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# GSM Based Computer Lab Security System Using PIR Sensors

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**Abstract**— Securing computer lab is very important issue in any college, organization, and computer department. This paper presents a system which uses Arduino and GSM module Global system Mobile communication to monitor and protect the computer lab and various other secure areas. The IP (Internet Protocols) camera is used to capture the images and video, PIR (Passive Infrared Radiating) Sensor is used to detect motions which are produced IR radiating objects. The PIR sensor will detect the IR radiant if security violates on particular place then the PIR sensor will detect the motion and it will intimate through call to the owners to alert about security violation.

**Keywords**— Arduino, GSM, IP Camera, PIR, Sensors.

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## I. INTRODUCTION

Home security system using PIR sensor is a system designed to reduce the high rates of crimes in most personal housing. The proposed system of home security systems is the most reliable way to protect one's 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.

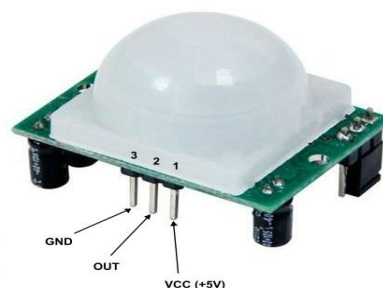


Fig 1: PIR Sensor

PIR sensors (Fig 1) 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'. When anybody comes in range of PIR sensor, then sensor sends a logic signal to microcontroller and take control and perform a given task.

## II. RELATED WORK

Sheikh I. Azid, and Bibhya Sharma [1] has proposed an Intelligent Home which is SMS Based Home Security System with Immediate Feedback for the secure operation. This proposed system will send an emergency SMS to the user and relevant civil authority in an average of 9.16s.

Mahendran.N, Geo Joe Mathai & Veenesh.M.U [2] Proposed Building Automation system which will control the applications based on its time based profile connected via a serial protocol named as I2C communication. This time based profile is modified by user defined. It also has the ability to communicate, organize and manage the time using Zigbee. This BAS can be used for building "Intelligent Automation System" for connecting multiple sensor input/ output unit interconnections with Arduino.

Sadeque Reza Khan, Ahmed Al Mansur, Alvir Kabir, Shahid Jaman & Nahian Chowdhury [3] has designed a Low Cost Home Security System using GSM Network. The proposed system is SMS based and uses wireless technology to revolutionize the standards of living and it provides ideal solution to the problems faced by home owners in daily life.

## III. PROPOSED SYSTEM

Security has been a major issue where the crime is increasing day by day everyone wants to take proper measures to prevent crime. The arduino GSM module PIR sensors module are attached to main doors of computer labs and the sensor will detect the motion which is produced by humans, animals, other objects, inferred radiation produce to detect the objects, the PIR sensor will send the signals to arduino board inbuilt microcontroller by using microcontroller the devices can operate easily and it will read the signal, the PIR sensor after reading the arduino will send those signals to GSM module. It will act like mobile phone the GSM module use to make call to the registered numbers and will watch the video live on own mobile phone through labs, the IP cameras is essential to watch the lab environment at the time of motion detection. The range of a typical PIR sensor is around 6 meters or about 30 feet. For proper operation of PIR sensor, it requires a warm up time of 20 to 60 seconds. This is required because, the PIR sensor has a settling time during which it calibrates its sensor according to the environment and stabilizes the infrared detector. If the sensor is not given enough calibrating time, the output of the PIR sensor may not be reliable and its output will be high when it detects motion.

The PIR sensor modules usually have 3-pin connection: +Vcc, Output, and Ground. The pinout may vary, and it can be powered through 5-12 Volts power supply as it has its own voltage regulator on board. The output goes high when the motion is sensed.

Besides it also has a 3-pin jumper selection for single or continuous trigger output mode. The two positions have labels H and L. When the jumper is at H position, the output remains high when the sensor is re-triggered repeatedly. In position L, the output goes high and low every time the sensor is triggered. So a continuous motion will give repeated high/low pulses in this mode. The front part of the sensor module has a Fresnel lens to focus the infrared light on to the sensor element.

The below diagram shows the in the presence of a human IR energy or radiation, the infrared sensor detects the energy and immediately converts it into minute electrical pulses.

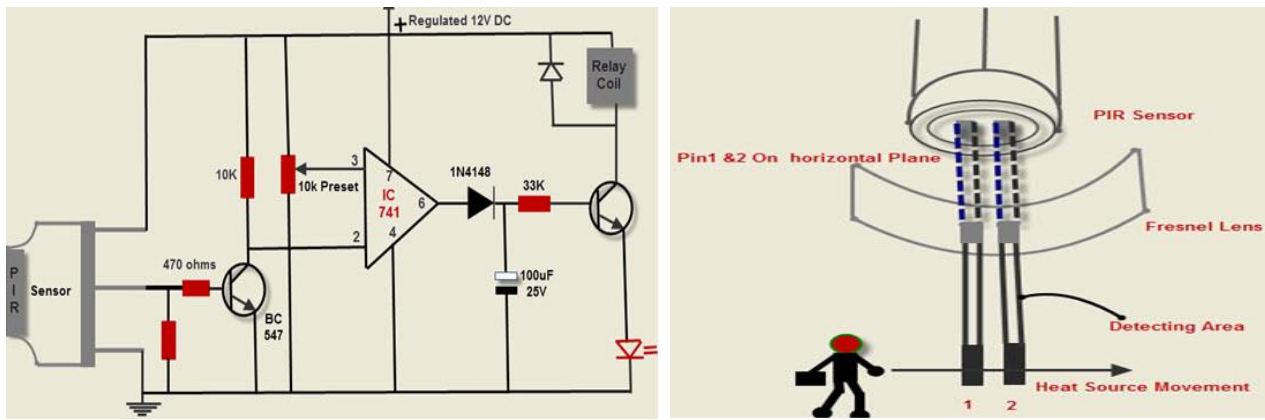


Figure 2: Circuit Diagram for Motion Detection Using PIR Sensor

As a comparator, the IC741 is set up –which consists of 8 pins. Wherein the pin3 is allocated as the reference input, while the Pin2 as the sensing input. When the collector terminal of the transistor goes low, then the potential pin2 of the IC becomes lower than the potential pin3. Immediately it makes the output of the IC high, triggering the relay driver consisting of another transistor and relay. The relay triggers and switches on the alarm device, which is connected to the circuit.

The capacitor 100uF/25V makes sure that the relay remains on even after the passive infrared sensor is turned off possibly due the exit of the radiation source. The PIR sensor device must be properly enclosed in a Fresnel lens cover to ensure that its efficiency is sufficiently enhanced.

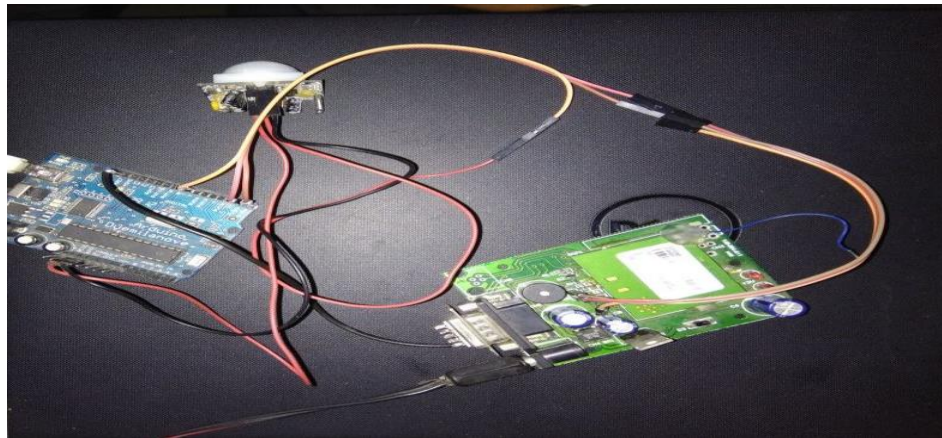
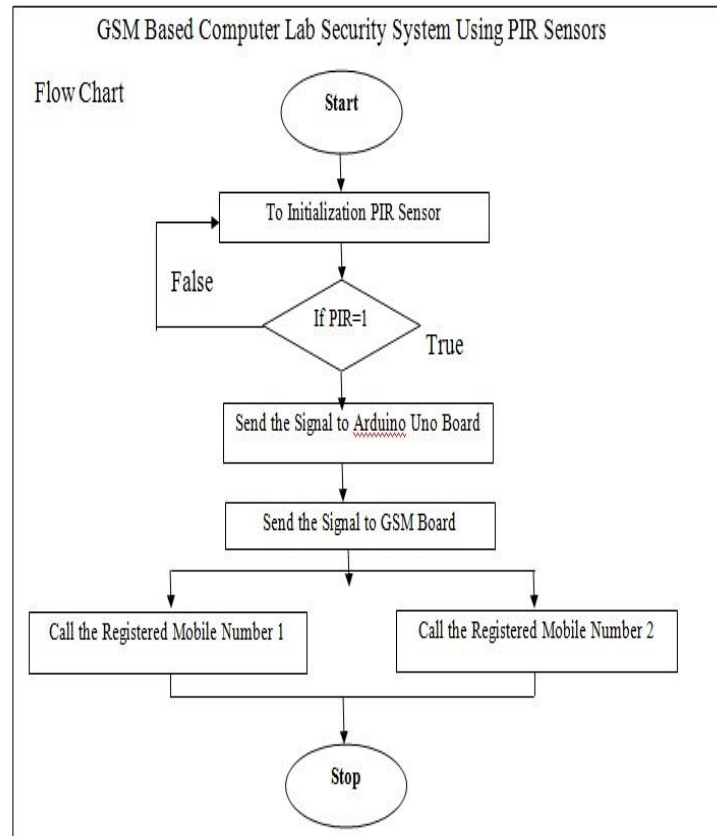


Figure 3: Components used in GSM Based Computer Lab Security System Using PIR Sensors

The Arduino is an open-source software platform it's used for building electronics and embedded system projects. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE that runs on your computer, used to write and upload computer code to the physical board.

Arduino does not need a separate piece of hardware called a programmer in order to load new code onto the board, Arduino IDE uses a simplified version of C++, making it easier to learn to program. It provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

Algorithm: "GSM Based Computer Lab Security System Using PIR Sensors"



- Step 1: Start
- Step 2: To initialize the PIR Sensor
- Step 3: To check if (PIR=1) true, go to next step4  
if (PIR=0) false, go to step1
- Step 4: To Send the signal to the Arduino Device
- Step 5: To Send the signal to GSM Device
- Step 6: Call to Registered Mobile Numbers
- Step 7: Stop

Specifications

- GSM SIM900A (MINI V3.9.2)
- Arduino Uno Board and USB Cable
- IP Camera.
- Jumper Wires 8 to 10
- Power adapter 5Volts
- GSM SIM Card

Features

- Allows data transmission and reception across GSM networks at speeds up to 9,600 bps currently.
- Forwarding of calls to another number. More capacity, ensuring rapid call set-up.
- Handsets also smaller and more robust.
- Place a call on Hold while you access another call.
- Encrypted conversations that cannot be tapped.

#### IV. CONCLUSIONS

Securing computer lab in colleges, organization and other department is important issue today. The proposed GSM based computer lab security system is designed using Arduino, PIR motion detection sensor and GSM module to provide security to such areas. This proposed system will intimate through call to the owners to alert about security violation.

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