A Survey on IoT Based Smart Home Automation Car Theft Prevention using Image Processing

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ABSTRACT

The paper introduces car theft prevention in Home and Smart Home automation using image processing Techniques. Nowadays car Theft Prevention is important to keep our vehicle safe and secure in all times. Home automation system is important for controlling and automation of Home appliances without direct human interruption which may Helpful for Elderly and disabled peoples.

Keywords : Car theft prevention, face Recognition, home automation

I.   INTRODUCTION

A)Home automation system is one of the automation systems used for controlling Home appliances it is used for controlling door locking and unlocking status, lights, air conditioning in the house ,control electrical and electronic appliances and so on using appropriate sensors and controllers.

Advantages of Home automation
- Security
- Energy efficiency
- convenience and comfort
- peace of mind

B) Car Theft prevention

Today era the use of vehicle is must for everyone .some time ratio of vehicle theft increasing day by day. Hence keeping our vehicles safe secure at all times should be prime importance .in this paper various technologies such as using RFID Tag, finger print method, steering wheel lock ,setting cameras provides security to safeguard to prevent the cars from theft.

C) Image processing

Image processing is one of the form signal processing.in image processing input is an image output is in the form of image or set of characteristics related to the image.in this paper image processing methods such as Face recognition, face detection are used to provide noncontact mechanism for finding the identity of the person. Face recognition and face detection security system are used in various fields to check whether he/she is authorized or unauthorized person and sends images to required person using various type of communication technologies .GSM modules are attached with the security system that sends unauthorized persons image to required using person MMS and emails.

II. LITERETURE SURVEY

A.ANDROID BASED HOME AUTOMATION SYSTEM USING BLUETOOTH & VOICE COMMAND

Bhavik pandya, Mihir Mehta, Nilesh Jain [1] describes that Here Home automation system is based on Arduino microcontroller, Bluetooth module for connecting the appliances and smartphone for signal transfer. The system also supports voice command. It decodes the user voice command and extracts the exact meaning of his/her voice. Android application in the users android device designed to receive voice command from user .application convertor converts voice signal to digital data signal & sends it to tmicrocontroller.IR sensor, Temperature sensor, and Gas leakage sensor are used. Sensors   senses the various changes in home and sends it to the home owners and users can control home appliances using Bluetooth modules with voice commands.

B.IMPROVINGSMARTHOME SECURITY; INTEGRATING LOGICAL SENSING INTO SMART HOME

Arun Cyril Jose,Reza Malekian, senior Member[2] describe that Home automation based on Raspberry pi, ZigBee communication. Logical sensing algorithm is used which works by analyzing multiple proximity and motion sensor values before and after the doors opened or closed. here there are two access points use, primary access point is main door in and out of the home. secondary access point is windows and balcony door. proximity sensors, motion sensors are placed near the access point inside the home are triggered before the door is opened. once the user stepped out and closes the door the sensors will not be triggered. Temperature sensors and gas sensors are used to sense the changing temperature and gas leakage. fire alarm is triggered if something out of ordinary happens and send alert message to the user. A microcontroller switch is used at the doors and windows to sense the state of doors and windows. PIR motion sensor, Ultrasonic range sensors are capable of non-contact measurement from 2cm to 400cm.and used to identify user activities inside the home near an access point. here the communication is based on ZigBee technology standard IEEE 802.15.4 with a range varying from 10m to 100m.

C.ENCHANCED SMART DOOR BELL SYSTEM BASED ON FACE RECOGNITION

Ayman Ben Thabet CEMLab,ENIS, University of Sfax, Tunisia.Nidahal Ben Amor CMLab, Enis University of Sfax,Tunisia, Lehrstuhl fur Mess-und Sensortechink,TU Chemnitz,Germany [3] describes image processing by porting open library to the Raspberry pi board. Algorithm for face recognition is based on principle component analysis (PCA).

a) Face detection
The role of the section is to resolve the images in order to determine the location of faces appear and pinpoint the location of faces to prepare for cropping.

b) Feature Extraction
To avoid environmental deficiencies like illumination, face expressions, occlusion and clutter. Feature extraction are implemented to extract information from the image in order to reduce dimension, conspicuous extraction and noise decreasing.

c) Face recognition
After preparing training file vector matching algorithm is applied between the stored data and input Image comes in face detection will pinpoint the traits of face and compare the extracted feature to the image available in database. here two methods used such as face identification the system could recognize the person through a given face image could precise the most probable identification using Eigen Face algorithm. face verification is used to differentiate a given image matches or not.

Raspberry pi mode B embedded board is used it only entails few hard devices wireless network adaptor, memory card push button and a web cam .which offers better manipulation with wireless flexibility and low cost of equipment inform the owner of new visitors when the doorbell is push on android application providing the user a notification showing the name and the last visit time is created.

D.IMAGE PROCESSING BASED ON REAL TIME VEHICLE THEFT DETECTION AND PREVENTION SYSTEM

In this paper A. Pazhampilly Sreedevi B. Sarath S Nair [4] describes that here the face recognition system is used to check whether the person trying to access the car is authenticated driver or not. The technology used here is face recognition and face detection .Hardware module includes image acquisition system ,sensors microcontrollers Alarm, and relay. Image acquisition is done using a digital camera .software module includes face detection and face recognition here camera will provide which captures the image and sends to microcontroller unit. PIR sensor used to detect the presence of driver .only the sensor detect the presence of driver microcomputer start processing the image .face recognition and face detection are used to get accuracy to find the intruder PCA algorithm is used in face recognition it is simple to code PCA algorithm which involves dimensionality reduction. Reduction in dimensionality demands less processing time and less memory

E.SECURITY SYSTENM FOR CAR USING RFID, THUMB IMPRESSION, STEERING WHEEL LOCK BASED ON ARM7

Shital Y. Gaikwad and Maheswari V.C **[5]**describes that security system for Car is based on Global system for Mobile, GSM, RFID, in-camera, steering wheel lock is developed to prevent a car.it consists of GSM, GPS, RFID, sensors. When anybody opens the door of vehicle it will ask for correct RFID identification then accelerometer sensor is used to measure any breaking of windows and movement of car when the key is inserted, message displays on liquid crystal display asking the user to enter the thumb impression if he fails to enter the correct thumb impression in three trails ,a text message is sent to the owner.it also has steering wheel lock used for more prevention. further connection to the fuel injector of the car is stopped so that unauthorized person cannot start the vehicle Hardware used in this paper is ARM 7 microcontroller. GPS is used in worldwide and it is useful tool for map-making, commerce scientific uses, land surveying.

F.FACE RECOGNITION USING LOCAL BINARY PATTERNS (LBP)

Md.AbdurRahim,Md.NajmulHossain,Tanzillahwahid and Md.Shafijul Azam**[6]**describes that face recognition of a human being conveys a lot of information about identity and emotional state of a person. This paper mainly consists of three parts

1) **Face Representation** represents how to model a face and face image determines the successive algorithms and classification

2) **Feature Extraction** the most useful and unique features the face image are extracted in feature extraction phase

3) **Classification** face image is compared with images from database

Therefore here face recognition is based on Local Binary pattern where first face area is divided into small regions. Histograms are extracted and concatenated into a single feature vector which forms an efficient representation of the face and is used to measure similarities between images

G.THE FACE RECOGNITION ALGORITHMS BASED ON WEIGHTED LTP

Haifeng Zhang&Shenjie Xu Hangzhou DionziUniversity,Hangzhou,china**[7]** describes that

LTP is applied for texture classification problems. This paper proposes an approach of weighted LTP to show facial feature effectively

1) Original face image divided into blocks
2) LTP characteristic value and histogram of each pixel are calculated by information entropy and histogram of whole face image cascade of the histogram of all sub regions.
3) The weighted Histogram of whole face image is calculated by chi-square distance the classification is performed by nearest neighbor classifier.

III. METHODOLOGY

There are various sensors & communication technologies used in Home automation, also various sensors such as temperature sensor, PIR sensor, motion sensor, gas sensors used communications such as Bluetooth, ZigBee wi-fi communications are used and in Face recognition PCA,LBP algorithms are used to get the best accuracy .car theft prevention uses RFID, thumb impression, steering wheel lock technology are used in this paper they are done to operate all appliances in home without direct human interface and prevent car theft in home.

Concept	Problem statement	Solution	Methodology/ components	Pros and cons
Android based home appliances using Bluetooth and voice command	Low distance Coverage, security issues, high power consumption	Using Artificial intelligence makes the system more user friendly and increase the automation process	Arduino Micro controller Bluetooth, Smartphone android app, Smart speech sense convertor	Pros: low cost, scalable according to the requirements Cons: Low distance Coverage
Improving Smart Home Security; integrating Logical Sensing into Smart Home	ZigBee communication ranges from 10m to 100m	Using various wireless communication technologies gives more range coverage	Raspberry pi, Arduino micro controller, Temperature sensor, PIR sensor, ZigBee communication	Pros: secured wireless communication Cons: Shortest distance coverage
Enhanced smart doorbell system based on Face recognition using PCA algorithm	Dimensionality of data increases, finding patterns in data become difficult .Accuracy affected with data size	Using Local binary pattern with hardware arrangement give good performance in real time	Raspberry pi with ARMv7 cortex A7 as the core and Open cv Library, face recognition using PCA algorithm	Pros: low power consumption, improved operation speed, cons: accuracy affected with data size
Real time car theft detection and prevention based on Image processing	Using 2D PCA based face recognition there is a problem in uniform illumination and threshold determination	PCA with neural network improves accuracy of image	Image acquisition, Sensors, alarm, Relay, digital camera, face recognition face detection, GUI	Pros: reduces increased amount of vehicle theft
Security system for car using RFID thumb impression, steering wheel lock	No face recognition	Adding Face recognition provides improved security	GSM,GPS, RFID, thumb impression steering wheel lock	Pros: Low cost, excellent vehicle anti-theft control system Cons :lack of Face recognitions
Face Recognition using LBP	The recognition after certain degrees of rotation is not possible	Implementing algorithms to deal with more degrees of	LBP, feature extraction,	Pros: LBP with hardware gives good performance

		rotation gives better performance	pattern recognition, Histogram, feature vector	Cons: permissible range of rotation -10 degree to 10 degree
The face recognition algorithm based on weighted LTP	Dealing with difficult lightning conditions and difficult to noises in face image	Implementing more discriminative features improve robustness and accuracy of face recognition	LTP, LBP, Face Recognition, Histogram Statistics. nearest neighbor classification	Pros: Shows facial features effectively Cons: difficult in dealing with different lightning Conditions

IV. RESULTS AND DISCUSSION

Various sensors are used in home to sense temperature, gas leakage and human behavior which senses and sends the information to the recipient and recipient successfully control the home appliances using Bluetooth, ZigBee and wi-fi communications. Face recognition provides accuracy and car theft can be prevented using RFID, thumb impression and steering wheel lock.

V. CONCLUSION

By using the technologies Home automation is very useful for elderly peoples and disabled peoples in home .car theft prevention is more helpful and useful to safeguard and secure our cars in home. Enhancing Algorithms used in face recognition provides better accuracy

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