

IOT Based Intelligent Door Lock System Using Raspberry PI

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Abstract - Door lock security systems are classified based on technology used as:1) Password based, 2) Biometric based, 3) GSM based, 4) smart card based, 5) RFID based, 6) Door phone based, 7) Bluetooth based, 8) Social networking sites based, 9) OTP based, 10) Motion detector based, 11) VB based, 12) Combined system.

At present if the personal identification number is somehow blanked out the system could not be accumulate. Powered by electricity may not comportment congruously in the case of a potency failure. The microcomputer apperception is the next step for dactylogram apperception. With the avail of GSM module, sends SMS to a corresponding number. Here are some of the noted drawback of a Keenly intellective Card Predicated Door Lock System. These types of security systems utilized for digital door lock are utilizing static RFID tags (passive). Guest enter inside through the gate by controlling the gate with the avail of the telephone set. The framework utilizing Bluetooth turns out to be more simple and salutary for congruous utilization. Such systems are generally predicated on Arduino floor. The model can sanction a pin to close and open a door from allotted zone utilizing SMS from a (convivial networking site) like Facebook, Whatsapp etc.

The proposed method in latest work does not require ascendancy avail to access the facility if the utilizer kens OTP technique and has a certify mobile phone . At the point when the laser light is falling conventionally on the photodiode, its reading is 255 in decimals. Electronic ocular perceiver represents the model for pick up the door images with the avail of microcontroller to substantiate the safety for offices and houses. In this system, Just as you can dismiss your keys from mind and be locked out of your abode, you can withal dissmis passcode from mind to access your RFID ingress system and be locked out. While it is safer to utilize a consummately desultory code and bypass conspicuous culls like birth dates or simple, perpetual numbers, this can pose a quandary if you have an arduous time recollecting things. So customers need to set a code that facile to agnizer but not facile to break. One final disadvantage of RFID door locks is that electrically-powered systems may not function felicitously in the case of a puissance loss. There is no a excellent product, but people will keep going to illimitable proximate to idealize.

Keywords: *Internet of Things, door lock system, raspberry pi, etc.*

I. INTRODUCTION

Engineers with business methodologies are the greatest support to our society. The advancements in technologies drive their notice conceptions and notionally theorizes to achieve sundry goals in fields of science. Adriano has been utilized as a platform to work for a long time. But with the dispatch of Raspberry pi, a credit card size low-price affordable computer, Adriano is no longer utilized in application platform. Raspberry pi platform is being used widely from the past few years as it provides facile use support and documentation. It is yarely available to all the terminus users. From simple scholastic to perspicacious application projects, Raspberry Pi has proved its consequentiality in the development of applications spreading out in sundry fields.

Objective

In this paper, we are demonstrating a perspicacious door system utilizing Internet of Things, which notifies intrusion by sending out email notification to the owner.

II. PROPOSED SYSTEM

Project is predicated on Home automation and Raspberry pi is the heart of our project. The hardware and software are the two consequential areas in our project.

a. Hardware Description

Raspberry Pi- 3Model is the third generation Raspberry Pi. It replaced with Raspberry Pi 2 Model B in February 2016. As of January 2017, Raspberry Pi-3 Model B is the newest version of Raspberry Pi. It is as small as credit card size..

The USB camera module used in this system which is directly plugs into the USB port of the Raspberry pi. USB Camera captures the image and sends it to the USB port of the Raspberry Pi board. The camera model used here is USB Camera model 2.0. The door lock module of this system is simulated using a DC motor to demonstrate the locking and unlocking function. This module is a combination of a relay driver circuit and a DC motor; this system uses an HFD27 Series 5V 1A 125 Ω (DPDT) Through Hole Sub Miniature DIP Relay to control the DC motor. The driver circuit is also provided with leads for a 9V battery to drive the motor when triggered. The driver is triggered by the core module through the GPIO pins.

b. Software Description

There are two paramount languages which are utilized for the programming of the Raspberry pi. The list are as follows:

Most of the tasks we perform on Pi emanate from the command line. We run commands from the command line the LXT Terminal program.

- Shell
 - Python
1. Python is considered one of the best First Language. Designating Programming languages due the facileness and placidity for any tyro to commence coding in the language. Python is interpreted we don't need to compile the code afore running as the program execute directly without being compiled to a machine level language.
 2. Python is a sublime and potent programming language that's facile to utilize (facile to read and incite) and with Raspberry Pi lets you connect your project to the authentic world.
 3. Python syntax is very unsullied, with an accentuation on readability and uses standard English keywords. Start by opening IDLE from the desktop.
 4. The most facile prelude to Python is through IDLE, a Python development environment. Open IDLE from the Desktop or applications menu: IDLE gives you a REPL (Read-Evaluate-Print-Loop) which is a prompt you can enter Python commands in to. As it's a REPL you even get the output of commands printed to the screen without utilizing print.

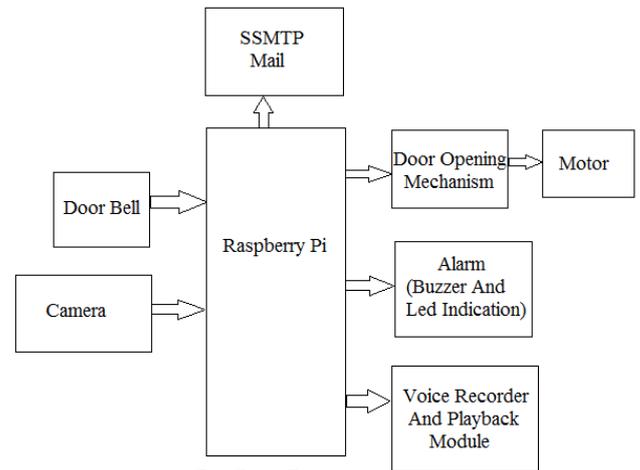


Fig : Block Diagram

III. METHODOLOGY OF WORK

In this project with a minicomputer raspberry pi different input and output is interfaced. In input section there is calling bell & camera. In processing section a minicomputer raspberry pi is utilized. Raspberry pi is equipped with Wi-Fi. And on the output terminal there are Lcd, magnetic door lock, electronically mailing accommodations. A calling bell is placed on door so that if someone visits the utilize the person will press the bell and the bell will engender a signal to raspberry pi denoting presence of a person. Most paramount input contrivance is the camera. It is utilized to takes a snapshot of that person and transmit it to raspberry pi. Raspberry pi process these inputs like whenever it gets a calling bell as input it transmits a signal to camera to capture an image of the visitor. Within the time it receives the picture it engender a Gmail alerting the utilize that someone has arrived in front of door. After receiving the image raspberry pi sends a mail to utilize affixing the picture. Utilize can control the magnetic lock through Gmail. If utilize wants to sanction the visitor access he can turn on the lock and if he wants to abnegate access for any reason utilize will authoritatively mandate the person to record his voice in voice recorder place near the door bell.

a. USB Camera

USB Camera captures the image and sends it to the USB port of the Raspberry Pi board. The camera model used here is USB Camera model 2.0.

The camera board in Raspberry pi is a minuscule PCB with camera on it. That is called camera module which should be connected with raspberry pi by minute ribbon cable. Raspberry Pi has on board camera slot interface where camera module is connected. It is 5Mega Pixel camera consumes around 250mA.

The camera module plugs to the CSI connector on the Raspberry Pi. It's able to distribute clear 5MP resolution image, or 1080p HD video recording at 30fps. The camera module annexes to Raspberry Pi by a 15 pin Ribbon Cable, to the dedicated 15 pin MIPI Camera Serial Interface (CSI),

which was designed especially for interfacing to cameras. The CSI bus is capable of prodigiously high data rates, and it exclusively carries pixel data to the BCM2835 processor.

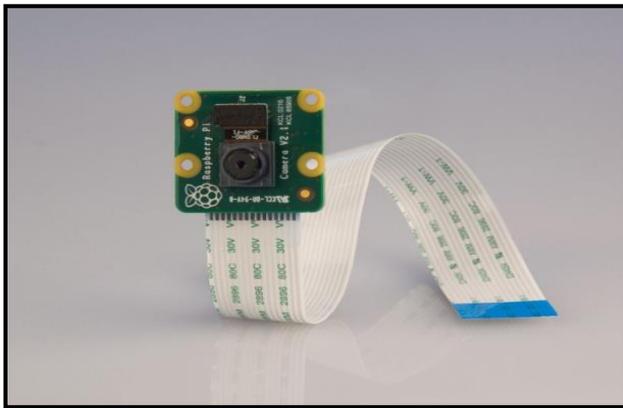


Fig no. 4.1 USB Camera

b. RASPBERRY PI

Raspberry Pi Model B has 512Mb RAM, 2 USB ports and an Ethernet port. It has a Broadcom BCM2835 system on a chip which includes an ARM1176JZF-S700 MHz processor, Video Core IV GPU, and an SD card. It has an expeditious 3D core accessed utilizing the supplied OpenGL ES2.0 and Open VG libraries. The chip concretely provides HDMI and there is no VGA sup-port. The substratum provides Debi an and Arch Linux ARM distributions and withal Python as the main programming language, with the fortification for BBCBASIC, C and Perl

Raspberry pi is a minuscule credit-card sized computer capable of performing sundry functionalities such as in surveillance systems, military applications, etc. The sundry functionalities of the components are given below

The sundry components of Raspberry-Pi are

- SD Card Slot is utilized to install OS/booting/long term storage. The total recollection of the SD card is about 8GB.
- Micro USB Power Port provides 700mA at 5A.
- RCA Video Out is connected to exhibit if HDMI output is not utilized. It is mainly used to carry audio and video signals. They are otherwise called as A/V jacks.
- Audio Out Digital audio is obtained if HDMI is utilized to obtain stereo audio. Here analogue RCA connection is utilized.
- Ethernet Port is utilized to connect to the Internet. It withal plays a role in updating, getting incipient software more facile.
- HDMI OUT (High Definition Multimedia Interface) is utilized with HDTVs and monitors with HDMI input. Withal HDMI-HDMI is utilized here.

- BROADCOM BCM 2835: It is otherwise defined as System on chip. It is a 700 MHz Processor. It has a Video core IV GPU.
- GPIO sanctions us to control and interact with authentic world

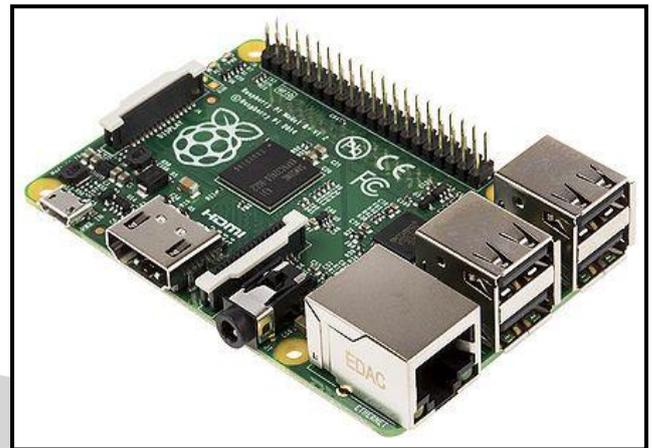


Fig no. 4.2 RASPBERRY PI

c. MOTOR

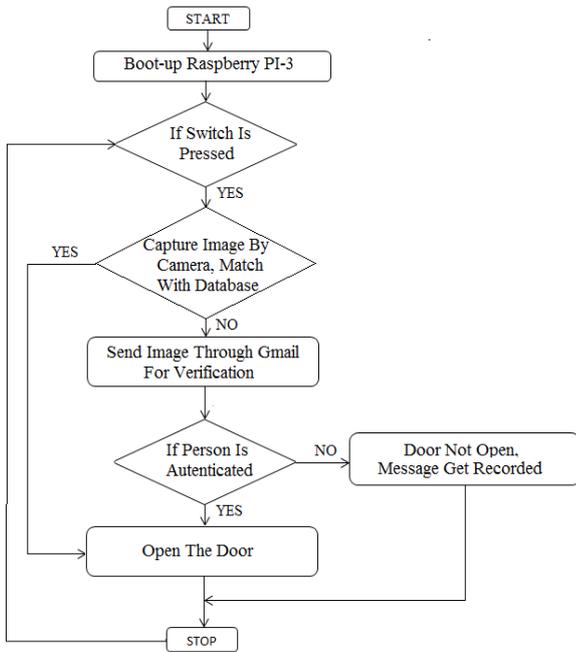
The door lock module of this system is simulated utilizing a DC motor to demonstrate the locking and unlocking function. This module is an amalgamation of a relay driver circuit and a DC motor; this system utilizes an HFD27 Series 5V 1A 125 Ω (DPDT) Through Aperture Sub Miniature DIP Relay to control the DC motor. The driver circuit is additionally provided with leads for a 9V battery to drive the motor when triggered. The driver is triggered by the core module through the GPIO pins.

A coil of wire with a current running through it engenders an electromagnetic field aligned with the centre of the coil. The direction and magnitude of the magnetic field engendered by the coil can be transmuted with the direction and magnitude of the current permeating it.

A simple DC motor has a stationary set of magnets in the stator and an armature with one or more windings of insulated wire wrapped around a soft iron core that concentrates the magnetic field. The windings customarily have multiple turns around the core, and in sizably voluminous motors there can be several parallel current paths. The terminuses of the wire winding are connected to a commentator. The commentator sanctions each armature coil to be energized in turn and connects the rotating coils with the external power supply through brushes. (Brushless DC motors have electronics that switch the DC current to each coil on and off and have no brushes.)The total amount of current sent to the coil, the coil's size and what it's wrapped around dictate the vigour of the electromagnetic field engendered.

When there Is Any Authenticated Person Or person Whose Image Is Stored in Database Then DC Motor which Is Connected To Door Lock Will Open The Door Lock. And If The Person Not Get Sanction Or His Image Is Not in Database The DC Motor Remains OFF.

IV. FLOWCHART



- Step 1 Start
- Step II Initialization of Raspberry pi, Camera
- Step III. If any person comes, and pressing doorbell camera captures the picture/image and sends to the user’s mobile device.
- Step IV. User gets notification and opens/closes door according to his/her convenience.
- Step V. If yes door is open
- Step VI. If NO person have to record their message after buzzer
- Step VII. End.

V. MAIN TECHNOLOGY USED

Here is the flow chart of the system. At first the system detects human and automatically raspberry pi take a snapshot which denotes the image acquisition part. After that image is annexed and mailed to utilize that is the image processing, mail part. At last when utilize sends a re-mail of door lock or open according to users command the magnetic lock gets open or close.

VI. INTERMEDIATE RESULT

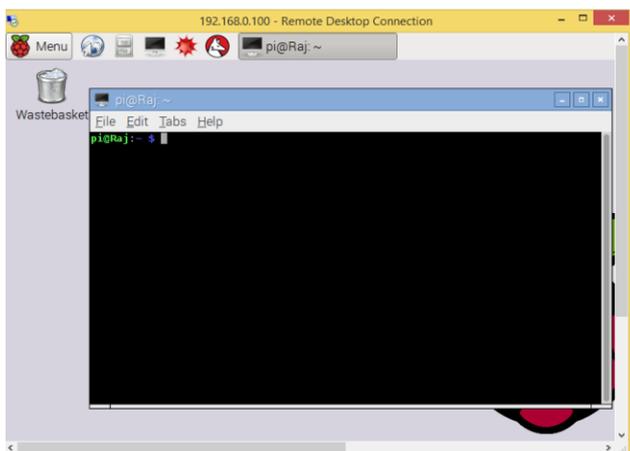


Fig : 7.1 Intermediate Result

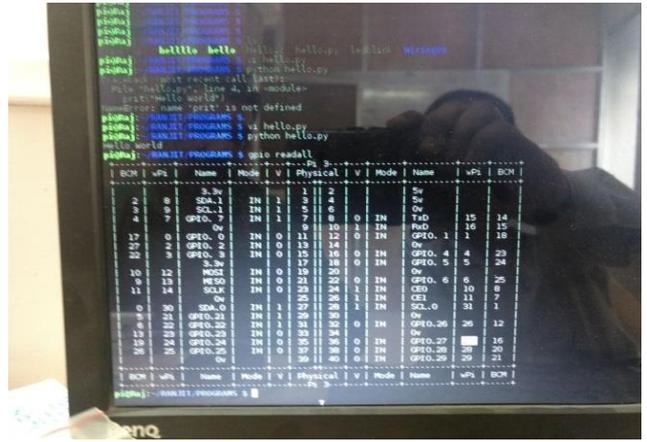


Fig : 7.2 Outcomes

The keenly intellectual surveillance system has been aimed to design in such a way that it can full fill the desiderata of the utilize for particular surveillance area. In current work we have Accumulated all the information about the astute surveillance system capable of recording/Matching image and transmitting to a Gmail. It is salutary as it offers reliability and privacy on both sides. We Have purchased all the obligatory components like Raspberry Pi 3,Raspberry Pi camera Module , Voice recorder Module, Door opening And Closing mechanism. We Additionally Done Some Of The Software Part Like Boot loading the Raspberry Pi, Making SD Card Bootable For Raspberry Pi. We Are learning The next Concept Which Are Needed To Consummate Our Project Like How To Send Gmail, How To Capture The Image In raspberry Pi camera, How to Control GPIO Pins Of raspberry pi so these Concepts can Avail Us For Consummating Our project.

VII. CONCLUSION

The lock was designed to ameliorate utilize accommodation by sanctioning him to check the image of a valid visitor and open or close the door lock remotely. Another efficient system function is that when a valid utilize approaches the door, the door lock system opens or closes the door without adscititious operations. This paper presents the design and implementation of a low cost but secure home security system for general users. The security level is incremented due to the utilization of Raspberry pi which sends the images to the utilize, has in built capabilities and is facilely connectible to external contrivances. Raspberry pi proves to be perspicacious economic and efficient platform for implementing the abode security system. Two advantages provided by the system is that, Indispensable action can be taken in short span of time in the case of emergency condition and design of a PCB board which is additionally diminutive in size. Reduced size makes it more applicable for commercial manufacturing and distribution. A raspberry pi and open source applications with its ever growing community and development provides a great hope in the near future.

VIII. FUTURE SCOPE

Proposed system is frugal and components are rarely available. It is portable and easily upgradable. Integrating with variants of sensors along with the proposed system, we can make many astute applications like home automation, Eagle ocular perceiver monitoring, Bank door security

We proposed a system of authentic time perspicacious door to provide communication between clients and home security. In order to provide efficacious system, we used Raspberry Pi embedded system which is integrated on the door of a house. The system is predicated on video technology which is a very popular technology for providing security and safety in urban areas.. Utilizing both technologies in the system provide sundry benefits to increment the efficiency in terms of communication between visitor and owner of the house and providing safety of home. In the proposed system, two different paramount techniques have been utilized for home security. First is the utilization of video technology to optically canvass the alfresco and the second is to offer communication between the visitor and owner of the house via door system.

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