

Iot Based Residence Supervising and Alerting System

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Abstract: Security is the most important thing in human life. In recent days, several crimes happen in residential areas in our city. People always concern about intruders or thieves when they are away from their home. In the world of Internet of Things (IOT) when we have all the technologies to protect our home, we always want a system which can be controlled and monitored from anywhere. This system will detect the presence of Intruder and quickly alert the user by sending an alert SMS. It comprises of Raspberry pi 3 Model B, PIR sensor, pi camera and buzzer. Raspberry Pi is used to control the whole system using python language. PIR sensor detects the human movement inside and outside the house. The live video streaming also helps us to strengthen the security. This system can be installed at the main door of your home and you can monitor it from anywhere in the world using your pi camera over mobile application. When the user leaves the house and if they are not assured about the security of their house, they switch to active mode. If person is been detected, SMS is sent to user through IoT to enable live video streaming. After the live streaming, if they are unknown SMS is sent to control room and the buzzer is actuated to alert the nearby people and if they are known person no action is required. If the person directly enters the house through any other way except the main door, the indoor PIR sensor detects and sends the message alert to the user and control room simultaneously.

Keywords: Raspberry pi 3 Model B, PIR sensor, pi camera, buzzer.

I. INTRODUCTION

Main Objective is to monitor and supervise the home in absence of a particular owner by developing an alerting system. Supervision, from home to huge industries, plays a prominent role in the acquiescence of our security. Aspects such as theft have been always a mess. Supervision is usually a monitoring system over a distance by use of electronic gadgets like CCTV cameras. Anyhow, CCTV technique is high-priced for average people to install. Moreover, this kind of system is unable to notify the user's home as soon as the theft occurs. This paper includes a buzzer system to overcome the drawbacks of the usual supervision systems. The system developed in this paper provides security while maintaining the privacy of the individuals since the user and the control room can view it. This system is made useful by developing a live video streaming during the theft. Therefore, it enables people to be more independent, safe and secured in their routine activities. Furthermore, it sends out an alert to the particular user, making it advance than the up-to-date surveillance systems. The users place the camera in their own house which needs supervision to ensure security. The system provides the particular user to assure the guaranteed security

through the smart phone which takes the additional responsibility to monitor the home when the control is available from almost everywhere. This alerts the user through message. The user can monitor the residence using the smart phone with the connected internet access.

II. EXISTING SYSTEM

- 1) The system will detect the presence of Intruder and quickly alert the user by sending him the alert mail.
- 2) Even CCTV technique which existing is costly for people to install. And, this system doesn't monitor the home as soon as the theft occurs.

RASPBERRY PI BASED SECURITY SYSTEMS FOR HOMES:

Several criteria have been used to select a security system required to safeguard a facility. The Raspberry Pi is also a very variable device whose functionality is not limited. However, the cost of an IP Camera is not easily affordable to small home owners. Raspberry Pi has an extendable SD card storage and can be expanded to suit the needs of an individual. The Raspberry Pi has a port to connect it to the internet. CCTV system requires a DVR, which is very expensive. Hence such a system may not be afforded by low income home owners.

III. PROPOSED METHODOLOGY

This system will supervise the residence whenever the user is not present and it will intimate the control room about the absence of the user through a mobile application. This helps them to maintain security in that particular area. And if the system detects the presence of intruder, it will alert the user as well as the control room. The monitoring is been done by the police station. Here, we have used two PIR sensors, one in indoor, and another one in outdoor in order to capture the motion of unauthorized persons. To prepare database of the people and in case of theft, it sends alert through the SMS to the particular user. The problem with conventional systems is that it is either always on or it gives the information only when the bell is pressed. In order to overcome this we use IoT which provides seamless data communication, remote control ability makes it easier to automate the process of security.

IV. LITERATURE SURVEY

- 1) IOT BASED HOME SECURITY SYSTEM USING RASPBERRY PI WITH EMAIL AND VOICE ALERT (JOURNAL PAPER - IJARCSE & VOL ISSUE DATE - Volume 8-Issue 4 April 2018)

This paper is based on the concepts of IoT, where in an unauthorized or unwanted intrusion or motion is detected

using different hardware and software tools. This paper makes the use of a Raspberry Pi 3 board. If an Intruder or unauthorized persons enter into our zone the PIR Sensor detects the person activity, then the security system capture the image of the unauthorized person and also give real time alert SMS to the authorized person. After the real time SMS alert the security system gives the buzzer sound. The image will be captured using Pi Camera which is attached to the Raspberry Pi. The captured image will be sent to the authorized person via g-mail by the usage of inbuilt WIFI module in the Raspberry Pi board. After completion of all these activities the buzzer will be activated and also sends voice messages through loud speaker.

Gaps identified -No video streaming, only save pictures.

2) RASPBERRY PI BASED SECURITY SYSTEM ON IOT PLATFORM (JOURNAL PAPER - ICRTEST & VOL ISSUE DATE- Volume 5-Issue 1 January 2017)

The Internet of things(IoT) is the internetworking of physical gadgets, and other thing that can installed electronically with programming, sensors, and web network that authorizes the articles to gather, control, screen and trade information. This paper depicts the survey on different security methods on movement discovery and advancement of an ease checking framework in view of Raspberry Pi, a Solitary Master card estimate board PC which takes after Motion Detection calculation being coded in Python as a default programming language. The calculation for movement recognition is being actualized on Raspberry Pi, which enables live gushing camera alongside discovery of movement.

Gaps identified- Does not send SMS, only email is available

WORKING

In the above block diagram (Fig5.1), raspberry pi zero model controllers adopt IoT to convey the messages [1]. The effective open source language python is used for programming. The daring thing is to capture the movement of any unknown person trying to enter the locked house. This system comprises of Raspberry pi 3 Model B, PIR sensor (HC-SR501), pi camera and buzzer. The PIR sensor detects the human movement inside and outside the house. PIR sensor is used to detect the presence of any person and a Pi Camera is used to capture the images when it detects the presence of a person. The data is gathered by the sensors is been directly send to the user through SMS. This system has two modes namely normal mode and active mode. When the user leaves the house and if they are not assured about the security of their house, the active mode is triggered. If unknown person is been detected, the buzzer is actuated automatically to alert the nearby people and live video streaming is activated. After the live streaming, if they are known person no action is required. The live video streaming also helps us to strengthen the security. The user gets immediate message when any person enters their house[3]. The SMS are sent through IoT. If the person directly enters the house through any other way except the main door, the indoor PIR sensor detects and sends the message alert to the user and control room simultaneously[4].

METHODOLOGY

The overall methodology is shown in fig.5.3

V.BLOCK DIAGRAM

The overall block diagram is shown in the fig.5.1.

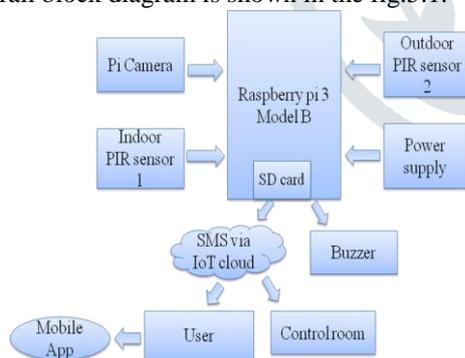


FIG 5.1.OVERALL BLOCK DIAGRAM

PIN DIAGRAM: The pin diagram is shown in the fig.5.2

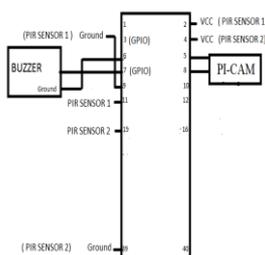


FIG 5.2.PIN DIAGRAM

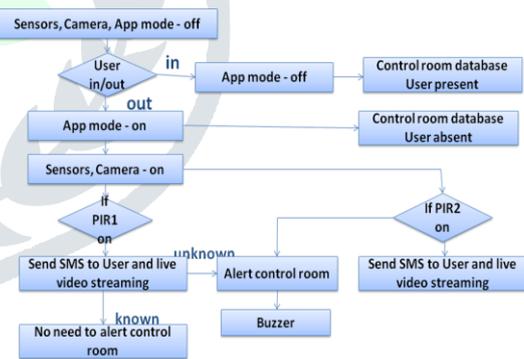


FIG 5.3.FLOWCHART

VI.HARWARE DESCRIPTION

A. RASPBERRY PI: The Raspberry Pi 3 supports generic USB type keyboard and mouse [2] . It has 4 USB ports and one Ethernet port. The other peripherals that can be attached are camera and a display. A touch interfaced display can also be used. The maximum resolution that can be achieved without any over clocking is 3840*2160 at 15 Hz. The output from the board is through a HDMI port. There are various operating systems that can be used but the most commonly used one's are Jessie and NOOBS (New Out Of the Box). The memory is the micro-sd card which is attached to the board with the OS pre-loaded onto it.

Programming the Raspberry Pi : To enable liable Communication with the outside world, the Raspberry Pi has to be programmed with a python programming language.



FIG 6.1.RASPBERRY PI 3 MODEL B CONTROLLER

SPECIFICATIONS

PROCESSOR

- Broadcom BCM 2387 chipset.
- 1.2GHz Quad-Core ARM Cortex-A53 (64Bit)

POWER

- Micro USB socket 5V1, 2.5A

CONNECTORS:

GPIO CONNECTOR

- 27 GPIO pins with +3.3 V, +5 V and GND supply lines.

CAMERA CONNECTOR

- 15-pin MIPI CSI 2

MEMORY CARD SLOT

- Push or pull Micro Secure Digital Input Output.

B. PIR SENSOR: PIR Motion Sensor Detector Module HC-SR501 enables you to sense motion. It is mostly used to detect the motion of a human body within the sensor’s range. It is also referred to used “PIR”, “Pyro-electric”, “Passive Infrared” and “IR Motion” sensor. Normally infrared radiation is not visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such prospect.

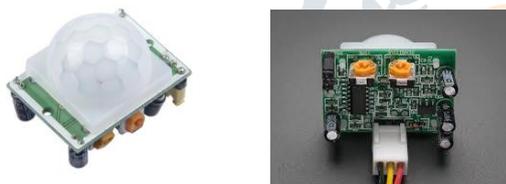


FIG 6.2 PIR SENSOR

PIR sensors don’t detect or measure heat instead they detect the infrared radiation ejected or reflected from an object. PIR sensor sense the motion, and it also checks whether the person detected was in or out of the sensor’s range. They are small, affordable, low-power, easy to use.

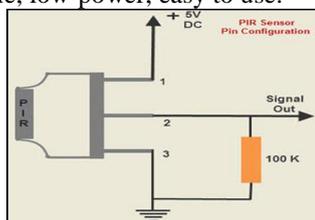


FIG 6.3 PIR PIN-OUT CONFIGURATION

An individual PIR sensor identify changes in the amount of infrared radiation striking upon it, which varies depending on the temperature and surface peculiarities of the objects in front of the sensor. When the human motion detects in front of the background, such as wall, the temperature at that point in the sensor’s field of view will rise from room temperature to body temperature, and vice-versa.

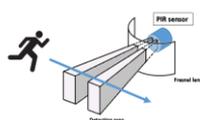


FIG 6.4 PIR DETECTION

PIR sensor detects the movement of persons around within approximately 10m from the sensor. This is an average

value, as the real detection range is between 5m and 12m. PIR sensors are made of a pyro electric sensor, which can detect levels of infrared radiation.



FIG 6.5 PIR SENSOR WITH RASPBERRY PI FEATURES

- Low Noise and High Sensitivity & Delay Time Adjustable.

C.PI CAMERA: The Camera Board on the Raspberry Pi is a small printed circuit board specialized with a camera on it. The PCB is connected to a ribbon cable which clings to the Pi on its own port. Pi Camera is a 5Mp camera Module, is capable of recording video of 1080p video and still images. The 5MP Raspberry Pi 3 Model B Camera Module Rev 1.3 with Cable equips pliable cable for attaching with Raspberry Pi 3 Model B.



FIG 6.6 PI CAMERA

The light weight camera module consents for that to be used in more practical roles, such as a hidden camera or even a camera. The board is small, at around 25mm x 23mm x 8mm. It weighs over 3g. The camera relates to the BCM 2835 processor on the Pi through the CSI bus. It is of a higher bandwidth link which carries pixel data from the camera back to the processor. This bus travels ahead the ribbon cable that attaches the camera board to the Pi.

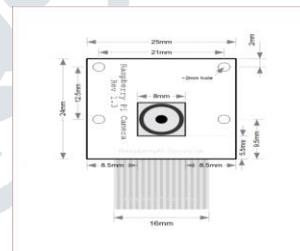


FIG 6.7 PI CAMERA MODULE DIAGRAM

Specific configuration settings are required to originate the camera plus a Python script to enable it takes pictures.

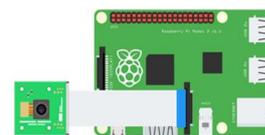


FIG 6.8 PI CAMERA WITH RASPBERRY PI

FEATURES

- Fully Compatible.
- Small and lightweight camera module.

D.BUZZER: A buzzer is an audio signalling device, which may be mechanical, electro mechanical, or piezoelectric. There are two main types of buzzer: active and passive. This is Small PCB Mountable 5V Passive Buzzer. It operates on 5V supply, uses a coil element to generate an audible tone.



FIG 6.9 BUZZER PIN DIAGRAM

This buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications.

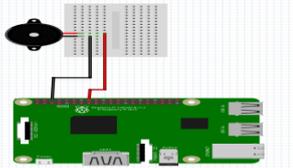


FIG 6.10 BUZZER WITH RASPBERRY PI

Buzzer pin configuration

1. Positive (Pin no 1) -Identified by (+) symbol or longer terminal lead. Can be powered by 6V DC.
2. Negative (Pin no 2) -Identified by short terminal lead. Typically connected to the ground of the circuit

FEATURES

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep

VII.SOFTWARE DESCRIPTION

PYTHON PROGRAMMING

Python is an open source high level programming language that is widely used in various domains which require auto memory management, support for multiple programming paradigms and an extensive dynamic standard library. Raspberry pi can be programmed using both C and python. Certain libraries have to be imported to use the python program for configuring the GPIO pins. Well there are other OS's available to the raspberry pi on the ROM site which require or can allow better use for other languages, but the main reason why python is preferred because it is a lab-on-a-chip where it is used for educational benefits,where we all know python is a fairly easy language to pickup.

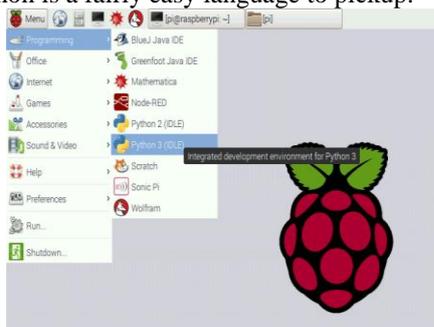


FIG 7.1 PYTHON WINDOW

ANDROID APPLICATION

Android Studio is an official integrated development environment (IDE) for Android app development. It is based on the IntelliJ IDEA, a Java integrated development

environment for software, and embeds its code editing and developer tools.



FIG 7.2 MOBILE APPLICATION

The official language for Android development is Java. Large parts of Android are coded in Java and its APIs are designed to be called Java. It is possible to develop C and C++ applications using the Android Native Development Kit (NDK), however it isn't something that Google promotes.

JAVA PROGRAMMING: Java is a programming language first released by Sun Microsystems back in 1995. Either use it on your desktop PC and even on the Raspberry Pi. Java doesn't compile to native processor code but rather it relies on a "virtual machine" which understands an intermediate format called Java byte code.

MY SQL SERVER DATABASE: My SQL is an Oracle-backed open source relational database management system (RDBMS) based on Structured Query Language (SQL). My SQL is most relevant with web applications and online publishing. My SQL server is available as a separate program for use in a client-server networked environment and as a library that can be embedded into separate applications.

PHP My Admin: Php My Admin is a LAMP application that is written in PHP [5]. Its specific purpose is to enable users with the ability to interact with administer and My SQL servers. All the information of Word Press is collected in the My SQL database, which is then coordinated with the database to create information in the Word Press site. PHP My Admin offers a graphical interface of the data, tables and fields stored in the My SQL database for database administration tasks.

VIII. INTERNET OF THINGS

The Internet of Things is defined as the network of physical objects, devices, and other items. It is embedded with electronics, software, sensors, and network connectivity that enables these objects to collect and exchange data.

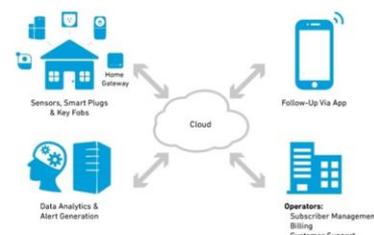


FIG 8.1 INTERNET OF THINGS

Once the data gets to the cloud, software processes it and it decides to perform an action, such as sending an alert to the user or by automatically adjusting the sensors without the need for the user.

FEATURES OF IoT:

- Connectivity
- Stream Processing
- High speed messaging

IX.RESULTS

The IoT based home security system has been designed and developed with Raspberry Pi-3, Pi-camera and PIR sensor. The user can get alerts anytime and anywhere through e-mail on smart phones or Laptop. Whenever any unknown or suspicious movement is detected, it gives loud alarm. The design of the live body detection system using Raspberry pi can make the smaller, lighter and with lower power consumption. It sends a security alert message to the authorized person utilities. Hence, the designed system successfully prevents access to any unknown person entering the home.

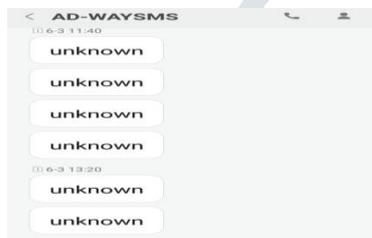


FIG 9.1 SMS



FIG 9.2 LIVE VIDEO STREAMING THROUGH APPLICATION

Based on Face Recognition” 2015 International Conference on Circuit, Power and Computing Technologies [ICCPCT]

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X. CONCLUSION

This paper presents the design and realization of a low cost but guarantees the safety of home security system for general users. The developed scheme is fast, highly reliable and provides enough flexibility to suit the requirements of different systems. Advantage provided by the system is that, Necessary action can be taken in short span of time in the case of emergency condition. A raspberry pi and open source applications with its ever growing community and development provides a great hope in the near future.

REFERENCES

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