Smart Receptionist with Smart Lock System

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Abstract: Security and safety is increasing day by day and with improvements brought in the past decade and innovations to bring comfort in our lives. In today's world technology has become a part of an integrated part of the society and therefore the security of an individual's home, office or their organization had to be considered with upmost priority. Smart Receptionist with a smart lock system is therefore mainly designed and developed for security system purpose. The smart security system is used in situation to see visitor when the main door of office or organization is closed. The purpose of this system is to control the door lock using RASPBERRY PI 3. In this system whenever person enters the office door, image of person is captured by CAMERA MODULE which is compared with database. If the persons images is matched with the database the SOLENOID LOCK opens, but when the image is unidentified it Emails the owner requesting to allow or deny the access.

Keywords: Raspberry pi 3, Camera module, Email, Solenoid lock.

INTRODUCTION

The system is developed to increase the security level which is called as "Smart Receptionist with Smart Lock System". The system is designed in such way so as to open the door using Raspberry pi 3. And give a access only to authorized person. This effective system provides access control to the door and security system which is based on a face recognition pattern.

Block Diagram

The main block of our security system is raspberry pi. It does all the work of taking the image from camera module and send it to the owners mail it also opens the door if owner allows the visitor. The working of block diagram starts from door bell and ends on door lock. when the door bell is pressed the camera module captures the image and send it to the raspberry pi which in turn compares the image with the database of images and if the image doesn't match image is forwarded to the owner for access and if owner approves the door lock opens.
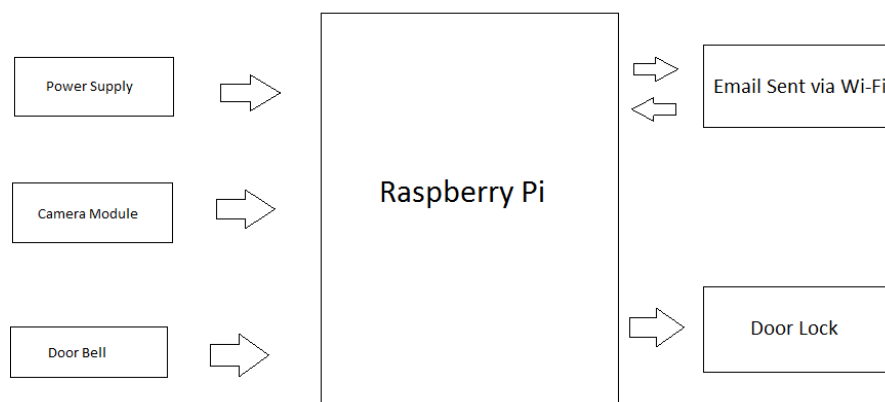

I.   HARDWARE REQUIREMENTS

A.   Doorbell Switch : It is the first sensor of project which will start the process when it get pressed. The doorbell which we are using is selected in such way that its output voltage signal is around 3 volts.

B.   Camera Module : 5 mp camera which can directly be plugged into raspberry pi board. This camera module is compatable with all the models of raspberry pi. When the doorbell is pressed camera is also switched on and it capture image and send it to raspberry pi using CSI bus.
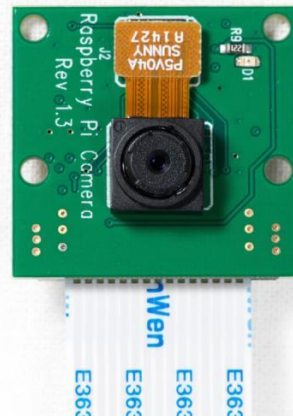
C.   Power Supply : As all the components used works on the low voltage power supply provided is 5 volts. It is used to give the power supply to the Raspberry Pi.

D.   Raspberry Pi 3 : It comes with various operating system like android , FreeBSD, Linux, PLAN 9 and many more out of this in this project linux operating system is used. Raspberry pi is the main block in the project it control all the components which used in this project. All models feature a Broadcom System on chip(SOC) ,which includes an ARM compatible Centre Processing Unit (CPU) and on chip Graphics Processing Unit (GPU) . CPU speed range from 700MHZ to 1.2 GHz for the pi3 and on board memory range from 256 MB to 1 GB RAM.
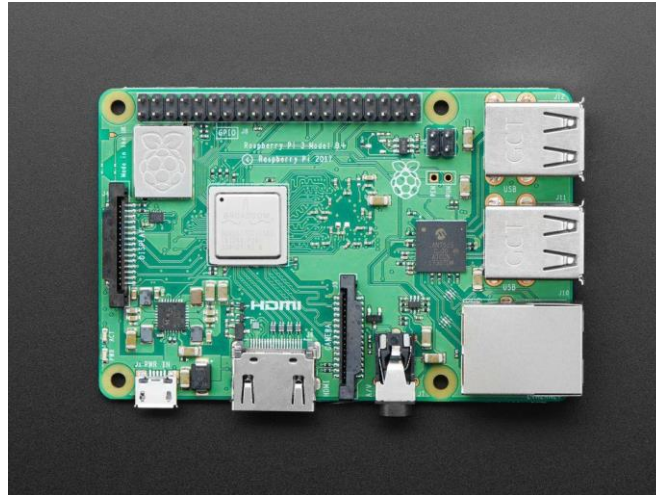
E.   Resistors and Zener Diode : General purpose register and zener diode is used for voltage regulator which can limit output of doorbell to 3.3volts.

F.   Transistor bc547 : This is a bipolar n-p-n transistor. Maximum base current is 5mA and collector current is 100ma. It is used to energies the relay.

G.   Relay : It is the electronic switch which is used to provide 12v dc supply from one metal rod to the solenoid lock connected to the door. When the relay flip the voltage is passed to the solenoid lock and the door opens.

H.   Solenoid Lock : 12v Solenoid lock are basically electromagnets they are made up of big coil of copper wire with an armature in the middle. When the coil is energized , the slug is pulled into the centre of the coil.
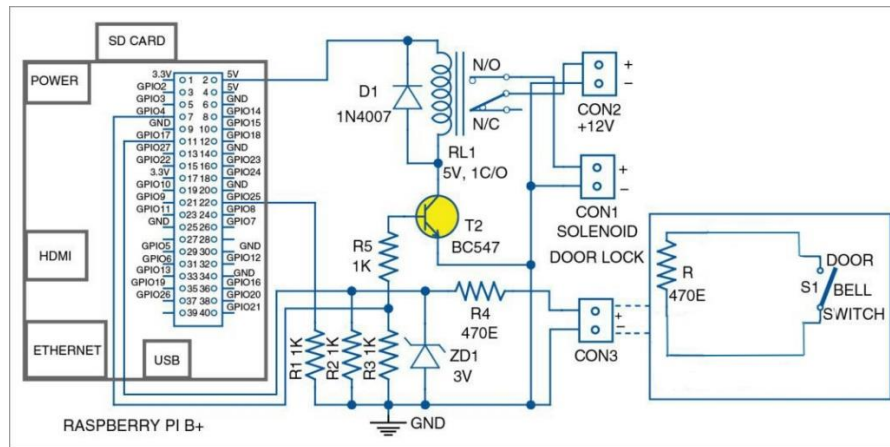
II. SOFTWARE REQUIREMENTS

A. Python - Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Python codes are used to capture the faces and recognize them using a camera module. We have used certain codes such as face recognition code and haarcascade code to capture the image.

B. OpenCV - OpenCV uses machine learning algorithms to search for faces within a picture. Because faces are so complicated, there isn't one simple test that will tell you if it found a faces or not. We have used opencv to create a platform for raspberry pi.

C. Thonny IDE - Thonny is an integrated development environment for Python that is designed for beginners. It supports different ways of stepping through the code, step-by-step expression evaluation, detailed visualization of the call stack and a mode for explaining the concepts of references and heap.

D. Raspbian Linux - Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run.

III. IMPLEMENTATION

1) Smart Lock Circuit – The interfacing circuit of the smart receptionist and smart lock system is implemented. Raspberry Pi runs on standard Raspbian Linux distribution with Wi-Fi dongle, GPIO library and programs written in Python Language. Raspberry Pi GPIO4, GPIO17 and GPIO25 are connected with resistors R3, R2 and R1 respectively, to make logic level low.

2) When the image is captured by the camera module, the image is stored in the folder created in the Raspbian Operating System if the person is unknown. Otherwise if the person is known, the system will compare the image with the image stored in the Folder containing images of all the Staff of the Organisation.

3) Smart Lock - When GPIO25 pin of Raspberry Pi becomes high, it enables the webcam to capture the photo of the visitor. Captured photo is sent to your email ID.
After your visitor is identified, you may open the door by pressing Lock tab on the Web browser. With Lock tab pressed, GPIO4 becomes high. Since relay driver transistor T2 is connected to GPIO4, T2 conducts and energises relay. This provides a 12V DC supply from CON2 to the solenoid lock connected at CON1, and the door opens.

4) SMTP Library – We have used SMTP Library to send the mail to the user's device.

IV.   RESULTS

As a result, we have implemented the smart receptionist and smart lock system using raspberry pi, camera module, doorbell switch and solenoid lock with low cost and low power. The system will allow visitors only when the receptionist approves the photo of the visitor when received as mail if not the visitor cannot enter the organization and the system will remain locked.

If the visitor is the staff of the organisation, the receptionist will directly allow the access of the visitor.

V.   CONCLUSION

The System is self reliant and can decide on its own to allow the visitor or not. Only the unknown visitor is granted permission by the owner itself. This smart Receptionist with smart Lock can make the office management easier. The main entrance of the work place is controlled by the system autonomously. It can save time by notifying and managing staffs and customers. Unwanted visits and confrontation can be avoided using this system.

VI.   FUTURE WORK

Using artificial intelligence and a better processing unit can make the system faster, efficient and secure. With the addition of voice feedback the system can give appropriate messages and acknowledgement to the user when needed. There will be no need of a human receptionist in the future.

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