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# RASPBERRY PI BASED VEHICLE STARTER ON FACE DETECTION

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***Abstract*— The goal of this project is to use the Raspberry Pi to create a facial recognition system for car access control. For future generation automobiles, this initiative adds sophisticated security measures. For the envisioned advanced system, the Raspberry Pi will serve as a command module. Only authorized and registered people are allowed to operate the car due to the robust security system. Generally a key is used to unlock and start a vehicle. But our project demonstrates the unlocking and starting a vehicle using facial recognition. Which not only is efficient but also will help reduce car thefts. Also, the alcohol detection module will not in any condition allow the car to be started, even if the user is registered.**

***Keywords*— Anti drink and drive car, Smart car, keyless car, OpenCV, AI, Raspberry pi, Facial recognition**

## 1. INTRODUCTION

This A smart automobile is one that has a number of sensors that assist the driver in analysing driving circumstances such as topography, weather, and engine temperature. Distance detection sensors and accelerometers are also included in these vehicles for obstacle detection and cruise control. Aside from that, automobiles feature buttons for starting the car, controlling the power windows, and using the heads-up display to play music and movies, to name a few. AI and ML have had its impact on vehicles too making them smart.

Smart automobiles are no longer considered a luxury item, but rather a necessity. Because of the intense rivalry among automotive manufacturers, adding new features to each edition of their vehicles has become the "success mantra." As a result, numerous businesses and colleges throughout the world are working around the clock to bring new characteristics. Enhancing the car's security is one such feature that has received the most attention. We also have implemented a system based on Raspberry pi that allows the car to turn on automatically without using keys. The smart car could be turned on using facial recognition techniques. The USB camera captures real-time photos and video and is used for face detection. Also an MQ3 gas sensor or an alcohol sensor is used in our project which is directly connected to the raspberry pi.

## LITERATURE REVIEW

An **Fatima Jabeen (2017)**This study offers an ignition system that detects and alerts drivers in real time for facial recognition, finger print authentication, and alcohol intoxication. The major goal of this suggested system is to minimise the frequency of accidents caused by drowsy or inebriated drivers, improve transit safety, and safeguard vehicles from theft.

**Mrs. Varsha S.** The FDS (Face Detection Subsystem), a GPS (Global Positioning System) module, a GSM (Global System for Mobile Communications) module, and a control platform are provided in this study as a low-cost expandable framework for smart car security. The method presented in this paper takes photographs of the driver and compares them to a database to determine whether or not he is an authenticated driver.The face detection subsystem detects faces in automobiles using an enhanced PCA method. The other modules provide users with crucial information and assist in keeping an eye on automobiles at all times, even when they are missing. This Raspberry Pi-based system prototype manages all of the procedures. Through a text message from his phone, the owner is able to execute automobile halting. The GPS module in the automobile recognises the vehicle's position. As a result, the identification of the thief and the

location of the automobile are simply wiser and less expensive with this method than with a standard one.

**Shrutika V. Deshmukh (April 2017)** Car thefts and identity fraud have been a severe problem in recent years. A facial recognition system must be built to prevent these thefts and identity fraud. The goal of this project is to create a facial recognition-based intelligent security solution. Face detection is done with haar-like features, while face identification is done using the HOG + SVM method. We employ the OpenCV libraries and the Python programming language to improve accuracy and efficacy. The training and authentication are carried out using a Raspberry Pi-based embedded device.

**Ketan J. Bhojane (may 2018)** The only method to power the automobile or supply ignition to the engine is with a vehicle key. By substituting the key with a specific user's face, the facial recognition-based automobile ignition system physically races the automobile ignition. When dealing with the subject, the goal is to create luxury characteristics while still being concerned about safety, which may be accomplished through the use of vehicle electronics. In this research, we propose a facial recognition system using the Raspberry Pi B and MATLAB's face detection and face tracking system algorithms.

**Laymar T. Santelices (December 2018)** In today's world, as technological advancements and scientific study yields scientific breakthroughs, the necessity for security grows in all fields. The use of a car is becoming a fundamental requirement for everyone. Furthermore, it is critical to safeguard the car from theft. Traditional car security systems rely on a large number of sensors and are expensive. When a car is stolen, there may be no other action or option available to assist the owner of the car in recovering it.The major purpose of this study is to employ a rapid, incredibly simple, precise, trustworthy, and cost-effective facial recognition approach to defend the vehicle against unwanted entry.

## 3. BLOCK DIAGRAM OF THE SYSTEM

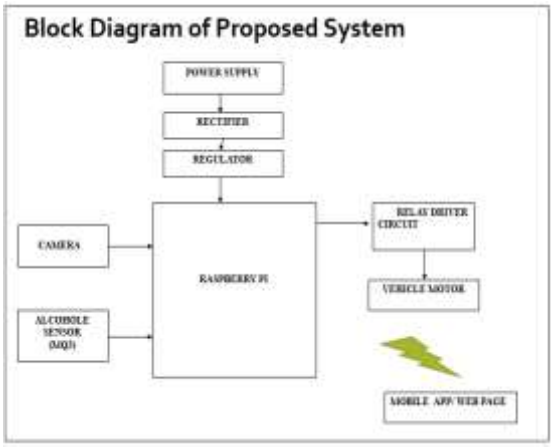


Fig. 1 Block diagram of the System

## 4. DESCRIPTION OF THE BLOCK DIAGRAM

The system consists of Power supply, Camera, Alcohol sensor, Relay, and most importantly Raspberry Pi. The power supply provides necessary power supply to our system, basically to the Raspberry pi. The camera module is attached with the camera module. It captures photos of the user who comes in contact with it in the car. The captured photos are then sent to raspberry pi, where the photos are analysed with the stored database of users. The photo captured is compared with the saved user data, if the image match is found then the user is permitted to turn on the system. But it doesn't start until the alcohol sensor sends data to the system, MQ3 sensor or alcohol sensor is used to sense alcohol, If alcohol is found, then car doesn't start. If there is no alcohol present then the car starts. The data is sent to a mobile app.

## 5. PROPOSED SYSTEM

The proposed system consists of various hardware and software elements

### 5.1 Hardware Elements

### 5.2 Software Elements

### 5.1 Hardware Elements

#### 5.1.1 Raspberry Pi

Raspberry pi is a small sized computer, in our project it is used to capture and analyse data. Raspberry pi comes with a 2 GB in built RAM and storage can be accessed by using a SD card. Operating system for Raspberry Pi is also stored in the SD card. The Raspberry pi is used to capture

data from camera module and alcohol sensor analyse it and send it to vehicle control relay and mobile app.

### 5.1.2 Camera Module

Camera module is an important aspect of our system. The camera captures pictures of the user who comes in contact with the camera and then sends it to Raspberry pi module for analysing the data.

### 5.1.3 Alcohol Sensor

MQ3 is an alcohol sensor which senses the alcohol from the user and sends the data to Raspberry pi for analysing. If alcohol is present the Car will not start and relevant error message is displayed on the app.

## 5.2 Software Elements

### 5.2.1 Thonny

Thonny is an Open source Python IDE which comes in built with the Raspbian OS. This is used for writing code for our system as it is based on facial recognition, it also uses OpenCV.

### 5.2.2 OpenCV

Open CV means Open Computer Vision. It is a library of programming functions which is aimed at resolving problems like face detection and image recognition.

## 6 FLOWCHART AND ALGORITHM

**Flowchart**

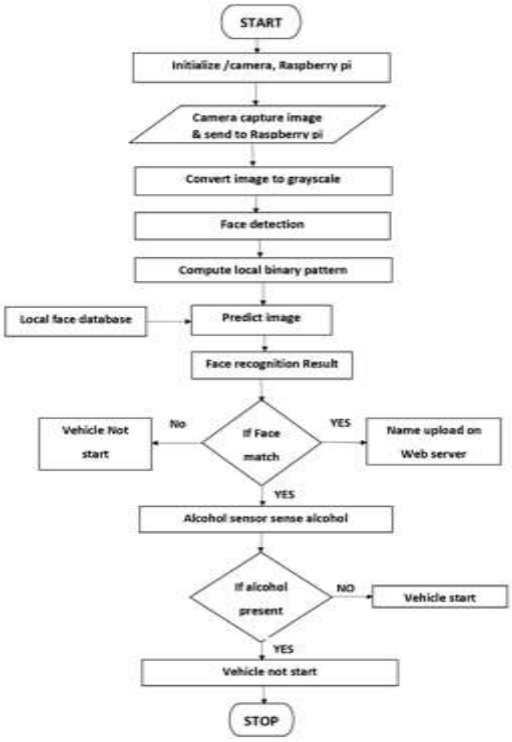


Fig. 2. Flowchart of the system.

**Algorithm**

- Step 1 :Start the vehicle
- Step 2 : Initialize the Raspberry pi and camera
- Step 3 : Camera captures the image and sends it to the Raspberry pi.
- Step 4 : Raspberry pi converts image into grayscale format.
- Step 5 :Face detection takes place .
- Step 6 : The image of face is matched with the local database.
- Step 7 : The predictions according to the input image is done.
- Step 8 : Face detection result .
- Step 9 : If the face is not matched with the local database the vehicle will not start and wait for the next person is introduced.
- Step 10 : If the face is matched with the local database image the name is uploaded to the webserver
- Step 11 : Alcohol sensor detects alcohol
- Step 12 : If there is any amount of alcohol present, the vehicle will not start.

- Step 13 : If there is no detection of alcohol, then the vehicle starts.
- Step 14 : End .

**7. RESULTS**

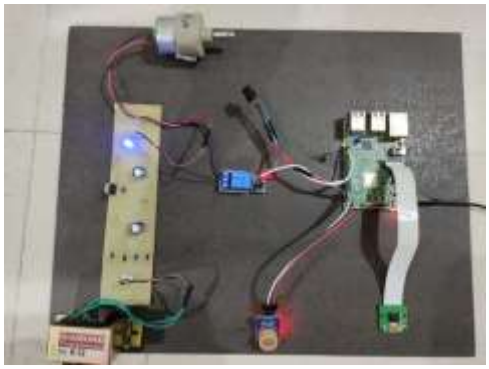

Fig. 3 Overall System Implementation


Fig.4 Unknown person detected Error displayed on mobile app


Fig. 5 Alcohol Detected Error displayed on Mobile App.


Fig.6 Registered User Detected and His Name Displayed on The Mobile App.

The concept has been implemented and tested satisfactorily. The project's goals have been met to a satisfactory degree. Due to the unsafe environment, a sophisticated system is built to safeguard automobiles from theft and other hostile situations. The Python programming language was used to create the facial detection application. The photograph of the individual is captured instantaneously by the camera when this software is performed on the Raspberry Pi. The image is then cut out of this.The identified picture is then contrasted to the owner's previously saved record in the database. The Alcohol sensor MQ-3 was chosen for this solution because of its excellent sensitivity in identification and resilience to gasoline disturbance. The alcohol sensor can detect the presence of alcohol in human breath. The alcoholic drunkenness is presented in this technique on the cell phone. The car will not start if alcohol is detected. wait for the next person to arrive.

**8. CONCLUSION**

The technology may be employed in a variety of locations, including banks, hospitals, labs, and other sophisticated automated systems, reducing the risk of illegal entrance significantly. If there is a robbery, evidence can be presented to the security department. The Raspberry Pi-based facial recognition system is smaller, lighter, and consumes less power, making it more handy than a PC-based system. It is easier to build applications on Linux due to the open source code. Python was used to create the system. Face detection in real time and face detection from specified photos, i.e. object identification, were both done.In terms of

image processing rate, the system's effectiveness was assessed. The results of the investigation demonstrated that the current method has a high performance productivity and can be utilised to recognise faces even in low-quality photos.

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