Security System and Automation using Raspberry Pi

Joseph Patole[1], Chinmay More[2] and Gaurav Kolapate[3]
[1,2,3]*U.G. Students, Department of Electronics, FR. Conceicao Rodrigues College of Engineering, Mumbai*
[4]*Professor Jayen Modi, Head of the Department of Electronic, Dr. Deepak Bhoir*

Abstract: As an essential part of many organization security and safety precedence, video surveillance has established its importance and benefits many times by providing immediate supervising of possessions, people, environment and property. Our paper 'Security System and Automation using Raspberry pi' deals with embedded technologies using image processing and speech processing for raspberry pi, microphone and camera module.
In this paper we present a security system and home automation technique. The camera module, microphone and buzzer will be interface with Raspberry pi. The camera will be able to identify the authorized person and will trigger the raspberry pi to open the door link. The microphone is used for automation process like controlling the electronic and electrical appliances in the room. The mic also works as an chat-box. This paper will serve as an example of how with the help of image processing and speech processing we can have fast and more secured system and make our life easier.

Keywords: Raspberry pi, Camera Module, Image processing, Speech processing.

I. Introduction

In existing security systems using RFID, if RFID card tends to be lost or misplaced it can be a bizarre to the one who owns the card. So this paper proposes an idea wherein a camera is used to detect the facial features of the appropriate person to whom it is predefined.
Also for automation in existing system, Node MCU provides a disadvantage wherein data is processed via IOT and if internet is lost the system fails.
Hence, this paper utilizes Raspberry pi fundamentals and image processing for security system and speech processing to ease the way we control our electrical and electronic appliances.

II. Block Diagram

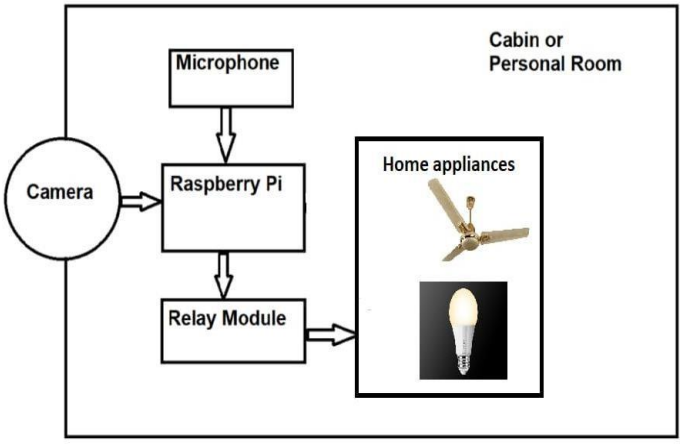

Figure 1

III. Flow Chart

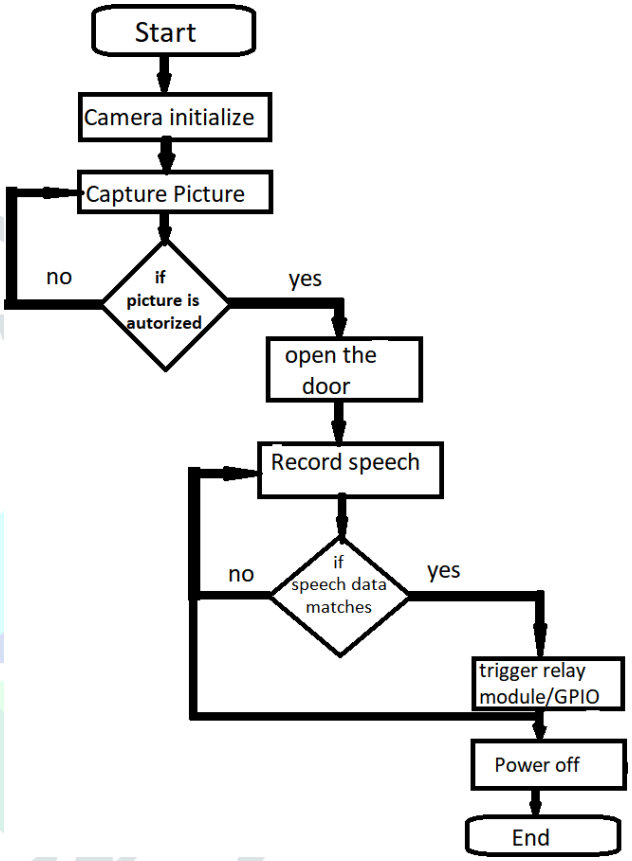

Figure 2

Above is flow of our project. As supply is given to the system the camera, raspberry pi and microphone starts functioning. The camera continuously keeps monitoring the area. It keeps clicking pictures and tries matching it with the authorized persons face. As soon as the authorized person comes in contact with the camera, the raspberry pi recognize the person and triggers its GPIO to unlock the door's latch.
Now the microphone records the sound and tries matching it with the feed data. As soon as the user gives any command to the system just like turning on/off the electrical/electronic appliances the raspberry will trigger the required GPIO connected to the relay module and thus it will do the needy.

IV. Specification of Components

- **Raspberry pi:**

The Raspberry- Pi acts as a input output device which constantly receives data from the camera and micro phone. The data from the microphone is then processed and converted into speech to command relay module for automation. The captured images from camera are compared to authorized image to trigger the door lock.

Figure 3

- **Camera Module:**

The 5MP omnivision 5647 Camera Module keeps monitoring the location for unusual activities. If the authorized person is standing in front of the camera then it triggers raspberry-pi to open the lock. Raspberry-pi is processed using image processing algorithm.

Figure 4

- **Micro Phone:**

It is interfaced with raspberry pi to automate room appliances using speech processing algorithm. Microphone send the speech signals to the raspberry pi where it is converted into text data and then this data helps in triggering the relay module of electronics and electrical appliances.

Figure 5

V. SYSTEM TESTING

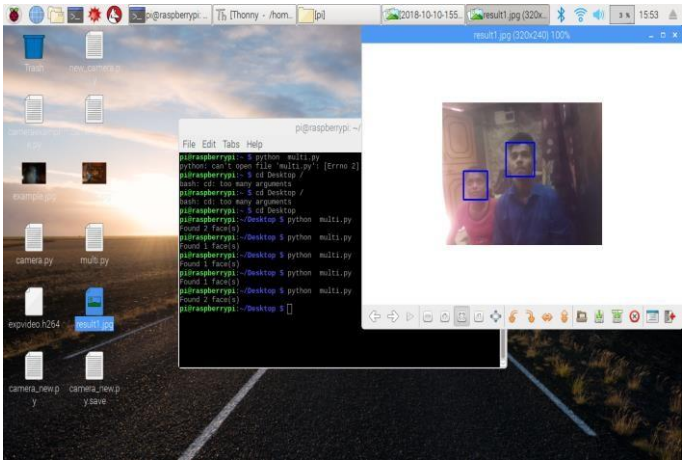

Figure 6

The above fig. shows the output of raspberry pi detecting number of faces. The camera captures the picture and with the help of image processing it detects the number of persons facing the range of camera. Here since there are two people facing camera the raspberry pi won't trigger the GPIO to open the door latch.

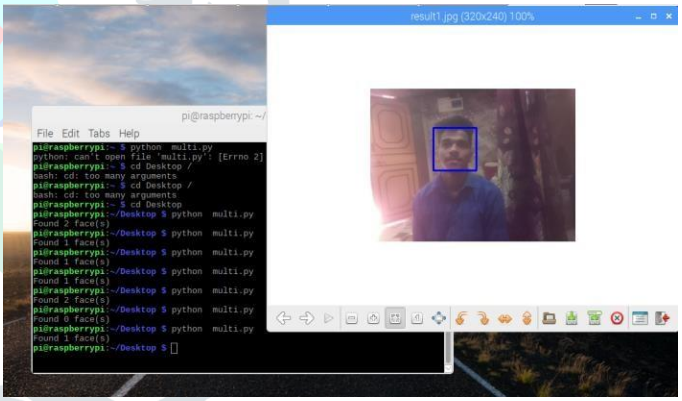

Figure 7

The above fig. shows the output of authorized person facing the camera range. The raspberry pi compares the image clicked by the camera with its stored images to verify the authorized person. As soon as it verifies the person it triggers its GPIO to unlock the door latch.

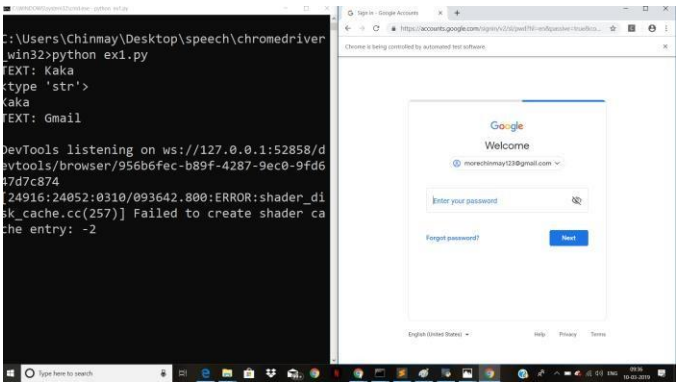

Figure 8

The above fig. shows the output of speech to text recognition and web scraping. As the user ask for any web access, the raspberry pi decodes it using speech to text converter and with the help of web scraping it opens the required web page.

VI. CONCLUSION

The image processing facilitates numerous benefits to the society in security aspect and from our paper we can provide and prove the strength of image processing that is capable to contribute the services regarding security purpose and help to implement them on the public platform. This design provides moderate and less expensive way of supervising of possessions, people and property in the field of domestic and as well as industrial standard to implement security system and automation.

At a final note, we conclude that image processing leads to become a boom in security systems and through speech processing we can have a more secure automation. This paper will be very beneficial in our normal day to day life and will bring much needed innovation in his fast changing world of technology where people prefer to have control over things using the machines which will bring ease to their routine life.

VII. REFERENCES

[1]. Speech recognition -- https://pypi.org/project/SpeechRecognition/

[2]. Web automation— https://selenium-python.readthedocs.io/

[3]. Web Automation-- https://seleniumhq.github.io/selenium/docs/api/py/api.htm

[4]. Face recognition-- https://pypi.org/project/face_recognition/

[5]. Text to speech conversion-- https://pypi.org/project/gTTS/

[6]. Triggering gpio-- https://www.raspberrypi.org/documentation/usage/gpio/python/README.md