National Conference on Engineering Innovations and Solutions (NCEIS – 2018)
International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 4 | Issue 6 | ISSN : 2456-3307

# Smart Roadway Lighting and Security System

**Afreen khan[1], Afreen Taj[1], Ameerah khannam S[1], Gowtham B M[1], Archana M R[2]**
[1]8th sem students, Department of Computer Science & Engineering/ATME College of Engineering/ Mysuru, Karnataka, India
[2]Asst.Professor, Department of Computer Science & Engineering/ATME College of Engineering/ Mysuru, Karnataka, India

## 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

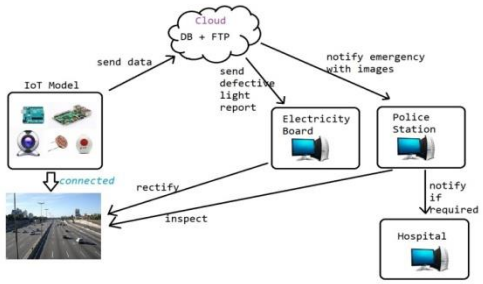


**Figure 1**

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.

## VII. REFERENCES

1. Archana. G, Aishwarya N, Anitha J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology,Vol-3, Issue-4, 2015.
2. AkshayBalachandran, Murali Siva, V. Parthasarathi, Surya and Shriram K. Vasudevan "An Innovation in the Field of Street Lighting System with Cost and Energy Efficiency"Indian Journal of Science and Technology,Vol-8, August 2015
3. DeepanshuKhandelwal, Bijo M Thomas, KritikaMehndiratta, Nitin Kumar "Sensor Based Automatic Street Lighting system" International Journal of Education and Science Research Review Volume-2, Issue-2 April- 2015 .
4. IsahAbdulazeez Watson, OshomahAbdulaiBraimah, Alexander Omoregie " Design and Implementation of an Automatic Street Light Control System" International Journal of Emerging Technology and Advanced Engineering, Volume 5, Issue 3, March 2015.
5. KapseSagar Sudhakar1, AbhaleAmol Anil2, Kudakechetan Ashok3, ShirsathShravan Bhaskar4 "Automatic Street Light Control System" International Journal of Emerging Technology and Advanced Engineering"Volume 3, Issue 5, May 2013.
6. Mustafsaad, AbdalhalimFarij, Ahamed Salah "Automatic Street Light Control System Using Microcontroller" Mathematical method and Optimization Technique in Engineering ISBN: 978-960-474-339-1.
7. SaksheeSrivastava, "Electronics And Communication Engineering, Institute Of Technology And Management AL-1, Sector-7, GIDA, Gorakhpur, U.P., INDIA" Advance in Electronic and Electric Engineering. ISSN 2231-1297, Volume 3, Number 5, 2013.
8. Prof. K.Y.Rajput, GargeyeeKhatav, Monica Pujari, PriyankaYadav, "International Journal of Engineering Science Invention" www.ijesi.org.