Smart Security System for Theft Protection Using Face Recognition

Snehal Bhowate[1], Kanchan Bashine[1], Poonam Gajbhiye[1], Samiksha Paidlewar[1], Nikhil Dharpure[1],

Prof. Pranali Langde[2]

[1]B. Tech Scholar, Department of Electronics and Telecommunication Engineering, J. D. College of Engineering and Management, Nagpur, Maharashtra, India

[2]Assistant Professor, Department of Electronics and Telecommunication Engineering, J. D. College of Engineering and Management, Nagpur, Maharashtra, India

ABSTRACT

The number of car robbery attempts at the local and international scale is rising rapidly in this modern era. By inventing robbery techniques, the owners are afraid that their cars will be robbed from their ordinary parking lot or from outside. This makes vehicle protection against robbery important as a result of insecurity. The computer vision based real-time vehicle safety system solves this problem. The proposed car safety system carries through real time user authentication based on image processing using face detection and recognition techniques and a microprocessor-based control system attached to the car. The infrarot sensor attached to the driver's vehicles seat activates the hidden camera, which is fixed inside the vehicle, as the person enters the parked vehicle overcoming the existing security features. The person's face is detected using Viola Jones algorithm once the image is obtained from the activated camera. The extracted face is recognized using the improved Linéar Discriminant Analysis (LDA) algorithm that distinguishes many features rather than looking for an exact pattern based on the Euclidean distance. Authorization requires that the threshold value is established and compared to the Euclidean distance over which the person is not authenticated. The face is sent to the mobile of the owner as an MMS via the operating GSM modem, which is classified as unknown. The owner shall be controlled with the relay in accordance with the owner's command when the information is received. The way to authenticate the person would be efficient and efficient in terms of vehicle safety.

I. INTRODUCTION

Authorisation requires that the threshold value is established and compared to the Euclidean distance over which the person is not authenticated. The face is sent to the mobile of the owner as an MMS via the operating GSM modem, which is classified as unknown. The owner shall be controlled with the relay in accordance with the owner's command when the information is received. The way to authenticate the person would be efficient and efficient in terms of vehicle safety. Of these face recognition and detection systems are more sophisticated, easy to deploy and people can be identified without their knowledge. Some of the advantages of the vehicle safety facial recognition method are:

1. It is more convenient to feel when you are sitting in position.
2. Low costs and a better way of using existing methods.
3. No active user part is required.

In the car security system, the goal is to avoid vehicle robbery and to ensure vehicle safety through avoidance of robbery. One level of driving authentication is the face recognition system, which authenticates the authorisation of a user to access the ignition system. A GPS receiver, the GSM modem and the camera captures the image from the microprocessor on the vehicle's internal control. The face is detected and recognised using the pose and lighting constraints algorithm. The recognised image in the database will be compared to the permitted user image. In combination, the system enables the vehicle to operate. Unless it is matched, it sends the owner MMS with GPS and face values. Shihab A Hameed et al . , (2011) have focused in their work on MMS and good response time database technology. This helps the owner to decide on vehicle control. The owner decides to prevent access to the vehicle or to permit the person to operate the vehicle and controls the system.

II. LITERATURE REVIEW

Divya Malik, Shaloo Bansal et al [1] here face recognition based on primary component analysis and linear discriminant analysis is presented. Face recognition is important because hackers or attackers will not fetch password. Face recognition is important. Eigen Facial uses the linear, uncontrolled dimensional reduction technique (PCA) for subspace production and the Linear Dimensional Reduction Technique (LDA) for the Fisher Facial. Linear Discriminant Analysis (LDA) is a linear, uncontrolled dimensional reduction method. LDA is better than PCA in classification systems, it offers higher class discrimination, so the LDA is commonly used in face recognition systems by using class data.

M. A. Abuzneid and A. Mahmood et al [2] presented an enhancement approach to recognition of human faces using a background neural network (BPNN) and extraction features on the basis of correlation between pictures from training. Research is crucial in terms of face recognition. The goal is to improve the precision of many applications in real time. T-dataset used for BPNN train.

In [3] term ReLU is utilized in neural network operation. It is an element wise operation and it is utilized pixel per pixel. ReLU generally replaces all the negative pixel values by 0's so in that way it would become non-linear. There is also numerous nonlinear functions like sigmoid or tan h instead of ReLU , but ReLu has outdone other techniques in terms of de-noising.

Grega, Michael, Andrzej Matiolanski, Piotr Guzik, and Mikolaj Leszczuk et al [4] presented Automated Detection of Firearms and Knives in a CCTV Image. Author proposed an algorithm for detecting firearm and knife in image. That algorithm utilizes OpenCV. It shows that a near zero false alarm it can produce but in order to do that it ignores positive alarms with the cost of sensitivity. So, actual percentage of firearm

and knife detection reduced. But in real time environment, if we missed a single in detecting firearm or knife, which leads to fail in saving many important lives.

Erhan, Dumitru, Christian Szegedy, Alexander Toshev, and Dragomir Anguelov et al [5] proposed object detection utilizing deep neural network (DNN). DNN can give good performance on image classification, here author only focused on the issue of object localization in the image. For image classification they utilized classification algorithm as DNN It can detect objects with localization but they focused less on detection of any particular objects used as weapon for doing crime.

Here B. S. Satari, N. A. A. Rahman, and Z. M. Z. Abidin et al [6] proposed a system that monitors the visitors of an organization by utilizing FR as an authentication technique. After authentication and verification process done authenticated visitor a printed visitor card is given that printed card consist of the image of the visitor, date and timing of visiting and the name of contact person or visiting person. Face recognition visitors management system (FRVMS) is proposed by author to increase the security of an organization from unauthenticated individual. This is necessary to ban illegal entry for certain purpose such as stealing assets or confidential data.

Z. Shao, J. Cai, and Z. Wang et al [7] present a novel intelligent processing and utilization solution to big surveillance video data depends on the event detection and alarming messages from front-end smart cameras. This technique consist of two parts first is pre alarming if abnormal events found and second is storage of surveillance video for fast retrieval of evidence. Pre alarming is helpful to prevent crime.

III. PROPOSED METHODOLOGY

The microcomputer, which is extensible in real time, includes an image processing unit and a microprocessor, which prevents parked cars from robbing. Enhanced authentication algorithms are applied to the face detection and recognition system. Figure shows the entire safety system consisting of each of the components. 1. Bagavathy et al , (2011) have realised that using ARM in real-time applications is important. ARM 7 is therefore used to control the system as a microprocessor. Once the intruder enters into the vehicle, the passive infraround sensor attached to the driver's seat activates a hidden camera inside the vehicle by the ARM 7 microscope control. The camera gets the image of the person inside the automotive attached to the driver's seat in the appropriate position. The system now tries to detect the face once the person's image is acquired.
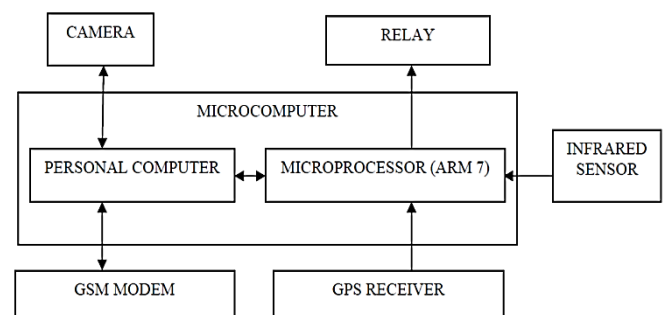
Figure 1. Block Diagram of Security System

The image-processing unit inside the microcomputer detects the face and authorises the person. Two parts of the image processing are facial detection and facial recognition.

The image acquired is processed with a Viola Jones algorithm to detect the face (Viola and Jones 2002), which uses the detection of the cascade object. Cascade detector detects the acquired picture face and extracts the face area.

The authentication-based safety system has a data bases stored in different environments for the face

images of authorised persons. The face images are enhanced by standardisation and are stored in the database to eliminate unnecessary information because of illumination restrictions during the acquisition of the image. Now the facial recognition task has to be carried out with the faces detected.

Various algorithms based on features or model can be used for face recognition. In real-time security systems, most feature-based algorithms are used. The main component analysis (PCA) and linear discrimination analysis (LDA) are effective in extracting recognition features. Both algorithms are compared (SK Hese and MR Banwaskar, 2013) and have similar characteristics but Linear Discriminant Analysis (LDA), when a large number of training sets are involved, outperforms Primary Component Analysis (PCA).Furthermore, LDA effectively discriminates most of the image 's data by calculating the intra-class and inter-class scatter matrices. The recognition in the vehicle security system through the LDA algorithm is done using the database containing normalised face images. LDA exhaust the functionality of extracting the images stored in the database, known as training images and the camera 's facial picture called a test image. The test image shall be compared with database images; with the Euclidean distance and threshold values the classifier used in the algorithm determines the image as known or unknown.

The Euclidean distance is best matched with the test image by calculating between the corresponding feature weights and the image that produces minimum distance. If the Euclidean distance is below the threshold value and a person is classified as unknown or unauthorised if the distance value exceeds the threshold value, the person shall be classified as known or authorised. The steps in the algorithm and authorization of image processing are shown in the Figure. 2.
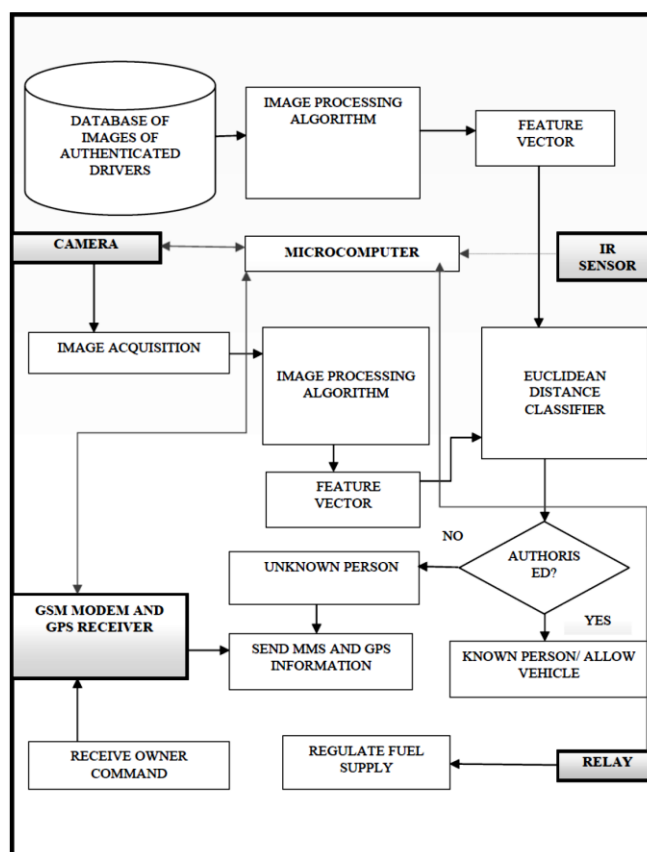

Figure 2. Image Processing based Authorization

IV. CONCLUSION

A built-in automotive safety system with face recognition is presented in this paper. This system can be used to reduce the increased theft of vehicles and enables the owner to detect the intruder and control the vehicle. The results achieved by the face recognition indicate that safety of the vehicle can be guaranteed. In addition, the system is reliance on in robot, border management, banking security involving ATMs etc. for other authorisation applications.

V. REFERENCES

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