automatically get ON.
7. Finally the overall monthly bill with cost will be sent to customer as well as service provider in the form of text at first day of every month.

III. EASE OF USE

BLOCK DIAGRAM

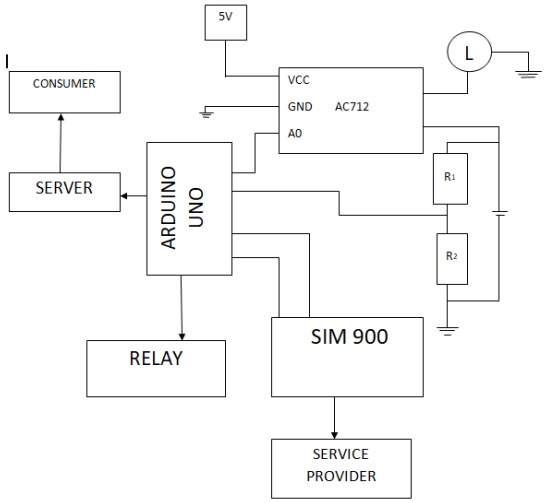

Figure 2. Block Diagram

A. ENERGY METER.

Energy meter or watt-hour meter is an electrical instrument that measures the amount of electrical energy used by the consumers. Utilities is one of the electrical departments, which install these instruments at every place like homes, industries, organizations, commercial buildings to charge for the electricity consumption by loads such as lights, fans, refrigerators and other home appliances.

Energy meter measures the rapid voltage and currents, calculate their product and give instantaneous power. This power is integrated over a time interval, which gives the energy utilized over that time period.

B. ARDUINO UNO(ATMEGA 328).

Arduino board is the heart of our system. Entire functioning of system depends on this board. Arduino reacts to the 5v supply given by opto-coupler and keeps on counting the supply and then calculates the power consumed and also the cost. This data, it continuously stores on webpage, so that users can visit any time and check their consumption. It even reacts accordingly as per programed, to the situations like message sending during threshold value etc.

C. GSM MODULE (SIM900).

GSM stands for Global System for Mobile communication. It is widely used mobile communication modem system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHZ, 900MHZ, 1800MHZ, 1900MHZ frequency bands. It has ability to carry 64kbps to 120Mbps of data rates.

In our system GSM is used to send the notification of threshold reaching to consumer and for sending message of total consumption of unit with cost to the service provider and consumer.

D. WEBPAGE (MQTT).

MQTT is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

The abstract of the MQTT specification does a good job in describing what MQTT is all about. It is very light weight and binary protocol, which excels when transferring data over the wire in comparison to protocols like HTTP, because it has only a minimal packet overhead. Another important aspect is that MQTT is extremely easy to implement on the client side. This fits perfectly for constrained devices with limited resources. Actually this was one of the goals when MQTT was invented in the first place.

E. SWITCHING DEVICE.

In our system we are using SSR as switching device even though we can use RELAY because SSR is highly advantageous. We are using switching device to switch the energy meter. For ON and OFF purpose of meter we are using switching block. SSR stands for SOLID STATE RELAY.

Why SSR instead of RELAY?

- Both are used as AC switching device, but if switching speed is high than SSR is suitable, if switching speed is slow than RELAY is used.
- Relay life decreases as number of usage time increases, but in SSR there is no change.
- For driving RELAY, current or power required is more comparatively to SSR.
- For switching SSR requires 15amp, whereas RELAY needs (30amp,50amp,90amp) as per requirement.

IV. OVERVIEW OF INTERNET OF THINGS

The IOT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefitxW in addition to reduced human intervention. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical system, which also encompasses technologies such as smart grids, virtual power plants, smart homes and smart cities. Each thing is uniquely identified through its embedded computing system but is able to interoperate within the existing internet infrastructure.

Figure 3. IOT Representation

People also want to communicate with all non-living things through internet such as home appliances, furniture's, stationeries, cloths etc. The people already have a lot of technologies to interact with living things but IOT enables to communicate with non-living things with comfort manner. IOT is a convergence of several technologies like ubiquitous, pervasive computing, Ambient Intelligence, Sensors, Actuators, Communications technologies, Internet Technologies, Embedded systems etc.

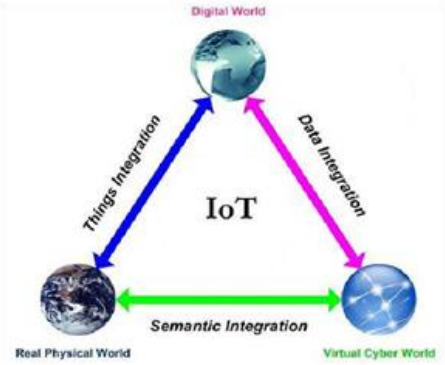

Figure 4. IOT Working

V. WHY ARDUINO BOARD THAN OTHER CONTROLLER?

Well known, controllers to us are 8051, pic 16f/18f, ARM7, msp430, other latest boards like Intel Galileo Gen 2 etc. Out of all these ARDUINO is the best.

- We require two UARTS, but pic 16f/18f and 8051 has only one UART.
- Whereas ARDUINO has two UARTS as required, one in hardware and other in software.
- Msp430 has 3 UARTS but it is very costly than ARDUINO.
- ARDUINO is even less in cost as compared to other controller.
- Other boards like Intel Galileo gen 2 are very costly and complex to handle.
- The best part of Arduino usage is that its programming is very easy as compared to other devices.
- For the new start by students it's very feasible and easy to use.

VI. CONCLUSIONS

Arduino and GSM based Smart Energy Meter for advanced metering and billing system is built which is able to read and send data via wireless protocol using GSM technology through GSM modem, capable of manage the meter as well as the line connection. However this project needs more modification for more reliable and higher degree of satisfaction and safety. For GSM module the network coverage of the SIM used is one of the important facts. The network strength should strong so that the GSM module can work well. One of the most important facts for this project is high cost of the component so that the overall cost of this project is high. Due to educational purpose and for research the equipment is provided with all pin connection, features and all possible events. As a result the manufacture cost is high. But when we implement this project commercially the cost may reduce by two or three times or more than the demo project. In commercial production for this project all the necessary component should provide only necessary pin connection and features. As a result overall cost may reduce more. In spite of being high cost at first time that mean when buy or install the overall cost of the system will reduce for this meter. The human labor that is taking data from energy meter in present day has to pay a good amount of salary for every month.

VII. ACKNOWLEDGEMENT

It gives us great pleasure in presenting the paper on "Smart Energy Metering using GSM and IOT". We would like to take this opportunity to thank our internal guide of Electrical and electronics Engineering Department, VVCE, Mysuru for giving us all the help and guidance we needed. We are really grateful to them for their kind support. Their valuable suggestions were very helpful.

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Image Blending and its Importance in Image Processing

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ABSTRACT

Digital image processing has a broad spectrum of applications in today's modern world. Image processing is the use of computer to process pictures, a technique that has revolutionised in the fields of medicine, geology and space exploration. It has become the hottest area in digital signal processing. In this paper, different techniques used in image processing and its applications are introduced. The brief introduction of mixing of two images, which is known as blending, and its usage in different areas like medical imaging, biological research, seismic data interpretation, film industry and photography are presented in this paper.

Keywords: Digital image processing, mixing, blending, medical imaging

I. INTRODUCTION

Nowadays, image processing is a rapidly growing technology. It forms one of the core research area in engineering and computer science field. It basically includes three stages. First, image capturing through image acquisition tools and second, analyzing the same and finally followed by the output stage called the processed or altered image. There are two types of image processing namely, analogue and digital image processing. Analogue image processing is used for hard copies such as printouts and photographs. Manipulation of digital images through computers are done with the help of digital image processing techniques. Various phases of digital image processing are image acquisition, image pre-processing, image enhancement, image segmentation and image classification. Image blending is one of the application of image processing applied in various fields such as, medicine, biological research, photography, film industry, geography and many more areas. The organization of paper is as follows - section II briefly introduces image processing and its techniques, section III provides its applications and this is followed by blending application and its different types in section IV.

II. IMAGE PROCESSING

In modern science and technologies, images are gaining broader scopes, because of ever growing importance of scientific visualization. Image processing usually refers to digital image processing techniques, like to process, to analyze and to present the images obtained from various sources, such as Microscope, Digital camera, Scanner etc. into suitable form. Nowadays, manufacturer of microscopes designs their instruments with features supporting image processing.

A. Image Processing Techniques

There are various Image Processing techniques. Following are the different types of techniques:

- ✓ Image Acquisition (capturing) is done through ultrasound, magnetic resonance imaging(MRI), computed tomography(CT), and electrical tomography
- ✓ Image Pre-processing: Image data recorded may restrain errors due to brightness value of the pixels and enabling to approach Image pre-processing.
- ✓ Image Enhancement involves using the techniques to improve visual impact, such as size, shape, color, and texture features better suited for either human or for machine interpretation
- ✓ Image Segmentation: Image segmentation is the process which subdivides the image into its constituent parts. For Image segmentation, different techniques are used, which includes Image thresholding-based technique, Image gradient-based technique and region-based technique.
- ✓ Image classification is classifying a pixel or group of pixels based on its grey value, which aides in extracting the information about the image.

III. APPLICATIONS OF IMAGE PROCESSING

Image Processing is used in various applications such as Medical Imaging, Biological research, Cancer research, Drug testing, Metallurgy, Film Industry, Graphic Arts, Printing Industry, Forensic studies and Material science.

In Medicine, extraordinary evolution of image acquisition technology enables physicians to deal with several kinds of images for the medical diagnosis. Medical images coming from different sources can often provide different information. Combining two or more co-registered multimodal medical images into a single image (image fusion) is an important support to the medical diagnosis.

In case of cancer tumor diagnosis, it involves capturing number of high-resolution smaller component images and later combining these smaller high-resolution component images to get a complete panoramic image of cancer tumor.

IV. IMAGE BLENDING

Image blending is a technique of blending or mixing two or more images to form a single merged image. It is similar to pixel addition. The value of each pixel in the output image is a linear combination of the corresponding pixel values of the input images. Here, the first image in the process of overlaying is called as upper or top layer and the second image which is blended with the first image is called as lower or bottom layer.

A. Different types of blending

- ✓ Normal blend mode is the standard blend mode which uses only the upper layer and does not mix colors with the bottom layer.
- ✓ In Dissolve blend mode, the pixels are taken randomly from the both the upper and lower layers. For high opacity most of the pixel would be taken from the upper layer and for the low opacity most of the pixel will be taken from the bottom layer. Due to this the image may look grainy.
- ✓ Multiply and Screen blend modes are very basic blending modes which are used for darkening or lightening the images.
- ✓ In Multiply mode, values of the pixels from the top layer are multiplied with the respective pixel values from the lower layer. The result is a darker image.
- ✓ In Screen mode, the values of pixels of two images are first inverted and then respective pixel values from both the images are multiplied. Finally, the lighter image is obtained by inverting the multiplied value.
- ✓ The Simple Arithmetic blending modes are division, addition and subtraction mode.
- ✓ In Divide blending mode, the respective pixel values of the one-layer divides with the pixel values of another layer. It is useful for making

the image brighter in case of grey image and helps in removing the tint of a colors in colored images.

- ✓ In Addition blending mode, the pixel values of both the images are added. If the value is above 1, the resulting image is white. If the pixel value is below 0, the resulting image is black.
- ✓ In Subtract blending mode, respective pixel values of the layers get subtracted. If the resulting value is negative then the image is black.
- ✓ The function of the Hue blend mode is to retain the luma and the chroma of the bottom layer of the image, while adopting the hue of the upper layer.
- ✓ In Saturation blend mode, it retains the luma and hue of the lower layer and adopts the chroma of the upper layer.
- ✓ In Luminosity blending mode retains the hue and chroma of the lower layer and adopts the luma of the upper layer.

Applications of Image blending

In Medical Diagnosis, a Computer Aided Diagnostic Systems helps in early diagnosis, monitoring and treatment for the ailment. This is where the medical imaging plays a vital role, where image blending plays its subsystem. As it is known, a complete panoramic image of the clinical diagnosis cannot be taken in single scan, component images will be stitched and blended to form a composite image aiding better clinical diagnosis. In geography, color and color blending plays a critical factor in seismic data interpretation. Mobile application like panoramic view makes use of Image Blending and Stitching. Once the image size goes beyond threshold limit, an image pyramid is considered.

An image pyramid builds multiple mosaics of images each one at a different zoom level, resulting in tiles, where each tile is stored in a separate file. This comes with a composition overhead to bring back the tiles into a single image. It can speed up image handling as each overview is tiled, and thus a sub-set of it can be accessed efficiently. A mosaic of these images can be accurately formed by applying image registration (stitching), overlap removal and blending techniques. For this an optimized, automated, fast and reliable method for both image joining and blending algorithms can be applied.

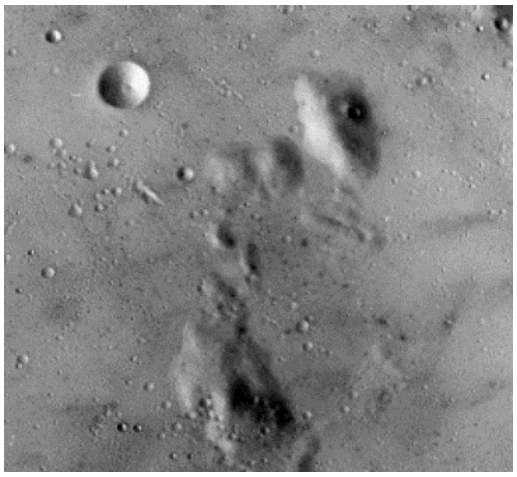

Figure 1. First image

Figure 2. Second image

Figure 3. Blended image

Figure 3 is the resulting image obtained by blending figure 1 and figure 2. Blending of images is calculated using the formula,

$$Q(i,j) = X \times P_1(i,j) + (1 - X) \times P_2(i,j)$$

where P1 & P2 are two input images, Q is the resulting image. X is the blending ratio which determines the influence of each input image in the output. This happens if the images are coloured. X can either be a constant factor for all pixels in the image or can be determined for each pixel separately using a mask. The size of the mask must then be identical with the size of the images. Here, P1 is the first image called as upper or top layer and P2 is the second image which is blended with the first image called as lower or bottom layer.

V. CONCLUSION

Currently, Image processing is one of the major areas in medical science to diagnose ailments. In this paper, different techniques used in image processing and its applications are introduced. Mixing of two or more images to get single image is called blending. Image blending plays a major role in medical imaging, seismic data interpretation, mobile applications, film industry and photography. A sample of blending two images is briefly introduced in this paper.

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Microcontrollebased Road Power Generation

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ABSTRACT

This paper introduces useful concept of present scenario, power is the major need for human life. There is a need to develop non-conventional sources for power generating due to the reason that our conventional sources of power are getting depleted day by day. The extensive use of energy has resulted in an energy crises over the few years. For meeting up the regular demand of energy we need to design a system that will produce electricity with technique of optimal utilisation of conventional sources for conservation of energy. This paper emphasizes on the idea how to utilize the energy which is wasted when the vehicle passes over a speed breaker. Lot of energy is generated when the vehicle passes over it. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of moving vehicles can be converted into mechanical energy at the shaft through rack and pinion mechanism. Then, this mechanical energy will be converted into electrical energy using generator which will be stored in the battery. The energy we save during the day light can be used in night time for lighting street lights. Therefore, by using this arrangement we can save lot of energy which can be used for the fulfillment of future demand.

Keywords: Kinetic energy, Speed Breaker, Electro-mechanical unit, Power Generation, Microcontroller, Energy conservation.

I. INTRODUCTION

In all the sectors of any country's economy, energy is an important unit. One of the most widely used form of energy is electricity, which can also be generated by converting kinetic energy of moving vehicles by making speed breaker as a generating unit called as Road Power Generation (RPG). Road Power Generation can be done by Roller mechanism, Spring mechanism, Crankshaft mechanism etc. But these mechanisms have some disadvantages. So this paper attempts to show an innovative concept of Road Power Generation using rack and pinion mechanism and controlling overall operation with the help of microcontroller to use this generated electricity in an efficient manner.

II. PROPOSED SYSTEM

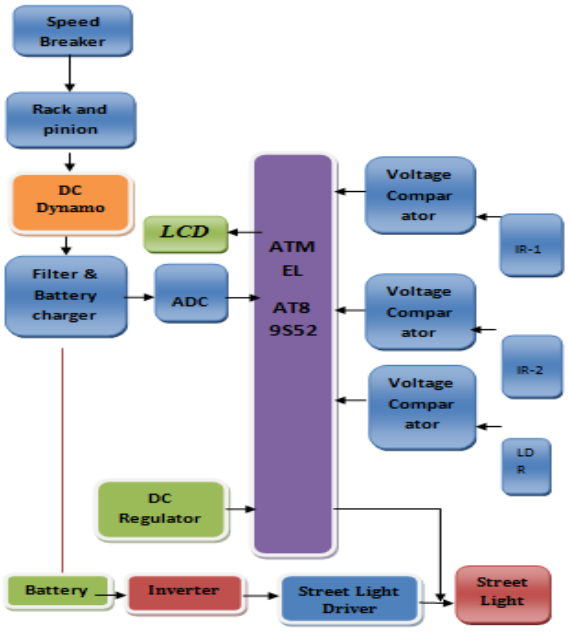

Figure 1. Block Diagram

III. EQUIPMENTS REQUIRED

- ✓ RACK AND PINION GEARS: The rack and pinion used to convert between rotary and translatory motion. The rack is the flat toothed part, while the pinion is the gear. Rack and pinion can convert rotary to linear of from linear to rotary motion
- ✓ SHAFTS: It is a rotating element, which is used to transmit power from one place to another place. It supports the rotating element like gears . It must have high torsional rigidity and lateral rigidity.
- ✓ SPRINGS: It is defined as an elastic body whose function is to distort when loaded and to recover its original shape when the load is removed. It cushions, absorbs or controls energy either due to shocks or due to vibrations.

DC DYNAMO: It is a device, which converts mechanical energy into electrical energy. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current through "faraday's law of electromagnetic induction". A dynamo machine consists of a stationary structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which turns within that field.

- FILTERS: Filters are the circuits which performs signal processing functions, specifically to remove unwanted frequency components from the signals.
- LDR: A photo resistor or light dependent resistor(LDR) is a resister whose resistance decreases with increasing incident light intensity. It is made up of high resistance semiconductor.
- LED: A light emitting diode (LED) is a semiconductor light source. LED's are used as indicator lamp in many devices and are increasingly used for other lighting.
- VOLTAGE COMPARATOR: It is an electronic circuit that compares two input voltages to know which of these voltage is greater.
- VOTAGE REGULATOR: It is an electrical regulator designed to automatically maintain a constant voltage level. Depending on the design, it may b used to regulate one or more AC or DC voltages.
- LCD(Liquid Crystal Display): It is the technology used for displaying the output on the screen.
- INVERTER: It is an electrical device used to convert power from DC to AC.
- MICROCONTROLLER: A microcontroller (sometimes abbreviated µC, uC or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM.

The 8051 is the name of a big family of microcontrollers. The device which we are going to use is _AT89S52_which is a typical 8051 microcontroller manufactured by Atmel™.

IV. WORKING PRINCIPLE

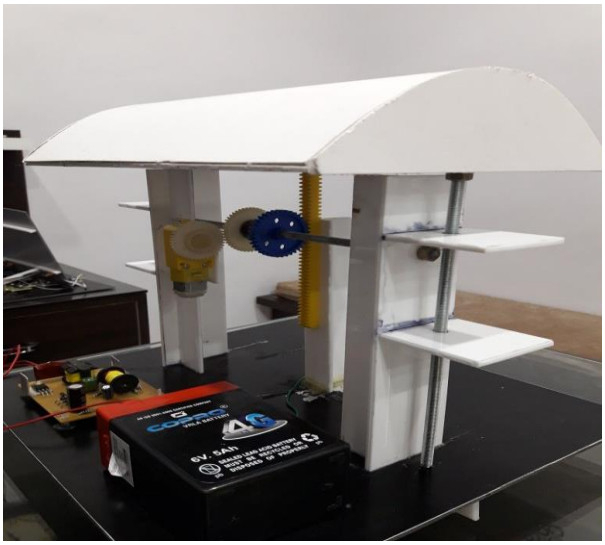

Figure 2

The working of this speed breaker arrangement for producing electricity is very simple. There are large number of vehicles running on the road. When these vehicles passes over the speed breaker it moves downwards due to its weight, than the springs that are attached to the speed breaker are compressed and the rack , which is attached to the bottom of the

speed breaker moves downwards in the reciprocating motion. pinion converts this reciprocating motion into rotary motion. so the shaft will rotate with certain rpm. The dc motor is connected to the shaft which converts mechanical energy into electrical energy and is stored in the battery. This stored dc power is converted into ac using inverter and is given to street light.

After generation the remaining operations are done using microcontroller. The supply for the working of microcontroller is given through dc regulator. The generated output is measured using microcontroller and is displayed on the LCD. The power generated is used in efficient manner by controlling the intensity of street light to 50% and 100% using LDR.

V. RESULT AND MODEL CALCULATIONS

- The weight of the load acting = 5 kg
- Height of the speed breaker = 5cm
- Workdone = Force*Distance
- Forc = Weight of the body = 5*9.81 = 49.05N
- Distance travelled by the body = Height of the speed breaker = 5cm
- Output power = Workdone/Seconds = (49.05*0.05)/60 = 0.04 Watts
- Power developed for 1 vehicle passing over the speed breaker arrangement for 1min = 0.04 Watts
- Power developed for 60minutes = 2.4 Watts

The proposed project was tested for generation of electric power. Different pressure was applied on speed breaker, the power generated were recorded.

Table 1

Sl.No.	Load(kg)	Power generated(watts)
1.	1	0.008
2.	2	0.016
3.	3	0.024
4.	4	0.032
5.	5	0.040

The above experiment indicates that when pressure was applied on speed breaker there was a corresponding increase in power. The results were encouraging.

VI. ADVANTAGES

- Pollution free power generation.
- Elimination of transmission system.
- Less area required and no obstruction to traffic.
- No need of man power during power generation.
- Low cost, easy maintenance and no fuel transportation problem.
- Electricity will be generated throughout the year.
- More efficient

VII. FUTURE SCOPE

In this world where there is shortage of electric power supply, this project will be helpful to solve some of the problems and RPG may be the possible answer for battery charging stations.

VIII. CONCLUSION

This method of Road Power Generation will prove a great benefit to the world, since it saves lot of electricity that is getting wasted in illuminating the street lights.

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A Novel Technique for Human Safety and Go Green for Priority Vehicles on Road Accidents

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ABSTRACT

As we all know our country is facing serious impacts on road accidents. Road accidents are an outcome of the interplay of various factors, some of which are the length of road network, vehicle population, human population and adherence/enforcement of road safety regulations, heavy traffic etc.The proposed paper gives the best solutions to reduce the problems. Accident identification and alerting, Vehicle accident detection using sensors networks and location information is conveyed to consent people using inbuilt features of smart phones like GPS and GSM meanwhile focusing on traffic zones. The accident location is shared with the nearby hospitals as well as ambulance services. This paper also deals with sending the health details of a person to the nearby hospital to get rid of few tests and utilize the time for other emergency services. The health details of a person is secured and read only format until it is changed by authorized doctor.

Keywords: Arduino Uno, Arduino IDE, Traffic Signal Monitoring, Health Information,

I. INTRODUCTION

Road accident causes injuries, fatalities, disabilities and hospitalization with severe socio economic costs across the country. Consequently, road safety has become an issue of concern both at national and international level.

Presently we have few models which alerts the accidents occurrence: These design focuses on providing basic information on the accident site to the hospital or police station. In this work, a three-axis accelerometer, Piezo electric sensor and Bluetooth communication with smart phones for GPS tracking system are used for accidental monitoring. The major components used in this device are: Arduino Uno (ATMega328P), Bluetooth Module (HC05), Accelerometer sensor (ADXL335) and piezo electric sensor.

These above mentioned papers just include the detection and alerting system, even after alerting the ambulance and getting the patient to the hospital, due to lack of time or in the gasping stage of the person, they need to take the tests required for further treatment due to which the person may die.

We have come up with few improved implementations in these above papers. This can be done by the following

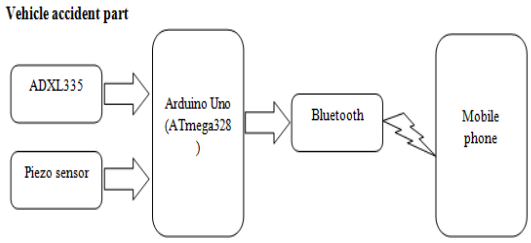
STATEMENT OF PAPER

Aim of Paper

Here our main intension is to send the health details of a person met with accident to nearby hospital using Arduino, at the same time clearing the traffic signal for ambulance i.e. sending the heath details of the person to hospital attendants of hospital to skip

few tests saving precious time of a patient and focusing on further treatments

Block Diagram



Our first unit comprises of Arduino, few sensors namely ADXL 335 and piezoelectric sensor with device like bluetooth.

The output of the sensor activates the Arduino. Based on few conditions the Arduino sends signal to the bluetooth which connects the Arduino and smart phone.

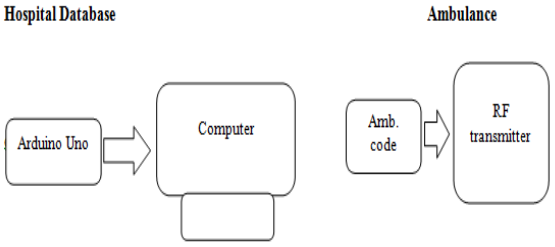
Certain conditions based on which the Arduino sends signal to the Bluetooth is as follows..

- If the voltage produced by the piezoelectric sensor is beyond normal or threshold value indicating severe accident or harm to the person.
- If the accelerometer reads more than threshold i.e. tilt of the vehicle exceeds the normal value indicating rollover of vehicle.

Later the Arduino activates Bluetooth which is further connected to mobile. After being activated the Bluetooth prompts mobile to send a message to the hospital, family and ambulance. The message is sent through the application in a handset. In the presence of internet the message is sent to the nearby hospital or else just to their family members.

The process does not continue if the output values of sensors are within range.

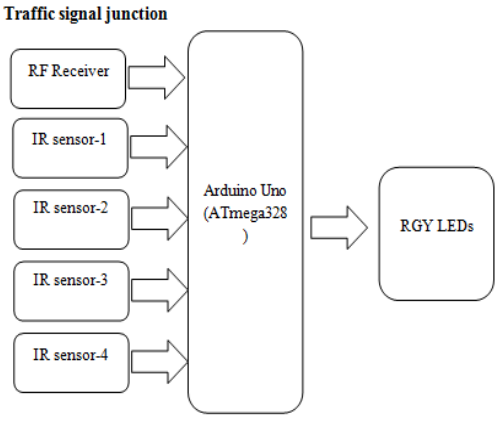
We can use GPS and GSM module instead of handset. We used handset to make our model compact.



a. b.

a. The message sent by the handset is received at hospital which contains link of the health details of the person.The hospital after receiving health details, skip few steps which would result same as mentioned in the health details from the link. The health details of public is saved at particular website which is accessed only by hospitals.

b. RF module is transmitter and receiver model wherein both transmitter and receiver is located on two different bodies. One is located on the ambulance i.e. transmitter and the other is located at the traffic junction i.e. receiver.



The traffic clearance for ambulance and other priority vehicle is done by the traffic signal unit. The arrival of the ambulance in the region is detected by the RF module and the arrival of the ambulance on particular lane is detected by IR sensors. Accordingly the programming is done in the ARDUINO. If the RF module output and the IR output is followed by a acceptable delay then the traffic is cleared by changing the signal.

Experimental Setup and analysis

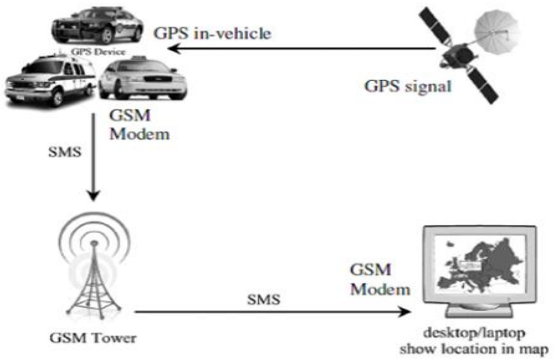
Principle of Operation

Operation 1: The location of the accident spot is sent to the hospital for the ambulance arrival through GPS and GSM.

Operation 2: The heath details of the person are forwarded to the hospital through application in the mobile.

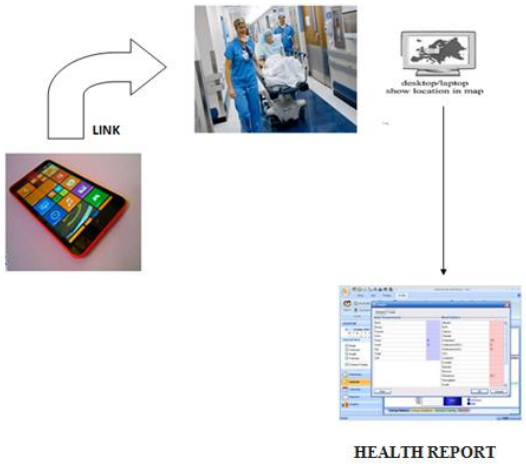
Operation 1

The location of the accident is sent to the hospital through GPS and GSM. Practically we are using GPS and GSM of the smart phone which is inbuilt. The flow is as shown



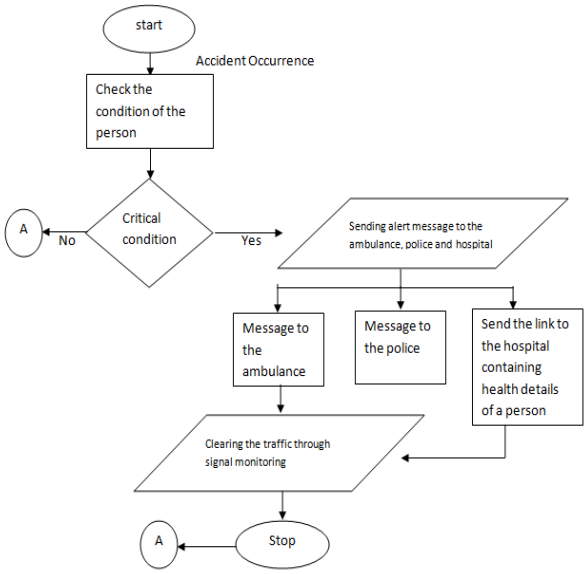
Operation 2

The link of the health detail of particular person is sent to the hospital attendants of hospital through the application developed in the smart phone.



Later the link is opened by the hospital attendants wherein the health details in displayed. The health details of the person is secured and read only format. If any changes it is done by the authorised doctor. The person should update the details every 6 months or frequently as recommended.

Flow Chart



Algorithm

Step1: Start.

Step2: Accident is detected using sensors located on the vehicle.

Step3: Send alert through messages using application to nearby hospital, police, ambulance and family members based on the condition of the person.

Step4: The heath details of the person are forwarded to the hospital attendants of the hospital for further arrangements.

Step5: Meanwhile traffic is cleared for quick reach of vehicle at the spot and back to hospital.

Step 6: End.

Advantages and limitations

Advantages

- Easy to operate and automatic.
- Sophisticated security.
- Simple and Reliable Design.
- To know the pre-existing diseases.
- Useful when patient is unconscious. Limitations
- The person needs to update his health details regularly.

1. The handset need to access internet connectivity to send a message to nearby hospital.
2. The message is not sent or received if the network of either of the device is not good (recipient and sender).

conclusion and future scope

II. CONCLUSION

In this paper, a novel idea is proposed for accident detection and alert system with SMS to the user defined mobile numbers with health details. The health details of the public are uploaded in a website secured by their user id. If this system is implemented in countries with large population like INDIA can produce better results. This system is more accurate with no loss of time.

III. FUTURE SCOPE

This paper is mainly focussing on to reduce the death rate caused due to accident injuries to a person. This can further be improved by focusing on alerting the hospital or any short treatment when the person is feeling uneasy while driving or if any parameters of a person like BP or DIABETES pitches high. Not only driver, it can also be made applicable to other people sitting in the car or vehicle.

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Generation of Electricity by Both Mega Hydro and Tidal Power Systems

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ABSTRACT

Electricity is now an important part of homes and industries. Almost all the devices at homes, businesses and industries are running because of electricity. Mega hydro is hydro power with a maximum electrical output. Hydro power or water power is power derived from the energy of falling water or fast running water, which may be harnessed for useful purposes. Hydropower is fuelled by water, so it is a clean fuel source. Hydro power systems of this size benefit in terms of cost and simplicity from different approaches in the design, planning and installation than those which are applied to larger hydro power. Tidal energy is one of the sources of ocean energy. Tide is a periodic rise and fall of the water level of sea which are carried by the action of the sun and moon on the water of earth. Tides are produced mainly by the gravitational attraction of the moon and the sun on the water of solid earth and the oceans. About the 70% of the tide producing force is due to the moon and 30% due to the sun. A tidal generator converts the energy of tidal flows into electricity. Greater tidal variation and higher tidal current velocities can dramatically increase the potential of a site for tidal electricity generation. Tidal power or tidal energy is a form of hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity. Although not yet widely used, tidal energy has potential for future electricity generation.

Keywords: Generation of electricity, mega Hydro, Tidal Power Systems

I. INTRODUCTION

Mega hydro is hydro power with a maximum electrical output. Hydro power or water power is power derived from the energy of falling water or fast running water, which may be harnessed for useful purposes. Hydropower is fuelled by water, so it is a clean fuel source .The energy generated through hydropower relies on the water cycle, which is driven by the sun, making it a renewable power source. It is also a versatile power source.AC electricity can be produced enabling standard electrical appliances to be used and the electricity can be distributed to a whole village.

Tidal power or tidal energy is a form of hydropower that converts the energy obtained from tides into useful forms of power, mainly electricity. Although not yet widely used, tidal energy has potential for future electricity generation. Tides are more predictable than the wind and the sun. Tidal energy has the potential to produce great deal of free and green energy.

II. METHODOLOGY

This project consists of two parts, one is mega hydro and other is Tidal power system

The working of mega hydro is as follows. When water is being pumped to the overhead tank, there is a lot of energy being wasted. We utilize this to generate electricity. We divide the Water using a t junction pipe. There are two stepper motors placed at the end of both the pipes. When the water is rushed out of the pipe it rotates the turbine which is coupled to the generator and hence electricity is produced

In the other part of the project is the Tidal energy systems. There are 3 main parts for this systems. They are Float, Shaft and the Dynamo.The float is a device which is used to convert the kinetic energy of the waves to the linear energy. As the name suggests the float is an floating device which is pushed up when there is a swell in the wave and pulled downwards when there is a Dip in the wave.

The Shaft is a devices which converts the linear motion created by the Float into rotational motion. This is achieved by the use of two chains When there is a swell one chain is pulled which will rotate one chain sprocket while the other sprocket remains in neutral. When there is a dip in the wave the first chain sprocket is in neutral and the second rotates. Thus Rotational motion is achieved in the same direction in both swell and dip of the wave.

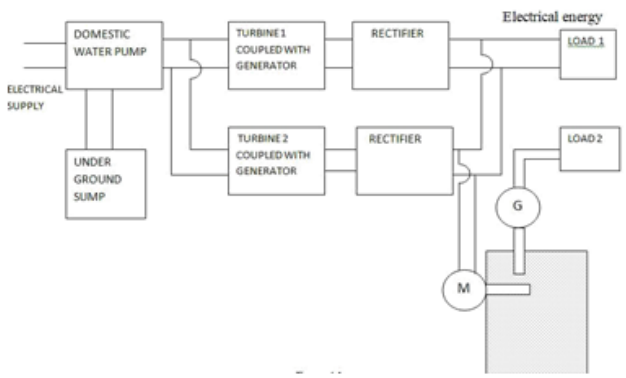
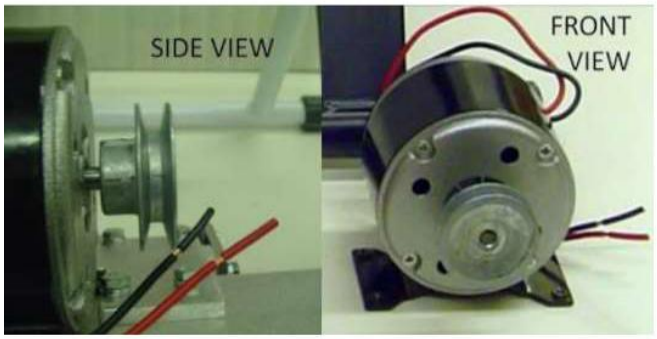


Figure 1. Block diagram

The Dynamo is coupled to the shaft using a gear box. This gearbox is required so increase the low RPM of the shaft to higher RPM. The dynamo then converts the rotational motion to electric energ

A.Dynamo

industry,large scale power generation, f and usually economical.A dynamo is another type of genera revolution.



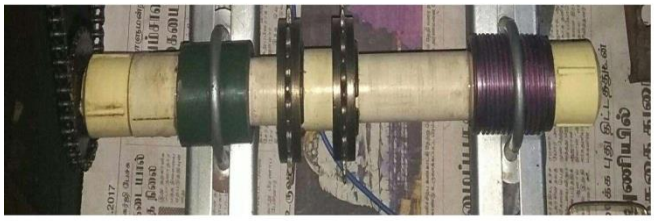


Figure 2. Dynamo

B.Gearboxproduce a much performance characteristics

- ✓ Low noise
- ✓ Low vibration
- ✓ Light weight
- ✓ Long operating life

Figure 3. Gear Box

G. The Distribution System connects the electricity supply from the generator to the houses. This is often one of the most expensive parts of the system.

H. The Consumer Loads are usually connected inside houses. Electrical load is a general name which refers to any device which uses the electricity generated. The type of electrical loads that are connected on a Mega hydro scheme will partly depend on the amount of power that is generated. Fluorescent lights are preferred because they use much less power for an equivalent amount of light as filament light bulbs do. This means that more lights can be connected to the same generator.

H. Design

1) Kinetic Energy

The kinetic energy of the stream flow flowing across thecross section with a velocity is given by

$$KE=1/2*\rho*V\ 3 \qquad (1)$$

ρ is the density of sea water (kg/m3) Cp is the power coefficient

A is the area of cross section of the channel (m2) V is current velocity (m/s)

The power output or the efficiency of the turbine depends on the design of the turbine. The power output for a turbine from these kinetic systems can be obtained by the following equation

$$P=1/2*\xi*V\ 3 \qquad (2)$$

ξ is turbine efficiency

P is power generated (in watts)

• is density of the water (seawater is 1025 kg/m³) V is velocity of the flow

2) potential Energy

The potential energy is mainly dependent on the tidal prism of the basin. Potential energy obtained due to the stored water can be calculated as$E=1/2*A*g*h^2$

h is the vertical tidal range

A is the horizontal area of the barrage basin is the density of water = 1025 kg per cubic meter (seawater varies between 1021 and 1030 kg/m3) g is the acceleration due to the Earth's gravity = 9.81 m/s2

From equation 3, it can be seen that the potential energy varies with square of tidal range. So, a barrage should be placed in such a location where it is possible to achieve maximum storage head.

III. CONCLUSION

Hydropower is important from an operational standpoint as it needs no "ramp-up" time, as many combustion technologies do. Hydropower can

increase or decrease the amount of power it is supplying to the system almost instantly to meet shifting demand. With this important load-following capability, peaking capacity and voltage stability attributes, hydropower plays a significant part in ensuring reliable electricity service and in meeting customer needs in a market driven industry. In addition, hydroelectric pumped storage facilities are the only significant way currently available to store electricity.

Hydropower's ability to provide peaking power, load following, and frequency control helps protect against system failures that could lead to the damage of equipment and even brown or blackouts. Hydropower, besides being emissions -free and renewable has the above operating benefits that provide enhanced value to the electric system in the form of efficiency, security, and most important, reliability. The electric benefits provided by hydroelectric resources are of vital importance to the success of our National experiment to deregulate the electric industry.

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Density Based Traffic Control with Emergency Override

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ABSTRACT

The human population in cities is increasing day by day and therefore number of vehicles is increasing exponentially. Traffic control signals have been playing significant role in managing traffic flow in cities. But the conventional traffic control signals fails in time management. It allocates equal time slots to each road irrespective of the traffic density. This creates unnecessary waiting for drivers, which is not possible every time.

Therefore, we propose density based traffic control system, which allocates different time slots to each road according to vehicle density. The vehicle density is measured in three zones low, medium and high. The traffic density in each lane is measured using IR sensors. Accordingly the traffic signal lights give the green light based on the vehicle density.

This system also comes with RF signal override control in case of emergency vehicles such as fire brigade and ambulance. The RF transmitter and a GPS module are placed in the emergency vehicle. Whenever the override feature is activated, the green light is given in the desired lane for some time by blocking all the other lanes by giving them red light. So this is also a priority based system. This system, therefore, offers advantages over conventional traffic control system.

Keywords. Density based traffic, IR sensors, RF transmitter and receiver.

I. INTRODUCTION

Traffic congestion is one of the major problems of urban life. This problem is increasing day by day because of the increasing number of vehicles with limited infrastructural development. One of the oldest ways was to have a traffic police to control the traffic manually through hand signaling. But as this became quite grueling, the conventional traffic light systems were developed to control traffic. But if a lane has more traffic congestion than the others, the existing system fails to control traffic. To solve this problem, a real time traffic control system is needed which will control the traffic.

This paper proposes a real time area based traffic density estimation method which will help an intelligent traffic control system to avoid wastage of time. The proposed system controls traffic lights according to traffic density. Also the project aims to provide signal override for emergency vehicles through RF communication.

II. LITERATURE REVIEW

The traffic density accurately because its range is less about 20m.

Automatic vehicle identification is basically an independent identification technique used with moving objects such as vehicles. This is implemented

using Radio frequency identification (RFID) as the object passes a RFID reader [3].

The major disadvantage in these systems is high implementation and maintenance cost.

III. OVERVIEW

Each lane is divided into three zone low, medium and high. IR sensors are fixed one in each zone as shown in Fig 1. The IR system gets activated whenever any vehicle passes on the road between the IR transmitter and IR receiver. If any one of the lane is blocked with a huge number of vehicles, then this system changes the signal timings automatically and thus avoids unnecessary waiting time at the junction.

Several researches have been made to collect the traffic data in real time to determine the nature of traffic. Some of them employ image processing technique [4] to estimate the traffic density of a road. But this method does not give Whenever there is an emergency, RF signal override is operated. So an interrupt is sensed and so the normal operation is halted for a few seconds. Then the normal operation is resumed.

There are three different modes of operation at any traffic junction. They are,

Normal mode.here the traffic signal lights change according to fixed time period just like a conventional traffic signals. This mode of operation can take place when the density in all the lanes is nearly same.

Density mode.this mode of operation controls the traffic signals according to the density of vehicles. This can happen when the density of vehicles in different lanes is not same.

Override mode.here the priority is given to the emergency vehicles by overriding the traffic signal sequence.

The system uses a pair of Arduino boards. One Arduino board is interfaced with the IR sensors. The second Arduino interfaced with the RF transmitter receiver and GPS module.

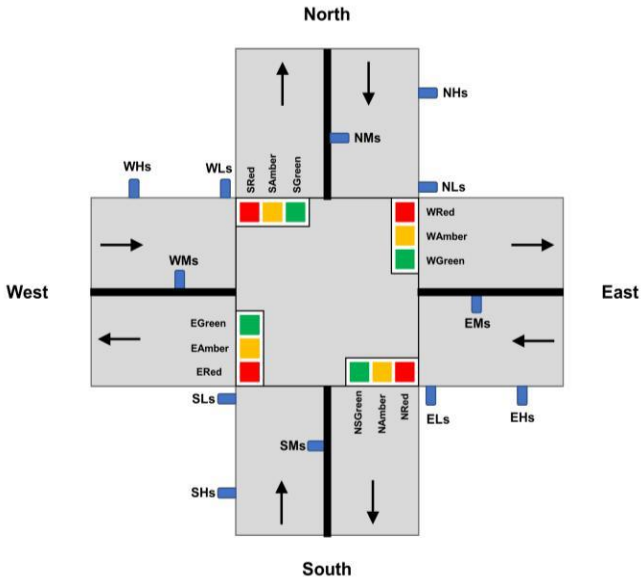

Figure 1. Representation of Traffic Signal Junction

IV. BLOCK DIAGRAM

The IR sensors are used for sensing the density of vehicles. This input is given to the Arduino board which changes the signal lights accordingly. GPS module is used for tracking the location of the emergency vehicle. The RF transmitter is used to transmit this information to RF receiver. The RF receiver, IR sensors and traffic signal lights are interfaced with the Arduino Mega as shown in Fig 2.

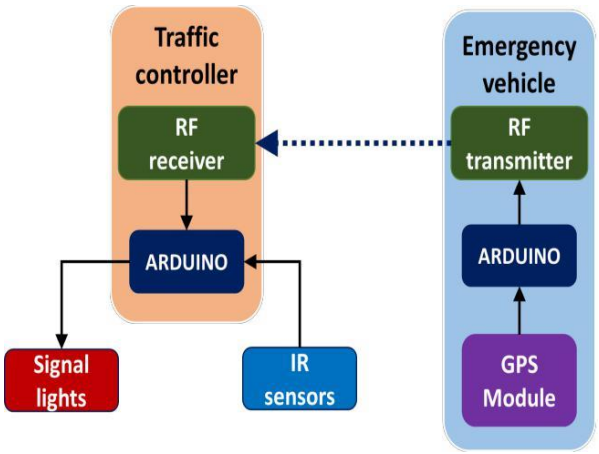

Figure 2. Block Diagram

V. METHODOLOGY

Measurement of traffic density is done by using IR sensors which are interfaced to Arduino board. IR sensors consist of IR transmitter and IR receiver i.e. emitter circuit and the receiver circuit. The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED.

The photodiode receives the radiation emitted by the IR LED once reflected back by the vehicle. Closer the vehicle, higher will be the intensity of the incident radiation on the photodiode. Thus we can determine whether the traffic density is low, medium or high.

Pre-defined time intervals are assigned to the signals. The green signal in the lane turns on only when the low sensor is activated irrespective of the medium and high sensors. If only the medium sensor or only the high sensor is activated and the low sensor is not activated, green signal for that lane is not given. So the operation skips to the next lane. This avoids unnecessary waiting by the traffic on the next road. If all the three sensors are activated then maximum time interval is assigned to this lane. No extra time is given to the road under consideration.

The emergency override is done with the use of RF transmitter receiver and GPS module. They are interfaced with another Arduino board in the emergency vehicle. Whenever the override signal is operated, the RF transmitter transmits the signal in all directions. The RF receiver which has the same crystal frequency as that of transmitter receives the signal. Here a crystal frequency of 433MHz is used. The receiver receives the information about the location of the vehicle. The coordinates of the vehicle and the direction in which the vehicle is

approaching is sent through the transmitter.

Whenever the override signal occurs the normal operation of the signals is halted (irrespective of the traffic density in other lanes), green signal is provided to that lane for a few seconds. Then the normal operation is resumed. i.e. after clearing the emergency the traffic signals are restored.

Using GPS module, coordinates of the emergency vehicle can be known. Using the latitude and longitude, the direction in which the vehicle is approaching can be accurately known.

The above method is quite advantageous because it helps in reducing the number of accidents and it is fully automatic.

The highest priority is given to the emergency mode of operation. The next priority is given to the density mode of operation. The least priority is given to the normal operation.

VI. HARDWARE CONNECTION DIAGRAM

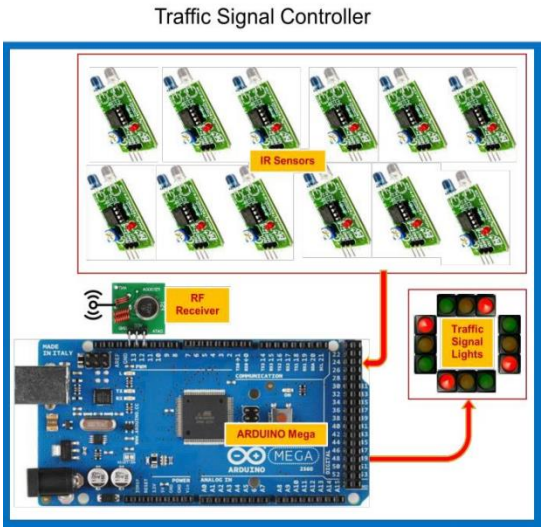

Figure 3. TrafficSignal Controller

Table 1

Components used	Specifications
Arduino Mega 2560	3.3V or 5V
IR sensors	4.5-6V
Traffic signal lights	3V
RF receiver	433MHz

Here three IR sensors are placed in each lane. They are used to measure the density of traffic. The low, medium and high sensors are separated from each other at certain

distance. The IR sensors and the traffic signal lights are interfaced to Arduino Mega 2560. The IR sensors which are used to sense the traffic act as input to the Arduino board. The traffic signal lights act as output controlled using Arduino Mega 2560.

Whenever there is normal mode of operation the IR sensors sense the traffic density and the traffic signal lights change according to pre defined time intervals. When there is density mode of operation the IR sensors sense the traffic density and change the traffic signals based on whether the density in the lanes is low, medium or high.

The GPS module SKG13BLRF transmitter is connected to Arduino Nano, are placed inside the emergency vehicle as shown in Fig 4.When there is emergency, the GPS module SKG13BL identifies the location of the emergency vehicle. Based on the values of latitude and longitude values the direction of the approaching vehicle can be accurately determined.

This data is sent by the RF transmitter to RF receiver .This data is received by the RF receiver is given to Arduino Mega as shown in Fig 3.These acts like an interrupt and thus override the traffic signal sequence in that lane. After a few seconds the normal operation is resumed.

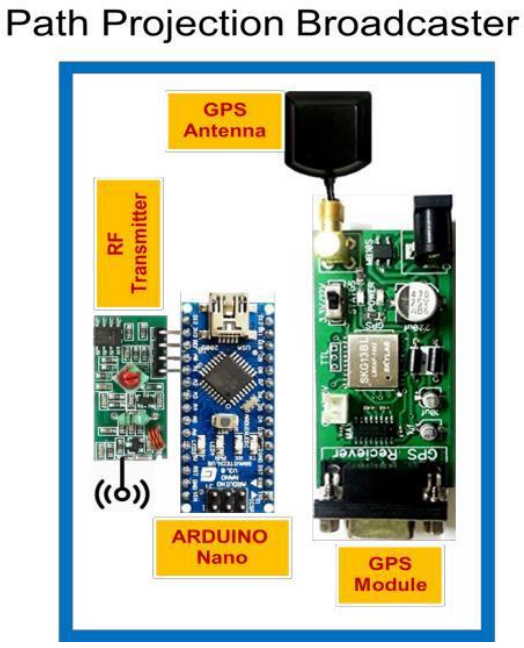

Figure 4. Path Projection Broadcaster

Table 2

Components used	Specifications
Arduino nano	5V
GPS module SKG13BL	3-5V
RF transmitter	433MHz

Based on the values of latitude and longitude the direction of the ambulance can be known.Some of the traffic signals may not be exactly alligned to North,East, South and

West.For North and North-East the direction is considered as North. For East and South-East the direction is considered as East.For South and South-West the direction is considered as South. For West and North-West the direction is considered as South. Fig 5 shows the directions considered.

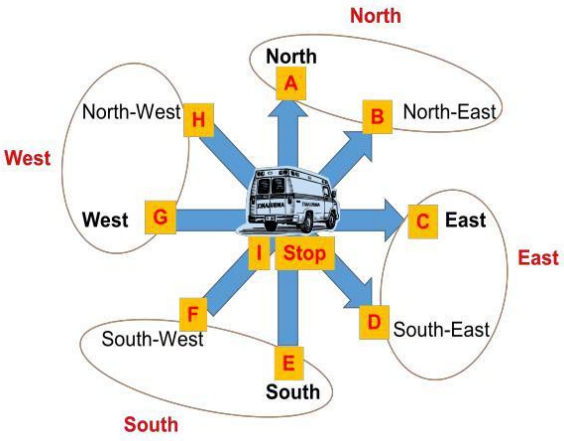

Figure 5. Direction Consideration

Sensors

Digital Input Pin	Assigned for
D22	NLs
D24	NMs
D26	NHs
D28	ELs
D30	EMs
D32	EHs
D34	WLs
D36	WMs
D38	WHs
D40	SLs
D42	SMs
D44	SHs

Figure 6 . Pins used for connectiong IR Sensors to Arduino Mega

Fig 6 shows the pins which are used for connecting Arduino Mega to the low sensors, medium sensors and high sensors present in North, East, West, South directions.

Fig 7 shows the pins used for connecting the traffic signal lights to Arduino Mega.

LEDs

Digital Output Pin	Assigned for
D23	NRed
D25	NAmber
D27	NGreen
D29	ERed
D31	EAmber
D33	EGreen
D35	WRed
D37	WAmber
D39	WGreen
D41	SRed
D43	SAmber
D45	SGreen

Figure 7. Pins used for connectiong traffic lights to Arduino Mega

RF Receiver

Pin	Assigned for
D10	RF_RX (INT4)
D9	RF_TX
D2	RF_EN

Figure 8. Pins used for connecting RF Receiver to Arduino Mega

RF Transmitter

Pin	Assigned for
5V	VCC
GND	GND
D12	DATA

Figure 9. Pins used for connecting RF transmitter to Arduino Nano

Figure 8 shows the pins used for connecting the RF receiver to Arduino Mega.
Figure 9 shows the pins used for connecting the RF transmitter to Arduino Nano.

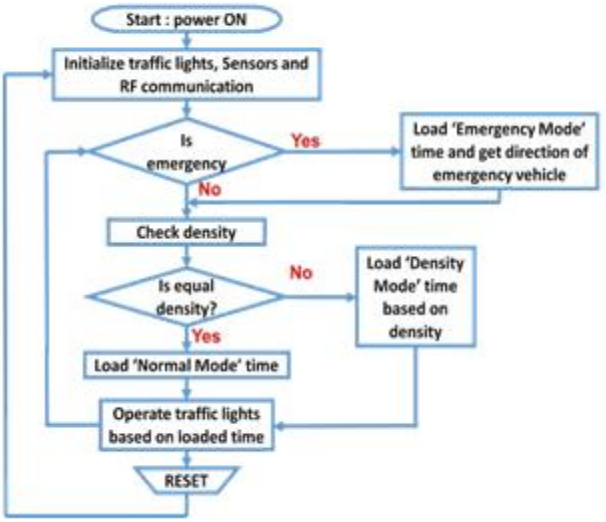

Figure 10. Flowchart of operation

The power supply is switched on. The traffic signal lights, IR sensors and RF communication are initialized. If there is an emergency, direction of the approaching vehicle is found and the emergency mode program is loaded. Check for emergency. If there is no emergency then the density of the vehicles is checked with the help of IR sensors. If the density in all the lanes is same, then the normal mode program is loaded and signals operate on loaded time. If the density is not same, then the density mode program is loaded and signals operate accordingly. Then program checks if there is an emergency and the loop continues. If the reset button is pressed, then the traffic lights, IR sensors and RF communication are initialized. The loop continues. This is depicted in the flow chart.

Fig 10 shows the flowchart of operation, and Fig 11 shows the hardware model.

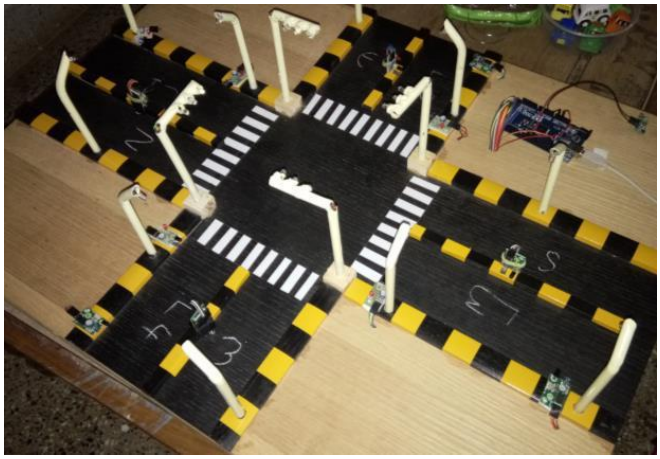

Figure 11. Hardware model

VII. CONCLUSION

The proposed system has many advantages compared to the existing one. The above system is time efficient ieavoiding unnecessary waiting at traffic signal junction by using density based controlling.

By introducing the above system, traffic jams can be avoided. So the traffic flows uninterruptedly and everyone will reach their destination in time. So time can be saved instead of wasting for waiting at junctions.

The priority is given to the emergency vehicles like ambulance and fire fighters which need urgent attention. So, human life is saved.

In future, this system can be extended to implement the authentication of emergency vehicles. Based on

the arrival and departure of emergency vehicle, optimization of traffic signals can be done.

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Optimal Capacitor Placement in Distribution System

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ABSTRACT

This paper presents an approach that determines the optimal size and location of capacitor in radial distribution system for improvement of voltage profile and reduce loss. Capacitor sizing and siting are done by particle swarm optimization technique. Particle swarm optimization offer the important information about the sequence of potential node for siting of capacitor. Particle swarm optimization is well applied and found to be very effective in radial distribution systems. The proposed method is tested for 33 bus distribution system.

Keywords. Capacitor sizing, Capacitor placing, radial distribution system, Particle swarm optimization.

I. INTRODUCTION

As distribution systems are growing large and being expanded too far, leading to higher system loss and poor voltage regulation, the need for an efficient and effective distribution system as therefore become more important. On this regard, capacitor banks are added on radial distribution system for loss reduction and voltage profile improvement.

With this various objectives in view, optimal capacitor placement aims to determine capacitor location and its size. Researches has been carried out over decades on optimal capacitor placement. Early approaches were based on heuristic techniques. In the 80's, more rigorous approaches were suggested illustrated by Grainger[1],[2] and Baran Wu, [3] formulated the capacitor placement as a mixed integer non-linear program. In the 90's few algorithms were introduced as a means of solving the capacitor placement program. [4]Ng and Salama have proposed a solution approach to the capacitor placement problem based on fuzzy sets theory. Using this approach the authors tried to account for uncertainty in the parameter problems.

[5]determines the optimal capacitor sizing in order to increase the reliability and improve power quality by the particle swarm optimization algorithm in the distribution network. In [6], a fuzzy set theory is used for optimal placement of capacitor to reduce power losses in the radial distribution network. [7],has suggested a simple strategy for the capacitor placement problem and improve power quality based genetic algorithm, the objective function consists the cost of power losses and costs related to the capacitor banks.

Self adaptive harmony search algorithm for optimal capacitor placement to reduce power losses in the distribution network is provided in [8]. Improved Harmony search algorithm for optimal placement capacitor is used in radial distribution network in [9]. In [10], it is suggested a new adaptive modified firefly algorithm to solve the optimal capacitor

placement problem, the objective function is composed of the power losses cost and cost of installing capacitors.

In [11],a particle swarm algorithm by considering the harmonic distortion for the capacitor placement is presented in radial distribution network. The objective function is combination of the capacitor costs and active losses costs. In [12], the PSO algorithm to solve this problem, with the aim of minimizing the losses in radial distribution network has been used.

Particle swarm optimization (PSO) was developed by James Kennedy and Russell Eberhart. It is based on metaphor of social interaction, searches a space by adjusting directions of moving points in a multi dimensional space and used for optimization of non-linear problems. The main advantages of the PSO are. simple concept, easy implementation quality to control parameters and good computational efficiency compared to other heuristic algorithms.

In this paper, capacitor siting and sizing is done by particle swarm optimization technique. PSO is used

for estimation of required level of shunt capacitive compensation to improve the voltage profile of bus system and the proposed method can successfully avoid premature convergence. The proposed method is tested on 33 bus radial distribution systems.

II. MATHEMATICAL MODEELLING

2.1 CONSTRAINTS.

In solving the optimal capacitor placement problem, the magnitude of voltage at each bus should be kept within its limits as follows

$$V_{min} \leq |V_i| \leq V_{max}$$

Where Vi is the voltage magnitude at bus I, Vmin is the minimum voltage limit and Vmax denotes the maximum voltage limit. The bus voltages can be obtained by using the iterative method of Newton Raphson.

2.2 POWER LOSS CALCULATION.

To calculate the power loss, Newton Raphson iterative technique has been employed

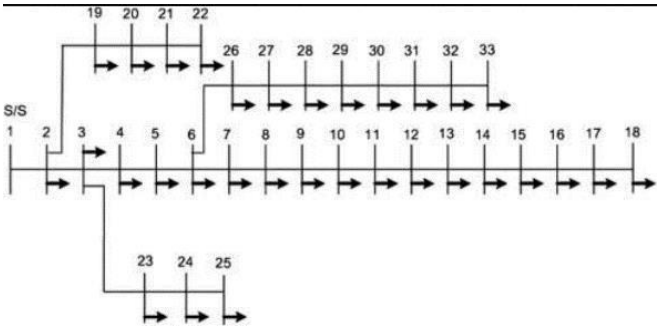


Figure 1. Single line diagram of 33bus system

Table 1. Line Data For Loss Calculation

FROM	TO	R	X	B	TRANSFORMER TAPPING
1.0000	2.0000	0.0922	0.0470	0.0000	1.0000
2.0000	3.0000	0.4930	0.4930	0.0000	1.0000
3.0000	4.0000	0.3661	0.3661	0.0000	1.0000
4.0000	5.0000	0.3811	0.3811	0.0000	1.0000
31.0000	32.0000	0.3105	0.3619	0.0000	1.0000
32.0000	33.0000	0.3411	0.5302	0.0000	1.0000

Table 2. Bus Data For Loss Calculation

USN O	BUS TYPE	VTG MAG.	ANGLE DEGREE	LOAD		GENERATOR		Qmin	Qmax	Injected MVAR
				MW	MVAR	MW	MVAR			
1	1	1	1	0	0	0	0	0	0	0
2	0	1	0	0.100	0.060	0	0	0	0	0
3	0	1	0	0.090	0.040	0	0	0	0	0
4	0	1	0	0.120	0.080	0	0	0	0	0
32	0	1	0	0.210	0.100	0	0	0	0	0
33	0	1	0	0.060	0.040	0	0	0	0	0

The line losses for the IEEE standard 33bus system as shown in fig 1 is calculated by Newton Raphson method by considering the above mentioned line data and bus data as input. The losses at each bus and total loss of bus system is calculated by Newton Raphson and the results of Newton Raphson are.

Table 3. Power Flow Solution By Newton Raphson Method

BUS NO	VTG MAG.	ANGLE DEGREE	LOAD		GENERATOR		Injected MVAR
			MW	MVAR	MW	MVAR	

1	1.000	0.000	0.000	0.000	3.917	2.434	0.000
2	0.997	0.014	0.100	0.060	0.000	0.000	0.000
3	0.983	0.096	0.090	0.040	0.000	0.000	0.000
4	0.975	0.162	0.120	0.080	0.000	0.000	0.000
32	0.917	0.388	0.210	0.100	0.000	0.000	0.000
33	0.917	0.380	0.060	0.040	0.000	0.000	0.000

III. PARTICLE SWARM OPTIMIZATION

Particle Swarm Optimization (PSO) is a meta heuristic parallel search technique used for optimization of continues non linear problems. The method was discovered through simulation of a simplified social model. PSO has roots in two main component methodologies perhaps more obvious are ties to artificial life in general, and to bird flocking, fish schooling and swarming theory in particular.

It is also related, how ever to evolutionary computation and has ties to both genetic algorithms and evolutionary programming. It requires only

primitive mathematical operators, and is computationally inexpensive in terms of both memory requirements and speed.

It conducts searches using a population of particles, corresponding to individuals. Each particle represents a Candidate solution to the capacitor sizing problem.

In a PSO system, particles change their positions by flying around a multi dimensional search space until

a relatively unchanged position has been encountered, or until computational limits are exceeded. In social science context, a PSO system combines a social and cognition models.

The general elements of the PSO are briefly explained as follows.

Particle X(t). It is a k-dimensional real valued vector which represents the candidate solution. For an ith particle at a time t, the particle is described as $Xi(t)=\{Xi,1(t), Xi,2(t),\ldots Xi,k(t)\}$.

Population. It is a set of 'n' number of particles at a time t described as $\{X1(t), X2(t)\ldots Xn(t)\}$.

Swarm. It is an apparently disorganized population of moving particles that tend to cluster together while each particle seems to be moving in random direction.

Particle Velocity V(t). It is the velocity of the moving particle represented by a k-dimensional real valued vector Vi(t)= {vi,1(t), vi,2(t)…… vi,k(t)}.

Inertia weight W(t). It is a control parameter that is used to control the impact of the previous velocity on the current velocity.

Particle Best (pbest). Conceptually pbest resembles autobiographical memory, as each particle remembers its own experience. When a particle moves through the search space, it compares its fitness value at the current position to the best value it has ever attained at any time up to the current time. The best position that is associated with the best fitness arrived so far is termed as individual best or Particle best. For each Particle in the swarm its pbest. can be determined and updated during the search. **Global Best (gbest).** It is the best position among all the individual pbest of the particles achieved so far. **Velocity Updation.** Using the global best and individual best, the ith particle velocity in kth dimension is updated according to the following equation.

V[i][j]=K*(w*v[i][j]+c1*rand1*(pbestX[i][j]-X[i][j])+c2*rand2*(gbestX[j]-X[i][j])). where,

- constriction factor

c1, c2 weight factors wInertia weight factor

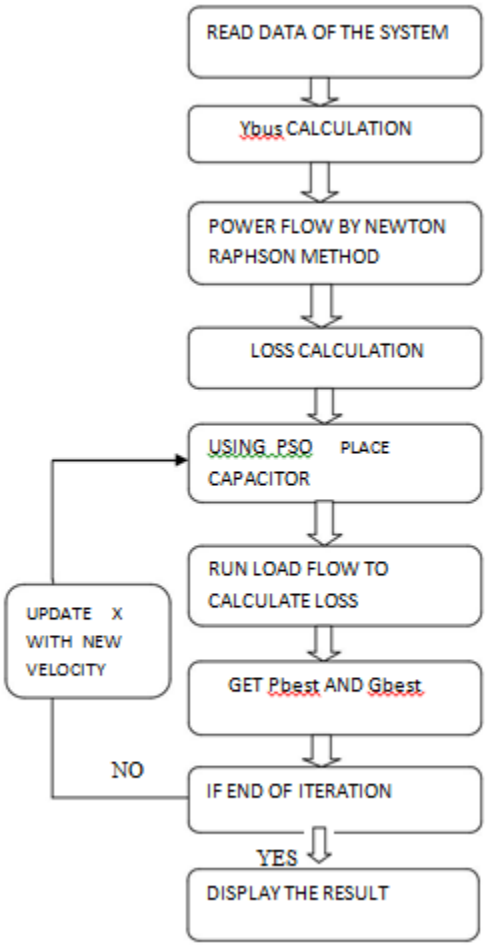
1. particle number
2. control variable

rand1, rand2 random numbers between 0 and 1

Stopping criteria. This is the condition to terminate the search process. It can be achieved either of the two following methods.

1. The number of the iterations since the last change of the best solution is greater than a pre-specified number.
2. ii. The number of iterations reaches a pre-specified maximum value.

IV. FLOW CHART



V. EXPERIMENTAL RESULTS

Matlab code is developed for the implementation of proposed technique. The results are obtained by applying the proposed method on a IEEE standard 33bus system.

For present work, the population of 40 swarms is taken. Iteration numbers are increased in steps and it is found optimal value is achieved with a minimal maximum iterations. Values of c1, c2 set at 2 experimentally.

Table 4 shows the simulation results without PSO

Table 4. Lineflow Losses Before Placement Of Capacitor

FROM	TO	POWER AT BUS		LINE FLOW	LINE LOSES	
		MW	MVAR		MW	MVAR
1		3.917	2.434	4.611		
	2	3.918	2.435	4.613	0.012	0.006
2		-0.100	-0.060	0.117		
	1	-3.905	-2.429	4.599	0.012	0.006
	3	3.444	2.208	4.091	0.052	0.026
	19	0.361	0.161	0.395	0.000	0.000
TOTAL LOSSES					0.203	0.135

Table 5. Lineflow Losses With Pso After Placing Capacitor

ITERATION NUMBER	OPTIMAL LOCATION	OPTIMAL SIZE(MW)	FINAL LOSS (MW)
1	27	0.9223	0.1048
2	6	2.000	0.1044
49	30	1.4486	0.0900
50	30	1.4486	0.0900
98	30	1.5068	0.0900
99	30	1.5068	0.0900
100	30	1.5068	0.0900

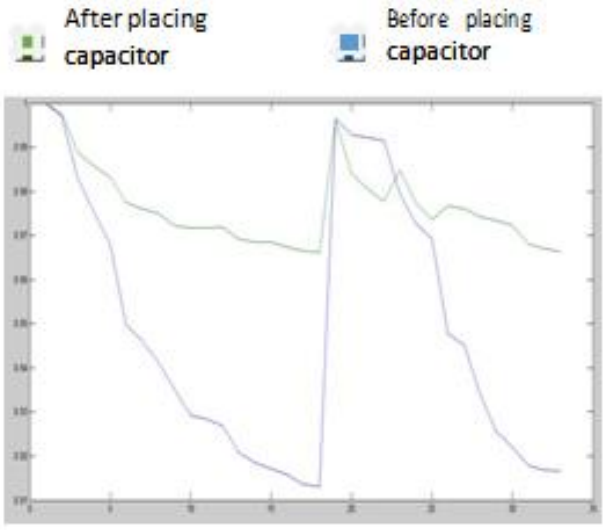


Figure 2. Improved voltage profile

Table 5. Siting And Sizing Of Capacitor After Pso

BEST PLACE	SIZE OF THE CAPACITOR	LOSESS
30	1.5068	0.0900

The proposed method for loss reduction by capacitor siting gives the results in the above tables. By comparing TABLE IV and TABLE V the loss reduction after placing capacitor can be seen. The improved voltage profile is shown in the fig 2. The best position for siting of capacitor and size of capacitor is tabulated in TABLE VI.

VI. CONCLUSION

In this paper, an algorithm that employs Particle Swarm Optimization, a meta heuristic parallel search technique for estimation of required level of shunt capacitive compensation to improve the voltage profile of the system and reduce active power loss.

The main advantage of this proposed method is that it systematically decides the locations and size of capacitors to realize optimum position for active power loss and significant improvement in voltage profile and premature convergence is overcome.

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Smart Way of Energy Utilization and Measurement in Industry Using Labview

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ABSTRACT

The Smart way of Energy utilization and measurement refers to the automation in Industries. An automation is a system which uses the information technology to monitor the electric equipment and communicates it with the outer world. It is a technology which is developing. An automation system has been developed in order to achieve some of the activities performed frequently in daily life automatically so as to obtain more easier and comfortable life. The system is based on the LabVIEW software and can act as the security guard of the Industries. The system can monitor the temperature level, the intensity of light, the moisture of soil, detection of fire and smoke, automatic billing of the industry. The approach combines hardware and software technologies. The approach combines hardware and software technologies. Virtual instrumentation uses a general-purpose computer to mimic real instruments with their controls and displays. Test results of the system have shown that it can be easily used for the smart automation applications[1]

Keywords; LabVIEW, Lm35, LDR, Soil moisture sensor, Smoke sensor, Energy meter, Pump, DC motor, LED, Fan, Buzzer.

I. INTRODUCTION

The smart way of automation is a key for energy conservation that can be equipped in industries. Nowadays the demand for automation systems in industries and offices are invariably increasing. These systems directly work on the industrial appliances and provide effortless operation and control of the devices. In this project the concept of the smart way of automation in an effort to reduce the energy consumption and wastage using advanced graphical software called LabVIEW. It provides the programming tools to code power system applications more easily, which saves programming time. With the development of low-cost electronic components, automation gives utilization and smart way of energy consumption. To resolve the automation and control issues, industries use the ever-changing technology in control system for efficient production or manufacturing processes.

In recent times, industrial automation efforts are being exercised intensively as to set up standards for building an efficient smart system suited to custom and regional requirements. Automatic control of appliances is an important aspect to be considered for implementing automation and security systems. Industrial automation is the use of various control devices, used to have control on various operations of an industry without significant intervention from humans and to provide automatic control performance.

In industries, control, strategies use a set of technologies, which are implemented to get the desired performance or output, making the automation system most essential for industries. Furthermore, in industries security aspects, any hazardous fire accident that might occur in industries while the workers are busy doing their work need be alerted by taking rescuing measures. An automated industry possesses facilities such as Automatic control of the light lamp present at the industry by sensing intensity of light, Automatic control of fan or AC by sensing room temperature ,

Automatic switching on and off the pump to water the garden by sensing moisture level of the soil, By detecting smoke or fire in the industry and alerting the workers by giving buzzer alarm, Real-time monitoring of power consumed by industrial appliances is monitored.

II. METHODS AND MATERIAL

- ✓ To design graphical user interfacing that interacting with a human.
- ✓ To control various sensors and equipment that support Smart Automation.
- ✓ To monitor the real-time power consumption in the industry.
- ✓ Provide alert system like Fire, Smoke etc., in case of emergency.
- ✓ To develop an intelligent system that supports power saving.
- ✓ This overall controller is done using LabVIEW tool.

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a platform and development environment for visual programming language from National Instruments.

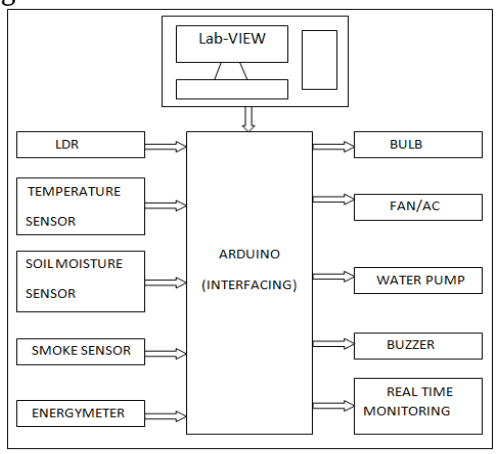


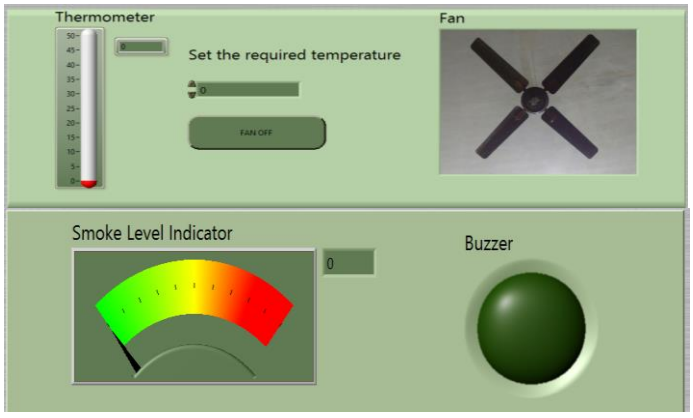
Figure 1.1. Block diagram

Figuer 1 shows the block diagram of Smart Home. In this, the programming has to be carried out in LabVIEW (Makerhub, LINX). Interfacing is done by using Arduino board which is able to carry out all controlling operation. As shown in the fig1, sensors detect the respective parameter and control the desired operation. LDR sensor is used to measure the intensity of light. The required intensity is set in the logic and when the condition met LDR gives the signal. Bulb which is interfaced with Arduino is operated depending upon the sensor output. That is if intensity present in the room less than required value bulb will switch on or if the intensity is greater than the set value it will switch off.

A temperature sensor (LM35) is used to measure the temperature inside the room. When the temperature inside the room is greater than the set temperature the Arduino switch on the fan/ac or if the temperature is less than the set value switch off. Soil moisture sensor is used to measure the water content present in the soil by measuring wetness of the soil. The user can select the type of plant which is on the farm, so it can automatically set the minimum water content required for the particular plant If the moisture content of the soil is less than the set moisture required for the plant the Arduino will turn on the Pump or else turn it off. The smoke sensor is used to detect the hazardous condition in the Industry. When a fire occurs it detect the smoke level which was set in the logic and when the condition is met Arduino operates buzzer which is interfaced with it and gives the alarm. Energy meter which is interfaced with the Arduino measures the amount of energy consumed in the Industry and stores the data for future reference.

III. RESULTS AND DISCUSSION

The front panel is also called as a user interface which consists of controllers and indicators. Controllers are a knob, push button, dials and other input devices. Indicators are graphs, LEDs, and other displays.



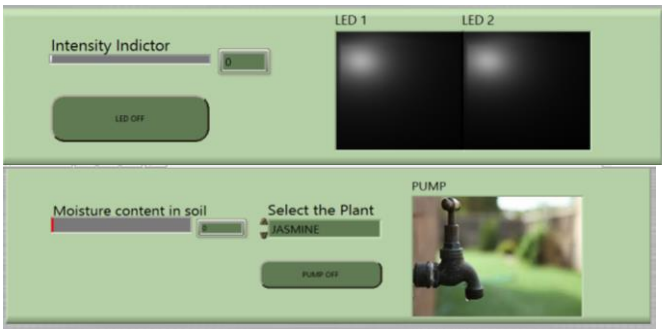


Fig 1.2 General arrangement of the front panel for fan, buzzer, light, and pump

Figure 1.2 a shows the general arrangement of front panel through which fan and lights are operated and also it indicates the output of the sensors.

In the controlling of a fan, the thermometer shows the present room temperature, and the user is provided with a controller through which the user can set the required temperature, and a Boolean switch is provided for the fan to remain in off state when it is not at all required.

The smoke sensor output is shown in the front panel also the buzzer turn to red color when there is a hazardous condition. The LED's are controlled by the sensors and the input programming and a Boolean switch is also provided for switching off of the light when it is not necessary.
The moisture level of the soil is indicated and the pump is operated according to the selected plant and also a Boolean switch is provided to switch off the pump when no crops are grown on the farm.

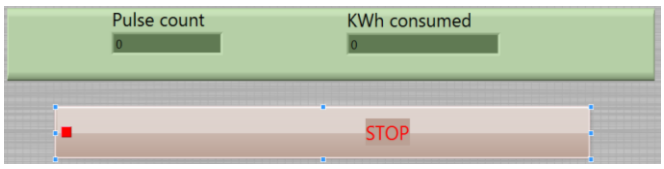
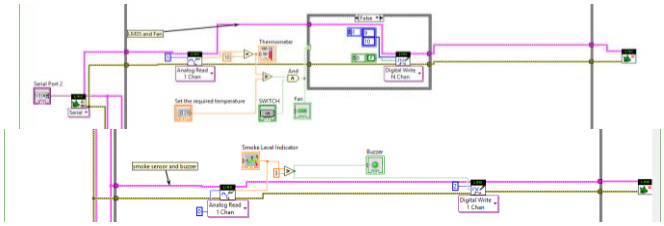


Figure 1.3 front panel for Energy meter reading

The Energy meter is interfaced with Arduino which acquire the data in the form of digital input and displays it in the front panel and also it can be stored in the excel sheet for further reference.



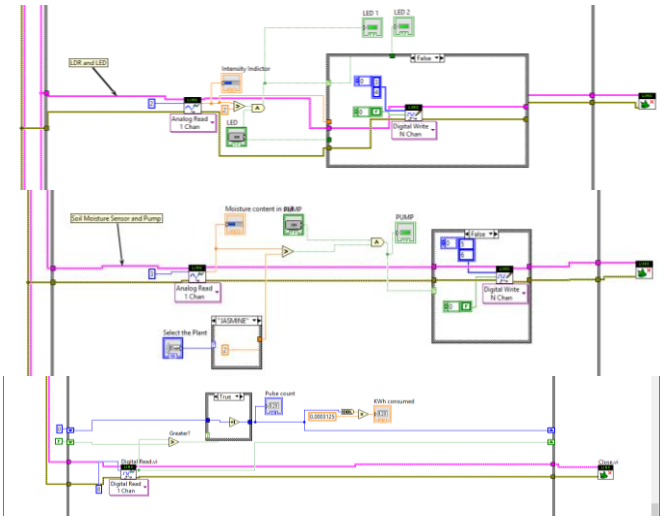


Figure 1.4 overall graphical programming

The above-explained conditions are all controlled accurately with the help of this graphical programming tool called LabVIEW. The logics are written on the while loop for the continuous operation and a stop button is provided to come out of the while loop. So it can stop the operation of all the programs.

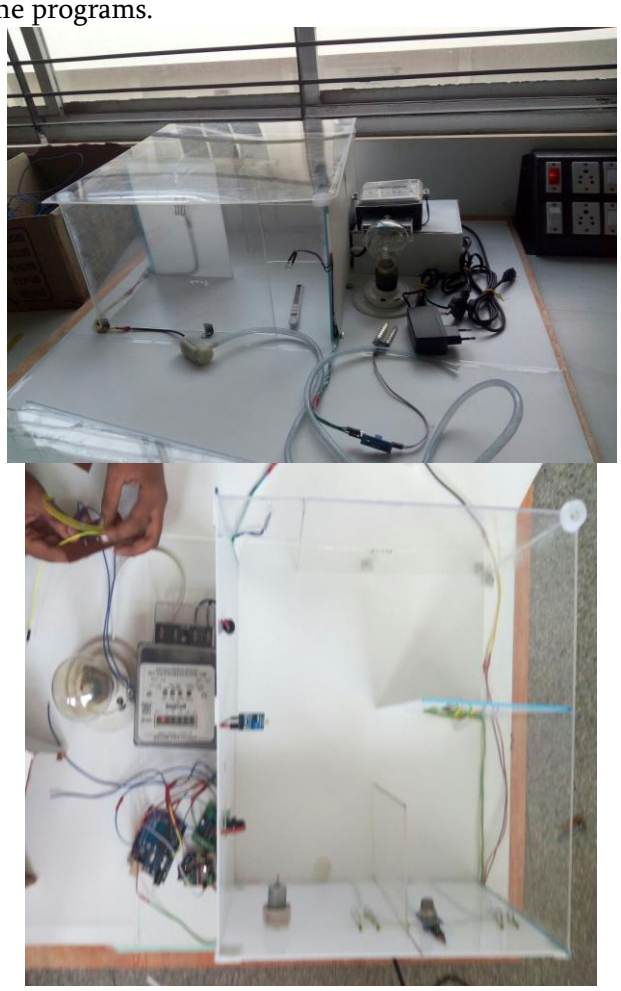


Figure 1.5 Working Model of the project

IV. CONCLUSION

From this project, we controlled the operation of Fan, LED's and Pump when it is not necessary by saving the Energy and also safety in the Industry is provided by introducing a smoke sensor with an alarm which can alert the workers. The energy meter is interfaced with Arduino and real-time monitoring is successfully achieved from it.

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Power Factor Correction by Introdusing Bypass Condensor at Power Distribution Boards Inshop Floors

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ABSTRACT

Wasted energy capacity, also known as poor power factor, is often overlooked. It can result in poor reliability, safety problems and higher energy costs. The lower your power factor, the less economically your system operates. The actual amount of power being used, or dissipated, in a circuit is called true power. Reactive loads such as inductors and capacitors make up what is called reactive power. The linear combination of true power and reactive power is called apparent power. Power system loads consist of resistive, inductive, and capacitive loads. Examples of resistive loads are incandescent lighting and electric heaters. Examples of inductive loads are induction motors, transformers, and reactors. Examples of capacitive loads are capacitors, variable or fixed capacitor banks, motor starting capacitors, generators, and synchronous motors. Power factor correction (PFC) is usually achieved by adding capacitive load to offset the inductive load present in the power system. The power
factor of the power system is constantly changing due to variations in the size and number of the motors being used at one time. This makes it difficult to balance the inductive and capacitive loads continuously. There are many benefits to having power factor correction. As a customer the cost doesn't get passed on for having a low power factor. As a utility company, equipment has a much longer life span and maintenance costs remain low.

Keywords: power factor correction, load compensation, reactive power control, static VARs compensator, power system modelling.

I. INTRODUCTION

Power factor is an energy concept that is related to power flow in electrical systems. To understand power factor, it is helpful to understand three different types of power in electrical systems. Real Power is the power that is actually converted into useful work for creating heat, light and motion.

Real power: Is measured in kilowatts (kW) and is totalized by the electric billing meter in kilowatt-hours (kWH). An example of real power is the useful work that directly turns the shaft of a motor.

Reactive Power: Is the power used to sustain the electromagnetic field in inductive and capacitive equipment. It is the nonworking power component. Reactive power is measured in kilovolt-amperes reactive (kVAR). Reactive power does not appear on the customer billing statement.

Total Power or Apparent power is the combination of real power and reactive power. Total power is measured in kilovolt-amperes (kVA) and is totalized by the electric billing meter in kilovolt-ampere-hours (kVAH). Wyandotte Municipal Service provides generation, transmission and distribution capacity to supply both real and reactive power to all its customers. Power factor

- (PF) is defined as the ratio of real power to total power, and is expressed as a percentage (%).

$$PF = \frac{\text{Real Power (kWh)}}{\text{Total Power (kVAH)}} \times 100$$

POWER FACTOR AND ELECTRICAL LOADS

In general, electrical systems are made up of three components: resistors, inductors and capacitors. Inductive equipment requires an electromagnetic field to operate. Because of this, inductive loads require both real and reactive power to operate. The power factor of inductive loads is referred to as lagging, or less than 100%, based upon our power factor ratio. In most commercial and industrial facilities, a majority of the electrical equipment acts as a resistor or an inductor. Resistive loads include incandescent lights, baseboard heaters and cooking ovens. Inductive loads include fluorescent lights, AC induction motors, arc welders and transformers.

II. METHODOLOGY

Methods of Improving Power Factor

❖ Static Capacitor:

➢STATIC CAPACITORS

- These are capacitors that are connected in a circuit in parallel with the load.
- A circuit with low, lagging (inductive) power factor (pf) can be improved by those static capacitors by decreasing the circuit's inductive reactive power.
- They act as a source of local reactive power and thus less reactive power flows through the line. Basically they reduce the phase difference between the voltage and current.

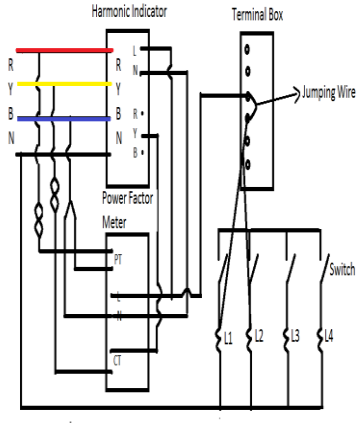
❖ Synchronous Condenser:

- A synchronous condenser is an overexcited synchronous motor, which draws leading currents from the system and hence compensates for lagging VARs.
- It is used as a reactive power compensator in some systems for power factor correction purposes.
- For inductive loads, synchronous condenser is connected towards load side and is overexcited.
- This makes it behave like a capacitor. It draws the lagging current from the supply or supplies the reactive power.

❖ Phase Advancer

- This is an ac exciter mainly used to improve pf of induction motor.
- They are mounted on shaft of the motor and is connected in the rotor circuit of the motor.
- It improves the power factor by providing the exciting ampere turns to produce required flux at slip frequency.
- Further if ampere turns are increased, it can be made to operate at leading power factor.

CIRCUIT CONNECTION



III. RESULT AND DISCUSSION

Loads	Voltage	Current	PF	Error	Harmonics
200w Bulb	230V	0.7	C 0.99	r ct (reverse ct)	Ithd-1.4% Vthd-1.1%
40W FTL	230V	0.3	L0.49	UC	Ithd-11.6% Vthd-1.4%
AFTER REVERSING CT CONNECTION					
200W Blub	230V	0.7	C0.99	OC	Ithd-1.3% Vthd-1.1%
40W FTL	230V	0.3	L0.51	UC	Ithd-11.4% Vthd-1.2%
9W CFL	230	0.1	1.00	UC	Ithd-0% Vthd-1.4%
20W LED	230	0.1	1.00	_	Ithd-0% Vthd-1.2%
AFTER INSERTING THE 2.5 µF CAPACITOR					
40W FTL	230	0.24	L0.86	_	Ithd-19.6% Vthd-1.1%
AFTER INSERTING THE 3.15 µF CAPACITOR					
40W FTL	230	0.5	0.92	_	Ithd-21.7% Vthd-1.1%

Observation:
Power factor improved from 0.5-0.86, but harmonics also increased from 11.5%-21.7%.

Observation:

Power factor improved from 0.5-0.86, but harmonics also increased from 11.5%-21.7%.

IV. CONCLUSION

- By observing all aspects of the power factor it is clear that power factor is the most significant part for the utility company as well as for the consumer.
- Utility companies get rid from the power losses while the consumers are free from low power factor penalty charges.
- As of now power factor in maintained above 0.98 at 66kv. So, no KEB penalty imposed so far, but power factor maintained at 11kv bill in z-division is found below 0.95 which just down to threshold limit of 0.95.
- So, we conclude that power factor maintained in y-division near to unity or by crossing to leading power factor.

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Solar Based Air Conditioning Using Peltier.

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ABSTRACT

In view of depletion of the conventional energy resources like coal, petroleum etc., it is necessary to utilize renewable energy resources to meet the world energy demand. The objective of this project is to draw a picture about a promising solar cooling concept, based on the use of solar panel and to define the aspects that need to be considered in future development. The total energy emitted from the sun is around 5200 times that of the global energy requirement. According to International Institute of Refrigeration, air conditioning and refrigeration consumes around 15% of the total worldwide electricity and also contributes to the emission of CFCs, HCFCs, CO2 etc. Solar energy is typically used to heat water or generate electricity. This work is based on the Peltier effect with which we can cool a specific area without using compressor which take a huge consumption of electricity.

Keywords. Solar panel, Arduino, Peltier, Battery

I. INTRODUCTION

As day by day increasing in the consumption of energy due to modernization in living standard of human being, due to industrialization globally. Because of this rate of consumption of energy is going high day by day and that is why the available limited fossil fuels like coal ,petroleum etc. is consuming at high rate all over the world. To overcome the environmental problem of pollution, global warming, ozone layer depletion research on the free available energy sources like solar, wind, hydro, geothermal etc. are been area of interest. Solar energy is a clean source of energy for power generation and most abundant available. Solar energy is the energy obtained from the sun that can be utilize in both way as thermal as well as electrical energy after conversion. Thermal energy is obtained from solar collectors and electrical energy is obtained from photo voltaic cells. The energy emitted from the sun on the earth in an hour is quite larger than the total energy consumed by the entire population on earth in one year factories, business etc. which consumes large electricity for running their machines, equipments, lightening, air conditioning and refrigeration system. During the same peak time the solar energy available, so its proper utilization may play a great role to fulfil the future demand as well clean source of energy. The demand for cooling may be driven by different aspects, comfort and refrigeration being the most common uses. In fact, the cooling demand is growing worldwide, even in colder climates, as comfort demand rises. This results in an increase in air conditioning mainly for tertiary buildings but also for residential applications. Solar energy technologies can provide electrical generation by heat engine or photovoltaic means, space heating and cooling in active and passive solar buildings;

potable water via distillation and disinfection, day lighting, hot water, thermal energy for cooking, and high temperature process heat for industrial purposes. Sunlight can be converted into electricity using photovoltaics (PV), concentrating solar power (CSP), and various experimental technologies. PV has mainly been used to power small and medium-sized applications, from the calculator powered by a single solar cell to off-grid homes powered by a photovoltaic array. A solar cell, or photovoltaic cell (PV), is a device that converts light into direct current using the photoelectric effect. The first solar cell was constructed by Charles Fritts in the 1880s. Although the prototype selenium cells converted less than 1% of incident light into electricity, both Ernst Werner von Siemens and James Clerk Maxwell recognized the importance of this discovery. The system is equipped by heat sinks, peltier (thermoelectric module) element, etc. It is the system which is designed to produce cooling but the main objective behind the project is that the thermoelectric module (peltier module) to produce cooling effect. This means that cooling of space is done without the use of greenhouse gases which would ultimately reduce the global warming which is usually caused by other air conditioning system which uses coolants. Thermoelectric cooling, also known as "The Peltier Effect", is a solid-state method of heat transfer through dissimilar semiconductor materials. Thermoelectric cooler (TEC), or Peltier Cooler uses the Peltier effect for the exchange of heat.The modern commercial TEC consists of a number of p- and n- type semiconductor couples. The heat pumping direction can be altered by altering the polarity of the charging DC current. Heat will be rejected through the module from inner side to the outer surface. Inner module face will be cooled while the outer face is simultaneously heated.

II. LITERATURE REVIEW

Riffat and Qiu compared the performance of the thermoelectric based air conditioning system with the conventional vapor compression and vapor absorption air conditioning and found that the COP was quite low than that of the conventional one.

Abdullah et al. They performed experimental study on a combined solar thermoelectric-adsorption cooling system for eight days. During the day time the cooling effect was produced by peltier effect by means of thermoelectric element. On the other hand the cooling effect during night time is produced by the adsorption cooling system. The overall COP of the system was average of the two combine system i.e. thermoelectric cooling (COP=0.152) and adsorption (COP=0.131).

Luo.et al performed an experiment and found that the heating effect produced by the thermoelectric based system is quite more efficient than the electrical heating system.

III. METHODOLOGY

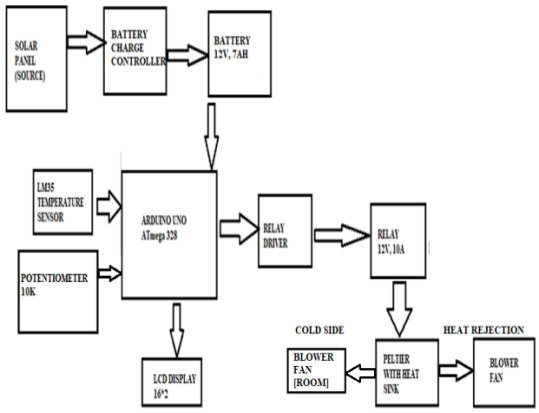


Figure 1. Block diagram of solar based air conditioning using peltier.

In this the hardware electrical elements being used are shown with proper connection. A 12 Volt 7Ah battery is used. Peltier/thermoelectric module model no. TEC1-12706 including the DC fan for cooling the heat side are used, all the connections are made parallel with the battery. Thermal sensor LM35 is used to notify the temperature inside the cabin which will be display on the LCD, relay is being used to control the temperature.

WORKING PRINCIPLE.

The cooling effect produced by the system is basically based on Peltier effect. Peltier effect is a temperature difference obtained by applying a voltage between two electrodes connected to a sample of semiconductor material to create a hot side and a cold side. Basically the heating and cooling effect is produced because of the electron-hole presented inside the P- N type superconductor. Thus the electron-hole are the heat carrier here in the system same as the refrigerant in conventional AC. The cold side of the peltier module is kept inside the chamber to be cooled while the Hot side is kept outside for removal of heat. DC fan with fins are assembled toward hot side for easily and quick removal of heat.

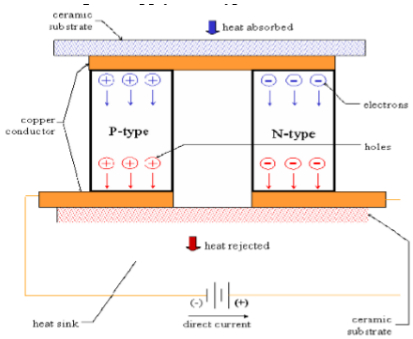


Figure 2. Working of peltier module

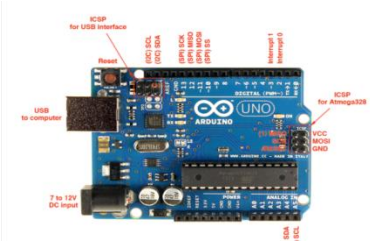
IV. HARDWARE DESCRIPTION

SOLAR PANEL

Solar photovoltaic module is the array of number of electrically connected solar cell mounted on a frame. Modules are designed to supply the electricity at certain voltage. The efficiency of the module and current supply by it is totally depend upon the amount of solar radiation fall on the surface of the PV module. Solar panel of 5watts, 12volts is used here.

ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino are able to read input light on a sensor, a finger on a button,activating a motor, turning on an LED, publishing something online.The arduino uno is microcontroller board based on ATmega328(datasheet).it has 14 digital input/output,16 MHz ceramic resonator,a USB connection, power jack and ICSP header and reset pin it contains everything needed to support the microcontroller.



PELTIER MODULE

A thermoelectric module consists of arrangements of number of P-type and N-type semiconductor which are heavenly doped with electron carrier and sandwiched between two ceramic substrates.

These elements are arranged in a way that is electrically connected in series but thermally connected in parallel. In this project we have used the Peltier module model TEC1-12706.

BATTERY

Battery used in the solar based air conditioning using peltier is having the following specification - 12 Volt DC and 7 Ampere hour. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current.

DC FAN AND HEAT SINK

Cooling fan works on 12V DC been used here to remove the heat from the hot side. Heat sink is a passive heat exchanger that cools a device by dissipating the heat into surrounding medium, it consists of fin blade due to which the surface area for cooling increase and hence the cooling effect obtained.

V. SOFTWARE DESCRIPTION

ARDUINO COMPILER

The open –source arduino software(IDE) makes it easy to write code and upload it to the board. It runs on windows, mac OS X, and linux. The environment is written in java and based on processing and other open-source software. This software can be used with any arduino board.

The program is dumped to arduino board to run it. The programing part is done in a way which displays the cold temperature and set temperature.

ADVANTAGES OF PELTIER MODULE

1. Direction of thermoelectric heating pump is reversible by changing the polarity of current, so it can work as cooler and heater too.
2. Thermoelectric module does not have moving part to wear and tear; therefore there is no need of any maintenance.
3. It has capacity to work for more than 200,000 hours in steady state.
4. It resists shock and vibration.
5. It can work in too severe or sensitive environment.
6. It does not contain any harmful material like chlorofluorocarbons (CFCs) which can damage environment.
7. It does not dependent on gravity. Thus, it can be placed in any direction.
8. Temperature can be maintained in fraction of degree, even below ambient temperature using thermoelectric module by controlling the power load provided to the module.
9. Temperature can work between 100ºC to 100ºC of heat sink temperature.

DISADVANTAGES

The main disadvantage of thermoelectric module is lower efficiency when compare to non-thermoelectric modules when working as power generator. It is usually 0.3 or lower.

VI. RESULTS

Once the whole hardware component is installed with proper connection, the system can be operated and the desired effect can be obtained. Following result is obtained after the designed system is switch on.

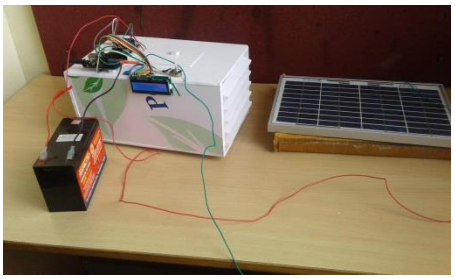


Table 1

SET TEMPERATURE (℃)	COLD TEMPERATURE (℃)
18	20
20	25
30	35
40	37

VII. CONCLUSION

A solar thermoelectric air cooling system is designed which can be better for use in remote areas where unavailability of electricity is there and also the designed system is good for cooling small area with good efficiency. It is shown in the result that the above designed system is cooling the desired space from the ambient temperature of 35°C to final temperature of 18°C.Thus the designed system attains the temperature difference of 17°C, which can further improved by using more number of peltier module. As the system is eco-friendly it can be better alternatives for the future use as considering the depleting of non-renewable sources.

VIII. FUTURE SCOPE

The units of energy production can be developed in the various regions by these days the society face the energy crisis and also the harmful effects of pollution. The thermoelectricity generate electricity without any harmful effects. Thermoelectric devices achieve an importance in recent years and in future it still increase a variable solution for application such as spot cooling of electronic components, remote power generation in space station and satellites etc. The low cost, eco friendly nature are enough inputs to motivate the engineers for their implementations in almost all the suitable application of daily life in near future.

IX. ACKNOWLEDGMENT

Any project completed successfully gives a great sense of achievement and satisfaction. The project would remain incomplete if the people who made it possible and whose constant guidance and encouragement go without mention.

We wholeheartedly thank our Guide, **Dr. Vagdevi S** Dean Academics, Professor and Head, Department of Electrical & Electronics, GSSSIETW, Mysuru for having shared a genuine desire to make a positive contribution to address the challenges associated with every element of the project.

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Auto Power Supply Control System from Four Different Sources

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ABSTRACT

The main objective of this paper is to provide uninterrupted power supply to a load, by selecting the supply from any source out of four such as mains, inverter, solar and generator automatically in the absence of any of the source. The demand for electricity is increasing every day and frequent power cuts is causing many problems in various areas like industries, hospitals. An alternative arrangement for power source is a must. As it is not feasible to provide all four different sources of supply, one source with alternate switches are provided to get the same function. Thus there is requirement for an alternate arrangement of power supply. This arrangement can be designed by using microcontroller and relays. When a source, say mains fails the supply shifts to next priority source generator and so on. LEDs (Light emitting diodes) can be used to show that which source is used to provide the supply.

Keywords. Generator, Inverter, Mains, Relay, Solar, Switches.

I. INTRODUCTION

An important requirement of electric power distribution systems is the need for automatic operation. In particular, the rapid and reliable transfer of the system from one power source to another during certain system events is important to achieving the reliability goals for such systems and the facility serves. However, the design of such an automatic transfer system is all–too-often considered "less important" than many other aspects of the overall power system design. Nowadays, electrical power supply is one of the important elements in human being needs. The most of the human activities is dependent on electrical power supply. In other words, without electrical power supply, almost the whole of activities is become postponed or worse cancelled. For usage of daily routine, voltage supplied is within 240V ac. The need for power supply is paramount for the growth of a country, access to electricity as the basic form of energy supply to the masses is vital for the development of a nation's economy. The power sector provides a platform for economic development; electricity has brought about development in all area of productions and services. Electricity has become indispensable to socio-economic and industrial development of any nation. Using uninterrupted power supply in an automated mode, we always have a substitute arrangement as backup to take place of main power supply in case of power-cut in an emergency case, where the power cut cannot be avoided.

II. METHODS AND MATERIAL

When the supply from all the sources (Mains, Solar, Inverter and generator) are ready, first "Normally open" switch is pressed then the mains get failed and the supply automatically shifts to inverter. To proceed further, second normally open switch is

pressed then the inverter get failed and supply is provided from solar and so on. Priority is assigned to each power source in the order of Mains, Inverter, Solar and Generator. In case the mains power fails, the supply should automatically shift to Inverter but if Inverter also fails at the moment then the supply will automatically shift to next priority source. Figure below explains the working and construction of the Auto power supply from four different sources. As shown in the diagram the four sources are Mains, Inverter, solar and Generator, four "Normally open" switches are used to show the failure of each supply, four relays are used to provide protection at each respective output. This output can be used to drive any load such as a lamp or motor. LEDs are used to display the source of supply. Other case is when the power switches from one source to another source, say Inverter fails and supply shifts to solar, if the mains come back then the supply will automatically reach back to mains power instead of switching to solar. At the output of microcontroller, each output port is connected to positive dc voltage. Relays are used in contact with the output port to provide switching at the output.

III. BLOCK DIAGRAM

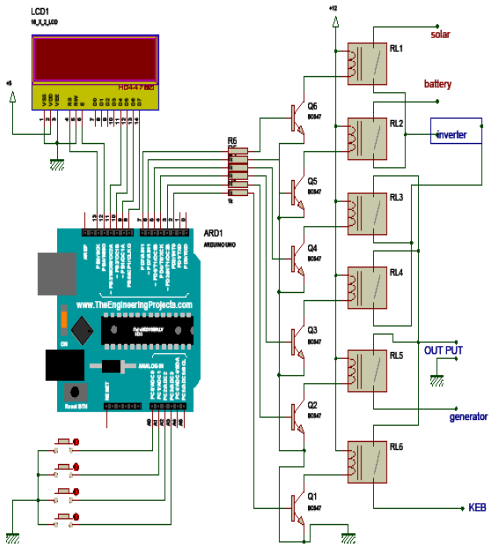
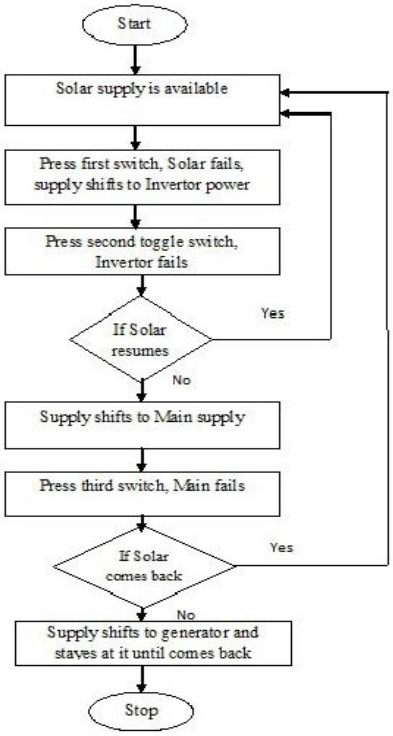


Figure 1. Auto Power Supply Control from Four Different Sources.

This project uses an arrangement of four different sources of supply which are channelized to a load so as to have an uninterrupted operation of the load. We have taken first source with solar supply and assumed as if being fed from four different sources by connecting all the four incoming sources in parallel. The ac source to the lamp is connected to four relays by making the entire normally open contacts parallel and all the common contacts in parallel. Four push button switches are used which represent failure of corresponding supply respectively and are interfaced to the controller. Initially we have given high input signal to the microcontroller, so as a result the controller generates a low output to activate the first relay driver which will result in the relay being energized and the lamp glows. While the push button for solar is pressed that represents failure of solar supply as a result the supply is provided from the next source and the microcontroller receive high input and generates low output to activate the second relay driver which will result in the second relay being energized and the lamp glows . When we press the inverter button, it indicates the inverter or fails to operate and the supply comes from the next source and the next source will supply high input to the controller and which will provide low signal to the third relay and the lamp switches ON and when we press the third push button the supply will chose next source now the fourth source will provide input to the microcontroller and controller activates the fourth relay and the load will get the supply and the lamp continues to glow. When all the relays are off leaving no supply to the lamp, the lamp is switched off. One 16 x 2 lines LCD is used to display the condition of the supply sources and the load on real time basis.

IV. FLOW CHART



V. RESULT

It provides a continuous power supply to the output load through any of the sources from which we are operating the device, i.e., inverter, solar and generator automatically in the absence of any of the source.

VI. CONCLUSION

The main scope of this paper is to provide a continuous power supply to the output load through any of the source in the absence of any of the source. The paper can be further enhanced by using GSM, other sources like wind power and also then taking into consideration for using the best possible power whose cost remains lowest at that moment. The significance of this paper lies in its various advantages and wide places of applications where this project can be used efficiently.

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Analysis of Power System Using Plc

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ABSTRACT

Building automation is a vital part of many cases related to energy efficiency and smart living in the context of smart cities. The operation and control of the next generation electrical grids will depend on a complex network of computers, software and communication technologies. The goal of our project is to design a user friendly automation system which can be easily integrated into the existing system. This project presents the design and implementation of a monitoring and control system for the demand side management for various loads based on Programmable Logic Controller (PLC) technology. Also, the data for the implementation of the hardware and software for monitoring and controlling the load, using PLC, is obtained from the substation. The PLC correlates the operational parameters to the load required by user and then monitors the system. This system saves energy by efficient power management which employs certain controlling mechanisms managed by a Programmable Logic Controller (PLC) as the most efficient control can be implemented by the use of the Programmable Logic Controller (PLC).

I. INTRODUCTION

Energy saving in any system deals with minimization of energy wastage. To achieve this the system needs to be improved. Estimating loadability of a generation and transmission system is of practical importance in power system. Construction and enhancement of generation or transmission systems requires huge amount of capital investment. Regardless of whether or not capital investment is available for constructing systems and enhancing their capacities, efficient utilization of existing power facilities is always desired for both economical and environmental concerns. Conceptually estimating loadability of a system is a generalized mathematical programming problem. It is not a standard mathematical programming problem because of certain constants (specifically dynamic security constants) which have to be expressed not in algebraic forms, but rather in the form of differential equation. Analytically estimating loadability of a power system is somewhat similar to the so called generation rescheduling problem. However, there are a few important distinctions.

First, computational effort of estimating loadability is several times more than that of generation rescheduling.Second, loadability of a power system is dependent upon the pattern of load increasing.

II. BLOCK DIAGRAM OF POWER SYSTEM

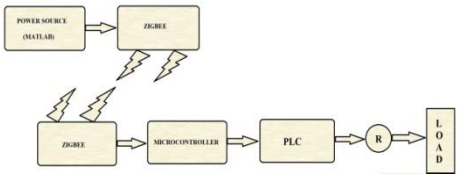

Figure 1. Block diagram of power system

A power system is simulated in MATLAB with desired number of generators and loads. The loads

are further divided into different sectors, i.e. large scale industries, small scale industries, educational and domestic sectors.

Logic is created in order to trip the loads on priority basis. The output generated in MATLAB is given to ZIGBEE for wireless transmission. The data from ZIGBEE is passed on to the microcontroller for serial communication of data to the PLC. The plc is programmed on certain preset values upon which the relays are sent signal to trip a particular load on priority basis.

IMPLEMENTATION

Figure 2. Hardware Implementation

A power system is created in MATLAB with desired number of loads and generators. Logic is created in MATLAB in order to trip the loads on priority basis. The four load sectors created as per the chosen priority are;

1. Large scale Industries
2. Small scale Industries
3. Educational sector
4. Domestic sector

The current and voltage profiles are generated and observed and based on the waveforms decision making for tripping of the particular relay(s) is carried out.

The output of the Matlab generated in the system is sent to Zigbee C2500 R4, using USB-UART, for the wireless transmission of data. This analog data is stepped down from 230V to 12V through a step-down transformer present on the board .And then the 12V from transformer is brought down to 5V . This 5V analog data is converted into its digital form, and serial communication takes place with the help of microcontroller 8051 transferring bytes of data at 9800 baud rate.

This data is given to the PLC AC31GRAF which then works upon the presetconditions.The PLC sends signal for the relay to trip the particular load.

III. RESULT

FEEDER CURRENTS AND VOLTAGE

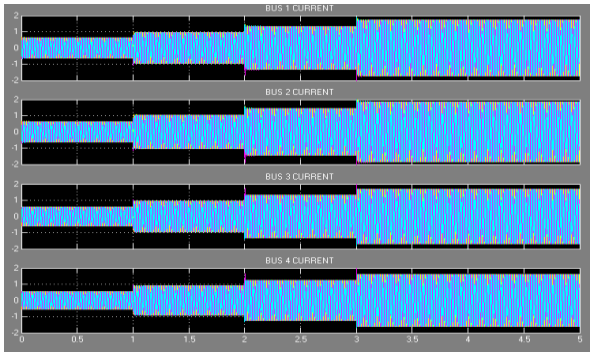

Figure 3. Feeders Current

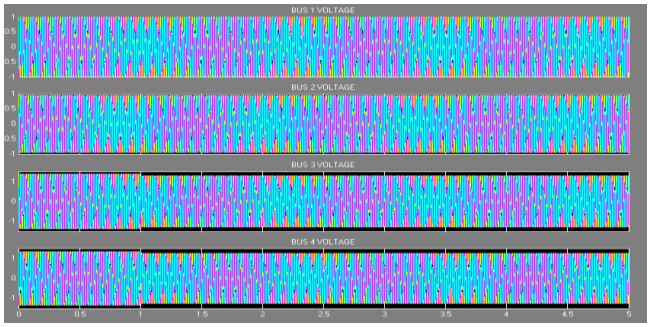

Figure 4. Feeders voltage

LARGE SCALE INDUSTRY

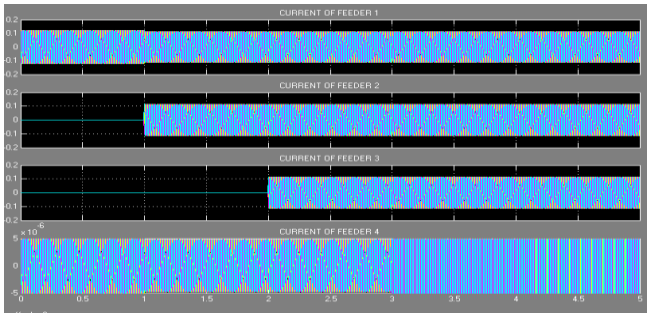

Figure 5. Currents profile inlarge scale industry

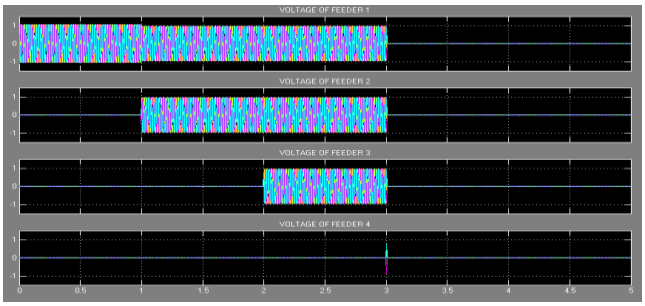

Figure 6. Voltage profile in large scale industry

SMALL SCALE INDUSTRY

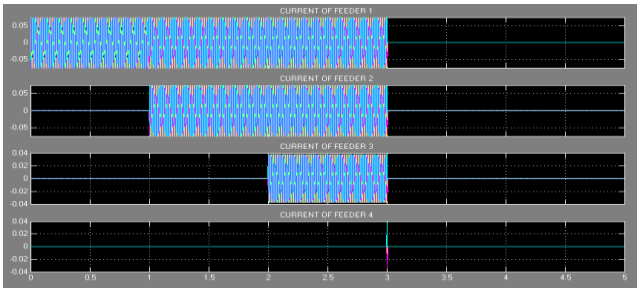

Figure 7. Current profile of small scale industry

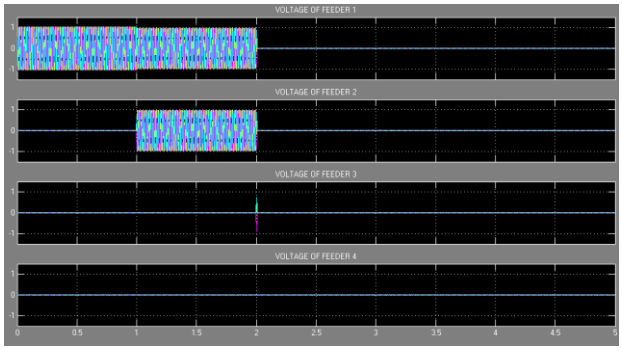

Figure 8. Voltage profile of small scale industry

EDUCATIONAL

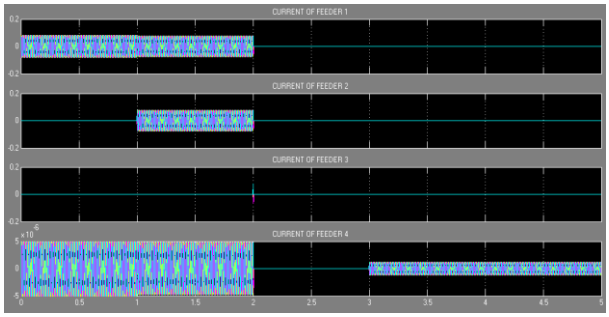

Figure 9. Current profile of educational sector

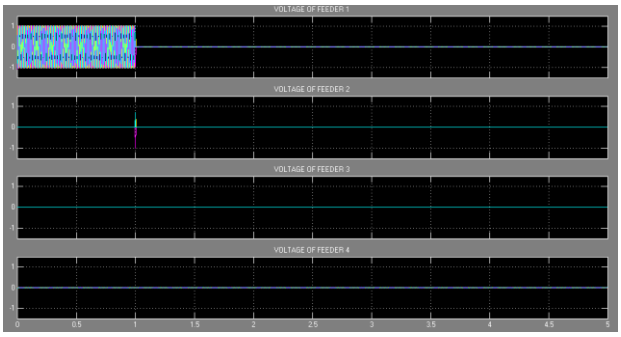

Figure 10. Voltage profile of educational sector

DOMESTIC

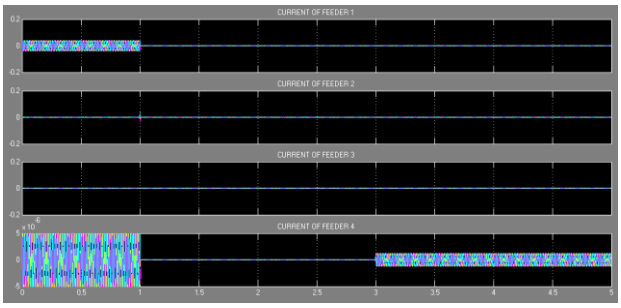

Figure 11. Current profile of domestic sector

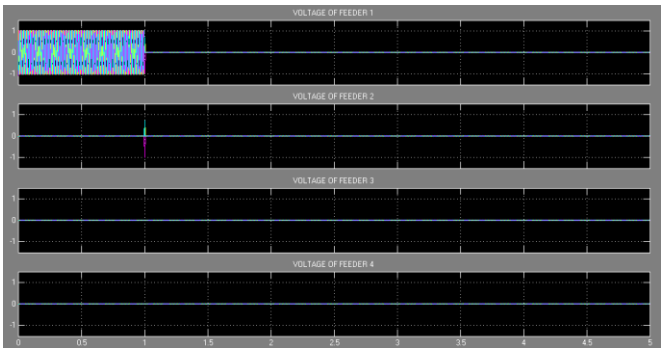

Figure 12. Voltage profile of domestic sector

CONTROL SIGNAL

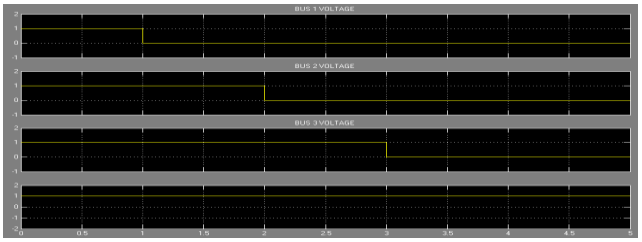

Figure 13. Control signal profile

The graphs of four load sectors are shown above. One the basis of these graphs we can analyze that;

- For the time period 0 – 1, the power flow is continuous for all four load sectors, i.e. 'Large

Industries', 'Small Industries', 'Educational Sector', and 'Domestic Sector'.

- For time period 0 – 2, the supply for domestic sector is tripped, while the power flow is uninterrupted in the other three sectors.
- For time period 0 – 3, the power is continuously supplied for only 'Large Industries', and 'Small Industries', while it is tripped for 'Educational Sector'.
- For time period 0 – 4, power flow is cut for 'Small Industries', while the powerflow for 'Large Industries' stays continuous.

Table 1. Logic of load shedding.

Sl no	GENERATION(MW)	LOADS				TIME INTERVAL	REMARKS
		L	S	E	D		
1	14.4	3	2	2	1	(0,1)	Generation >Demand
2	14.4	3	2	2	1	(0,2)	Generation <Demand
3	14.4	3	1	2	1	(0,3)	Generation< Demand
4	14.4	3	1	2	1	(0,5)	Generation< Demand

IV. CONCLUSION

Successful experimental results were obtained from the described scheme indicating that the PLC can be used in Automated systems.

This aims to emphasise on Automating the power system using Programmable logic controller i.e, minimizing the manual errors caused due to human interference and reducing the risk during faulty conditions. It also involves demand side management by prioritising demand control, which is the huge problem faced in the present envelope of problems in power system.

Comparative to previous RTU's used in power management which required racks of electronic equipments for its working, PLC based system are highly reliable and only a single base controller works efficiently. Without changing any hardware connection, rather just by simply changing the program in the PLC, we can change the operation of system. It requires less hardware compared to any microcontroller or microprocessor based system. Widely used in Substation control because they are inexpensive, easy to install and very flexible in applications. A PLC interacts with the external world through its inputs and outputs.Through loadability analysis, simulation, and tests, we can conclude as follows .On priority basis, the various loads are tripped. Load shedding can be planned as per the requirement.

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A Solar Input Wpt Using Resonance Induction Coupling

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ABSTRACT

Solar Power Satellites (SPS) converts solar energy into electromagnetic waves and sends that microwaves in to a beam to a receiving antenna on the Earth for conversion to ordinary Electricity. SPS is a clean, large-scale, stable electric power source. For SPS Wireless power transmission is essential. WPT contains microwave beam, which can be directed to any desired location on Earth surface. This beam collects Solar Energy and converts it into Electrical Energy. This concept is more advantageous than conventional methods. The SPS will be a central attraction of space and energy technology in coming decades. It is not a pollutant but more aptly, a man made extension of the naturally generated electromagnetic spectrum that provides heat and light for our sustenance. Wireless Power transmission (WPT) is a useful and convenient technology that can be employed to collect solar energy and concentrate on earth surface without the need for a wire connection called solar power satellites (SPS). This project provides an analysis of wireless power transfer with an assessment of its practical applicability in terms of power range and efficiency. Wireless power transmission is a useful and convenient technology that can be employed to collect solar energy (Renewable energy) and concentrate on earth surface without the need for a wire connection. Transferring of electrical energy from transmitting to receiving antenna up to 20 V of input 12 V of frequency 65 KHz transfer up to the distance of 10 cm

Keywords. Solar Panel, Capacitor Bank, High Frequency Converter, Half bridge Driver, Resonant Transmitter Antenna, HF Rectifier Resonant Receiver Antenna.

I. INTRODUCTION

Recently, wireless power supply devices which supply electric power wirelessly (in the medium of air) to apparatuses without power cables or the like have come to be in practical use. The principles upon which wireless electric power transmission is realized are generally categorized into three types.

- Electromagnetic induction type,
- Radio reception type and
- Resonance type.

Electromagnetic induction non-contact power transmission employs the phenomenon in which application of an electric current to one of adjacent coils induces an electromotive force in the other coil with magnetic flux as the medium.

Wireless power transfer (WPT) is a breakthrough technology that provides energy to communication devices without the power units. With the remarkable progress being made recently, this technology has been attracting a lot of attention of scientists and R&D firms around the world. Recently, the usage of mobile appliances such as cell phones, PDAs, laptops, tablets, and other handheld gadgets, equipped with rechargeable batteries has been widely spreading.

It is known that electromagnetic energy is associated with the propagation of electromagnetic waves.

Theoretically, we can use all electromagnetic waves for a wireless power transmission (WPT). The difference between the WPT and communication systems is only efficiency. Maxwell's Equations indicate that the electromagnetic field and its power diffuse to all directions. Though we transmit energy in a communication system, the transmitted energy is diffused to all directions. Though the received power is enough for a transmission of information, the efficiency from the transmitter to receiver is quiet low. Therefore, we do not call it the WPT system.

A system of Wireless Power Transfer (WPT) transmits power to the device which has to work without any wires, and is the key subsystem of the Future Fast, Flexible, Free-Flying, and Fractionated (F6) System. The WPT technology is very important for the space solar power station and deep-space exploration, and it could break the limit of capability and operation for satellites and make the satellites much lighter, smaller and more flexible and durable. Moreover the WPT system could transmit power to a space vehicle in order to supply the power for interstellar probe. Currently, the WPT system utilizes the microwave and laser as the medium of transmitting power.

II. BLOCK DIAGRAM & CIRCUIT DIAGRAM

A. BLOCK DIAGRAM

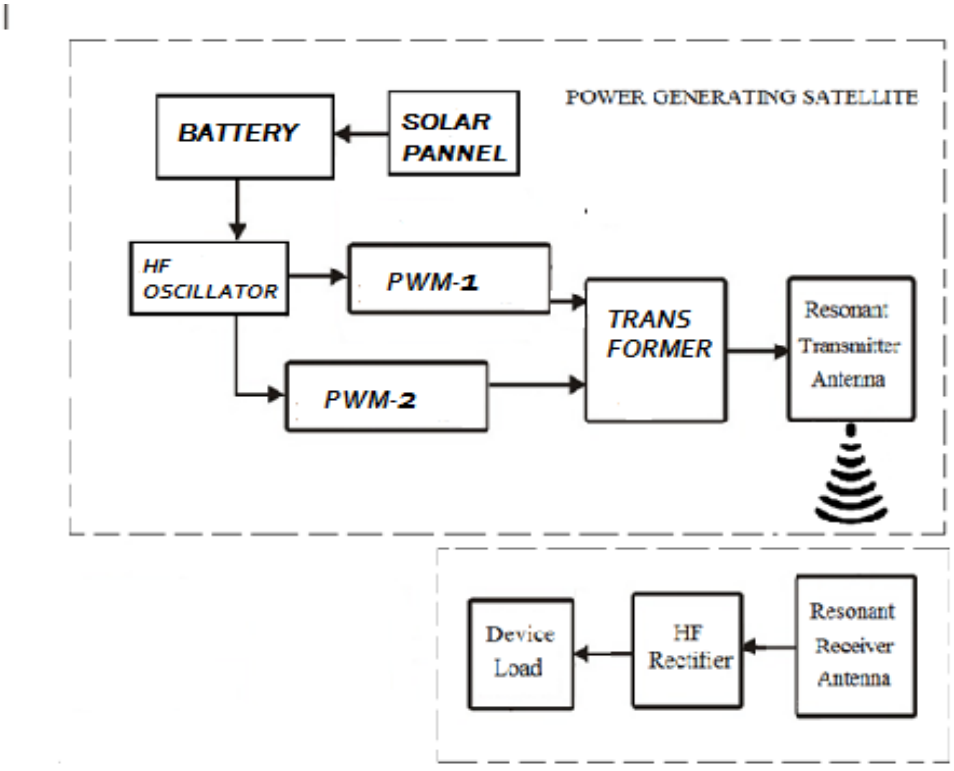

Figure 1. block diagram

B. CIRCUIT DIAGRAM

1. Transmitter Unit

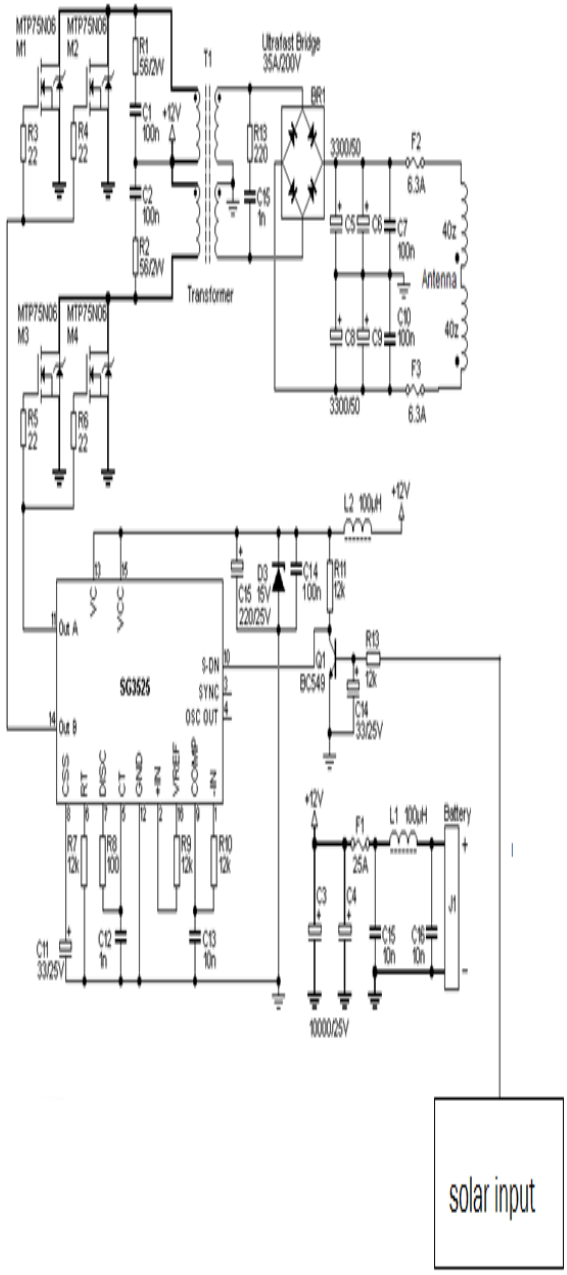

Figure 2. Transmitter side circuit

Receiver Unit

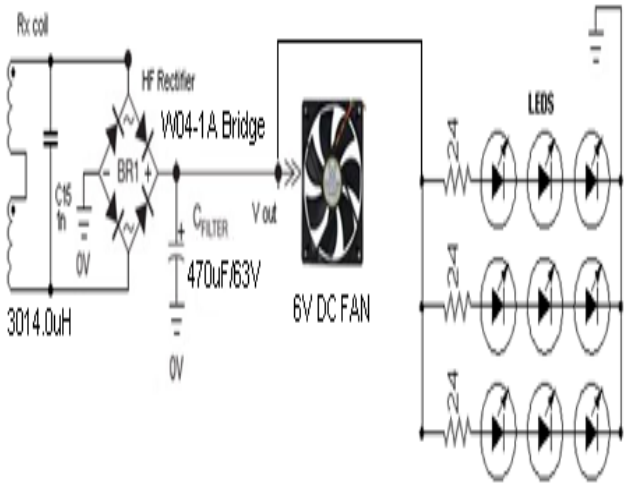

Figure 3. receiving side circuit.

III. DESCRIPTION

a. Solar Panel PVArray

Solar PV arrays collect light radiation from the space and convert them into DC electrical output.

b. Super Capacitor Bank

Super capacitor bank stores the electrical output from the solar panels and provides to the power converter.

c. High Frequency Converter

High frequency converter consists of a high frequency oscillator which generates PWM pulses and drives the Mosfets. Here two separate PWM pulses PWM1 and PWM2 are produced and supplied to the Mosfet gate.

d. Resonant Transmitter Antenna

The transmitter antenna is designed with windings of copper coils which convert the high frequency oscillating electrical current into Electromagnetic waves resonating ant a particular frequency.

e. Resonant Receiver Antenna

The receiver antenna receives electromagnetic waves from the transmitter antenna and converts into high frequency electrical output.

f. HF Rectifier

HF rectifier consists of fast switching rectifier diodes which converts HF voltage into DC voltage and filters the output voltage which is utilized by the loads.

IV. HARDWARE DETAILS

Wireless power transmission is not a new idea. Nikola Tesla demonstrated transmission of electrical energy without wires in early 19th century. Tesla used electromagnetic induction systems. William C Brown demonstrated a micro wave powered model helicopter in 1964. This receives all the power needed for flight from a micro wave beam. In 1975 Bill Brown transmitted 30kW power over a distance of 1 mile at 84% efficiency without using cables. Researchers developed several technique for moving electricity over long distance without wires. Some exist only as theories or prototypes, but others are already in use.

Consider an example, in this electric devices recharging without any plug-in. The device which can be recharged is placed on a charger. Supply is given to the charger and there is no electrical contact between charger and device.Previous schemes for wireless power transmission included attempts by the late scientist Nikola Tesla and the Microwave power transmission. Both Tesla's design and the later microwave power were forms of radiative power transfer. Radiative transfer, used in wireless communication, is not particularly suitable for power transmission due to its low efficiency and radiative loss due to its Omni directional nature.

Table 1

Solar output voltage	12 V
Transformer output voltage	20 V
Frequency across Transmission and receiver side	65 KHz
Output voltage of circuit	Up to 20 V (depends on distance)

Table 2

Distance between transmission and receiving antenna	**voltage transfer up to in terms of voltage**
1 cm	20 V
2 cm	19 V
5 cm	15 V
8 cm	13 V
10 cm	11 V

Transmitter kit.

Figure 4. Transmitter side hardware kit

Receiver kit.

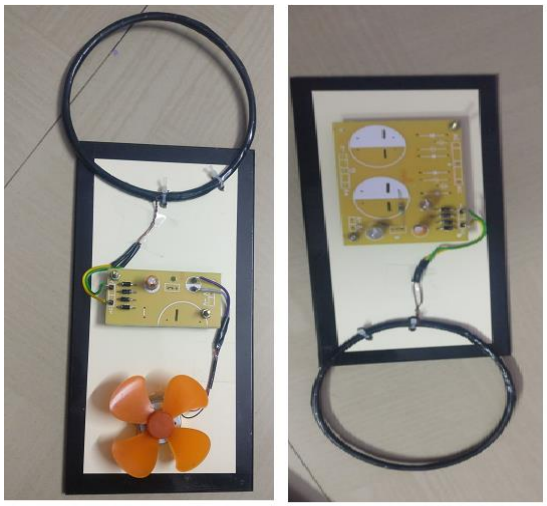

Figure 5. receiving side hardware kit

V. METHODS OF WIRELESS POWER TRANSMISSION

There are 3 types of wireless power transmission

- Inductive coupling.
- Transformer coupling.
- Resonant Inductive Coupling.
- Radio and Microwave Energy Transfer.

a) Inductive Coupling

The coupling between two electric circuits through inductances linked by a common changing magnetic field.

b) Transformer Coupling

Electrical energy transferred from one circuit to another with by use of a magnetic core.

c) Radio & Microwave Energy Transfer

To use RF or Microwave energy for transmitting power, in which the radiated RF energy from an antenna is extracted and converted into usable energy through a receiving antenna.

d) Resonant Inductive Coupling

The inductive coupling is the resonant coupling between the coils of two LC circuits with the same resonant frequency, transferring energy from one coil to the others.

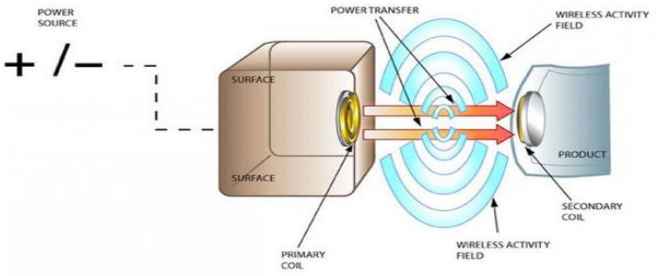

Figure 6. Resonant Inductive Coupling

With inductive resonance, electromagnetic energy is only transferred to recipient devices that share the identical resonant frequencies as the energy source, so energy transfer efficiency is maintained, even when misalignment occurs.

VI. VOLTAGE RECTIFIER

A rectifier would be needed to rectify the AC voltage received from the receiver coil to drive a DC load. A type of circuit that produces an output waveform that generates an output voltage which is purely DC or has some specified DC component is a Full Wave Bridge Rectifier. This type of single phase rectifier uses four individual rectifying diodes connected in a closed loop "bridge" configuration to produce the desired output. The smoothing capacitor connected to the bridge circuit converts the full-wave rippled output of the rectifier into a smooth DC output voltage.

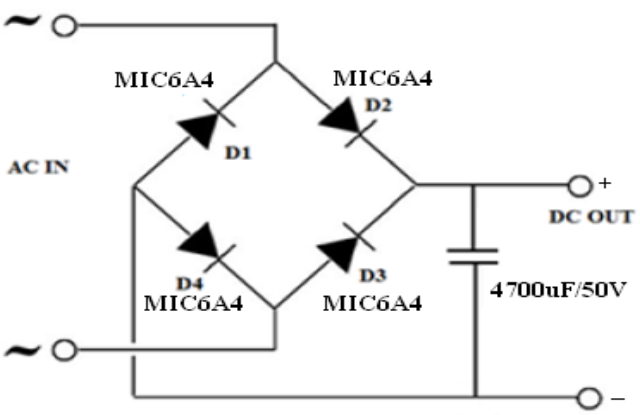

Figure 7. Bridge Rectifier

Since the diodes had to rectify AC signals of Megahertz frequencies, fast signal diodes, MIC6A4, had to be used for the bridge circuit. However we did not implement this circuit with our final setup as we did not drive a DC load with our setup.

VII. OSCILLATOR

There are two general classes of oscillators. sinusoidal and relaxation. Op-Amp sinusoidal oscillators operate with some combination of positive and negative feedback to drive the op-amp into an unstable state, causing the output to transition back and forth at a continuous rate. Relaxation Op-Amp oscillators operate with a capacitor, a resistor or a current source to charge/discharge the capacitor, and a threshold device to induce oscillation.

VIII. SWITCHING MOSFET'S

The main idea behind the switch-mode Power Amplifier technology is to operate a MOSFET in saturation so that either voltage or current is switched on and off. The figure below shows the circuit diagram of the switch-mode power amplifier.

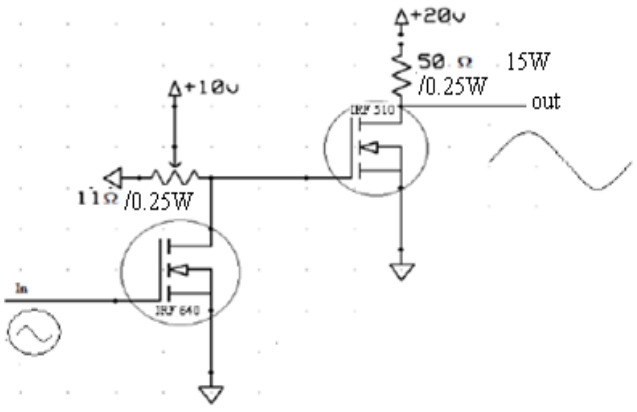

Figure 8. Switching MOSFET'S

Our switch-mode design consisted of a MOSFET IRF 510, which when turned on allowed large current from the DC power supply to flow through the resistor of 50 Ohms and through the transmitting antenna to transfer current from the power supply through the transmitting coil. The current and voltage required to drive the gate of the MOSFET IRF 510 was supplied by the MOSFET IRF 640 whose gate was driven by the input signal from a Hewlett Packard signal generator. The maximum voltage when the coils were tuned at resonance was recorded to be around 102.3V.

WIRELESS POWER CALCULATIONS

i. FREQUENCY CALCULATION

LC Resonance Calculator

When an inductor or capacitor are placed in series or parallel they will have a resonant frequency which is determined by the design equation below. LC resonant circuits are useful as notch filters or band pass filters. The are also found in oscillator circuits.

Frequency:	0.0749	(MHz)
Capacitance:	1.50e+3	(pF)
Inductance:	3.01e+6	(nH)
Calculate		

Design Equations:

2*pi*F= 1/sqrt(L*C)

0.0749 megahertz =
74.9 kilohertz

ii. SIMULATION OUTPUT CIRCUIT AND WAVE FORM

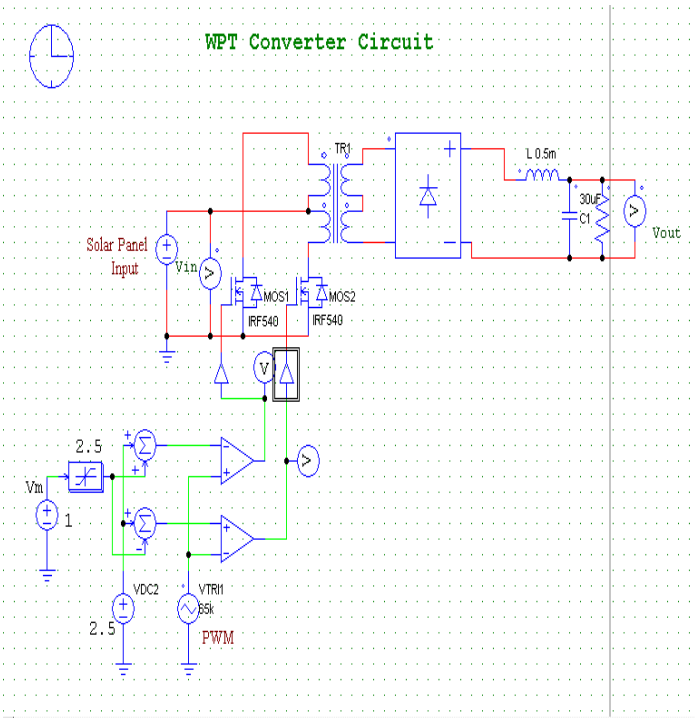

Figure 9. simulation circuit

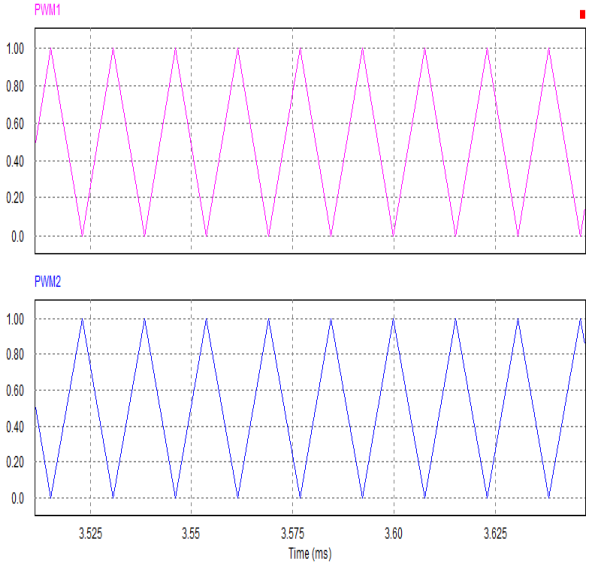

Figure 10. PWM1=MOSFET switch 1, PWM2=MOSFET switch 2

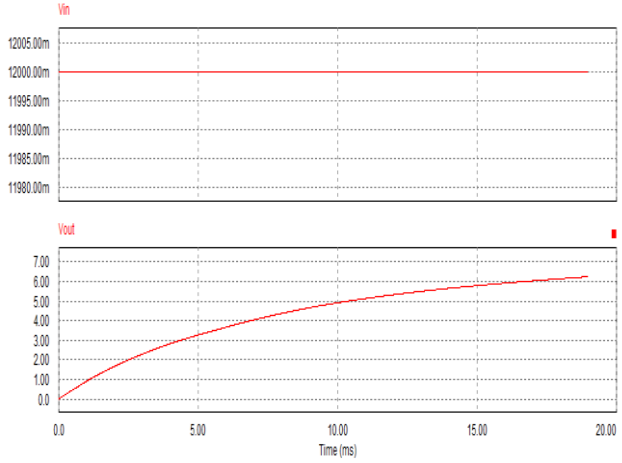

Figure 11. input and output voltage wave form

IX. APPLICATIONS OF THE PROJECT

Wireless power has a bright future in providing wireless electricity. There are no limitations in power applications. Some of the potential applications are powering of cell phones, laptops and other devices that normally run with the help of batteries or plugging in wires. Wireless power applications are expected to work on the gadgets that are in close proximity to a source of wireless 'power, where in the gadgets charges automatically without necessarily, having to get plugged in. By the use of Wireless power there is no need of batteries or remembering to recharge batteries periodically. If a source is placed in each room to provide power supply to the whole houseWireless power has many medical applications. It is used for providing electric power in many commercially available medical implantable devices.Another application of this technology includes transmission of information. It would not interfere with radio waves and it is cheap and efficient.

X. BENEFITS

No need of line of sight - In Wireless powertransmission there is any need of line of sight between transmitter and receiver. That is power transmission can be possible if there is any obstructions like wood,metal, or other devices were placed in between the transmitter andreceiver.No need of power cables and batteries - Wireless power replaces the use of power cables and batteries.Does not interfere with radio wavesNegative health implications - By the use of resonant coupling wavelengths produced are far lower and thus make it harmless.Highly efficient than electromagnetic induction - Electromagnetic induction system can be used for wireless energy transfer only if the primary and secondary are in very close proximity. Resonant induction system is one million times as efficient as electromagnetic induction system.Less cost - The components of transmitter and receivers are cheaper. So this system is less costly.

XI. CONCLUSION

Solar energy is a promising alternative to using fossil fuels for the development of a sustainable carbon-free fuel economy. Thermo chemical and biological conversion processes are promising technologies with potential for high efficiency. The most obvious problem for the SPS concept is the current cost of space launches. But solar energy has a large potential to be a major fraction of a future carbon-free energy portfolio. The deployment of solar technologies for energy production at a large scale requires the involvement of both political and economical players, but also further improvements in the conversion efficiency and reduction of manufacturing cost. A large ongoing research effort aims to find innovative

solutions to overcome these barriers. In the last decade, photovoltaic technologies have experienced an astonishing evolution that led to the increase of the efficiency of crystal-silicon solar cells up to 95%.

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An Intelligent And Automated Drip Irrigation System Using Wsn

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ABSTRACT

In past few years, automatic irrigation system has seen a rapid growth in terms of technology. At present cost-saving technology, laborsaving are the addressing key issues in irrigation. An automated Drip irrigation system was developed in order to facilitate continuous and efficient irrigation under water and labour scarcity conditions. Due to reliability, robustness and limited resources, resistive sensors were chosen. It proposes an automatic irrigation system for the agricultural lands. Currently the automation is one of the important roles in the human life. It not only provides comfort but also reduce energy, efficiency and time saving. In this paper, we propose an intelligent and an automated drip irrigation system using wireless sensor network in low cost, which is usable by Indian farmers. Renesas microcontroller is the main heart of the whole system. Temperature, humidity, soil moisture value of the land will be given to user via GSM/GPRS module.The pump incorporates an automatic pressure demand switch such that the pump will commence when a tap is opened and turn off when the tap is closed.

Keywords: Global system for mobile communication (GSM), Renesas Microcontroller, Moisture sensor, Temperature sensor, water level sensor, Photo voltaic cells (PV).

I. INTRODUCTION

The requirement of building an automation system for an office or home is increasing day-by-day. Industrialist and researchers are working to build efficient and economic automatic systems to control different machines like lights, fans, air conditioners based on the requirement. Automation makes an efficient use of the electricity and water and reduces much of the wastage. Drip irrigation system makes the efficient use of water and fertilizer. Water is slowly dripped to the roots of the plants through narrow tubes and valves.

Water is fed directly to the base of the plants, which is a perfect way to water plants. There should be proper drainage in the fields or pot plants to avoid any water logging which in case may affect the productivity. There already exist automatic drip irrigation systems, which water plants based on soil humidity, pH value of soil, temperature and light. These parameters are required in big agricultural fields where productivity of the crop matters. In small areas like office premises, buildings, house gardens etc. where watering plants at regular interval intervals. This paper presents a smart irrigation system to water plants with the use of devices like Renesas microcontroller and other sensors. GSM is used to control the system wirelessly while embedded C programming language is used for automation purpose. This paper contributes an efficient and cheap automation irrigation system. System once installed has no maintenance cost and is easy to use.

This graduate project defines the implementation of a mobile driven intelligent and completely automated wireless drip irrigation system. The system together provides a very advanced control over the currently implemented manual system. The implementation involves use of valve control, drip control and pump control using a microcontroller based board.

LCD board is provided to collect moisture and temperature level feedback from various types of plants with different moisture content. This helps the user in collecting different feedback for different types of the moisture level with separate breeds of crops that can be cultivated accordingly. The concept is enhanced by integrating GSM technology, such that whenever the water pump switches ON/OFF, an SMS is delivered to the concerned person regarding the status of the pump.

All the above features are distinct and hence making it better than projects already existing also few more such advantages are differential feedback from each plant, pump and valve control to manage flow to individual drips, complete monitoring over text message, for different seasons variable valve timings can be saved. This it is easy to control as well as beneficial from small ranging home arrangements of flower to varied farm crops.

II. METHODS AND MATERIAL

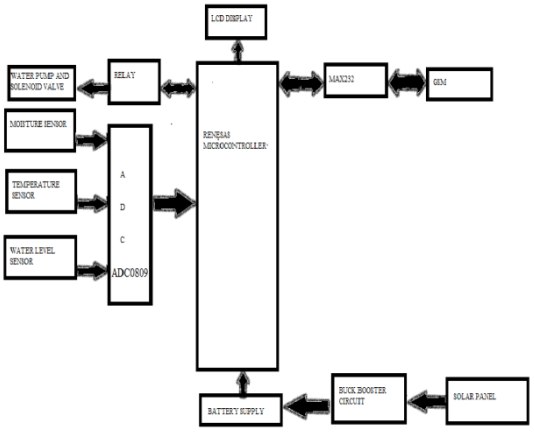

Figure 1

The important parameters to be measured for automation of irrigation system are soil moisture and temperature. The entire field is first divided into small sections such that each section should contain one moisture sensor and a temperature sensor.

- The Soil moisture sensor is used to determine the moisture content present in the soil. This Information is given to the microcontroller in terms of resistance. The best of determining the soil moisture is by using the electrodes.
- The temperature sensor is used to determine environmental temperature. It is a device, which is designed specifically to measure the hotness or coldness of an object.
- These sensors are buried in the ground at required depth. Once the soil has reached desired moisture level, the sensors send a signal to the micro controller to turn off.
- For the sake of safety, a message is sent via GSM Modem to the farmer to carry out the safety precautions.
- Solar power is the cleanest, most reliable form of renewable energy available, and it can be used in several forms to help power your home or farm. Solar powered photovoltaic (PV) panels convert the sunrays into electricity .Here we use PV panels to supply power to the microcontroller via battery.
- Using Renesas microcontroller, the minimum execution time can be changed from ultra-low speed to high speed. Depending upon series and number of pins ROM provides storage about 16-512KB and 2-32KB of RAM. Most of pin of Renesas has multi task feature. It is less prone to damage due to electrostatic charge. It operates with 5V power supply.
- Water pump is controlled by the microcontroller through relay on decision made by user. Every information is stored in the database for further process.
- Bug booster (step-up converter), is a DC-to-DC power converter that steps up voltage (while stepping down current) from its input (supply) to its output (load).Since the PV panel is able to produce least amount of power bug booster is used to boost up the power for the supply.

- ADC0809, it is used to help the user to interface an analog to digital convertor (ADC) with FPGA.
- Low cost and effective with less power consumption using sensors for remote monitoring and controlling devices, which are controlled via SMS using a GSM.

III. RESULTS AND DISCUSSION

An Automated Drip Irrigation System using Wireless Sensor Network proves to be a real time feedback control system which monitors and controls all the activities of drip irrigation system efficiently. The project is designed using structured modeling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications.

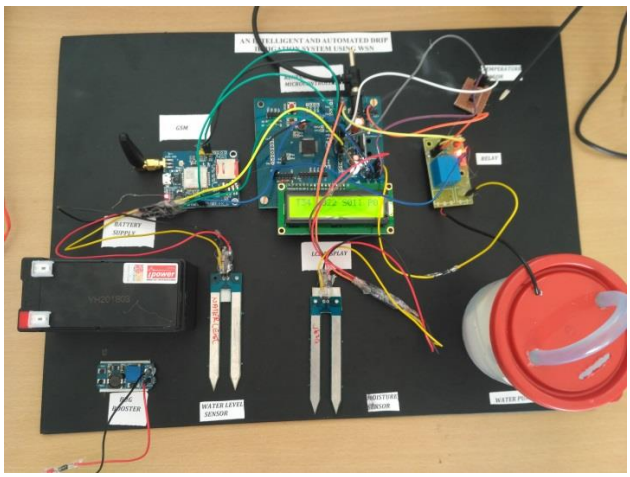

Figure 2

IV. CONCLUSION

The system provides with several benefits and can operate with less manpower. The system supplies water only when the moisture in the soil goes below the reference. Due to the direct transfer of water to the roots water conservation takes place and helps to maintain the moisture to soil ratio at the root zone constant to some extent. Thus, the system is efficient and compatible to the changing environment. Also, the system saves the water and improves the growth of plants.

By using the automatic irrigation system one can optimizes the usage of water by reducing wastage and reduces the human intervention. The excess energy produced using solar panels can also be given to the grid.

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Fully Automated Cotter Pin Insertion Using Servo Press

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ABSTRACT

Few years ago, industries depended completely on man power which was the deciding factor of production rate, duration as well as economic status of industries. But now it is an era of AUTOMATION which decreases the stress on workers, helps in completion of the work faster and also decides the growth of industries. Instead of working hours together it's better to make the work easier using automatic control and operations in order to increase the rate of production and decrease the time consumption in completion of work. Also it is very difficult to pick and place heavy equipment, the workers may face problems. Hence, automatic pick and placing of the equipments and for other operations automation will be helpful considering the safety of workers.

Here we are automatically inserting a cotter pin using servo press. Servo press consists of servo drive and servo motor .Using a programmable logic controller (plc.), the servo motor and the servo drive can be controlled in order to insert a cotter pin to the specific requirement

Keywords: Cotter pin, servo motor, servo drive, plc and DIDO communication.

I. INTRODUCTION

Presses are used in industrial settings for a wide variety of uses, including squeezing, forming and pressing operations .There are many different types of presses .Among those the most popular these days are pneumatic press, hydraulic press and the servo press technologies .But pneumatic and hydraulic presses are similar in function and can be used for a lot of the same things. However there are some specific differences between them to be considered when attempting for choosing between them.Pneumatic presses are controlled by manipulation of pressurized air. The air is forced in to a tube which fills with the air and applies pressure that causes the press to move downwards. Once the press stroke is finished the air is evacuated through valves and mechanical springs cause the pump to move upward again. Pneumatic presses greatest advantage is their speed. They can move ten times faster than hydraulic presses. They can also stop at any time that the operator opens valves to release the air. Pneumatic presses are extremely versatile, able to be placed on a factory in any position in which the operator requires it to be, even upside down.Hydraulic presses are fundamentally chambers filled with some sort of liquid, usually oil .A position presses in to the chamber, causing the oil to shift position. Since the chamber is sealed, the oil exerts pressure on another, larger piston or base plate, which is in turn pressed downwards. Hydraulic presses are very strong and dependable. They are able to create a large amount of pressing tonnage. They are ideal for hydro forming, which is a type of metal shaping involving a liquid agent. They move very slowly. However it requires a lot of

maintenance. They have a great deal of other devices that monitor and regulate the oil pressure to ensure the press work efficiently.Traditional mechanical press can achieve the highest production speeds. The hydraulic press offers versatility but mechanical servo press offers both versatility and higher production speeds. Since pneumatic press last up to five years without being replaced and hydraulic press requires lot of maintenance and regulate oil pressure to ensure press work efficiently. Thus it is better to choose servo press in order to get desired operational control. To insert a cotter pin we are using servo press by programming a plc.

II. METHODS AND MATERIAL

A Fully automated cotter pin insertion is designed mainly using a PLC, Servomotor and a Servomotor drive .In order to insert a cotter pin a constant torque is required. Hence it is necessary to have a motor that produces a constant torque, therefore we use a servomotor. The block diagram of an entire cotter pin insertion unit is as shown in the figure below.The PLC is connected to the servomotor and the servomotor drive through a profinet bus. Once the input is given the PLC gets activated and starts operating. Here the PLC used will be ET200s of make Siemens. The PLC is configured using simatic manager step7 version (5.5) software to monitor the distance and pre-set current value is also configured in order to maintain a constant torque of the motor. The communication from the PLC to the servo drive is made through the profinet bus. The servo drive and servo motor is configured using delta software. The servo motor is connected to a servo drive that converts the rotational motion to the linear motion. The servo motor and the servo drive used is ECMA-CA-1020-P-S.

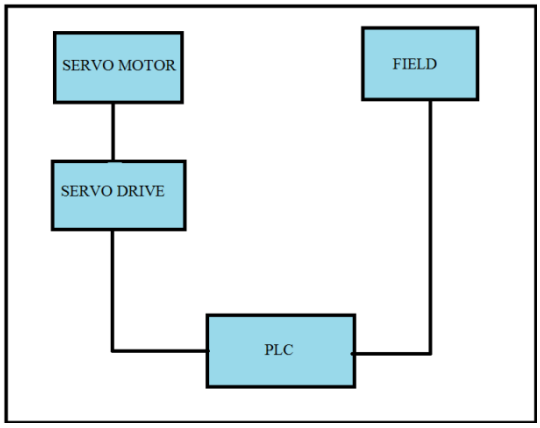

Figure 1.1. Block diagram

III. RESULTS AND DISCUSSION

Servo drive is configured with digital inputs and digital outputs as per the requirement. It is configured with four different positions to which the servo motor has to be run.The configuration is done using the DELTA software. The PLC is programmed for 4 different positions wherein the plc triggers, monitors and controls the servo motor for running to the specific positions configured. By doing carrying out these operations cotter pin has been successfully inserted to the position required accurately.

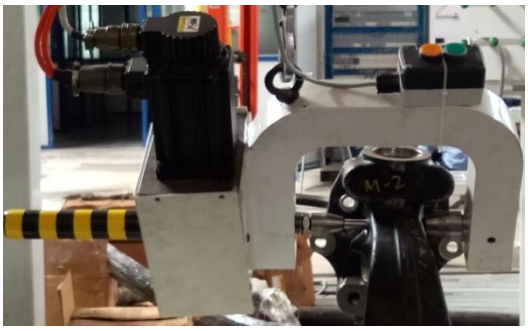

Figure 1.2 cotter pin insertion[front view]

Figure 1.3 cotter pin insertion [rear view]

Figure 1.4 cotter pin insertion [side view]

IV. CONCLUSION

Cotter pin insertion using a servo press has been configured using a servo drive and programmed with programmable logic controller for four variants of pressing. The four different variants help in pressing the cotter pin accurately without any damage. The prominent function of servo press is to press a cotter pin accurately and is found to be more accurate than traditional presses such as hydraulic and pneumatic press.

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Bluetooth Based Dc Fan Controller

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ABSTRACT

This paper presents the overall cost-effective FAN control through Android mobile with wireless micro controller. This is designed using Bluetooth technology will be beneficial to our society. The System is made to satisfy the needs of elderly and physically challenged people. Automated process gives more comfort for users, reduce risks and increase performance. Recent days the Smartphone and tablets are becoming powerful with new and useful characteristics. This is suitable to develop control systems. In this project, we introduce an Android OS based application for Smartphone that communicates with the fan through mobile device continuously to control the FAN speed according to the surrounding temperature.

Keywords: PIC Microcontroller, Bluetooth module, DC Fan.

I. INTRODUCTION

In modern days the popularity of controlling electrical device through phone has been increasing due to high performance and reduce work by connecting through Smartphone which is useful for elderly and physically disabled people, who can access and control the Appliances by staying at some place and access them remotely without the help of others. This can increase the life quality of them. Wireless technology is emerging day by day, several different connections are introduced such as Bluetooth, WIFI, and GSM. Bluetooth with globally available frequencies of 2400Hz is able to provide connectivity up to100 meters a speedup to 3Mbps. Based on the microcontroller the data may send and receive between the mo-bile device and hardware is possible.

This communication between two devices by using Bluetooth is more reliable and securable.

A. Existing System

Managing household appliances from a computer or a Smartphone was invented in existing system there was used to control only ON and OFF process. The used technologies in existing system we may use GSM, infrared and Wi-Fi. By using this method it takes more time to configure and control the appliances. Even it may cover large areas but it produces more interference while using GSM to connect with mobile internet.

B. Drawbacks

- ✓ More time consumption
- ✓ Cost effective
- ✓ Interference problem
- ✓ Data connection required
- ✓ Less reliability

C. PROPOSED SYSTEM

The Bluetooth technology is the gift for the modern automation which operates over 2.4GHz frequency, Bluetooth technology can link digital de-vices within a range of 10m to 100m at the speed of up to 3 Mbps depending on the Bluetooth device. This proposed technology is used to adjust the speed variation, and control the speed of the FAN using Blue-tooth signal

through Android mobile phone by using android application.

D. Advantages

- ✓ More reliability
- ✓ Low connection
- ✓ Unwanted wiring reduced
- ✓ Faster transmission
- ✓ More useful for elders and physically challenged

II. COMPONENTS

A. Bluetooth Module

Bluetooth is a wireless technology standard for ex-changing data over short distances. If the distances may exceeds it cannot work. Range of Bluetooth is 30 feet. HC-05 module is an easy to use Bluetooth Serial Port Protocol module, designed for translucent wire-less serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (En-hanced Data Rate) 3Mbps Modulation with entire 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm

B.PIC MICROCONTROLLER:

The name PIC initially referred to Peripheral Interface Controller. PIC have a set of registers that function as general-purpose RAM. The code space is generally implemented as on-chip ROM, EPROM or Flash ROM.

C. TEMPERATURE SENSOR:

Temperature Sensor LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature.

D. DC MOTOR DRIVER AND DC FAN:

A DC fan is a electrically powered machine. A fan consists of a rotating arrangement of a vanes or blades. The rotating assembly of blades and hub is known as impeller, a rotor, or a runner. Motor Drivers acts as current amplifiers since they take a low-current.

III. BLOCK DIAGRAM

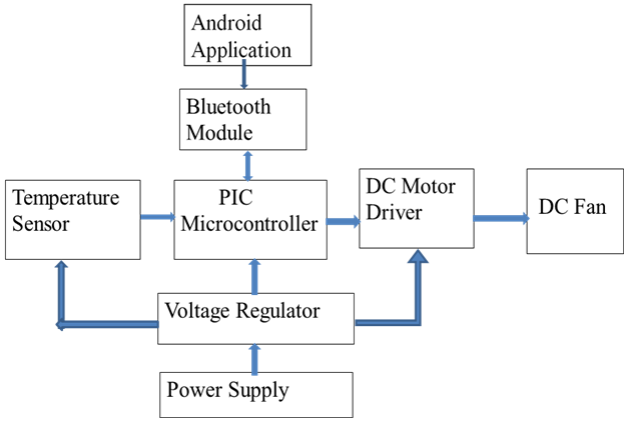

Figure 1

IV. CIRCUIT DIAGRAM

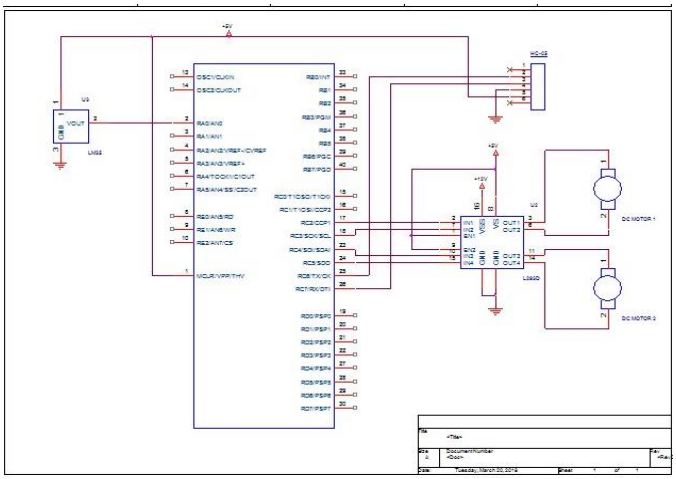

Figure 2

A. Circuit Description:

- ✓ First we need to connect the 5V regulated power supply to Vcc pin of PIC then connect the analog and digital GND pins to the GND.
- ✓ Temperature Sensor is connected to the I/P of the ADC pin i.e, AN0 pin of the PIC microcontroller(pin2 to pin2) and the other two pins i.e, pin1, pin3 are GND and Vcc respectively.

- ✓ Another part of the PIC is connected to the HC05 Bluetooth module and to the DC fans through a motor driver IC i.e, L293D.
- ✓ The HC05 bluetooth module has 6pins, as we know that Vcc and GND of the module goes to Vcc and GND of PIC. The TXD pin i.e, pin3 goes to RXD pin of PIC and RXD pin i.e, pin2 goes to TXD pin of PIC.
- ✓ The I/P pins of the motor driver are connected to the PIC microcontroller. I/P1 and I/P2 of the motor driver IC are connected to RC2 and RC3 of PIC. The I/P 3 and I/P4 of the motor driver IC are connected to RC4 and RC5 of PIC. Output pins are connected to the DC fans.

V. SOFTWARE REQUIREMENT

SOFTWARE USED: Embedded C

Embedded C is a set of language extensions for the programming language.

- ✓ It possesses cross development in nature.
- ✓ It is dependent on hardware architecture.
- ✓ It is used for limited resources like RAM, ROM and I/O peripherals on embedded controller.

A. Model Output

STEP1:

Figure 3. simple application

STEP 2:

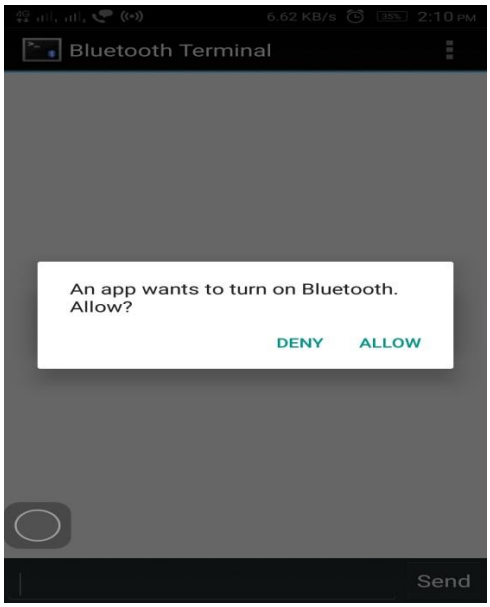

Figure 4. Response by the user

STEP 3:

Figure 5. Selects the Bluetooth device

STEP 4:

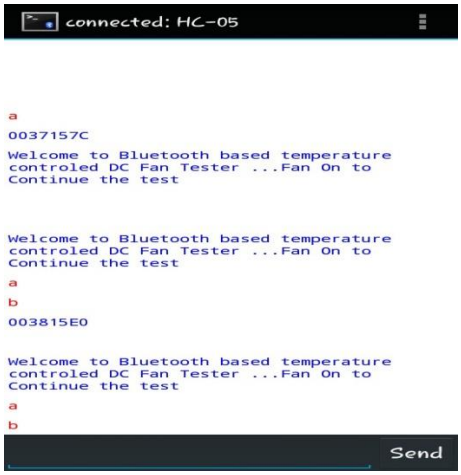

Figure 6. Select the operation

VI. CONCLUSION

This system is designed at low cost and it is used to improve the standard of living .The wireless connectivity through the android device provides help to the people especially to elderly and physically challenged people.

The implementation of the Bluetooth connection in control board allows the system to install in simple way, the control board can be directly installed besides the electrical switches. The wiring of the electronic equipment's can be greatly reduced. By using the help of Bluetooth, the devices can be controlled in faster and easier comparing with other technologies.

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Universal High Frequency Multiple Output Forward/ Isolated Buck Converter For Gate Drive Application Using Digital Proportional Integral Controller.

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ABSTRACT

This paper presents design and implementation of DC-DC Buck converter by using ATmega32 microcontroller. The forward DC-DC converter is most widely used electronic circuits for its high conversion efficiency and flexible output voltage. These converters are designed to regulate the output voltage against the changes in the input voltage. Many existing and developing electrical and electronic technologies require the voltage of different levels that are supplied from an available source voltage. To control the output voltage of the converter, the controller is designed to change the duty cycle of the converter. In this converter, MOSFET switch is digitally controlled by ATmega32 microcontroller. The circuit is verified with hardware implementation. This paper focuses on the hardware design and implementation of forward converter using pulse width modulation with digital proportional integral controller. Generating multiple outputs for gate drive applications.

Keywords. Buck Converter, forward converter, isolated converter, microcontroller, high frequency, Pulse width modulation and PI control.

I. INTRODUCTION

The forward converter is a DC/DC converter that uses a transformer to increase or decrease the output voltage (depending on the transformer ratio) and provide galvanic isolation for the load. With multiple output windings, it is possible to provide both higher and lower voltage outputs simultaneously. [1]

The DC converter is a device, which transforms AC to DC. This device is also known as an AC to DC converter. A Chopper can be considered as a DC equivalent of an AC transformer with a convertible constant convertible in a continuous form. Like a transformer, the converter can be employed for stepwise increase or reduction of DC source Voltage. [2]

The name Buck Converter most probably evolves from the fact that the input voltage is bucked/chopped or attenuated, in amplitude and a lower amplitude voltage appears at the output. [3]

MOSFET switch produces a flow of current in the drain when a voltage is applied between the gate and source terminals. The gate of a MOSFET is composed of a silicon oxide layer. Since the gate is insulated from the source, an application of a DC voltage to

the gate terminal does not theoretically cause a current to flow in the gate, except in transient periods during which the gate is charged and discharged. In practice, the gate has a tiny current on the order of a few nano amperes. When there is no voltage between the gate and source terminals, no current flows in the drain except leakage current, because of a very high drain-source impedance. [4][11]

The output voltage is sensed Vout and compared with the input voltage Vref then an error signal is produced which is processed through PI controller to generate a control voltage. The control voltage is used to feed to the PWM generator for control of switch. The PI controller has two parameters namely Kp and Ki. PI controller has transfer function. C(s) = Kp+ (Ki/S)

Where, KP=Proportional gain and Ki= Integral gain. [5]

The voltage mode control strategy is proposed by using pulse width modulation (PWM) with a proportional-integral (PI).[12]

The PWM signals are generated by comparing the voltage of the output with the ADC value of ATmeg32 AVR microcontroller. [6]

II. OPERATION CIRCUIT MODEL FOR FORWARD BUCK CONVERTER.

The forward converter with multiple output windings is the simplest implementation for multi output power supply. Typical application area for this solution is the low power, low current, and multi-output power conversion where semi-regulated output voltages are acceptable and noise requirements are significantly relaxed. [7]

The primary side of the transformer is connected to the 24 volts DC supply. As the forward converter with multiple outputs is obtained because of the isolation of the transformer. The output is controlled by the primary side of the transformer of MOSFET switch. The MOSFET has to be switched at certain rate to get the output voltage of 10 volts this is done by taking a feedback. Based on the feedback voltage the output voltage of 10v is down converted (buck) for 2.5volts using voltage divider.

The figure 1 shows the circuit diagram of the forward converter using digital PI controller by the ATmega32 microcontroller.

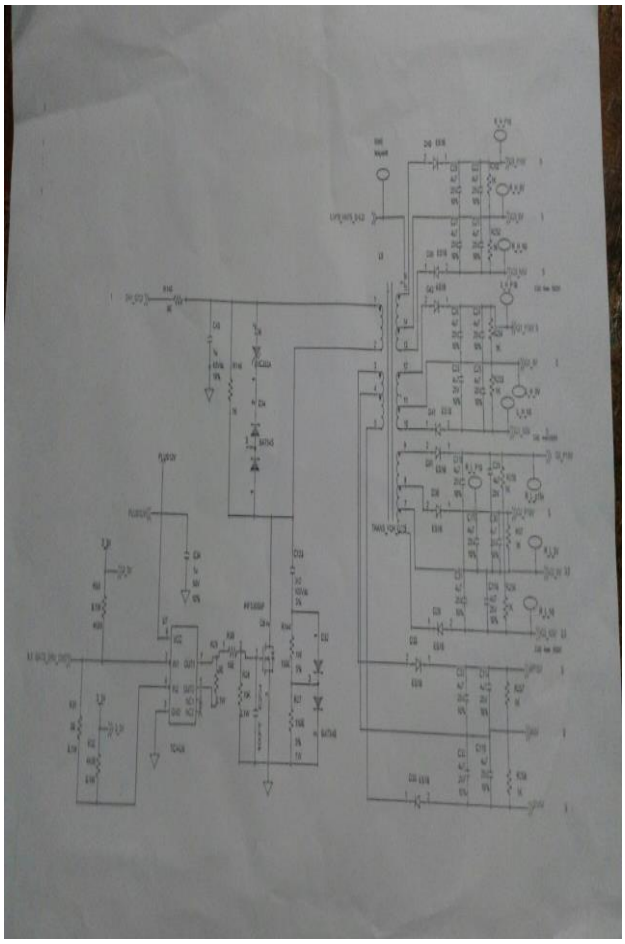

Figure 1. schematic circuit diagram of a isolated forward buck converter with digital PI control.

If the output voltage is to be of 10v, the microcontroller should have 2.5 volts of feedback. Taking that feedback from the output and giving it to a microcontroller. By comparing the feedback voltage with the reference voltage based on the error is given by,

Error =Vref-Feedback

Where, Vref is the reference voltage, feedback is from the output.

Where the input is operating at a switching frequency of 65 kHz. The pulse width is varying based on the error. If the error is positive the pulse width is decreased. If the error is negative the pulse width is increased to maintain the output voltage of 10 volts dc as constant.

As earlier discussed, the forward converter is having multiple outputs where one of the output is controlled but the other output will be automatically generated. Based on the PWM technique the pulse width is changing through gate drive and it is giving it to MOSFET. When the PWM is changed automatically MOSFET ON time and OFF time will be changing to give the supply voltage to the required voltage as the output.

III. SCOPE

- ✓ Design and modeling dc-dc converter (buck) using PWM to generate the pulse.[8]
- ✓ Design of the PID controller and the system will operates in close loop or in other word has feedback to stabilize the system and the system is linear.[9]
- ✓ Form stability analysis of the system.[10]

IV. RESULT AND DISCUSSION

The output of the isolated forward buck converter is obtained by varying the PWM in the controller. For the multiple output of the buck converter the MOSFET switch is turned ON and OFF by changing the PWM using ATmega32 AVR microcontroller.
The output will be 10 volts DC (positive) and -5 volts DC (negative) is obtained because of the isolation of the transformer. The multiple outputs are obtained.

V. CONCLUSION

The designing of forward converters has been carried out for constant voltage applications. The design concepts are validated and results are obtained.

Forward converter will be highly stable with high efficiency. Better efficiency due to moderate duty cycles, lower voltage MOSFETs and reduced switching losses due to reduced peak-to-peak voltage swing.

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IoT based waste management using Microcontroller

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ABSTRACT

Digital technology is evolving continuously for the past two decades and its impact on our lives is getting stronger and stronger. With the advent of smart phones, one can access every corner of the world with the fingertips. Over 46% of the global population is connected to the internet and this number is estimated to rise to 70% by the end of 2017. With rapidly growing technology, scientists and visionaries across the globe envision a world made simpler with the use of the internet, thus giving birth to the concept of smart waste management. Internet of Things is the upcoming era where all the things we use in our everyday life are connected to the internet. Smart TVs, Air Conditioners, Refrigerators and inventories have already stepped into the market. Today time has come where even waste from industries and houses are being managed by smart phones and internet in home. Our project tries to contribute to waste management and the Internet of Things. In this project, we intend to employ the concept of waste management with the use of internet. The use of sensors that detect the prevailing conditions inside the dust collectors. All these sensors are connected to Arduino Yun which continuously processes the output of each sensor in the program written through Google Application program interface (API)s. This is used as feedback to control the waste collector. This project aims at making life simpler. The same concept can also be used for garbage system. It can also be used for generation of power to an extent from domestic waste and can also contribute to smart city technologies.

Keywords: Internet of things, smart bins, technology, digital, smart city, generation, domestic waste, management.

I. INTRODUCTION

This chapter provides an introduction to the basics concepts that need to be learnt before understanding this project. Basics of Internet of Things, Smart city and Smart bin.

Internet of Things (IOT):

It is an advanced method of connecting things with the use of internet. It can be described as connecting everyday objects like smart phones, TVs, refrigerators, air conditioners, home appliances, special sensors and actuators to the Internet, where these devices are intelligently linked, monitored and controlled, thus enabling new forms of communication between things and users, and also between things themselves.

Smart city:

A smart city is an urban development vision to integrate information and communication technology (ICT) and Internet of things (IOT) technology in a secure fashion to manage a city's assets. These assets include local departments' information systems, schools, libraries, transportation systems, hospitals, power plants, water supply networks, waste management, law enforcement, and other community services.

Smart dustbin:

Cleanliness is next to godliness is said and believed from the centuries. In this era of environmental concern individuals are outwardly interested in the healthy state of their surroundings. Whether it may a small home of four members or locality cleanliness is of equal importance. India being a huge and highly populated nation, effective waste management is the major concern in maintaining the health and hygiene of the people. Convectional waste management systems which are currently employed in India have static routes and schedules where garbage from containers are collected on fixed schedules, regardless if they are full or not. This type of situation is often seen where dustbin is not addressed even if it is filled and garbage is spread on open streets. This severely affects the health and hygiene of the people.

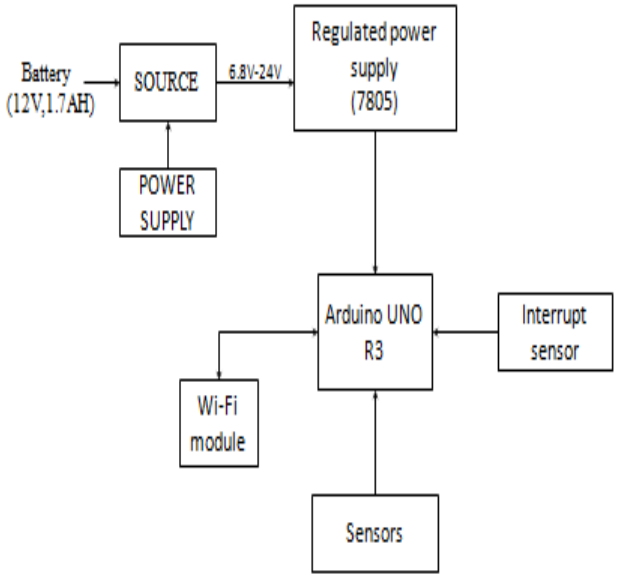
II. OBJECTIVES

- The proposed system would be able to automate the solid waste monitoring process and management of the overall collection process using IOT (Internet of Things).
- In the proposed system the major concepts we are using on Basics of Internet of Things, Smart city and Smart bins.
- In this proposed system, whenever the waste bin gets filled this is acknowledged by placing ZigBee at the waste bin, which transmits it to the receiver at the desired place in the area or spot.
- In the proposed system, the received signal indicates the waste bin status at the monitoring and controlling system.

III. METHODOLOGY

In this project methodology model takes place the fundamental process activities of the current undergoing project plan, specification, analysis, design development, Validation and evolution which represent them as separate process phases. In the smart dust bin hardware contains Arduino Uno board, sensors (MQ2), Moisture sensor, Interrupt sensor, WI-FI module, and Regulated power supply. In the smart dustbin, the sensors will continuously monitor the status of the bin. If the bin reaches more than certain level, the level sensors will trigger the message to the concerned authority. If the bin reaches more than certain level, the weight sensors will trigger the message to the respected persons. Also when certain threshold level is reached, the level sensors trigger the message for the authority.

IV. BLOCK DIAGRAM



V. WORKING

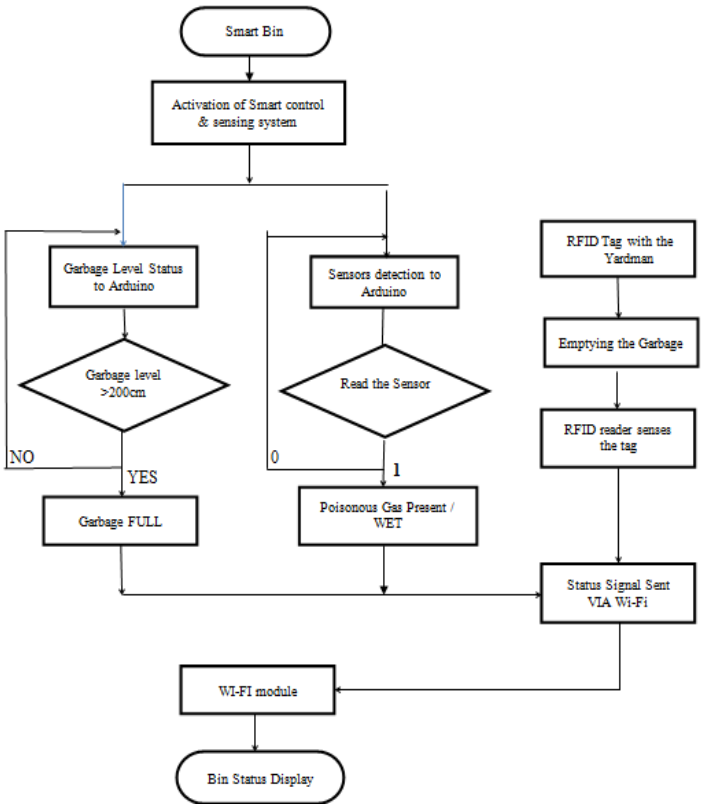
In the traditional approach, a number of trucks from the municipal authority are sent to the waste bins to collect the Municipal waste (MW). The wastes are loaded in the truck and then transported and transferred to the pre-specified locality. However the group of the people involved in collecting and transporting the wastes are usually not responsible enough to make the job well done. It is recommended to power the board via the micro USB connection with 5Vdc.If power in the board through the Vin pin, one must supply a regulated 5V DC.

There is no on-board voltage regulator for higher voltages, which will damage the board.

The input voltage to the Arduino board. Unlike other Arduino boards, if you are going to provide power to the board through this pin, we must provide a regulated 5V. The constant 5v power supply used to power the microcontrollers and other components on the board. This can come either from VIN or be supplied by USB. We placed three sensors in the smart bin .they are, IR sensors, Humidity sensors and gas sensors to measure the status of bin. This process is aided by the ultrasonic sensor which is interfaced with Arduino UNO to check the level of garbage filled in the dustbin and sends the alert to the municipal web server once if garbage is filled. In this each dustbin is given a unique ID for easy identification. We continually monitor all dustbin in our system through an internet connection, and also monitor all the events in the system. In this system many number of dustbins are connected through the internet. The ultrasonic sensor is connected to detect the level of dustbin. The dustbin is divided into three level. The Ultrasonic sensor detect the level of the dustbin and send it to the RF transmitter. Arduino Mega will be programmed to perform the task to measure via sensor and give output. Arduino Mega will be connected to Internet and it will be logged onto the server through the Ethernet shield is configured as the server and will send the commands to the Arduino Mega to monitor all events. This information is then given to the web using internet. This will display the level of all dustbin and display the ID of dustbin which is full. It will also indicate the presence of Toxic gases in the dustbin. If any large quantity of moisture content present in the dustbin it gives message to the concerned authority.

The processor transmit the bin filling alert, Humidity alert and toxic gas alert to the Municipal Corporation via SMS intimation. In major cities the waste gathering vehicle visit the population of the particular area and sometimes these dustbins may not be full. Informing the status of each and every dust bin in real time to the concerned authority can send the garbage collection vehicle only when the dustbin is full. The status of the bin is continuously monitored at the control station to provide a user interaction with the system. The values stored in the database helps a user to have the updated status of the data in the bin as well as the previous values of the parameters of the bin. This collected data from the bin can be used in the optimization of routes for the collection trucks for efficient use of resources in the waste management system.

VI. FLOW CHART



VII. RESULT AND DISUSSION

The following are the results which obtained from this work.

- ✓ Waste Level detection inside the dustbin
- ✓ Transmit the information wirelessly to concerned authority.
- ✓ The data can be accessed anytime and from anywhere
- ✓ The real-time data transmission and access

- ✓ Avoids the overflows of Dustbins This IOT based waste management is very useful for smart cities in different aspects.

We have seen that, in cities there are different dustbins located in the different areas, dustbins are over flown many times, and the concerned people do not get information about this. Our system is designed to solve this issue and will provide complete details of the dustbin located in the different areas throughout the city. The concerned authority can access the information from anywhere and anytime to get the details. Accordingly they can take the decision on this immediately.

VIII. CONCLUSION

The advantages, applications and feasibility of this project in real time application is discussed in this chapter. Smart dustbins are the future. Many private companies and government projects have already started working on creating the next generation smart dustbins. All conventional or traditional dustbins and waste management method are being redesigned to act as smart dustbins. Water proof sensors and microcontroller boards are gaining importance because of their application in the waste management system. Pressure, humidity and temperature sensitive electronics devices are also becoming popular. The next phase of the technological evolution in the waste management system would be the development of a master control unit that monitors and controls the entire city waste management dustbins. Though there are several ways to implement the waste management, monitoring the dustbins through the internet is highly powerful. With the latest technological advancements in the field of cloud technology and fast internet facility the IOT based waste management technology is future-proof. Since a large portion of the population is already using smart phones, laptops and the internet, this technology does not face any barrier to go to market. In this project, a complete working prototype of an Internet of Things based waste management has been developed. The prototype developed can be used to provide government sectors the access to monitor waste dustbins remotely using a smart phone or a computer through internet. A dedicated web page has also been developed to provide easy access to the users to their smart dustbins. In future sensors and Arduino boards can also be protected from emergency like fire because of the chemical reaction taking place in the dustbins due to bio waste in the dustbins.

IX. FUTURE SCOPE

- ➢ The main aim of this project is to make the waste management simpler. The same concept can also be used for savage system. This project is already in implementable stage.
- ➢ A few minor improvements from the end user point of view and addition of a few more features to this project can make it an excellent product in today's market to use in all the private sectors and in public places

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Smart Engine System for Train using Arduino Uno Kit and Generation of Electricity using Hybrid Energy

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ABSTRACT

The railway network of India is the biggest in South Asia and perhaps the most complicated in all over the world. There are so many different types of train local, fast, superfast, passenger, goods etc., and there are so many multiple routes. Although the timetable is perfect, it is not at all possible to maintain it. Moreover, that is why the train accidents are becoming more and more usual. The accidents between trains are increasing due to negligence of intelligent techniques implemented in the trains and improper control signaling from the Train Traffic Control Station (TTCS). Therefore, this a kind of intelligence to the train engines itself, so that it prevents accidents.

In our project we aim at generating electricity using combined renewable energy resources of wind and solar from a running train and using a part of this energy to detect damages in the railway track system by passing a minute voltage over the track, thus avoiding the train accidents. Remaining energy can be saved using battery and used for train lighting system.

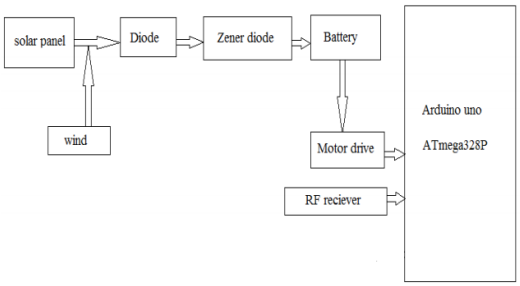
Keywords: Arduino Uno Kit; Solar Panel.

I. INTRODUCTION

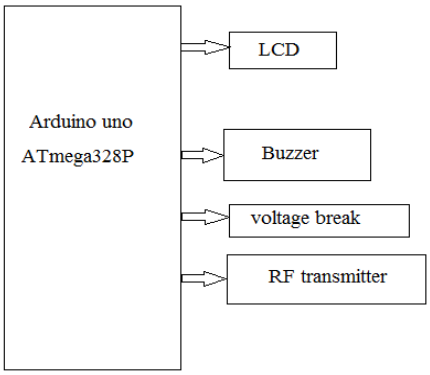
Train accidents occur normally due to safety violations resulting from 'human error or limitations' and 'equipment failures' losing precious lives. The ministry of railways (railway board), Govt. of INDIA has referred for developing and efficient train anti-collision system. The goal of this work is to design and implement a cost effective and intelligent full-fledged micro-controller and wireless based train anti-collision system to successfully prevent the train collisions. It aims to efficiently integrate into the existing signalling system and avoids accidents in manned as well as un-manned level crosses, without changing any of the existing system implemented in Indian railway.

We also aim at avoiding the different possibilities of train accidents such as accidents due to damage of track and we provide wireless communication for the engine system to slow down at receiving station. The second part of the project aim at generating electricity using combined renewable energy sources of wind and solar from a running train and using a part of this energy to detect damages in the railway track system by passing a minute voltage over the tracks using wheels of the train, thus avoiding the train accidents. Remaining energy can be saved using battery and used for train lighting system.

II. METHODS AND MATERIAL



BLOCK DIAGRAM FOR RECEIVER



BLOCK DIAGRAM FOR TRANSMITTER

A. WORKING PRINCIPLE

In this project, we are using Arduino Uno as a controller, which controls the various input, and output signals. Both the transmitter and receiver are of RF type with minimum range so that train can get enough time to decrease its speed and stop before the signal pole. A minute voltage of below 5V is passed through the track to check the gap or any damage in the railway tracks. The controller then receives the signal and it gives alarm with LCD display. Thus, we can avoid the different possibility of train collision. We are generating the electricity in train using combined sources of wind and solar. When the train is running on the track the generated wind and solar panel provided on the top of train, combined and used to generate electrical energy. This energy can be stored in battery and used.

As per the objective, we have designed the above functional diagram. Its working is as follows,

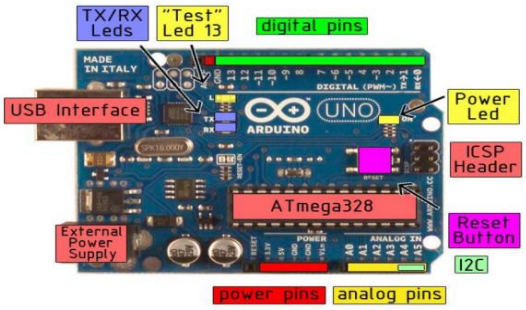
1) CONTROLLER: We use ARDUINO UNO as a controller, which receives signal from various input, output devices, and control its operations based on the signal received.
2) POWER SUPPLY (6 to 8V): It is used to give input supply to the kit. Software is used to identify the object across railway track.
3) RADIO FREQUENCY RECEIVER AND TRANDMITTER: The control signal from the train is transmitted to the station using RF transmitter and received by the receiver at the station.
4) LIQUID CRYSTAL DISPLAY: To display the output detected.
5) SOLAR PANEL with WIND (FAN) HYBRID ENERGY SYSTEM: To generate electricity from a running train. Here we are placing solar panel on the top of the train and fans are placed at sides of the train windowpanes. The combined energy of solar and wind is use to generate electricity through generating part.
6) BATTERY: To store the energy that is generated from the solar panel and wind hybrid energy system.

B. MATERIALS REQUIRED

1) ARDUINO UNO KIT: The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0.

The Arduino Uno can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC

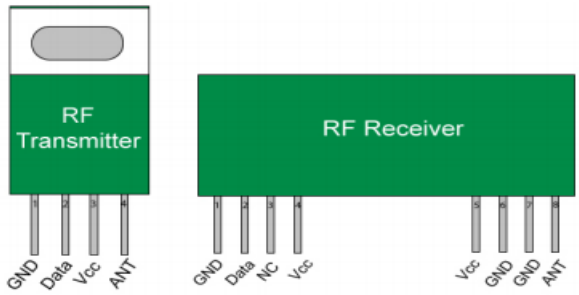
adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jackThe board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.



ARDUINO UNO

2) RF TRANSMITTER AND RECEIVER:

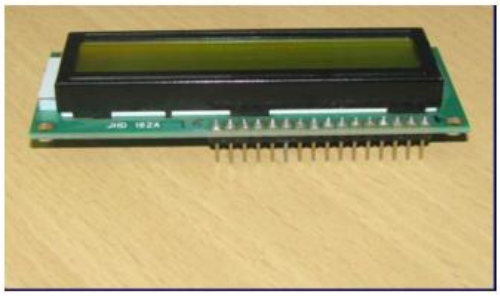
RF module, as the name suggest operates at radio frequency. The corresponding frequency range varies between 30 kHz and 300 GHz. In this RF system, the digital data is represented as variation in amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). Transmission through RF is better than IR because of many reasons. Firstly, signal through the RF can travel through larger distance making it suitable for long range application. Also, while IR mostly operates in line of sight modes, RF signals can travel even when there is an abstraction between transmitter and receiver. Next RF transmission is most strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of an RF transmitter and receiver. The TX/RX pair operated at a frequency of 434 MHz .An RF transmitter receives serial data and transmit it wirelessly through RF through its antenna pin. The transmission occurs at the rate of 1kbps-10kbps. The transmitted data is received by an RF receiver operating at a same frequency as that of the transmitter.



RF TRANSMITTER AND RECEIVER

3) LCD (LIQUID CRYSTAL DISPLAY):

A 16*2 LCD pin display 16 characters per line and there are two such lines. In this LCD each character is display in 5*7 pixel matrix. This LCD as two resistors, namely, command and data. The command resistor stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. the data resistor stores the data to be display on the LCD. The data is the ASCII value of the character to display on the LCD.



4) SOLAR PANEL:

Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heat. A photovoltaic (PV) module is a package, connected assembly of solar cells. Solar photovoltaic panels constitute the solar array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. A photovoltaic system includes a panel or an array of solar modules, solar inverter and sometimes a battery or solar tracker in inters connection wiring.

SOLAR PANEL

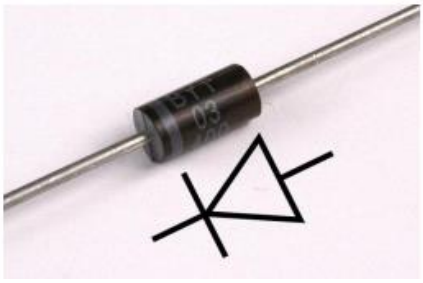
5) FAN: To represent the generation of electricity from the wind.

FAN

ZENER DIODE: The Zener diode is like a general purpose signal diode consisting of a silicon PN junction. When biased in the forward direction it behaves just like a normal signal diode causing the rated current, but as soon as reversed voltage applied across the Zener diode exceeds the rated voltage of the device, the diode breakdown voltage is reached at which point a process called "Avalanche Breakdown" across in the semi-conductor depletion layer and a current starts to flow through the diode to limit this increase in voltage.

ZENER DIODE

6) DIODE: 1N4001 is a member of 1N400x diodes. Diode is a rectifying device which conducts only from anode to cathode. Diode behaves open circuited for the current flow from cathode to anode. 1N4001 is a 1A diode with low forward voltage drop and high surge current capability. It comprises of diffused PN junction and has low reserve leakage current of 5μA. its DC blocking voltage is 50V.



DIODE

7) DC MOTOR IC DRIVE:

L293D is a dual H-BRIDGE motor drive integrated circuit. Motor drives act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

DC MOTOR IC DRIVE

8) BATTERY:

A primary cell is a battery that is designed to be used once and discarded, and not recharged with electricity and reused like a secondary cell. In general, the electrochemical reaction occurring in the cell is not reversible, rendering the cell rechargeable. As a primary cell is used, chemical reaction in the battery use up the chemicals that generate the power; when they are gone, the battery stops producing electricity and is useless. In contract, in a secondary cell, the reaction can be reserved by running a current into cell with a battery charger to recharge it, regenerating the chemical reactants. Primary cells are

made in a range of standard sizes to power small household appliances.

BATTERY

9) RECHARGEABLE BATTERIES:

A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, while a non-rechargeable or primary battery is supplied fully charged, and discarded once discharged. It is composed of one or more electrochemical cells. The term "accumulator" is used as it accumulates and stores energy through a reversible electrochemical reaction.

RECHARGEABLE BATTERIES

C. SOFTWARE DESCRIPTION

1) ARDUINO COMPILER:

The open source Arduino software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, mac OS X, and Linux. The environment is written in Java and based on processing and other open source software. This software can be used with any Arduino board. The program is dumped to Arduino board to run it.

III. RESULTS AND DISCUSSIONS

Once the whole hardware component is installed, the system can be operated and the desired effect can be obtained. That is a cost-effective and intelligent full-fledged micro-controller and wireless based train anti-collision system and also generating electricity using hybrid energy of solar and wind.

IV. CONCLUSION

The features implemented in this project such as Generating electricity using solar and wind energy can be used for lighting system of train. The design and implementation cost is effective and intelligent full-fledged Arduino controller and wireless based Train Anti Collision System to successfully prevent the train collisions has been done.

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Alternative Communication Device For Stroke People

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ABSTRACT

Adults with acquired neurological disorders (stroke, Traumatic Brain Injury ...) develop their disability for verbal communication and literacy capabilities as typical speakers and writers. Depending upon their neurological condition, they gradually or suddenly lose their speech or language capabilities and are required to rely on Alternative Communication systems(ACS) to meet their communication needs.

This technology offer valuable opportunities to people with physical disabilities. The attractive features of this system include noninvasive signal recording, little training requirement, and a high information transfer rate. This project presents the design and development of a system that brings out a disabled person from the condition of prisoner in his own body. Stroke is one of the main causes of disability in the world. About 20% of stroke patients experience aphasia, with 20-30% of these individuals exhibiting severe communication deficits for at least a portion of their recovery period. Alternative Communication (ACS) encompasses the communication methods used to supplement or replace speech or writing for those with impairments in the production of spoken.

Keywords: (ACS)-Alternative Communication systems, (AT) Assistive technology, PIR Sensors, ARDUINO , Signal conditioning.

I. INTRODUCTION

Much research work has been devoted in the past twenty years to developing Assistive Technology (AT) devices aiming at offering to people suffering a disability associated to disorders of verbal communication, the possibility of communicating with the persons in their entourage and having some control on their environment. These AT devices are operated by human-machine interface sensors receiving information provided by the person with disabilities [1].

When working in the area of alternative communication, one of the recurring problems is selecting the sensor that will be best suited, whatever the type of AT devices (communication aid, assistance when using the computer, etc.) used. As a consequence, one of the first tasks to be done is identifying the proper sensor from among the set of devices available on the market or developed in research labs. One of the major difficulties encountered in the quest for a well-adapted AT devices is that the selection process is strongly influenced by the user's specific needs, which in turn has an impact on the type of sensor to be used. Thus, this process cannot be carried out without taking full account of the human-machine system to which it is going to be applied. It is therefore necessary to study the performances of the user-sensor-system. The purpose of this paper is to report about our study regarding the several technologies employed in the

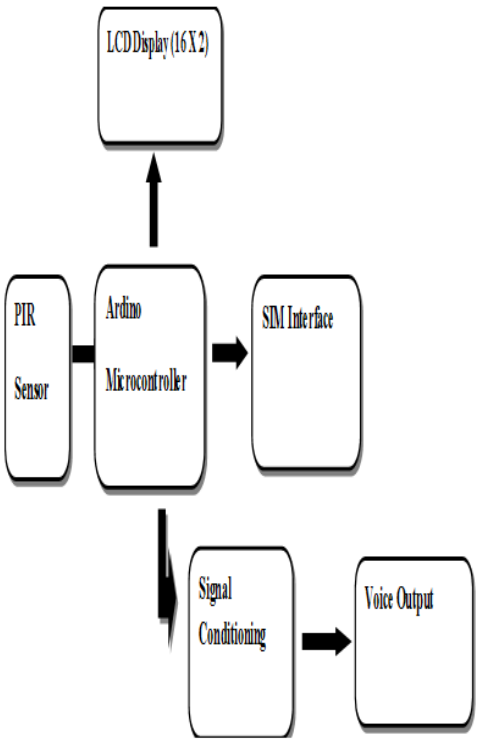
restricted area of alternative communication systems. Many people have communication problems after a stroke. About a third of stroke survivors have some difficulty with speaking or understanding what others say, and this can be frightening and frustrating.[2]

Imagine for a moment, that you wake up one day and you are completely paralyzed. How would you communicate with others in the room? How would you get your morning coffee, or breakfast for that matter? You can't effectively say what you want so you are now at the mercy of a dietician who choose foods that are "best" for you. How can you tell them that you don't like the taste of lemon in your tea or burnt toast? For that matter, how will you be able to communicate anything with others regarding pain levels, basic needs and anything else you have to say? For you, this was just an exercise, a learning experience that you can leave at any time and communicate freely with anyone you choose about anything you like. For some, especially those who are partially or completely paralyzed due to injury or disease, this is the harsh reality of their life. They face these challenges every day and have a hard time communicating something as simple as a "Hello". How do these people with significantly impaired mobility communicate with others? What means of communication are available to them?[3]

A stroke is an injury to the brain. The brain controls everything we do including everything we interpret and understand. A stroke can cause problems with communicating if there is damage to the parts of the brain responsible for language. These functions are controlled by the left side of the brain in most people. As one side of the brain controls the opposite side of the body, many people who have communication problems after stroke also have weakness or paralysis on the right side of their body. Stroke can also cause communication problems if muscles in the face, tongue or throat are affected.[2]

So on top of all these condition this paper is our effort in giving a transformation for speech disabled people from disabled to be abled in all ways that is in terms of communication.

II. BLOCK DIAGRAM



III. WORKING

The basic working principle of this is, that it detects near proximity (also known as touch) without depending on physical contact. In simple words, we can understand that its working is same as a simple switch (or) circuit. This simple switch used here is nothing but the PIR Sensor. A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves.

Therefore, when any physical medium touch moves in front of this surface of this sensor, the internal clot get closed inside the sensor and current starts flowing. Here, this movement sensor is connected to the Arduino Microcontroller. The Arduino Uno board is a microcontroller based on the ATmega328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack and a reset button. This contains all the required support needed for microcontroller.

Whenever the disabled person wants to convey an emergency message, he waves his finger or any other part of the body and this sensor recognizes this movement and passes message to the microcontroller and this Arduino microcontroller receives the signal from the sensor. The microcontroller counts the number of movement the sensor makes and this received information as an output is obtained in three different ways.

i. Firstly, The Arduino Microcontroller is interfaced with the LCD display, so the emergency message to be conveyed is displayed on the LCD screen.
ii. The Arduino Microcontroller is interfaced with a GSM SIM, by this the emergency message to be conveyed will be sent as a SMS to the other persons mobile phone.
iii. The emergency message is conveyed as a voice output through signal conditioning. Signal conditioning is the manipulation of a signal in a way that prepares it for the next stage of processing.

IV. CONCLUSION

1. It is one of the innovative way helpful for disabled people who are facing problems in conveying their information.
2. This brings out the disabled person from the condition of prisoner in his own body.
3. The basic needs of the person can be easily fulfilled.
4. Develops an augmentation mode for disabled people to participate in wider variety of options.

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Switching Operation of Circuit Breakers Using Password

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ABSTRACT

Nowadays electrical accidents to the lineman are increasing, due to the lack of communication between electrical substation and maintenance staff. Hence, to avoid this we are implementing password-based circuit breaker where the switches of the circuit breaker is operated using RFID and OTP.
Keywords. RFID, OTP

I. INTRODUCTION

Security is the prime concern in our day-to-day life. Everyone needs to be secure as much as possible. Especially people working in electrical field need to work with a lot of care as a small carelessness may lead to a loss of life. The main reason for such hazard is the lack of communication and coordination between the maintenance staff and electric substation staff. Henceforth it is important to make provision so that no lineman loses his life during the work. In order to overcome the problem a system has to be designed such that the control to turn on or off the line will be maintained by the in charge person only[1].

This project deals with the problem in two ways, OTP method and RFID method. In addition, this idea appears as the most effective and reliable method to provide safety to line man.

In OTP method the system has an arrangement where password is required to operate the circuit breaker (on/off) [2]. To repair a particular section of the electric supply line, the lineman wants to turn off the supply to that line. For this he first put a request to the system. Then the system responds to him using the LCD display to enter the password. Then the system generates a password and it will be sent to the phone (the number of whose is stored in the program). The entered password is compared with the password generated. If the password entered is correct, only then the line can be turned ON/OFF. The password-based circuit breaker can also be implemented in automatic door locking system for providing high security. In RFID method, each person will be given with unique tags and these tags have to be scanned to operate the circuit breakers. The system is fully controlled by a Arduino Mega board. The advantage of using Arduino over Microcontroller is that it is more user friendly. Building codes for it is very easy. Codes built in Python, Embedded C, C++ can be used to run on it. The project makes use of Global System for Mobile Communication module, Radio Frequency Identification (RFID) module, 4-driver relay circuit, an LCD display and a matrix keypad. The GSM module is used in order to send the OTP to the respective phone number. RFID module consists of a reader and tags in it. Each tag will have a unique number; these tags will be scanned across the reader. The reader senses the card and verifies the tag

number. A 4-driver relay circuit is used and it is connected to four lamps in this project instead of circuit breakers. LCD is the medium through which the user can interact with the system. A matrix keypad is interfaced to the Arduino to enter the password.

II. METHODS AND MATERIAL

The methodology of this system is very simple. Here, the keypad and LCD are interfaced to take the input from the user and display the command, RFID is used to scan the tags. GSM enables sending of OTP to the person. 4-drive relay is connected at the output followed by four lamps.

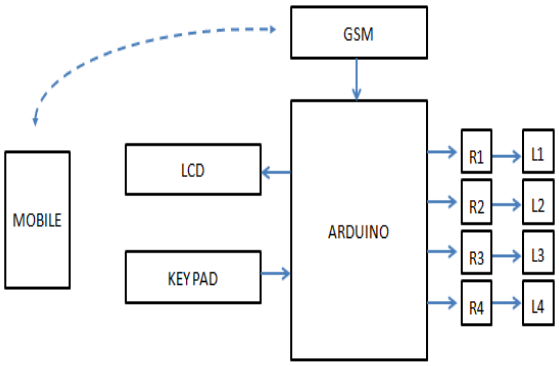
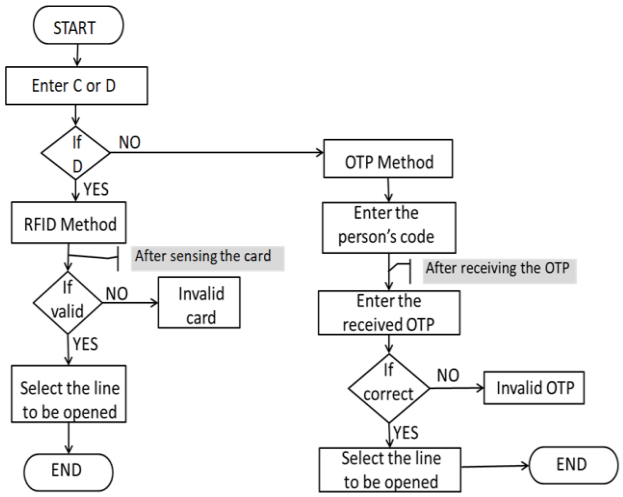


Figure 1.1. Block diagram of password based circuit breaker.

The operation of this project can be analysed from the following flowchart. Initially the user has to choose either of the methods. 'C' is entered for

RFID method and 'D' is entered for OTP method. After the scanned tag or the entered OTP is verified to be correct then the person will be allowed to select the line to be operated. And later after the work is finished the person can turn on the line by pressing 'C' in the keypad.



Figire 1.2. Operational Flowchart

A. Circuit Breaker

A circuit breaker is an automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow. Unlike a fuse, which operates once and then must be replaced, a circuit breaker can be reset (either manually or automatically) to resume normal operation.

B. Relay

A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, long life, and proven high reliability. Relays are used in a wide variety of applications throughout industry, such as in telephone exchanges, digital computers and automation systems. Highly sophisticated relays are utilized to protect electric power systems against trouble and power blackouts as well as to regulate and control the generation and distribution of power.

C. GSM Module

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a

variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

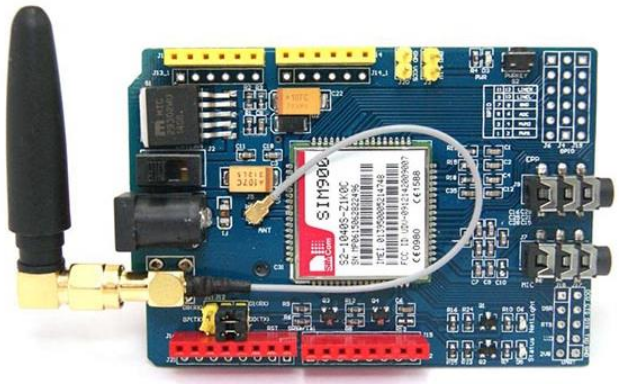


Figure 1.3. Global System for Mobile Communication.

D. RFID

RFID stands for Radio Frequency Identification uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

RFID tags are used in many industries, for example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line; RFID-tagged pharmaceuticals can be tracked through warehouses; and implanting RFID microchips in livestock and pets allows for positive identification of animals.

Figure 1.4. Radio Frequency Identification

E. Arduino Mega 2560

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students ,hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to incredible amount of accessible knowledge that can be of great help to novices and experts alike. Thanks to its simple and accessible user experience, Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users.

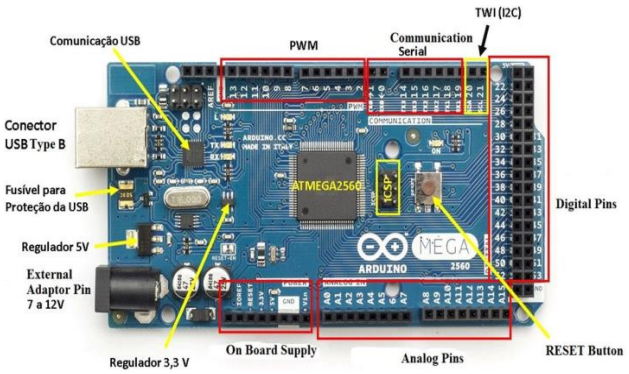


Figure 1.5. Architecture of Arduino Mega 2560.

III. RESULTS AND DISCUSSION

The electric lineman safety system is designed to control a circuit breaker with help of a password and RFID. OTP generation, OTP verification and scanning of the tags are the major tasks involved in this system. RFID is the main attraction of this project. It provides a new approach to the security of the lineman and completely eliminates the accidents to the lineman due to electric shock during the electric line repair. This system can also implement in many other public areas also.

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Design of Optimal controller for Enhanced Power System Stability using Multistage LQR with coordination operation of PSS and UPFC

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ABSTRACT

This paper presents, a multistage LQR is introduced and applied for simultaneous coordinated designing of the unified power flow controller (UPFC) and power system stabilizer (PSS) as a damping controller in the single machine power system. The results of these studies show that the proposed coordinated controllers have an outstanding capability in damping power system inter-area oscillations and enhance greatly the dynamic stability of the power system. The dynamic stability characteristics are investigated with PSS and UPFC acting individually and as a hybrid system. The hybrid controller shows a better performance compared to individual controllers. The proposed technique is implemented using MATLAB/SIMULINK platform.

Keywords: multistage LQR, unified power flow controller, Power System Stabilizer.

I. INTRODUCTION

With the ever-increasing complexities in power systems across the world, especially opening of electric power markets, it becomes more and more important to provide stable, secured, controlled and high quality electric power in today`s environment.

In the paper [1], the author has presented the results of comprehensive comparison and assessment of the damping function of multiple damping stabilizers. A multi-stage LQR concept introduced in another paper authored by R. K. Pandey [2],In this paper a settling time, minimum peak overshoot for a multi machine system has been realized.. . Shayeghi & H.A.Shayanfar [3]. Sasongko Pramono Hadi provides a detailed dynamics modeling of a multi machine power system equipped with GUPFC as the extension of UPFC configuration [4]. Mehdi Nikzad etal,provides Three robust methods considered and applied to design controllers are QFT, u-synthesis and H1 are applied on SMIB power system installed with UPFC and investigations are carried out on the stability parameter [5].

Sangu Ravindra has used an adaptive Artificial Neural Network (ANN) damping controller for UPFC. The performance of ANN controller has been compared with that of conventional lead-lag controller [6]. A.V.Sudhakara Reddy tried with an adaptive neuro-fuzzy controller for UPFC and compare the performance with lead-lag controller. The adaptive neuro-fuzzy controller shows good performance of reduce settling time and peak over shoot of low frequency oscillation [7]. The authors Mahdiyeh ESLAMI, Hussain SHAREEF have developed UPFC and PSS controllers using modified particle swarm optimization MPSO on multi machine system [8].The authors Mohammad Reza Esmaili etal have used UPFC and PSS coordinated

controllers using a new hybrid particle swarm optimization based co-evolutionary cultural algorithm. In this optimization process, the best parameters of PSS and UPFC controller are obtained by using the nonlinear model of the system in order to increase the power system stability [9]. The authors S. Robak, M. Januszewski, D.D. Rasolomampionona have made a comprehensive study of PSS and UPFC from the point of damping of power swings. The work is carried out on a multi machine system.[10].

In this paper dynamic stability study is carried out on SMIB linearized Philips heffron model using Power System Stabilizer and Unified Power Controller based on Multistage LQR technique. The dynamic stability parameters are investigated with Unified Power Flow Controller and Power System Stabilizer acting individually and coordinating together. The coordinated controller (PSS+mB PSS+δB) shows a excellent performance compared to individual controllers

II. POWER SYSTEM INSTALLED WITH PSS

Here a single machine connected to infinite bus is considered for analysis, The linearized model of the studied power system consisted of synchronous machine connected to infinite bus bar through transmission line is represented in a scheme diagram as shown in Figure 1. [11]

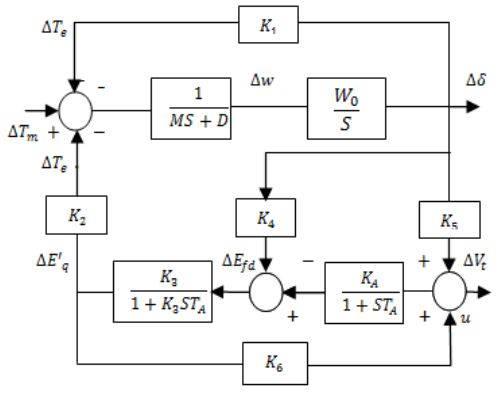

Figure 1. Block Diagram of Power System

The state space formulation for the above system can be expressed as follows [12] :

$$x'(t)=Ax(t)+Bu(t) \qquad (1)$$

Where, the state variables are the rotor angle deviation (Δδ) speed deviation (Δw) , q-axis component deviation (Δ E'q) and field voltage deviation (ΔEfd) represent the state and control input matrices given by

$$A=\begin{bmatrix} 0 & w_0 & 0 & 0 \\ -\frac{k_1}{M} & -\frac{D}{M} & -\frac{k_2}{M} & 0 \\ -\frac{k_1}{T'_{d0}} & 0 & -\frac{k_3}{T'_{d0}} & \frac{1}{T'_{d0}} \\ -\frac{k_A k_5}{T_A} & 0 & -\frac{k_A k_6}{T_A} & \frac{1}{-T_A} \end{bmatrix}$$

$$B_{PSS}=\begin{bmatrix} 0 \\ 0 \\ 0 \\ \frac{K_A}{T_A} \end{bmatrix} \qquad B_{mB,\delta B(UPFC)}=\begin{bmatrix} 0 & 0 \\ -\frac{k_{pb}}{M} & -\frac{k_{p\delta b}}{M} \\ -\frac{k_{qb}}{T'_{d0}} & -\frac{k_{q\delta b}}{T'_{d0}} \\ -\frac{k_A k_{vb}}{T_A} & -\frac{k_A k_{\delta vb}}{T_A} \end{bmatrix}$$

with their values used in the experiment are described in the appendix section at the end of paper.

The values of matrix A and matrix B for this loading condition are taken from paper authored by L Yathisha [13].

The closed loop control system A_1 are given by

$$A_1 = A - BK \qquad (2)$$

Where, B_{PSS} = Control input matrix of Power System Stabilizer and B_{UPFC} = Control input matrix of Unified Power Flow Controller and it consists of four input variables modulating index and phase angle of shunt inverter (mE;δE) and modulating index and phase angle of series inverter(mB;δB). For the current research the chosen input is considered. All the relevant k-constants and variables along

$$A = \begin{bmatrix} 0 & 377 & 0 & 0 \\ -0.0168 & 0 & -0.1696 & 0 \\ -0.0393 & 0 & -0.484 & 0.1983 \\ 58.80 & 0 & -333.70 & -20 \end{bmatrix}$$

$$B_{PSS} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1000 \end{bmatrix} \quad B_{mB,\delta B(UPFC)} = \begin{bmatrix} 0 & 0 \\ -0.046 & 0.17 \\ 0.201 & 0.1501 \\ -561.2 & 0.60 \end{bmatrix}$$

III. OPTIMAL CONTROL THEORY

Optimal control theory, an extension of the calculus of variations, is a mathematical optimization method for deriving control policies. Optimal control deals with the problem of finding a control law for a given system such that a certain optimality criterion is achieved. A control problem includes a cost functional that is a function of state and control variables. An advantage of the quadratic optimal control method over the pole-placement method is that the former provides a systematic way of computing the state feedback control gain matrix. The optimized feedback controllers for the present research are derived from the Linear Quadratic Regulator (LQR). For, the sake of completeness the LQR control methods are explained briefly in the following sections.

A. Linear Quadratic Regulator

Consider with

$$\dot{x}(t) = Ax(t) + Bu(t) \qquad (3)$$

$$y(t) = Cx(t) \qquad (4)$$

The input u is expressed as r-Kx, where r is the reference input and K is the feedback gain, also called the control law. Now assume that the reference input r is zero and that the response of the system is excited by nonzero initial state $x(0)$, which in turn excited by external disturbances. The problem is then to find a feedback gain to force the response to zero as quickly as possible. This is called the regulator problem. If $r = 0$, then the input $u = -Kx$ and the closed loop system is given by

$$\dot{x}(t) = (A - BK)x(t) \qquad (5)$$

The most systematic and popular method is to find K to minimize the quadratic performance index

$$J = \int_0^\infty (x^T Q x + u^T R u) dt \qquad (6)$$

where Q and R are the positive-definite Hermitian or real symmetric matrix. From the above equations,

$$K = -R^{-1} B^T P \qquad (7)$$

and hence the control law is,

$$u(t) = -Kx(t) = -R^{-1} B^T P x(t) \qquad (8)$$

in which P must satisfy reduced Riccati equation

$$PA + A^T P - PBR^{-1} B^T P + Q = 0 \qquad (9)$$

The LQR function allows you to choose two parameters, R and Q, which will balance the relative importance of the input and state in the cost function that you are trying to optimize.

B. Multistage LQR

LQR This technique for designing LQR is given by R K pandey in 2010. The design procedure in various stages is as follows:

(i) 1st **stage**: In this stage the LQR is designed using Bryson based LQR

$$Q = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad R = [1]$$

$$[k1, s, e] = lqr(A, B, Q, R)$$

(ii) 2 nd **stage** : Choose Q_1 & R_1 matrices as

$$Q_1 = \begin{bmatrix} 10 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad R_1 = [1]$$

Select, $A_1 = A - (B * k_1)$

$[k_2, s, e] = lqr(A_1, B, Q_1, R_1)$

(iii) 3 rd **stage** : Choose Q_2 & R_2 matrices as

$$Q_2 = \begin{bmatrix} 100 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad R_2 = [1]$$

Select, $A_2 = A_1 - (B * k_2)$

$[k_3, s, e] = lqr(A_2, B, Q_2, R_2)$

(iv) 4 th **stage** : Choose Q_3 & R_3 matrices as

$$Q_3 = \begin{bmatrix} 1000 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \qquad R_3 = [1]$$

Select, $A_3 = A_2 - (B * k_3)$

$[k_4, s, e] = lqr(A_3, B, Q_3, R_3)$

IV. SIMULATION RESULTS AND DISCUSSION

The simulation results is carried for all the four state variables rotor angle deviation *(Δδ)* rotor speed deviation *(Δw)* q-Axis component deviation *($ΔE'_q$)* and field voltage deviation *($ΔE_{fd}$).*

The feedback controller gains are given below:

$$k_{PSS} = 1.0e + 03 * [-0.0650 \quad -5.165 \quad 0.0710 \quad 0.0002]$$

$$k_{mB} = 1.0e + 03 * [0.0484 \quad 7.4234 \quad -0.1489 \quad -0.0009]$$

$$k_{\delta B} = [71.8865 \quad 297.4276 \quad 1.2723 \quad -0.0309]$$

$$k_{PSS+mB} = \begin{bmatrix} -34.224 & -287.7463 & -0.2266 & 0.1775 \\ -63.394 & -530.1513 & -0.1846 & -0.0864 \end{bmatrix}$$

$$k_{PSS+\delta B} = \begin{bmatrix} -0.0364 & -0.1421 & 0.0503 & 0.2361 \\ 72.0769 & 299.5019 & 0.0014 & 0.0001 \end{bmatrix}$$

The simulation results of four state variables *(Δδ, Δw, $ΔE'_q$& $ΔE_{fd}$)* for nominal operating conditions PSS, mB, PSS+mB and PSS, δB, PSS+δB controller are plotted as given in Figures 2-7. Validation of the approach for this operating conditions is done by comparing peak overshoots & settling time as given in Tables 1to 4.

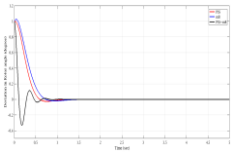

Figure 2 Deviation in rotor angle with Damping controller
(PSS, mB and PSS+mB)

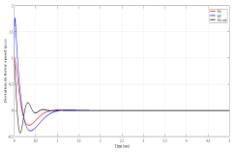

Figure 3 Deviation in rotor speed with Damping controller
(PSS, mB and PSS+mB)

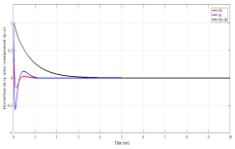

Figure 4 Deviation in q-axis component with Damping controller
(PSS, mB and PSS+mB)

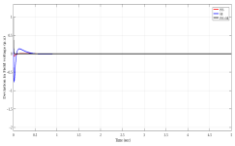

Figure 5. Deviation in field voltage with Damping controller
(PSS, mB and PSS+mB)

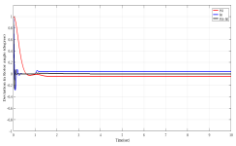

Figure 6.Deviation in rotor angle with Damping controller
(PSS, δB and PSS + δB)

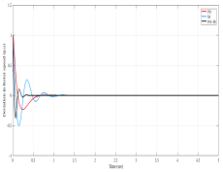

Figure 7.Deviation in rotor speed with Damping controller
(PSS, δB and PSS + δB)

Table 1. Comparision Of Peak Overshoot For Pss, Mb And Pss + Mb Control Inputs

State Variables	PSS	mB	PSS + mB
Δδ	1.1	1.0	-0.35
Δw	1.75	-0.25	-0.35
$\Delta E'_q$	-0.20	-0.55	0
ΔE_{fd}	-0.05	-0.75	0

Table 2. Comparision Of Settling Time For Pss, Mb And Pss + Mb Control Inputs

State Variables	PSS	mB	PSS + mB
$\Delta\delta$	1.4sec	1.3sec	0.65sec
Δw	0.9sec	1.4sec	0.7sec
$\Delta E'_q$	1.0sec	1.0sec	4.5sec
ΔE_{fd}	0.15sec	0.8sec	0.01sec

Table 3. Comparision Of Peak Overshoot For Pss, Δb And Pss + Δb Control Inputs

State Variables	PSS	δB	PSS + δB
$\Delta\delta$	1.1	-0.3	-0.25
Δw	-0.25	-0.5	-0.35

Table 4. Comparision Of Settling Time For Pss, Δb And Pss + Δb Control Inputs

State Variables	PSS	δB	PSS + δB
$\Delta\delta$	1.7sec	1.1sec	0.25sec
Δw	0.8sec	1.3sec	0.35sec

Figures 2 to 5, show the plots of all the four state space variables *(Δδ, Δw, ΔE'q& ΔEfd)* with the legends PSS, mB and PSS+mB.

Figures 6 and 7, show the plots of all the four state space variables *(Δδ & Δw)* with the legends PSS, δB and PSS+δB. Tables I to II, show the comparison of peak overshoots and settling time for PSS, mB and PSS + mB control inputs

Tables III to IV, show the comparison of peak overshoots and settling time for PSS , δB and PSS + δB control inputs

Figure 2 to 5 and Tables I & II, reveal that the PSS + mB provides robust performance in peak overshoot and settling time for all the four state variables.

Figure 7 to 9 and Tables III & IV, PSS + δB provides better performance only for the state variable deviation rotor angle *(Δδ)* in peak overshoot and deviation in rotor angle, deviation in rotor speed (*Δδ, Δw)* effective in settling time.

V. CONCLUSION

This paper tries to provide a coordinated PSS and UPFC controller based on Multistage LQR technique. The main observations are summarized as below

- System stability (peak overshoot) is enhanced with proposed PSS+mB damping controller with.respect to Δδ, ΔE'qΔEfd for nominal loading condition.
- System stability (peak overshoot) is improved with proposed PSS+δB damping controller with respect to Δδ,and Δw nominal loading condition
- System stability (settling time) is enhanced with proposed PSS+mB damping controller with respect to Δδ, Δw and ΔEfd for nominal loading condition
- System stability (settling time) is improved with proposed PSS+δB damping controller with. respect to Δδ and Δw for nominal loading condition

APPENDIX

The test parameter data values are

Synchronous Machine

$H = 4.0,\ D = 0.0,\ T'_{do} = 5.044$

Excitation System

$k_A = 100, \quad T_A = 0.01$

k constants for the nominal operating conditions

$k_1 = 0.5661, k_2 = 0.1712, k_3 = 2.4583$

$k_4 = 0.4198, k_5 = -0.1513, k_6 = 0.3516$

$k_{pe} = 0.3795, k_{qe} = 1.1618, k_{ve} = -0.4591$

$k_{pb} = 0.1864, k_{qb} = -0.1513, k_{vb} = 0.3516$

$k_{p\delta e} = 1.1936, k_{q\delta e} = -0.0380, k_{v\delta e} = 0.0311$

$k_{p\delta b} = 0.0529, k_{q\delta b} = -0.0423, k_{v\delta b} = 0.0189$

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Implementation of MPPT Algorithm for Solar PV cell using P&O, Incremental Conductance and Constant Voltage Method

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ABSTRACT

The conventional energy source are depleting day by day at an alarming rate. In the present era, there is an acute shortage of energy source for the production of electricity . The feasible alternative is non-conventional energy source. This paper deals with modelling of PV array including the effects of temperature and irradiation. The DC-DC converter is used for boosting low voltage of the PV array to high DC voltage. Since the efficiency of a PV array is around 13% which is low, it is desirable to operate the module at the peak power point to improve the utilization of the PV array.

A maximum power point tracker (MPPT) is used for extracting the maximum power from the solar PV array and transferring that power to the load. Implementation of MPPT technique has been developed using P&O, incremental conductance and constant voltage algorithm has been done using MATLAB based M file programming scheme.

Keywords. Photovoltaic (PV) array, Maximum power point tracking(MPPT), DC-DC converter, Modelling of PV array.

I. INTRODUCTION

As the sources of conventional energy depleting day by day, resorting to alternative sources of energy like solar and wind energy has become need of the hour. A field of photovoltaic solar energy has experienced a remarkable growth for two decades

A photovoltaic system directly converts sunlight into electricity. Due to its low power, it is necessary to combine multiple cells into series or into parallel, forming a PV module and modules are further connected into series or into parallel with the required values of current and voltage to form a photovoltaic array. But this photovoltaic system has two major drawback one is that the conversion efficiency required for electrical power generation is very low especially during low irradiation condition may be the efficiency is around 9 to 17%, the second drawback is that the P-V and I-V characteristics of solar cell is non-linear and it also varies depending upon the temperature and irradiance.

In case of PV and IV characteristics of solar cell there is an unique point called maximum power point at that point entire PV system operates at maximum efficiency and produces its maximum output power. Therefore maximum power point tracking techniques are needed to maintain the PV array's at its maximum power point. Many MPPT techniques have been proposed in literature these techniques varies between them in many aspects including simplicity, convergence, speed, hardware implementation, sensors required, cost range of effectiveness. Perturb and Observe, Incremental conductance and constant voltage are the techniques to be used [1], [2].

In P&O method [3], [4], there is a perturbation in the operating voltage in the PV array. However, the P&O algorithm cannot compare the array terminal voltage with the actual MPP voltage, since the change in power is only consider to be a result of the array terminal voltage perturbation. As a result, they are not accurate enough and it also slows in finding the MPP if the voltage is far away from the MPP. Thus there are some disadvantages with this method where they fail under rapidly change in atmospheric conditions [5].

Incremental conductance method is the method which overcomes the drawback of the P&O method. In this method the array terminal voltage is always adjusted according to the MPP voltage. It is based on incremental and instantaneous conductance of the PV module [6], [5], [7], [8].

The open circuit voltage d is based on observation that the voltage of the maximum power point is always close to a fixed percentage of the open circuit voltage.

II. METHODS AND MATERIAL

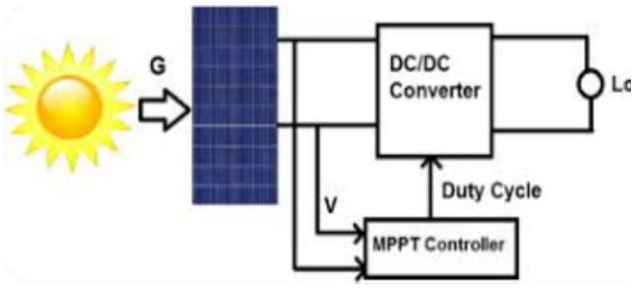

Figure 2.2. Block Diagram of MPPT model.

2.1 MODELLING OF SOLAR CELL

A solar cell is the building block of a solar panel. A photovoltaic module is formed by connecting many solar cells in series and parallel. To understand the Physical behavior of a solar cell, it is useful to create a model which is electrically equivalent, and is based on discrete electrical components whose behavior is well known. This model is known as a single diode model of solar cell.

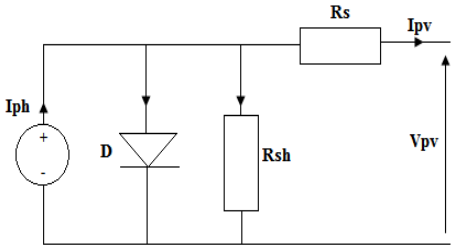

Figure 2.2. Single diode model of solar cell

The I-V characteristics of the equivalent solar cell circuit can be determined by following equations [1]. The current through diode is given by.

ID = I [exp (q (V + I RS)/KT) – 1] …(1)

While, the solar cell output current.

I = IL – IL – ISH …(2)

I = IL – I [exp (q(V + I RS)/KT)) – 1] – (V + IRS)/ RSH… (3)

Where.

I = Solar cell current (A)

I= Light generated current (A)

ID= Diode saturation current (A)

q = Electron charge (1.6×10-19 C)

K= Boltzmann constant (1.38×10-23 J/K)

T= Cell temperature in Kelvin (K)

V =solar cell output voltage (V)

RS=Solar cell series resistance (Ω)

RSH=Solar cell shunt resistance (Ω)

The I-V and P-V curves for a solar cell are given in the following figure. It can be seen that the cell operates as a constant current source at low values of operating voltages and a constant voltage source at low values of operating current.

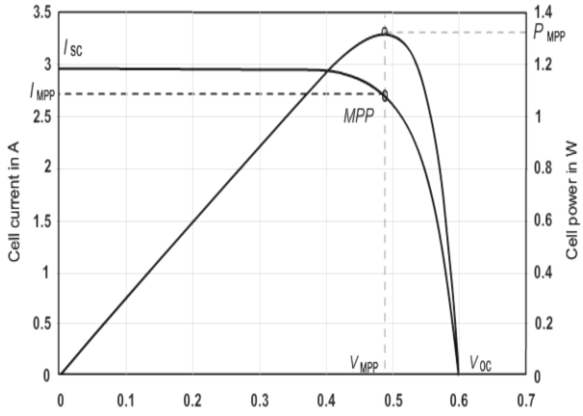

Figure 2.3. P-V I-V curve of a solar cell at given temperature and solar irradiation.

2.2 MAXIMUM POWER POINT TRACKING

The efficiency of a solar cell is very low. In order to increase the efficiency, methods are to be undertaken to match the source and load impedances properly. One such method is the Maximum Power Point Tracking (MPPT). This is a technique used to obtain the maximum possible power from a varying source. In photovoltaic systems the I-V curve is non-linear, thereby making it difficult to be used to power a certain load. This is done by utilizing a dc-dc converter whose duty cycle is varied by using a MPPT algorithm.

MPPT or Maximum Power Point Tracking is algorithm that included in charge controllers used for extracting maximum available power from PV module under certain conditions. The voltage at which PV module can produce maximum power is called "maximum power point" (or peak power voltage).

FLOW CHART OF MPPT ALGORITHMS

The most widely used methods for maximum power point tracking are studied here. The methods are

1. Perturb & Observe Method Algorithm

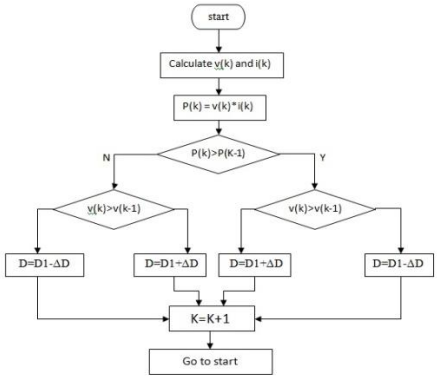

Figure 2.2.1 Flowchart of Perturb & Observe Method

2. Incremental Conductance Method Algorithm

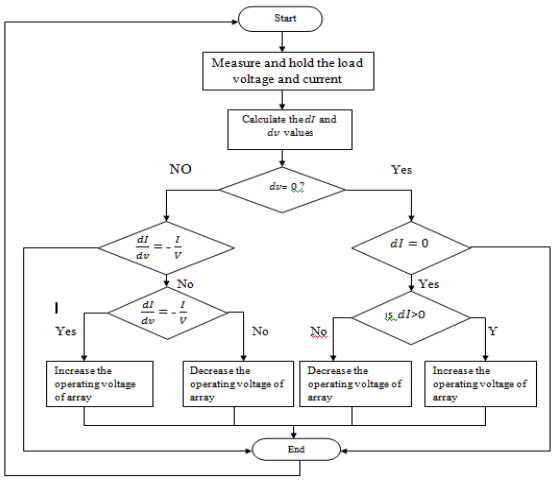

Figure 2.2.2 Flowchart of Incremental Conductance Method

3. Constant Voltage Method

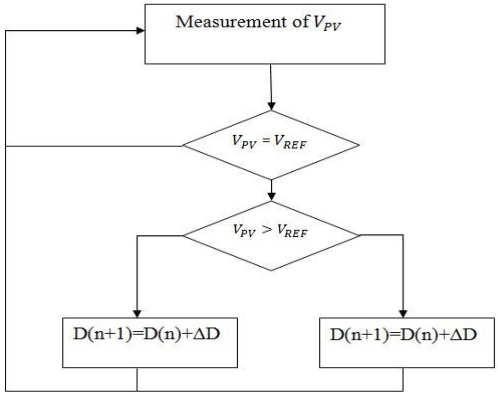

Figure 2.2.3 Flowchart of Constant Voltage Method

III. RESULTS AND DISCUSSION

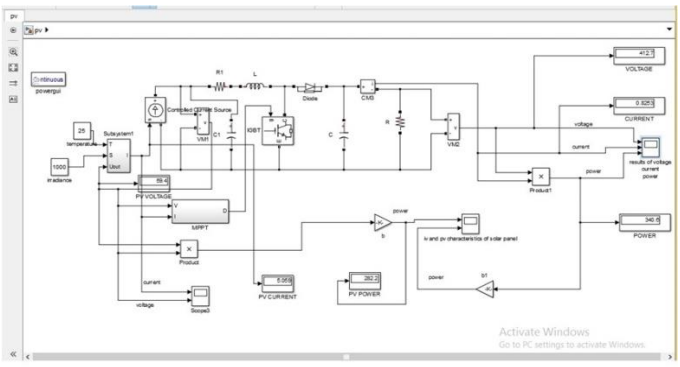

Figure 3.1 Simulink model of P&O Algorithm

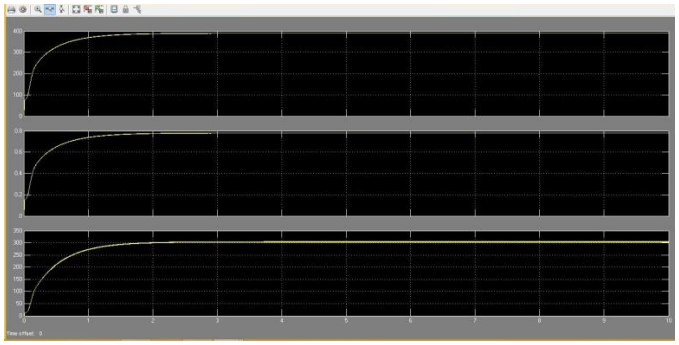

Figure 3.2 result of p&o algorithm method

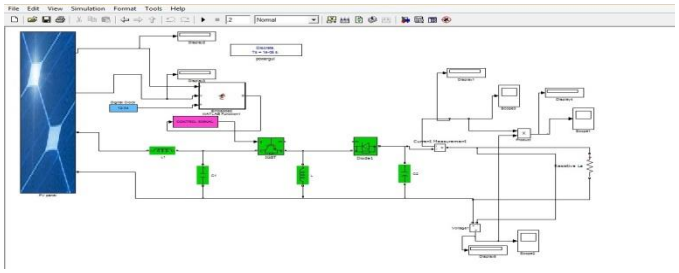

Figure 3.3 Simulink model of Incremental Conductance Algorithm

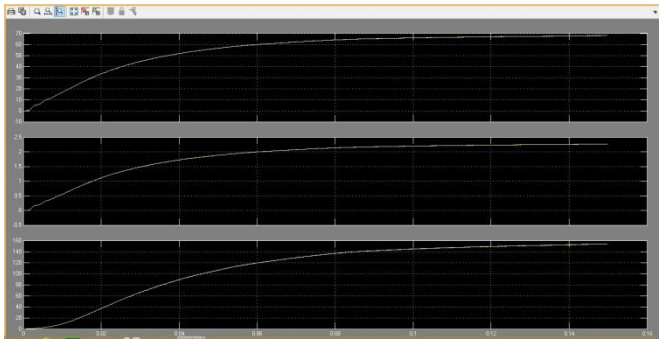

Figure 3.4 result of incremental conductance algorithm method

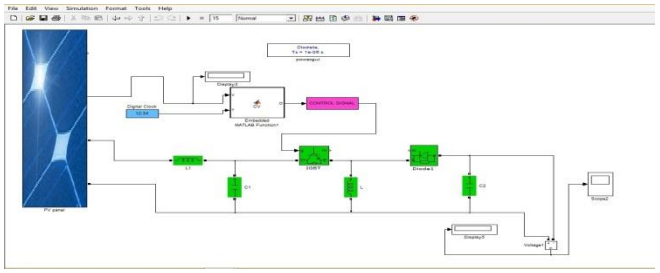

Figure 3.5 Simulink model of Constant Voltage Algorithm

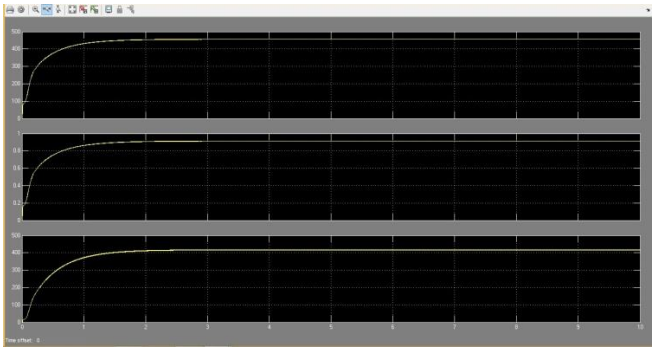

Figure 3.6 result of constant voltage algorithm method

IV. CONCLUSION

P&O and incremental conductance and constant voltage methods are implemented with MATLAB-SIMULINK for simulation. The MPPT method simulated in this paper is able to improve the dynamic and steady state performance of the PV system simultaneously. Through simulation, it is observed that the system completes the maximum power point tracking successfully despite of fluctuations. When the external environment changes suddenly, the system can track the maximum power point

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Single Phase Solar Inverter with Smart Charge Control

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ABSTRACT

In recent years, the interest in solar energy has risen due to surging oil prices and environmental concern. In many remote or underdeveloped areas, direct access to an electric grid is impossible and a photovoltaic inverter system would make life much simpler and more convenient.
With this mind-set, this paper aims to design, build, and test a solar panel inverter with thermo electric generator to convert waste heat in to electricity. This inverter system could be used as backup power during outages, battery charging, or for typical household applications. The key features of the system are a true 50Hz, 230V RMSoutput voltage, a wide input range, an intelligent charger and a power output for led lamps. The overall goal is to design this system while minimizing component costs. Although systems with similar features already exist, many are prohibitively expensive. In addition, inverters in the lower price range typically lack the features mentioned above. Hence the main aim of the proposed work lies in designing a solar panel inverter that is flexible and utilizes a wide range of input voltage range for various photovoltaic panels. Also, the proposed scheme is said to provide a charge control option that makes optimal use of any solar panel.

Keywords. Solar panel, charge switcher control

I. INTRODUCTION

This section explains the motivation of the project and purpose of design. This section also provides information about the technology used and the device performance in household applications.

The initial selection of this project was motivated by the increased interest in renewable energy systems, which has been fuelled by rising oil prices and environmental concern. It is our belief that the marketplace needs a wider variety of products that will utilize such systems for household applications.
We also believe that the process of designing a solar panel interface will be greatly beneficial to a power engineer in the rapidly expanding field of renewable energy applications. With additional power source as thermoelectric generator for waste heat to power, as compared to other commercially available inverter system, flexible – utilizing a wide input voltage range for various photovoltaic panels as well as providing a charge control option, and make optimal use out of any solar panels Centrifugal pump is still in operation then, definitely pump will be heated up, which leads to failure of winding, wear and tear losses. The water also acts as a coolant to cool down various components of pump. If pump is running dry then due to heat factor, parts can be damaged and this will cease the pump.

II. OBJECTIVE

The main objective of this project is to design, a solar panel inverter. As compared to other commercially available inverter system, flexible – utilizing a wide input voltage range for various photovoltaic panels as well as providing a charge control option, and make optimal use out of any solar panels.

Optimal cost for manufacturing will be rupees 3,000 to 4,000. Long backup hours due to LED usage technology as a source of light. Advance monitoring system gives good battery life and fast charging cycle and two way charging can also be done.

Figure 1 shows the block diagram used in the present work.

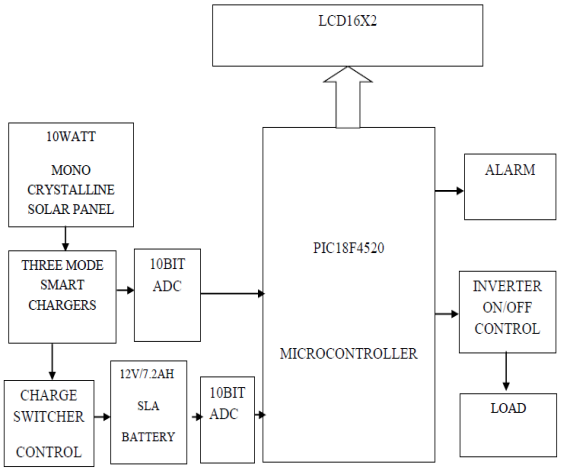

Figure 1.Block Diagram on charging control

III. METHODOLOGY

In the circuit diagram we can observe that 12V battery is connecter to the diode LED and also connected to the pin8 of the IC 4047 which is VCC or power supply pin and also to pin 4 and 5 which are astable and complement astable of the IC. Diode in the circuit will help not give any reverse current, LED will work as a indicator to the battery is working or not. IC CD4047 will work in the astablemultivibrator mode. To work it in astablemultivibrator mode we need an external capacitor which should be connected between the pin1 and pin3. Pin2 is connected by the resistor and a variable resistor to change the change the output frequency of the IC. Remaining pins are grounded .The pins 10 and 11 are connected to the gate of the mosfets IRF540. The pin 10 and 11 are Q and ˜Q from these pins the output frequencies is generated with 50% duty cycle.

The output frequency is connected to the mosfets through resistor which will help to prevent to the loading of the mosfets. The main AC current is generated by the two mosfets which will act as a two electronic switches. The battery current is made to flow upper half or positive half of the primary coil of transformer through Q1 this is done when the pin 10 becomes high and lower half or negative half is done by opposite current flow through the primary coil of transformer, this is done when pin 11 is high. By switching the two mosfets current is generated.

This AC is given to the step up transformer of the secondary coil from this coil only we will get the increased AC voltage , this AC voltage is so high; from step up transformer we will get the max voltage. Zener diode will help avoid the reverse current.

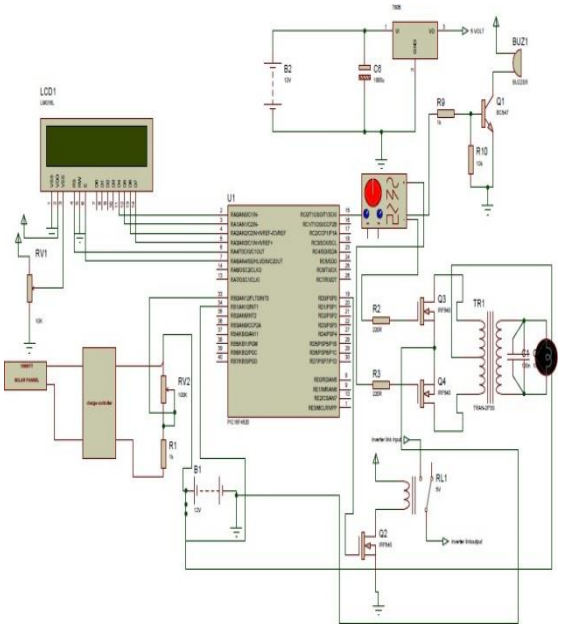

Figure 2. Circuit diagram of charging control

IV. HARDWARE USED

Table 1. shows the list of hardware components

SlNo.	Component	Quantity
1	Pic 18f4520	1
2	Btal 12 triac	1
3	Buzzer	2
4	Opto coupler	1
5	Lcd 16x2	1
6	relay	5
7	Transformer 12v,1a	1
8	10watt solar panel	1
9	IC 7805 Voltage Regulator	1
10	Irf 540 fet	2
11	Cd 4017 ic	1
12	12 volt 7.2 ah sealed lead acid battery	1
13	IC LM324	4

V. SOFTWARE USED

MikroC pro

The MikroC PRO for PIC is a powerful, feature-rich development tool for PIC microcontrollers. It is designed to provide the programmer with the easiest possible solution to developing applications for embedded systems, without compromising performance or control.

PIC and C fit together well.PIC is the most popular 8-bit chip in the world, used in a wide variety of applications, and C, prized for its efficiency, is the natural choice for developing embedded systems. MikroC PRO for PIC provides a successful match featuring highly advanced IDE, ANSI compliant compiler, broad set of hardware libraries, comprehensive documentation, and plenty of ready-to-run examples.

VI. ADVANTAGES

Direct room temperature conversion of light to electricity through a simple solid state device. Absence of moving parts. Ability to function unattended for long periods as evidence in space program me.Modular nature in which desired currents,voltages and power levels can be achieved by mere integration.Maintenancecost is low as they are easy to operate.They do not create pollution.They have long effective life.They are highly reliable; They consume more fuel to operate as the sun's energy is free. They have rapid response in output to input radiation changes; no long-time constant is involved, as on thermal systems, before steady state is reached. They are easy to fabricate, being one of the simplest of semiconductor device. They can be used with or without sun tracking, making possible a wide range of application possibility.

VII. DISADVANTAGES

Their principal disadvantages are their high cost, and the fact that, in many applications, energy storage is required because of no isolation at night. Efforts are being made world- wide to reduce cost through various technological innovations. The conversion efficiency of solar cells is limited to 10 %. Large areas of solar cell modular are required to generate sufficient useful power.The present costs of solar cells are comparatively high, making them economically uncompetitive with other conventional power generation methods for terrestrial applications, particularly where the demand of power is verylarge.

Solar energy is intermittent and solar cells produce electricity when sun shines and in

proportion to solar intensity. Hence, some kind of electric storage is required making the whole system more costly. However, in large installations, the electricity generated by solar cells can be fed directly into the electric grid system. Battery charge level maintenance and discharge limit and lifeshortened

VIII. APPLICATIONS

Various solar photovoltaic systems have been developed and installed at different sites for demonstration and field trial purposes. The terrestrial applications of these include provision of power supply to:Water pumping sets for micro irrigation and drinking watersupply, Radio beacons for ship navigation atports, Community radio and televisionsets,Cathodic protection of oil pipelines, Weathermonitoring, Railway signallingequipment, Batterycharging, Streetlighting.

The major application of photovoltaic systems lies in water pumping for drinking water supply and irrigation in rural areas. The photovoltaic water pumping system essentially consists of.
A photovoltaic (PV)array, Storagebattery, Power controlequipment, Motor pump sets,and Water storagetank.

IX. RESULT

Single Phase Solar Inverter and Charging SystemDevelopment

ssAs the project proceeded, the module went through various changes and improvements. This section discusses many of the obstacles and advancements the group faced as the project developed. The key points that will be outlined in this section are the evolution of the portable design, the obstacles faced, and the completeunit.

Table 2. Shows the output values of Light Condition

Conversion efficiency	Light condition	Solar voltage	Time	Season
10%	10%	6-7 volts	5am-7am	Summer
40-60%	90-100%	19 volts	7am-4pm	
10-20%	5-10%	3-4 volts	5am-7am	Rainy
40%	40-50%	16-19 volts	7am-4pm	

Resulting output condition of battery and inverter:

Battery:

Output:12V, 7.2 Amperehour

PWMfrequency:4-5 kHz and its maximum will be up to 400kHz.

Inverter:

Batteryfullcharge.Load 18 watts it will back up to 9 hours Battery70%

Charge.Load 18 watts it will back up to 6-7 hours Battery50% charge.Load 18 watts it will back up to3hours

Outputload:120-200volts and current consumption will be depending onload.

FINAL SETUP OFPROJECT

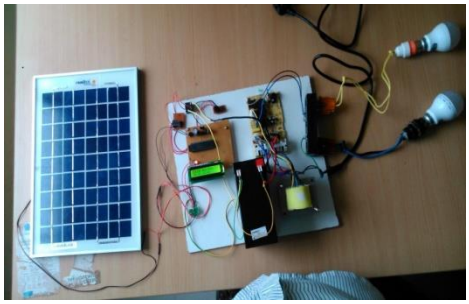

Figure 3. Inverter is turned off

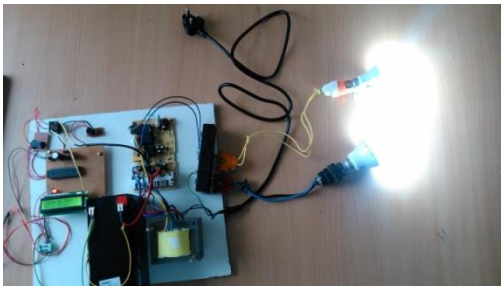

Figure 3.1. Inverter is turned on

X. CONCLUSION

Photovoltaic power production is gaining more significance as a renewable energy source due to its many advantages. These advantages include everlasting pollution free energy production scheme, ease of maintenance, and direct sunbeam to electricityconversion.

However the high cost of PV installations still forms an obstacle for this technology. Moreover the PV panel output power fluctuates as the weather conditions, such as the insulation level, and cell temperature.

The described design of the system will produce the desired output of the project. The inverter will supply an AC source from a DC source. The controller will implement the MPPT algorithm and synchronization with the grid.

In this work, a single phase PWM inverter has been implemented with PIC18F4520 microcontroller and gate drivers. Several outstanding features of the developed Sinusoidal PWM inverter are.fewer harmonic, low cost, simple and compact. The implemented inverter is for low power and low voltage application.

XI. FUTURE IMPROVEMENTS

Besides we've done no work for voltage regulation. So in this sector there has also opportunity for future scope. Besides these, our project work is not tested on high voltage. We just work on 220 volts which is in household range. Now a day there is a high demand on DC power transmission. For industrial and high voltage DC voltage conversion will be a good future work. It needs the further enhancement of the system. It needs a huge transformer. Of course the requirements will cause huge amount of expenses. Finance is a critical issue for further enhancement. This system will be enhanced to additional devices like Televisions, Washing machine, Mixer, Grinder, Fan with additional battery increase in wattage of the solar panel.

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Reduction of Distribution Losses of The Vinayaka Feeder (11kv) Situated Between Bogadi and Basavanhalli, Mysore BY

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ABSTRACT

Losses incurred in electrical power systems have two components. technical losses and non-technical losses. This paper, presents the results of a practical case study for assessing technical losses of a distribution feeder at Bogadi Distribution Station, Mysore and appropriate solutions are suggested to reduce the losses. The optimum technique is used to find the existing losses incurred by review of the data record and field survey. Also, the total investment and the cost benefit ratio are calculated and the optimum technique to reduce the losses by adding another feeder is suggested.

Keywords. Technical and non-technical losses; KEB thumb rule (Optimum technique to calculate the losses); Cost benefit ratio;

I. INTRODUCTION

Power is generated for the consumer utilization. From when power is generated it is transmitted through transmission lines via grids & then distributed to the consumer. Power distribution is the final and most crucial link in the electricity supply chain and most visible part of the electricity sector, according to Power Grid Corporation of India Limited. At present, distribution losses is about 30%. Loss of power in distribution sector also causes increase in cost to produce more power, and the global warming concerns. Reasons for distribution losses may be due to. theft of electricity, low metering levels and poor financial health of utilities with low cost recovery, which generally causes power quality issues and increase in the cost to electricity supply. Distribution losses can be classified as Technical losses and Non-Technical losses. The technical losses are most visible losses because it is related to material properties and its resistance to the flow of current that is also dissipated as heat. The technical losses can be clearly classified as thelosses in power dissipated in distribution lines and transformers due to their internal resistance. This paper is mainly aimed at reducing the distribution losses of a feeder in the Bogadi Station, Mysore.To obtain the best possible technique. Various suggestions according to the literature survey done are as follows. Preventive and corrective maintenance should be carried out to minimize power losses on the distribution network. In addition, aged and overloaded transformers should be replaced and upgraded respectively. [1] The results of a practical case study for assessing both technical and non-technical losses of a transmission and distribution network at Southern Governorates of Jordan Distribution Electric System and

appropriate solutions and suggestions to reduce the losses. List of recommendation are presented based on losses results and also future solution is presented in this paper by using smart grid concept for energy losses reduction. [2] A practical study on technical losses in distribution system and analysis of the impact of losses in power sector. The additional energy needs to be produced and transferred to cover the technical losses. By installing the capacitor bank, resizing of conductors, shortening the distances and by phase balancing, the losses can be reduced. [3] This paper focuses on the mathematical analysis of losses that occur in electric power system. The Depezo loss formula, loss factor, use of system parameters for evaluating the system losses, the differential power loss and power flow methods are explicitly illustrated. The B-losses coefficient, which expresses the transmission losses as a function of outputs of all generation, is also explained. [4]
India has a **national grid**.

One among the most important part of an electrical grid power system is the **distribution system** that feeds the power to nearby homes and industries.
Distribution substation delivers electric energy directly to industrial and residential consumers. **Distribution feeders** transport power from the distribution substations to the end consumers' premises.

II. PRESENT STATUS

- The SRS substation at **Hootagalli**, **Mysor**e is connected to the national grid where in the voltage gets stepped down from **220kV to 66kV**.
- Thus reduced voltage is further sent to various distribution substations. One among them is situated at **Bogadi, Mysore** where the voltage is further reduced to **11kV** which is fed to consumers via the feeders.

The SLD of the Bogadi Substation is as shown below.

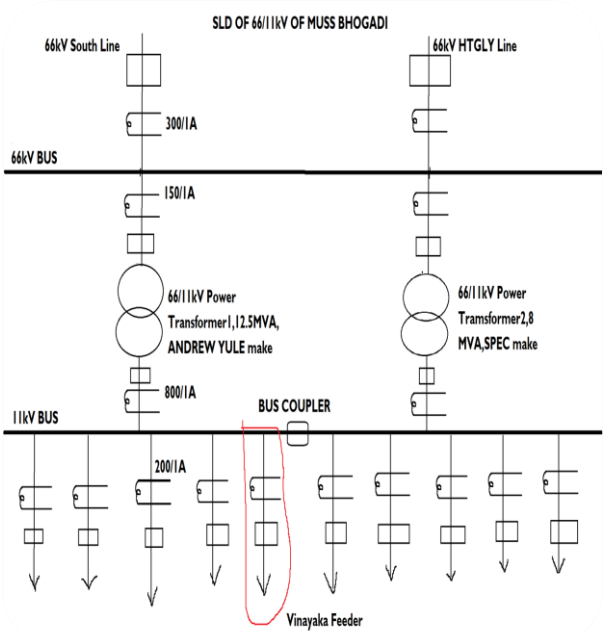

Figure 1. SLD of the Bogadi Substation, Mysore

The Actual Problem.
The Bogadi substation has 10 feeders each of 11kV. One such feeder being the Vinayaka feeder experiences a huge amount of losses.
But, for a good distribution system it's necessary to have minimum losses.

- This project is basically to analyse the total technical distribution losses of the Vinayaka feeder.
- Suggest the best possible technique to reduce the losses.
- Suggest the cost benefit ratio by estimating the cost involved for reduction of losses and time required for recovering the expenditure made to reduce the losses.

III. THE PROPOSED METHOD.

The procedure for the execution of the project is as follows.

1. Field survey is done
2. Total technical losses are estimated by using KEB Thumb rule
3. Optimum technique to reduce the losses is estimated

4. Cost benefit ratio by estimating the cost involved for reduction of losses and time required for recovering the expenditure made to reduce the losses is estimated.

1) Field survey.

A field survey is carried out from the starting point to the ending point of the feeder and a map is plotted for obtaining the exact distances between transformers and hence the total length of the feeder and hence to obtain the exact total technical losses that are occurring in the feeder.

The details obtained from the field survey are as follows.

The Vinayaka feeder has.

- ✓ Total of 63 TC's
- ✓ Out of which. 12 TC's are of 250kVA;
- ✓ 50 TC's are of 100KVA;
- ✓ 1 TC of 63kVA
- ✓ 1 TC of 25Kva

The field survey done is as shown below.

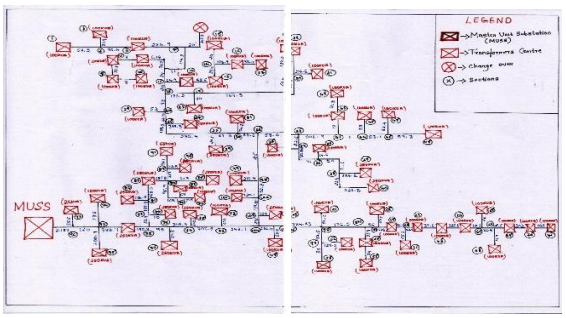

Figure 2. Field Survey Map

The field survey map is further reduced to a map as shown below by considering the point which offered maximum voltage regulation of 21.99% as the tie line.

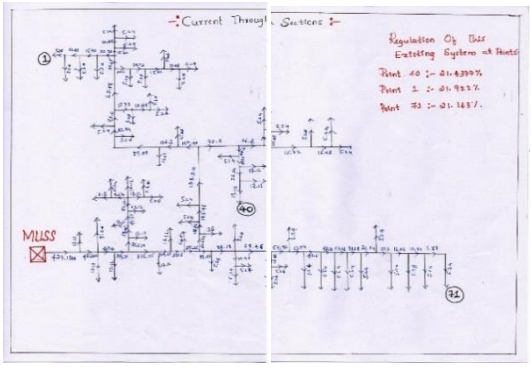

Figure 3. Survey map reduced for the calculation of Voltage regulation

Once the map above is obtained, the total existing technical losses were calculated as shown below.

Table 1. Technical Losses

Sl. No.	Section	Connected Load in kVA	Distance in km	kVAkm	Current(I) in amps	Resistance(R) in ohms	IR	I^2* R
1	1&2	100	0.0532	5.32	5.24	0.0307	0.1609	0.8429
2	2&4	200	0.0364	7.28	10.48	0.02105	0.2203	2.3119
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
96	96 & MUSS	8138	2.13	1733.94	427.1344	1.2316	526.0587	224697.7
96a	96 & 97	25	0.0556		1.312	0.3215	0.4218	0.5534
								Total= 390408.9095

2) The KEB Thumb rule used to estimate the total technical losses is as follows.

- All the points at which transformers are connected are marked as numbered points
- The kVA between points is obtained
- Distance between the points are marked
- Current through various sections are found out by finding the currents through each of the transformers as. I through a transformer of rating "X" KVA = (X * 1000) / ((3^1/2)*11*1000)
- Resistance in various sections are found out using the formula.

  R = r * distance of that section in km,

  Where,

  r = resistance of the conductor per km at 30 deg. Centigrade = 0.57824ohms

  r at 20 deg. Centigrade = 0.5465 ohms (for rabbit conductor)

  r at 30 deg. Centigrade = r at 20[1+a (30-20)];

  where, a = temperature co-efficient = 0.004(a constant)
- Voltage drop in any section can be found using the formula. I*R
- Losses in each section are calculated as. I^2 * R
- Total losses of the feeder is found out, by adding up the losses in all the sections.

3) Optimum technique to reduce the losses of 11KV feeder.

Considering the availability of roads, addition of another feeder can be done in order to reduce the total technical losses currently occurring in the feeder.

When done so, the regulation of the existing feeder is found to be reduced to 10.6156%

The additional feeder added is as follows.

- A double circuit is added up to a distance of 2.915km
- One circuit feeds the all the loads up to 2.915km from the MUSS
- Another feeder continues from the end point of double circuit till the end point of the load and feeds the remaining of the 0.9371km

Losses of the system after adding the feeder are found out in the same manner as above, but for different load conditions.

Hence, we get three different tabular columns with the same contents as above. But, the loads would vary. The three tables would be.

a. The modified existing feeder
b. Additional feeder 1
c. Additional feeder 2

Losses under each of the above categories are found out to be.

i. The existing system losses gets reduced to 51033.28776 watts
ii. Losses of additional feeder 1 is found to be 41757.3956 watts
iii. Losses of additional feeder 2 is found to be 28690.1657 watts

The total technical losses are found to be reduced from 390408.9095watts to 121480.8491watts

This implies, we can save 268928.0604watts of energy by the addition of another feeder as suggested.

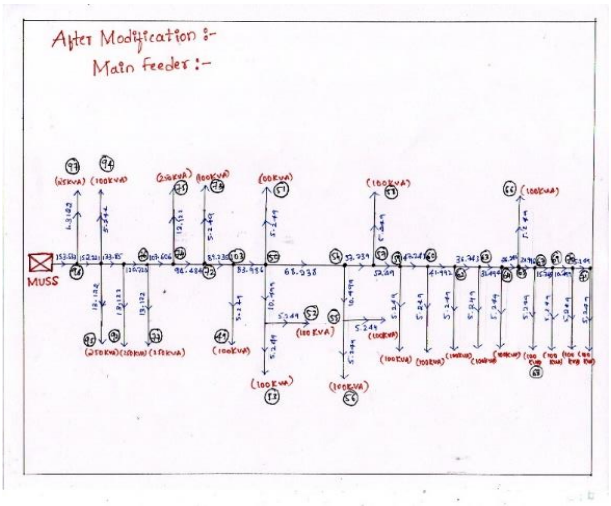

Figure 4. Suggested Modification for the existing feeder

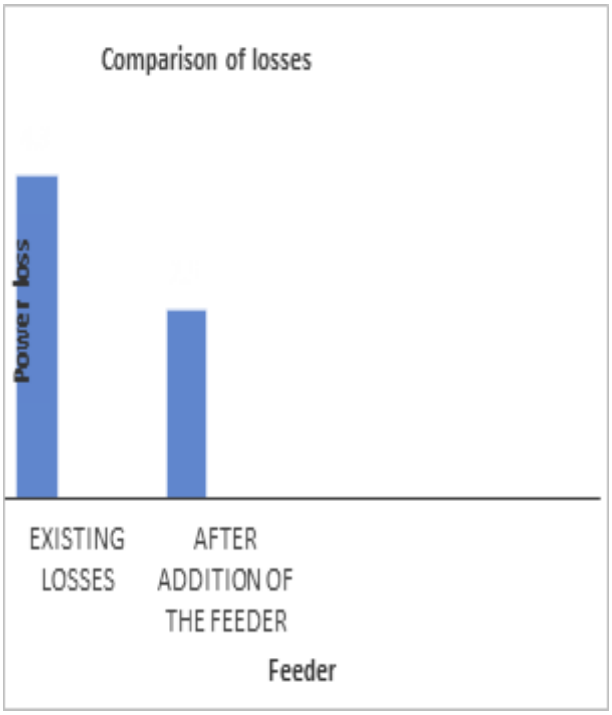

Figure 5. Comparison of Losses

4) Suggestion of the cost benefit ratio.

The existing system experiences a loss of 390408.9095 watts.

After the addition of 2 more feeders with a double circuit the losses get reduced to 121480.8491 watts.

That implies,

Savings = (Existing losses) – (Losses after the addition of new feeder)

= (390408.9095) – (121480.8491)

= 268928.0604 watts

i.e., a total of 268928.0604 watts of energy can be saved.

Considering, Rs. 4.5/- per unit energy,

We can save a total amount of. (4.5 * 268928.0604) = Rs. 12,10,176.272/- per year.

Investment for the project.

Required length of conductor.

Double circuit up to a distance of 2.915 km

The above length will serve feeder 1

Another single circuit for a length of another 0.2304 km

Per km cost of conductor with pole = Rs. 3,00,000/-

Per km cost of the double circuit

Conductor with pole = Rs. 6,00,000/-

That implies,

Total investment for the required

Length of the conductor= [(2.915* 6,00,000) + (0.2304 * 3,00,000)]

=Rs. 18,18,120/-

By saving Rs. 12,10,176.272/- per year,

We can get back the invested amount of Rs. 18,18,120/- in a span of 1.5 years.

Thereafter, we can save 2,68,928.0604 watts of energy every year and hence an amount of Rs.12,10,176.272/-

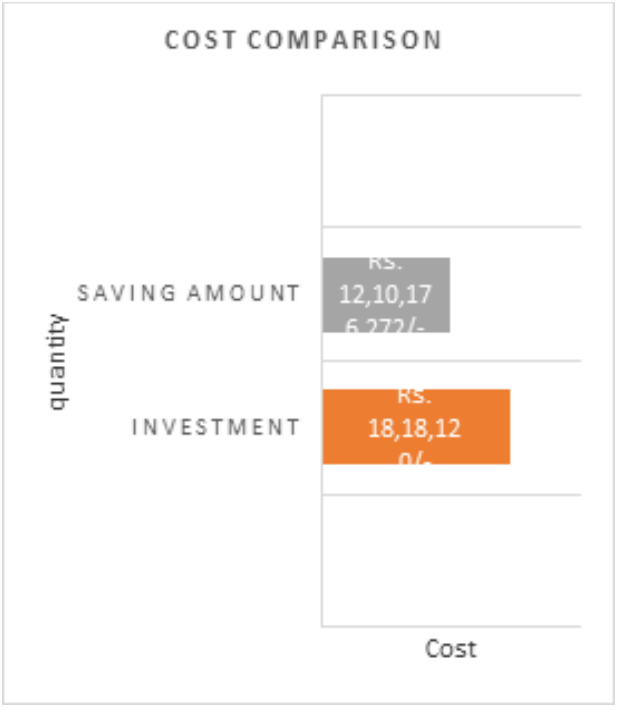

Figure 6. Cost comparison

IV. CONCLUSION

The paper demonstrates the KEB thumb rule to calculate the technical losses of a distribution feeder. It suggests the technique of addition of another feeder to the existing system in order to reduce the technical losses. It also presents the method of finding the total required investment to reduce the losses and gives a suggestion regarding the cost benefit ratio

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[4] IJRRAS 12 (2) ● August 2012 www.arpapress.com/Volumes/Vol12Issue2/IJRRAS_12_2_20.pdf 320 ANALYSIS OF TECHNICAL LOSSES IN ELECTRICAL POWER SYSTEM (NIGERIAN 330KV NETWORK AS A CASE STUDY) by M. C. Anumaka Department Of Electrical Electronic Engineering, Faculty of Engineering, Imo State University, Owerri, Imo State, Nigeria Email. engranumakamc@yahoo.com

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"Testing Of Basic Electronic Components Using Avr-Microcontroller"

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ABSTRACT

The testing of basic electronic component was very difficult in preceding days because the testing of each component has to be done in those distinct devices. In this project, all the basic electronic component can be tested in a single kit that can be accomplished using AVR-Microcontroller. In AVR-Microcontroller family, ATMEGA-328 is chosen under 8051 microcontroller, using AVR CODE STUDIO (Version-7.0) Program is given to the ATMEGA-328 Microcontroller, the program will be run and the working condition of basic electronic component can be displayed in LCD(Light emitting display).The LCD will display the condition of basic electronic component by giving the output as "GOOD" or "BAD".

Keywords: Microcontroller, Resistors, capacitors, inductors, diodes, transistor, voltage regulator, LCD.

I. INTRODUCTION

In preceding days the basic electronic component were tested using analog multicenter, voltmeter, ammeter, digital multicenter(DMM).But this device cannot be used for integrated circuit because it consists of all most all the basic electronic component which cannot be tested in individual devices. To overcome this drawback in our project we have constructed a component tester were we can test the working condition of all the basic electronic components.

Component testing is a method where testing of each component in an application is done separately. Suppose, in an application there are 5 components. Testing of each 5 components separately and efficiently is called as component testing. Component testing is also known as module and program testing. It finds the defects in the module and verifies the functioning of software. Component testing is done by the tester Component testing plays a very important role in finding the bugs. Before we start with the integration testing, it is always preferable to do the component testing in order to ensure that each component of an application is working effectively.

The basic electronic components are Resistor, capacitor, inductor diode, BJT, FET, MOSFET, JFET, Thyristor, SCR, DIACs, TRIACs, and IGBT. The above basic electronic components can be tested in a single kit. The component tester is used test the several components. The component tester can test voltage up to 50v.

To construct the components tester here we are using ATMEGA-328 Microcontroller. Microcontroller is a small computer on a single integrated circuit. It contains one or more CPUs

along with memory and programmable input/output peripherals. The ATMEGA-328 is a very popular microcontroller chip produced by ATMEL; it is an 8-bit microcontroller that has 32K of flash memory, 1K of EEPROM and 2K of internal SRAM. Totally, ATMEGA 328 has 28 pins.

The position of component will be detected by TSOP sensor and it is controlled by IR code. The tester does not detect the component it display their working condition, respective values and properties. The tester can be test only electronic component but not power component, because they require more current and power which AVR-Microcontroller could not handle.

The AVR microcontroller is simple, low powered, low cost microcontroller. The most common implementation of this chip is on the popular. Based on this the Arduino Uno and Arduino nano models are prepared. The AVR-Microcontrollers are mainly used in embedded system, so it is also called as embedded microcontroller.

II. LITERATURE REVIEW

1) "Transistor tester with AVR microcontroller and a little more version 1.06k"- Karl Heinz kubbeler , kh.kuebbeler@web.de, Feb 23,2013.
In this paper, we studied that for operation, they have used Atmega 28, Atmega 168 microcontroller & displaying the results to a 2*16-character LCD-display.Automatic detection of NPN & PNP bipolar transistor, N&P channel MOSFET's, JFET's, diodes, double diodes, thyristor & triacs. Automatic detection of pin layout. Measuring of current amplification factor &base-emitter threshold voltage of bipolar transistor. Up to two resistors are measured &values with up to four decimal digits in the right dimensions. The probe numbers of the tester (1-3) surrounds all symbols. Resolution of resistor measured is now 0.1ohm, one capacitor can be detected and measured, value with up to four decimal digits in the right dimensions. The resolution can be up to 1pf.

2) "The AVR microcontroller & C compiler co-design"- Dr.Gaute myklebust, Atmel Corporation, Atmel development centre, Trondheim, Norway.
In this paper, we studied that high-level languages (HLL's) are rapidly becoming the standard methodology for embedded microcontrollers maintenance support. In order to ensure that the new ATMEL AVR family of microcontrollers was well suited as a target for C-compiler, several C compiler development was started before the AVR architecture & instruction set we are completed. During the initial development of the C compiler, several potential improvements in the AVR were identified & implemented. The result of this co-operation between the compiler developer and the AVR development team is a microcontroller for which highly efficient, high performance code is generated. This paper describes the AVR architecture & the changes that were undertaken in the architecture & Instruction set during the compiler development phase in order to make the AVR family of microcontroller's very suitable targets for a C compiler.

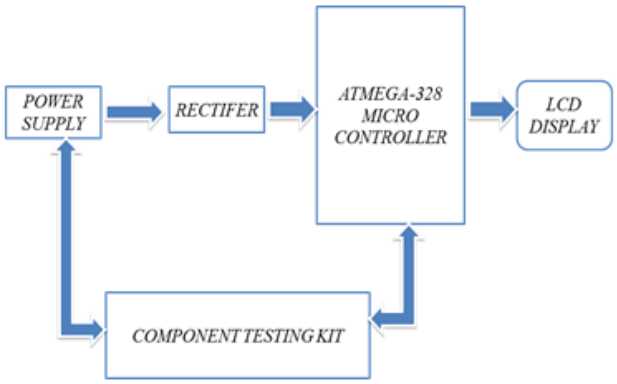
3)"Atmel AVR310: using the USI module as a I2C master"
The two wire serial interface (TWI) is compatible with Phillips I2C protocol. The bus was developed to allow simple, robust & cost effective communication between integrated circuits in electronics. The strength of the TWI bus includes the capability of addressing up to 128 devices on the same bus, arbitration & the possibility to have multiple masters on the bus. The universal serial interface (USI) module on devices like Atmel At mega 169, Atiny 26 & Atiny 2313 has a dedicated two-wire mode. The USI provides the basic hardware resources needed for synchronous serial communication. Combined with a minimum of control software, the USI allows higher transfer rates & uses less code space than solutions based on software only. This application note describes a TWI master implementation, in form of a full featured driver & an example of usage

for this driver. The driver handles transmission according to both standard mode & fast mode.

4) "AVR microcontroller hardware design considerations" This application note provides basic guidelines to be followed while designing hardware using AVR microcontrollers. Some known problems faced in real-time designs have been addressed by providing possible solutions & work around to resolve them. The scope of this application note is to provide an introduction to potential design problems rather than being an exhaustive documentation on designing applications using AVR microcontrollers. Some of the features of this project are guild lines for providing robust analog & digital power supply, connection of reset line, interfacing programmers/debuggers to AVR devices, using external crystals or ceramic resonator oscillators.

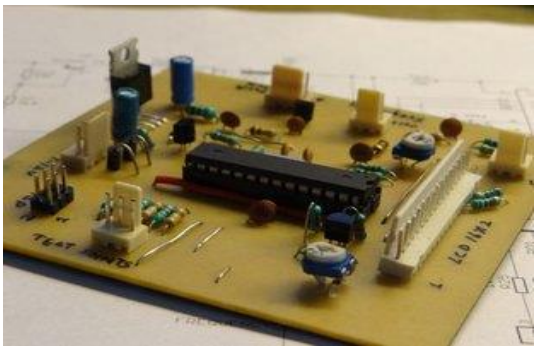
III. METHODS AND MATERIAL

The below figure shows the block diagram of component tester.



Figuer 1.1 Block diagram

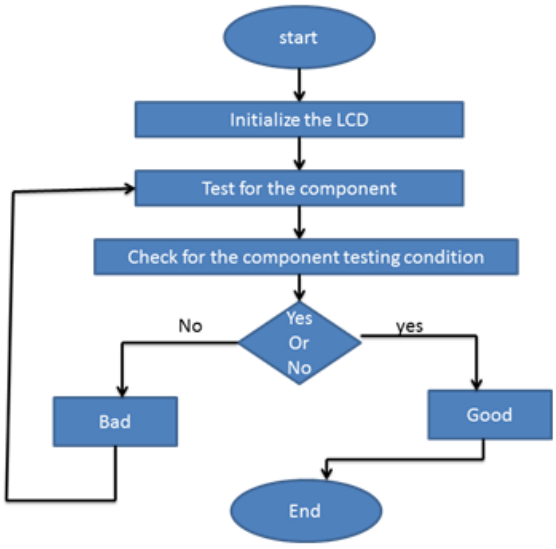
The power supply is having 230V ,50HZ AC supply is given to the component tester kit and rectifier, the rectifier converts from AC to DC because the microcontroller operates in DC voltage that is present in the PCB board .In PCB board it contains resistors, capacitors ,inductors etc,, That means the PCB board consist of integrated circuit which will reduce the voltage from 230V up to 5.5V.This is because ATMEGA328 Microcontroller operates at 5.5V DC .In PCB it contains LCD it shows the display the working condition of the component.



Figuer 1.2 – PCB Board of component tester

The working of component tester is carried out by following procedure. For example if we want to test the working condition of resistor, initially all basic electronic component program will be fed to the ATMEGA328 Microcontroller using AVR code studio (V.0.7).When supply is given to the component tester by placing the resistor on the socket, the microcontroller will select the appropriate program of the component, in that two cases are present, later it will check the cases and it display the working condition of the component that is it GOOD or BAD.

FLOW CHART

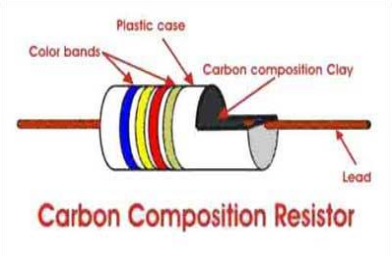


Figuer 1.3 Flow chart program of the Component tester

The above figure shows flow chart of the AVR CODE STUDIO program. Where this are the steps to be followed while writing the program.

COMPONENT REQUIRED

RESISTOR:



A resistor is a passive two electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within integrated circuits.

The resistor is a passive electrical component to create resistance in the flow of electric current. In almost all electrical networks and electronic circuits they can be found. The resistance is measured in ohms. An ohm is the resistance that occurs when a current of one ampere passes through a resistor with a one-volt drop across its terminals. The current is proportional to the voltage across the terminal ends. Ohm's law represents this ratio:

$$R = \frac{V}{I}$$

CAPACITOR:

A capacitor is a passive two-terminal electrical component that stores potential energy in an electric field. The effect of a capacitor is known as capacitance. While some capacitance exists between any two electrical conductors in proximity in a circuit, a capacitor is a component designed to add capacitance to a circuit. The capacitor was originally known as a condenser.

The physical form and construction of practical capacitors vary widely and many capacitor types are in common use. Most capacitors contain at least two electrical conductors often in the form of metallic plates or surfaces separated by a dielectric medium. A conductor may be a foil, thin film, sintered bead of metal, or an electrolyte. The non-conducting dielectric acts to increase the capacitor's charge capacity. Materials commonly used as dielectrics include glass, ceramic, plastic film, paper, mica, and oxide layers. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy

INDUCTOR:

An inductor, also called a coil, choke or reactor, is a passive two-terminal electrical component that

stores energy in a magnetic field when electric current flows through it. An inductor typically consists of an insulated wire wound into a coil around a core.

When the current flowing through an inductor changes, the time-varying magnetic field induces an electromotive force (e.m.f.) (voltage) in the conductor, described by Faraday's law of induction. According to Lenz's law, the induced voltage has a polarity (direction) which opposes the change in current that created it. As a result, inductors oppose any changes in current through them.

BJT:

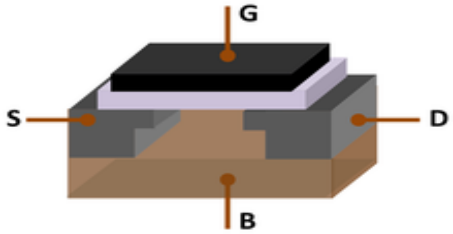
A bipolar junction transistor (bipolar transistor or BJT) is a type of transistor that uses both electron and hole charge carriers. In contrast, unipolar transistors, such as field-effect transistors, only use one kind of charge carrier. For their operation, BJTs use two junctions between two semiconductor types, n-type and p-type.BJTs are manufactured in two types, NPN and PNP and are available as individual components, or fabricated in integrated circuits, often in large numbers. The basic function of a BJT is to amplify current. This allows BJTs to be used as amplifiers or switches, giving them wide applicability in electronic equipment, including computers, televisions, mobile phones, audio amplifiers, industrial control, and radio transmitters.

PNP NPN

FET:

The field-effect transistor (FET) is a transistor that uses an electric field to control the electrical behaviour of the device. FETs are also known as unipolar transistors since they involve single-carrier-type operation. Many different implementations of field effect transistors exist. Field effect transistors generally display very high input impedance at low frequencies. The conductivity between the drain and source terminals is controlled by an electric field in the device, which is generated by the voltage difference between the body and the gate of the device. The field-effect transistor was first patented by Julius Edgar Lilienfeld in 1926 and by Oskar Heil in 1934, but practical semiconducting devices (the junction field-effect transistors [JFETs]) were developed later after the transistor effect was observed and explained by the team of William Shockley at Bell Labs in 1947, immediately after the 20-year patent period eventually expired.

MOSFETs:



MOSET field effect transistor is a unipolar transistor, which acts a voltage-controlled current device and is a device in which current at two electrodes drain and source is controlled by the action of an electric field at another electrode gate having in-between semiconductor and metal very a thin metal oxide layer.

A MOS transistor is called a majority carrier device, in which the current in a conducting channel (the region immediately under the gate) between the source and the drain is modulated bay voltage applied to the gate.

- The majority carriers of an nMOS transistor: Electrons.

- The majority carriers of a pMOS transistor: Holes.

IGBT:

An insulated-gate bipolar transistor (IGBT) is a three-terminal power semiconductor device primarily used as an electronic switch, which, as it was developed, came to combine high efficiency, and fast switching. It consists of four

alternating layers (P-N-P-N) that are controlled by a metal-oxide-semiconductor (MOS) gate structure without regenerative action. Although the structure of the IGBT is topologically the same as a thyristor with a MOS gate, (MOS gate thyristor), the thyristor action is completely suppressed and only the transistor action is permitted in the entire device operation range. It switches electric power in many applications: variable-frequency drives (VFDs), electric cars, trains, variable speed refrigerators, lamp ballasts, air-conditioners and even stereo systems with switching amplifiers.

LIQUID CRYSTAL DISPLAY:

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock.

IV. RESULT AND DISCUSSION

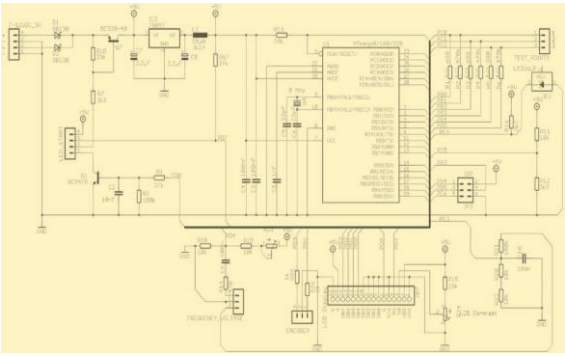


Figure 1.4 shows the schematic representation of component Tester built on PCB Board.

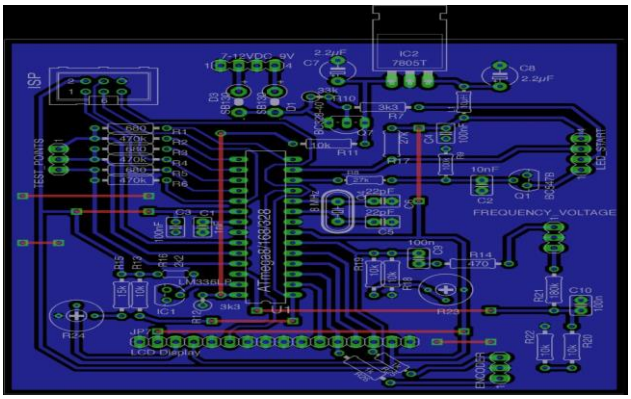


Figure 1.5 Arrangement of components on PCB Board

The components used to design the PCB Board is 1x1nF (102) Ceramic Capacitor, 1x10nF (103) Ceramic Capacitor, 4x 100nF (104) Ceramic Capacitor, 2x 22pF (22) Ceramic Capacitor, 2x 2.2uF, 50V Electrolytic Capacitor, 2x 1N5819 or any other Schottky Diode with current rating of 1A, 1x 7805 - 5V Voltage Regulator, 1x LM336 - 2.5V Voltage Reference Diode, 1x 10uH Inductor, 1x BC547 Transistor,1x BC328-40 Transistor, 3x 680 ohm Resistor with 0.1% Tolerance (1% Tolerance would also do), 3x 470k ohm Resistor with 0.1% Tolerance (1% Tolerance would also do), 2x3k3 ohm resistor, 2x 27k ohm resistor, 1x 100k ohm resistor, 1x 33k ohm resistor, 6x 10k ohm resistor, 1x 470 ohm resistor, 1x 15k ohm resistor, 1x 2k2 ohm resistor, 1x 200k ohm resistor, 2x 1k ohm resistor, 2x 10k ohm preset (Variable Resistance), 1x 8MHz Crystal Oscillator, 1x ATMEGA 328/328p with Socket, 1x 16X2 CHARACTER LCD, 1x Rotary Encoder w/ Button Module and KNOB, 1x Red LED (you can use any color I chose Red as it used to denote POWER)

Hardware Parts:-

1x 16 Pin Polarized Header Cable - Relimate Connectors, 3x 3 Pin Polarized Header Cable - Relimate Connectors,2x 4 Pin Polarized Header Cable- Relimate Connectors, 1x 9V Battery Connector, 6x Banana Jack Connectors (Female), 3x Banana Jack Connector Cable (with Male Heads), 1x Enclosure Case (I used a plastic Switch Board Enclosure Case/ Plastic Project Box)

V. CONCLUSION

Figure 1.6. output of the component tester

The above figure shows the output of the component tester. If we observe in this figure, the voltage of the component is measured and displayed that is, v1=20mv is shown. The conclusion of this project is, it can check the working condition and also it can measure the voltage and frequency of all the basic electronic component and it is easy to operate.

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Transformer Health Monitoring System

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ABSTRACT

In the power system the transformer and generator are our expensive and important equipments. If either one of them is damaged or trip due to any reason such as temperature, current or voltage then the whole supply would be switched off. Then the time and money both would be waste, so the monitoring of transformer and generator is mandatory for supplying the smooth supply to the consumer. Monitoring transformer for the problem before they occur can prevent faults that are costly to repair and result in a loss of electricity. The main aim of developing this system is to monitor the status of the transformer, and also to reduce cost of repair, and improve services to customers.

Keywords: Transformer Health Monitoring System, Arduino Uno, Arduino IDE, Sensors.

I. INTRODUCTION

The distribution transformer is an electrical equipment which distributes power to the low–voltage users directly, and its operation condition is an important component of the entire distribution network operation. Operation of distribution transformer under rated condition(as per specification on their name plate) guarantees their long life. However their life is significantly reduced if they are subjected to overloading, resulting in unexpected failures and loss of supply to a large number of customers thus effecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformers.

Transformers have a long life, if they are operated under good conditions. In case they are overloaded then their life is significantly reduced. Overloading and ineffective cooling of transformers, are the main causes of failure, in transformer. All such type of factors can reduce the transformer life. The main concern with transformers protections is protecting the transformers, against internal faults & external faults. If transformer becomes overloading, it causes a rise in temperature of transformer oil and windings. If winding temperature of transformer is increased, as compared to transformer limit then insulation will deteriorate. The transformer protection scheme, need to protection against transformers overload, transformers faults, as well as protection against internal fault. The main concern with transformers protections is protecting the transformers, against internal faults & external faults. If winding temperature of transformer is increased, as compared to transformer limit then insulation will deteriorate.

Transformer failures can be broadly categorized as electrical, mechanical or thermal. The cause of a failure can be internal or external. Table lists typical causes of failures. In addition to failures in the main tank, failures can also occur in the bushings, in the tap changers, or in the transformer accessories.

II. OBJECTIVES

- Normally the transformer failures occur due to the over voltage fluctuations and over current fluctuations, overheating and spark etc.
- So that purpose we can develop these system to reduce the faults respectively. The parameters of the generator like voltage fluctuations, current fluctuations, Temperature, oil chamber moisture, spark, Gas are monitored remotely through arduino.
- To monitor and record parameters of a distribution transformer like Current, Voltage, Temperature and Humidity. Remote terminal unit is installed at the distribution transformer site and above parameters are processed and recorded.
- It is important to keep an eye on transformer health when operator is not present at transformer site, so we are introducing embedded system named as two way communication systems between transformer and operator.
- This system is designed to send alert messages, whenever related parameters value exceeds the predefined limits. This system proposes a compact design and development of remote monitoring system, for a distribution transformer.
- The main objective of this project is to develop mobile embedded system will help the utilities to optimally utilize the protection of power line of transformer and identify problems before any catastrophic failure.
- This system will help the transformers, to operate smoothly & to detects the problems before any failure.
- The main objective is, to develop a real time monitoring, health conditions of transformer to prevents failures of transformers & improve reliability of services of the customers.
- The main aim is to develop these system for monitoring the real status of the transformer, and also to reduce cost, improve efficiency and services to customers.
- By using this system, the user or supply company can easily check the instant temperature, current or voltage of transformer or generator if they increased their rated parameters then the user can shift the load to another supply source before something occurred

III. BLOCK DIAGRAM

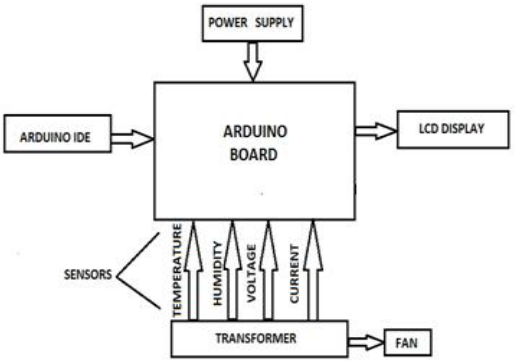

Figure 1.1: Block Diagram

1) HARDWARE

a) Transformer: The use of transformers with unity turns ratio is to isolate two circuits operating at same voltage levels. (hence called isolation transformer). Transformers that have a ratio of 1 to 1 between the primary and secondary windings are often used to protect secondary circuits and individuals from electrical shocks between energized conductors and earth ground. Suitably designed isolation transformers block interference caused by ground loops.

b) Arduino Board: It is a microcontroller board based on 8-bit atmega328p microcontroller. Along with atmega328p, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. To support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog

input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

c) LCD Display: LCD modules are vey commonly used in most embedded projects, the reason being its cheap price, availability and programmer friendly. Most of us would have come across these displays in our day to day life, either at PCO's or calculators. The appearance and the pinouts have already been visualized above now let us get a bit technical. **16×2 LCD** is named so because; it has 16 Columns and 2 Rows.

d) Temperature and humidity Sensor: The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data.

e) Voltage Sensor: The max Arduino analog input voltage is 5 V, so the input voltage of this module should be not more than 5 V x 5 = 25 V (if for 3.3 V system, the input voltage will not more than 3.3 Vx5=16.5V). Because the Arduino AVR chip have 10 bit AD, so this module simulation resolution is 0.00489 V (5 V / 1023), and the input voltage of this module should be more than 0.00489 V x 5 = 0.02445 V.

f) Current Sensor: The **ACS712 Module** uses the famous **ACS712 IC** to **measure current** using the Hall Effect principle. These ACS712 module can measure current AC or DC current ranging from +5A to -5A, +20A to -20A and +30A to -30A.

g) Motor Driver : The L293D is a famous 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. Using this L293D motor driver IC is very simple. The IC works on the principle of Half H-Bridge. L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction.

2) SOFTWARE

a) ARDUINO IDE: The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

IV. METHODOLOGY

Transformer health monitoring system worked on the principle of hardware components and programmed microcontroller. Suppose we want to monitor the data such as temperature, current or voltage of any transformer, generator, industrial or domestic load then this system is directly connected with these components or equipments. Then we just switch on this system directly from 220V ac. After that, the current sensor, voltage sensor and temperature sensor sense their corresponding data but this data is in analogue from it converted into digital form through the arduino board, which is interfaced with current, voltage and temperature sensors. Then this data is received by the 8bit atmega 328p microcontroller through the arduino board, then microcontroller display this data at LCD.

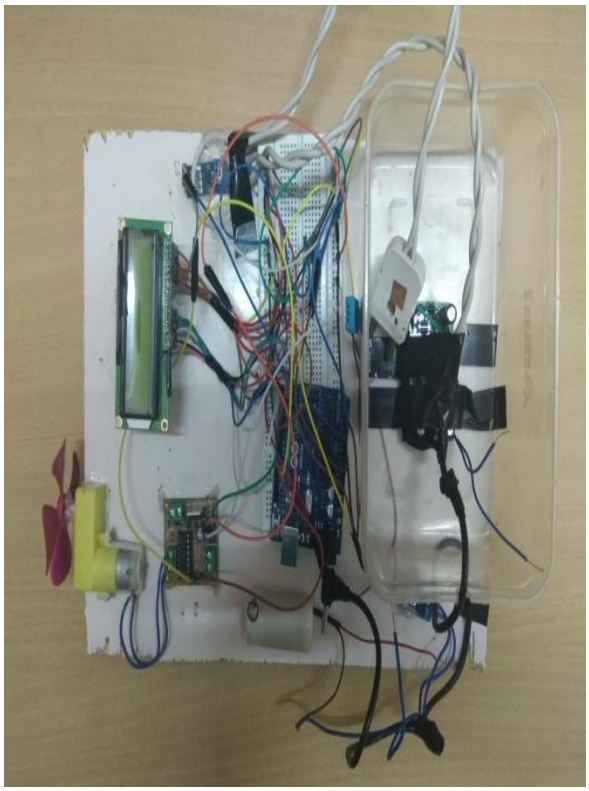

Figure 1.2: Model of transformer health monitoring system

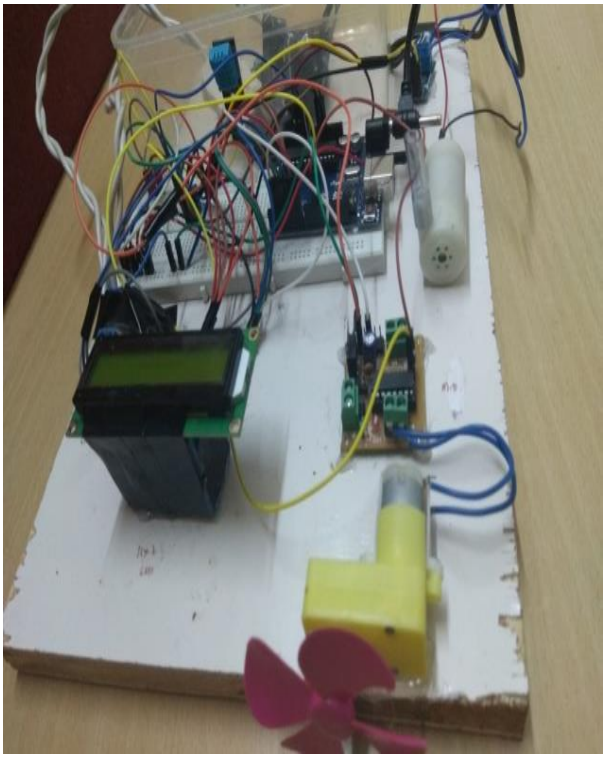

Figure 1.3: Working model of health monitoring system

V. CONCLUSION

Transformers are among the most generic and expensive piece of equipment of the transmission and distribution system. Regular monitoring of health condition of transformer not only is economical also adds to increased reliability. In distribution network there are many distributions transformer & associating each transformers with such a system, we can easily figure out health of the system by using particular sensors. We can use this system to monitor different parameters in substations, distribution transformers in street and small systems at houses. We need not have to check all transformer & corresponding phase current & voltage & thus we can recover system in less time.

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Effect of Dispersed Generation On Distribution System Security – An Overview

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ABSTRACT

Due to the increasing demand of energy consumption along with the need for renewable energy sources, distributed generation (DG) has come into picture in recent days. Power system protection is one the foremost concern which arises due to the incorporation of a DG into an existing distribution system. The interference of this DG could affect power quality issues, deprivation in system dependability, decrease in the efficiency, over voltages and safety issues. This paper discusses the different definitions projected in the literature. Further the DG system to become a major contributor in the current power expansion it needs to be connected with the prevailing grid system. This incorporation will cause some technical, functional and economic impacts on distribution systems. A summary of the operating concerns that must to be tackledin context with the distribution protection with DGs areconversed. This article also recapitulates these unusualconsequencesof DG on the power system.

Keywords: Distribution System,issues, impact, islanding, coordination, Protection schemes.

I. INTRODUCTION

Electrical energygenerated and dispersed to consumerssets up one of the biggest consumer markets in the world.

As a nation we have turned out to be so reliant that most of the day-to-daytasks would be deferred if there were any disruption in electric energy production, transmission and dissemination [3]. Traditionally there has been anexcessive deal of effort put into modeling and improving the reliability of the generation and transmission systems. Yet, when equated to the generation and transmission systems, substantial less resources has been placed on the facts of making the distribution system more dependable[1]. Bulk of all disruptions experienced by the consumer in a given year are owed by the distribution system.

Incorporation of DG creates a lot of issues in the power system due to the fact that the power system would not have been designed or planned keeping DG in the thought. The procurement of DGmay perhaps influence power quality hitches, deprivation in system reliability, drop in the efficiency, over voltages and safety disputes [7]. On the converse the power system dispersal are finelyplanned which might take care the adding of DG if there is appropriateEarthing, transformers and protection is delivered.

But there are limits to the addition of distributed generations if it goes beyond its limit then it is

important to modify and change the already designed distributed system equipment and protection, which could in a result facilitate theincorporation of new compeers [6].

On the other hand, interconnected DG could worsen the performance of the power system leading to negative upkeep benefits. The assimilation of DGmay possiblyconsequence the power

quality owing to deprived voltage regulation, voltage flickers and harmonics. These circumstances can have a thoughtfulimpression on the functioning and robustness of the electricalpower system and also cause destructiveconditions to equipment [12].

This paper aims to broadly review all protection practices which have been endorsed for distribution networks. It is expected that the work presented will be advantageous for research scholars in DG protection in finding appropriate references and applying suitable protection schemes. Subsequently, application of the correct protection scheme will enhance the dependability and fidelity of active distribution networks.

II. INCORPORATION OF DG

Dispersion of DG in Distribution networks has an impact on various fields. These impacts could be positive ornegative and are considered as the benefits and drawbacks of the distributed generation.

The DG protection is recognized from the Point of ConjointConnection (PCC) and the interconnection transformer. [2]

The objective of the interconnection protection is to safeguard the grid from the DG unit on the grid-side throughout the paralleloperations of the DG and the grid. The protection can be positioned either on the primary side of the interconnectiontransformer or on the secondary.Even though DG is a reasonableoption to bump into the power demand of the market, there are multiplicities of practical,functional, commercial, and supervisorydisputes that have tobe measuredafore the DG plants are intersected withthe centralgridiron. The interconnection issues have enough prospective toavoid distributed generation schemes from being developed.[5]

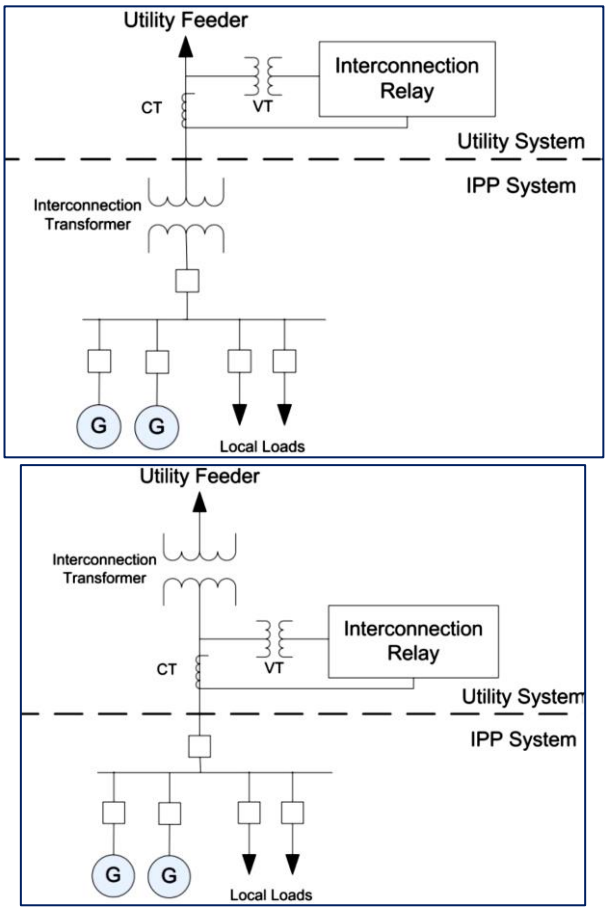

Figure 1. Interconnection Protection at the Secondary

III. TECHNICAL ISSUES

The key technical issues for DG connection connect to power quality, protection, islanding and stability of the system.

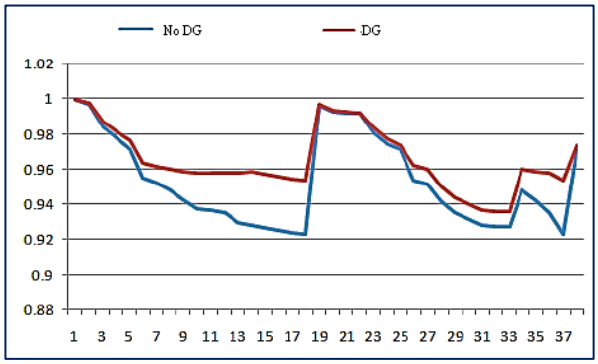

Figure 2. Interconnection Protection at the Primary

The integration of DG couldupshot in disparities in voltage profile alongside a feeder by altering the track and scale of active and reactive power flows.DG consequence on voltage regulation can be optimistic or pessimisticliable on distribution system and distributed generator topographies as well as DGlocality [3].

The connection of DG entities alongside the power distribution feeders may expedite to overvoltage owed to superfluous of active and reactive power. For example, a minor DG system partaking a conjoint distribution transformer with numerous loads possibly willshoot the voltage on the ancillary side, which is adequate to root high voltage at these consumers [5].

ForinconsequentialDG unit(less than 10MW) the influence on the primary is trivial. On the other hand, if the collective competencyfeeder upsurges in anticipation ofperilous thresholds, then voltage regulation analysis is compulsory to surefire that the feeder voltage will be secure surrounded by appropriate boundaries [3].

- **Voltage Glitches:**

A Voltage glitch is initiated by variation of dynamism which upshots due to spasmodic production from wind turbine generators and photovoltaic grounds, or association and suspension of induction generators from the distribution network.

Most of the DG mechanism are competent to delivergrid lock generation during the instance of interludes or cessation of the central system. DG centered on an induction generator, or with an incorrigible inverter, or lacking proper storage might be unqualified to function in off gridgenre. [6]

- **Harmonics**

A few types of DG, i.e., photovoltaic (PV) and fuel cells, are linked to the dispersalnetwork through power electronic converters. The contemporaryconverters use pulse width modulation (PWM) practice and as a result yieldsmaller amount Variable frequency components than the conventional compeers of thyristor based line commutated inverters.

DG centered on induction and synchronous generators tune the reaction of the scheme to the other Variable frequency componentbases by fluctuatingvocal impedance of the grid. In addition, one of the roots for resonance are the condensers used for excitation of induction generators

Table 1. Variable Frequency Components (Harmonics) current instillationnecessitiesas per IEEE 519-1992.

Order	Permissible limit
Less than 11th order	4.00%
11th to 17th order	2.00%
17th to 23rd order	1.5%
23rd to 35th order	0.5996%
35th or superior orders	0.298%
Overall Harmonic Variation	5.00%

- **Voltage Unbalance**

Voltage unbalance can arise due to incorporation of a solitarystage DG, i.e., DG grounded on PV units, in DisseminationSystem. This destabilizationturns out to beobvious as graduallysolitary stage DG entities are acquainted withDissemination System. [6]

3.2 Protection Issues

The existence of DG may perhapssource a numerouscomplicationscorrelated to inappropriate action of coordinationsecurities. The clangs amongst

DG and safety schemes are:

(*i*) Deficiency of dexterity in the defense system;

(*ii*)Unpredicted rise in smallpathundercurrents (SCC);

(*iii*)Undesired islanding and ill-timed stumbling of generators boundary securities.

Customarydispersalschemes were not planned to devourdynamicpower engenderingcomponents in them. Power is deliveredby the transmission scheme and power drift is primarilyunidirectional. With the incorporation DG in the structure, power flow can be bi-directional [5]

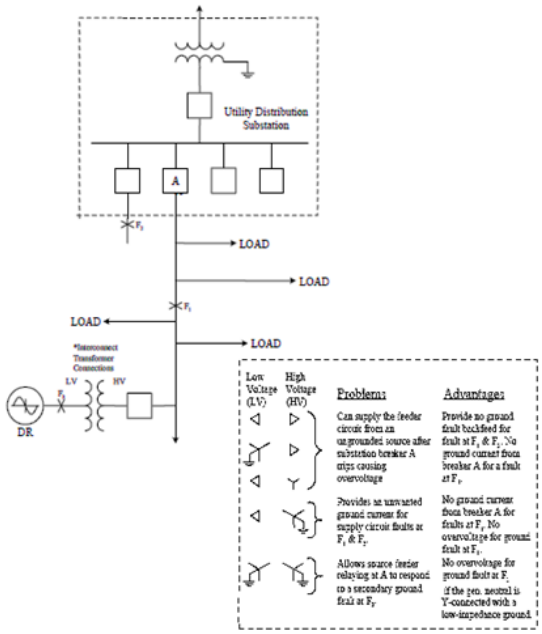

Figure 3. Interconnection Transformer Connections

a).Influence of co-ordination on Protection Scheme: Coordination can be apprehended by the subsequentinstance.

The current I_{UC}deprived of the DG is not equivalent to the currentI_{UC}using the DG as understood from the figure. Through the DG interrelated, the fault current perceivedby the recloser (I_{RE}) would be greater than shorn of the DG associated. This would commonly not source a problem usingthe recloser size as long as the new superiorI_{RE}does not overdo the recloser extremeinterjectinggrade.

Nevertheless, it is to be expected that harmonizationamongst the recloser and a few fuses will be mislaid. For the reason thattogether the recloser and fuses functionmore rapidly at greater error currents, the essentialboundariesconcerning there closer curvature and the fuse least possible melting curvaturemay perhaps be condensed to dropsynchronization [6].

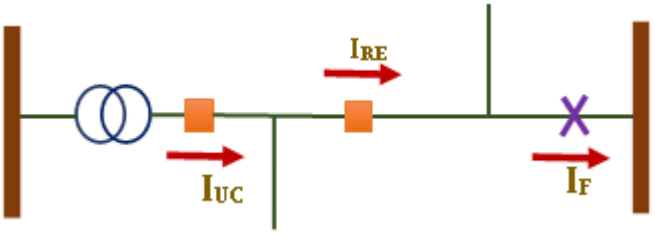

Figure 4. Classic feeder by means ofinclusion of DG up track recloser.

I_{UC} - Current from the Utility Center

I_{RE}- Fault current perceived by the recloser.

I_F- Fault Current

Deprived of DG : $I_{UC} = I_{RE} = I_F$

Using the DG pooled : $I_F = I_{UC} + I_{DG}$

$I_{RE} = I_F$

However, $I_{RE} \neq I_{UC}$

Liable on features of the grid and DG, numerousaddedsafetycomplications can arise. They are:

1. Feeders may experience False Tripping which is also called as sympathetic tripping)
2. Variation in fuse coordination with fast tripping of recloser due to DG action
3. Generating units may undergo nuisance tripping
4. Protection unsighting
5. Amplified or diminished fault intensities
6. Unsolicited islanding
7. Proscription of spontaneous reclosing
8. Unsynchronization in the reclosing action

b) Consequenceon Short Circuit Levels of the Network due to DG

The short circuit levels of the grid might get upset due to manifestation of DG. An escalation is created in the fault currents whileequated to usual situations where DG is not incorporated to the grid [3].

Adiscrete DG may not have a great fault impact, nonethelessthere will be anupsurge in the fault current. In the occasion of large number of minorentities, or limited large entities, the short circuits levels can be reformed adequate to be a motivation for miss coordination between defensive

elements such as fuses or relays. The reliability and safety of the distribution system may be disturbed due to this.

Figure 6displays a usual fuse adjacent on a feeder where fuse optimization is engaged and DGs are implanted in the scheme. In this circumstance if the fault current is sufficiently huge, the fuse might not match up with the feeder circuit breaker in the course of a fault.

This may lead to superfluous fuse functioning and declineddependability on the adjacent [3].

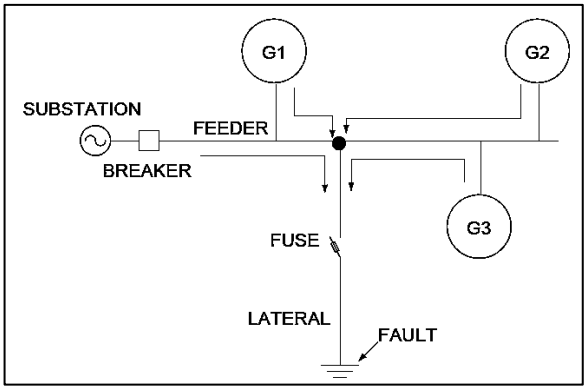

Figure 5. Fault influences due to DGs injected to the system. Fuse-breaker super visionmight not be accomplished.

In case the DR is positioned intermediate of the fault and the utility center, a reduction in fault current from the utility center may be witnessed. Conversely, if the DRs arerobustwhen related to the servicecenter, it may have a momentousimpression on the fault current upcoming from the service center. This might be the root cause to trip, serial tripping, or synchronization problems [14].

The characteristics of the DG also influences the short circuit intensities. The synchronous generator is the uppermostcontributing DG to faults. In the course of the first few sequences its involvement is one and the same as of the induction generator and self-excited synchronous generator, whereas after a first few phases the synchronous generator is the extreme fault current causal DG type. The inverter interfaced DG typedonates the minimum fault current. In a few inverter categories the fault contribution persists for less than one succession. [11].

c). Instantaneous Reclosing.

Figure 7 shows theprinciple of fault currents and the recloseintermission between "shots". [5] It displays first TwoShots of a Usual Distribution System ReclosingArrangement in the course of a Short Circuit. Many utilities practice "instantaneous" reclose for power quality persistence and obfuscate the concern. The recloseinterval is technically 0.5s but can be as small as 0.2s.

However, this upturns the option that the DG may notdetach in time. The encounter between necessity of a DG anduse of instantaneous reclose will become significant withcumulative penetration of DGs. Henceforth it is suggestedin contradiction ofconsuming instantaneous reclose on feeder sections thatcontain DG. A reclose interval of 1.0s or more would bedesirable. This will radicallycondense the probabilities thatthe DG will be unsuccessful to detach in time, but will also causereduced power quality to a certain section of customs.

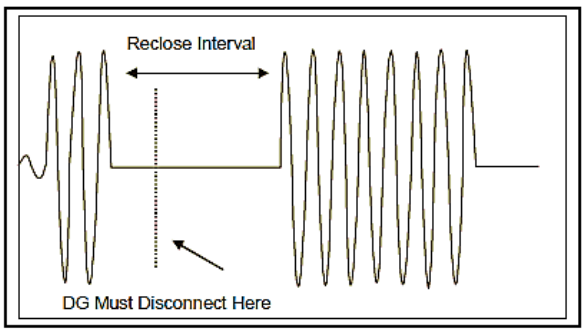

Figure 6. Fault current and Reclose interval

3.3 Coordination in the protection system.

Universally,fortification of power systems is pitched in such a way thatonly the faulted part of the system is quarantined when a faultoccurs. This amendment is called protection coordination, whichcan be undesirably affected by the existence of DG [13].Undesired islanding and ill-timed tripping for faultson diverse feeders. This concern is very

imperative anddiscussed unconventionally in the next section.

a) Islanding

An island is "That fragment of a power system comprising of one or more power sources and load that is, for a certain periodof time, disconnected from the rest of the system."

Islanding is the circumstance when the DG is no longer functioning in analogous with the utility and may occur as aconsequence of the following situations:

- A fault that is sensed by the utility, and which upshots in opening a disconnect device but which is notsensed by the DG protection devices
- Unintentional opening of the usual utility supply be equipment failure
- Utility switching of the distribution system and loads
- Deliberatedetach for servicing either at a point on the utility or at the service entrance
- Human error
- Act of nature [16]

In the Figure 8, a substation is shown which steps downtransmission voltage into distribution voltage. One of the feedersis shown in detail. There are many consumer joiningpoints in the feeder. Large DGs are normallyattached to the primary feeders (DG1 and DG2).Small DGs such as inverter based PVsystems are linked to the low voltage secondary feeders (DG3). Islanded procedure can be Intentional Islanding orUnintentional islanding. In intentional islanding, the islandinghas been scheduled prior and the system has been intended to handlethe situation. The DG at that time is well suitable to regulate voltage and frequency in theislanded grid. [14, 15] Unintentional islanding takes place if the switching devicebetween the DG and the rest of the utility grid is openedand the DGcarries on to feed the distribution grid.

The DG equipment may not at all be appropriate to control voltageand frequency. The voltage and frequency caneven get so out of range that connectedconvention equipment isruined. [7]

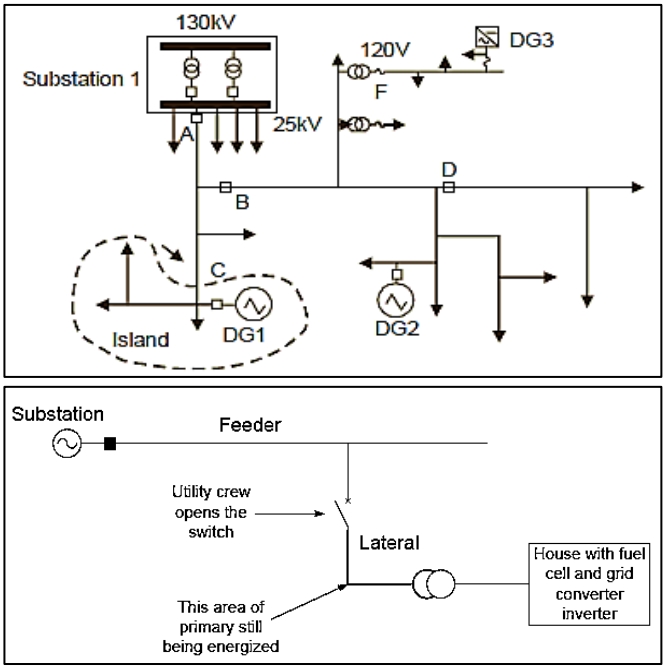

Figure 7: Islanding of a DG system

b) Temporary faults

In radial schemes, fault clearance necessitates the opening ofonly one device since there is only one sourcecontributing current to the fault. On the contrary, meshedsystems call for breakers at both ends of afaulted line to open. Apparently, when DG is existing, there are several power sources and opening only theutility breaker does not assure that the fault will clearrapidly. [5][6]

As a result, DG will be mandatory to detach fromthe system when a fault is suspicious, before the fastreclosing time has lapsed, so that the system regresses toa true radial system and the normal fault clearing processmay proceed.

In fact, there is the opportunity that DG will get detached either too rapidly or too slowly with adamaging influence on the distribution system. Thiscreates several potential operating clashes withrespect to overcurrent protection and voltage restrictions.

In this outlook DG appears to be rather discordantspecifically with fast reclosing during temporary faults.This procedure may not allow the DG units to haveenough time to be cut off from the grid. In thiscase DG units may tolerate the voltage and fault arc,avoiding effective reclosing in the instance of temporaryfaults. [11]

c) Sympathetic tripping

Sympathetic tripping arises when a protective devicefunctions unreasonably for faults in other protection zones.This can happen with distributed generation due tounpredicted fault contributions from the DG.

An exampleof how sympathetic tripping may perhaps arise is shown in Figure 9.
The relays at breaker "A" and there closer are not directional.

Therefore, adequate fault current undeniably from the distributed generation would source any of these devices to function in "sympathy (understanding)" with "B" which essentially perceives thefault.[7][4]

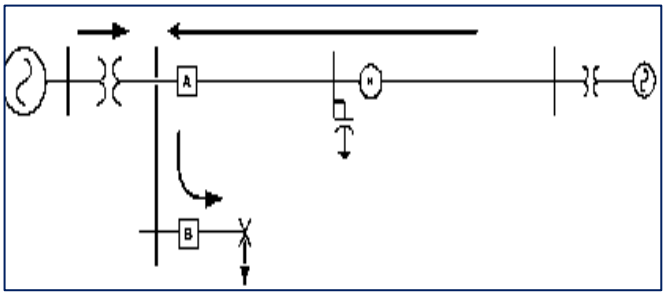

Figure 9: Illustration of Sympathetic tripping

IV. CONCLUSION

DG has much potential to upsurge the systemperformance. Nevertheless,distribution system schemes and functional practices aretypically based on radial power flows and this produces an unusual challenge to the incorporation of distributedgeneration. Diverse concerns related to power quality when DR is integratedwith the existing power system has been conversed in the paper.
DGs are a feasible substitute for emerging countries where grid supply has dependability below appropriate levels.

The association of DGs todistribution grids significantly influences the grids performance.
This paper has defined a few of the concerns thatneed be deliberated to assure that DG will not worsen the system's power quality, safety or reliability.

Penetration of DG can be magnificently in corporated with the power system on condition that the interconnection strategiesbump into the in tricatenecessities that contemplate not only power quality but also system efficiency, power reliability and safety.

This paper also emphases on the DG's influence on the gridsmechanism and protection patterns. A number of protection problems are recognized to study the requirements for protection in the existence of DGs.

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A Review on RL78 Microcontroller

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ABSTRACT

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip. Sometimes referred to as an embedded controller or microcontroller unit (MCU), microcontrollers are found in vehicles, robots, office machines, medical devices, mobile radio transceivers, vending machines and home appliances among other devices. A microcontroller's processor will vary by application. Options range from the simple 4-bit, 8-bit or 16-bit processors to more complex 32-bit or 64-bit processors. Common MCUs include the Intel MCS-51, often referred to as an 8051 microcontroller, the AVR microcontroller, the programmable interface controller (PIC) from Microchip Technology; and various licensed ARM microcontrollers.In this paper we discuss about the advantages and applications of Renesas RL78 microcontroller.Renesas RL78 microcontrollers consists of both general-purpose and application-specific devices. These increasingly popular MCUs make possible ultralow-power applications by giving system designers advanced power-saving features and high-performance operation.

Keywords: RL78, MCUs, Applications

I. INTRODUCTION

A **microcontroller** is a small computeron a single integrated circuit. In modern terminology, it is similar to, but less sophisticated than, a system on a chip or SoC; a SoC may include a microcontroller as one of its components. A microcontroller contains one or more CPUs (processor cores) along with memoryand programmable input/output peripherals. Program memory in the form of ferroelectric RAM, NOR flashor OTP ROM is also often included on chip, as well as a small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications consisting of various discrete chips. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, Remote controls, office machines, appliances, power tools, toys and other embedded systems.

The RL78/G1x (general purpose group) is a true low power MCU series within the RL78 Family.The CPU core in the RL78 microcontroller employs the Harvard architecture which has independent instruction fetch bus, address bus and data bus. In addition, through the adoption of three-stage pipeline control of fetch, decode, and memory access, the operation efficiency is remarkably improved over the conventional CPU core. The CPU core features high performance and highly functional instruction processing, and can be suited for use in various applications that require high speed and highly functional processing.

II. FEATURES OF RL78

The main features of the RL78 microcontroller are as follows.

The RL78 microcontroller is classified into three types of cores according to the types of instructions, the number of clocks, and the performance: RL78-S1 core, RL78-S2 core, and RL78-S3 core.

- ✓ 3-stage pipeline CISC architecture
- ✓ Address space: 1 Mbyte
- ✓ Minimum instruction execution time: One instruction execution per one clock cycle
- ✓ General-purpose register: Eight 8-bit registers
- ✓ Types of instructions: 74 (RL78-S1 core), 75 (RL78-S2 core), 81 (RL78-S3 core)
- ✓ Data allocation: Little endian

III. ADVANTAGES

i) RL-78 low power modes maximize batterylie.

- ➢ Three low-power modes maximize battery life – either by putting on-chip functions such as the CPU, clock and peripherals in standby – or by turning them off when they aren't being used.
- ➢ RUN MODE In Run mode, RL78 devices offer substantial savings in current consumed when compared to competitors.
- ➢ HALT MODE Halt mode disables CPU operation, saving as much as 80% of total MCU current, while allowing a fast CPU wake-up time.
- ➢ STOP MODE Stop mode achieves the lowest RL78 power consumption; it disables the CPU and on-chip functions that run on the CPU clock

ii) High efficiency

The rl78 family provides up to 44 dmips performance at 32 mhz The devices achieve an unrivaled ratio of power consumption to performance – 1/3 of other devices, enabling significant power savings. RL78 devices offer important design advantages. They have a higher DMIPS rating and consume less power than popular 32-bit technology.

iii) Built in features help reduce system cost

With many added features built in, the RL78 family can help you lower system cost and accelerate time to market

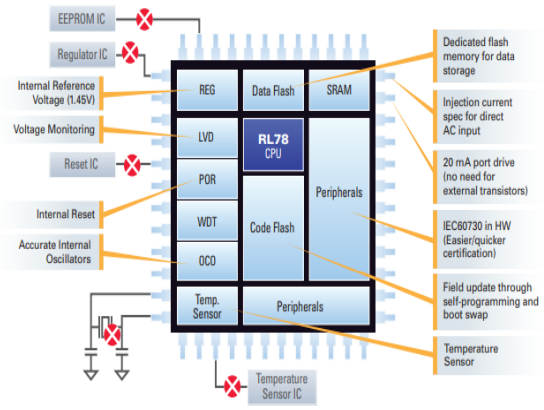

Fig.1 Block diagram of RL78 Microcontrollee

iv) Noise immunity :

The 5.0V operation and internal regulator system of RL78 MCUs give the devices inherently high levels of noise immunity, allowing savings in overall system costs. Noise immunity for – Analog inputs, digital I/O – CPU, peripherals Low noise emission – CPU digital noise is encapsulated in a short wiring of REGC System designs can eliminate or minimize external noise-reduction filters.

IV. APPLICATIONS

RL78 FOR SEGMENT DISPLAY APPLICATIONS

Metering :RL78 MCUs are ideal for smart metering applications with their lower power Active mode and Standby mode, including LCD and RTC current.

Medical RL78 MCUs offer true low-power consumption and their rich features are ideal for portable health and fitness devices.

Home Automation For long battery life and operation down to 1.6V, the RL78 is the top choice.

RL78 FOR LIGHTING APPLICATIONS

Devices in the RL78/I1A product group offer dedicated lighting-communication features and power-stage control capabilities. They can communicate with a host controller for altering lighting intensity and/or color.

High-resolution PWM timers enable excellent lighting control performance Support for the DALI/DMX512 communication standard aids system integration Features of the power stage control include the 64 MHz Timer KB, which provides dithering (0.98 nsec quasi resolution), soft-start turn-on, comparator triggered stop, zero-current detection and timer restart options Free Windows based Applilet software facilitates designs for remotely controllable lighting installations High-temperature support (105ºC and 125ºC)

RL78 FOR BLUETOOTH APPLICATIONS

True low-power RL78 microcontroller and Bluetooth Low Energy (BLE) wireless technology increases battery life and accelerates Bluetooth connected device development

RF Adaptable Technology automatically optimizes power consumption versus communication range

Industry-leading support tools shorten time to market

Firmware-over-the-air (FOTA) capability enables convenient application upgrades in the field

RL78 FOR SENSOR APPLICATIONS

The RL78/I1E MCU is an intelligent, flexible analog MCU suitable for countless industrial and medical sensing applications such as flow measurement, strain gauges, pressure or temperature sensing. With enhanced analog features such as configurable OpAmps with programmable gain, supporting inverting, non-inverting topologies, or instrumentation amplifiers, the RL78/I1E can be a platform for different types of sensors.

V. CONCLUSION

The devices achieve an unrivalled ratio of power consumption to performance – one third of other devices, enabling significant power savings.

RL78 devices offer important design advantages. They have a higher DMIPS rating and consume less power than popular 32-bit technology.

- ✓ Maximum operating frequency 32 MHz.
- ✓ High-speed and high-performance 1.39 DMIPS/MHz
- ✓ Power supply voltage 1.6V to 5.5V Power-down state 46uA/MHz
- ✓ Built in temperature Sensor and low-voltage detection circuits

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Bidirectional Visitor Counter for Smart Power Management

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ABSTRACT

In today's world, there is a continuous need for automated appliances. With the increase in the living standards, there is an immediate need for developing circuits that would change the complexity of life to simplicity. This Project is designed and presented in order to count the visitors of an auditorium, hall, malls, etc. The system counts both the entering and exiting visitor of the auditorium or hall or other place, where it is placed. Depending upon the sensors interruption, the system identifies the entry and exit of the visitor. On the successful implementation of the system, it displays the number of visitor present in the auditorium or hall.

Depending on the number of people present in the hall we are going to control the lights and fans on considering the environmental aspects like temperature, light etc. If no one in the room the fans and lights are going to switched off automatically, the fan's speed is regulated according to the temperature in the room. When the projector switch get turned ON all the lights will get turned OFF but fans remains in the ON condition.

Keywords: Arduino board, LDR, IR Sensors, LCD.

I. INTRODUCTION

The "BIDIRECTIONAL VISITOR COUNTER FOR SMART POWER MANAGEMENT IN AN AUDITORIUM" is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons/visitors in the auditorium very accurately and also to regulate the fan according to the temperature inside the auditorium. When somebody enters into the room then the counter is incremented by one and the main circuit gets energized, the light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed. The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software. Microcontroller continuously monitors the Infrared Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed. This obstruction is sensed by the Microcontroller Atmega328/P.

The electronic device nowadays is rapidly taking its best position to ease the human complexity of living life. As per the concern of the human disabilities in keeping counter of everything happening in and around the world we limit this project to you to increment the functioning of the visitors through the controlling system. The audacity of this project will not only give a count of the person entering the room but will also light up according to the individuals entered and regulate the fan according to the temperature inside the auditorium. We set up the program in such a way so that each individual when under goes this system will leave a mark through the

counter and lighting up the LED and fan will be regulated according to the temperature. This project will negotiate as well as cooperate to its level best if we put in better action and give it a better way of exposure. The real time power consumption, temperature and count data are displayed using the 16x2 LCD. When the projector switch get turned on all the lights will get turned off but the fans will remains in the on condition.

II. LITERATURE REVIEW

[1] The main aim of this paper is to design and employ of power saving in general public places like auditoriums, shopping malls and theatres etc. Generally an Auditorium consists of so many number of electrical and electronic devices or equipments. To control and monitor all these equipments or appliances we need a person or controlling system.

[2] In this paper Automatic controls play an ever-increasing role in a human way of life. Automatic control is vast technological area whose central aim is to develop control strategies that improve performance when they applied to a system. the distinct characteristic of automatic control is that it reduces the human operator. One such gadget is the fan. In this paper, an automatic control solution is suggested to control the fan speed.

[3] The project controls a room light as well as count the number of individuals entering and leaving a room. When an individual enters in to a room then counter is incremented by and accordingly number of lights in a room will be switched ON and when the individuals leaves a room then the counter is decremented by one. Lights will turn OFF when all the individuals go out of a room. The total number of individuals present inside a room is also displayed on the LCD display. IR sensors sense the obstruction and microcontroller receives these Signals produced by the obstruction from the sensors. The received signal is operated via program stored in ROM of Microcontroller.

[4] Microcontroller at89s52 based visitor counter flow chart, bidirectional visitor counter using fpga, IR sensor based visitor counter circuit diagram, pc based visitor counter in microcontroller, visitor counter using atmega16 microcontroller, concept of bidirectional counter using 89s52, future scope related to bidirectional counter.

III. METHODS AND MATERIAL

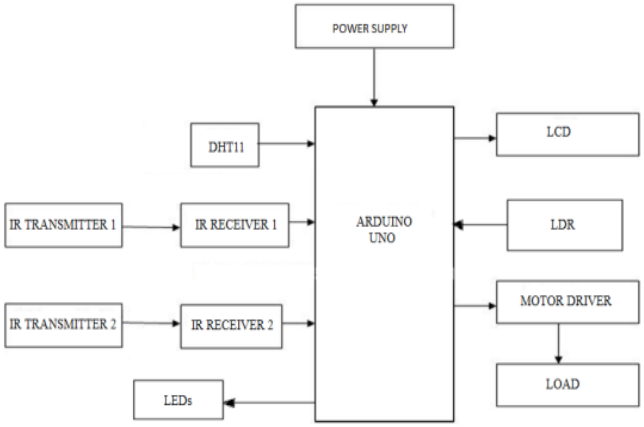


Fig 1: Block diagram of Bidirectional visitor counter

Infrared sensors are a type of light sensors they function in the infrared part of the frequency spectrum. IR sensors are active sensors they consist of an emitter and a Receiver. When the beam is cut the controller then accordingly comes to know if the person is entering or exiting and then accordingly increments or decrements the count, which is, then displayed on the 16 x 2 Alphanumeric LCD. If there are people in the room, the controller turns on the power in the room. Since the controller cannot provide the necessary power a relay is used. The controller turns ON/OFF the relay using a motor driver circuit.

MATERIALS REQUIRED

A. HARDWARE COMPONENT

1. Arduino UNO board:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs , a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

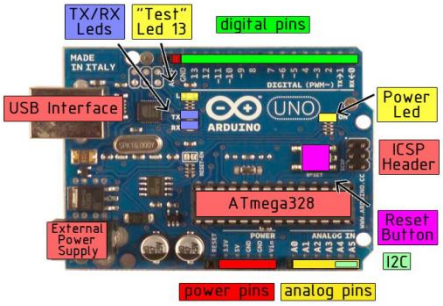


Fig 2: Arduino board

2. IR Sensor:

Fig 3: IR sensor module

The basic concept of an Infrared Sensor, which is used as obstacle detector, is to transmit an infrared signal, this infrared signal bounces from the surface of an object and the signal is received at the infrared receiver. An IR sensor consists of an emitter, detector and associated circuitry.

3. LDR:

Fig 4: LDR

A light dependant resistor also know as a LDR, photo resistor, photo conductor or photocell, is a resistor whose resistance increases or decreases depending on the amount of light intensity. LDRs (Light Dependant Resistors) are a very useful tool in a light/dark circuits.

4. Motor driver L293D:

Fig 5: motor driver

It is a simple 16 pin dual H-bridge IC for DC Motor. It act as current amplifiers since they take a low current control signal and provide a higher current signal.

5.Liquid Crystal Display(LCD):

Fig 6: Liquid crystal display

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

6. LED light:

Fig 7: LED light

Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

7. DHT11:

Fig 8: Temperature sensor

DHT11 digital temperature and humidity sensor is a composite sensor contains a calibrated digital signal output of the temperature and humidity.

8. DC Motor (PMDC):

Fig 9: DC motor

A DC Motor whose poles are made of permanent magnets is known as permanent magnet DC (PMDC) Motor. The construction of PMDC is similar to conventional dc motor whose stator poles are replaced by suitable permanent magnet no need to have field windings.

B. SOFTWARE REQUIREMENT

Embedded C in Arduino software:

Embedded C is one of the most popular and commonly used programming languages in the development of embedded systems. Embedded system consists of both hardware and software. If we consider a simple embedded system, the main hardware model is the processor. The processor is the heart of embedded system and it can be anything like a Microprocessor, Microcontroller, DSP, CPLD (Complex programmable logic device) and FPGA (Field programmable-gated array).

IV. RESULTS AND DISCUSSION

A. CIRCUIT DIAGRAM

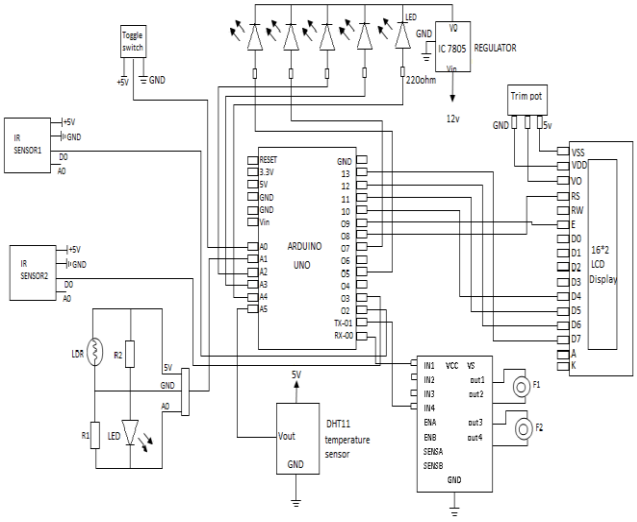


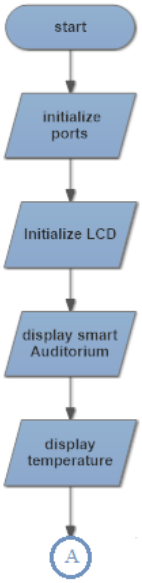
Fig 10: Circuit diagram

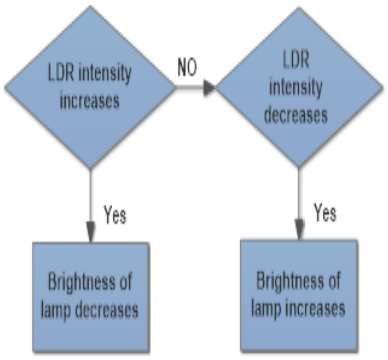
Circuit operation:

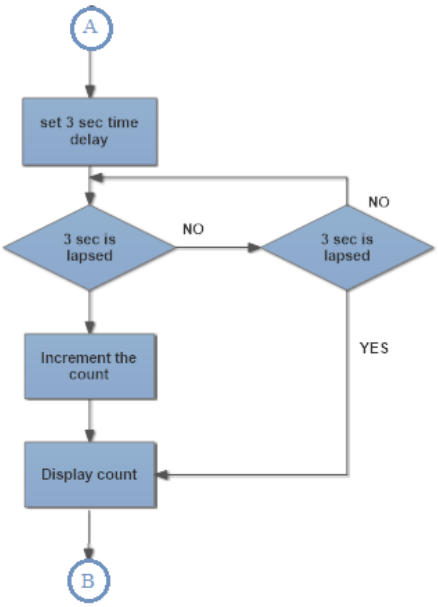
The two IR sensors are directly connected to the microcontroller pin the outputs of two sensors are applied as a high pulse and low pulse. These high and low pulses are considered as set-1 and reset-0. These conditions are checked by microcontroller as per the written code in it, if the interruption occurs in sensor 1 followed by sensor 2 results in an increment in the count value and if the interruption occur in sensor 2 followed by sensor 1 results in decrement in the count. If the count is less than one, the LED and fan circuit get turned off. There are two IR sensor namely IR sensor IN and IR sensor out for detecting the person's entry and exit movements through the door, when the person enters the room the count get incremented and the led will glow depending on the output from the LDR.

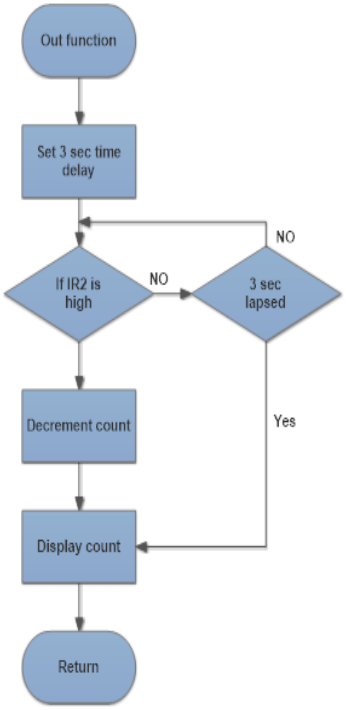
The temperature sensor (DHT11) used in the project determines the temperature of the room and the microcontroller takes the input from sensor depending on the temperature value transistor drive circuit operates the dc fan. The temperature and number of counts are displayed in LCD (16*2).

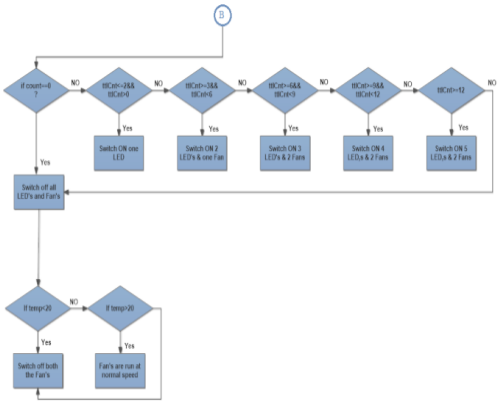
B. FLOW CHART











V. CONCLUSION

This project deals with the usage of the energy in this competitive world of electricity. This project saves more electric power than it seems and also collaborates the knowledge of electric and digital study. The functioning also teaches us how we can preserve electricity even in the electricity-based project. This system is an effective way for the power management, automatic device control and together count, temperature and power consumption. Controlling circuit used in this project controls the devices like fans, lights etc. This system can be used to operate other devices for the effective power usage.

VI. FUTURE SCOPE

1. Multiple devices can be turned ON/OFF instead of just lights and fans.
2. By modifying this circuit we can achieve the task of opening and closing the door.
3. A long with this metal detector can be added for security reasons.

VII. ACKNOWLEDGMENT

We would like to take this opportunity to express our gratitude and sincere thanks to our respected HOD Dr.VAGDEVI for her guidance, insight, and support she has provided throughout the course of this work.

I would also like to thank Mrs. SHILPSHREE V N for his consistent help and guidance and all faculty members and staff of the Department of Electrical and Electronics Engineering, GSSSIETW, MYSORE for their extreme help throughout the course.

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Analysis of wormhole Intrusion Attacks in MANETs

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ABSTRACT

Security of different networks has always been a primary concern as its necessary to protect the resources being shared and communication being done among the legitimate users. If we let down our safeguards, an attacker can transform the routing protocol and interrupt the network operations through mechanisms such as packet drops, flooding, data fabrication etc. MANET is a type of network whose dynamic topology, decentralizing governance and other such features are always in favour of many security attacks. This paper presents detail study of wormhole attack, algorithms to detect them that has been proposed so far and also directs the reader toward the areas that can be explored and work upon in future.

Keywords: Security, MANET, Wormhole attack, Wormhole detection technique, Wormhole prevention, classification

I. INTRODUCTION

The is the features of MANET (mobile adhoc network) that makes it vulnerable to many security attacks. MANET contains various mobile hosts (laptops etc.). As the name suggests the hosts can move anywhere within the network so there is no fix structure of this network so providing security to such network is a really significant issue [1]. There is no centralizing body for governing all network activities. This feature saves from the bottleneck of having single governing body but there is no specific area where providing security may assure safeguarding from every type of attacks. Moreover, nodes in this type of network have limited transmission ranges so if any two nodes are within the transmission range of each other, they communicate directly otherwise, nodes situated on paths between them act as a router and forwards the information from source to destination. This characteristics highlights an important aspect of MANET that is, to transmit data efficiently there is need of cooperation among intermediate nodes that also means, if any of the node is malicious node it can adversely affect the communication. Any attacker can do harm to network activities in two ways, either, he can affect routing methods involved in transmission like misleading the rules used in routing protocols or altering the information needed in routing methods (AODV, DSR etc.) like hop count, no. of nodes etc or data being delivered can be affected like adding or subtracting any of the bits in any frame field. Thus, a slight modification can do serious harm to transmission.

Security ssues like is in MANET are the fields that have Been worked upon a lot in recent days.

Various algorithms has been proposed and various papers have been published. If we go for employing security algorithm at a time than it will affect the network performance like delay in transmission due to calculation of different factors and if we keep in view enhancement of network performance only it may result in inadequate security measures hence any measure provided for security in MANET should

maintain the trade-off of better network performance and adequate security measures. Security attacks in MANET are classified in two different categories: active attacks versus passive attack as depicted in Fig. 1. Passive attacks: Attackers in this attack snoops the data being exchanged without altering it. Active attacks: This type of attacks disturbs the normal functioning of network by altering or dropping the packets being exchanged. Internal attacks: Attacks of this type are from compromised nodes that are part of network. External attacks: Attackers carry out this type of attack through nodes that does not belong to network in consideration.

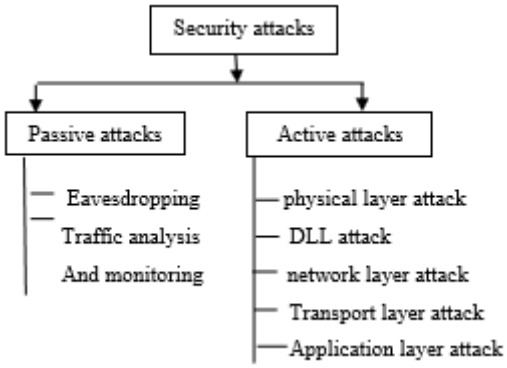

Fig 1: types of security attack

Wormhole attack is an active attack as shown in fig 2

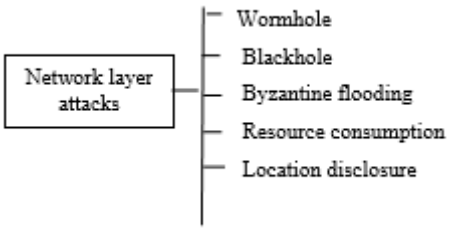

Fig 2: network layer attacks

II. WORMHOLE ATTACK

A wormhole attack [2] is one of the most sophisticated and severe attacks in MANET. In this attack, a pair of colluding attackers record packets at one location and replay them at another location using a tunnel like link. The level of affect it can have on network can be understood by the fact that it can be launched against all communications that provide authenticity and confidentiality. The malicious nodes involved in attack are called wormholes. For example, in fig 3, the path from S to D via wormhole link (W1, W2) has the length of 5 when the normal path has the length of 11.

Therefore, in most routing protocols, S prefers sending data to D along the path with wormhole link. The wormhole link can be formed by many type of links such as by using Ethernet cables, long-range wireless transmissions, an optical link in wired medium etc. Wormhole attack stores packets at one end-point in the network and tunnels them to other end-point. However, the above method is difficult to deploy because it requires some special hardware to create an out-of-band channel. Hence another technique that uses encapsulation is more popular to launch wormhole attacks. Instead of using an out-of-band channel, the malicious node W1 encapsulate packets it acquires and send them to the second malicious node W2 through the tunnel that exists between them. W2 decapsulates and gets the original packets and rebroadcasts them again in network. As the original packets were encapsulated, they were not changed by intermediate nodes that lies in the path between W1 and W2. Through this way, W2 seems to get the packet directly from W1 with the same hop count although they are several hops far from each other. Wormhole attacks affect the network in following way

- It decreases the number of hopes per route
- Route discovery time get reduced
- Reduces average delay time
- Increases average retransmission time

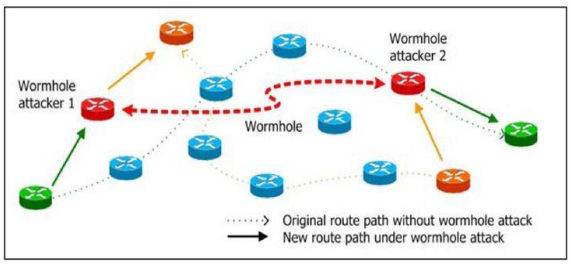

Fig 3: wormhole attack

TAXONOMY OF TYPES OF WORMHOLE ATTACK

Wormhole can be implemented in various ways [3],[4],[5] depending upon various factors. If classification is to be done on the basis of attackers then there can be three types of wormhole Open wormhole, half open wormhole and close wormhole [6]. Consider the scenario in which m1 and m2 are malicious nodes, S and D are the good nodes that are source and destination respectively, a and b are the good nodes between source and destination. If node S and D are connected by using a wormhole, then source and destination nodes think that they are neighbors and all data between them will be transmitted by using a wormhole link. Both the nodes m1 and m2 are in the wormhole. In open wormhole both the wormholes are visible In half open wormhole, m1 node is the neighbor of S and it tunnels m2 to destination and only one node can be seen due to wormhole attack. In the close wormhole attack both nodes m1 and m2 are not visible to source node and destination node. If classification is to be done on the basis of implementation, it totally depends upon the manner in which the attack is launched like if attacker is using encapsulation then packets get encapsulated at one wormhole and travel along all the intermediate nodes in encapsulated form and finally get delivered to another wormhole, this resists increase in hop count. In this case both wormholes are not directly connected; they just make other intermediate node believe they are directly connected. If attacker is using out-of-band channel then both colluding nodes are directly connected using channel with high bandwidth. This channel can either be a wired connection or wireless connection. This attack requires extra hardware to be launched but it provides simplicity. If colluding nodes have potential of high power transmission attacker can use high power transmission. If attacker is using protocol deviation method to attack network, he causes violation in rules to be followed while using any specific routing method that may result in discarding of any genuine request. If classification is to be done on the basis of medium to be used there are two types: in-band wormhole which has no change in medium to be used for creating wormhole tunnel as in packet relay, encapsulation etc. and out-of-band wormhole which require different medium to be used for creating wormhole tunnel like in high transmission mode. If classification is done upon the basis of location of victim nodes there are two types of wormhole attack: simplex in which victim node is in the range of only one attacker and duplex in which victim node is in the range of both the attacker. If classification is done on the basis of data that can be carried through tunnel, wormhole attack can be of three types: threshold based in which packets having size greater or equal to threshold value get dropped, all pass based in which all packets get passed irrespective of size and all drop based in which all packets will be dropped.

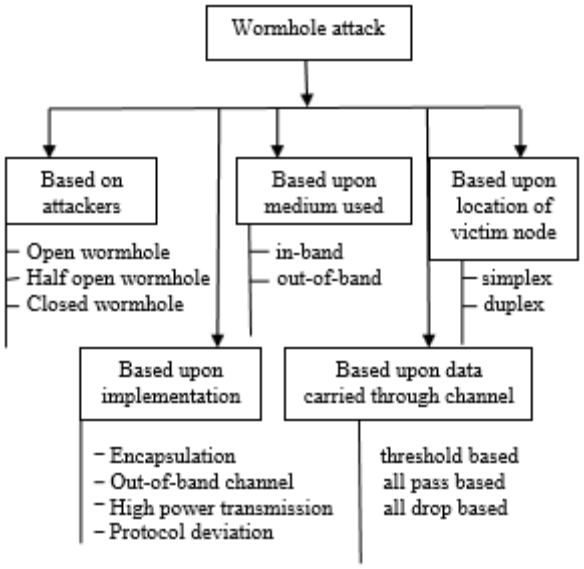

Fig 4: classification of wormhole attack

III. RELATED WORK

The In 2003 hu et al. and Capkun et al. had used geographical and temporal leaches to detect wormhole attack. This technique uses GPS technology for coordination among all nodes .Clocks are loosely synchronized. It is very robust and straightforward solution but carries the limitation of GPS technology [7].

In 2004 various method have evolved for detection of wormhole like Wang and Bhargava had used network visualization that had centralized controller for network and works best for mesh networks but certain features like mobility and varied terrains were not studied, Lazos and Poovendran had used localization method that brought in the concept of guard nodes, every nodes were made aware of their location with respect to the network but as obvious was not readily applicable for mobile networks, Park and Shin had used LISP for detection of wormholes which were applicable for static networks only, Hu and Evans used directional antenna in which each node carry a directional antenna[8].

In 2005 Lazos et al. used a method in which nodes have both directional antenna and GPS. Beside him, Baruch et al. had used time of flight that has hardware that enables onebit message and immediate replies without having CPU involvement, it is highly impractical as it require MAC layer modification, Song et al used statistical analysis that works only for multi-path on-demand protocols, Khalil et al uses LITEWORP that require static topology for network, it uses pre-distribution pair-wise key management protocol which is not applicable if there is any protocol deviation [9].

In 2006 Hu et al devised connectivity based approach that requires connectivity information of nodes and uses tightly synchronized clocks, it is impractical as such synchronization is hard to achieve in any network, Weichao el al uses end-to-end mechanism that requires knowledge of location information and has loosely synchronized clocks, this mechanism uses geographic location and authentication to detect defects in network[10], Eriksson el al used true-link that has authentication and time-based mechanism, it works only with standard 802.11 along with little backward compatibility[11].

In 2007 Trans et al used TTM [12], it is transmission-time based mechanism and requires cooperation of all nodes that lie along the path, Rasmussen and Capkun used radio fingerprinting that uses Chipcon 1000, 433MHz radio[13].

In 2008, Özdemir et al. introduced TTBM i.e. transmission and trust based mechanism [14], Khalil et al. used MOBIWORP that has maximum limit on number of nodes that attacker can capture[15], Papadimitratos et al. and Poturalski et al. introduced secure neighbour discovery. In 2009, Venkataraman et al. introduced GTA that is applicable for proactive protocols that uses adjacency matrix of nodes and has graph- based mechanism [16], Shokri et al. introduced neighbour verification protocol that performs local geometric consistency tests[17], Chen et al. introduced CSB that has consistent-set based resistant localization system and there is no packet loss in the system[18].

In 2010, Chen et al. introduced secure localization that has conflicting-set-based resistant localization [19] and Graaf introduced distributed detection system [20]. Currently various approaches like statistical analysis has been used for detection and prevention of wormhole attack.

IV. COMPARISON AND DISCUSSION

Various methods have been devised so far for detecting and preventing against wormhole attack. Each employ different mechanism and target on different aspect of network like watch dogs, they identify colluding nodes by storing a copy of packet before forwarding it. When packets are overheard, it is matched with copy stored in buffer and if they match, copy is discarded otherwise failure count is incremented and if this counted reaches the threshold it is considered as malicious node. But this method does not able to detect collision during ambiguous collision or receiver collision. In directional antennas it is assumed that each node maintain an accurate set of neighbors so wormhole can be detected if it is able to find false neighbor and ignoring messages from that node. Directional antenna is used to find the direction and angle of

arrival of messages but if attacker poses attack from places between these directional antennas, it is not able to detect it. In statistical analysis scheme frequency of links being used in transmission is noted as links which are part of wormhole tunnel will be used again and again. This method does not require any special hardware, neither there is any alteration of existing protocols. It does not require any set of information as it just uses the routing data which is already available at each node. Graph theoretic model categorizes nodes into two types: guard node and regular node. Guard node uses GPS technology to access location information and regular node calculate their location with respect to the guard node thus they are able to detect any abnormal transmission. In this scheme sender encrypt each transmission by local broadcast key which get decrypted at receiver side but this method has disadvantage of high time delay in calculating position and specialized hardware is required by guard nodes. In TTM (Transmission Time based Mechanism) attack is identified in route setup stage by calculating transmission time among two nodes. It requires co-operation among nodes. Dispersed detection approach uses ranges of nodes for detection of wormholes.

Table 1

METHODS	SYNCHRONIZATION	MOBILITY FACTOR	QoS FACTOR	FALSE DETECTION
HMTI[21]	Not required. Since PSD profiling is done locally.	Handled weakly. Topologically robust, short range worm-hole can be detected.	Jitter and delay.	Used PSD to detect false positive alarm.
DelPHI [22]	Not required.	Not considered.	Delay	Not handled.
Temporal Leashes Technique[23]	fine-grained synchronization	Restrict the maximum transmission distance of packet	Delay up to leashes factor	Not handled
SaW [24]	Not considered.	Not considered.	Not considered.	Failed to detect.
WORMEROS [25]	Time synchronization not required. RTT between source node and destination node is considered.	Topological change is not considered.	Not considered	Both false positive and false negative alarms are considered.
Farid et al. [26]	Some time delay added to detect suspicious links.	Not considered	Packet processing time, queue delays within nodes.	Not handled.
SAM [27]	Not considered	Cluster and uniform topology considered.	Not considered	Not handled
DaW [28]	Not considered.	Not considered.	Delay parameter.	Failed to detect.
WAP [29]	Only the source node is synchronized.	Maximum transmission distance is calculated.	Delay per hop.	Not handled
Geographical Leashes Technique[30]	coarse synchronization	Restrict the maximum transmission distance of packet	Delay up to leashes factor	Not handled
LITEWROP	Not required	Static networks only	Not required	Not handled

V. CONCLUSION

Wormhole attack is among those attacks that poses serious threat on adhoc network. It is easy to launch wormhole attack in MANET as features of MANET are very favorable for such attacks. Various detection and prevention methods are being proposed so far but to achieve all security goals is not an easy task. This paper indicates various algorithms and protocols for providing counter measure against wormholes but still there is some bottleneck being faced in some or the other way. Future work includes developing more efficient and secure protocol that can work under all circumstances. As MANET has feature of having nodes capable of moving anywhere in network and having characteristics that can make it router as well as source or destination, a protocol that can provide adequate security in such a dynamic natured network is demanded, so by taking help from all the work being done so far in this field and by keeping in view all conditions of the network a more promising protocol should be developed.

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Microwave Sensing of Quality Attributes of Agriculture and Food Products

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ABSTRACT

Highly automated and computerized processes in agricultural and food industries require the development of sensors for continuous measurement and monitoring of quality attributes for agricultural and food products. Recent advances in calibration methods and availability of reliable and inexpensive microwave components offer an opportunity for the development of a new generation of low-cost microwave sensors for process monitoring and control.

This paper discusses both the development of calibration methods for indirect determination of bulk density and moisture content from measurement of the dielectric properties at a single microwave frequency and development of inexpensive microwave meters for routine characterization of grain, seed and in-shell peanuts in static and dynamic situations. Accuracy and savings associated with the use of such devices are also covered.

Keywords: temperature sensor; humidity sensor; ultrasonic device; Toggle Switch; GPS

I. INTRODUCTION

A lot of new inventions are there for saving agriculture mainly they are concentrated in planting and to grow the plants in a good manner, when we are giving new ideas to cultivations most of them are not bother about the seeds or grains and some technology is available and that are expensive for normal farmers .

Here we are giving a new idea for storing food products (grains, seeds, etc) and we are implementing an automatic system for saving the seeds and grains from Indian climate change and also we adding the anti- theft system and producing ultrasonic echo for thefting of food products also from small animals like rat, squirrels, birds etc

II. LITERATURE REVIEW

Sensing moisture content in grain is needed to protect the seeds by getting damaged using the advance moisture sensors available. A microwave method for on-line determination of bulk density and moisture content of particulate materials is very important with respect to preserve the grains without getting harmed by insects from paper by S. Trabelsi, A. Kraszewski, and S. O. Nelson [1].

Quality control in seeds is very important using Machine vision inspection of crumb grain by continuously monitoring the grain in storage room &checking the condition of the grains by Application of machine vision in agricultural product by Sapirstein, H.D[2] Evaluation of the functional properties of grains using a computer

vision method need to be implemented so as to have continuous surveillance on the seeds from Application of machine vision in agricultural product by Wang, H., and Sun, D[3]. , J., Navarro, F., and Molto, E[6]. New density independent calibration function for microwave sensing of moisture content in particulate materials need to be monitored to keep the seeds healthy and can be stored for longer duration of time from paper by S. Trabelsi, A. Kraszewski, and S. O. Nelson[5].

Multispectral inspection of seeds in real-time using machine vision and digital signal processors are to be done in order to ensure that the seeds are preserved from Application of machine vision in agricultural product by Aleixos, N., Blasco By this it is easy to find out the volume humidity and temperature of the seeds and grains by continuously monitering using GSM technology.A practical model for estimation of agricultural products volume using machine vision", 2008, In Proc. 5th National Congress on Agricultural Machinery Engineering and Mechanization is done to take care of the agricultural products from Application of machine vision in agricultural product by Amiriparian J,M.H.Khoshtaghaza, and E.Kabir[7]

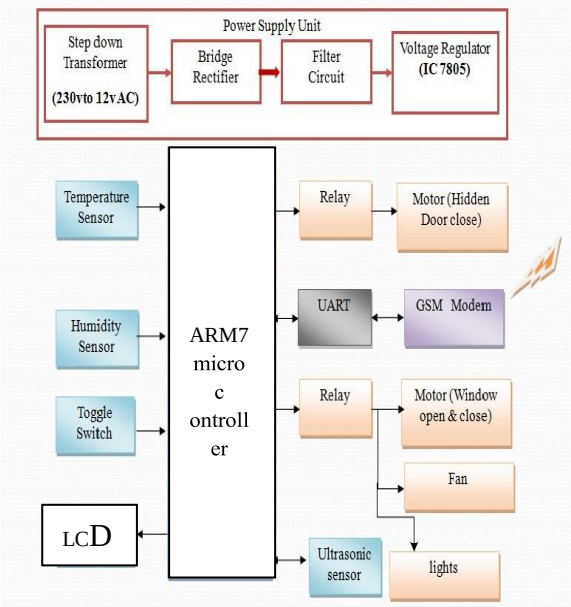

Fig 1. Intelligent food grain system

These components are connected with ARM micro controller board and the results are displayed in LCD display. In this method, temperature and humidity is measured and the results are stored in the registers in the PIC board. It will ensure the present temperature and humidity conditions in the room where the seeds are kept. The sensor will monitor the temperature and microcontroller for the lower machine control unit. The grain environment information such as temperature, humidity data is collected and stored by Multi-sensor. If the humidity and temperature sensor value increases, the further action is done by ARM microcontroller. If the inner room and outer room temperature is up, normal or not equal, ARM microcontroller automatically generates the signal to run the motor for opening the window. When the temperature is normal, it closes automatically. If the humidity level is high, fan will rotate automatically. At the same time corresponding in charge will get the information through GSM. Toggle switch is used to activate or deactivate the Theft security process. Ultrasonic sensor is used to produce the echo signal for stop the reproduction for animals (like cat, rat, etc) and lizard (like Central bearded dragon. Ground agama, etc). And it also detects if any person enters the store system it automatically sends information to the corresponding in charge humidity condition within the room and the status is sent to the person who is in charge of the room.

This is done because when temperature increases the grain will burn and if the humidity increase the grain may grow, to avoid those conditions this method is used. This system will continuously monitor the interior conditions and notifies the in-charge when there is any change in those conditions. This system is based on embedded ARM

III. FLOWCHART

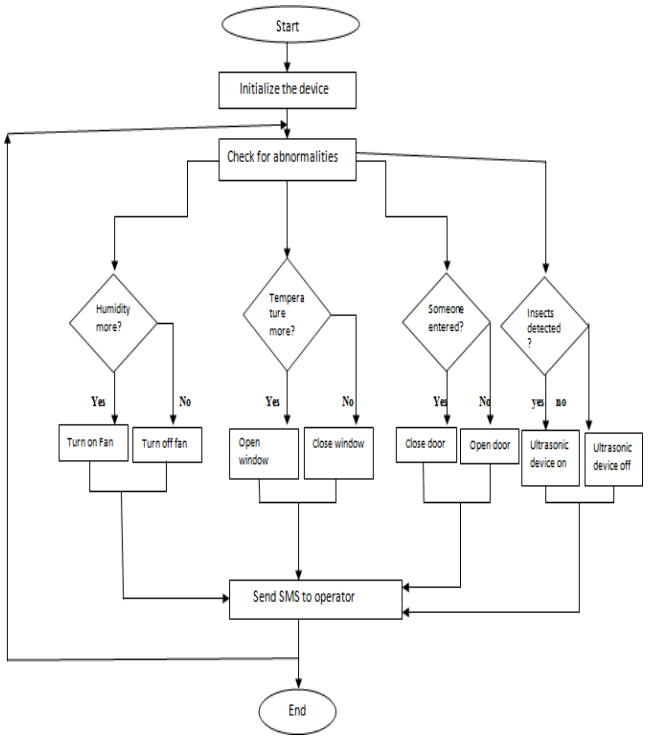

Fig 2: Flow Chart Of The System

This system is based on embedded ARM7 Microcontroller for the lower machine control unit. The grain environment information such as temperature, humidity data is collected and stored by Multi-sensor. If the humidity and temperature sensor value increases, the further action is done by ARM7 microcontroller. If the inner room and outer room temperature is up, normal or not equal, ARM7 microcontroller automatically generates the fan will rotate automatically. At the same time corresponding in charge will get the information through GSM signal to run the motor for opening the window. When the temperature is normal, it closes automatically. If the humidity level is high, fan will rotate automatically. At the same time corresponding in charge will get the information through GSM. Toggle switch is used to activate or deactivate the Theft security process. Ultrasonic sensor is used to produce the echo signal for stop the reproduction for animals (like cat, rat, etc) and lizard (like Central bearded drago, Ground aga a, etc). And it also detects if any person enters the store. Here we have designed one hidden door for security purpose. If person enters the store; it automatically sends information to the corresponding in charge. The in charge can activate the door by using the GSM.

IV. CONCLUSION

This method is a cost effective method and it is very useful be present status of the seed/grain contained in the room. The grain condition is monitored continuously and it will prevent the seed from damage or any other side effects. Increase in temperature or increase in humidity will definitely have side effects on the seed. This is also prevented by taking necessary actions before they are damaged. This method will help the farmers from a heavy loss and also to increase their grain within a short period of time.

Information through GSM signal to run the motor for opening the window. When the temperature is normal, it closes automatically. If the humidity level is high, fan will rotate automatically. At the same time corresponding in charge will get the information through GSM. Toggle switch is used to activate or deactivate the Theft security process. Ultrasonic sensor is used to produce the echo signal for stop the reproduction for animals (like cat, rat, etc) and lizard (like Central bearded drago, Ground agama, etc). And it also detects if any person enters the store. Here we have designed one hidden door for security purpose. If person enters the store; it automatically sends information to the corresponding in charge. The in charge can activate the door by using the GSM.

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Experimental Determination of THD for Different Lighting loads

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ABSTRACT

With the advent of power electronic system in generating stations, sub-stations, transmission etc., the power supply are being contaminated in terms of distortion of voltage and/or current waveforms. Distorted waveform introduces harmonics into the system. These harmonics causes overheating for machines, transformer, capacitors and also telephone interference. To mitigate these problems it is necessary to understand the level of harmonic distortion. In this regard, the present work is a basic step to estimate Total Harmonic Distortion (THD) of different lighting loads. An experimental setup was prepared for this purpose and experiments were conducted for four lighting loads that are commonly used in practice. The waveforms of these loads were recorded and Fast Fourier Transform (FFT) has been used to determine Total Harmonic Distortion and Individual Harmonic Components of each load. The results obtained were compared with the standard specifications and found to be acceptable in case of Incandescent lamp and Florescent lamp whereas a considerable deviation was found for Compact Florescent lamp and High Pressure Sodium Vapour lamp.

I. INTRODUCTION

Power quality is broadly defined as characteristic of power supply necessary for better performance of equipments. Major criteria of specifying good quality power is that “The wave shape should be pure sine wave within allowable limits of distortions”.

With the advent of power electronic systems, such as thyristor converter technology in modern electrical plants, the power supply system are being contaminated as the ideal voltage and current waveforms and getting distorted in turn affecting the equipments in the electrical network.

Due to the waveform distortion, the voltage-time relationship deviates from the pure sine function. These periodic deviations from the sine wave are known as “Harmonics”.

Harmonics are the havoc created by non-linear loads present in the system. These types of loads draw current in abrupt pulses rather than a smooth sinusoidal manner. This results in waveform distortion where the original 50Hz waveform has numerous additional waveforms superimposed upon it creating multiple frequencies within the normal 50Hz sine wave [1].

Most electrical networks can withstand non-linear loads upto 15% of the total electrical system capacity without concern[1], but exceeding this limit can anticipate some non-apparent negative consequences such as:

- ✓ Blinking of incandescent lights
- ✓ Transformer saturation.
- ✓ Capacitor failure- Harmonic resonance.
- ✓ Circuit-breaker tripping.
- ✓ Computer malfunction or lockup- voltage distortion.
- ✓ Conductor failure- Inductive heating.
- ✓ Electronic equipment shutting down- Voltage distortion.
- ✓ Flickering of fluorescent light.

The heating effect of harmonic currents can cause destruction of equipment, conductors and fires. Voltage distortions can also lead to overheating of equipment, electronic equipment failure, expensive downtime and maintenance difficulties. Harmonic currents and voltage distortions are becoming the most severe and complex electrical challenge for the electrical industry.

Lighting is one such field, where the artificial light sources, such as Incandescent lamp (GLS), Fluorescent Tube Light (FTL) and High Pressure Sodium Vapour lamps (HPSV) are commonly used in residential, commercial, street lighting and industrial applications. To obtain better ignition and power factor a 33μF capacitor is normally used in HPSV lamps. In recent days Compact Fluorescent lamps (CFL) are used from the point of consumption. HPSV with capacitor and CFL behave almost as non-linear loads because they work on the principle of discharge. These discharge lamps contribute for Harmonic Distortion affecting the quality of the power.

Power Quality and Reliability is the key to successful delivery of quality product and operation of an industry. It is now even more critical to the industry because of increasing application of electronic loads and electronic controllers which are sensitive to the quality of power supplied. These can have serious economic consequences and cost business millions of rupees each year in revenues loss, process improvements, and scrapped product. There is a dire need for all concerned to discuss the business of power quality and the latest technologies for improving power system efficiency and reliability [2]. In this context, the present work involves the basic experiments to observe/record waveforms of different lighting loads and estimation of Total Harmonic Distortion (THD) using Fast Fourier Transform (FFT).

II. HARMONICS- A BRIEF REVIEW

A Harmonic is defined as a sinusoidal component of a periodic wave or quantity having a frequency that is integer multiples of the fundamental frequency [3]. Harmonics can be voltage and/or current related and present in an electrical system in multiples of the fundamental frequency. If the fundamental frequency is 50Hz, the second harmonics is 100Hz, the third harmonics is 150Hz and so on. Due to harmonic effect, the sinusoidal waveform is no longer stand and it becomes a non- sinusoidal or complex waveform. However, the harmonic is one of the major factors. That disturbs the waveform shape of voltage and current, which in turn causes problems to the system or the components present in the system.

2.1 Harmonics Types

Harmonics of those orders which are always present even under ideal operation-balanced AC Voltages, symmetric three phase network and equidistant pulses. There are Harmonics in AC side of the order.

$$h = np \pm 1 \quad \ldots\ldots (1)$$

The harmonics in the converter DC side are of the order

$$h = np \quad \ldots\ldots (2)$$

where p – Pulse number

n – Integer

The order of harmonics obtained from above equation is called characteristic harmonics. The harmonics of the order other than the characteristic harmonic are termed as Non-Characteristic Harmonics. These are due to

- ✓ Imbalance in the operation of two bridges forming a 12 pulse converter.
- ✓ Firing angle errors.
- ✓ Unbalance and distortion in AC voltages.
- ✓ Unequal transformer leakage impedances

The harmonics produced due to. The first cause is termed as residual harmonics. These are mainly due to the difference in the firing angles in the two bridges which lead to unequal cancellation of the harmonics of order 5,7,17,19 etc, [4].

2.2 Harmonic number (n)

Harmonic number (n) refers to the individual frequency elements that comprise a composite waveform. For example, $h = 5$ refers to the fifth harmonic component with a frequency equal to five times the fundamental frequency. If the fundamental frequency is 50 Hz, then the fifth harmonic frequency is 5×50, or 250 Hz. The harmonic number 6 is a component with a frequency of 300 Hz. If the multiple of fundamental frequency is an odd number, it is known as odd harmonic component. For even harmonic component the multiple of fundamental frequency is even number.

2.3 Individual and Total Harmonic Distortion

Individual harmonic distortion (IHD) is the ratio between the root mean square (RMS) value of the individual harmonic and the RMS value of the fundamental.

$$IHDn = (In/I1)*100 \quad \text{.....(3)}$$

The IHD indicates the contribution of each harmonic frequency to the total harmonic distortion describes the net deviation due to all the harmonics. These are both important parameters in order to solve the harmonic problems, it requires information on the composition of the individual distortions so that any treatment may be tailored to suit the problem.

Total harmonic distortion (THD) is the square root of sum of all the squares of individual harmonic distortions. The greater the THD the more distortion there is of the 50Hz sine wave. Harmonic distortion occurs in voltage and current waveforms. Typically voltage THD should not exceed 5% and current THD should not exceed 20% [3].

$$THD=\sqrt{(IHD_1^2+IHD_2^2+IHD_3^2\ldots+IHD_{14}^2)} \quad \text{....(4)}$$

The Total Harmonic Distortion, while conveying no information on the harmonic make up, is used to describe the degree of pollution of the power system as for as harmonics are concerned.

The various causes of harmonics are, use of electronic loads, discharge lamps, energy conservation devices in both domestic and industrial sectors, solid state power electronic devices, adjustable speed drives etc,.

Harmonics leads to mal-operation of the relays, over heating of transformers; lamp may draw the excess current, flickering lights, reduced system capacity, failure of the capacitors and performance of machines become poor [5].

III. EXPERIMENTATION

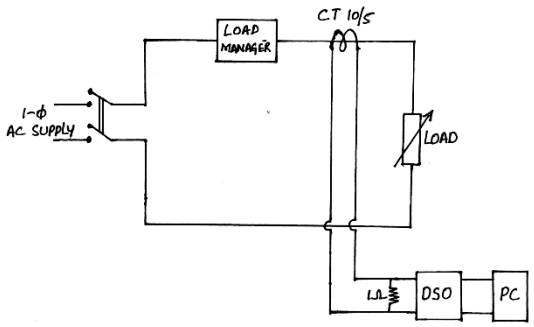

Figure 1. Schematic diagram of experimental set-up

3.1 Experimental setup

The experimental setup prepared for the present work is shown in Figure 1. It consist of a load manager (KRAYCARD MAKE), Digital Storage Oscilloscope(DSO) 256MS/s, 60MHz, Scientec make, CT (10/5), shunted with a non-inductive wire wound resistor (1Ω) and terminals to connect different loads. The output of the DSO is interfaced to computer.

3.2 Experimental Procedure

A single phase supply was given to the circuit after connecting the lamp across the load terminal. The readings of voltage, current, power and power factor were noted with the help of load manager. The waveform was observed and stored in DSO. The stored waveform was then converted into data file using ULTRASCOPE software. The data thus obtained is used in origin software and FFT analysis was performed to obtain different harmonic components.

Experiments were repeated for all the loads considered in the study and Table 1 gives the different loads used in the present study with their specifications.

Table 1. Lighting loads used for present work

Type of lamp	Rating
Incandescent bulb (GLS)	200W
Fluorescent tube light (FTL)	40W
Compact fluorescent lamp (CFL) Spiral	23W
High pressure sodium vapour lamp (HPSV)	250W, 33μF

IV. RESULTS AND DISCUSSIONS

The main aim of the present work was to estimate the Total Harmonic Distortion (THD) and Individual Harmonic Component of lighting loads, namely GLS, FTL, CFL and HPSV. These lamps are used in residential, Street lighting and Industries. The estimation of THD and Individual Harmonic component was accomplished through experiments by storing the waveforms in DSO. Using ULTRASCOPE software the waveform recorded is converted into data file. Further with the help of origin software, FFT analysis has been performed for different lighting loads. The recorded waveform and respective FFT analysis for GLS, FTL, CFL and HPSV are shown in figures 2(a) & 2(b), 3(a) & 3(b), 4(a) & 4(b) and 5(a) & 5(b) respectively.

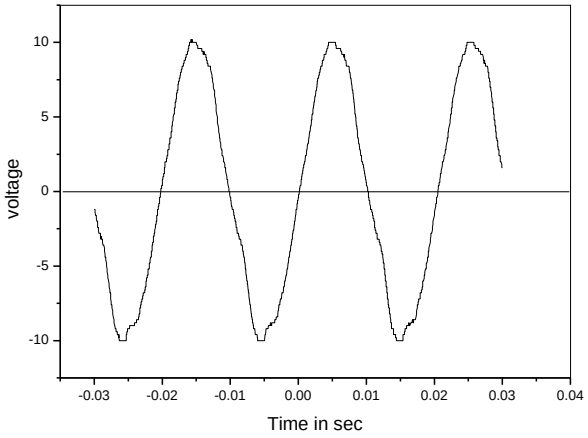

Figure 2 (a) Wave shape of the GLS_200W

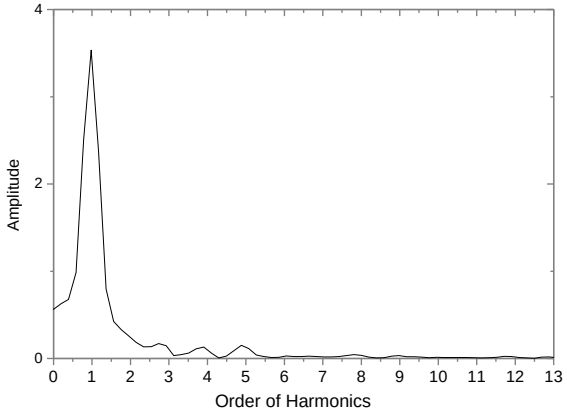

Figure 2 (b) FFT analysis of the GLS_200W waveform

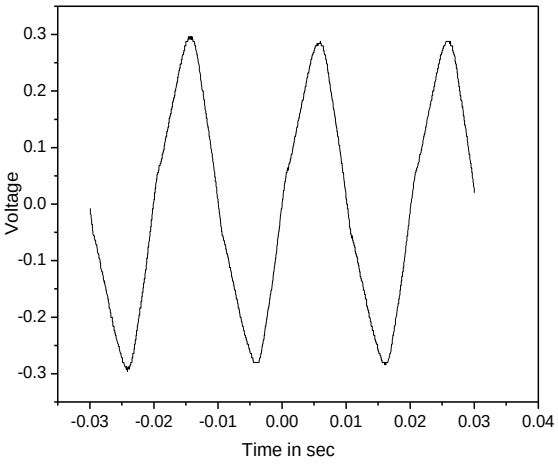

Figure 3 (a) Wave shape of the FTL_40W

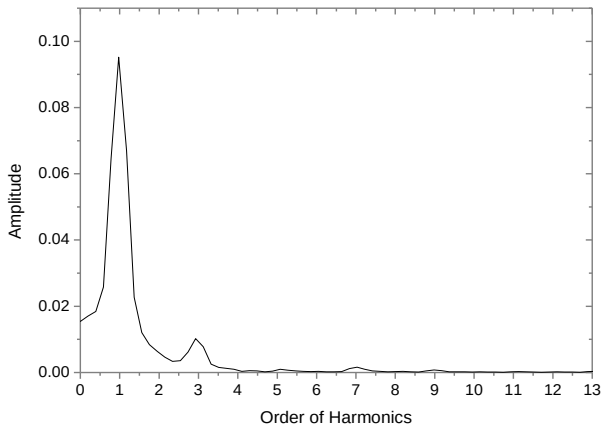

Figure 3 (b) FFT analysis of the FTL_40W waveform

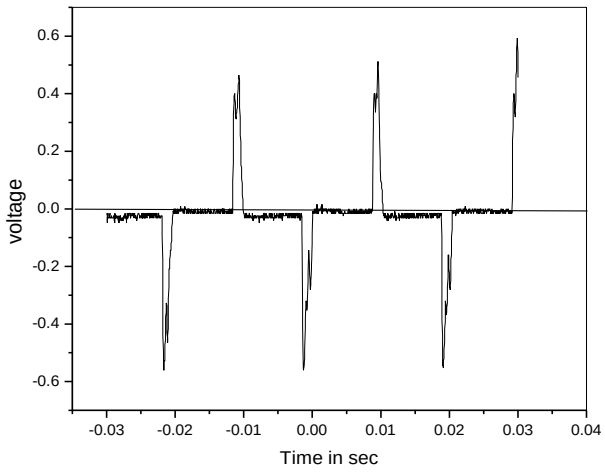

Figure 4 (a) Wave shape of the CFL_23W

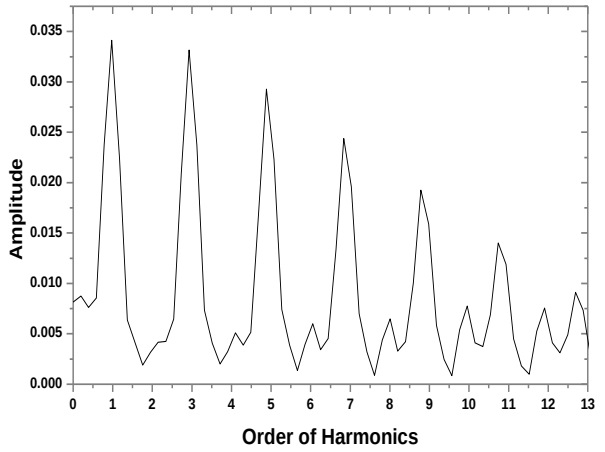

Figure 4 (b) FFT analysis of the CFL_23W waveform

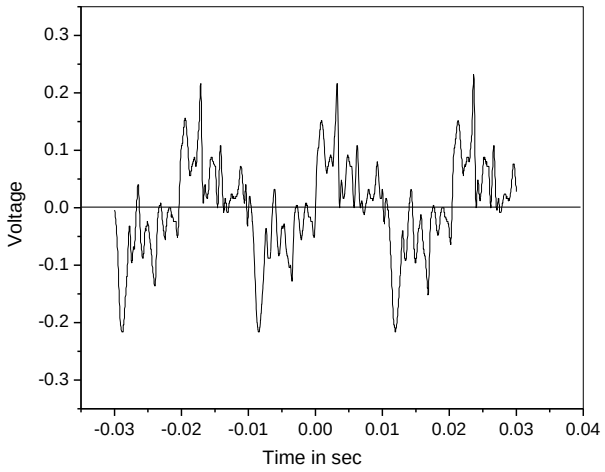

Figure 5 (a) Wave shape of the HPSV_33 µF Capacitor

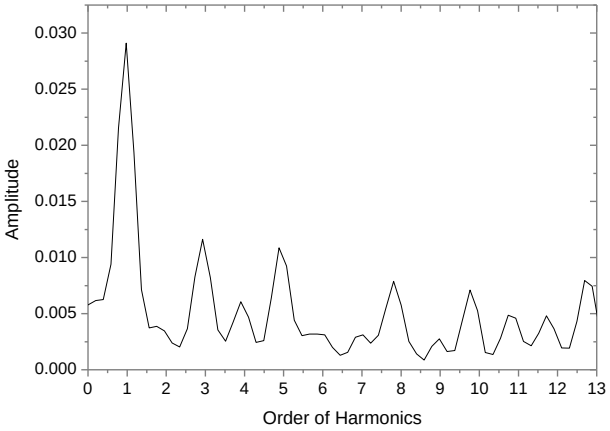

Figure 5 (b) FFT analysis of the HPSV_33 µF Capacitor waveform

From figures 2(a) & 3(a) it can be observed that GLS and FTL are showing almost sinusoidal wave thereby giving a THD of 13.02% and 14.17% respectively, when the THD of the input was about 13%. Figures 4(a) & 5(a) shows the highly distorted waveforms for CFL_23W and HPSV, where the THD was found to be 106% and 73.35% with the same input mentioned above. Also, in case of 23W CFL the individual harmonic components are not following the standards.

After performing the FFT analysis on individual wave shapes, THD was calculated using equation (4).

Table 2 shows the calculated values of THD for the lighting loads considered in the present study.

Table 2. THD for different loads

LAMP	%THD
Incandescent bulb (GLS)	13.02
Fluorescent tube light (FTL)	14.17
Compact fluorescent lamp (Spiral)	106.0
High pressure sodium vapour lamp (HPSV)	73.35

V. CONCLUSIONS

The main aim of the present work was to estimate Total Harmonic Distortion of different lighting loads namely, Compact Fluorescent Lamp, Sodium Vapour lamp, Fluorescent tube light, and Incandescent lamp. For this purpose a set up was prepared and experiments were performed. From the results the following conclusions can be drawn

- ✓ GLS and FTL give low THD in which GLS is the least.
- ✓ CFL_23W gives highest THD among the loads considered in the present study.
- ✓ Individual harmonic component estimated in case of CFL_23W does not follow the standards. i.e., 3^{rd}, 5^{th}, 7^{th}, 9^{th} harmonic component are significantly high when compared to the percentage of fundamental.

From the results and discussions and the above conclusions it is clear that, while selecting the type of the lighting load care must be given for the harmonic distortion. It is also noted that, in the case of sodium vapour lamp by inclusion of capacitor may improve the striking voltage and power factor but increases the Harmonic distortion. Thus while selecting the value of the capacitance there should be a compromise between power factor, striking voltage and the Total Harmonic Distortion.

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Fine Tuning Of State Estimator Using Phasor Values From Pmu's

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ABSTRACT

State estimation is a key function of the Energy Management System (EMS), providing a reliable and consistent data, by processing the information obtained from telemetering or remote units. Traditional power system state estimators are subject to considerable changes because of the extensive application of Phasor Measurement Unit (PMU). The availability of synchro-phasor data has raised the possibility of a linear state estimator if the inputs are only complex currents and voltages and if there are enough such measurements to meet observability and redundancy requirements. The unique ability to calculate synchronized phasors at high precision makes the phasor measurement unit (PMU) an important measuring device to improve the accuracy of state estimation. In this paper, the linear model of state estimation is proposed to show the important contribution of PMU measurements to the power system state estimation. The effectiveness of the proposed state estimation algorithm is validated using standard IEEE 14 bus test system and real time 637 bus southern grid network of Indian power system.

Keywords: PMU, EMS, State estimator, linear estimator, SRPG System

I. INTRODUCTION

State estimation (SE) plays a key role in real-time monitoring and control of the power system. The basic idea of SE is to estimate voltage magnitude and angle at each bus in the system based on the measured data. Voltage-dependent quantities, such as transmitted real and reactive power, are computed based on the estimated bus voltages. A state estimator requires that the measured input data must contain redundancy. This redundancy leads to an over-determined system of equations, whose optimal solution is given by minimization of the estimation errors. In the case of non-linear relationship between the voltages and other electrical quantities in the network, the solution is obtained iteratively starting from an initial guess. Conventional state estimators utilize the weighted least square (WLS) approach, which converts the non-linear equations into the linear form, by using first-order Taylor's series expansion. However, the development of a time synchronized phasor measurement units (PMUs) based wide-area monitoring system (WAMS) has brought a paradigm shift in the manner in which the SE problem can be solved [10].

PMUs are also able to measure the voltage phase angles at different substations, and these angle measurements are relative to an absolute time reference, viz., coordinated universal time (UTC). Apart from this, the phasor measurements offer many advantages compared to the supervisory control and data acquisition (SCADA) measurements; for example, measurements of voltage phasors by

PMUs are quite accurate, PMU measurements are synchronized and time-stamped, and phasors can be acquired and refreshed every 20–50 ms, which is a much faster rate compared to the SCADA system [1]. The phasor measurements-based static SE has received significant attention in recent years. Phadke et al. [2] suggested the concept of linear state estimator. A key advantage of such a linear state estimator is that GPS-synchronized voltage and current phasor measurements from PMUs can be linearly expressed in terms of system states, eliminating the need for iterative SE algorithms. However, such estimators neglect the traditional scalar SCADA measurements, therefore, reducing the measurement redundancy.

In [3], a multi-area state estimator was suggested for the large-scale power system SE, assuming that the neighboring subsystems affect only boundary buses. But, SE solutions for the internal buses are also affected by the measurements in the neighboring subsystems. An alternative to use the phasor measurements in SE was suggested in [4] by keeping the existing SE software in place. Phasor measurements were used in the post-processing step of the traditional WLS state estimator. A three-phase state estimator utilizing both SCADA and the phasor measurements was proposed in [5]; however, such an estimator involves an additional quadratic term in the representation of measurements, thereby, demanding changes in existing SE software in energy management systems (EMSs) as in fig 1.

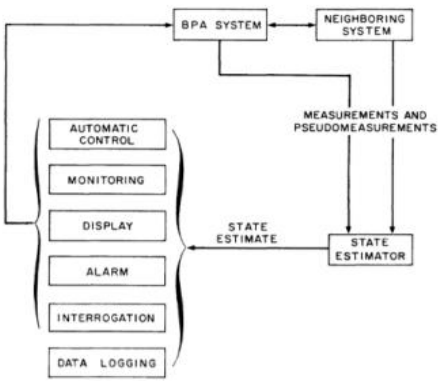

Figure 1: Location and function of state estimator in system

This paper addresses one specific aspect of PMU applications, viz. the utilization of PMU data data in the SE process. It is intended to derive maximum benefits of phasor measurements by including them in the SE process while keeping the existing SE models the same.The paper is organized as follows. Section 2 gives a brief description of traditional SE, based on non-synchronized SCADA measurements such as voltage magnitude, real and reactive power flows, and power injections. Section 3 explains the proposed phasor assisted SE and Section 4 provides the simulation results of the proposed methods. Finally, in section 5 conclusions drawn based on the results of the study are presented.

II. TRADITIONAL WLS METHOD

The system measurement equation is as follows [1]:

$$z=\mathrm{h}(x)+e \quad (1)$$

where: z is the (m x 1) measurement vector; x is the an (n x 1) state vector to be estimated; h is a vector of nonlinear functions that relate the states to the measurements; and e is an (m x 1) measurement error vector. It is necessary that m ≥ n and the Jacobian matrix of h(x) has rank n.

The optimal state estimate vector x may be determined by minimizing the sum of weighted squares of residuals

$$\text{Min } (x)=[z-h(x)]TR^{-1}[z-h(x)] \quad (2)$$

where, R is the measurement covariance matrix is linearized using the Taylor series expansion, retaining the first two terms and ignoring higher-order terms. This leads to a linear WLS problem having the solution

$$\Delta x=(HTR^{-1}H)^{-1}HTR^{-1}\Delta z \quad (3)$$

where, H is the Jacobian matrix of h(x). The iterative approach is applied to obtain the state update until the absolute value of the difference of the states between successive iterations is less than the tolerance value ε, typically, ε is set to 1e-4. The

function h(x) can be linear or nonlinear. H is a constant matrix (m × n) in the case of linear function, and it needs only one iteration to converge. Alternatively, the solution is

$$x = (HTR^{-1}H)^{-1}HTR^{-1}z$$

III. PROPOSED PHASOR-ASSISTED STATE ESTIMATOR

Once PMUs are installed, say at a few substations, the voltage and current phasors from these buses are available. These phasor measurements can be used to improve the SE. A literature review reveals that many attempts have been made to include the voltage phasor measurements and the current phasor measurements after deriving new set of equations, which relate current as a measurement to the state vector into the traditional state estimator [3, 5, 7, 8].

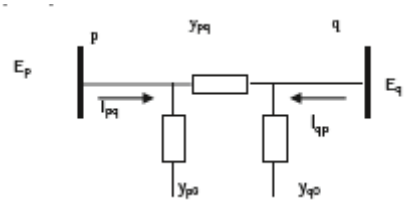

Figure 2. Pi equivalent of transmission line

$$\begin{bmatrix} E_p \\ E_q \\ I_{pq} \\ I_{qp} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ y_{pq} + y_{p0} & -y_{pq} \\ -y_{pq} & y_{pq} = y_{q0} \end{bmatrix} \begin{bmatrix} E_p \\ E_q \end{bmatrix}$$

From the pi network of a transmission line, a current measurement bus incidence matrix is defined in a manner similar to the element bus incidence matrix. It has as many rows as measurements of currents and as many columns as there are buses (excluding ground). If m is the number of current measurements, n the number of lines measured, p the number of buses with voltages measurements, and q the number of buses in the system then A is an m × q incidence matrix and y is an m × m diagonal matrix of admittances.

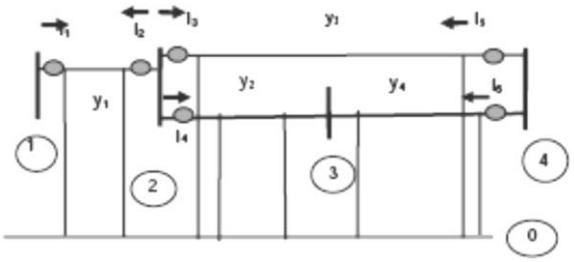

Fig 3: Six(m) current measurements on four(n) lines, three(p) voltage measurements and four (q) buses [2]

$$\mathbf{z} = \begin{bmatrix} \mathbf{II} \\ \mathbf{yA} + \mathbf{y_s} \end{bmatrix} [\mathbf{E_b}] = \mathbf{BE_B}$$

Where II is a unit matrix from which rows corresponding to missing bus voltages are removed.

$$\hat{\mathbf{x}} = (\mathbf{B^T W^{-1} B})^{-1} \mathbf{B^T W^{-1} z} = \mathbf{Mz}.$$

Unlike the earlier state estimator, this estimator is linear and hence no iterations are needed. Once the measurements are obtained, the estimate is obtained by matrix multiplication. The matrix M which converts the measurements to the state estimate is constant as long as the bus structure does not change. It can be computed off-line, and stored for real-time use. Under certain conditions of measurement configuration, the matrix **M** becomes real, simplifying the computations even further.

WLS estimators assume a set of measurement error variances, whose reciprocals are chosen as weights for the measurements. The measurement weights are typically assigned based on some assumed accuracy of the measuring instruments. It is possible to incorporate the voltage phase angle measurements and phasor current measurements, obtained from the PMUs, in the measurements vector. Linear state estimation using the proposed approximation has been done and the obtained results are compared with the conventional state estimator.

IV. SIMULATION RESULTS

The SE programs using MATLAB, based on the proposed SE techniques were developed and tested on the IEEE 14-bus system, and the Indian southern Region Power Grid (SRPG). Measurements for traditional SE consisted of real and reactive power flows in all the lines, real and reactive power injections at all the generator buses, and voltage magnitude at all the buses. The solution accuracy of the proposed state estimators was verified through comparison of the test results and compared with the conventional WLS state estimator. Each PMU is assumed to measure the bus voltage phasors and the current phasors in all the lines connected to the PMU bus. The phasor angles were adjusted such that the reference bus angle is zero.

The simulation results on the test systems are discussed as follows.

i) IEEE 14-bus System

The conventional WLS state estimator and linear SE were run in order to estimate the states of the system. Table lists the accuracy of the estimates obtained by the SE methods. Results presented in clearly show that the use of phasor measurements improves the accuracy of SE.

Test cases were run, and the results revealed that the maximum error in angle estimation, using the proposed phasor-assisted SE, was limited to 0.181 and the error in magnitude estimation was limited to ˙0.04 p.u.

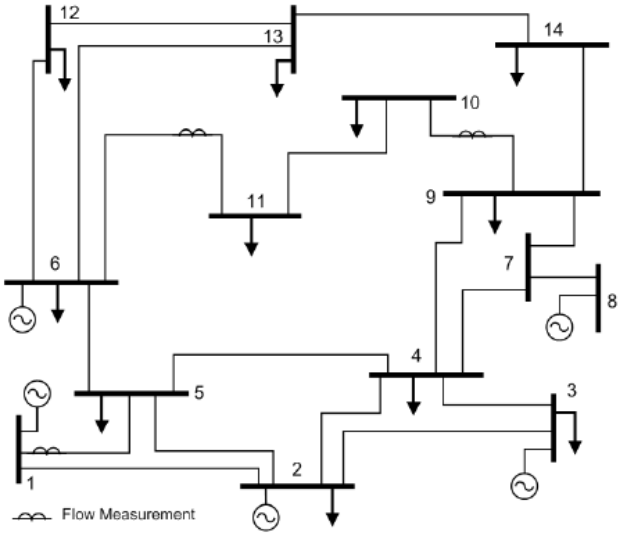

Figure 4. IEEE 14 bus Test system

It is observed from the test results that the addition of phasor measurements greatly improves the voltage magnitude estimation. To reflect them as PMU data, their weightage is increased from 10000 to 25000(table 1). Figures 5, 6 and 7 show the comparision of the values estimated by the conventional and linear estimator respectively. The error magnitude in comparision to the metered and estimated values is also shown.

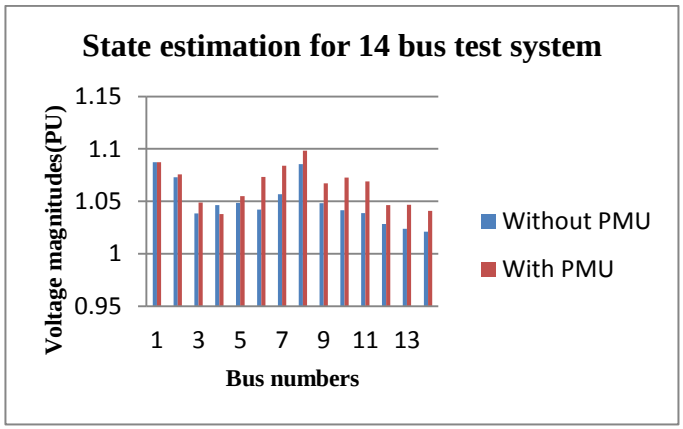

Figure 5. Comparison of voltage magnitudes by conventional and linear state estimator

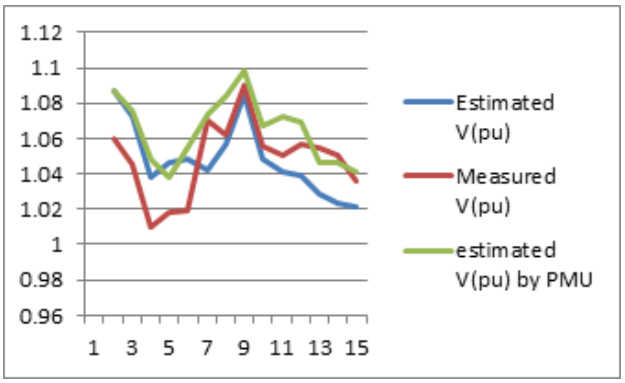

Figure 6. Comparison of metered voltage magnitudes with conventional and linear state estimator

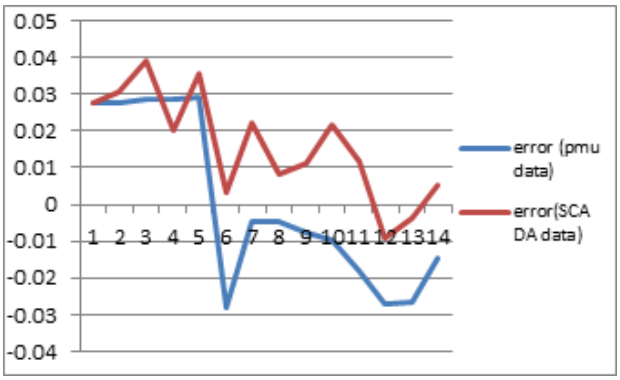

Fig 7: Comparison of error magnitudes

Effect of PMU measurements is speed and accurate. Elapsed time of state estimation by WLS method with metered data is 15 sec. For PMU measurements along with metered data elapsed time is 8 sec.

Table 1. Comparison of estimated states

	Without PMU		With PMU	
Bus number	V(pu)	Angle(deg)	V(pu)	Angle(deg)
1	1.0874	0	1.0874	0
2	1.0728	-4.73	1.0758	-4.98
3	1.0385	-12.0647	1.0489	-11.8667
4	1.0462	-9.7815	1.0379	-9.6815
5	1.0486	-8.3205	1.055	-8.1205
6	1.0421	-13.9942	1.0732	-14.0942
7	1.0568	-12.9268	1.0838	-12.9768
8	1.0854	-12.9268	1.0984	-12.9388
9	1.0481	-14.5543	1.0671	-14.6573
10	1.0415	-14.7305	1.0725	-14.7505
11	1.0388	-14.4973	1.0688	-14.6974
12	1.0283	-14.8874	1.0463	-14.8976
13	1.0238	-14.9641	1.0468	-14.9851
14	1.0209	-15.7475	1.0409	-15.7676

ii) SRPG 637 bus System

The SRPG network is the among the five regional electricity boards in India that comprise the six states. A reduced representation of the SRPG system has been considered, which consists of 637 buses (220 and 400 kV only) and 1593 branches (lines/transformers).

The performances of the proposed phasor-assisted SE were tested for this practical system, assuming that 50 PMUs are placed in the system, which are strategically placed. The proposed estimators have been applied on this test system. There were 637 voltage magnitude measurements. The SD of the phasor measurements is much smaller than the conventional SCADA measurements.

In this system also the proposed phasor-assisted SE methods provide better results compared to the conventional SE.

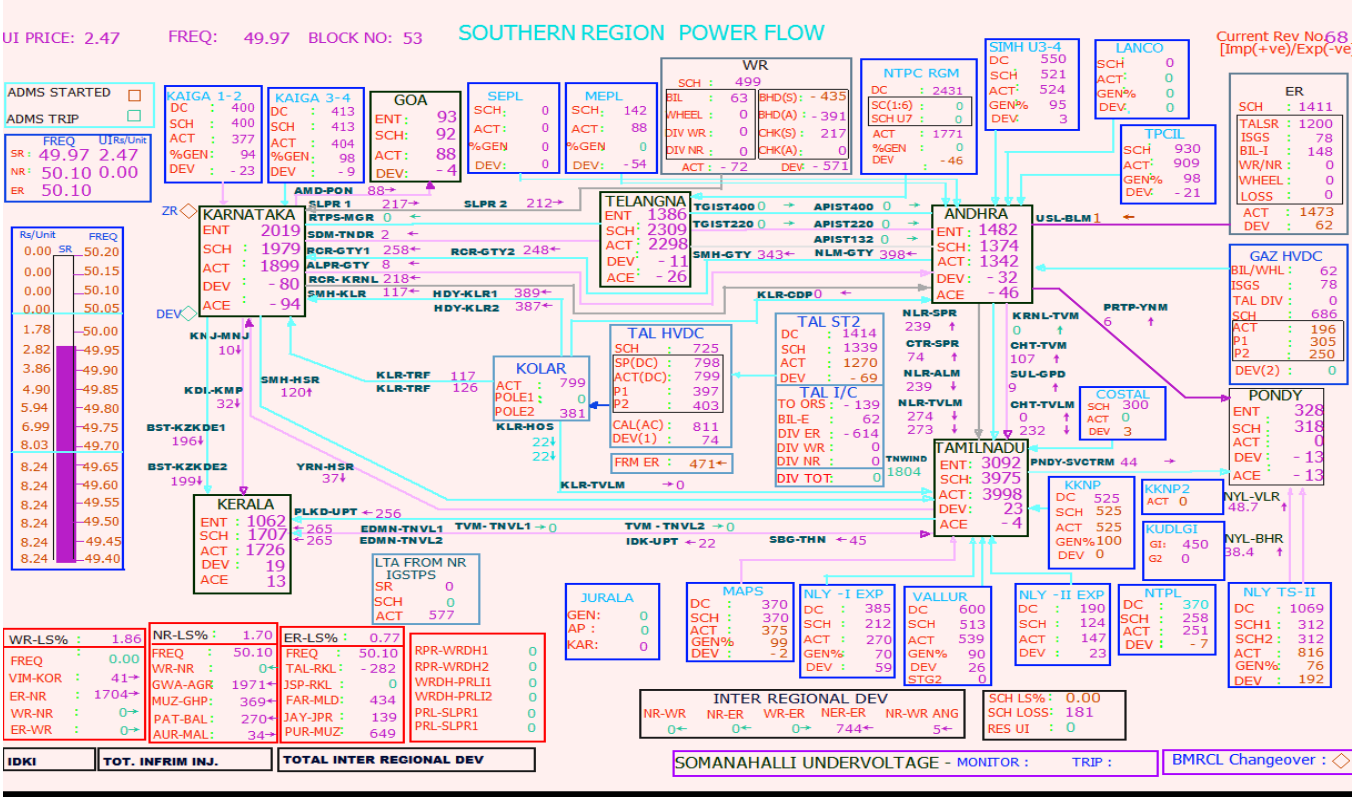

Figure 7. Southern region 637 bus grid

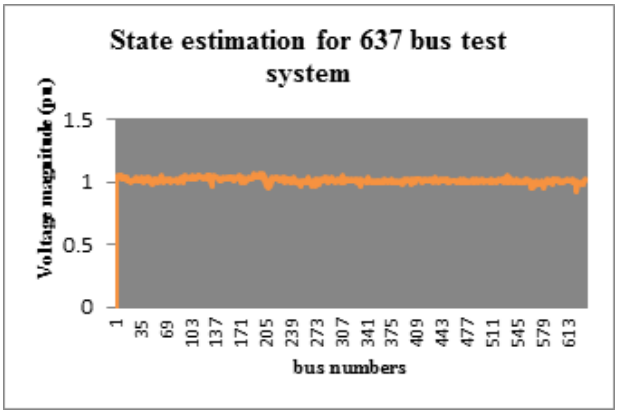

Figure 8. voltage magnitudes estimated by linear state estimator

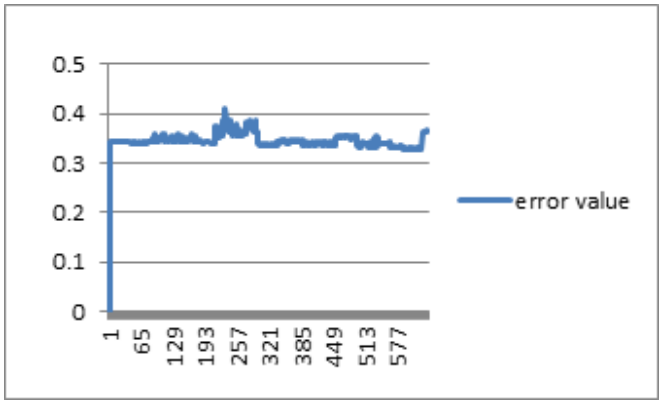

Figure 10. Error in linear state estimator and metered values for 637 bus system

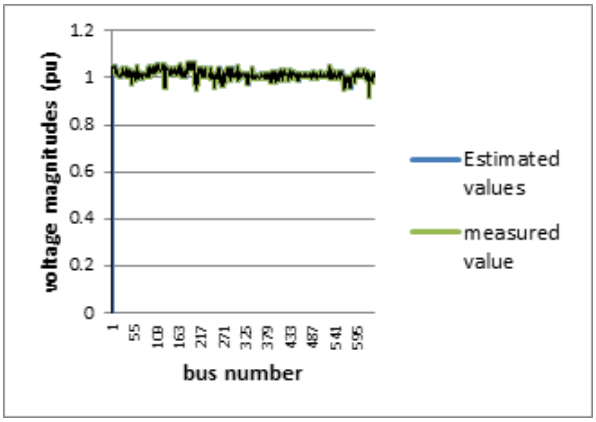

Figure 9. Comparison of voltage magnitudes by conventional and linear state estimator for 637 bus system

V. CONCLUSION

A phasor-assisted linear state estimator has been developed in this paper using MATLAB. IEEE 14 bus test system and SRPG network was considered for case studies. Weighted Least Squares method using metered data and with PMU measurements were compared and the results revealed that the maximum error in angle estimation, using the proposed phasor-assisted SE, was limited to 0.181 and the error in magnitude estimation was limited to 0.04 p.u.

It is concluded that states obtained with PMU measurements are more accurate compared to metered data. An attempt has been done to linearize the state estimation procedure.

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Automatic Smart Parking System using Internet of Things (IOT) for Parking Provider

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ABSTRACT

Internet of Things (IOT) plays a vital role in connecting the surrounding environmental things to the network and made easy to access those un-internet things from any remote location. It's inevitable for the people to update with the growing technology. And generally people are facing problems on parking vehicles in parking slots in a city. In this study we design a Smart Parking System (SPS) which enables the user to find the nearest parking area and gives availability of parking slots in that respective parking area. And it mainly focus on reducing the time in finding the parking lots and also it avoids the unnecessary travelling through filled parking lots in a parking area. Thus it reduces the fuel consumption which in turn reduces carbon footprints in an atmosphere.

Keywords: IOT, sensors, web page, Wi-Fi module

I. INTRODUCTION

The project aims at designing an advanced smart parking system using IOT technology. The devices can be switched ON/OFF using a mobile through server (Wi-Fi). Automation is the most frequently spelled term in the field of electronics. The hunger for automation brought many revolutions in the existing technologies. These had greater importance than any other technologies due to its user-friendly nature. These can be used as a replacement of the existing switches in home which produces sparks and also results in fire accidents in few situations. Considering the advantages of Wi-Fi an advanced automation system was developed to monitor the status of parking slots.

Wi-Fi (Short for **Wi**reless **Fi**delity) is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet. The controlling device for the monitoring in the project is a Microcontroller. The data collected by the Microcontroller. Microcontroller reads the data and sends the data over Wi-Fi to the IOT web page. The Microcontroller is programmed used embedded „C" language.

II. METHODS AND MATERIAL

We conducted an experiment in order to depict the working of our system at every stage from checking the availability of parking space to actually park a car in a vacant parking slot.

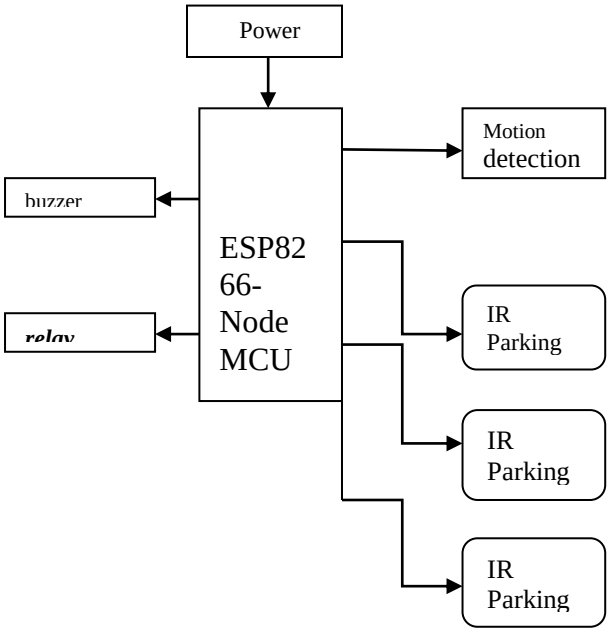

Figure 1. block diagram of smart parking

Circuit diagram

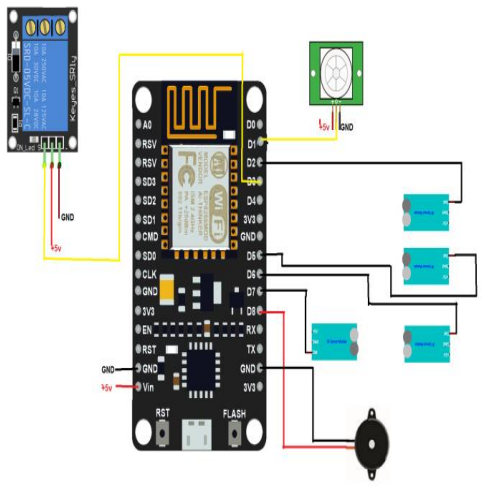

Figure 2. circuit diagram of smart parking

Esp8266-Node MCu:

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects.

Is a controller along with a wifi chip on board ,where over this project we are using this module to connect as to make project low cost ,more compact and flexible of using .Esp8266-node mcu will be connected with internet ,by connecting it wireless broadband which are providing internet like modems installed with wifi along with internet , connecting esp8266 node mcu with particular server page as to monitor the status of parking of number of cars over the parking area owner and this helps allotting location to new vehicles entering the parking area.

Motion detection sensor:

PIR sensor:

used to know the status parking area during night times any people on parking area try to make vehicle theft its all done with help of the motion detection sensors.

LDR:

To now the parking status is it much sunny day need to be cars covered by high humidity and temperatures.

IR:

This sensor is a short range obstacle detector with no dead zone. It has a reasonably narrow detection area which can be increased using the dual version. Range can also be increased by increasing the power to the IR LEDs or adding more IR LEDs.

Using iR the parking of vehicles will be detected ,where using node mcu we are implementing 6 parking space with containing individual ir sensor to know the status of parking space, based on this the parking space will allotted.

III. RESULTS AND DISCUSSION

The project “IOT based Smart Parking system” was designed such that the status of parking slots can be known from anywhere in the users webpage. This is achieved using Wi-Fi communication.

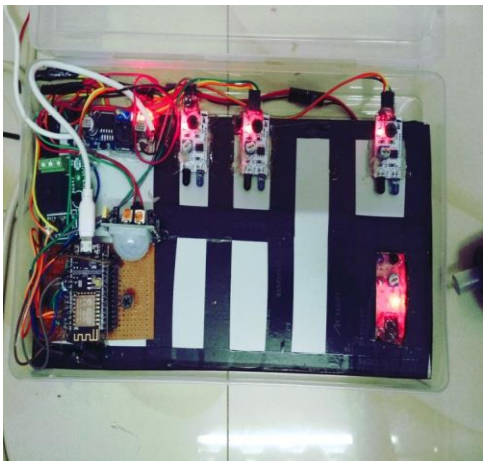

Figure 3. working model of project

In this system, the user has to be connected to the Wi-Fi network of that particular parking area through which he is given access to the webpage and can know about the status of the parking slot.

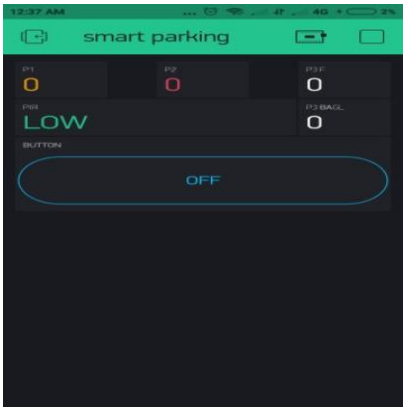

Figure 4. display of availability of slots

IV. CONCLUSION

The concept of Smart Cities have always been a dream for humanity. Since the past couple of years large advancements have been made in making smart cities a reality. The growth of Internet of Things and Cloud technologies have give rise to new possibilities in terms of smart cities. Smart parking facilities and traffic management systems have always been at the core of constructing smart cities. In this paper, we address the issue of parking and present an IoT based Cloud integrated smart parking system. The system that we propose provides real time information regarding availability of parking slots in a parking area. Users from remote locations could book a parking slot for them by the use of our mobile application. The efforts made in this paper are indented to improve the parking facilities of a city and thereby aiming to enhance the quality of life of its people.

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Congestion Management In Deregulated Power System Using Heuristic Search Algorithm

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ABSTRACT

The impact of restructuring in the field of communication sector has brought an evolutionary change in power sector too. This revolutionary idea has brought about competition in this sector with an aim of reduction in the electricity price. The competitive environment not only benefits the utilities and customers however it kindles some of the technical issues, typical one being the transmission congestion. It is considered to be tenacious since it admonish system security and may result in inflation of electricity prices effecting in feeble market condition. The explication to the dispute of congestion has been furnished in this paper. To minimize the congestion cost, an effective multi objective approach is proposed to endorse generator rescheduling and FACTS technology using a metaheurisitc optimization algorithm, symbiotic organic search algorithm. The choice of most sensitive generators to reschedule real and reactive power is realized using real power transmission congestion distribution factor

I. INTRODUCTION

Parameter	Value
Inertia	0.3
Damping ratio	0.95
Particle size	20
Max. iteration	20
C_1	2
C_2	2

With the rise in mechanization, sophistication and enrichment of lifestyle, the obligation on the electrical power has enlarged. Due to hasty increase of load and deficiency of requisite resources, the dispute of power smashup and power outages occur. The power sector is controlled to clear this sprouting need for electrical power along with atoning the economical and security factors. The amendments passed in "The Electricity Act 2003", pave the way for taking measures contributive to the development of power industry, concurring competition therein, mitigation of electricity tariff affirming transparent, efficient and environmental amiable policies.

Consequently, the monopolistic power sector accomplished as vertically integrated utility (VIU) has been privatized and unbundled into generation, transmission and distribution companies. Around the world the practice o privatization and restructuring of electric power markets has a large bang on the power systems. The participants being the buyers and sellers of electrical power play a major role and they make the power market more competitive. Henceforth, restructuring in electric power sector

has inspired greater utilization of transmission lines. While the producers and consumers of electric power ought to sell and buy in extent that would antecedent the transmission lines to operate at or beyond at least one of the transfer limits, the system is said to be congested. Congestion in transmission lines result in forbidding the existence of new contracts, sequential blackouts, augmentation of electricity prices and moreover it enforce the system security and reliability. Thereupon a control strategy is very much indispensable to attenuate the transmission line congestion satisfying security limits in a merest time. Congestion management is such a strategy to alleviate congestion in the lines perhaps sustaining the system security. Independent system operator (ISO) is solely responsible to handle congestion for it is the most discerning and significant deed as it hazards the system security and has the liability to cause rise in electricity prices eventuating in sloppy power market. The Congestion management methods utilizes phase shifters, transformer taps and FACTS devices such as Thyristor Controlled Series Compensator (TCSC) to mitigate congestion whereas some of the rarer methods are generator rescheduling, prioritization and curtailment of loads. In this system, a multi objective optimization approach known as Particle Swarm Optimization (PSO) is taken to mitigate the congestion caused in the lines.

1.1 Deregulation In Power System

Electric deregulation is the process of changing rules and regulations that control the electric industry to provide customers the choice of electricity suppliers who are either retailers or traders by allowing competition. Deregulation improves the economic efficiency of the production and use of electricity.

1.2 Objectives of The Deregulated Power Market

1. To provide electricity for all reasonable demands.
2. To encourage the competition in the generation and supply of electricity.
3. To improve the continuity of supply and the quality of services.
4. To promote efficiency and economy of the power system.

1.3 Restructuring Process

The restructuring process starts with the unbundling of the originally vertically integrated utility. This essentially leads to separate the activities involved in an integrated power system leading to creation of functional partition amongst them. For example, the unbundling of power industry involves separating transmission activity from the generation activity. Further, distribution can be separated from transmission. Thus, these three mutually exclusive functions are created and there are separate entities or companies that control these functions. Then, the competition can be introduced in the generation activity by allowing other private participants in this segment. In contrast to the vertically integrated case where all the generation is owned by the same utility, there is a scope for private players to sell their generation at competitive prices.

II. PARTICLE SWARM OPTIMIZATION IN CONGESTION MANAGEMENT

Particle Swarm Optimization (PSO) is a stochastic optimization method executed by Dr. Kennedy. This method is meant for its clarity and faster rate of convergence. The technique provides fair solution for discontinuous optimization problems. Like other evolutionary algorithms, PSO as well is a population based optimization algorithm which replicates the emergent movement of swarm of birds flying in search of food. Each member in the search space is a particle and every particle moves throughout the search space searching for its global minimum (or maximum) called as gbest. While traversing, the velocity of the individual particle is adjusted at every instant and the particle is updated to its new position in consonance with its own experience and of its neighboring particles.

In the course of every generation, two values are updated for each particle viz. the best position or fitness value it has attained earlier called as the position best or pbest and the best value attained by any other particle in the population called as global best or gbest. In a N-dimensional space, every particle is considered to be a solution whose prominent and subordinate degree are evaluated by computing its fitness value. The particles have the liability to hold memory of the best positions they have attained during the course of traverse in search space and share this information to the other particle.

Considering N dimensional space, the particles are generated randomly and it posses two parameters :

(1) position of the particle Xi = (Xi1,Xi2, …, Xin) and
(2) velocity of the particle, Vi = (V i1, Vi2, …, Vin).

Based on the information about its pbest and gbest values the particles update their positions and velocities using the following equation,

$$V_i^{k+1} = \omega * V_i^k + C_1 * rand1 * \left(P_i^k - X_i^k\right) + C_2 * rand2 * \left(gb^k - X_i^k\right) \quad (1)$$

$$X_i^{k+1} = X_i^k + V_i^{K+1} \quad (2)$$

where, x represents inertia weight, rand1 and rand2 represents random values between 0 and 1, C1 = 2 and C2 = 2 called as acceleration constants, k represents the iteration number (Table 2.1).

Table 2.1 PSO Parameter

Parameter	Value
Inertia	0.3
Damping ratio	0.95
Particle size	20
Max. iteration	20
C_1	2
C_2	2

The step by step process in PSO algorithm is summarized below,

1. Prepare the line data, bus data and all the relevant datas of the bus system to be considered along with the parameters of PSO.
2. Impose congestion in the bus system and run NR power flow for the given generation and load pattern.
3. Generate a random set of control variables using PSO procedure for instance incremental and decremental generation shift, TCSC parameters satisfying the limits. The values obtained are enforced in the system data.
4. Run NR power flow.
5. Determine if the constraints are being satisfied exempting, add the penalties and find the fitness function.
6. Till the specified no. of iterations, find the velocity of the particle, add the velocity of the earlier iteration result to access a new set of population, run NR power flow and calculate the fitness value as stated in the previous step.
7. Output the solution of the best generation pattern and terminate the process.

2.1 Modeling of TCSC

Installing of FACTs device in electric utilities will maximize active power flow across existing transmission corridors. These devices are capable of controlling the parameters such as voltage magnitudes and their angles, line impedances, active power and reactive power so the continuous variation of line impedance can be achieved by using TCSC and there by maintaining the active power flow in the transmission line at particular level. TCSC is one of the best known FACTs controllers, and it has been in use for many years. TCSC consists of parallel combination of capacitor and thyristor controlled reactor. In actual, TCSC system comprises a combination of many cascaded TCSC modules. In a network, various parameters are considered for load flow analysis, which requires TCSC modeling.

The equivalent model of TCSC is shown below in Fig. 2.1

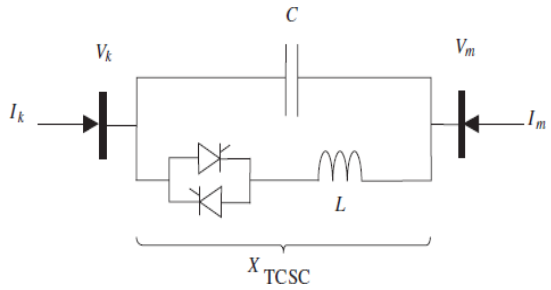

Figure 2.1. Equivalent model of TCSC

It consists of anti-parallel connections of thyristors and combination of inductor and capacitors. This is a series connected device and which can be proved supportive in reducing net losses, provide voltage support, enhancing transient stability. As per operating principle of TCSC, it has ability to control active power flow in transmission line.

2.2 Wireless Technology

Being competitive, information interchange between utilities and ISO is necessitous to meet technical challenges. Here an advanced metering infrastructure (AMI) was suggested which benefits the utilities to collect and exploit metered datas in perceptive aspect. The consumers can realize their electricity price, billing and prepayment alarm in case of abnormalities and so on. The AMI system utilizes multi communication media like global systems for mobile communications (GSM) and general package radio service (GPRS). Correspondingly the similar two way communication benefits during congestion management also. When the system is subjected to congestion, the suggested method does simultaneous optimization of rescheduling the real power as well as locating TCSC at appropriate location. The optimized rescheduled data's are collected in collecting terminal unit which consists of microcontroller board, a backup battery and communication module such as GSM or GPRS.

The microcontroller is decked with input–output interface and communication ports. Serial port devices such as RS. 232 or RS. 485 can be employed for this level of data transmission.

This information can be transmitted through (1) GSM that can impart short message service (SMS) which is applicable for less data exchange applications or (2) GPRS that employs data rates in the range of 56–114 Kb/s and provides stable connection to the internet for mobile phone and computer users. Henceforth the generating stations whose generators are to be rescheduled to alleviate congestion are thereby informed through wireless communication. Apart from GSM or GPRS, WiMax a long range wireless communication technique can also be used for this power applications.

2.3 14 Bus Test System

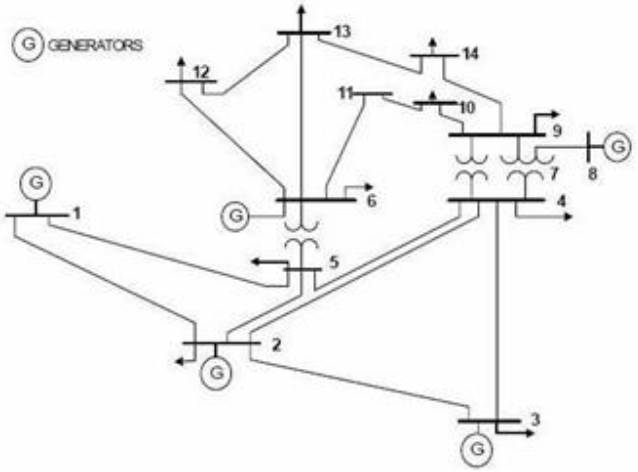

Figure 2.2. Single line diagram for 14 bus system

The Figure 2.2 shows the one line diagram of the 14 bus system. The system includes 5 generator buses, 9 load buses and 20 transmission lines. The overloading transaction results in some of the lines to operate beyond their limit. After optimization with PSO algorithm, the line flows are reduced i.e., congestion has been relieved.

III. CONCLUSION

Particle swam optimization is a new heuristic optimization method based on swarm intelligence. Compared with the other algorithms, the method is very simple, easily completed and it needs fewer parameters, which made it fully developed. This optimization algorithm in relieving congestion along with generation scheduling with TCSC is presented.

IV. RESULT

The proposed objective has been tested on IEEE 14 and IEEE 30 bus systems considering three congestion cases (1) bilateral transaction (2) multilateral transaction and (3) overloading. It results in the condition of modifying the transactions. Hence the entire system is divided into various zones depending on the sensitivity of line flows in the congested lines.

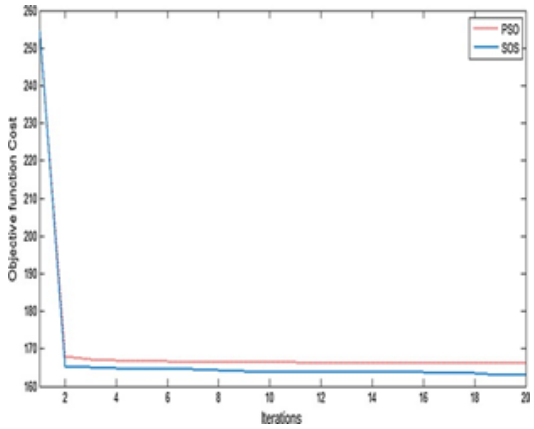

Figure 4. 50% overloading

Particle swam optimization is a new heuristic optimization method based on swarm intelligence. Compared with the other algorithms, the method is very simple, easily completed and it needs fewer parameters, which made it fully developed. This optimization algorithm in relieving congestion along with TCSC will maximize active power flow across existing transmission corridors.

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Design and Construction of Switch Mode Power Supply (SMPS)

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ABSTRACT

There are two types of DC power supply can be found in the market, Switch-Mode Power Supply (SMPS) and linear power supply. However, many customers prefer to choose SMPS than linear power supply because for same power rating, SMPS is smaller, cheaper and lighter than linear power supply especially transformer. The high frequency switching transformer that is used in SMPS is smaller and lighter than the transformer that is used in linear power supply. SMPS also have better efficiency than linear power supply. This project is focusing on developing SMPS using flyback converter topology. This flyback converter topology is chosen because it affords to carry power till 150 watts and few components are used to construct the circuit. There is high frequency switching transformer at the middle of flyback circuit that is used to isolate and step-down the high DC voltage and low DC voltage.

Keywords: Switch Mode Power Supply (SMPS), Through hole PCB, Power Transformers.

I. INTRODUCTION

Switched mode power supply converts the available unregulated ac or dc input voltage to a regulated dc output voltage. However in case of SMPS with input supply drawn from the ac mains, the input voltage is first rectified and filtered using a capacitor at the rectifier output. The unregulated dc voltage across the capacitor is then fed to a high frequency dc-to-dc converter.

Most of the dc-to-dc converters used in SMPS circuits have an intermediate high frequency ac conversion stage to facilitate the use of a high frequency transformer for voltage scaling and isolation. In contrast, in linear power supplies with input voltage drawn from ac mains, the mains voltage is first stepped down (and isolated) to the desired magnitude using a mains frequency transformer, followed by rectification and filtering. The high frequency transformer used in a SMPS circuit is much smaller in size and weight compared to the low frequency transformer of the linear power supply circuit. The 'Switched Mode Power Supply' owes its name to the dc-to-dc switching converter for conversion from unregulated dc input voltage to regulated dc output voltage.

SMPS are rapidly replacing linear regulated power supplies in most of the consumer electronic applications due to their advantages like higher efficiency, better output voltage regulation, compact size. In this paper the 25W SMPS has been designed by using a flyback isolating transformer.

The main components used in the design of SMPS are as follows

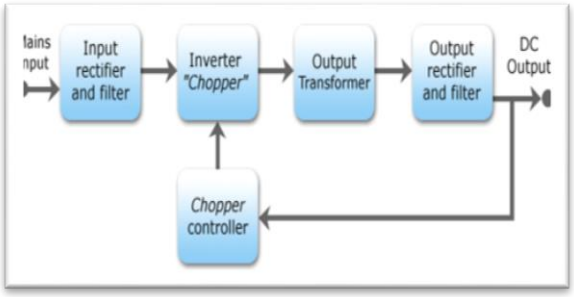
- Kbl10 (Bridge Rectifier)

- Mov Capacitor
- Resistor
- Capacitors
- Top Switch 258 With Heat Sink
- Smps Transformer
- Mbr30100(Schottky Diode)
- Ka431 (Shunt Regulator)
- Pc817(Opto Coupler)
- Diodes
- Throuh Hole Pcb Board

II. METHODOLOGY

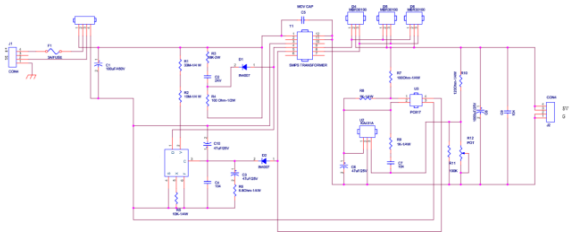
The SMPS can be made of different voltage and current ratings based the output requirements. The design of SMPS worked in this paper is basically 5V, 5A, 25W SMPS.

The basic block diagram of SMPS is as follows



The input supply drawn from the ac mains, the input voltage is first rectified and filtered using a capacitor at the rectifier output. The unregulated dc voltage across the capacitor is then fed to a high frequency dc-to-dc converter. The dc-to-dc converters used in SMPS circuits have an intermediate high frequency ac conversion stage to facilitate the use of a high frequency transformer for voltage scaling and isolation. The high frequency transformer used in a SMPS circuit is much smaller in size and weight. Then the output of the transformer is connected to the output rectifier and filter then the output is being fed to the output.

III. DESIGN AND CONSTRUCTION OF SMPS



Schematic diagram of SMPS

The components and type of topology are selected based on the specifications. For the converter AC input voltage varying from Vin_min 80V and Vin_max 285V, corresponding bridge rectifier DC voltage and hence DC input to flyback converter varies from VDC_min 72 V to V DC_max 400V. The nominal switching frequency is 132 kHz and the Switching frequency of converter topology ranges between 30 kHz to 150 kHz according to the variation of load and input voltage, and expressed by equation (3.1)

$$F_{SW} = \frac{1}{I_{pri_{pk}} * L_{pri}\left(\frac{1}{V_{in}}+\frac{1}{V_R}\right)+\pi\sqrt{L_{pri}(C_D)}} \quad \text{.....3.1}$$

Where

F_{sw}: Switching frequency

V_{in} : AC input voltage

V_R : Reflection voltage

L_{pri}: Primary inductance of transformer

C_D : Capacitance of drain

$I_{pri_{pk}}$: Primary peak current of transformer

T_{on} : ON time period of switch

T_{off}: OFF time period of switch

The variation in the duty cycle with respect to switching frequency is presented by equation

$$D = \frac{T_{on}}{T_{on} + T_{off}}$$

Considering efficiency of the converter is η as 85%.

Where

D: Duty cycle

T_{on}: ON time period of switch

T_{off} : OFF time period of switch

Total output power

$P_{out}=V_{out} * I_{out}$

3.1 DESIGN OF SMPS TRANSFORMER(DCM FLYBACK)

The design of flyback transformer is shown in below steps

STEP 1: System Specifications and Requirements:

Table 2. Flyback Transformer System Specifications

Parameter	Value	Name
Vac Maximum	265V	Maximum input AC voltage
Vac Minimum	85V	Minimum input AC voltage
Fsw	132KHz	Switching Frequency
Eff	75%	Efficiency
Pout	30W	Output power (maximum)
Vout	5V	Output Voltage
Fline	60Hz	Line Frequency

STEP 2: Determining Input Capacitor Cin and the DC input voltage range:

Maximum input power: $PinMax = \frac{Pout}{n}$

Using 1uF per watt of input power, the required DC capacitor

C_{in} is:

C_{in}=40uF

Use the standard capacitance value of 40uF/400V

With the input capacitor chosen the minimum DC input voltage (DC link capacitor voltage) is obtained by:

$$VDCmin = \sqrt{2Vac^2 - \frac{Pinmax * (1 - d_{Charge})}{Cin * Fline}}$$

STEP 3: Flyback reflected voltage (VR) and the Max VDS MOSFET voltage stress, VR is chosen at 75V. Assuming 30% leakage spike the expected maximum VDS is equal to:

V_{DSmax}=V_{DCmax}+V_R+30% of V_{spike}

STEP 4: Determining D_{max} based on $V_{reflected}$ and V_{inmin}:

$$D_{max} = \frac{V_R}{V_R + V_{DCmin}}$$

STEP 5: Calculate primary inductance and primary peak current: The primary peak current can be found by

$$P_{inmax} = \frac{P_{outmax}}{n}$$

$$I_{pri} = \frac{2 * P_{inmax}}{V_{dcmin} * D_{max}}$$

The primary inductance should then be design within the limit of maximum duty cycle;

$$L_{primax} = \frac{V_{dcmin} * V_{dcmax}}{I_{pri} * f_{sw}}$$

STEP 6: Choosing the proper core type and size: we can use EE20/10/6 ferriite core for this 25W power level

Core: EE20/10/6 Ferroxcube/TDK

Cross Sectionl Area, Ae=32mm^2

Core Material: 3C96/Ferroxcube, TP4A/TDK

Bobbin: E20/10/6 coil former, 8 pins

STEP 7: Determining minimum primary turns:

$$N_p = \frac{L_{pri} * I_{pri}}{B_{max} * A_e}$$

It is important that operating B_{max} should not exceed the saturating flux density (B_{sat}) given on the core's data sheet. B_{sat} of ferrite core varies depending on the core material and temperature but most of them has a B_{sat} rating closed to 400mT. If there is no further reference data used B_{max}= 300mT. Higher B_{max} allows for lower number of primary turns for lower conduction loss but with higher core loss. For optimized design the sum of both the core loss and the copper loss should be mutually minimized. This usually happened near the point where core loss is equal to the copper loss.

STEP 8: Determine the number of turns for the secondary main output (Ns) and other auxiliary turns (N_{aux}):

$$n = \frac{V_R}{V_{out} + V_d}$$

$$N_s = \frac{N_p}{n}$$

An auxiliary winding N_{aux}, on the primary is needed for the VCC supply

$$\frac{N_{aux}}{N_s} = \frac{V_{auxmax} + V_f}{V_{out} + V_f}$$

STEP 9: Determining the wire size for each output windings: The RMS current on each winding is calculated: Primary winding RMS current:

$$I_{prms} = I_p * \sqrt{\frac{D_{max}}{3}}$$

Secondary Winding RMS current:

$$I_{secpk} = I_p * \frac{N_p}{N_s}$$

$$I_{secrms} = I_{secpk} * \sqrt{\frac{1 - D_{max}}{3}}$$

STEP 10: Calculation of the wired size

$$A_{wpri} = \frac{I_{prms}}{J_{max}}$$

Where, A_{wpri} =Size of the primary wire in mm^2

J_{max}=Current density in A/mm^2

$$A_{waux} = \frac{I_{auxrms}}{J_{max}}$$

A_{waux} =Size of the auxillary wire in mm^2

$$A_{wsec} = \frac{I_{srms}}{J_{max}}$$

A_{wsec} =Size of the secondary wire in mm^2.

Output diode selection

The selection of output diode is governed by the output voltage and output capacitor voltage twice of these voltage the ratings of diode is selected. The maximum voltage across the diode is 24V and maximum current is 5A. Hence by considering the factor of safety,

MBR30100 Diode of 100V, Vf =0.15V and 20A rating is selected.

Power loss in output diode is

P_D= Vf*Iout (3.34)

= 0.75 W.

Output capacitor selection:

The output capacitor is selected on the basis of permissible ripples ΔVo = 80mV in the output and is determined by equation.

$$C_{out} = I_{out} * (1 - D_{min}) * T_s \Delta V_o$$

= 0.9mF

Thus, 1capacitor of 1000uF value each are selected.

Prototype model of an SMPS

IV. CONCLUSION

In this paper a 5V, 5A SMPS has been implemented.

- ✓ It has high efficiency and low cost and small weight and size.
- ✓ The operation of flyback transformer has been studied and a flyback transformer is being implemented.
- ✓ The losses will be minimum and only the switching losses are present.
- ✓ The current rating is medium.
- ✓ The high frequency transformer used in a SMPS.

In addition to the proposed SMPS, the SMPS can also be implemented to multiple outputs using DC-DC converters.

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Manure and Distributed Energy From An Institutional Generated Food Waste Through IOT Control

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ABSTRACT

In our nation we have several places where all having their own individual mess. Taking example of our college, where daily a large amount of kitchen waste is obtained which can be utilized for better purposes. Biogas production requires anaerobic digestion. Project was to create an Organic Processing Facility to create biogas which will be more cost effective, eco-friendly, cut down on landfill waste, generate a high-quality renewable fuel, and reduce carbon dioxide & methane emissions. Overall by creating biogas reactors on campus in the backyard of our hostels will be beneficial. Kitchen (food waste) can be collected from hostels and canteen as feedstock for our reactor which works as anaerobic digester system to produce biogas energy. The anaerobic digestion of kitchen waste produces biogas, a valuable energy resource.

Keywords: Digester tank, Methane storage tank, Conveyer belt, Bluetooth module.

I. INTRODUCTION

Anaerobic Digestion (AD) is a process in which micro organisms break down biodegradable material in the absence of oxygen. The process is widely used to treat wastewater sludge's and industrial and farm wastes because it provides volume and mass reduction of the input material (up to 50% reduction). Anaerobic digestion is considered a renewable energy source because the methane rich biogas produced is suitable for energy production and can replace fossil fuels. As part of an integrated waste management system, AD reduces the amount of methane that would be sent into the atmosphere if the waste was just sent to the landfill .Additionally, the nutrient rich solids and liquids left after Digestion can be used as fertilizer.The anaerobic process itself is a very complicated Biochemical process, Based on temperature and input Substrate, different strains of bacteria digest complex chains of carbohydrates, fats and proteins into their component parts. In food waste applications, the first phase of Hydrolysis can be separated from the rest as little methane is produced in this phase and the input substrate can be pasteurized to adhere to waste handling regulations. The last stage of the process, Methanogenesis, is where the biogas is produced and it can contain 65-70% methane which can be used for heat and power application, above all these process can be controlled and maintained by using IOT.

II. METHODOLOGY

Biogas can be obtained from anaerobic digestion this have three main Phases.

1. First Stage.
2. Second Stage.
3. Third Stage.

1. First stage

Complex organic compounds are attacked by hydrolytic and fermentative bacteria, which secrete enzymes and ferment hydrolyzed compounds into acetate and hydrogen .A small amount of the carbon converted will end up as volatile fatty acids, primarily propoinic acids and butyric acids.

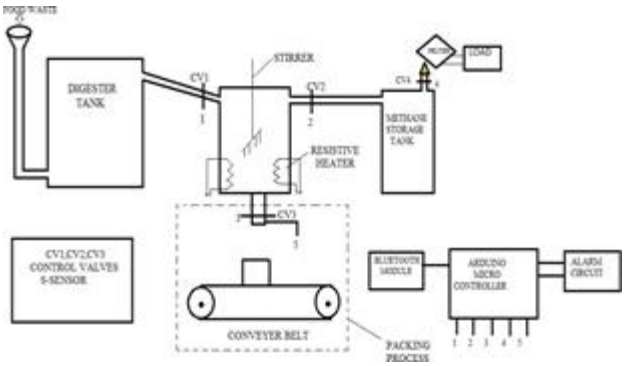


Figure 1. Fermentative Bacteria

1. Second *Stage*

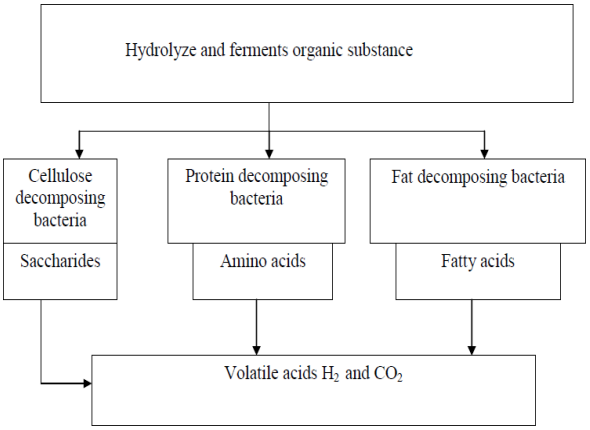


Figure 2. Block Diagram

The process involved in the above diagram is explained below:

The hydrogen- producing acetogenic bacteria continue decomposing by converting the volatile fatty acids into acetate and hydrogen producing acetogenic bacteria.

2. Third Stage

Methane –producing bacteria convert the hydrogen and acetate into methane .There is a certain amount of specialization in that different bacteria act on different substrates.

In order for these bacteria to work properly and achieve the desired end products, the following conditions have to be well balanced :

1. The dilution of the substrate i.e. amount of water to dilute the animal waste.
2. The optimum temperature which should be 350C.
3 .Type of substrate (due to their suitable carbon to Nitrogen (C: N) ratio and total solid content cattle, pig and poultry manures are recommended).
4 Rate of feeding the digester (overfeeding can lead to accumulation of volatile fatty acids).

- ✓ The food waste is first hydrolyzed and then dumped to the digester tank through the funnel
- ✓ The food waste is in semi liquid form and is allowed to decay for about 40 days. The decay period may vary depending upon the rigidity of the food waste.
- ✓ The slurry produced is heated using resistive heater. The heating produces the required methane gas.
- ✓ The produced methane gas is stored in the methane storage tank and is heated and used when required.
- ✓ The methane gas is burnt to produce electricity by peltiers.
- ✓ After heating, the retained waste is packed by automation.

III. PROCEDURE

As the project was on small scale, we employed all regularly available materials to create the working proto type of the model.

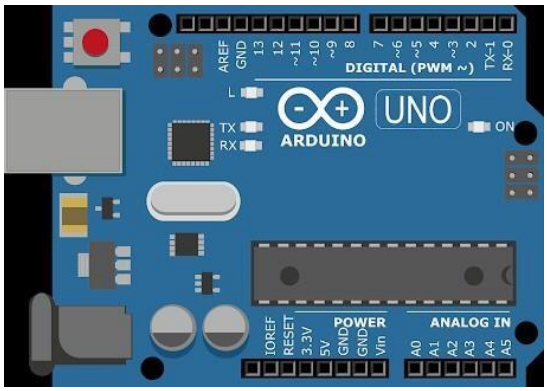
1. Substrate inlet: This consists of a receptacle for the raw fresh organic waste and pipe leading to digester. The digester must be air tight.

2. Digester: This is the reservoir of organic wastes in which the substrate is acted on by anaerobic microorganisms to produce biogas.
3. Gas storage: This is simple empty chamber but enclosed space above the slurry in the digester, which has an inlet and outlet outfit.
4. Gas burner and Peltier coupler: This may be a modified burner for heating water and this is passed over peltier coupler to produce electricity.
5. Resistive heater: it is to heat the food waste to produce more biogas.
6. Exhaust outlet: This consists of a pipe of large size to facilitate outflow of exhausted slurry
7. Microcontroller (Atmel series): This is used to control the whole process. By connecting to Wi-Fi hotspot of the system we can control and operate the system.

IV. IOT-INTERNET OF THINGS

The Internet of Things (IOT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing internet infrastructure. The figure of online capable devices increased 31% from 2016 to 8.4 billion in 2017. Experts estimate that the IOT will consist of about 30 billion objects by 2020. It is also estimated that the global market value of IOT will reach $7.1 trillion by 2020.

The IOT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention.



3. BIOGAS

BIOGAS is produced by bacteria through the bio-degradation of organic material under anaerobic conditions. Natural generation of biogas is an important part of bio- geochemical carbon cycle. It can be used both in rural and urban areas.

components	Concentration(by volume)
Methane (CH4)	55-60%
Carbon-dioxide (CO2)	35-40%
Hydrogen sulphide (H2S)	20-20,000ppm (2%)
Ammonia(NH3)	0-0.05 %
Nitrogen (N)	0-2 %
Oxygen (O2)	0-2%
Hydrogen (H)	0-1 %
water(H2O)	2-7%

Figure 3. Composition of Biogas

PROPERTIES OF BIOGAS

1. Change in volume as a function of temperature and pressure.
2. Change in calorific value as function of temperature, pressure and water vapour content.
3. Change in water vapour as a function of temperature and pressure.

Energy content	6-6.5 kWh/m3
Fuel equivalent	0.6-0.65 1 oil/m3 biogas
Explosion limits	6-12% biogas in air
Ignition temperature	650-750 *C
Critical pressure	75-89 bar
Critical temperature	-82.5*C
Normal density	1.2 kg/m3
Smell	Bad eggs

Figure 4. General Features of Biogas

BENEFITS OF BIOGAS TECHNOLOGY

- ✓ Transformation of organic wastes to very high quality fertilizer
- ✓ Improvement of hygienic conditions through reduction of pathogens
- ✓ Environmental advantages through protection of soil, water, air etc.
- ✓ Micro-economical benefits by energy and fertilizer substitutes
- ✓ Macro-economical benefits through decentralizes energy generation and environmental protection

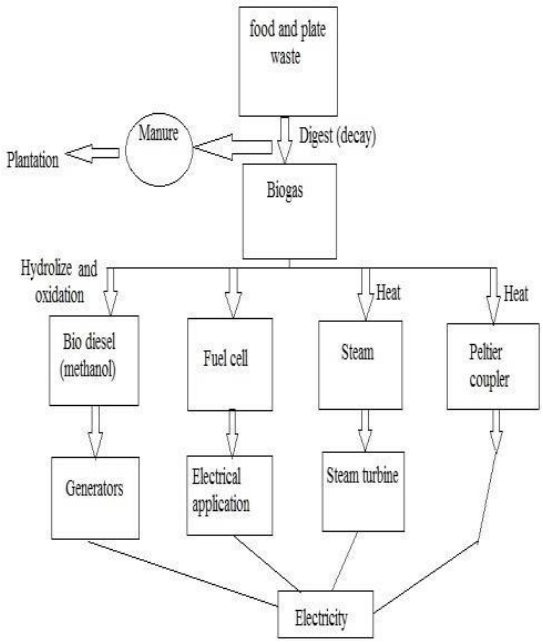


Figure 5. Web Diagram

V. OBJECTIVE

- The purpose of this is to find how the Institutional food waste can be managed by converting it into biogas and to design an anaerobic digester which uses food waste to generate the biogas.
- The waste generated in canteen/hostel in the form of vegetable refuse, stale cooked and uncooked food, milk products can all be processed in this plant.
- By this method we can achieve hygienic environment for an extent.
- Electricity generation from Institutional food waste.
- Manure from food waste sludge (scalable to entrepreneurial activity).
- Implementing advance technology for the process (IOT- Internet of things- Arduino).

VI. POSSIBLE OUTCOMES

- Generating up to 10w /kg of waste.
- Packaged organic manure for plantation in the college.
- Hygiene of the institution can be achieved.
- The food waste can be reduced by AD and we get biogas.
- The electrical energy can be generated using biogas.
- The slurry can be used as manure since it has nutritious values.

VII. ADVANTAGES

- Due to anaerobic digestion is implemented all milk and oil products also degraded by microorganisms.
- Due to automation through I O T methods it's easy to control the system.
- Low maintenance required and Eco friendly.

VIII. APPLICATIONS

- The food waste produced in the institution/hostel can be converted into electrical energy.
- Produced electricity can be used to institution or if produced in large scale it can be selling to power grids.
- Slurry which is very nutritious it can be used as manure for plantation.
- Biogas will be produced this can be stored in cylinders.

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Design of Standalone and Grid Connected Solar Power System

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ABSTRACT

This paper displays the outline and advancement of sun oriented power plant using photovoltaic technology. Entire segments required and cost estimation for design of solar power plant is done with high productivity counts. Plan of standalone (independent framework) system and Grid connected (Network associated framework) system are made by considering some as the parameters which influences the maximum or greatest power generation from solar modules. Design calculation of individual parts is clarified in well ordered. Ecological impact of solar power plant and payback period for sun oriented power plant establishment are additionally clarified in this paper.

Keywords: Photovoltaic Technology, Standalone System, Grid connected System, solar module structures

I. INTRODUCTION

In the present scenario, due to ecological issues and vitality emergency as a result of constrained fossil assets, an alternative sustainable power source demand is increasing. To take care of the vitality demand, photovoltaic, wind turbine frameworks are assuming vital part. The utilization of different wellsprings of vitality advances keep on being produced to diminish the ozone depleting substance discharge and to achieve the future vitality request.

The issue is the manner by which to utilize solar PV panels to get optimal power yield and to choose singular parts as for climate and atmosphere insights [1]. The outline of solar power plant must be made with the end goal that maximum sun oriented radiation should got by each PV panel [2]. New advancements that assistance to oversee Non-conventional vitality so it can deliver day and night while reinforcing the power matrix. These advances incorporate battery storage, supply forecast and smart grid innovations. There are numerous kinds of solar PV modules [3]. Contrasted with all kind of crystalline module polycrystalline is the more affordable with more efficiency of 13 to 15%. Along these lines in this paper polycrystalline sun oriented modules are utilized for outlining the standalone [4] and grid connected [5] solar power plant. At first to design the solar power plant, calculation of energy for specific region is assessed by National Renewable Energy Laboratory Software [6].

Solar power system incorporates distinctive segments relying upon system type, size, and area [2]. The fundamental parts for solar power plant are,

1. Mounting structures
2. Solar PV panel
3. Array junction box
4. Charge controller
5. Inverter
6. Battery bank
7. Transformer
8. Auxiliary vitality sources and loads

II. METHODOLOGY

A. Factors Affecting Generation of Power:

Solar Radiation, which solar radiation incident on the solar modules varies depending on the area of the module, location and time interim per day. Along these lines solar radiation directly affects the panel power. Subsequently, a reduction in solar radiation decreases the output power. Expression for output power from solar panel in terms of radiation

$$Power\ output = R \times A \times \eta$$

Where, R = Solar radiation

A = Area of a panel

η = Panel efficiency

Above condition demonstrate that solar radiation is directly relative to power output. As solar radiation incident on panel increases power output additionally increments. 100- 200 W/m^2 least power required to produce minimum rated output from the PV Panel. Optimization of power and voltage control can also be done using newer technology [7]

Tilt Angle, which is the point between the flat plane and the solar panel. The tilt angle of the panel is the way to obtain maximum energy. Solar panels are most proficient, when they are perpendicular to the solar radiation. Tilt angle for particular area can be ascertained by adding 15 degrees to the latitude in winter or by subtracting 15 degrees from the scope in summer.

Temperature, which plays important role in solar power output from solar PV panels. Increment in temperature makes voltage diminish however current to increment [1]. The general impact of such temperature is that it causes the power yield of the solar module to diminish. Solar panel power loss can be calculated by the expression,

$$\text{Power output loss in \%} = \text{Temperature difference} \times \text{Temperature coefficient}$$

Temperature difference = difference between temperature at particular time and nominal temperature of the day

Temperature coefficient = -0.5% (Normally all Panels are designed with -0.5%)

$$\text{Solar module power loss} = \text{Power output loss in \%} \times \text{Rated power of panel}$$

Wind Speed, this is an additional vital factor which influencing the generation of power. Solar panels may get removed from mounting structure due to strong breezes. And furthermore higher the height of the under structure, more are the breeze loads on such tilted boards. High wind speed effect expands the cost of under structure and it again expands the overall system cost. Wind has monetary part on the framework execution. Tilt of board by wind has critical part in the electrical qualities of board.

Humidity, it portrays the amount of water vapor in air. The humidity reduces the measure of visible solar radiation incident on solar modules. In this manner humidity influence the current, voltage, power output. As the level of humidity expands, level of power generation likewise diminishes.

B. Standalone System:

The rooftop PV framework is a photovoltaic framework where solar panels are mounted on the rooftop of a private or business building or structure. The different segments of such a framework incorporate photovoltaic modules, array junction box, mounting structures, charge controller, cables, solar inverters, battery bank, and other electrical frill.

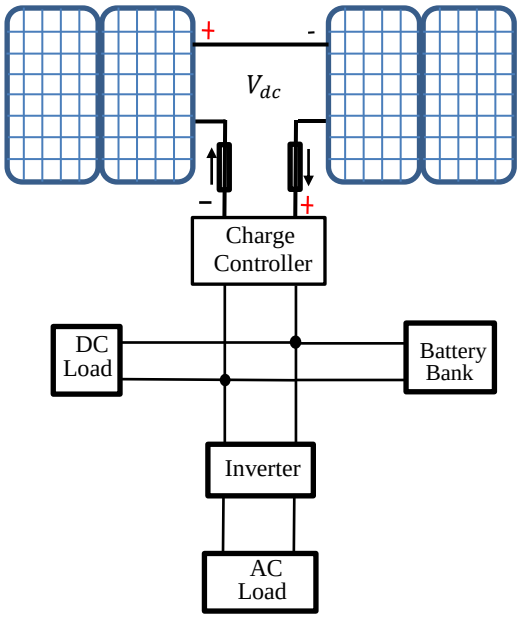


Figure 1. Simplified Standalone System

C. Grid Connected System:

A grid-connected PV system consists of solar panels, one or several inverters, a power conditioning unit and grid connection equipment. The low voltage generated by the plant is stepped up using a transformer and that is connected to grid.

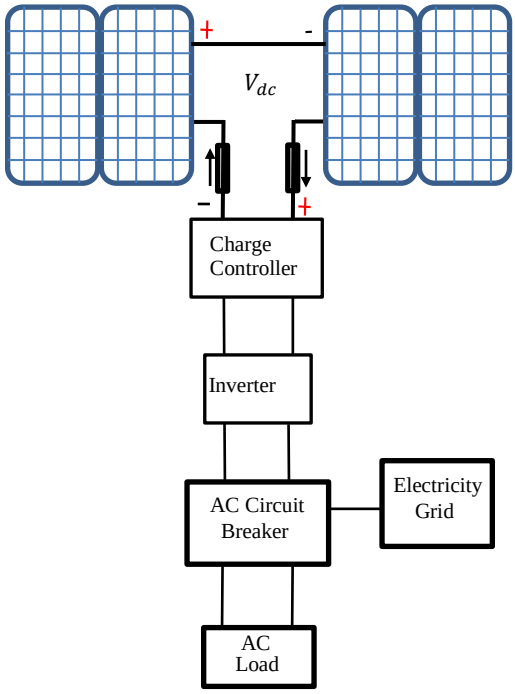


Figure 2. Simplified Grid connected System

III. DESIGN AND CALCULATION

A. Design ofStandalone Solar Power Plant

The Table 1 shows the energy consumption per day of a single house which is located at Bengaluru

Table 1: Energy consumed per day

Sl. N	Items	Pow	Numbe	No. of	Wh
1	Incandes	40	2	1	80
2	CFL	85	1	1	85
3	LED	7	3	6	126
4	Refrigera	11	1	6	690
5	Table	50	1	1	50
6	Mixer	50	1	0.25	125
7	Televisio	12	1	5	625
	Total	99	Total Wh per		1781

No. of units consumed per day =1781Wh or 1.781kWh =1.781units

No. of units consumed in the month of August = 1.781×30 = 53.43units

Bill Amount = Rs. 239.39

Design of solar panel system

Sanction load = 0.00HP + 0.48 kW = 0.48 kW

The solar panel system is designed for 1.0 kW

Expected area required = 10 ×10 = 100 sqft

Expected generation per day: 5-6 Unit/kW

The details of energy consumption per hour in a house are given below based on the connected load.

Table 2. Energy consumed per hour

Sl. No	Items	Power (watts)	Number	Wh per hour
1	Incandescent bulb	40	2	80
2	CFL Bulb	85	1	85
3	LED Bulb	7	3	21
4	Refrigerato	115	1	115
5	Fan	50	1	50
6	Mixer	500	1	500
7	Television	125	1	125
	Total watts	992	Total Wh	976

No. Of units consumed per hour = 0.476

Daily Energy Consumption = 1.781 kWh

Hourly Energy Consumption = 0.976 kWh

1. Selection of inverter:

Inverter is selected for 1.25 times the hourly load.

Rating of Inverter = 1.25×0.976 = 1.22 kW

If a power factor of 0.7 is assumed then, the required inverter rating is = $\frac{1.22}{0.7}$ = 1.7428 kVA

Let an inverter of 1-3 kVA be selected.

2. Selection of Battery:

Battery capacity is selected based on daily energy consumption.

If 12V, 120Ah battery is selected, then the kWh of battery = 12V x 120Ah = 1.44kWh

If the deep discharge value of the battery is 70 %, then the energy to be stored by the battery is the sum of daily energy consumption and extra energy

(30%) that the battery has to store because of deep discharge = 1.781 + (0.3×1.781) = 2.3153 kWh

Number of batteries required is the ratio of total kWh to be stored by the battery and kWh of battery $= \frac{2.3153}{1.44} = 1.608 \approx 2$ Batteries each of 120 Ah

3. Selection of Solar PV panels:

Consider solar PV panel of capacity 250Wp

Average generation is taken as 5 Units per day by a 1kW solar module

To generate 1.781 Units/day, the solar module capacity needed is $= \frac{1.781}{5} = 0.3562$ kW

25% Extra module capacity $= 0.25 \times 0.3562$

$= 0.08905$ kW

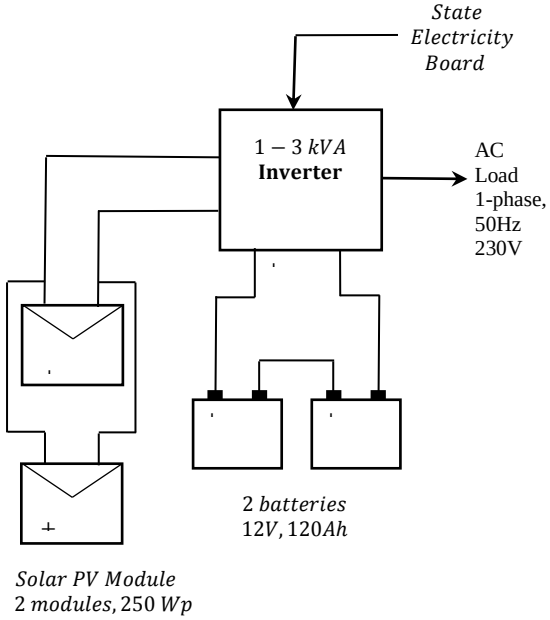
Total solar PV requirement $= 0.3562 + 0.08905$

$= 0.44525$ kW

Number of solar panels required $= \frac{0.44525kW}{250W}$

$= 1.781 \sim$ **2 panels**

For 1.718kWh requirement, 2 panels, 2 batteries and



inverter of 1 kVA are required.

Figure 3. Design of standalone solar PV system

Cost Estimation for Installation 1MW Solar Power Plant:

SOLAR PV MODULE

Cost of 250W panel – Rs. 7000/-

For 1MW Power generation, module cost around Rs. 2.8 Crores

COST OF LAND

Land costs vary from Place to Place and based on the particular location of the projects. However, it must be noted that the land Utilized for Solar projects is to be plane surface. Thus, approximate land cost is Rs. 25 lakhs/MW.

CIVIL AND GENERAL WORK

Civil and general works cost is proposed to be set to Rs. 35 lakhs/MW. The cost of civil works depends on the quality of soil, ground water table, shape of ground, etc.

Civil works include preparation of terrain for digging, levelling and mounting, building control room to house inverter and other components, fencing or boundary wall, cable trenching, arranging water supply, lighting etc.

MOUNTING STRUCTURE

The amount of steel required for 1MW is nearly 50 tons. Cost per ton of steel is about Rs. 60000/- to Rs. 70000/-

The approximate cost for mounting structure is 35 Lakhs/MW

POWER CONDITIONING UNIT

The commission acknowledges the fact that the additional cost of replacement of inverter parts or upgrade of inverter at 12-14 years should be considered. Thus the commission includes additional Rs. 5 lakhs/MW for requisite replacement or upgrade. The PCU cost is thereby set to Rs. 35 lakhs/MW.

EVACUATION COST

Evacuation cost includes, cost of transformers and all DC and AC cabling within the solar farm, including DC cabling between solar PV panels and inverters, junction boxes, AC cabling between inverter and pooling station, Earthing; LT & HT switchgear, step-up transformer, breakers, isolators, protection relays, CT, PT, and metering. It also includes cost of SCADA systems. This cost may be fixed as Rs. 4-

5 lakhs/MW. The total cost for evacuation is hereby set to Rs. 44 lakhs/MW.

Therefore overall cost estimation for 1MW Solar Power Plant is Rs. 4.54 Crores

Area Required for 1MW Solar Power Generation:

Total area required for installation of solar power plant is splited into 4 parts.

1. Area for panel installation
2. Area required to minimize the shading effect by any obstacle.
3. Area for control and service rooms for the inverter and monitoring systems.
4. Additional land area required for the Storage rooms and Worker's room.

In designing of solar power plant each panel considered, is assumed with the capacity of 250W and dimension of 1976 x 990 x 42 mm ($2m^2$)

6 panels are required to generate 1kW thereby area required for 6 panels is $12m^2$ and to generate 1MW $12000m^2$ (3 Acres) area is required.

Area required to minimize the shading effect by any obstacle and area required for control and service rooms for the inverter and monitoring systems is nearly equal to 1 Acre.

Total area required for solar power plant installation is approximately 4 Acres.

Technical Specification and Design Calculations:

Table 3. Technical Specification of Solar PV	
Module type	RI 210
Model Capacity	210 Wp
Solar PV Technology	Polycrystallin
Open Circuit voltage	36 V
Short Circuit Current	7.68 A
Maximum voltage (V)	29 V
Maximum current (I_{max})	7.25 A
Technical Specification of Grid-tie Inverter/Power	
Inverter Capacity	1000 kVA
Minimum Input DC	450 V
Maximum Input DC	850 V
Permissible Voltage limit	900 V
Output AC Voltage	440 V, 50 Hz,3
Technical Specification of Unit	
Primary voltage	11/33 kV
Secondary voltage	440 V
Transformer Capacity	1250 kVA

Grid Connected Plant Capacity = 1000kW

Required voltage to GPCU (String voltage) = 650V

To generate required voltage, the total number of modules to be connected in series = 650/29 = 22

Number of modules in each string = 22

Total power generation per string= 4.713A

To generate a required power, total number of string connected in parallel per inverter = (Capacity of GPCU/ Total power generation per string) = 212

Total number of modules used per Inverter = (Number of strings x Number of modules in a string) = 4756

Total Installed Capacity per inverter = (Total number of module× each module capacity) per Inverter = 999kWp

Total energy generation @ 5hours average per day per inverter = (Total installed capacity per inverter x 5hours) = 4994kWh/day

Total energy generation per year (for 300 days) per inverter = (Total installed capacity per inverter x 5 x 300) = 1498MWh/year = 1.5MU

Total AC power generation per Inverter = (Total DC power generation - Total loss) = 1000 – 240 = 760kW

Unit Transformer Capacity = 1250kW

Proposed Unit Transformer Capacity = (Unit transformer capacity x Total installed capacity) = 1250kVA

Total No. of Unit Transformer = (Proposed Unit Transformer Capacity x power factor) = 1

Table 4. Economic Analysis	
Investment Cost	4Crores/MW
Total Investment Cost	Rs.4 Crores
Total O & M Expenditure for the Life of SPVPP @ Rs 25 Lakhs/Year/MW	625Lakhs / 25 Years
Over all Expenditure (Total Investment Cost + Total O&M Expenditure)	Rs.10.25 Crores
Area Required	4 Acres/MW
Total Area Required	4 Acres

Life of the SPV modules	25 Years
Tariff as per KERC	Rs 6.51/unit
Total Revenue (Total Energy Generation x Tariff)	Rs.97.54 Lacks/ year
Payback period excluding Interest and O&M expenditure = (Total Investment Cost/Total Revenue)	4.1011387 years

IV. CONCLUSION

This paper has discussed the design of Standalone solar power plant and grid connected solar power plant with the following features: (a) plant power generation can be maximized by considering the factors affecting the generation of power; (b) data collection and estimation of power generation will lead to minimize cost, losses and makes installation easier. Individual can install solar power plant based on estimation of energy consumption per month. Total power generation of 1498216kWh/year from solar power plant with installed capacity of 1MW. Referring to the above solar power plant, 1498216kWh/year is the total conventional energy savings @1unit saved equal to 2 units generated, 1498216kgs/year is the total coal saved @1kg/unit, 4944114Lts/year is the total water saved @ 3.3Lts/unit, 1498216kgs/year is the total Co2 + GHG saved @ 1kg/unit generation at consumer point.

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PCA for Processing Tank Using PLC

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ABSTRACT

In this work we are going to implement the automation for a process tank to control the power variable like temperature, level and product mixing by measuring and controlling the flow ratio. Here we are going to arrange the magnetic flow meter for flow measurement and gauge type level transmitter for level measuring purpose. RTD sensors are used for temperature measurement purpose. Their will be two fluids which will flow through the respective valve to the open tank according to the predetermined ratio, up to the predetermined liquid level measured by level transmitter. Once this level is reached the supply to the heating coil will be ON and the fluid is heated up to certain desired temperature which is sensed by RTD. When the fluid reaches the predetermined temperature slushing will start and the command will go to agitator and then it is pumped out by the VFD operated motor. All these operation sequence logics will be programmed in ABB PLC and the programming tool is ABB Automation Builder. The total operation can be monitored, controlled through ABB SCADA

Keywords: PLC, RTD sensors, Level transmitter, VFD fed IM, ABB Automation builder, CoDesys

I. INTRODUCTION

Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector. So that processing tanks require continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also the lack of few features of microcontrollers. Thus this project takes a sincere attempt to explain the advantages the companies will face by implementing automation into them. The process control which is the most important part of any processing plant, and its automation is the precise effort of this project. In order to automate a processing plant and minimize human intervention, there is a need to develop a SCADA (Supervisory Control and Data Acquisition) system that monitors the plant and helps reduce the errors caused by humans. While the SCADA is used to monitor the system, PLC (Programmable Logic Controller) is also used for the internal storage of instruction for the implementing function such as logic, sequencing, timing, counting and arithmetic to control through digital or analog input/ output modules various types of machines processes. Systems are used to monitor and control a plant or equipment in industries such as temperature, liquid level, and ratio of product mixing.

II. METHODOLOGY

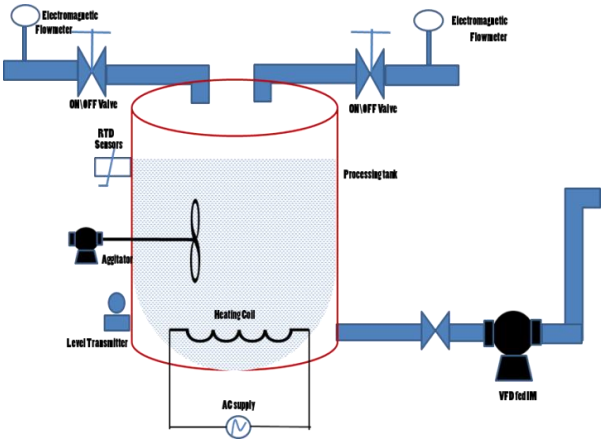


Fig 2.1: Block Diagram of PCA for processing tank using PLC

Fig 2.1 shows the Block Diagram of Fire Fighting robot. Over the years the demand for high quality, greater efficiency and automated machines has increased in the industrial sector. So that processing tanks require continuous monitoring and inspection at frequent intervals. There are possibilities of errors at measuring and various stages involved with human workers and also the lack of few features of microcontrollers. Thus this project takes a sincere attempt to explain the advantages the companies will face by implementing automation into them. The process control which is the most important part of any processing plant, and its automation is the precise effort of this project. In order to automate a processing plant and minimize human intervention, there is a need to develop a SCADA (Supervisory Control and Data Acquisition) system that monitors the plant and helps reduce the errors caused by humans. While the SCADA is used to monitor the system, PLC (Programmable Logic Controller) is also used for the internal storage of instruction for the implementing function such as logic, sequencing, timing, counting and arithmetic to control through digital or analog input/ output modules various types of machines processes. Systems are used to monitor and control a plant or equipment in industries such as temperature, liquid level, and ratio of product mixing.

HARDWARE &SOFTWARE DETAILS

HARDWARE USED:

1. Magnetic Flow Meter

Fig 3.1 Electromagnetic flow meter

Fig 3.1 shows Electromagnetic flow meters, or magnet meters, are comprised of a transmitter and sensor that together measure flow. The magnetic flow meter's sensor is placed inline and measures an induced voltage generated by the fluid as it flows through a pipe.

The transmitter takes the voltage generated by the sensor, converts the voltage into a flow measurement and transmits that flow measurement to a control system.

2. RTD Sensor

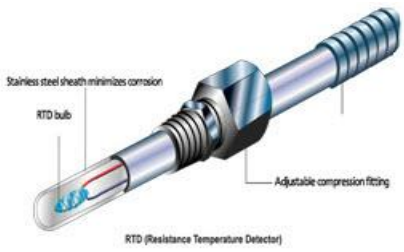


Fig 3.2: RTD Sensor

The main advantages are less expensive, more rugged and vibration resistant.

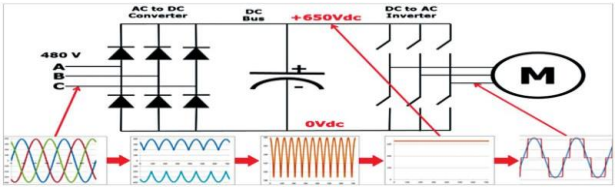
An RTD (resistance temperature detector) is a temperature sensor that operates on the measurement principle that a material's electrical resistance changes with temperature.

3.Level Transmitter

Fig 3.2 Level Transmitter

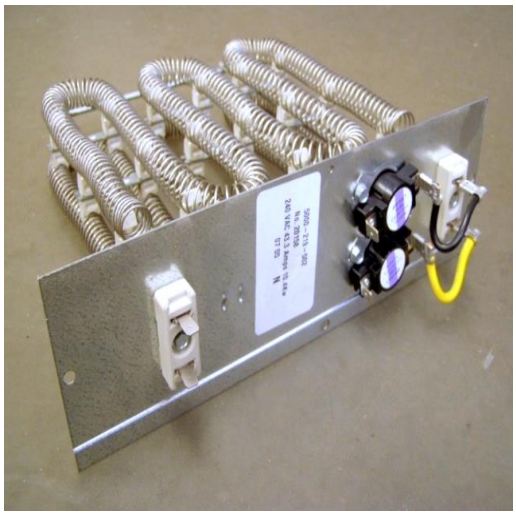
A level sensor is a device for determining the level or amount of fluids, liquids or other substances that flow in an open or closed system. Continuous level sensors are used for measuring levels to a specific limit

3. VFD Fed Induction Motor



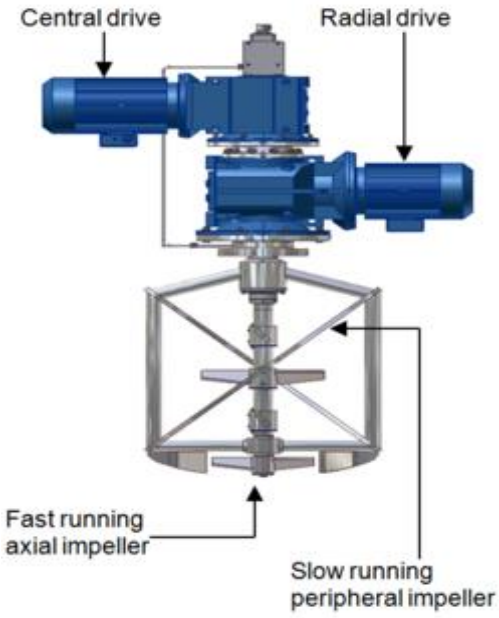
VFD is a power electronics based device which converts a basic fixed frequency, fixed voltage sine wave power (line power) to a variable frequency, variable output voltage used to control the speed of motor. It regulates the speed of a three phase induction motor by controlling the frequency and voltage of the power supplied to the motor.

4. Heater:



Electric heater is a device which converts heat energy into electrical energy by using metal as an heating element. Metals allows flow of current through them and produces heat.

5. Agitator:



Industrial agitators are machines used in industries that process products in the chemical, food, pharmaceutical and cosmetic industries, in a view of:mixing liquids together,promote the reactions of chemical substances, keeping homogeneous liquid bulk during storage, increase heat transfer (heating or cooling).

SOFTWARE REQUIREMENTS

1. Automation Builder

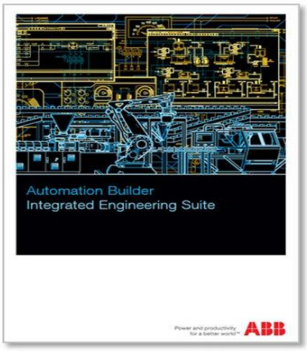
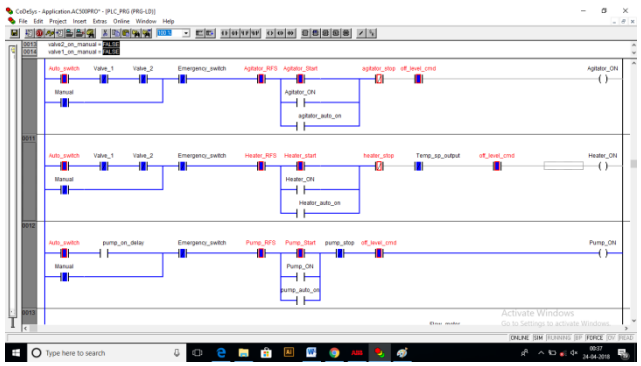


ABB Automation Builder is the integrated software suite for machine builders and system integrators wanting to automate their machines and systems in a productive way. Combining the tools required for configuring, programming, debugging and maintaining automation projects from a common intuitive interface, Automation Builder addresses the largest single cost element of most of today's industrial automation projects: software

2.CoDeSys

CoDeSys is a complete development environment for your PLC. (CoDeSys stands for Controlled Development System). CoDeSys puts a simple approach to the powerful IEC language at the disposal of the PLC programmer. Use of the editors and debugging functions is based upon the proven development program environments of advanced programming languages (such as Visual C++).

III. RESULTS ANDCONCLUSIONS



The most important aspect of any processing plant is the processing control. Several techniques can be implemented to control the processing tank in processing plant. The method that has to be used relies on varied objectives like superior quality, increased efficiency, high profit and other such points depending upon the purpose of the company that implies it. With the prime objective of catering to these necessities and the needs of the industrial sector, significance has been given here to automation

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Stability Analysis on Power System

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ABSTRACT

Stability is an important constraint in power system operation and control .The transient stability is an important aspect in designing and upgrading electric power system. This paper presents the concept of power system stability, reasons for instability and the transient state stability analysis of power system is done using the capacitor bank and induction motor model in the MATLAB/SIMULINK environment. By adding capacitor bank reactive power is improved which in turn enhances the active power of the system. The instability caused by the induction motor is also analysed in this paper.

Keywords: MATLAB/Simulink, stability, capacitor bank, induction motor.

I. INTRODUCTION

Power system is a vast and major portion of electrical engineering studies. It is mainly concerned with the production of electrical power, its transmission from the sending end to the receiving end as per consumer requirements, incurring a minimum amount of losses. The power at the consumer end often changes due to the variation of load or due to disturbances induced within the length of transmission line. For this reason, the term **power system stability** is of utmost importance in this field. Another factor that needs to be considered to understand stability well is the stability limit of the system. It is the maximum amount of power delivered from the system without loss of synchronism.

Reasons For Instability

Instability in power system can be caused by a series of events that can lead to the loss of system stability. Power system stability is the ability for the system to find a stable state following an event, stable state means that all voltages and frequency are in their boundaries and no equipment is under stress.

Each and every power system encompasses various synchronous machines including generators, motors and other rotating machines, which are working in power system by maintaining proper synchronism under all steady state conditions. Synchronism of a power system gets disturbed, when disturbances occur in power system. In other words disturbances occur when the parameters of power system component's characteristics deviate from their normal working range leading to instability of the system.

Sudden changes in loads connected to the grid, like either sudden increase or decrease in load that can lead to over or under voltage conditions, both of which are not good at all leads to instability.

Problem formulation

A power system is designed to handle several load demand scenarios. This design is done much in advance (planning stages) based on the expected demand, while keeping some reserve "margins" for situations in which one or more equipment is out of service. However during operation, it is not possible to requisition or install equipment at short notice. Therefore, an operator is forced to ensure that the system is operated within the existing design constraints.

The different constraints in the power system are

- **Equality constraints:**

The equality constraints are represented by the power balance constraint, where the total power generation must cover the total power demand and the power loss.

$$P_g = P_d + \text{loss}$$

Where P_g = power generated P_d = power demand

- **Inequality constraints:**

The inequality constraints are the constraints where the total power generated is not equal to the total power demand and power loss.

$$P_g \neq P_d + \text{loss}$$

Where P_g = power generated P_d = power demand

The inequality constraints reflect the limits on physical devices in the power system as well as the limits created to ensure system security.

Upper and lower bounds on the active and reactive generations:

$$P_{gimin} \leq P_{gi} \leq P_{gimax}, \quad Q_{gimin} \leq Q_{gi} \leq Q_{gimax}$$

Upper and lower bounds on the bus voltage magnitude:

$$V_{imin} \leq V_i \leq V_{imax}$$

Stability constraints: A power system may not be able to cater to power flows beyond a certain point due to stability constraints. An unstable system is the one which cannot withstand disturbances, i.e., it may not settle to equilibrium although a post-disturbance equilibrium condition may exist. This is due to the basic physical characteristic which defines the behaviour under transient conditions. Improvement of stability may require system reinforcement (like adding new transmission lines) and/or improving/augmenting existing automatic controllers.

II. ANALYSIS USING CAPACITOR BANK AND INDUCTION MOTOR CIRCUIT

Single line diagram

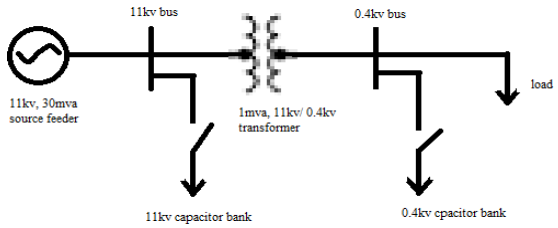

Figure 1. Single line diagram of capacitor bank energising circuit

The figure shows the single line diagram of capacitor bank energising model that consist of a 11KV, 30MVA source feeder connected to a 11KV bus, a 1MVA, 11KV/0.4KV transformer the primary of which is connected to the 11kv bus and secondary is connected to 0.4KV bus, a load is connected to the 0.4KV bus, a 11KV capacitor bank is connected to the 11KV bus through the switch and a 0.4KV capacitor bank is connected at the 0.4KV bus through the switch. The stability of the system is analysed in the simulink environment after the switches of capacitor bank are closed one after the other

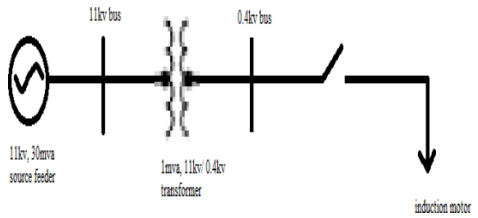

Figure 2. Single line diagram of Induction motor starting circuit

The figure shows the induction motor starting model that consist of a 11KV, 30MVA source feeder connected to a 11KV bus, a 1MVA, 11KV/0.4KV transformer the primary of which is connected to the 11KV bus and the secondary is connected to the 0.4KV bus, an induction motor along with the resistive load is connected at the 0.4KV bus through the switch. The instability caused by the motor is analysed in the MATLAB/Simulink environment.

III. MPLEMENTATION USINGMATLAB/SIMULINK

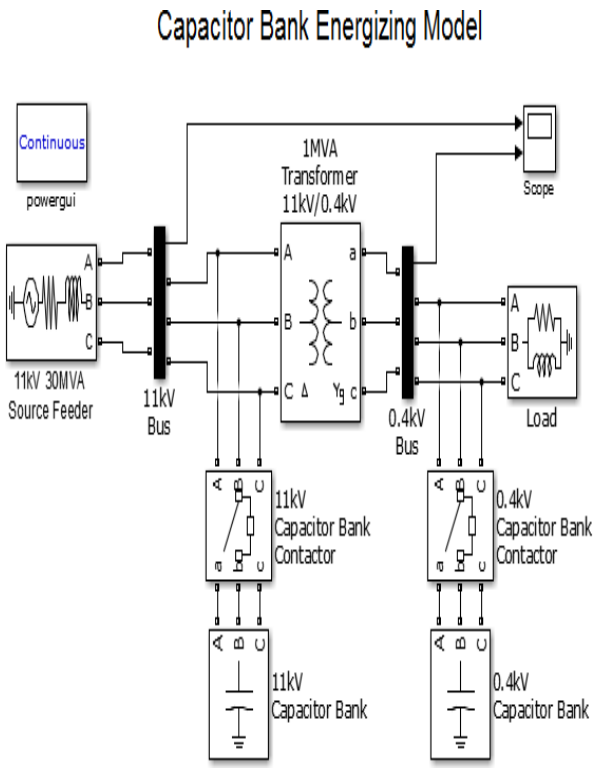

Figure 3. Simulink model of capacitor bank

By considering a capacitor bank energizing model the reactive power of the system can be improved. This is shown in the above figure.

The capacitor bank energizing model consists of a 11kV 30MVA source feeder, a of 1MVA, 11kV/0.4kV transformer, two buses of 11kV and 0.4kV,two capacitor banks of 11kV and 0.4kV,two capacitor bank contactor of 11kV and 0.4kV and a load.

The disturbances created when both the capacitor contactors are open, when one of them is closed and other open and when both the contactor are closed are studied and the stability of the system is analysed.

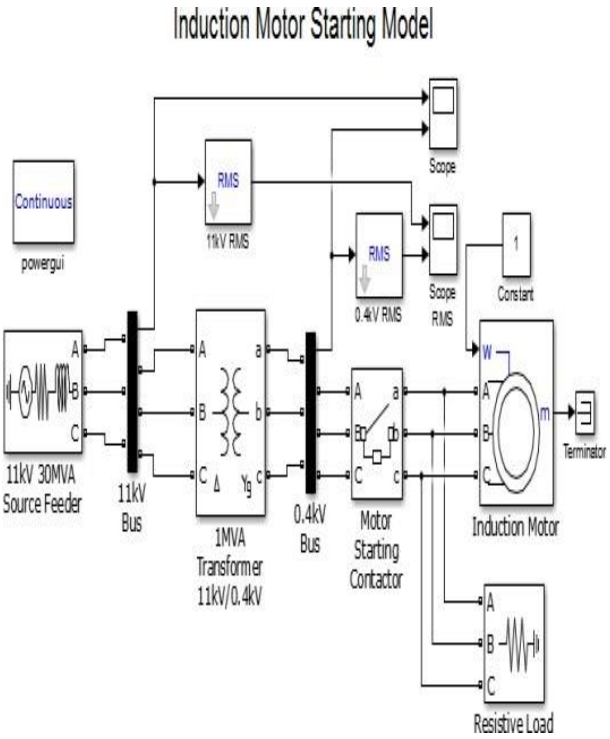

Figure 4. Simulink model of induction motor

The induction motor when switched on draws high starting current; this can be studied using the induction motor starting model as shown in the above figure.

The model consist of 11KV, 30MVA source feeder ,a 1MVA, 11KV/ 0.4KV transformer , two buses of 11KV and 0.4KV , a motor starting contactor and a induction motor with an resistive load.

The instability caused by the motor due to high starting current can be analysed using MATLAB/Simulink that are discussed in the result section.

IV. RESULTS AND DISCUSSIONS

Capacitor bank energising model

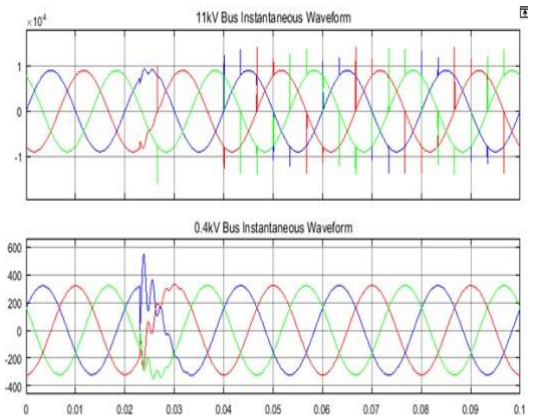

Figure 5. Waveform when both the capacitor bank contactor are open.

The above waveform shows the result of the capacitor bank energizing model when both the capacitor bank contactor are open. The simulation time for the capacitor bank energizing is selected as 0.1 sec (10 cycles). It can be seen that when both the contactors are open there is disturbance at the 11KV bus from the duration 0.02-0.03 sec and 0.04-0.1 sec. At the 0.4KV bus the disturbance occurs from 0.02-0.03 sec.

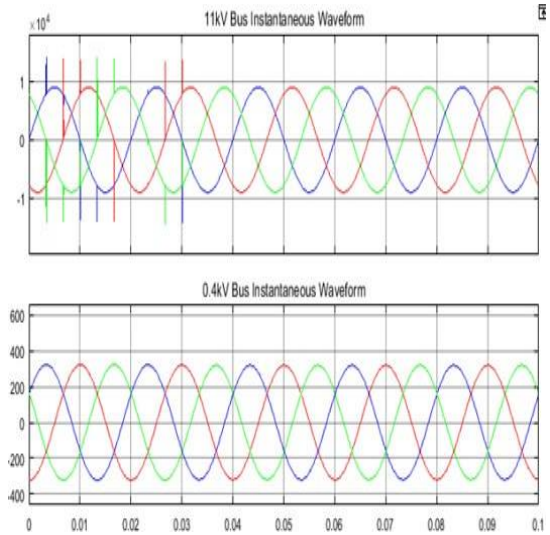

Figure 6. Waveform when 11kV contactor is open and 0.4kVcontactor is closed.

The above waveform shows the result of capacitor energizing model when the capacitor bank contactor is open at the 11KV bus and contactor at 0.4KV bus closed. The simulation time for the capacitor bank energizing is selected as 0.1 sec (10 cycles). The simulation results show that the disturbance occurs in the duration 0-0.03 sec and is cleared at 0.03sec at the 11KV bus with the normal operation at 0.4KV bus.

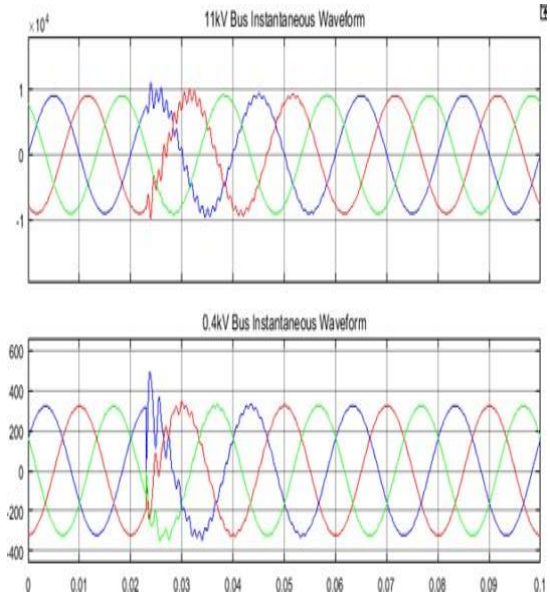

Figure 7. Waveform when 0.4kV contactor is open and 11Kv contactor is closed.

The above waveform shows the result of capacitor energizing model when the capacitor bank contactor is open at the 0.4KV bus and contactor at 11KV bus closed. The simulation time for the capacitor bank energizing is selected as 0.1 sec (10 cycles). From the simulation results it can be seen that at the 11KV bus the disturbance occurs between 0.02-0.06 secs and is cleared from 0.06 sec. At the 0.4KV bus it is seen that the maximum disturbance occurs between 0.02-0.04 secs and is completely cleared at 0.06 sec.

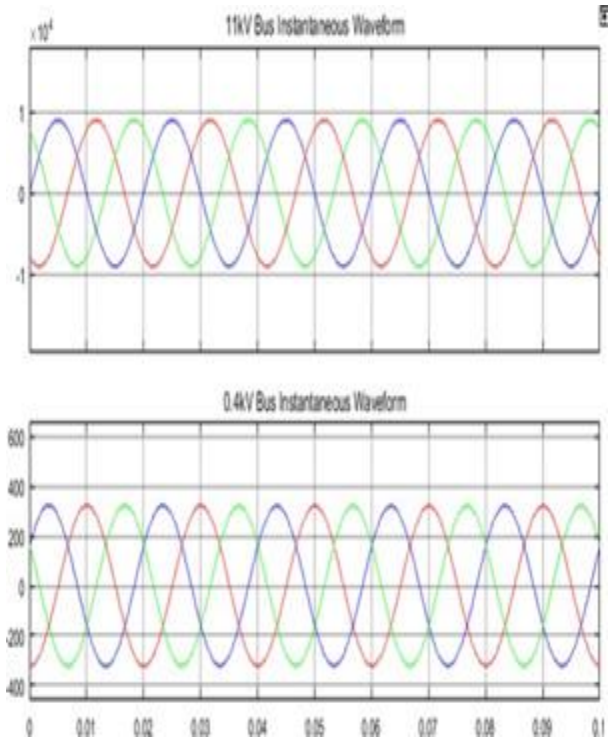

Figure 8. Waveform when both the contactors are closed.

The above waveform shows the result of the capacitor bank energizing model when both the capacitor bank contactor are closed. The simulation time for the capacitor bank energizing is selected as 0.1 sec (10 cycles). From the simulation results it can be seen that when both the contactors at the buses are closed the power generated from the source is delivered to the load efficiently without any disturbances. Hence when a capacitor bank is connected at the load side where the disturbance occurs more, these disturbances are reduced with the use of capacitor banks that increases the reactive power which in turn enhances the active power at the load and thus the system become balanced.

V. INDUCTION MOTOR STARTING MODEL

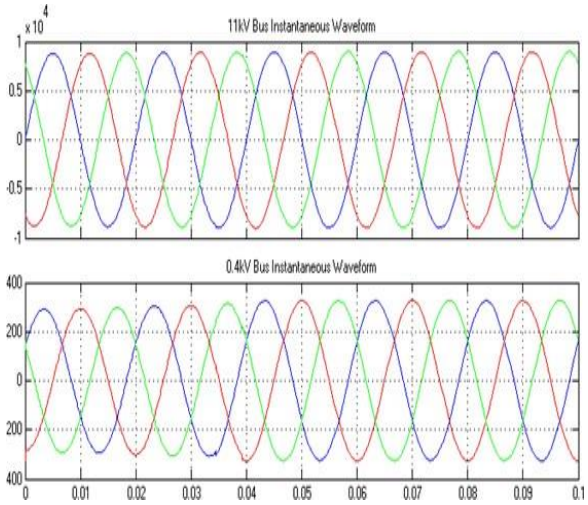

Figure 9. Waveform under normal condition

The figure 9 shows the supply waveform of all the three phases supplied to the induction motor connected to the load bus. It can be seen that the magnitude of the voltage in all the three phases remains the same at both the buses.

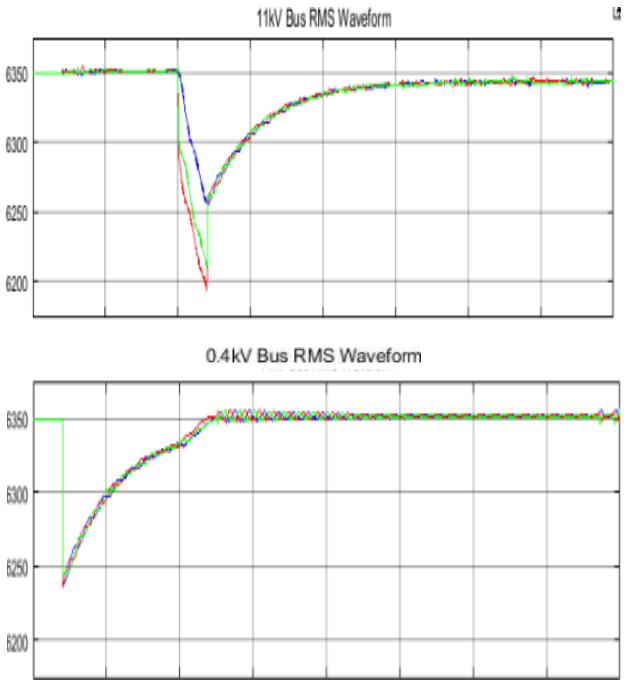

Figure 10. Induction motor characteristics during starting

Figure 10 shows the induction motor starting characteristics. It can be seen that when the induction motor is started the magnitude of the voltage decreases suddenly due to high starting current hence the voltage reduces at 0.12 sec and

later the voltage starts to increase exponentially and becomes stable at 0.25sec. Similarly the voltage magnitude of all the three phases at0.4kv bus decreases' suddenly that leads to the instability and the voltage increases gradually after and results in the stable system.

VI. CONCLUSION

The stability of the system is studied and analysed using capacitor bank energising model and the induction motor starting model. The induction motor characteristics during starting and under normal condition are studied and the simulation results shows that when a capacitor bank is connected at the load side where the disturbance occurs more, the disturbances are reduced and the reactive power is improved which in turn enhances the active power at the load and thus the system becomes stable.

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