

Embedded Linux Based Multiple features Smart Door Unlock with Fingerprint Detection

Tabassum fatima¹, Maseera firdous², Syeda arjuman³, Nazia sultana⁴,
Electronics and Communications Engineering, ISL Engineering College,
Hyderabad, Telangana 500005, India.

Ayesha Sultana,
M.E, Assistant professor,
ISL Engineering College.

Abstract

Nowadays, there is a growing interest in the smart home system using Internet of Things. One of the important aspects in the smart home system is the security capability which can simply lock and unlock the door or the gate. In this project, we proposed an IOT based smart security system for unlock door using multiple methods. we are using fingerprint sensor only for family members to unlock the door. If anyone came to the house, at that time the family member present inside the house then they unlock the door through local Wi-Fi, if no one present inside the house; they unlock the door through IOT (remote. it) from anywhere in the world. Raspberry pi3 processor has inbuilt Wi-Fi so it received the data from cloud and generates signal to unlock the door and then door is opened to let the person in.

Keywords: Adapter power supply, Raspberry pi, Finger print module, 4*4 keypad, DC motor, LCD display, Buzzer, Pushbutton, LED Indicators.

1. Introduction

Among the present biometric technologies are the face recognition, fingerprint recognition, finger-geometry, hand geometry, iris recognition, vein recognition, voice awareness and signature recognition, Biometric technique requires the physical presence of the character to be identified.

Wi-Fi (Short for **W**ireless **F**idelity) is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing technology. Range of Wi-Fi technology is 40-300 feet.

The project presents a security home system based on the Internet of things. However, security issues concerning the management of a huge number of connected devices cost effectively has emerged in this research field. This article presents a system to connect a door to Internet, so that the access control system can be controlled from anywhere in the world.

The project presents a Password Based Door Unlock System using keypad is a simple project where a secure password will act as a door unlocking system. Traditional lock systems using mechanical lock and key mechanism are being replaced by new advanced techniques of locking system. These techniques are an integration of mechanical and electronic devices and are highly intelligent. One of the prominent features of these innovative lock systems is their simplicity and high efficiency. Such an automatic lock system consists of electronic control assembly, which controls the output load through a password.

Automation is the most regularly spelled term in the area of electronics. The hunger for automation delivered many revolutions in the existing technologies. This assignment makes use of an onboard computer, which is commonly termed as Raspberry Pi processor. It acts as heart of the project. This onboard computer can effectively talk with the output and input modules which are being used. It does not consist of a built-in tough disk or solid-state drive, but uses an SD card for booting and long-term storage.

In this project we are using DC motor to indicate the door. The device also consists of LCD which displays the information about project.

2. LITERATURE SURVEY

[1]. This paper describes a design of a door locking system to operate the door with a different control. It uses Bluetooth technology, which is easily available on

almost every gadget and consumes less power. The design of the proposed system also includes a special feature to increase the security and to make it simpler for use.

[2] Presents sensible Security System. These security structures enable to lock/unlock the door the usage of three one-of-a-kind modes i.e. Keypad, Bluetooth and Global System for Mobile (GSM) modules. These three modules function on a 4-digit password. We can open or close the door by the use of keypad, Bluetooth software from smart cellphone and additionally by way of the use of 4-digit message from GSM. If any unknown person does the three consecutive unsuccessful tries to enter the password, then Arduino controller will send a warning message to owner mobile variety and additionally provoke the buzzer alarm as a warning of unauthorized intrusion.

[3]. This paper proposes an idea to provide high level security to home by using IoT technology. A standard UBS camera captures the image to spot the person. It's a prototype that identifies the visitor. If the door recognizes the visitor, it will greet them by name, and therefore the door is going to be unlocked. If they are not identified the door will remain firmly locked.

3. Implementation:

Embedded Linux Based Multiple features Smart Door
Unlock With Fingerprint Detection

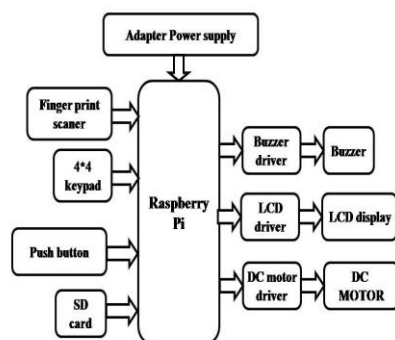


Fig1: Blockdiagram

FAMILY MEMBERS: In this project we are using fingerprint sensor only for family members to unlock the door. Fingerprint sensor is interfaced with a raspberry pi processor. If the family member wants to unlock the door he/she need to place the finger on fingerprint sensor for scanning. If it matches the fingerprint to the predefined database which stores the fingerprint database then raspberry pi3 processor generates signal to unlock the door and then door is opened to let the person in. If it is not matched then

raspberry pi3 processor generates signal to lock the door and gives the audible alert through buzzer.

Known guests: using keypad which is interfaced to the raspberry pi processor to enter the Password for known guests like friends or relatives. The known guest wants to enter the house he/she enter the password through keypad if it is matched by the saved password then buzzer will indicate to the family members with different beep. At that time the family member present inside the house then they unlock the door through local Wi-Fi, if no one present inside the house; they unlock the door through IOT (remote. it) from anywhere in the world. Raspberry pi3 processor has inbuilt Wi-Fi so it received the data from cloud and generates signal to unlock the door and then door is opened to let the person in.

If password is not matched with the saved password buzzer give the **unknown guest indication** with different sound. And make the password reset using pushbutton. The status of the project is display on LCD.

4. Related Work:

The short introduction of distinct modules used in this undertaking is mentioned below:

Raspberry Pi (ARM-11) PROCESSOR:



Fig2: Raspberry Pi3

The **Raspberry Pi** can be set up to run like a standard (albeit bare bones) desktop computer, that isn't really the point. Rather, it's intended to be **used** as an educational tool for those who wish to learn to program. It's also intended to be modified and customized for specific tasks. In this version, they've upgraded to a 1.2 GHz 64-bit quad-core ARM processor and added 802.11n Wireless LAN, Bluetooth 4.1 and Bluetooth Low Energy. If you're searching to incorporate the Pi into your next embedded design, the 0.1" spaced 40-pin GPIO header offers you get

admission to 27 GPIO, UART, I2C, SPI as nicely as each 3.3V and 5V energy sources.

Raspberry Pi processor is programmed the use of embedded 'Linux'. Linux is the best-known and most-used open source running system. As an running system, Linux is software program that sits under all of the other software on a computer, receiving requests from those applications and relaying these requests to the computer's hardware.

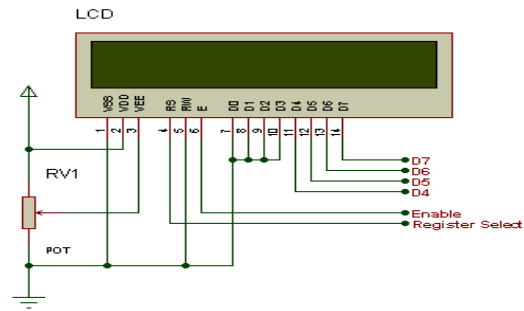


Fig4: 16*2 LCD Display

Finger Print Scanner:

Finger print scanner systems are comprised of a sensor for scanning a fingerprint and a processor which stores the fingerprint database and software which compares and matches the fingerprint to the predefined database. Within the database, a fingerprint is usually matched to a reference number, or PIN wide variety which is then matched to a person's title or account.

The comparison is carried out through the processor and the assessment is made between the valleys and ridges though your total fingerprint is recorded, the processor takes only components of the finger print to examine with different records.



Fig3: Finger print

LCD Display:

One of the most common units attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 displays. This ability sixteen characters per line by 2 traces via 2 lines, respectively.

BUZZER:



Fig5: Buzzer

The vibrating disk in a magnetic buzzer is attracted to the pole by way of the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic subject which vibrates the disk at a frequency equal to that of the force signal.

Keypad:

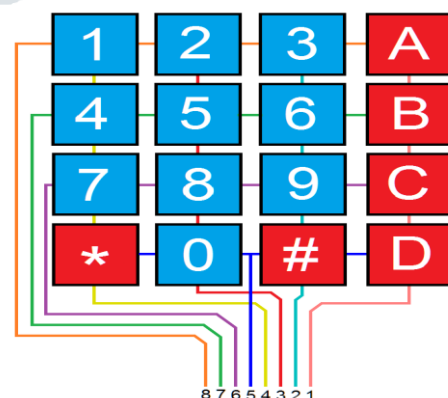


Fig6: Buzzer

In order for the microcontroller to determine which button is pressed, it first needs to pull each of the four columns (pins 1-4) either low or high one at a time, and then poll the states of the four rows (pins 5-8). Depending on the states

of the columns, the microcontroller can tell which button is pressed.

For example, say your program pulls all four columns low and then pulls the first row high. It then reads the input states of each column, and reads pin 1 high. This means that a contact has been made between column 4 and row 1, so button 'A' has been pressed.

DC MOTOR:



The 12V DC gear motors are simply an extension of the DC motors. It consists of a gear assembly attached to the motor. The gear assembly is used for reducing the speed and increasing the torque of the motor. The speed can be reduced to any desirable figure by using the correct combination of gears in a gear motor. Gear reduction is the concept where gears reduce the speed of the vehicle but increase its torque.

5 RESULTS:

The **Embedded Linux Based Multiple features Smart Door Unlock with Fingerprint Detection** system implemented using the RPi. The RPi is powered by a 5V adapter. Raspbian is accessed remotely from remote.it which is accessed on the mobile phone.

6. CONCLUSION:

The present model gives an Integrating characteristic of all the hardware aspects which has been used and developed in it with Arm-11 Raspberry pi processor. The Presence of every and each and every module has been reasoned out and positioned very carefully. Hence the contributing to the excellent working unit for **Embedded Linux Based Multiple features Smart Door Unlock with Fingerprint Detection** Using Embedded Linux device has been designed perfectly. Secondly, using notably superior IC's like Broadcom BCM2387 chipset, 1.2GHz Quad-Core ARM Cortex-A53 (64Bit) processor, Linux operating device technological know-how with the assist of growing technology. Thus, the assignment has been efficiently designed and tested.

5. ACKNOWLEDGEMENT

We would like to thank all the authors of distinctive lookup papers referred in the course of writing this paper. It used to be very know-how gaining and beneficial for the further research to be performed in future.

REFERENCES

- [1] Omkar Pawar, Prathamesh Lomkar, Randhir Singh, Vivek Salunke and Prof. D.M. Ujlambkar., "Door Lock System using Facial Recognition ", IJRASET March 2019.
- [2] Muhammad Sabirin Hadis, Elyas Palantei, Amil Ahmad Ilham, Akbar Hendra, "Design of smart lock system for doors with special features using bluetooth technology", 2018 International Conference on Information and Communications Technology (ICOIACT).
- [3] Sandesh Kulkarni, Minakshee Bagul, Akansha Dukare and Prof. Archana Gaikwad, "Face Recognition System Using IoT", IJAR CET November 2017.
- [4] Sourav Roy, Md Nasir Uddin, Md Zahirul Haque and Md Jahidul Kabir, "Design and Implementation of the Smart DoorLock System with Face Recognition Method using the Linux Platform Raspberry Pi", IJCSN December 2018.
- [5] A. Ibrahim, A. Paravath, P. Aswin, S. M. Iqbal, and S. U. Abdulla, "GSM based digital door lock security system," in Power, Instrumentation, Control and Computing (PICC), International Conference, 2015.
- [6] Rajat Bhise, Nikilesh Phadnis, Rahul Bari, Vijay Dhage "Iot Based Door Lock And Unlock System Using Face Recognition," International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 12 | Dec 2018.
- [7] I.-K. Hwang and J.-W. Baek, "Wireless access monitoring and control system based on digital door lock," IEEE Transactions on Consumer Electronics, vol. 53, 2007.
- [8] C.-H. Hung, Y.-W. Bai, and J.-H. Ren, "Design and implementation of a door lock control based on a near field communication of a smartphone," in Consumer Electronics Taiwan (ICCE-TW), 2015 IEEE International Conference on 2015.
- [9] Paul Viola and Michael Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features" Accepted Conference on computer vision and pattern recognition, 2001.