



BCM2837B0 CORTEX-A53(ARMv8) BASED VEHICLE STARTER USING FACIAL RECOGNITION AND QR CODE DETECTION

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Abstract— A vehicle security system has become an essential part for all vehicle owners as it ensures the safety to their properties. This system is necessary because the vehicle is an expensive property so the loss due to theft is not compensable. The technologies for vehicle security systems nowadays are evolving very fast each year. These vehicle security systems almost cover controlling and managing appliances where the safety issue is the top priority. A vehicle key is the only way to start the vehicle or to provide ignition to the engine. The face recognition-based based vehicle starter system literally replaces the vehicle ignition by replacing the key with a specific user face. This smart vehicle starter system is powered by a raspberry pi circuit. Here, the face detection system takes multiple photos of the person and stores this data in its database. While scanning, when the face is detected by the camera the system compares the given face with the images in the database and authorizes the person, if the person is already registered then it starts the vehicle or else identifies the person as an invalid user and the buzzer goes on and access is denied and the motor doesn't start. For future generation automobiles, this initiative adds sophisticated security measures. If any unauthorized person wants to start the vehicle, the person needs to get the QR code from the owner of the vehicle. When that QR code comes in contact with the camera, the vehicle starts. Also, the alcohol detection module will not in any condition allow the car to be started, even if the user is registered or the correct QR code is given. Also, the alcohol detection module will not in any condition allow the car to be started, even if the user is registered. In the proposed system RF communication technology is used to provide wireless communication between raspberry pi and the vehicle.

Index Terms:- Anti drink and drive the car, Smart car, keyless car, OpenCV, AI, Raspberry pi, Facial recognition, QR code.

I. INTRODUCTION

Vehicles are the primary mode of transportation for most of us, and are often an indispensable part of our lives. But what would happen if your vehicle suddenly disappeared. Over 7,00,000 drivers fall victim to this costly crime each year. Currently, the emergence of industrial revolution 4.0 in the autonomous vehicle sector is experiencing rapid growth. The advanced autonomous technology involves many aspects of the vehicle, such as autonomous self-driving, and full autonomous self-driving. One of the important aspects of an advance autonomous vehicle is a security system. Security system plays an important role in the vehicle safety system, especially in a theft case and unauthorized person Nowadays, conventional security systems such as key, code pin, and ID card, are very popular in many countries. However, the conventional security system has the potential to be lost, stolen, or duplicated by someone Furthermore, many traffic accidents occur mostly due to young vehicle drivers and theft due to vehicle security systems. Based on these circumstances, it is necessary for a security system able to prevent the car.

Face recognition is one of the key components for future intelligent vehicle applications such as determining whether a person is authorized to operate the vehicle. This study describes the development and implementation of an automatic face recognition system in the car environment. The challenge is to build a fast and accurate system that is able to detect, recognize and verify a driver's identity with the constraint introduced in the car environment in daylight lighting conditions. A further constraint is to use a low-cost web camera to capture the frontal images.

The system can be divided into two parts: face detection and face recognition. For this face detection and face recognition, Haar cascade and K-nearest neighbors (KNN) algorithms are used.

The Haar Cascade algorithm uses edge or line detection features to detect a face quickly and in real-time. The KNN algorithm aims for face recognition tasks. The KNN algorithm can compete with the most accurate models because it makes highly accurate predictions. Therefore, you can use the KNN algorithm for applications that require high accuracy but that do not require a human-readable model. The quality of the predictions depends on the distance measured.

BLOCK DIAGRAM

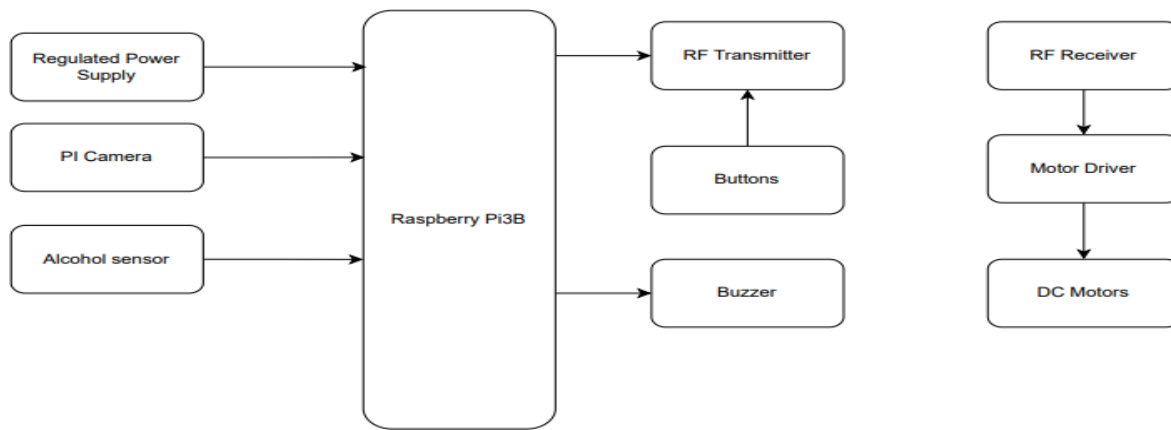


Fig: Block diagram

II. MOTIVATION

The main step towards handling vehicle thefts include facial recognition. 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 and non-biometric methods usually provide such security features. Sometimes these systems fail due to hacked password and encryption of decrypted data, but it is almost impossible to make replica of distinctive characteristics. Biometric systems are modern and use techniques like fingerprint recognition, iris recognition and face recognition. Of these face recognition and detection systems are more sophisticated, easy to deploy and people can be identified without their knowledge. Some advantages of facial recognition method for vehicle security application are:-

1. More convenient, sensed as soon as one is seated in position.
2. Low cost and a better approach to be used with existing methods.
3. Requires no active part of the user.

III. METHODOLOGY

The project is provided for the safety of vehicles. Here the faces of owner of the vehicle is put in the local databse. When the person wants to start the vehicle, the camera turns on and captures the image of the person. If the image is matched with the image stored in the local database the vehicle stars. Also,if the person is an authorized, if the person consumes alcohol,the vehivle never starts.

If any unauthorized person wants to start the vehicle, the owner of the vehicle should send the authoriaed QR code. So, when the camera turn on if this QR code is captured,the vehicle turns on.

The flowchart of this Project is as follows:

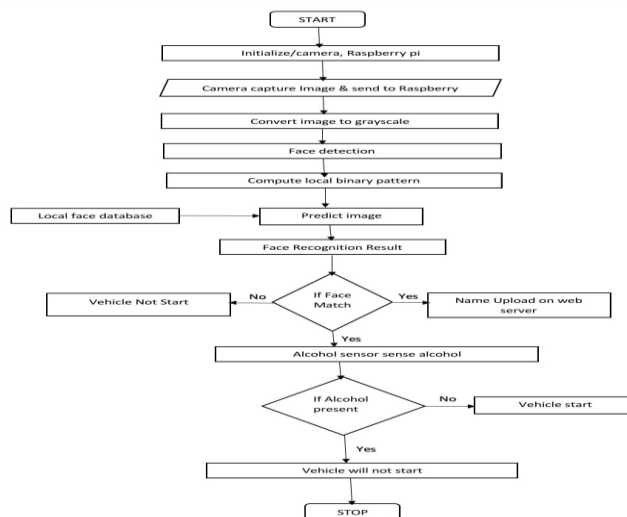


Fig: Flowchart

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 webservice.

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

IV. HARDWARE SETUP

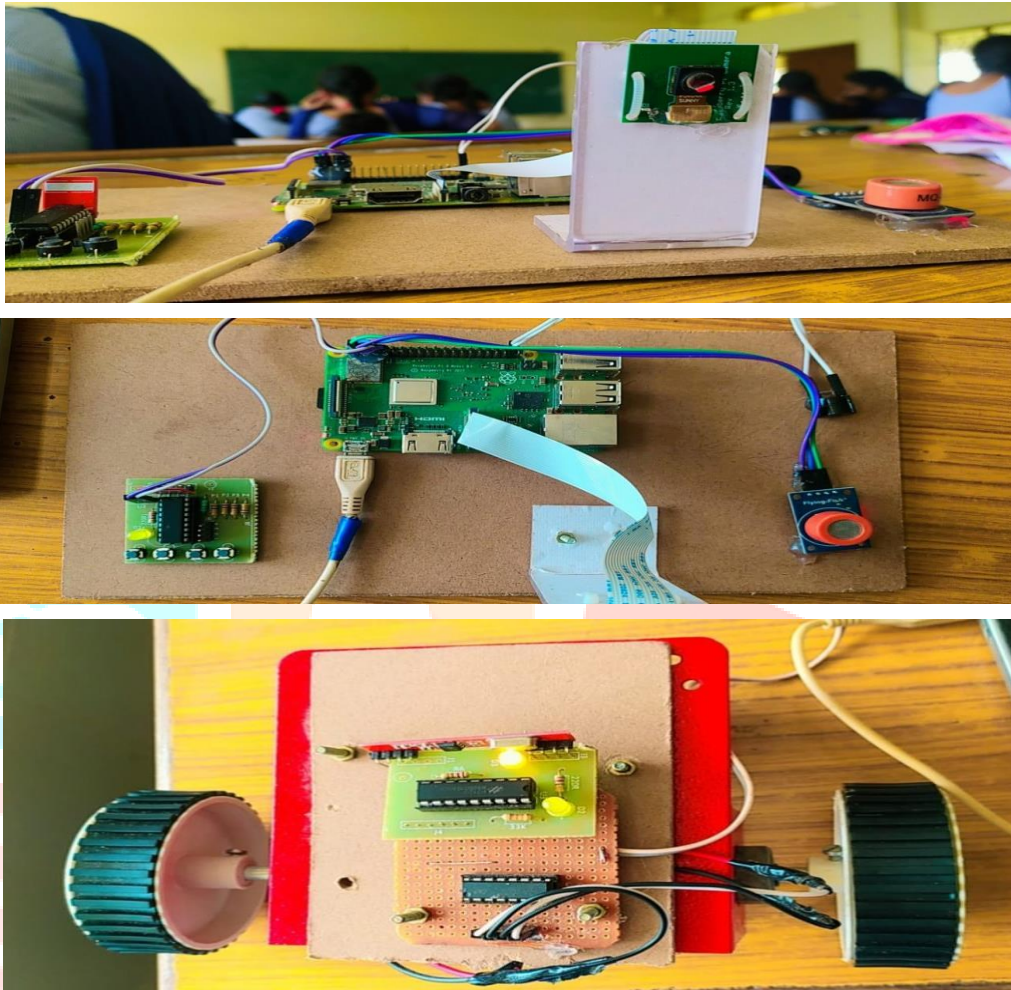


Fig: Hardware setup

SIMULATION

Booting the Raspberry Pi for the first time

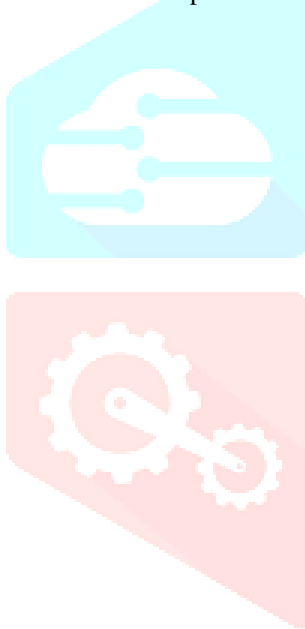
- insert SD card in to raspberry pi b+ board
- On first boot you will come to the Raspi-config window
- Change settings such as timezone and locale if you want
- Finally, select the second choice: expand_rootfs and say 'yes' to a reboot
- The Raspberry Pi will reboot and you will see raspberrypi login:
- Type: pi
- You will be asked for your Password
- Type: raspberry
- You will then see the prompt: pi@raspberrypi ~ \$
- Start the desktop by typing: startx
- You will find yourself in a familiar-but-different desktop environment.
- Experiment to start a new python project.



Fig: Interfacing of raspberry pi code in VNC viewer

V. RESULTS

Proposed guiding device is designed using Python software tool, LIDAR sensor, GPS module, raspberry Pi3b+ and many results has been extracted for the safe and independent navigation of an impaired person . The below shown figures are the results that has been extracted for the implemented design



```
*Python 3.7.3 Shell*
File Edit Shell Debug Options Window Help
Python 3.7.3 (default, Jul 25 2020, 13:03:44)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/Desktop/code/train.py =====
Enter the name of the person : |
```

Fig: Display after running the code

```
*Python 3.7.3 Shell*
File Edit Shell Debug Options Window Help
Python 3.7.3 (default, Jul 25 2020, 13:03:44)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license()" for more information.
>>>
===== RESTART: /home/pi/Desktop/code/train.py =====
Enter the name of the person : reshma
```

Fig: Display after entering the name



Fig: Display of Camera when Person is in contact with it

VI. CONCLUSION AND FUTURES SCOPE

Face recognition is a both challenging and important recognition technique. Among all the biometric techniques, the face recognition approach possesses one great advantage, which is its user-friendliness. In this paper, an embedded automotive security system involving face recognition is presented. The system can be used to reduce the increased vehicle theft and allows the owner to identify the intruder thereby having the vehicle under his/her control. The results obtained through face recognition show that it can be relied upon to ensure the safety of the vehicle. The system provides faster face detection and recognition for owner authentication. Ignition is provided immediately, after owner authentication, for starting the vehicle engine. The concept has been implemented and tested satisfactorily. From the outcomes got in the project it is clear the framework gives quicker face recognition and acknowledgment for proprietor authentication. Ignition is given quickly, after proprietor validation, for beginning the vehicle engine. This implies that the framework satisfies all the normal outcomes and it is productive for the user. The framework can be utilized to lessen the expanded vehicle burglary and permits the vehicle under his/her control. The results acquired through the face acknowledgment show that it very well may be depended upon to guarantee the wellbeing of the vehicle.

This work can be extended in the future with a minimum delay to recognize the faces by using the Raspberry Pi 4 model.

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