

Vehicle Security System using Face Recognition based on Internet of Things

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Abstract -Now a days vehicle technology system is getting increased research popularity and adding a vehicle theft security system in order to avoid getting vehicle theft in the parking and sometimes driving in unsecured places. In this current world where technology is growing up day by day and scientific researchers are presenting new era of discoveries, the need for security is also increasing in all areas. At present, the vehicle usage is basic necessity for everyone. Simultaneously, protecting the vehicle against theft is also very important. When the vehicle is stolen, no more information is available to help the owner of the vehicle to find it back. So, in this proposed vehicle security system based on internet of things the face detection system (FDS) is used to detect the face of the driver and compare it with the predefined face. The vehicle security system performs image processing based on real-time user authentication using face detection and recognition technique. As soon as the image is acquired from the activated camera, the face of the person is detected. The extracted face is recognized using the HAAR cascade algorithm. It is used to detect the face of the person as authorized or unauthorized. The authorized persons only access the vehicle ignition. If unknown person is detected, the theft image will be send to the vehicle owner by using IMAP protocol and signal send to controller unit through serial communication for activates the electromechanical relay for lock the ignition system. GSM will send alert SMS to authorized person .

Keywords: Face detection system, Internet of things, Haar cascade algorithm, IMAP protocol, GSM (Golbal System for Mobile Communication),SMS.

I.INTRODUCTION

The use of vehicle becomes important everywhere in the world and also preventing it from theft is required. Vehicle manufacturers are attaining the security features of their products by introducing advanced automated technologies to avoid the thefts particularly in case of cars. Biometric systems are modern and use techniques like fingerprint recognition, in our project face recognition and detection systems are more sophisticated, easy to deploy and people can be identified without their knowledge. In this world, everyone and every industry likes to keep in pace with the advancement in the technology. Automobile industry is also not behind in this aspect. Nowadays almost everyone has a car. As purchasing a car is a big investment people are really concerned about the advanced technologies in automobile industry. Therefore, automobile companies have witnessed a major boost in their technological aspects by introducing automation in the vehicles to provide user friendly and advance features to their customers. As far as vehicle security is concerned many options are available depending upon the technology being adopted. Many auto theft alarms and devices are installed in cars but they didn't prove to be a solution to the customer's problems. Face recognition-based car/vehicle security system is one of the possible technology solutions and it is designed by several groups to identify the car/vehicle upon getting it stolen. However, the issues in locking/unlocking and switching ON and OFF the car engine upon losing the keyless remote of the car are untouched. It is quite common that a person faces many difficulties in locking and unlocking the car upon losing the keyless remote of the car. Therefore, to tackle these issues an electronic system is developed and discussed in this project.

II. LITERATURE SURVEY

In the work of Nicolas Morizet [1] The existing car anti-theft system are Car alarm, flashing light techniques which makes use of different type of sensors which can be pressure, tilt and shock & door sensors, but the drawbacks are cost and it only prevents the vehicles from theft but can't be used to

trace the thief. Traditional car security systems rely on many sensors

When firstly 'Car Alarm System' is introduced, this system consists of mostly electromechanical devices. As technology advanced, they evolved into fully integrated microprocessor-based system using multiple electronics sensors. In, the hardware and software of the GPS and GSM network were developed.

In the work of Saurabh P. Bahurupi [2] The smart car security system using image processing' is introduced which can Overcome the advantages of GSM and GPS based system. In this system we can Able to recognize the face of the theft by the camera used in that circuit. This system introduces and describes the design of mobile controller car security system offering higher level of car security features with the information of the thieves. In web introduce wheel and steering

lock system, to prevent car from theft, but they are visible from outside the car and prevent the wheel from being turned more than a few degrees.

Onsen Toyger [3] In, a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This proposed to Design a vehicle tracking system that works using GPS and GSM technology This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a Moving Vehicle and report the status of the Vehicle on demand.

Viola P [4] Face detection techniques have been heavily studied in recent years, and it is an important computer vision problem with applications to surveillance, multimedia processing, and consumer products. Many new face detection techniques have been developed to achieve higher detection rate and faster. Since Viola introduced a boosted cascade of simple classifiers using Haar-like features capable of detecting faces in real-time with both high detection rate and very low false positive rates, which is considered to be one of the fastest systems, much of the recent work on face detection following Viola-Jones has explored alternative boosting algorithms such as Float-Boost, Gentle Boost, and Asymmetric Gadabouts.

Joseph A. O'Sullivan [5] Advances in Security Technologies: Imaging, Anomaly Detection, and Target and Biometric Recognition" Many new techniques, such as biometric recognition technique, image processing technique, communication technique and so on, have been integrated into car security systems. At the same time, the amount of accident of cars still remains high, specially, lost. So, one practicable car security system should be efficient, robust and reliable. Traditional car security systems rely on many sensors and cost a lot. When one car is really lost, no more feedback could be valid to help people to find it back. We put forward the face detection technique to be applied in car security.

Mahendra S M, [6] The real time car theft detection application the architecture is designed using skin color information with adaboost algorithm. The proposed to design vehicle security system video frame will be recoded and face of the person trying to unlock the car will be detect using PCA principal component analysis algorithm for face recognition. If the person is not user the car door will not open and it will immediately intimate the authorized person regarding the theft detail by sending the message to the his/her through GSM the car door will open and it allow for authorized access. GPS technology is used to track the current position of the theft vehicle.

Pranali Langde [7] In this paper presents real time car system comprises the protection of vehicle parked in parking with the help of an integrated unit of computer vision with a high-end Microprocessor. Face detection and recognition system use enhanced algorithms for authorized. Here we are using the latest raspberry pi3 Model B+ with a 64-bit 1.4GHz Quad-core Processor, with 1GB RAM. We have deployed a Pi camera with the proper interfacing of RPI Camera Raspberry pi. When any person will enter in a car the system will passively active by the action of the opening door. And the camera will be activated. The camera deployed in the car in front of the appropriate driver seat will acquire the image of a person's face seating on the driver seat. Once the image of the person is acquired, the system now tries to detect the face.

III. PROPOSED SYSTEM

In this proposed system, we are designing a vehicle anti-theft system based on the image processing technique. In this, we are using the haar cascade classifier algorithm for face recognition This algorithm will give us more accurate results when we compare to other types of algorithms. In this the input

images are taken from the live video by using the camera, then the video frames can be converted into single frame image. This haar cascade classifier Algorithm will take number of images and check those all images at the time of face on recognition. we have to save images by using data sets and after that, we will train those faces to algorithm system because this kind of technique is effective and fast. It stores into the data base. It converts colour images to gray scale images and then it converts into pixels for detecting this will divides the image into various pieces then it stores the values of each pixel. After that the Haar cascade classifier algorithm will be classifies the face of person as authorized or unauthorized person by comparing with the trained dataset. If the authorized persons only access the vehicle ignition. If unknown person is detected, the theft image will be send to the vehicle owner by using IMAP protocol and signal send to controller unit through serial communication for activates the electromechanical relay for lock the ignition system.

GSM will send alert SMS to authorized person .

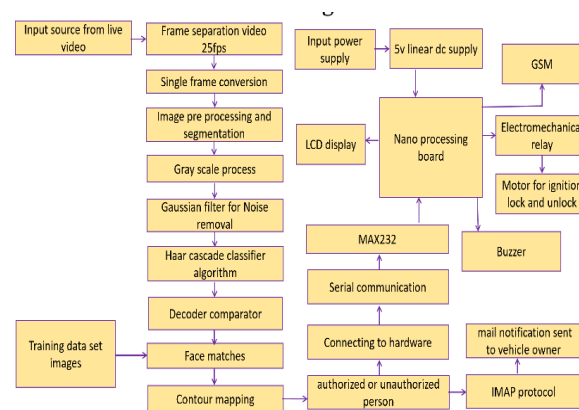


Fig 1: Block diagram of proposed system

VI. RELATED WORK

The above fig 1: block diagram of the project we present a face detection system based on Internet of Things first the user record the video continuously in 25fbs then it convert the video into single frame conversion to identify the image the image preprocessing is to detect the person face it also analysis the part of image segmentation is used to separate the unwanted part of images in gray scale processor where the unwanted image will turn into darkest black and wanted will turn into brightest white

.A Gaussian Filter is a low pass filter used for reducing noise (high frequency components) and blurring regions of an image. By using haar cascade algorithm, is for identifying the person, where in this algorithm, every structure of a person is being given and through the data base. Here encoder will send the data base image into decoder is processes where it will decode the person is whether authorized or unauthorized. After analyzing the image of real owner then face gets matches, then the contour mapping will give an analysis of authorized person. The extracted face is recognized using the HAAR cascade algorithm. It is used to detect the face of the person as authorized or unauthorized. The authorized persons only access the vehicle ignition. If unknown person is detected, the theft image will be send to the vehicle owner by using IMAP protocol and signal send to controller unit through serial communication for activates the electromechanical relay for lock the ignition system. GSM will send alert SMS to authorized person

A. 8dlib landmark

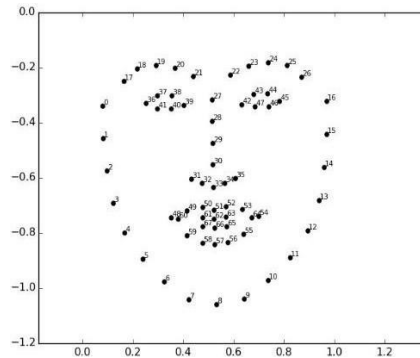


Fig 2: 68dlib landmark

The pre-trained facial landmark detector inside the dlib library is used to estimate the location of 64(x, y)- coordinates that map to facial structures on the face.

B.Haar cascade Algorithm

Face Detection, a widely popular subject with a huge range of applications. Modern day Smart phones and Laptops come with in-built face detection software’s, which can authenticate the identity of the user. There are numerous apps that can capture, detect and process a face in real time, can identify the age and the gender of the user, and also can apply some really cool filters. The list is not limited to these mobile apps, as Face Detection also has a wide range of applications in Surveillance, Security and Biometrics as well. But the origin of its Success stories dates back to 2001, when Viola and Jones proposed the first ever Object Detection Framework for Real Time Face Detection in Video Footage. It is an Object Detection Algorithm used to identify faces in an image or a real time video. The algorithm uses edge or line detection features proposed by Viola and Jones in their research paper “Rapid Object Detection using a Boosted Cascade of Simple Features” published in 2001. The algorithm is given a lot of positive images consisting of faces, and a lot of negative images not consisting of any face to train on them. The repository has the models stored in XML files, and can be read with the OpenCV methods. These include models for face detection, eye detection, upper body and lower body detection, license plate detection etc. Below we see some of the concepts proposed by Viola and Jones in their research.

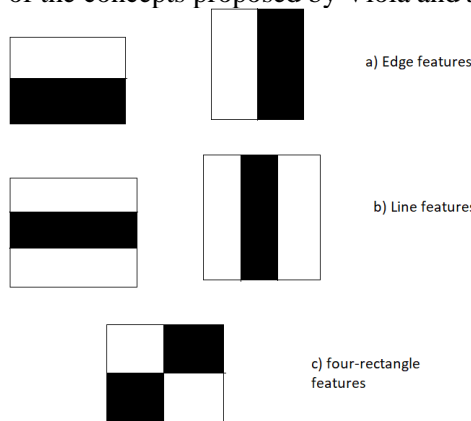


Fig 3: Features used in Haar cascade

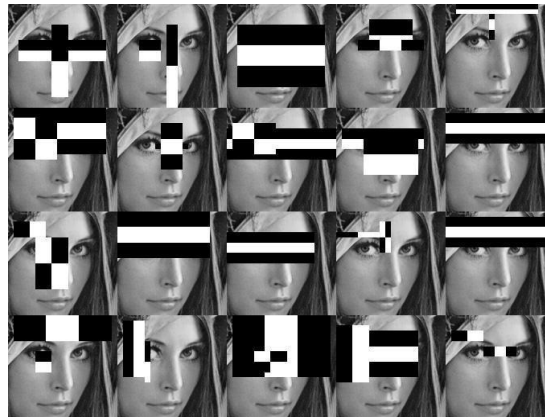
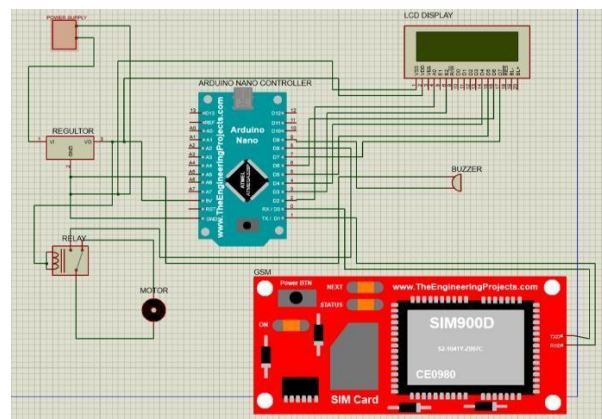


Fig 4: Face Identification using Haar cascade

CIRCUITE DIAGRAM :



Hardware components:

- Nano processing board
- Electromechanical relay
- LCD display
- DC Motor
- Power source
- 5v linear DC supply
- GSM
- MAX232

NANO MICROCONTROLLER:

The nano board is designed in such a way that is very easy for beginners to get started with microcontroller. This board especially is breadboard friendly is very easy to handle the connections. Lets start with powering the board

USB JACK: Connect the mini USB jack to a computer through a cable and it will draw power required for the board to function.

Vin Pin: The Vin Pin can be supplied with a unregulated 6-12v to power the board. The on board voltage regulator regulated it to +5v.

+5V pin: If you have a regulated



LIQUID CRYSTAL DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

- The declining prices of LCDs.
- The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters..
- Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
- Ease of programming for characters and graphics.



Fig 7: LCD Display

ELECTROMECHANICAL RELAY

The relay function can be better understood by explaining the following diagram given below.

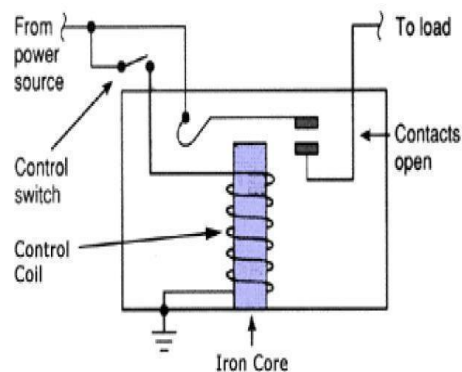
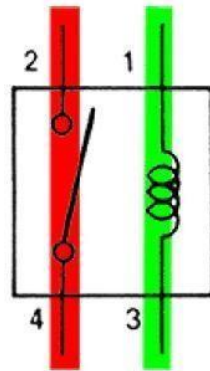


Fig:9 relay design

Relay operations

- Energized Relay (ON)



- De – Energized Relay (OFF)
- **Energized Relay (ON)**

As shown in the circuit, the current flowing through the coils represented by pins 1 and 3 causes a magnetic field to be aroused. This magnetic field causes the closing of the pins 2 and 4. Thus the switch plays an important role in the relay working. As it is a part of the load circuit, it is used to control an electrical circuit that is connected to it. Thus, when the electrical relay in energized the current flow will be through the pins 2 and 4.

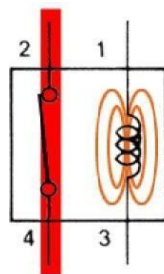


Fig : 10 Energized Relay (ON)

- **De – Energized Relay (OFF)**

As soon as the current flow stops through pins 1 and 3, the relay switch opens and thus the open circuit prevents the current flow through pins 2 and 4. Thus the relay becomes de-energized and thus in off position.

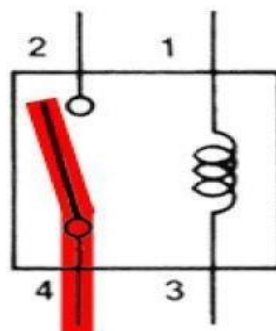


Fig 11: De-Energized Relay (OFF)

In simple, when a voltage is applied to pin 1, the electromagnet activates, causing a magnetic field to be developed, which goes on to close the pins 2 and 4 causing a closed circuit. When there is no voltage on pin 1, there will be no electromagnetic force and thus no magnetic field. Thus the switches remain open.

Gobal message system(GSM)



v.RESULT

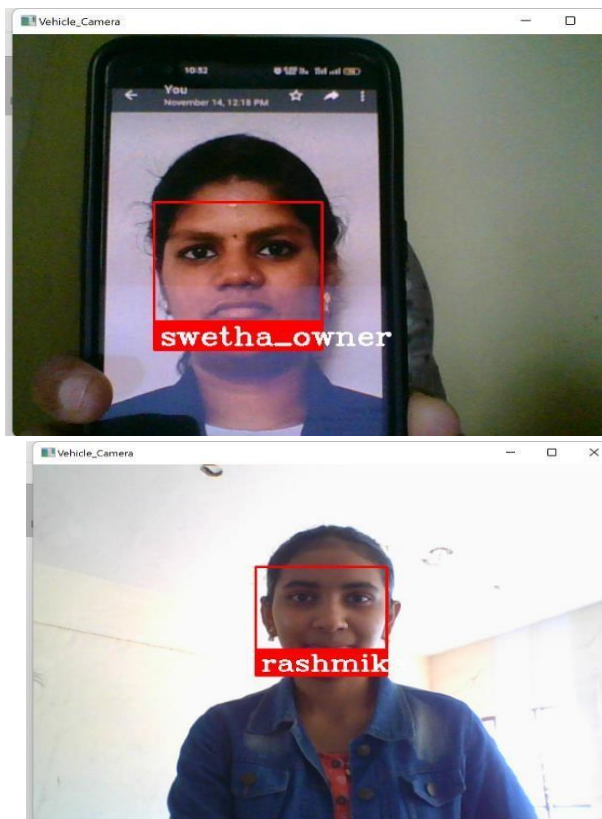


Fig 13: Authorized person

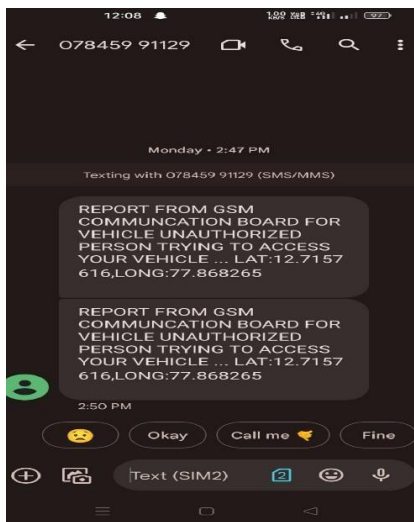


Fig 14: SMS alert

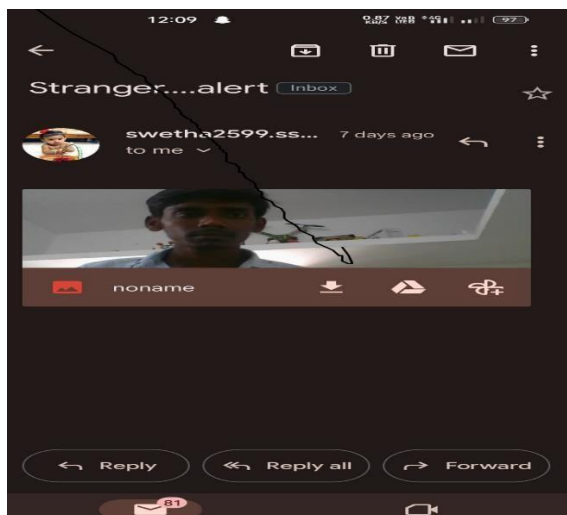
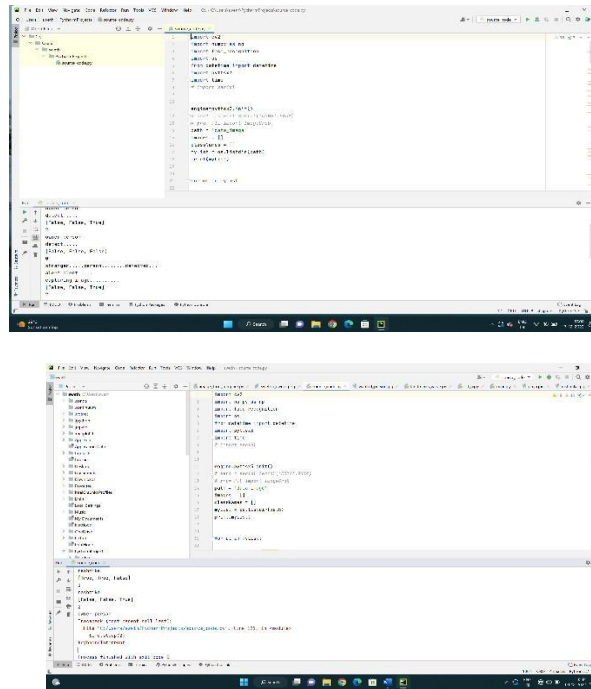


Fig 15: Mail alert of stranger image



VI.CONCLUSION

In this project we implement image recognition techniques that can provide the important functions by advanced intelligent automobile security, to avoid vehicle theft and protect the use of unauthenticated users. Secured and safety environment system for automobile users and also key points for the investigators can easily find out the hijacked image. We can predict the theft by using this in our daily life. This project will help to reduce the complexity and improve security, also much cheaper and smarter than traditional one's.

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