Home Security System

Goutam R[1], Megha Kumari[2], Mubasheera[3], Nidhi R Nayak[4]
[1, 2, 3, 4] Atria institute of technology

Abstract- *In today's life, securing our confidential data as well as valuable things is a big task. The development in the field of technology must be useful to overcome security problems. The proposed system is a Face detection and recognition system for access control. By considering two modern technologies such as IoT and Face recognition we can provide access control to the end user. The system mainly consists of features like capturing the image of a person, face detection, face recognition, that is, run the face detection and recognition algorithms on the device. If the person is recognized by the system, then he can get an access to the home. This system utilizes raspberry pi camera, raspberry pi, and a dc motor. If the person on the door is not recognized then the door remains locked and alarm is raised.*

Keywords- Internet-of-Things, Raspberry Pi, Raspberry Pi Camera, Face Recognition, Door Unlock Model, Buzzer, Blynk App, Dc Motor, Node

I. INTRODUCTION

In order to provide security to home, we are using IoT technology. Internet of things (IoT) is a modern technology used to connect computing devices to real time objects. IoT has the ability to make things self-instructed. Therefore, IoT is used in many modern security technologies[1].

In today's world, home security has become a serious issue. People are not safe in their own house. Traditional security systems are not able to handle situations like hacking, system break down. Suspicious people like thieves, murderers and criminals will try to enter home any time they want. The gadgets available now are not secure and can be easily hacked by intruders. Hence to overcome this situation, we are developing a secure system so that no one should get an intrusion to the system. Therefore, we are implementing automated door unlocking system using face recognition and IoT[1].

As we know that home security has become a major issue in the society. The existing systems developed for security purpose can be easily hacked by the intruders. We are developing an IoT based automated door unlocking system using face recognition technology. The simplicity and flexibility in the system can be achieved by using Raspberry Pi[1].

II. LITERATURE SURVEY

[1]TITLE: Securing an IoT based Home using Digital Image Processing and an Android.
AUTHORS: Hardik Asnani, Suhaib Khan, Suhaas Nandeesh, Prarthana.

DESCRIPTION: The IoT based components sense the motion of the person standing at the door which in turn leads to the capturing of the person's image. This image is sent for processing by the face detection and face recognition sub-modules of the Server. If the face is recognized to be the one belonging to one of the residents of the home, the door gets automatically unlocked. Otherwise, the facial image of the person is sent to the owner's Android application from where the owner can take three actions for authorizing the person standing at the door i.e. the owner can press the Accept button, the Reject button or the Buzzer button.

A remote access control system comprises of the internet to control the devices and appliances at home or office with the person controlling them from anywhere around the globe.

[2]TITLE: IoT Based Door Entry System Indian.
AUTHORS: Rishabh Kumar Gupta, S. Balamurugan, K. Aroul and R. Marimuthu.

DESCRIPTION: In the system proposed in , a Raspberry Pi board is used as the platform for monitoring and controlling the door lock. The door entry system proposed here consists of a switch for guest monitoring, camera for guest authentication, solenoid actuator for the opening of the door and a speaker set for making the system intimate the responses to the guest. Switch, speakers and camera for interaction with the guest are mounted at appropriate places at the door.

[3]TITLE: A Digital Door Lock System for the Internet of Things with Improved Security and Usability.
AUTHORS: Kyungil University, Gyeongsan.

DESCRIPTION: Recently, digital door locks have been widely used as part of the IoT (Internet of Things). However,

the media has reported digital door locks being opened by invalid users to invade homes and offices. In this study, a digital door lock system that can work with the IoT environment is proposed. It is designed and implemented to enhance security and convenience. The proposed system provides strengthened security functions that can transfer recorded images to a user's mobile device when an invalid user attempts an illegal operation; it can also deliver alarm information to the mobile device when the door lock is physically damaged. The proposed system enables a user to check the access information and remotely operate the door lock to enhance convenience.

III. PROPOSED SYSTEM

ARCHITECTURE

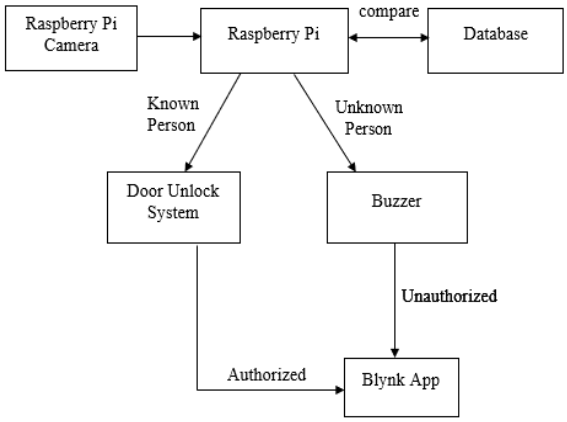


Fig 1: Block Diagram

A. Raspberry Pi

Raspberry Pi is a micro-controller board which is used to develop various embedded level projects. Its size is same as a credit card. It has a memory chip of size 512 MB at the center of the board[1]. Raspberry Pi has Instruction Set Architecture which is different from other architectures and it is used in Advanced RISC Machines.Raspberry Pi runs on GNU/Linux Raspbian, Windows, IOS which are compatible to Raspberry Pi.

Fig 2: Raspberry Pi

Open source and programming-oriented features of Linux makes the development easy. C++, Python, SQL and HTSQL are the different programming languages supported by Raspberry Pi[2].

Raspberry Pi has four different power modes[4]:

- Run mode – the central processing unit(CPU) and ARM11 core functionalities are available and powered up.
- Standby mode – although the power circuits on the core are active, the main core clocks are powered down.
- Shutdown mode – there is no power.
- Dormant mode – the core is powered down and all caches are left powered on.

Features of the Raspberry Pi [1]:

- CPU quad core 64-bit ARM Cortex A53 clocked at 1.2 GHz.
- GPU: 400 MHz Video Core IV multimedia.
- Memory: 1GB LPDDR2 900 SDRAM i.e. (900MHz)
- Video outputs: HDMI, Composite Video (PAL and NTSC) via 3.5mm jack
- Network: 10/100 Mbps Ethernet and 802.11n wireless LAN
- Bluetooth version 4.1
- width: 85.60 mm* 56.5 mm
- Weight: 45g

B. Camera Module

The Raspberry Pi Camera Module is a high image sensor custom designed add-on board for Raspberry Pi[1].It attaches to Raspberry Pi board by connecting it to one of the two small sockets on the board upper surface. It uses CSI

interface which was designed especially for interfacing to cameras[1].

Fig 3: Raspberry Pi Camera

C. DC Motor

The DC Motor or Direct Current Motor to give it its full title, is the most commonly used actuator for producing continuous movement and whose speed of rotation can easily be controlled.This motor will be programmed in such a way that when the system authenticates the person in front of the camera, the motor will rotate to open the door.

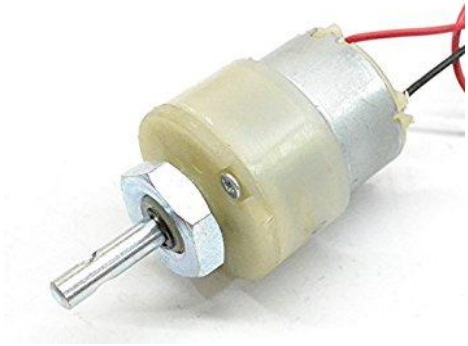


Fig 4: DC Motor

D. Blynk App

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.

Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

E. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short).Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.A buzzer is a device which makes a buzzing or beeping noise.

Fig 5: Buzzer

F. Electromechanical Relays

The relay is the device that open or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus, protects the system from damage.

Fig 6: Relay

G. NodeMCU

NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT product. It includes firmware which runs on the ESP8266 Wi-

Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP826.

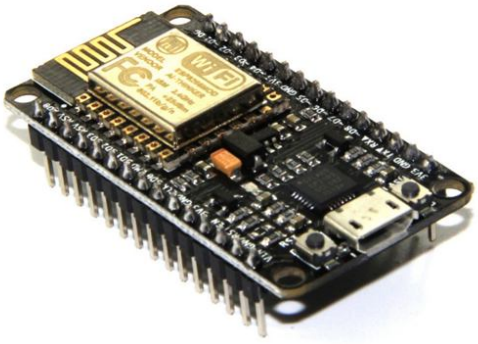


Fig 7: NodeMCU

IV. IMPLEMENTATION

i. Setting Up the Raspberry Pi

With the correct cables and storage prepared you'll be able to install an operating system on your Pi.There are several distros available for the Pi, but the most popular is Raspbian, a cleverly named Debian port configured specifically for the Pi.Installing this can be tricky if you don't follow the instructions, and like any OS installation on the Raspberry Pi it requires additional software to make your SD card bootable.

Fig 8: Raspberry Pi Setup

ii. Installing Raspbian

To get started installing Raspbian, visit Raspberry Pi Downloadsand download the latest version. You will also need Win32 Disk Imager. With both downloaded, unzip Win32 Disk Imager and insert your card into the card reader.

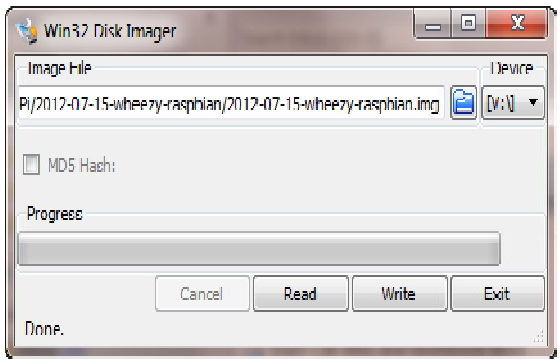


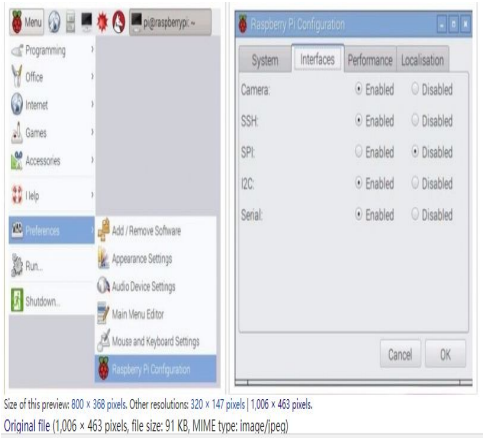
Fig 9: Raspbian OS Installation

Run the utility and select the correct drive letter (check in Windows Explorer) and click the file icon to browse to the directory where you have downloaded your latest Raspbian build.To start installation, click Write and wait. When the process is complete you will be notified.Your Pi is ready to go!

iii. Setting Up Raspberry Pi Camera Module

The Raspberry Pi Camera should be connected to Raspberry Pi as mentioned below:

- Before connecting the camera module to Raspberry pi make sure that the Pi is switched off.
- Now connect the camera to the camera port available in the Pi.
- Connect all the necessary things such as keyboard,SD card,HDMI cable and switch on the Pi.
- Now enable the camera which is under Raspberry Pi configuration.
-



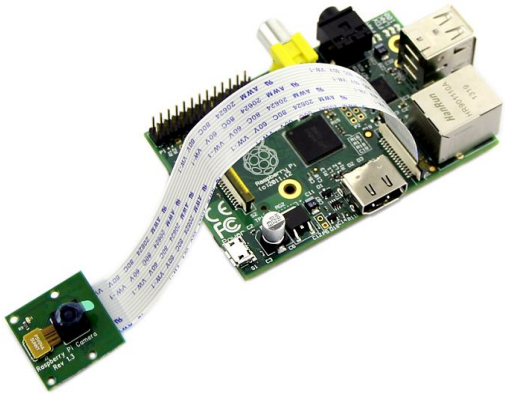


Fig 10: Camera Module Setup

iv. Creating New Project on Blynk App

After downloading the app, create an account and log in.Next, click the “Create New Project” in the app to create a new Blynk app. Give it any name you please, just make sure the “Hardware Model” is set to ESP8266.

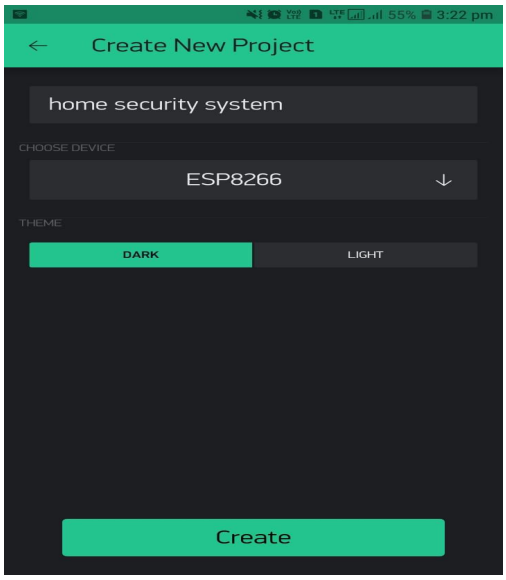


Fig 11: Blynk App

v. Setting Up the Entire Model

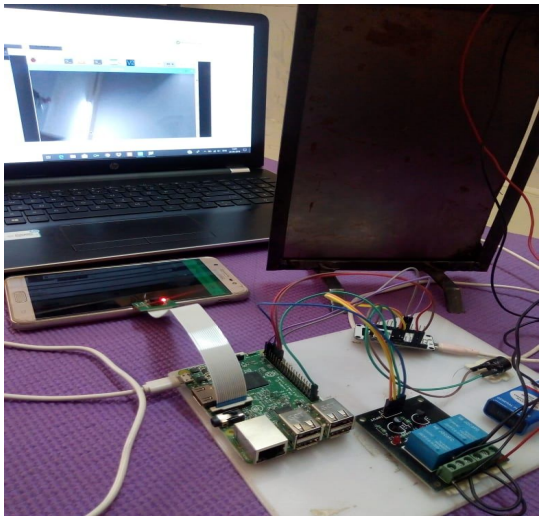


Fig 12: Model Setup

V. RESULTS

Case 1: Authorized Access

When the person outside the door is known, the door gets unlocked automatically and the notification is sent to the Blynk app.

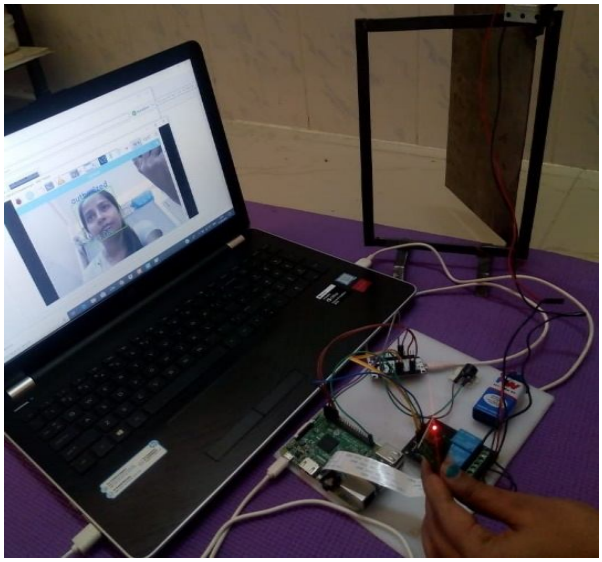


Fig 13: Authorized Access

Case 2: Unauthorized Access

When the person outside the door is unknown, the door remains locked and an alarm is raised through buzzer. Unauthorized access notification is sent to the owner.

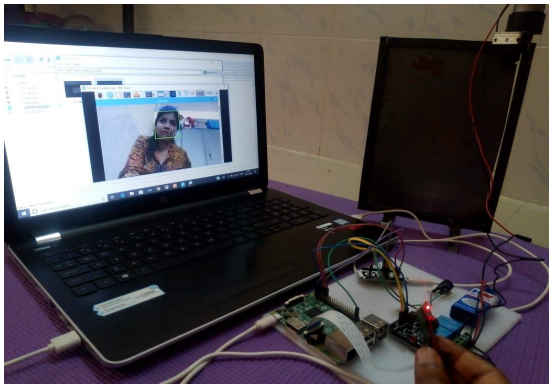


Fig 14: Unauthorized Access

VI. CONCLUSION

The proposed security system is low cost and consumes less power. As this system uses two modern technologies i.e., IoT and Face Recognition, it provides high level security. These are the emerging technologies in research and industries. Therefore, IoT and Face Recognition have made significant impact on home security system. The system becomes more secure because of these two technologies. Remote controlling and monitoring are possible because of IoT and Face recognition has made it almost impossible for the intruders to hack the security system.

REFERENCES

[1] Sandesh Kulkarni, Minakshee Bagul, Akansha Dukare, prof. Archana Gaikwad, “Face Recognition System Using IOT”, International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 6, Issue 11, November 2017, ISSN: 2278 – 1323

[2] Prof. B.P.Kulkarni, Aniket V Joshi, Vaibhav V Jadhav, AkshayKumar T Dhamange, “IOT Based Home Automation Using Raspberry Pi”, International Journal of Innovative Studies in Sciences and Engineering Technology(IJISSET) Volume 3, Issue 4, April 2017, ISSN:2455-4863

[3] Bhumika Agrawal, Chelsi Gupta, Meghna Mandloi, Divya Dwivedi, Jayesh Surana, “GPU Based Face Recognition System for Authentication”, 2017 IJEDR, Volume 5, Issue 2, ISSN:2321-9939

[4] Horan B. Practical Raspberry Pi, USA: Apress, 2013

[5] http://vis-www.cs.umass.edu/lfw/