Cloud-Based Home Sheltring using Raspberry PI

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Abstract

The quest for Home Automation is every increasing, given the need for more secure ways to protect our belongings. This project "Cloud Based Home Sheltering Using Raspberry Pi" proposes a system to secure one's property with the ability to ability to remotely control the safety system.
Keyword- Raspberry PI, PIR Sensor, Electronic Lock

I. INTRODUCTION

Nowadays most houses are being waylaid by robbers. To reduce this, we have planned this idea of making a real time project to secure the houses from strangers. The number of houses robbed within a year is more than 5000. So as to control that we had proposed this idea to implement a remotely accessed home security system.

This paper proposes that to keep our homes protected from strangers or robbers, we have been developed a system which uses PIR sensor to detect unwarranted movement and capture a image and send it via the mail or what's app. Here we uses the PI camera to capture the person's image. So the two main thing are to detect the human presence and to capture the image of the person. The door can be controlled via remote access from anywhere with the help of an android app.

One of the important reason for house burglary is money and jewelry. Thus in order to protect ones valuables, we have idea where we have a data base to check out the persons image. If it already excites in any ostracize list, it raises an alarm. The system can be accessed to view the image from anywhere by using the android app.

In this we have used the PIR sensor to detect the human movement and to switch on the PI camera. The PI cam will capture the image of the person in front. We use an electronic door locking device to open and close the door.

II. RELATED WORK

There are several real-time home automation systems which are implemented in houses and private offices. Some of the most related work to the objective of this paper is discussed in this segment.

A. Asghar [1] proposed a system that is used to predict the security system of the home and monitoring system. This system uses Raspberry pi module to monitoring the location of the home and predicts the home through a web application. It also uses a PIR sensor for monitoring system. It helps the system to alert that someone is there to monitor them and to imform to the owner through a web application. The drawback of this system is that it doesn't provide any alert system during emergency situations and usage of a web application is difficult in a mobile device.

Withanage, C. et al. [2] proposed a monitoring and smart home system for own houses. The houses is equipped with a GPS/GSM integrated with a smart ticketing device. The location of the home can be tracked using an Android application. Tracking the home through the Android application and smart home system are the highlights of the system. The main drawback is that it has an integrated GPS with a smart ticketing device which is not much reliable and also it does not have any emergency alert system.

Pavithra, D. et al. [3] proposed a system which is used to monitor the home. The home is tracked using GPS and Arduino is used to increase the accuracy of the home security level. The information is accessed using a web application. This system uses the information that is shared by the users to know about unpredictable road issues in the upcoming destinations. The lagging points in this system are that web application cannot be used efficiently in mobile devices.

W. H. E. Liu, and D. Pearson et al. [4] proposed a system that is used to home prediction and indicate the owner in the upcoming destinations. GPS/GSM device in the home is used to track the home location and alerts the owner if there is any problem in your house through SMS or web application or Android application. It uses unsupervised learning algorithms to improve accuracy in security level estimation. The demerit of this system is the use of IOT inter of things in every smart system.

Al-Ali Abdul-Rahman, Mohammad Al-Rousan. et al. [5] proposed a real-time home automation system using Arduino. This system has a GPS/GSM module placed in the home is used to track the location of the home to monitor. The location of the home is monitoring till date the database frequently. This system is useful when the things in home has been stolen as the device is hidden and placed in the home. It also has an emergency alert system which can be used by the owners during emergency

situations. The demerit of this system is that the message has been sent to the user and real-time tracking using Google maps can be done only if the user sends a request message to the module in the home.

Most of the related existing systems use tracking devices using GPS/GSM module in the vehicle and the vehicle is tracked using a web application. The major drawbacks of these systems are the usage of web application which is not easy to use in mobile devices at any time and the lack of emergency alert system. Some systems use RFID technology to alert the users or the passengers which is difficult to implement in all the buses and bus stops. The proposed system is mainly focused for the use in college transport services and it uses GPS and GSM modules for a simple tracking system along with alcohol detection and prevention, RFID based on-board attendance, fuel monitoring and emergency alert systems which provides improved security. The real-time tracking of the vehicle is done using an Android application and alert messages are sent through SMS.

III. METHODOLOGY

The surveillance and monitoring from of our homes from anywhere is the proposed idea in this project. We have planned to monitor the house using the Pi cam in this project. The main idea of this project is to secure the home from the strangers and to welcome relatives on our door-step even if we went somewhere. We can access the home from anywhere and we can allow them to wait inside the home. So we have planned to capture the image of the person and to send it to the related person so that they can take decision whether to allow him into the house or not. We also have a data base to cross check the persons images and it will take the decision to allow them if we have programmed the system accordingly. All of this control has been centralized and given to the owner of the house so he can access this form anywhere.

The Passive Infrared Sensor (PIR) technology is used to detect human movement. The PIR sensor will generate or radiate energy for detection purpose. They work entirely on the detection of infrared radiation emitted or reflected from objects. They do not detect or measure based on heat.

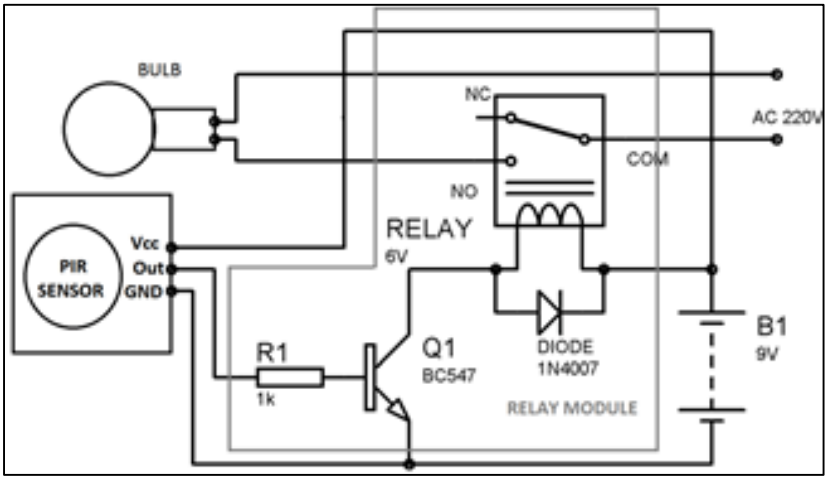


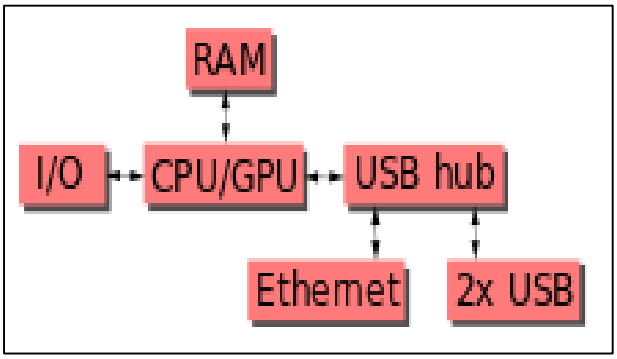
Fig. 1: Circuit diagram of the PIR sensor

An electronic door lock has been used here to unlock the door from remote with the help of the raspberry pi and a cloud connection. The camera has been used to capture the image of the person and send it to the owner.

IV. RELATED TECHNOLOGY

A. Raspberry PI

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support.



This block diagram depicts Models A, B, A+, and B+. Model A, A+, and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the Pi Zero, the USB port is connected directly to the system on chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port.

B. Performance

The Raspberry Pi 3, with a quad-core Arm-cortex processor, is described as 10 times the performance of a Raspberry Pi 1. This was suggested to be highly dependent upon task threading and instruction set use. Benchmarks showed the Raspberry Pi 3 to be approximately 80% faster than the Raspberry Pi 2 in parallelized tasks.

Raspberry Pi 2 V1.1 included a quad-core Cortex-A7 CPU running at 900 MHz and 1 GB RAM. It was described as 4–6 times more powerful than its predecessor. The GPU was identical to the original. In parallelized benchmarks, the Raspberry Pi 2 V1.1 could be up to 14 times faster than a Raspberry Pi 1 Model B+.

While operating at 700 MHz by default, the first generation Raspberry Pi provided a real-world performance roughly equivalent to 0.041 GFLOPS. On the CPU level the performance is similar to a 300 MHz Pentium 2 of 1997–99. The GPU provides 1 Gpixel /s or 1.5 Gpixel /s of graphics processing or 24 GFLOPS of general purpose computing performance. The graphical capabilities of the Raspberry Pi are roughly equivalent to the performance of the Xbox of 2001.

The LINPACK single node compute benchmark results in a mean single precision performance of 0.065 GFLOPS and a mean double precision performance of 0.041 GFLOPS for one Raspberry Pi Model-B board. A cluster of 64 Raspberry Pi Model B computers, labelled "Iridis-pi", achieved a LINPACK HPL suite result of 1.14 GFLOPS (n=10240) at 216 watts for c.

C. Electronic Lock

An electronic lock (or electric lock) is a locking devices which operates by means of electric current. Electric locks are sometimes stand-alone with an electronic control assembly mounted directly to the lock. Electric locks may be connected to an access control system, the advantages of which include: key control, where keys can be added and removed without re-keying the lock cylinder; fine access control, where time and place are factors; and transaction logging, where activity is recorded. Electronic locks can also be remotely monitored and controlled, both to lock and unlock.

D. Gas Detector

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals. Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in firefighting.

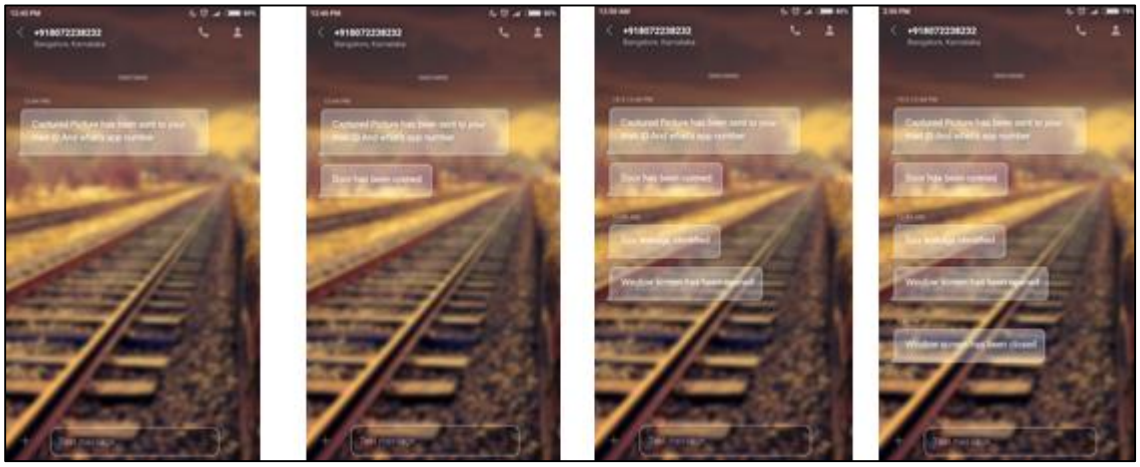
E. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relay. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Soiled state relay control power circuits with no moving paths, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "PROTECTIVE RELAY".

V. RESULTS AND DISCUSSION

All the required modules are connected to Raspberry pi and placed in the house. Android is a modern mobile platform that powers millions of mobile devices around the world. An Android application is created to access the raspberry pi powered system. The PIR sensor module placed in the entrance of the home gets the image needed and updates it into the cloud. Using the Android application and with unique login details the owner alone can access the security system that is assigned to their Ip address. Unauthorized access is restricted.

Alert messages are sent to a concerned phone number about the situation through SMS using GSM module. An alert message is sent to the owners of the house only when a person come to meet up at your home.



VI. CONCLUSION AND FUTURE ENHANCEMENTS

The proposed system discussed in this paper offers a simple automated system for home security with added monitoring and security features. It provides an Android application for real-time monitoring which is affordable and can be used only by the authorized owner. This system is designed with an objective of more security for the home and to provide a secured home system which is much useful for the owners with the ability to provide allowance for known ones to enter.

In future, the IOT technology used in on-cloud based system can be improved by using Raspberry pi by placing it in the house of the owners. The Android application used in the system can be further optimized and updated in the future. This system also can be used for the offices, and manager cabins.

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