Face Recognition using Raspberry PI for Door Lock System

Mrinal Kasture[1], Rohan Mistry[2], Kalpesh Talekar[3], Naveenkumar Kushwaha[4], Sangita Nikumbh[5]

[1]*Electronics and Electrical Engineering, New Horizon Institute of Technology and Management, Thane, India.*

[2,3,4,5] *University of Mumbai, Mahatma Gandhi Road, Kala Ghoda Fort Mumbai, Maharashtra 400032, India.*

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Abstract - *This project aims to present a security door lock system based on Raspberry pi technology which is used to provide an alarm system that can notify the owner, as well as, recognize guests. In this, the authorized individuals are the only ones who will be permitted to access the doors. The system works by taking snaps for the guest through a code and camera pi positioned in the doors then, a notification will be sent to the owner. Face recognition has ample possible applications to hardware and devices. Using embedded platforms like the Raspberry Pi and open-source computer vision libraries like Open CV, we can now add face recognition to make projects. In this project, we will be building a system that unlocks itself using face recognition which runs on a Raspberry Pi 3B. The system identifies and differentiates between the owner and stranger using face recognition and acts accordingly. In this system, it interacts with the stranger at the door in case the owner is not present at home and notifies the owner via email regarding the activity taking place at the door.*

***Key Words*: Face detection, Raspberry PI 3b, Door lock Security, IoT**

1. INTRODUCTION

We have seen the face unlock feature in our smartphone that makes things very simple. Face detection is additionally employed in several places like airports, railway stations, and roads for police work. A Raspberry PI may be a featured a system-on-a-chip setup engineered round the Broad-com BCM2835 processor–a little however fairly powerful mobile processor ordinarily employed in cellphones. It enclosed computer hardware, GPU, audio/video process, and different practicality all on a low-power chip paired with a 700Mhz single core ARM processor. Over the intervening years the inspiration has discharged multiple revisions. The Raspberry Pi is a single board that plugs into monitor, TV or directly connects wireless with portable computer and may be an inexpensive device. It comes with GPIO pins through that we can connect external sensors, modules and HATs. We have coded directly through the raspberry pi and use all the GPIO to form advanced comes. Open CV is associate degree ASCII text file library for laptop vision, machine learning, and image process. Currently it plays a significant role in real-time processing that is incredibly vital in today's systems. By this library, we can method pictures and videos to spot objects, faces, and even handwriting. Once integrated with varied libraries, like NumPy & python, that is capable of process the Open CV array structure for analysis, it identifies image patterns and their options, which can be employed in vector area to perform mathematical operations. Here, we have built a Face Recognition system using the Open CV Library on Raspberry Pi, as it is portable to work as a surveillance system. There are two factors, one of which is the coding part and the other is the database.

1.1 RESEARCH METHOD

A tendency to see the setup of the house security system involves the utilization of a Raspberry Pi three model B to that a Passive Infrared sensing element (PIR sensor) and a digital camera square measure connected throughout implementation of the system the PIR sensing element is setup to notice motion within the secured surroundings, if motion is detected then the Raspberry Pi three model B makes use of the digital camera to initiate the face detection method and on finding a face captures a picture of the secured surroundings. The system conjointly consists of a digital camera that's connected to the Raspberry Pi three model B via Associate in Nursing USB port. once Associate in Nursing persona non g rata enters the secured surroundings the PIR sensing element detects motion and alerts the system, the system in response activates the digital camera and begins a face detection method that relies on Open CV. If a face is found by the face detection method, then the system captures a picture of the surrounding the digital camera, the system stores a replica of the image beside the date and time once the image was captured as a backup. once getting the image the system takings to send the image to the user's E-Mail account [1]. They planned associate implementation of detector internet node as a vicinity of web of Things (IOT) Raspberry Pi (RPi) and GSM. RPi is customizable, moderately price and programmable little PC having giant numbers of peripherals and network for communication. During this work communication between the remote user and therefore the home devices is enforced GSM and SMS that use the AT Commands [2]. Results from Hema. N projected to extend the interaction with home security system varied

further modules like image process and wire area unit used. To develop secure home system they have each hardware, software package co design. In hardware we'd like a micro controller that management the functioning of the system. Actuators used area unit diode and servo motor. The devices like IR sensor, temperature device, gas device and Raspberry pi camera area unit used. IR device is employed for motion detection, temperature device for sensing the temperature, gas device for sensing any harmful gases. Raspbian stretch is use to program the raspberry pi controller and Open CV is employed for image process. wire electronic communication is employed to act with home security system and to receive notification [3]. In this work, the system operates through a mix of Arduino UNO and Android-based smartphone. it's capable of activity all the identity verification stages on its own like face detection, options extraction, face recognition applying Open CV libraries. Moreover, the system includes a secondary protection level, like the standard pin-code based and RFID based security levels that stretch the practicality. The system is simple to tune, and also the golem OS permits to update the information for face recognition simply. Face recognition may be a part of the life science space that conjointly contains fingerprint, eye iris recognition, auricle form, hand pure mathematics, palm lines, the pattern of keystrokes on a keyboard, signature, and speech, and even polymer comparison. This technology allows the identification and verification of an individual's identity by examination countenance with the info keep within the information. Just like a fingerprint, face recognition analyzes the textures and shapes. The system is capable of detective work somebody's face within the variety of a picture or a video, and it will compare and analyze the predetermine characteristics of the face keep within the information [4].

1.2 PROPOSED METHODOLOGY

We have considered models of proposed systems: major systems and subsystems, along with their implementation. This system was easily implemented for any security purposes. It was easy to maintain and use, also it was cost effective. When a person stood facing the camera system, the Pi Camera Module scanned the face and compared it with the database stored. When the face matched with the database, the GPIO pin indicated the Solenoid lock to grant access to the user. Also, an email will be sent to the owner regarding the happening activity. If the face is not identified by the system, access will be 'denied'. An email will be sent to the owner regarding any activity taking place at that time.
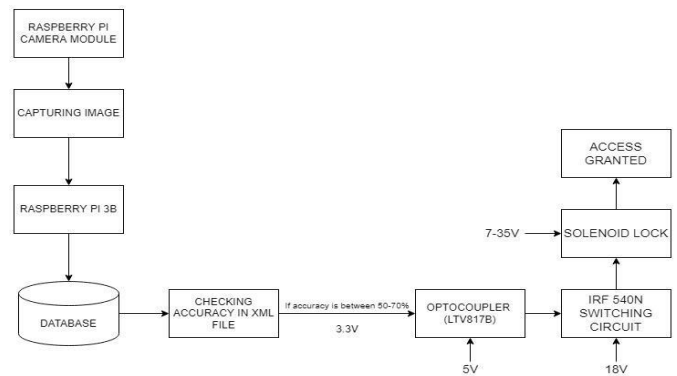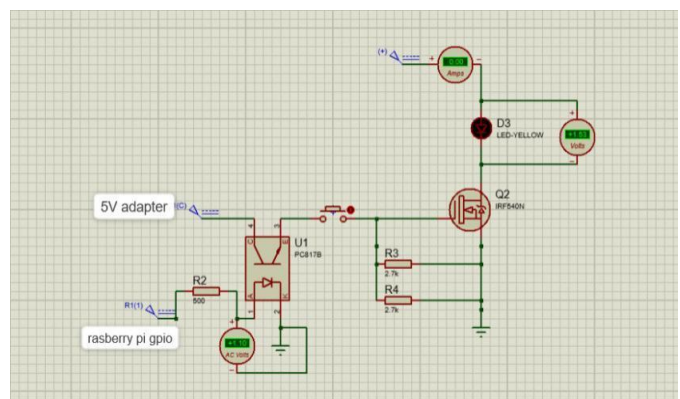

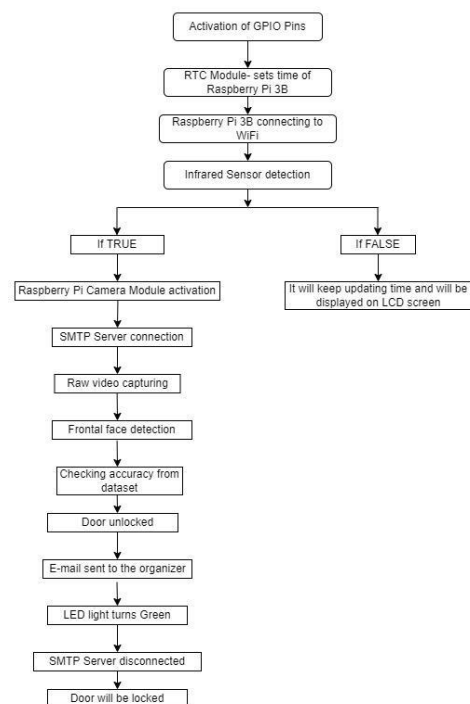Figure-1: Workflow of the system

Figure-2: Switching Circuit

Figure-3: Flowchart of the main code

2. FINAL RESULTS

After the face detection, the LCD display and a Green LED light, which is shown in Figure-4, indicates that the access has been granted. Furthermore, the owner receives an email regarding the activity occurred, which is seen in Figure-5. Also, the solenoid therefore unlocks to permit the registered user to enter.
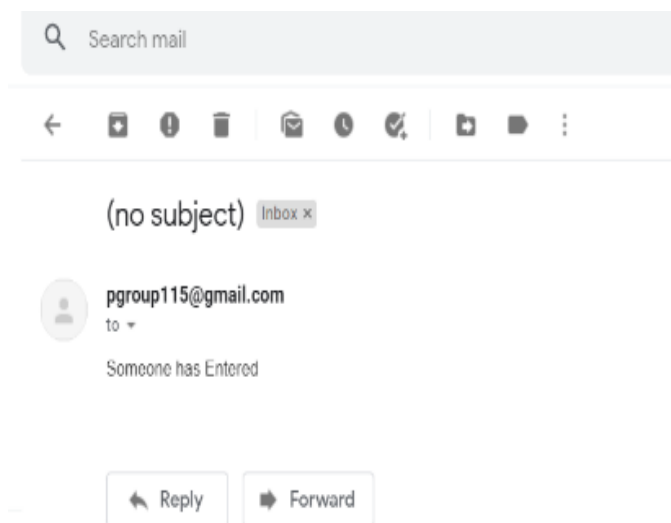

Figure-4: Output

Figure- 5: Email received to the owner

3. CONCLUSION

This device primarily focuses on the owner's security and convenience. The proposed system is user-friendly, time-saving, and reliable as it eliminates the traditional locking system. It also sends an email alert to the owner if anyone is making an attempt to unlock the door. To make the system more ideal, we can upgrade the camera quality for night surveillance, high resolution, and other new parameters to accomplish it.

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