

Component Description

PIR Motion Detection Sensor

Passive Infra-Red or PIR Sensor is a Pyroelectric device that detects motion. Hence, it is also called as motion detection sensor. It detects motion by sensing the changes in infrared levels emitted by nearby objects.

GSM Module (SIM900A)

SIM900A is the GSM/GPRS module with built in RS232 interface. It has dual band GSM/GPRS system that works on 900/1800MHz frequencies. With the help of RS232, the modem can be connected to PC or microcontroller via serial cable. Voice calls, SMS and internet access are possible with this module. There are on board connections for microphone and headphones with which we can make or receive calls.

Arduino UNO

It is the main controller used in this project. It detects the signals from PIR sensor and sends commands to GSM Module accordingly. The serial pins of the Arduino are used in this project to communicate with GSM module.

Arduino UNO

PIR Motion Detection Sensor

SIM900A GSM Module with SIM inserted

HARDWARE REQUIRED

- ARDUINO UNO
- ARDUINO IDE v1.8.5
- PIR MOTION SENSOR (HC- SR501)
- GSM SIM900A MODULE Dual-Band 900/ 1800 MHz
- 9V 1A DC CHARGER
- CONNECTING WIRES
- PERF BOARD (DOT PCB)
- SOLDERING IRON
- 0.5mm SOLDER WIRE

COMPONENTS DESCRIPTION

1. Passive Infrared Sensor (PIR) :



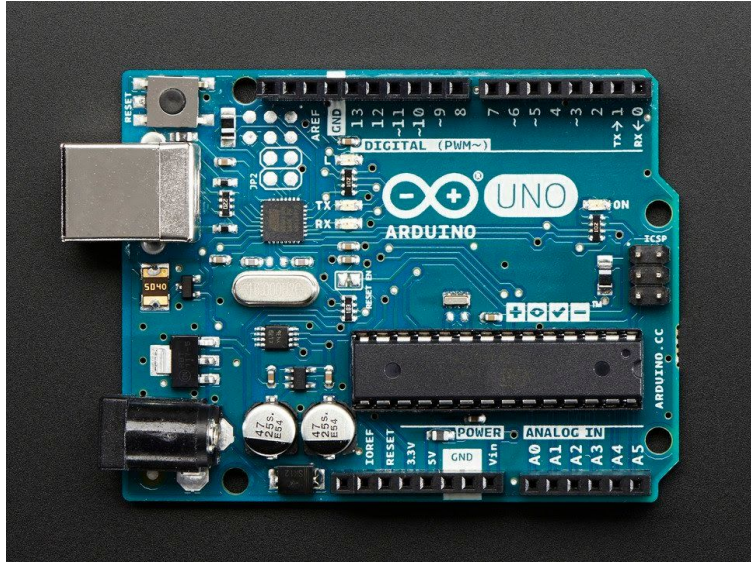
PIR sensors detect a person's body heat when the person comes in close proximity. These sensors are small, low power, inexpensive and easy to use. Due to these reasons, PIR sensors are generally used in gadgets, home appliances, business enterprises, industries, etc. PIR gives digital output when it detects motion. It consists of pyro-electric sensor that detects the infrared radiation emitted from humans. Passive Infra-Red or PIR Sensor is a Pyroelectric device that detects motion. Hence, it is also called as motion detection sensor. It detects motion by sensing the changes in infrared levels emitted by nearby objects. PIR sensors have ranges of up to 10 meters (30 feet).

2. GSM Module (SIM900A) :



SIM900A is the GSM/GPRS module with built in RS232 interface. It has dual band GSM/GPRS system that works on 900/1800MHz frequencies. With the help of RS232, the modem can be connected to PC or microcontroller via serial cable. Voice calls, SMS and internet access are possible with this module. There are on board connections for microphone and headphones with which we can make or receive calls. Wireless modules are the component of an M2M device which produce, transmit and decode data over a cellular network. There are two basic wireless networks for which modules and M2M solutions are developed – GSM and CDMA. It can be differentiated by the cellular standard (GSM/UMTS/CDMA), the cellular data standards (GSM, UMTS, GPRS, EDGE, HSDPA), as well as by technologies. It is always used in a poor environment, so there's always a high demand on the quality.

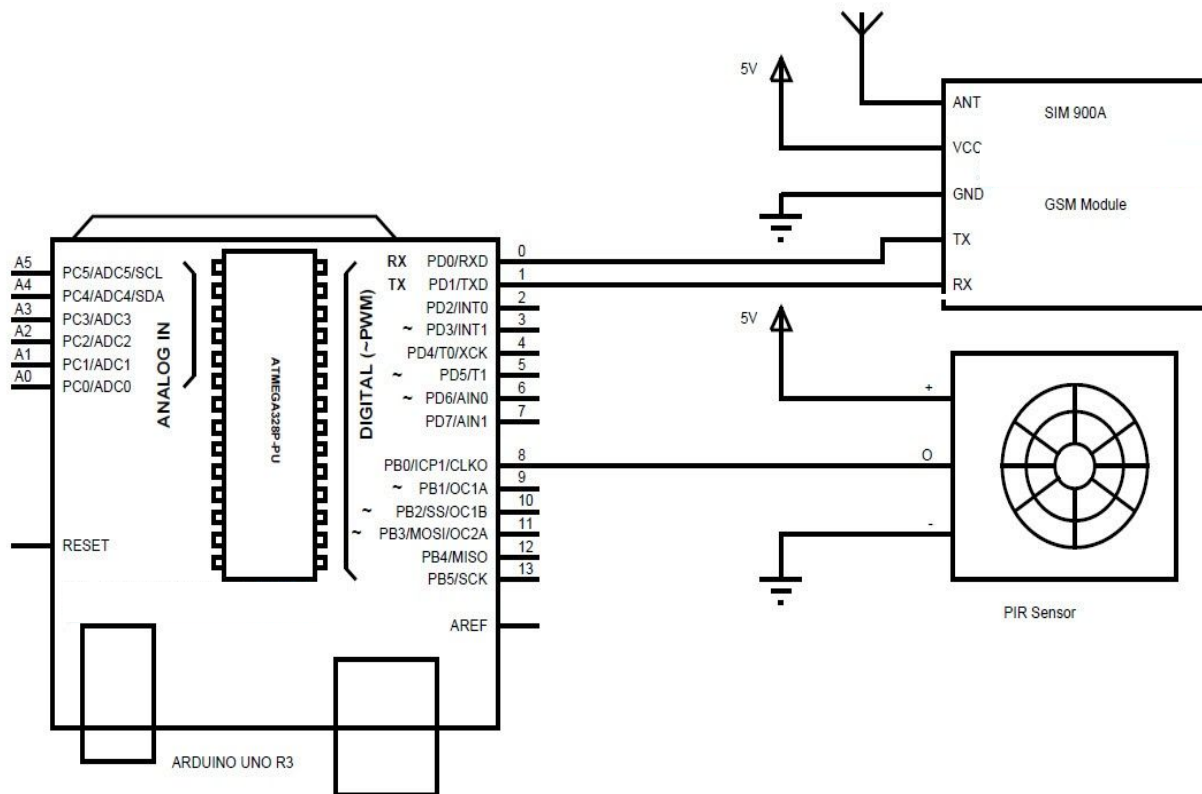
3. ARDUINO UNO :



It is the main controller used in this project. It detects the signals from PIR sensor and sends commands to GSM Module accordingly. The serial pins of the Arduino are used in this project to communicate with GSM module. The Arduino UNO is a widely used open-source microcontroller board based on the ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery.

Circuit Design of Arduino GSM Home Security Alarm System

As the project is based on an Arduino, the connection is pretty simple. PIR motion detection sensor module has a digital output pin. The pir positive is given to arduino +5v. This is connected to any of the digital I/O pins of the Arduino. The GSM Module communicates with the microcontroller in a serial manner. It has an Rx and Tx pins on the board. These pins are connected to the Tx and Rx pins of the Arduino. It is important to note that while uploading the program (sketch) to Arduino, the GSM module must be disconnected as it might interfere with the serial communication with the Arduino IDE.

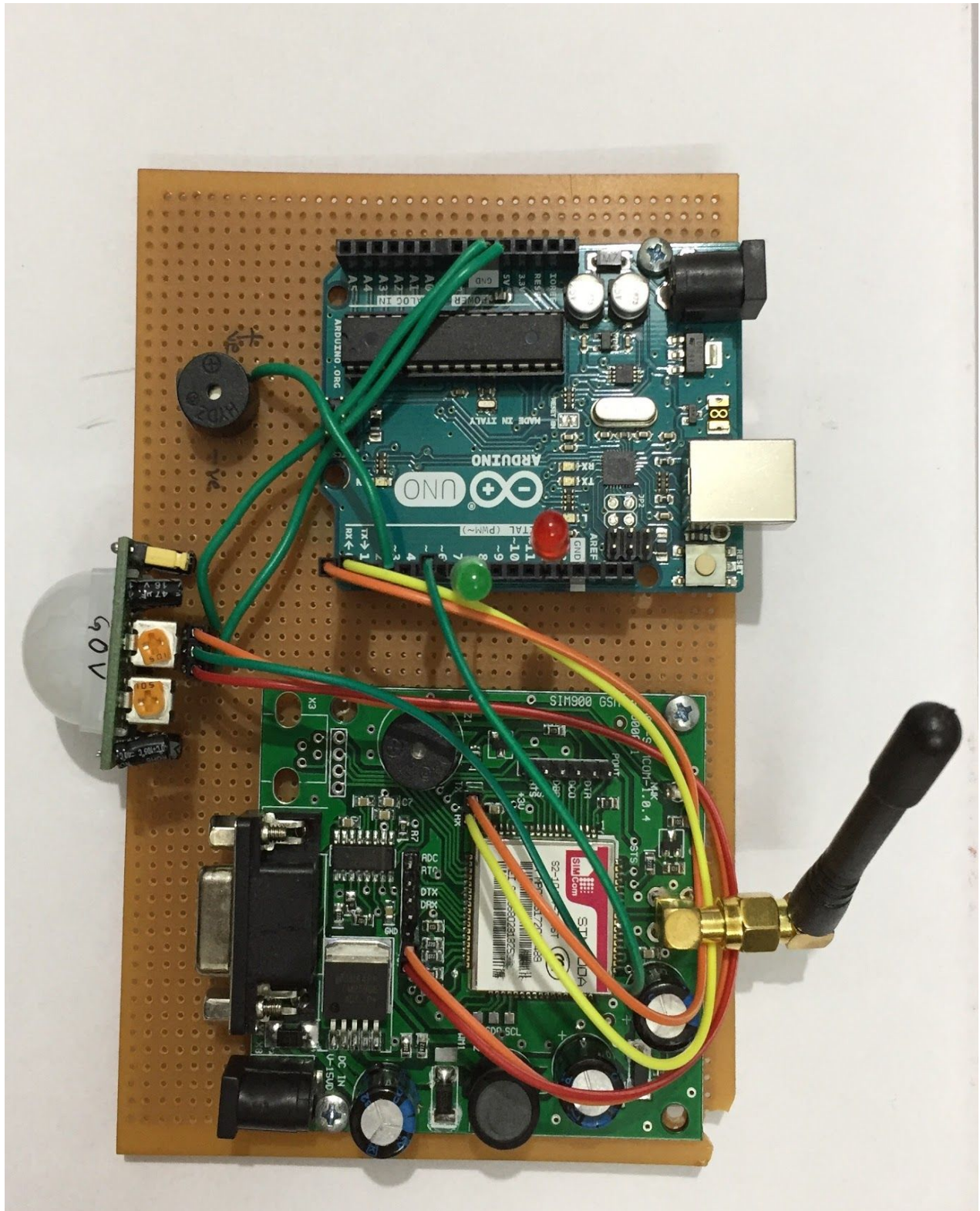


Working of Arduino GSM Home Security Alarm System

Home Security Alarm Systems are very important in present day society, where crime is increasing. With the technological advancements we have achieved in the recent years, a homeowner doesn't have to worry about home security while getting off his/her home.

Modern home security systems provide enough security from burglars, fire, smoke, etc. They also provide immediate notification to the homeowner. The aim of this project is to implement a simple and affordable, but efficient home security alarm system. The project is designed for detecting intruders and informing the owner by making a phone call. The working of the project is explained below. PIR sensor detects motion by sensing the difference in infrared or radiant heat levels emitted by surrounding objects. The output of the PIR sensor goes high when it detects any motion. 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. During this time, there should be very little to no motion in front of the sensor. If the sensor is not given enough calibrating time, the output of the PIR sensor may not be reliable. When the PIR sensor detects any motion, the output of the sensor is high. This is detected by the Arduino. Arduino then communicates with the GSM module via serial communication to make a call to the pre programmed mobile number. An important point to be noted about PIR sensors is that the output will be high when it detects motion. The output of the sensor goes low from time to time, even when there is motion which may mislead the microcontroller into considering that there is no motion. Home Security Systems are an

IMAGE



ARDUINO CODE

//Home Security Alarm System Using Arduino

```
int LED1=12;                                // led 1 red
int GND1=13;                                // gnd red led
int LED2=7;                                 // led 2 green
int GND2=8;                                 // gnd green led
int pirOutput=6;                            // pir output pwm~6
int buzzer=3;                               // buzzer pwm~3

void setup() {
  Serial.begin(9600);                       // serial monitor at 9600 baud rate
  pinMode(LED1,OUTPUT);
  pinMode(GND1,OUTPUT);
  pinMode(LED2,OUTPUT);
  pinMode(GND2,OUTPUT);
  pinMode(pirOutput,INPUT);                 // output of pir is input to arduino
  pinMode(buzzer,OUTPUT);
  digitalWrite(pirOutput,LOW);
  digitalWrite(GND1,LOW);
  digitalWrite(GND2,LOW);
  digitalWrite(LED1,LOW);                   // red led is off
  digitalWrite(LED2,LOW);                   // yellow led is low
```

```

delay(10000);                                // delay of 10000ms (10s)

digitalWrite(LED1,HIGH);                     // red led is high
}

void loop()  {

if(digitalRead(pirOutput)==HIGH)

    {

digitalWrite(LED2,HIGH);                     // green led is high (motion)

delay(1000);                                // delay of 1000ms

playTone(1500,100);                          // (duration, frequency)

delay(100);

Serial.println("Motion Detected");

Serial.println("ATD+919987211472;");         // mobile no.

delay(10000);                                // delay of 10000ms

Serial.println("ATH");                       // after a delay of 5 secs hang the call

digitalWrite(LED2,LOW);                     // green led is low (no motion)

delay(1000);                                // delay of 1000ms

playTone(0,0);

delay(100);

    }

}

```

APPLICATIONS

- GSM Based Flash Flood Intimation System
- ECG Data Transferring System Implemented With GSM Network
- GSM Based Forest Fire and Rain Fall Detection System
- Vehicle Tracking System Using GSM and GPS System
- Speed Control of Induction Motor Using GSM Modem
- Temperature Measurement for Industries through GSM Network
- Health Monitoring System over GSM
- Weather Monitoring By SMS Using GSM Modem
- Implementation of Student Enquiry System through SMS Using GSM Technology
- Home Automation System Using GSM Technology
- Automatic Irrigation System for Farmers Using GSM
- GSM and Zigbee Based Remote Patient Monitoring System
- GSM/GPS Based Vehicle Theft Intimation System
- GSM Controlled Railway Level Crossing Gate by User SMS
- Integrated Energy Meter for Energy Billing Based On GSM Technology
- GSM Based Industrial Automation System for Automatic Control
- Closed Loop Control System for Precise Motor Control Implemented via GSM

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