Face Recognition Based Vehicle Starter Using IOT

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ABSTRACT

A vehicle key is the only way to start the vehicle or to provide ignition to the engine. The face recognition-based vehicle starter system literally replaces the vehicle ignition by replacing the key with specific user face. This smart vehicle starter system is powered by raspberry pi circuit. Here, the face detection system takes multiple photos of the person and stores this data into 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 invalid user and the buzzer goes on and access is denied and the motor doesn't start. To clear data we need to use the clear option to clear entire data.

Keyword - *Face registration, Face recognition, Ignition.*

1. INTRODUCTION

With the knowledge and applications of large amount embedded techniques, vehicle security program study and analyses are consistently improving. Many trendy techniques, a well-known as biometric passport campaign, perception processing technique, communication technique thus, have been entire into vehicle security systems. At the same anticipate, the approach to the vehicles remains valuable. So, one efficient vehicle security program should be sensible, competent and reliable. So, to prohibit vehicles stealing from thieves, owners of the automobiles are facing towards technology as an anti-robbery system. Detecting faces in images is a fundamental task for realizing surveillance systems or intelligent vision-based human computer interaction. To build flexible systems that work in a variety of lighting conditions and run-on mobile phones or handheld PCs, robust and efficient face detection algorithms are required. Appearance-based methods are mainly employed to achieve high detection accuracy.

2. EXISTING SYSTEM

In existing method does not embedded with RF communication. They do not exist the camera in previous case. In existing method, the Arduino platform was implemented. In this system, monitoring only applicable. Data is not stored in the system.

3. PROPOSED SYSTEM

In this proposed system, we develop a system with hardware and software components that would optimize the security of the vehicles. In line with this, the paper aims to achieve the following specific objectives: To install a face recognition system in the vehicle for authentication of engine ignition and to implement alert system using buzzer.

4. HARDWARE DESCRIPTION

4.1 Raspberry Pi 3 b+

Raspberry pi is a pocket personal computer with Linux operating system on it. This is great cheap to encourage young people for learning, programming, experimenting and for making innovation. Resembling like motherboard, raspberry pi has all the components to connect inputs, outputs and storage. The model A has all of the same features of the model B minus one of the USB plugs, the Ethernet port, and half of the RAM. An SD card inserted into the slot on the board acts as the hard drive for the Raspberry Pi.

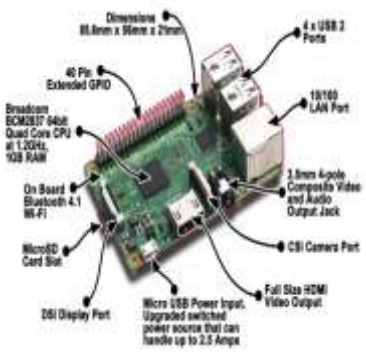

Fig – 1: Raspberry pi 3b+

4.1 DC Motors

A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed. Here, the speed is 200 RPM

5. SOFTWARE DESCRIPTION

5.1 Raspbian OS

The Raspberry Pi lines of micro-computers are impressive machines with endless possibilities. As a result. The Linux community has created dozens upon dozens of special Linux operating systems for it. Everything from Linux powered server operating systems, to media centres, console emulation kits and more; there's just so much to choose from. Raspbian is a Debian-based computer operating system for Raspberry Pi. There are several versions of Raspbian including Raspbian Stretch and Raspbian Jessie. It has been officially provided by the Raspberry Pi Foundation as the primary operating system for the family of Raspberry Pi single-board computers. Raspbian was created by Mike Thompson and Peter Greenasan Independent paper. Raspbian is highly optimized for the Raspberry Pi line's low performance ARM CPUs. Raspbian uses PIXEL, Pi Improved X windows Environment, Light weight as its main desktop environment as of the latest update. The scripts and files created are run on the Raspbian OS. It is an ARMHF port of the popular open source operating system with one key difference: Raspbian builds differently than Debian, to support hardware floating point.

5.2 Python

Python is a flexible and dynamic language that you can use in different ways. You can use it interactively when you simply want to test a code or a statement on a line-by-line basis or when you're exploring its features. You can use it in script mode when you want to interpret an entire file of statements or application program. To use Python interactively, you can use either the Command Line window or the IDLE Development Environment.

6. ALGORITHM

6.1 HAAR-like features and rectangle sum

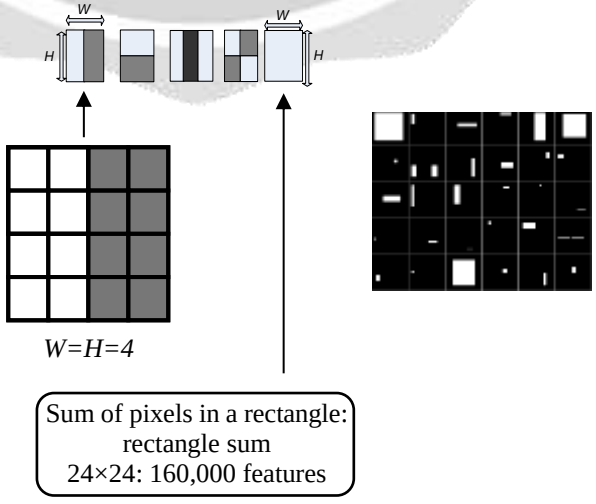

Fig – 2: HAAR-like features and rectangle sum

Haar-like features are digital image features used in object recognition. A Haar-like feature considers adjacent window, sums up the pixel intensities in each region and calculates the difference between these sums. The difference is then used to categorize subsections of an image. For example, with a human face, it is a common observation that among all faces the region of the eyes is darker than the region of the cheeks. Therefore, a common Haar-like feature for face detection is a set of two adjacent rectangles that lie above the eye and the cheek region. The algorithm uses edge or line detection features. A simple rectangular Haar-like feature can be defined as the difference of the sum of pixels of areas inside the rectangle, which can be at any position and scale within the original image. This modified feature set is called 2-rectangle feature.

6.2 Extended HAAR-like features

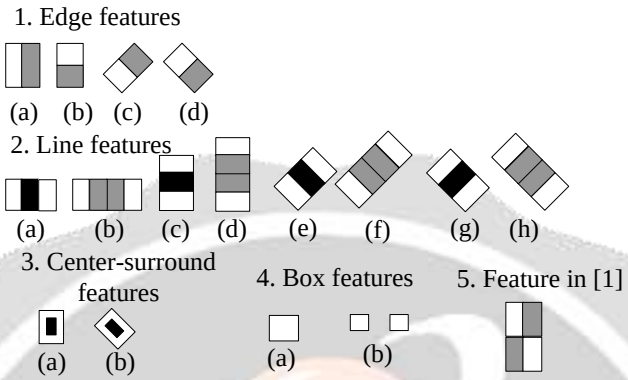

Fig – 3: Extended HAAR-like features

If you look at a photograph showing a person's face, you will see the eye region is darker than the bridge of the nose. The cheeks are also brighter than the eye region. A simple way to find out which region is darker or lighter is to sum up the pixel values of both regions and comparing them. The sum of pixel values in the darker region will be smaller than the sum of pixels in the brighter region. This can be accomplished using Haar-like feature.

6.3 HAAR-like features – application

Face recognition

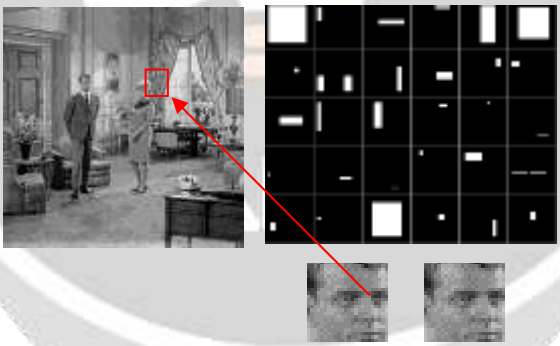

Fig – 4: HAAR-like features-application

In the process of face detection, place random feature rectangles on thr image in turn. The difference between sum of pixel of the white region and sum of pixel of the black region serves as a feature. If the rectnagle congtains faces, the eigen value serves as a face feature. Otherwise the eigen value serves as a non-face feature. Different sizes of rectangles on different positions of the image provide large amounts of features. After input images are detected by multiple strong classifiers, it can be confirmed that the image is a face.

6.4 Flowchart

Camera gathers the images of the face in dataset folder. The datum of each face is fed to the recognizer i.e., Haar cascade. During recognition the camera captures the image of a face and checks with the stored images.

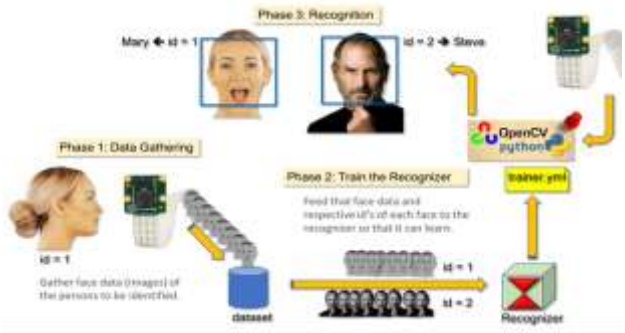

Fig – 5: Flowchart

6.5 Dataset Capture Flowchart

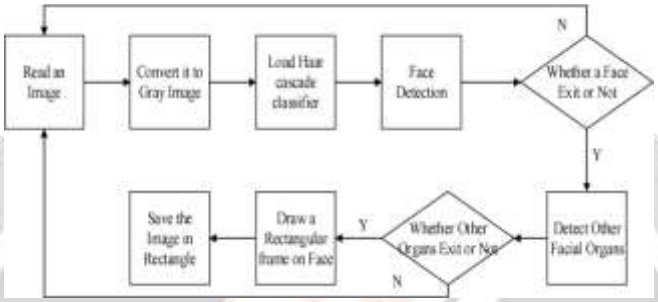

Fig – 6: Dataset capture flowchart

An image of the face is read and the image converted to gray scale image. Haar cascade classifier is loaded for face detection. Checks whether it is a face, if a face is detected, then it begins to detect other facial organs. If not a face, exits. Checks whether other facial organs present, if the facial organs are detected, then it drawns a rectangular frame on face and stores the Image in rectangle. If no facial organs detected then it reads the image again.

Fig – 7: Stored Dataset Details

The image in rectangle is stored in a folder called dataset. Various number of images are stored for precise and faster face detection.

6.6 Block diagram of the paper

+12V of battery is connected to 12V of power supply and -12V of battery is connected to ground of power supply. Power supply has IC7805, whose 12V, ground, 5V(output) pins is connected to 12V, ground, 5V pins of L293d motor driver IC. Inputs (IN1, IN2, IN3, In4) of L293d driver IC is connected to 31, 33, 35, 37 pins of raspberry pi 3b+ and outputs (01, 02) of L293d IC is connected to motor and outputs (03, 42) of L293d IC is connected to another motor. Input of alcohol sensor is connected to pin 3 of raspberry pi and outputs of alcohol sensor 5V, ground pins are connected to 5V and ground pins of IC 7805. Input of buzzer (red wire) is connected to pin 8 of raspberry pi and output (black wire) is connected to ground of IC7805. Ground of IC 7805 is connected to ground of raspberry pi.

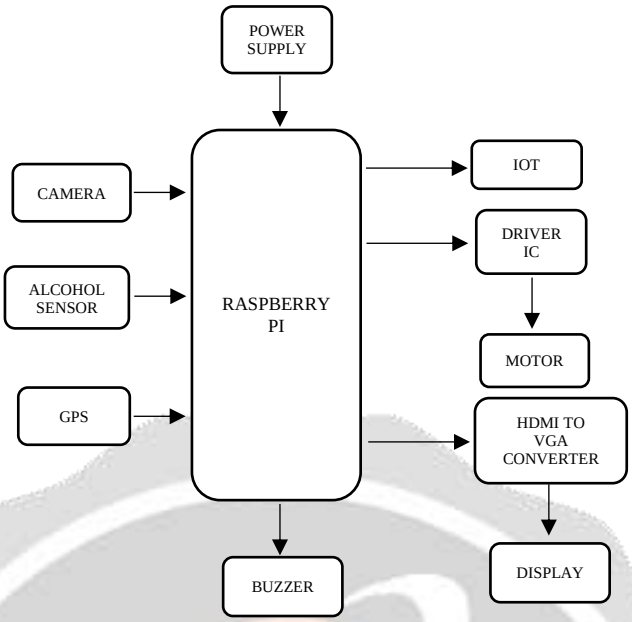

Fig – 8: Block diagram

7. RESULTS

First the camera captures several pictures of the user and stores the registered data in a dataset folder. During recognition, when the registered user is in front of the camera, the motor runs. If it detects a registered face, it shows a green box around the face with the name in raspberry output. If any unregistered user appears in front of the camera, the buzzer goes ON and ESP8266 module captures and sends the unknown person's picture to an email address. The GPS sends the location of the vehicle to the email address.

Fig – 9: Hardware Output

The above image is the final hardware output of this paper.

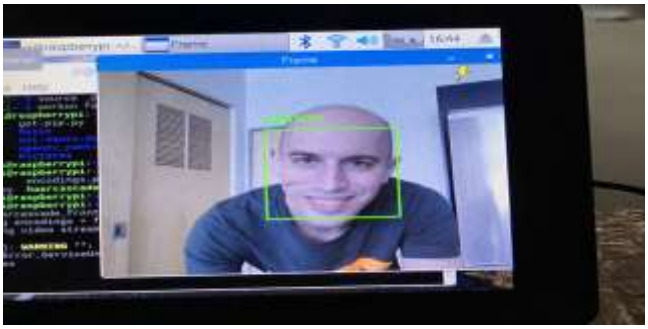

Fig – 10: Raspberry Output

8. CONCLUSION

From the results obtained in the demonstration it is clear the system provides faster face detection and recognition for owner authentication. Ignition is provided immediately, after owner authentication, for starting the vehicle engine. All the sensors of black box are excellent at performance and provide adequate data to the system for monitoring and accurate information about the status of vehicle is provided to the owner and family. This means that the system fulfil all the expected results and it is fruitful for the user.

9. FUTURE SCOPE

As the actual implementation of the system for commercial purpose is taken in to the consideration the system can be upgraded with advance components. For improving system Performance, best and advance versions of the components used, can be included in the system Advance version refers to Orange-pi for faster processing, high resolution cameras, higher accuracy digital sensors etc.

10. REFERENCES

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