

Design of Vehicle Protection and Tracking System Using Face Recognition

Minakshi G. Dhage¹, Dr. S. B. Patil², Prof. P. R. Wankhede³

*PG Student¹, Professor², Professor³, Electronics and Telecommunication Engineering
S.S.G.M.C.E, Shegaon, India*

Abstract— Now a day there may be a speedy growth inside the automobile robbery. The protection of car from theft turns out to be critical due to insecure surroundings. Actual time car protection system is the solution for this hassle. The proposed vehicle security machine performs picture processing based totally real time person authentication using face detection. The gadget described on this paper robotically takes images of driver and compares his or her face with database to test whether he is an authenticated motive force or now not. The face detection system utilized in proposed system primarily based on HAAR classifier set of rules. The other modules transmit necessary records to users and assist to preserve vehicle secure. This machine prototype is constructed on Raspberry pi 3, controls all of the strategies. The GPS module within the car detects the vicinity of the automobile. The photo of thief or unknown man or woman is send to the owner via using mail. So via this device the identification of the thief and the vicinity of the auto are really smarter and less expensive than conventional one.

Keywords— *Face Recognition, Face Detection, GPS (Global Positioning System)*

I. INTRODUCTION

In automobile security gadget, the objective is to save you the robbery of automobile and make certain safety of automobile by means of avoiding the way of theft. the security degree of the gadget need to be increases by using supplying driver verification the usage of face recognition device that confirms a consumer being a certified character to have get right of entry to the ignition system. The raspberry pi based totally manipulate machine fixed inside the vehicle uses GPS receiver and captures photograph from the digital camera on detection of person in front of the digital camera in the automobile. Face is detected and recognized using algorithm overcoming the pose and illumination constraints. The recognized photo is compared with the authorized image of users within the database. If matched, the machine lets in running the automobile. If no longer matched, it sends photograph of the person and GPS values to the owner. For face detection the Haar classifier algorithm is used and for face reputation the SVM is used. The SVM educated to recognise whether or not the consumer's image matched with the image from database or now not. Essentially this research is aimed for imposing a machine this is able to figuring out the proprietor. Therefore face reputation is used to set off the ignition of vehicle. The vehicle safety gadget using Face reputation provides flexibility to pick out proprietor and to prompt the vehicle. To growth the accuracy, performance and reliability of the face recognition, algorithms are needed. Principle Component Analysis (PCA) and Haar cascade are used for face popularity motive.

II. ALGORITHM FOR FACE RECOGNITION

A. Face Detection Using Haar Classifier Algorithm

The face discovery calculation proposed by Viola and Jones is utilized as the premise of our plan. Its epic methodology expanded exactness yet in particular speed, taking into consideration ongoing applications that at the time could process 15 pictures for every second. It utilizes a preparation technique called boosting, where a course of feeble classifiers (numerous classifiers set after one another) is prepared utilizing a huge arrangement of basic yet computationally efficient highlights, with the goal that simply the best hopefuls figure out how to go through the entire course of classifiers. Advances have been made since, particularly on account of unconstrained face location. The calculation utilizes a necessary picture so as to process Haar highlights of a face hopeful in consistent time. It utilizes a course of stages which is utilized to dispense with non-face hopefuls rapidly. Each stage comprises of various Haar highlights. Each element is arranged by a Haar include classifier. The Haar include classifiers create a yield which would then be able to be given to the stage comparator. The stage comparator wholes the yields of the Haar include classifiers and contrast this worth and a phase limit to decide whether the stage ought to be passed. On the off chance that all stages are passed the face applicant is closed to be a face. These terms will be talked about in more detail in the accompanying areas.

B. Integral Image

The basic picture, otherwise called a summed territory table, is a method that empowers quick and basic calculations of wholes over rectangular zones in a picture. Every pixel (x, y) in the fundamental picture is equivalent to the entirety of pixels above and to one side of (x, y) in the first picture, as appeared in Equation (1).

$$\Pi(x, y) = \sum_{x' \leq x, y' \leq y} I(x', y') \quad (1)$$

Any rectangular total would then be able to be determined utilizing not many tasks. In handy terms, a basic picture is the twofold total entirety of a picture, along the line measurement and the section measurement

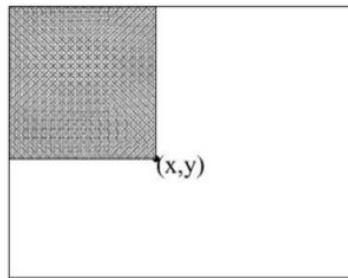


Figure 1: Integral image

C. Haar-Like Features

Haar-like highlights are a straightforward technique or apparatus to portray a specific article inside a picture. Each Haar-like element depicts the item by portraying the distinction in its forces at a specific district. Accordingly it can affirm whether a picture contains this item by checking if certain areas have contrasts in their forces like the article to be distinguished. A model that would explain this idea is the Haar like element portraying the locale of eyes and cheeks inside a human face. This depends on the way that the eye and eyebrow area have darker forces than the cheek locale. Along these lines if the picture at this district happens to have an enormous contrast in its forces, this infers the picture may contain a face.

There are essentially three kinds of Haar-like highlights which are: 2-rectangular features (Edge features), 3-rectangular features (Line features), and 4-rectangular feature. 2-rectangular and 3-rectangular features may come in both horizontal and vertical directions. The element is determined by subtracting the whole of pixels in the white area from the aggregate of pixels in obscurity locale. A figure showing these features is shown below

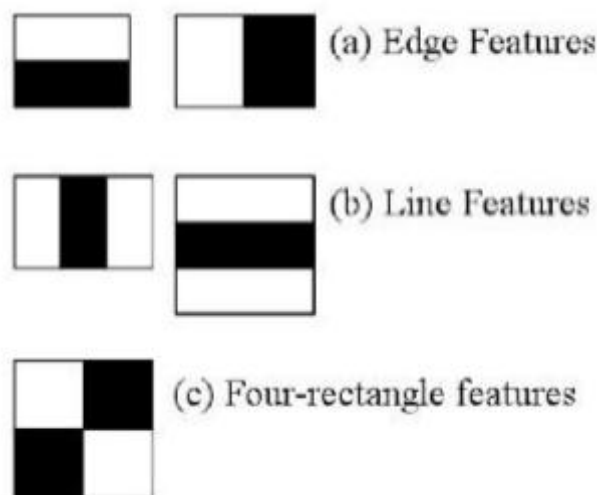


Figure 2: Haar like features

D. Cascade

The face detection algorithm eliminates face candidates swiftly using a cascade of stages. The cascade eliminates candidates by making stricter requirements in each stage with later stages being much more difficult for a candidate to pass. Candidates exit the cascade if they pass all stages or fail any stage. A face is detected if a candidate passes all stages.

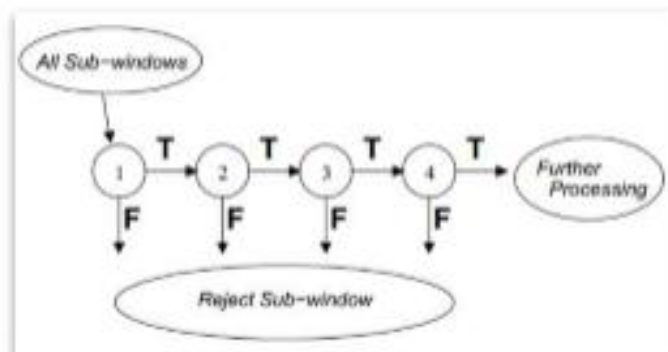


Figure3: stages of the cascade classifier

E. LBP feature extraction

Each face image can be considered as a composition of micro-patterns which can be effectively detected by the LBP operator. To consider the shape information of faces, they divided face images into M small non-overlapping regions R₀, R₁, ..., R_M. The LBP histograms extracted from each sub-region are then concatenated into a single, spatially enhanced feature histogram defined as:

$$H_{i,j} = \sum_{x,y} I(f_l(x,y) = i)I((x,y) \in R_j) \quad (2)$$

where i = 0, ..., L-1, j = 0, ..., M-1. The extracted feature histogram describes the local texture and global shape of face images.

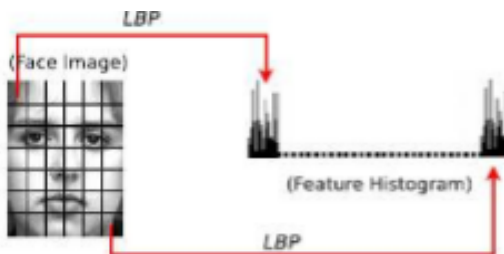


Figure4: LBP based facial representation

F. Face recognition training phase

Face acknowledgment is the technique for distinguishing and recognizing the individual in a picture or a video outline. It is the way toward extricating facial highlights and coordinating them with a pre-characterized database so as to locate the comparing individual. Numerous conditions limit the capacity to effectively perceive the individual in the picture, for example, the varieties in light, picture quality, the individual's posture and outward appearances. Numerous strategies have been executed to perform face acknowledgment. To get the face acknowledgment framework running, it ought to be first prepared on a lot of pre recognized face pictures. At first, each picture in the preparation set ought to be taken under a similar lighting condition and posture. A short time later it ought to be standardized and all pictures ought to be adjusted with the goal that the highlights (nose, eyes, and so forth.) show up at similar areas lastly scaled to a standard size. Each preparation picture should then be changed over into a solitary vector by connecting every one of its lines to frame a solitary line. To perceive the face, the identified picture of the client contrasted and the put away database pictures, in the event that the match will be discovered, at that point the specific picture will be perceived else it will be considered as face not perceived.

III. METHODOLOGY

The figure demonstrates the square graph of the proposed framework. The proposed vehicle security framework essentially comprises of Four stages; Image Detection, Face Detection, Feature Extraction, Face Recognition. The working of the framework is delineated as pursues: In this framework at first the picture of the driver caught through the camera, the caught picture at that point prepared and the HAAR classifier is utilized to identify the face in the caught picture. After this the identified picture of the client contrasts and put away picture from the database. The SVM is prepared to perceive the picture. The camera catches pictures of the client for 15sec. It can catch set of pictures; at that point these pictures are put away in database of the framework. On the off chance that the picture of the client coordinated with the put away pictures from database then the client picture ought to be considered as known picture and the hand-off will be ON, thus the start of vehicle will be enacted. On the off chance that the client picture does not coordinated with the put away picture, at that point the hand-off stays off and client ought to be considered as obscure, subsequently the start won't be enacted. At that point the picture of the client send to the proprietor by utilizing mail and

at same time the SMS of area of vehicle send to the proprietor. The area of vehicle is send as URL connects. At the point when the proprietor taps on the URL connect, he will get the precise area of vehicle. By knowing the substance of the obscure client, proprietor effectively can recognize the hoodlum and furthermore he can give the data to the police to get vehicle back. The area of vehicle is send as URL connects. By knowing the area of vehicle and the picture of the hoodlum, it will be anything but difficult to shield the vehicle from getting robbery

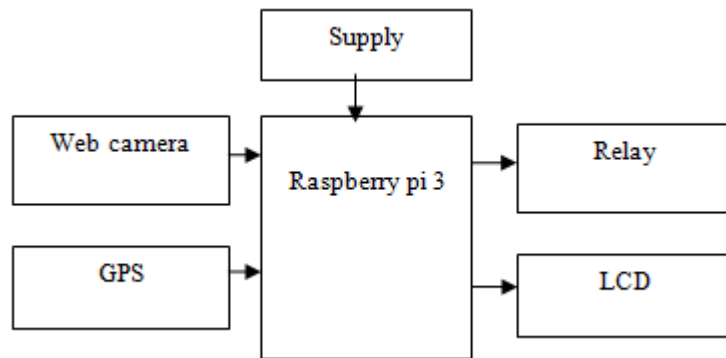


Figure5: Block diagram of proposed system

The figure 6 shows the flow chart of the proposed system. The detail flow of working of the system should be given, how to create database, how to verify the face and then the ignition of vehicle.

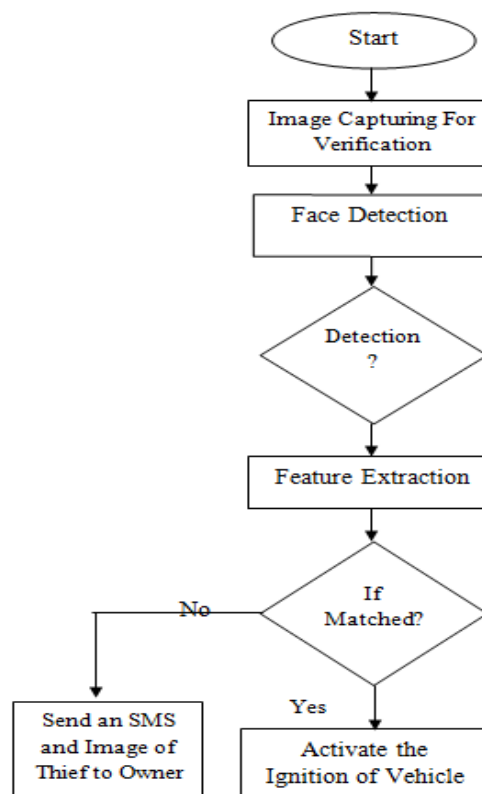


Fig 6: Flow chart of the proposed system

IV. Hardware Design

The figure 6 shows the experimental setup of the proposed system. In this system the raspberry pi 3 control all the devices. The system consists of raspberry pi 3, web camera, GPS module, relay, 16x2 LCD and supply. The supply required for the proposed system is 5v. The 16x2 LCD is used to display the status of the system. In this system the USB to serial convertor is used to connect the GPS receiver to the system.

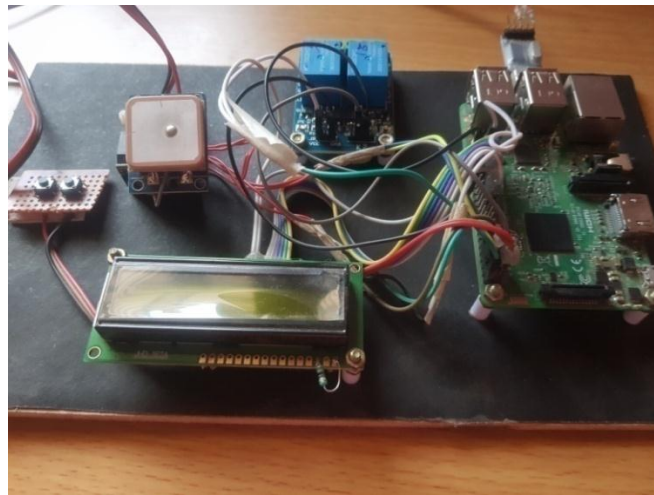


Figure 7: Experimental setup of the proposed system

V. Results

1. When the captured image of the user matched with the image from the stored database then the relay will be ON. Hence the Ignition will be activated.

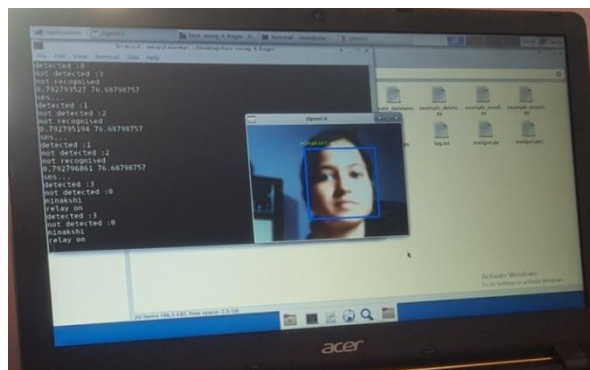


Figure8: face detected



Figure 9: Result displayed on LCD

2. When the unknown person trying to start the vehicle whose image is not stored in database, then the message displayed on LCD as unknown face detected and the relay remains off. So the Ignition will not be activated and the SMS and the image of the user will be received by the owner.

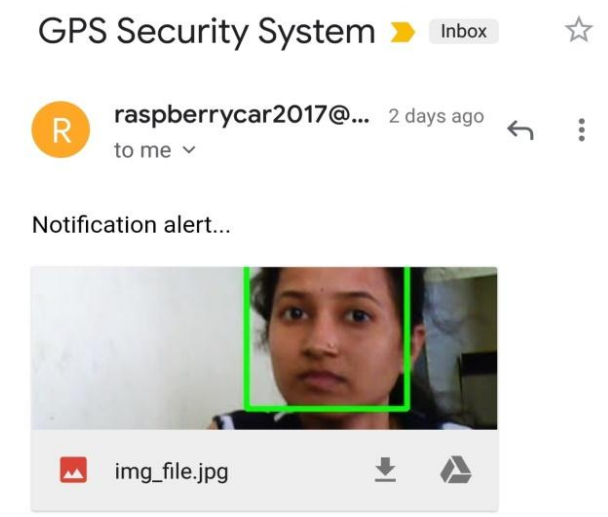


Figure10: email received by the owner when unknown face detected.

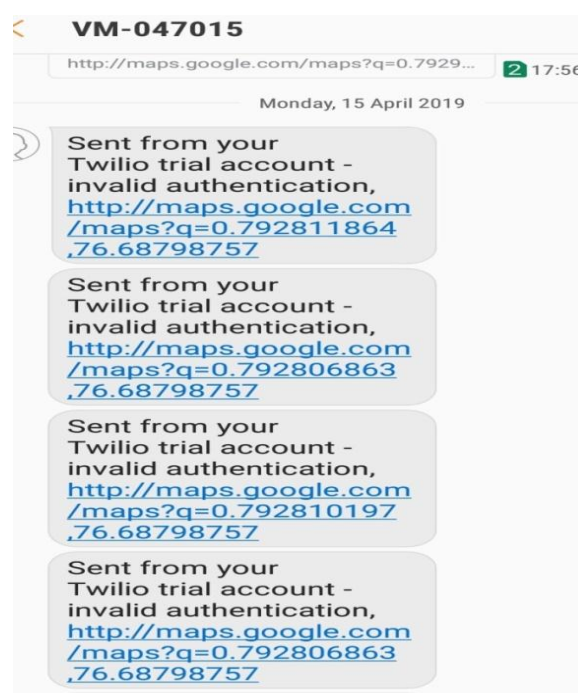


Figure11: SMS with GPS coordinates of vehicle.

VI. CONCLUSION

We have successfully developed and implemented a vehicle security and tracking system that gives information of the location of stolen vehicle using GPS technology and also provides security to the engine. From the above discussion a reliable, secure, fast and an efficient system has been developed for vehicle security. The proposed system can be used to reduce the increased vehicle theft. In the results, it can be deduced that the use of face recognition security systems offers a much better and fool proof means of restricting the ignition of vehicles by unauthorized users.

REFERENCES

- [1] Mrinmoy Dey, Md. Akteruzzaman Arif and Md. Asif Mahmud, "Anti-theft Protection of Vehicle by GSM & GPS with Fingerprint Verification" International Conference on Electrical, Computer and Communication Engineering (ECCE).
- [2] Anup Kamat, Sonali Devtarse, S.R.Nibe, "Real Time Vehicle Theft Identity and Control System Based on ARM 7", International Journal of Advanced Research in Education Technology (IJARET).

- [3] B.G. Nagaraja, Ravi Rayappa, M Mahesh, Chandrasekhar M Patil, Dr. T.C. Manjunath, “Design & Development of a GSM Based Vehicle Theft Control System”, International Conference on Advanced Computer.
- [4] H. V. Dadwani, R. B. Buktar, “Vehicle Tracking And Anti-Theft System Using Internet Of Things”, International Journal of Advances in Electronics and Computer Science.
- [5] D. Santhoshi Rani, K. Radhika Reddy, “Raspberry Pi Based Vehicle Tracking And Security System For Real Time Applications”, International Journal of Computer Science and Mobile Computing.
- [6] Vinil Kumar.V, Divya.N, Mr. K.S.Vairavel “Smart Door Lock Opening In Cars Using Face Recognition” International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137 Volume – 02, Issue – 12, December – 2017, PP – 07-11, 2017 IJLERA
- [7] Rajashree Tripathy, R N Daschoudhury “Real-time Face Detection and Tracking Using Haar Classifier on SoC” International Journal of Electronics and Computer Science Engineering ISSN- 2277-1956 ISSN 2277-1956/V3-N2-175-184.
- [8] N.Pooja, G.V.S.Jyothirmayee, D.L.Bhargav, N.V.S.Ganesh, J.S.Lakshman Kumar, B.Naga Jyothi “Fingerprint Based Anti-Theft System for Vehicle Safety” International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 5, Issue 2, February 2017 Copyright to IJIRCCE DOI: 10.15680/IJIRCCE.2017. 0502213 2660.