

Intelligent Surveillance With Cloud Storage For Home Security

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ABSTRACT

In present days, wireless devices are being used to handle the daily chores that the traditional desktop and laptop computers once handled. Home automation can be defined as operating many of our appliances in the house, climate, security and video monitoring by video from a centralized or remote location. A home automation system enables us to keep a track on our houses from a distant area, giving us a real assurance of security. Many systems will make us to interact with the home-security system, giving the ability to control our home remotely. Lower prices of cameras and different accessible technologies of the network have made remote home-monitoring quite efficient providing us the control of everything from our cell. In the following paper, we put forth the design and implementation of a home automation system to spot an intruder at home when no one is there. This cost-effective system of security uses a small Passive Infrared module (PIR) and a Door sensor (Reed Proximity Sensor), and is built around Raspberry Pi 2 microcontroller. The presence of an intruder is indicated when the system senses the signal produced by the sensors. The system sends a message to the user through a GSM module SIM900a after detecting the presence of unrecognized individual. The operator then observes the interruption on an Internet enabled hand-held device by using the IP address of the installed IP WebCam or a mobile in home, and warns the police and neighbors. The user can also save the photos, which can be stored in a cloud for later use. Preparatory investigations have revealed encouraging outcomes.

Keywords— IP WebCam, ARM11 microcontroller, GSM module, PIR

I. INTRODUCTION

In today's world, security is just a click away of the appropriate technology, and with the help of such advancements taking place, the security of one's house must also not to be forgotten. Modern developments in electronics and telecommunication, technologies have led to the reduction and advancement of the performance of desktops, networking and sensors. These changes have given rise to the advancement of several household automation systems and technologies.

[1] Home-automation is the combination of surveillance system and home security. Surveillance can be defined as

monitoring of the activities, behaviour, observing particular location for the purpose of directing, protecting and influencing. A home automation system should provide security structures for a house by alarming the residents from natural, accidental and/or human. Many of the home automation systems that are commercially available can be classified in two categories: locally controlled systems and

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remotely controlled systems. Locally controlled systems use an in-home controller to achieve home automation. This allows users the complete use of their automation system from within their home via a wireless interface.

[2] There are a number of issues involved when designing a home automation system. Data infrastructure and Cloud networking allow individuals to monitor, manage, and control their personal data through the Internet. This paper presents the implementation details of the home security system using a public cloud server to detect an unauthorized person at home when nobody is there. This system uses an ARM11 microcontroller and is divided in two sections: viz. In-home system and Remote user access. As soon as the intruder is in, Door Sensor and Passive Infrared (PIR) sensors detect the intrusion, and report intrusion events to the user by using GSM module. The installed IP webcam helps the user to monitor the intrusion from anywhere, on an Internet enabled device by using the IP address of IP webcam and can also use login id and password for authentication. If the intrusion is genuine, the user is provided with options to alert neighbours, play alarm or even report to the police. The user can also save the images in a public cloud server by accessing internet. Using this technique, burglary can be avoided effectively.

II. LITERATURE SURVEY

1. GSM Based Home Automation System Using App-Inventor for Android Mobile Phone

In this paper, author introduced Home automation based on GSM system.. Programming is not essential. The main aim of this paper is to have ease in programming using GSM. It is a platform to design using GSM. User can control home equipment using GSM by each corner of world. In hardware, Raspberry Pi 2 board with ARM11 microcontroller, GSM Modem, Sensors and some other small devices are used. [1]

2. Efficient Interactive Control System based on GSM

In this paper, author introduced GSM technology with ARM microcontroller. Simulation software is Proteus v8 and Keil compiler used for embedded C programming. Main aim of this project is if in future any accident will occur, the system will send an SMS message to the user's phone. At any instance, user can send request. Home equipments can be controlled using SMS service means GSM so user can save his/her time and money. In proposed system, power supply gives 5V power to the system. AT89S52 is 8-bit, low cost controller. MAX232 is used for conversion of signal. Last but not the least, GSM module SIM900a is messenger between the handler and controller using AT commands. This paper presents detail information about circuit in simulation diagram using Proteus and all necessary devices.[2]

III. BLOCK DIAGRAM

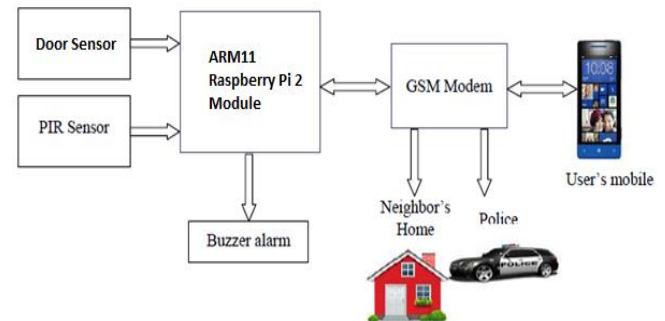


Fig. Block diagram of In-home Security System

BLOCK DIAGRAM DESCRIPTION

RASPBERRY MICROCONTROLLER :

The proposed embedded security system is designed using Raspberry pi 2 microcontroller. It is a member of the Advanced RISC Machines (ARM) family. ARM is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro-programmed Complex Instruction Set Computers. The Raspberry pi 2 Chip is Broadcom BCM2836 SoC having Core architecture of Quad-core ARM Cortex-A7, 900 MHz cpu, Dual Core VideoCore IV® Multimedia Co-Processor. It has memory of 1GB LPDDR2 & Booted from Micro SD card. It is running a version of the Linux operating system, power of Micro USB socket 5V, 2A.

Raspberry pi 2 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale.

SENSORS:

DOOR SENSORS:

Reed Proximity Sensors also called as magnetic sensors are reliable due to their simple construction and sealed reed switch contacts. They will give millions of operations at the stated ratings. Applications are many and examples of Reed Proximity Sensor applications can be found in most industries.

These type of devices very sensitive to misalignment and are suited to environments that are contaminated by dust, liquid and where non-contact hygiene is a consideration. These Reed proximity sensors consist the reed switch and the actuator magnet. The reed switch will change state when the actuator magnet comes into close proximity to it, there does not have to be any physical contact between the reed switch and actuator. There consist three operating faces for both the reed switch and the

actuator. The operating distance can be varied by the choice of actuator magnet. Both the reed switches and actuator magnets are coupled in rugged cases and are suitable for use in rough or casual environments. The switch configurations are available with normally open or changeover contacts.

PIR SENSORS:

A passive infrared sensor (PIR) sensor is mostly used in the home to detect the intrusion by sensing the motion. PIR sensor is an electronic sensor that measures IR light radiating from objects and senses the movement of people, animals or other objects in its field of view. PIR sensors are basically used as proximity sensor and are made from pyro electric materials. They have an effective range of about 6m, and a field of view less than 180°. All the objects with a temperature above the absolute zero emit heat energy in the form of radiation. Usually this type of radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such purposes. The term passive refers to that PIR devices do not generate energy for detecting. It works by detecting the energy generated by other objects in its field of view. It is important to note that PIR sensors do not detect "heat" per se; instead they detect the infrared radiation emitted from an object. The sensor has three terminals, viz., Vcc, GND and V out. When the sensor detects any motion it provides +5V output otherwise 0V. task of a voltage divider. When the IR sensor is interrupted, a SMS is sent to user reporting that "Someone entered in your home". The IR transmitter and receiver pair detects an obstacle or interrupt within the range of about 3m.

GSM MODULE:

Global System for Mobile communications (GSM) is wireless standard for mobile phones. The application of the GSM is to provide worldwide wireless communication. GSM supports and handles multiple users by using TDMA technology. During the past two decades, GSM technology has improved well to offer better services. New technologies have been developed based on the original GSM system. It works like a mobile phone, it accepts a SIM card, and operates subscription to a mobile operator. GSM modem allows transmission of short message service (SMS) in Text mode and Protocol Description Unit (PDU) mode. SIM900A GSM module is used in this design. This module operates on AT command over TTL interface. AT command is an acronym for Attention command that is recognized by GSM module. If any intrusion is detected, GSM sends SMS to user as "intrusion entered in your home".

BUZZER ALARM:

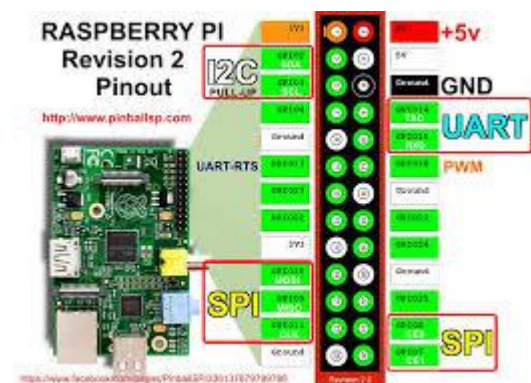
A buzzer is a signaling device, actually used in automobiles, it generates buzzing noise when activated. After recognizing whether intrusion is genuine or not, if the intrusion is genuine then user sends the reply sms as *1 which will ON the buzzer in the house. Use of buzzer does more than just to scare a burglar. It cautions and gives indication to the robbers.

IP WEBCAM:

Surveillance is very useful to observe and monitor threats, and helps to prevent and investigate criminal activities. In our project, we are going to use a IP webcam. It is an android application used for security surveillance. It supports remote viewing and also recording from anywhere anytime through web browser. It provides user authentication with login id and password. IP webcam also turns android mobile into a network camera. It actually requires Android OS2.2+. After getting the indication of intrusion event, the user monitor the intrusion from anywhere, using an Internet device using IP address of an IP webcam.

IV. PROPOSED SYSTEM

1. Product Name Raspberry Pi 2, Model B



Product Description:

- The Raspberry Pi 2 delivers 6 times the processing capacity of previous models.
- This second generation Raspberry Pi has an upgraded Broadcom BCM2836 processor, which is a powerful ARM Cortex-A7 based quad-core processor that runs at 900MHz.
- The board also features an increase in memory capacity to 1Gbyte.

2. GSM SIM900a



- The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module

which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions.

- Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

3. PIR Motion Sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range.

They are small, inexpensive, low-power, easy to use and don't wear out.

PIRs are basically made of a pyroelectric sensor, which can detect levels of infrared radiation.

They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

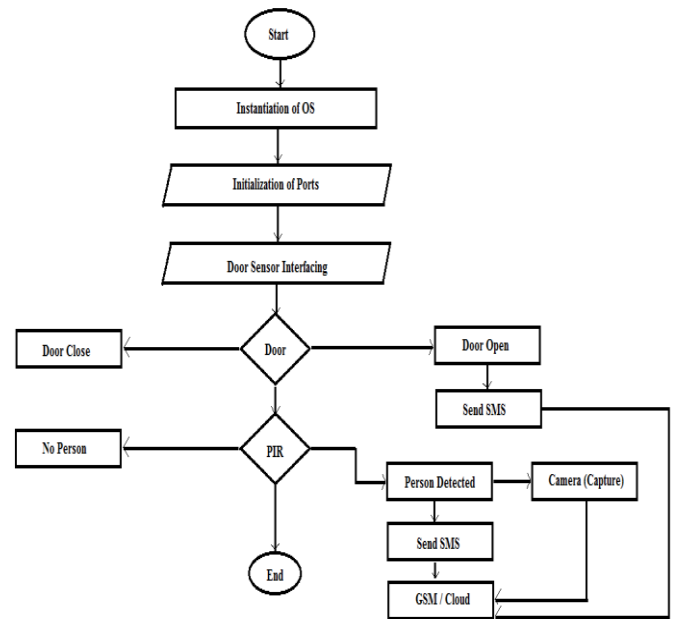
4. Reed Proximity Sensors

- Reed Proximity Sensors / Switches (sometimes referred to as magnetic sensors) are inherently reliable due to their simple construction and sealed reed switch contacts.
- These devices are very tolerant to misalignment and are particularly suited to environments that are contaminated by dust, liquid and where non-contact interlocking or hygiene is a consideration.
- Reed proximity sensors consist of two parts, the reed switch and the actuator magnet. The reed switch will change state when the actuator magnet comes into close proximity to it, there does not have to be any physical contact between the reed switch and actuator

V. ALGORITHM

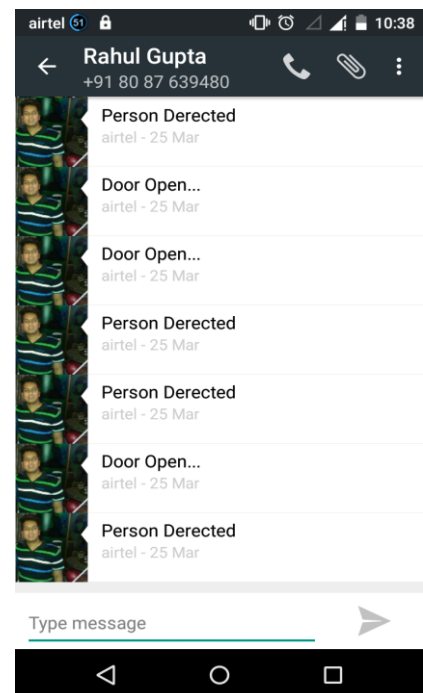
1. Start.
2. Instantiation of Operating System.
3. Initialize GPIO as input of Door Sensor and PIR Sensor.
4. Initialize output port to buzzer.
5. Initialize output port to GSM.
6. If Door == 1, send message to user mobile "Door Open".
7. Enable buzzer == 1 (Buzzer ON)
8. If PIR == 1, send message to user mobile "Person Detected".
9. Enable buzzer == 1 (Buzzer ON)
10. Camera captures image and send to cloud network.
11. Continue loop from 6 to 10.
12. End.

VI. FLOWCHART



VII. RESULTS AND ANALYSIS

- After the execution of the program, we observed that as the door opens then the Reed Switch and actuator magnets are separated. After the separation, buzzer turns ON.
- Simultaneously, an SMS is delivered through GSM to the receiver's mobile as "Door Open". Further the intrusion is detected by passive infrared sensor due to some movements and again the buzzer turns ON and an SMS is delivered as "Person Detected".



- After detecting a person, the camera captures an image and sends to the cloud network at that instant.



- In this way, a quick indication through SMS and detection through image of intrusion is available as expected.

VIII. CONCLUSION

We have designed and implemented a cost effective ARM11 raspberry pi 2 microcontroller based home security system. The proposed system provides home security and surveillance. Deploying sensors, GSM and android mobile IP web cam helps to detect, report and monitor intrusion events to users. Also the system informs to the neighbourhood and alerts police, thereby reducing damages caused by burglary. The use of cloud network in the system allows for storage of captured images and recorded videos. Multiple PIR sensors may be used to obtain wider coverage. By integrating multi-touch mobile devices, cloud networking, wireless communication and power-line communication, a fully functional home automation system can be designed and built.

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