

# AUTOMATIC FACIAL RECOGNITION AND ALCOHOL DETECTION TECHNOLOGY FOR VEHICLE ANTI-THEFT

Dr. K. Santhosh Kumar<sup>1</sup>, Yerra Niharika<sup>2</sup>, Surampudi Raja Karthikeya<sup>3</sup>, Gajwelli Ravi Raja<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Electronics and Communication Engineering, St. Peter's Engineering College, Hyderabad 500100

<sup>2,3,4</sup>Undergraduate Student, Department of Electronics and Communication Engineering, St. Peter's Engineering College, Hyderabad 500100

**Abstract:** This is a sophisticated mechanism that can be used in a variety of vehicles. There are a lot of cars. Duplicating vehicle keys is not difficult nowadays, and utilising such keys raises the danger of thievery. For such issues, we give an effective and dependable solution. Our technology employs a face recognition system to identify authorised vehicle users, and only authorised users are permitted to operate the vehicle. This enables for a quick and simple authentication mechanism. The setup incorporates a Raspberry Pi circuit as well as a camera. When we enable the system authority, we have three options: registration, start, and clear data. When we register, it first scans the owner's face. The owner can start the vehicle after successfully registering it. If an unauthorised user attempts to use the automobile, the system scans the person's face and compares it to the authorised face; if it does not match, the system denies the request. As a result, the technology contributes to the security of such intelligent vehicles. We have added an alcohol detecting feature. If alcohol is discovered, the engine is shut off and a alert message with the car's coordinates is sent to the registered cellphone number.

**Keywords:** Face recognition system (FRS), Raspberry Pi, message services, Global System for Mobile, Global positioning system (GPS), Alcohol detecting sensor.

## INTRODUCTION

With the new contemporary period, the creation of new technologies is a necessary, whether in the management or technical sectors. Improvements are required in all fields. Regarding the project chosen in the subject of vehicle security. Biometrics, retinal scanning, and image processing are only a few of the approaches that have been enhanced. Apart from all the improved techniques, vehicle theft remains high. In order to maintain car security, the system must be efficient, robust, and highly reliable. This article describes a security system that includes facial recognition using a Raspberry Pi, the FRS algorithm and a database of images uploaded by the vehicle owner. If the newly scanned image does not match the image already uploaded to the database, the system will instantly cease. The entire process is managed by a Raspberry Pi that has been programmed. A block diagram of the vehicle security system is shown in below figure. The Raspberry Pi system serves as the core processing unit in this case. It is in charge of the GSM module, the camera, and database operations. To detect alcohol, we will utilise an alcohol detection sensor. If alcohol is discovered, the raspberry pi will first turn off the engine and then send a message including the car's coordinates to the registered mobile phone.

## LITERATURE SURVEY

**Fatima Jabeen 2017:** This paper proposes an ignition system that recognises and warns drivers of alcohol intoxication, facial recognition, and fingerprint authentication in real time. This proposed system's main objectives are to reduce the number of accidents brought on by intoxicated or sleepy drivers, increase transit safety, and protect vehicles from theft.

**Mrs Varsha S:** A low-cost extensible framework for smart automobile security is presented in this study using the FDS (Face Detection Subsystem), a GPS (Global Positioning System) module, a GSM (Global System for Mobile Communications) module,

and a control platform. The method described in this research uses images of the driver to check his authenticity by comparing them to a database. The face detection subsystem uses an improved PCA technique to find faces in moving vehicles. The other modules help users keep track of cars even while they are missing and give them access to vital information. The prototype Raspberry Pi-based system controls all of the processes. The owner can initiate vehicle halting by sending a text message from his phone. The car's GPS module can identify the location of the vehicle. Because of this, using this method rather than a conventional one simply makes more sense and is less expensive for identifying the thief and finding the car.

**Shrutika V. Deshmukh (April 2007):** Identity theft and car theft have become major issues in recent years. It is necessary to develop a facial recognition technology to stop these thefts and cases of identity fraud. The creation of an intelligent security solution based on facial recognition is the aim of this project. Haar-like characteristics are used for face detection, whereas the HOG + SVM approach is used for face recognition. To increase precision and effectiveness, we use the Python programming language and the OpenCV packages. The embedded device, which is based on the Raspberry Pi, is used for training and authentication.

**Ketan J. Bhojane (May 2018):** The only way to start the engine and power the car is with a vehicle key. The facial recognition-based automobile ignition technology physically replaces the key with a particular user's face. The objective when dealing with the matter is to produce luxurious qualities while still being concerned about safety, which can be achieved by utilising car electronics. In this study, we suggest a facial recognition system that makes use of the face detection and face tracking techniques in MATLAB and the Raspberry Pi B.

**Laymar T. Santelices (December 2018):** In the modern world, security is increasingly necessary in every industry as scientific research and technology development lead to new discoveries. Everybody's use of a car is quickly becoming a necessity. Additionally, it is crucial to protect the car from theft. Traditional car security systems are pricey and rely on numerous sensors. When a car is stolen, there might be nothing else that can be done to help the owner of the automobile get it back. The main goal of this project is to protect the car from unauthorised entrance using a quick, incredibly easy, accurate, reliable, and economical facial recognition method.

**Achim Roth, Michele Martone, Birgit Wessel, and Astrid Gruber, "Vehicle Theft Track System King, Detecting and Locking Using Open CV"** Technologies like GPS and GSM modems have grown in popularity recently. The ideal system would be a face recognition car theft detection system. It offers a complete resolution to a dilemma. A Python programme discovers and recognizes faces using face recognition technologies. By using a mobile application to recognize and compare faces in their data, face recognition software is capable of resolving and identifying devices and determining whether or not they have an automated owner.

**Manoj Saini and Shagufta Khan B, "GSM Based Fuel Theft Detection"** This study's goal is to assess how well GSM-based technology works while sending SMS messages to users through a physical link. A hybrid system that is GSM-optimized is used by the Anti-Theft Safety Technology to keep an eye on and protect the car. The system alerts the car's owner of a fuel theft and sounds the buzzer to trigger the system's alarm.

**Kosalendra Eethamakula, Leema G, and Muni Vara Prasad K** have put out a proposal for a system that would use face recognition technology to offer vehicle security and allow remote control of automobiles by starting the engine. In order to provide necessary features, this presented theft control techniques that might be used by improved intelligent automotive security. In addition to reducing complexity and enhancing security, this project also makes the system more inexpensive and smarter than earlier versions. The expected results show that the detection and recognition of a JPG picture on Raspberry PI takes about 6 seconds. It looks too lengthy for real-time face detection. The paper offers a greater number of solutions with precise results than

other existing methods.

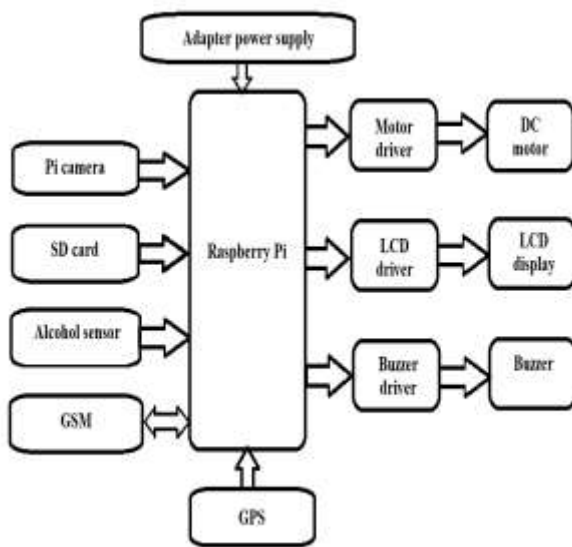
### EXISTING SYSTEM

The Arduino platform was included into the already used procedure. The existing system does not support RF communication. Only fundamental sensor monitoring is used in the previous system; real-time authentication is not supported. In the earlier scenario, the camera did not exist.

### PROPOSED SYSTEM

We developed a project in our proposed system that combines hardware and software elements to enhance vehicle security. In keeping with this, the paper seeks to accomplish the following goals: to create an alarm system utilising a buzzer and install a facial recognition system in the car to authenticate engine activation. We integrated GSM and GPS for SMS sending and real-time position monitoring. In this project, we've incorporated a sensor for alcohol detection. In this project, face recognition and a buzzer are used to go beyond the existing system's standard levels of protection.

### BLOCK DIAGRAM



### MODULES EXPLANATION

#### HAAR CASCADE

In order to recognise faces, The Haar cascade approach is employed. It is a machine learning-based approach in which a cascade function is used. It was trained using a large number of positive and negative images. Then, it is applied to additional photographs to find objects. Initially, both positive and negative images are used to train the classifier.

By deducting the amount of pixels under the white rectangle from the sum of pixels under the black rectangle, each feature value is calculated. Many functions are now calculated based on all possible sizes and locations of each core. We will find the total of pixels under white and black pixels for feature computations. Most of the properties we calculate are trivial. For example, in the photograph we used for our project, the first feature chosen appears to emphasise the eyes more than the nose and cheeks. The second one is darkened for the eyes, and the bridge of the nose is highlighted.

#### FACE RECOGNITION ALGORITHM

It is a software programme for facial recognition that uses facial recognition to automatically identify or confirm a person

characteristics that the database offers. The facial recognition system compares newly captured facial features with facial photographs that have already been submitted to the database to identify faces. One of the most extensively used and successful applications of image detection, face recognition is the most popular topic of research in image processing and computer vision.

The face recognition algorithm is constructed in such a way that it recognises faces by extracting facial information from a person's digital image. For instance, the algorithm may determine or confirm the relative position, size, and form of the ears, nose, cheekbones, and eyes. The provided data is then contrasted with these features.

The face recognition method has advanced into sophisticated representations and detecting processes from the earlier system's simple geometric models. Both the business industry and the fields of biometrics and computer vision research have given FRS a lot of attention. FRS recognises objects using still pictures.

## **GSM MODULE**

The GSM module provides an example of how to use AT commands. Through a computer, they can do all of a mobile phone's functions, including making and receiving calls, sending and receiving SMS, and more. A MMS, etc. These are mostly used for SMS and MMS services that are computer-based.

## **RASPBERRY PI**

The Raspberry Pi is a credit card-sized minicomputer that may be used for IoT (Internet of Things) and several minor computing activities. Its fanless CPU is built on ARM architecture, and it features all the connectors you'll need to connect a computer, including an ethernet cable, HDMI, audio jack, USB, and others.

Raspberry Pi is mostly utilised for educational purposes. Hardware enthusiasts, educators, hobbyists, students, professors, and high school students all use it for computer science-related projects.

Getting the original image's grayscale is crucial for getting better results when thresholding and histogramming the image. Using a histogram grayscale image is more beneficial since thresholding and taking results has the potential to produce results with less precision or error.

## **OPEN CV**

### **Open cv Facial Recognition**

A range of applications, including machine learning, computer vision, and image processing, employ the open source library known as "Open cv." To process the open-cv array structure for analysis, it is integrated with numpy. This enables the identification of the picture pattern and all of its characteristics as well as the application of mathematical operations to these features. In order to identify faces and emotions, open-cv and the Haar Classifier are employed.



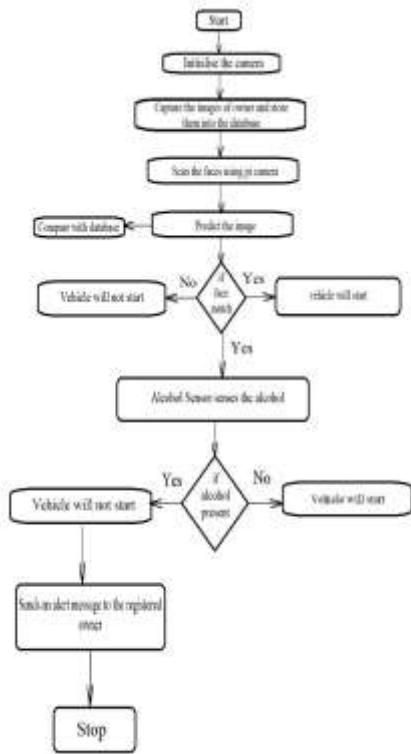
## **PROCEDURE**

1. The system employs a face recognition system to recognise authorised vehicle users.
2. The vehicle may only be used by authorised users.
3. When we activate the system, we have three options: registration, start, and clear data.

4. It scans the owner's face as it registers. The owner can start the car once registration has been completed successfully.

By taking into account the threshold impact when categorising the face as positive or negative. We have chosen the minimal rate feature to obtain the most accurate classification of face and non-facial images. The procedure is continued until the requisite accuracy and lowest error rate is achieved. Histograms are used to portray digital images graphically. Each tonal value's number of pixels is plotted.

**Flowchart:**



**HARDWARE REQUIREMENTS**

1. Raspberry Pi
2. Pi Camera Module
3. DC Motor as Vehicle
4. Buzzer
5. LCD Display
6. Alcohol Sensor
7. GPS
8. GSM

**SOFTWARE REQUIREMENTS**

1. Python
2. Open CV
3. OS : Linux

**Advantages & Disadvantages**

Advantages:

- It provides more security for vehicles
- Visible alerts using LCD display
- Audible alerts using buzzer.
- Only authorized persons may enter the vehicle
- Low cost
- Simple Design

Dis-advantages:

- Interfacing Pi Camera to the Raspberry pi with a Ribbon Cable

Applications:

- All types of vehicles.

## RESULT

This system has an LCD display, a buzzer alarm, a raspberry pi camera, and a raspberry pi circuit. The three options of registration, start, and clear data are available when we switch on the system authority, and while registering, it first scans the owner's face. The owner can start the car once registration has been completed successfully. When an unauthorised individual attempts to use the automobile, the system scans their face to see if it matches the authorised user's face. If it matches, the system permits access and the buzzer activates; if not, it blocks access and the DC motor accesses the car ignition. This system contributes to the security of such sophisticated cars. The project's status will be shown on the LCD.

When a car is stolen, the owner may find out where it is by sending the system an SMS with the code "WRU". The system will send the car owner who has predefined data recorded on the raspberry pi using a programme a replay SMS along with the position. The device will turn on the buzzer and automatically turn off the ignition of the car when a sensor detects alcohol. This system includes a GPS module and GSM for delivering alarm SMSs that also provide the recipient's position.

## OUTPUT



## CONCLUSION AND FUTURE SCOPE

By giving the system specific programmed functions, we can use it to improve and maintain the vehicle's safety. The central controller will immediately halt the car's operation and send the proper SMS to the authorised user through a GSM module if any unauthorised user tries to use or steal the vehicle. Additionally, by mandating that drivers are not impaired by alcohol and employing an alcohol detection sensor, we can increase road safety. It has been created with integrating features for all the hardware elements used. Every module's presence has been thoughtfully considered and arranged, which helps the unit function as best it can. Second, employing cutting-edge ICs, the project has been effectively carried out with the aid of developing technology. As a result, the project's design and testing were successful. To this project, we may add a finger print module.

## REFERENCES

- [1] Sukanya Sagarika Meher kaj Pallavi Maben, "Face Recognition and Expression Recognition Using PCA", 2014 IEEE International Advance Computing Conference (IACC).
- [2] Vinat A., Akshay Kumar C., Gaurav Shenoy, K.N. Balasubramanayam Murthy, S. Natarajan: "ORB-PCA Based Feature Extraction Technique for Face Recognition", Dua Internacia Simpozio pri Komputila Vizio kaj Interreto - 2015.
- [3] V Akila et al., "An Intelligent Car Anti-Theft Face Recognition System", International Journal of Online and Biomedical

Engineering, **voi. 17, nro 1**, s. **120-128**, 2021.

[4] Geetha Shree A, Ashwini S Shivannavar kaj M.Z. Kurian, "A Design Overview on Car Ignition Control and Security System Based on Face Recognition Techniques", International Journal of Industrial Electronics and Electrical Engineering, **voi. 8, ei. 6**. 2020.

[5] Raj Rai kaj Dinesh Katole "Survey Paper on Vehicle Theft Detection Through Face Recognition System" estis publikigita en International Journal of Emerging Trends kaj Technology in Computer Science (IJETTCS) 2014 unua temo.

[6] Guxiong Li and Kai Huang, "Intelligent vehicle security system based on facial recognition technology, South China National Metrology Center", Applied Mechanics and Materials, 2014.

[7] "Face Recognition Based Vehicle Security System" by Virajparmar, Rushikesh Shinde and Shital Agarwal, 2016.

[8] T. Fritz et al., "Interferometric processing of TanDEM-X data", Proc. International Geoscience Remote Control Symp. (IGARSS), Vancouver, BC, Canada, 2011, n. 2428–2431.

[9] M. Lachaise, T. Fritz; Blass, R. Bamler, and M. Eineder, "Phase unwrapping correction with two baseline data for the TanDEM-X mission", julikussa Proc. International Georoad Remote Sensing. Symp. (IGARSS), Munich, Germany, 2012, pp. 5566–5569.

[10] D. BorlaTridon et al., "TanDEM-X: DEM acquisition in the third year-era", Int. J. Spaco Ses. Ing., **sina. 1, hi. 4**, p. 367–381, October 2013.

[11] M. Martone, P. Rizzoli, B.S. Bräutigam and G. Krieger, "The first two years of the TanDEM-X mission: an overview of interferometric performance," Radio Sci., **vol. 48, no. 5**, pp. 617-627, September 2013.

[12] Prof. K.T. Jadhao and PrashanthBalrajBalla, "IOT Based Face Recognition Security System", 2018AlamuriRatnamala Institute of Engineering and Technology (ARIET) pp. 1-4.

[13] S. Padmapriya and Esther Annlin Kala James, "Real Time Smart Security System using Face Detection and Recognition", 2012 International Conference on Computer Communication and Informatics (ICCI-2012), pp. 1-6.

[14] Website on Raspberry-Pi 3 B and related topics Available at:<https://www.raspberrypi.org/products/raspberry-pi-3-model-b-plus/>

[15] The Raspberry Pi Camera Module website is available at:<https://www.raspberrypi.com/documentation/accessories/camera.html>