

GSM Based Home Security System Using PIR Sensor

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Abstract

Securing a home is an indispensable task because of the burglary incidents. The conventional design of home security systems typically monitors only the property and lacks physical control aspects of the house itself. In today's context, it is common to leave the house unattended as people are busy catching up with their tight daily schedule. Therefore, most people have chosen the home security system as the most reliable way to protect their home. All the body generates some heat energy in the form of infrared which is invisible to human eyes. But, it can be detected by electronic sensor.

PIR sensors are widely applied in wireless residential security systems, home alarms systems and many more security circuits as motion detector sensors. A typical PIR sensor detects the Infrared Red (IR) waves from human body and so it is also known as 'human sensor'. This system is very simple. And the working of this system is very simple as well. In this system PIR sensor used for sensing and then microcontroller is used for controlling purpose and a GSM module which is used for SMS and calling purpose. When anybody comes in range of PIR sensor, then sensor sends a logic signal to microcontroller and take control and perform a given task.

Keywords

GSM, PIR Sensor, Security System, SMS, Microcontroller

I. Introduction

Home security system using PIR sensor is a system designed to reduce the high rates of crimes in most personal housing. In present time Home/Office and many other place security is most important. In our absence these places are not secure. For make these palaces secure many people prefer electronic security systems. The paper shows the details about making a simple microcontroller based home security system using a GSM module and a PIR sensor. It gives a call and SMS to a pre specified phone number when any kind of intrusion is found.

II. Existing System

Alarm based human motion detection is an embedded system which we are used to provide security. This is our proposed system. Instead of manual security if we use alarm based detection system for detecting human motions to provide security which reduces man power and is very cheap. As we know human body radiates heat in the form of Infrared radiations. When a person moving around this circuit, PIR sensor detects the change in the IR levels of surroundings and sends a signal to the microcontroller.

III. Proposed System

The system contains PIR sensors to detect obstacle, GSM Module for communicate with GSM Phone. The whole system is controlled by open-source microcontroller. The system collects all information from PIR sensors, process that information and sends call to corresponding GSM mobile phone number by using

a GSM modem. If PIR sensors detect any obstacle in covered area then a signal send to microcontroller, controller activate GSM and make a call and SMS to the home owner mobile phone using the GSM Module.

IV. Block Diagram Description

The following fig. 1. represents the block diagram of the proposed system.

In this system PIR sensor used for sensing and then microcontroller used for controlling and then a GSM module which is used for calling purpose. When anybody comes in range of PIR sensor, then sensor sends a logic signal to microcontroller, then it will necessary action to take control and perform a given task. Here a calling and SMS task is given to microcontroller using GSM.

A. Microcontroller

Open-source physical computing platform based microcontroller board for developing a software environment for writing program for the board.

B. PIR Sensor

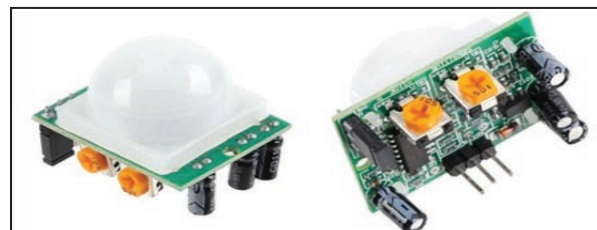


Fig. 2: PIR Sensor

PIR sensors are used to detect living being movement. PIR is a Passive Infrared sensor, which detect infrared rays. All living being with a temperature above absolute zero emits heat energy in the form of radiation. These radiations are infrared ray. Human eye cannot see these rays because these rays are radiated at infrared wavelength. When any living being comes in range of PIR sensor, it detects heat of that living being and generates an output. PIR sensor module does not send any rays for detection; its only detects heat (Infrared). Passive elements are those elements that don't generate their own voltages or energy. They just only measures things. So we can say that this sensor is a passive infrared sensor and it doesn't generate anything by itself. It is only capable to measure the radiations emitted by other objects around it. It measures those radiations and do some desired calculations.

PIR sensor has total 3 pins:

1. Pin#1 is of supply pin and it is used to connect +5 DC voltages
2. Pin#2 is of output pin and this pin is used to collect the output signal which is collected by PIR sensor.
3. Pin#3 is marked as GND pin. This pin is used to provide ground to internal circuit of PIR sensor.

C. GSM Module

System for Mobile Communication is an open, digital cellular technology used for transmitting mobile voice and data services. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator. A GSM modem connected to a computer, allows the computer to use the GSM modem to communicate over the mobile network. GSM modems can also be used for sending and receiving SMS and MMS messages. AT commands are used to control GSM module. ATD are commands are used for calling.

V. Working Principle

The project mainly focuses on providing security when the user is away from home's mobile technology that can perform remote technology communication wherever they are. Through this facility messages can send quickly, accurately and at a low cost. Mobile phone integrated security systems, where the information send by a security system to user mobile phone in the form of call.

C programming language is used in making this system, the program was applied to create a security system works automatically, which can make a way to communicate with user mobile phone when there is a security breach in the house. Modular in design use to make easy expandable for add more sensors to the core system microcontroller platform.

The system contains PIR sensors to detect obstacle, GSM Module for communicate with GSM Phone. The whole system is controlled by microcontroller. The system collects all information from PIR sensors, process that information and sends call to corresponding GSM mobile phone number by using a GSM modem. If PIR sensors detect any obstacle in covered area then a signal send to microcontroller, controller activate GSM and make a call to the home owner mobile phone using the GSM Module shown in fig. 3. The system organized in several units like microcontroller, interfacing, GSM module and PIR sensors.

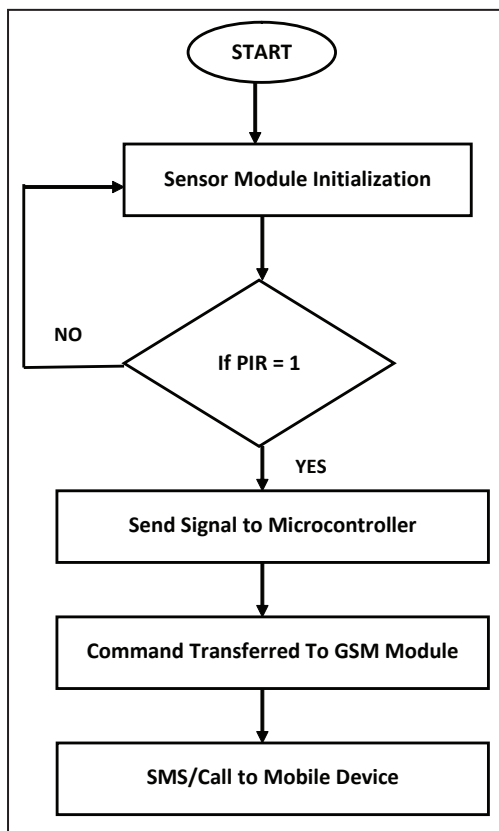


Fig. 3: Flow Chart of Home Security System

VII. Result

Home security system using PIR sensor can be implemented for security concerns. It will make a call to the user when any intrusion is detected inside a room.

VIII. Advantages

- Low cost.
- Easy to implement.
- Low power consumption.
- Automated operation

IX. Future Enhancements

Future suggestions of this project are very great considering the amount of time and resources it saves. This system can be used as reference or as a base for realizing a scheme to be implemented in other project of greater including the audio-visual camera by sending the captured images to an email instantly. The project itself can be modified to achieve a complete home automation system which will then create a motion system which will then create a platform for user to interface between himself and his households.

X. Conclusion

The Home security system feature become draws much attention in the future. People getting more concerned to protect their house from unauthorized people. This system can monitor a house by use of sensors that integrated with a microcontroller and a GSM unit. A calling mechanism is used to alert users via mobile phone when a possible intrusion occurs. Today almost every one using mobile phone so by use this system user will not have to carry additional device to monitor their house. This system is design using modularity to become a flexible system that can be add more sensors without change the whole system, only add some sensors to increase systems functionality. So this system is a modular home security system by using call function to communicate between system and user. The project model can be used in places such as banks, office.

Theft tricks have becoming now possible to control it, which different depending on the location and type of things. Modern devices entered in all areas, became easy to narrow the opportunities for robber in several different ways without cost of considerable material. Microcontroller has been used for design a security and reliability system for the home. GSM has been used for calling purpose to the owner (Under any circumstances and in any place) to inform him that his house has been hacked.

References

- [1] Mahendran.N, Geo Joe Mathai, Veenesh.M.U, "Multiple sensor feeding supported, building automation system using arduino platform", With Exposure of 802.15.4 Functionalities, International Journal of Engineering Trends and Technology, Vol. 4, Issue 2, 2013.
- [2] SheikhIzzal Azid, Bibhya Sharma, "Intelligent Home: SMS Based Home Security System", With Immediate Feedback, World Academy of Science, Engineering and Technology, Vol. 72, 2012.
- [3] Sadeque Reza Khan, Ahmed Al Mansur, AlvieKabir, Shahid Jaman, Nahian Chowdhury, "Design and Implementation of Low Cost Home Security System Using GSM network", International Journal of Scientific and Engineering Research, Vol. 3, Issue 3, 2012.

- [4] R. Hariprakash, G. Venkatramu, S. Ananthi, "University of Madras, K. Pad Manahan "Some Problem and Methods for Remotely Controllable Automatic Home Security System", Systems and Networks Communications. ICSNC, 3rd International Conference Publication, pp. 400-403, 2008.
- [5] Wuhan, China, "An Improved Short Message Security Protocol for Home Network", Industry Applications Society Annual Meeting, Conference Record of the 1994 IEEE Publication, 1994, pp. 2121-2125.
- [6] Litton C. D., Vinson R. P., "Application of the Diesel, R. Anandan et al, Journal of Global Research in Computer Science, 4 (4), April 2013, pp. 126-132 © JGRCS 2010.



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