INTRUDER DETECTION SECURITY SYSTEM

C. Siva Swetha[1], Mrs. S. Saranya[2]

[1]PG student, Department of Computer Science, Dr. N.G.P Arts and Science College, Coimbatore, Tamil Nadu, India
[2]Assistant Professor, Department of Computer Science, Dr. N.G.P Arts and Science College, Coimbatore, Tamil Nadu, India

---***---

Abstract - *The Development of an inexpensive and effective security system is detailed in this paper. This PIR and Ultrasonic sensor and GSM based security system can be used in the household as well as the domestic device. The PIR sensor and Ultrasonic based Security system can detect the movement of the object and it will send the signal to the Arduino. The Arduino will send the data to the buzzer and GSM will send the message to the mobile number which is registered. It will send the message using internet access. The Sensor detects any motion in its permissible range and triggers the alarm and sends a message to the registered number*

Key Words: **Arduino UNO, PIR Sensor, Ultrasonic sensor, Arduino IDE, Motion Detection, GSM.**

1. INTRODUCTION

We have designed an interesting and cheap security alarm. This Gadget helps you to protect your house or any other domestic applications from thieves. In this paper, we are going to use an Arduino Uno Board, P.I.R Sensor module, Ultrasonic sensor, GSM module, and some other components. This application can either powered with 9V Battery or with U.S.B of your computer. This is a simple motion-sensing alarm that senses when somebody enters within a particular distance. When an intruder is detected, it activates a siren and sends the message to the registered mobile number. Our body makes heat energy in the form of infrared which is invisible to humanoid eyes. But it can be detected by an electronic sensor. This kind of sensor is made up of crystalline material which is Pyroelectric. In this paper, we are using the P.I.R. Motion Sensor Module as an infrared sensor that generates an electric charge when showing in heat and sends a signal to Arduino. According to the level of the infrared in front of the sensor, Arduino sends the status to the mobile number with the help of GSM using internet access with a distance of the person or object and start buzzing speaker. A simple program is running on Arduino which checks sensors if anything is moved or a new object has been detected.

2. METHODOLOGY

 The main aim of this paper is to securing the domestic applications or for home security using the PIR motion sensor, Ultrasonic sensor, Arduino UNO, GSM module, jumper wires, and Buzzer. By inserting the program to the Arduino board to get the excepted output for the movement detection. When the movement or any infrared ray that detect on the motion sensor it will give the signal to the Arduino board and Arduino send the data to GSM module will send the message to the mobile number using the internet access and to the buzzer so that it displays the detection and the switch up the alarm. And it also effective cost so that all people can get it easily.

3. COMPONENTS REQUIRED

3.1 P.I. R Motion Sensor

This Passive Infrared Sensor (PIR) module is used for motion recognition. It requires 10-60 seconds of resolving time before beginning its process. It involves of pyroelectric sensor that senses motion by assessing change in the infrared levels emitted by the objects. It can detect motion up to 6 meters [1]. For frequent essential projects or items that need to discover when a separate has left or arrived in the area. PIR sensors are unbelievable, they are flat control and insignificant effort, have a wide lens range, and are simple to interface with. Most PIR sensors have a 3-pin connection at the side or end. One pin will be pounded, another will be an indication and the last pin will be power. Power is usually up to 5V. Occasionally better modules don't have direct output and instead just work a relay which case there are ground, power, and the two switch relations. Interfacing PIR with the microcontroller is very informal and simple. The PIR acts as a digital output so all you need to do is attending for the pin to flip high or low. The motion can be detected by testing for a high signal on a single I/O pin. Once the sensor warms up the output will remain low while waiting for there is motion, at which time the output will swipe high for a couple of seconds, then return low. If motion stays the output will cycle in this manner until the sensors line of view of still again. The PIR sensor needs a warm-up time with a specific end goal to capacity suitably. This is because of the settling time included in reviewing nature's domain. This could be anyplace from 10-60 seconds [2].

Fig -1: P.I.R Motion Sensor

3.2 Ultrasonic Sensor

A visual sensor has a transmitter and receiver, whereas an ultrasonic sensor usage a single ultrasonic element for both emission and reception. In a reflective model ultrasonic sensor, alone oscillator emits and receives ultrasonic waves interchangeably. This permits miniaturization of the sensor head.

DISTANCE CALCULATION:

The distance can be measured with the following formula:

Distance $L = 1/2 \times T \times C$

where L is the distance, T is the time between the release and reaction, and C is the sonic speed. (The value is multiplied by 1/2 because T is the time for a go and return distance[4].
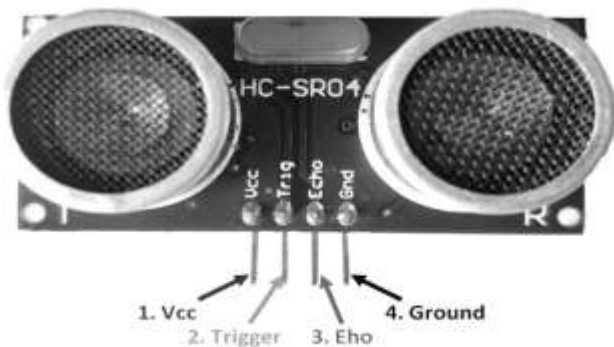

Fig -2: Ultrasonic Sensor

3.3 Arduino UNO

Arduino is a hardware and software company that is an open-source computer electronics platform based on easy-to-use hardware and software. Arduino are used to read inputs - light on a sensor, a finger on a switch, or a Twitter communication - and turn it into an output - starting a motor, switching on an LED, printing something online[3].
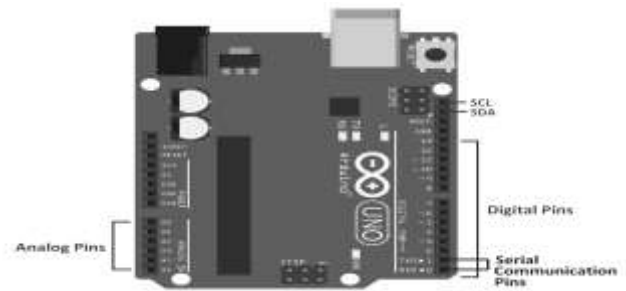

Fig -3: Arduino UNO board

3.4 GSM Module

SIM 900A is the GSM/GPRS module manufactured in the RS232 interface. It has a dual-band GSM/GPRS system that mechanism on 900/1800MHz frequencies. With the help of RS232, the modem can be associated with a PC or microcontroller via serial cable. Voice calls, SMS and internet access are potential with this module. There are on board contacts for microphone and headphones with which we can make or receive calls [9].

Fig -4: GSM Module

3.5 Buzzer

An electrical device that is used to make an energetic sound is called Buzzer, for example, to attract someone's attention[5]. A buzzer is a small yet well-organized component to add sound features to our project/system. It is very small and dense 2-pin construction hence can be easily used on breadboard[6].

Fig -5: Buzzer

3.6 Breadboard

A Breadboard is a building base for prototyping of electronics. Initially, the word referred to a literal breadboard, a refined piece of wood used for slicing bread. In the 1970s the solderless breadboard (a.k.a. plug board, a terminal array board) became existing and nowadays the term "breadboard" is generally used to refer to these. Because the solderless breadboard does not want soldering, it is recyclable. This makes it easy to use for making temporary prototypes and testing with circuit design. For this reason, solderless breadboards are also standard with students and in technological education. Older breadboard kinds did not have this stuff. A stripboard (Veroboard) and like prototyping printed circuit boards, which are used to shape semi-permanent fused prototypes or one-offs, cannot effortlessly be reused. A diversity of electronic systems may be prototyped by using breadboards, from tiny analog and digital circuits to whole central processing units (CPUs)[8].
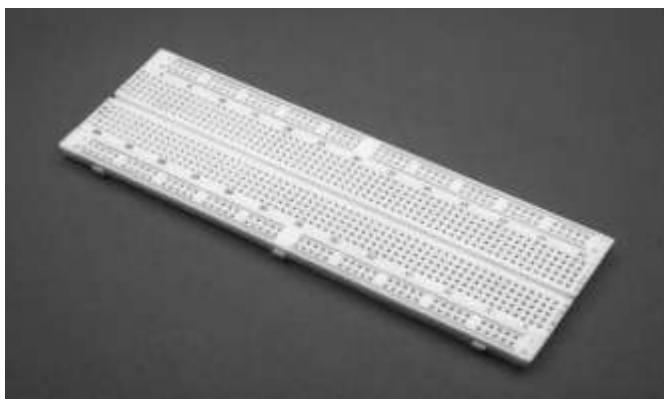
Fig -6: Breadboard

3.7 Jumper wire

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or cluster of them in a cable, with a connector or pin at each end (or occasionally without them – simply "tinned"), which is usually used to join the components of a breadboard or other prototype or test circuit, inside or with other equipment or components, without soldering[7].

Fig -7: Jumper wire

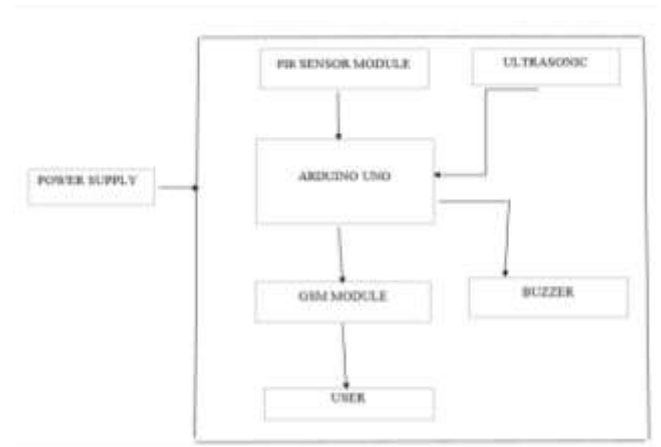## 4. SYSTEM DESIGN

4.1 Block diagram

Fig -8: Representing the block diagram of security system.
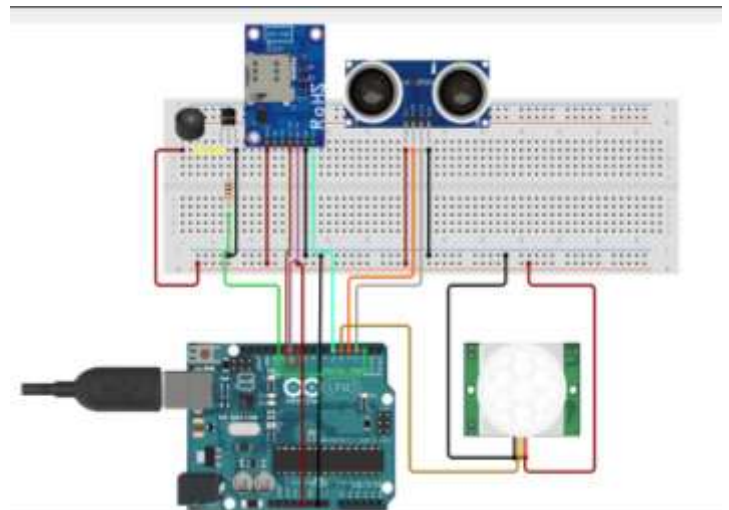
4.2 Schematic diagram

Fig -9 Representing the connection of hardware.

5. PROCEDURE

This application is a basic motion and distance measuring activated alarm. It is built around an Arduino Microcontroller. It is connected to a PIR motion sensor, Ultrasonic sensor, a buzzer, LCD, resistor, and a pair of external terminals. The whole arrangement is battery motorized so that it is easily portable. Once you have the code, you can connect all the external portions. The coolest way to do this is with a breadboard. This will let you make impermanent connections to test everything out.

Step 1: connecting the PIR sensor to Arduino UNO and breadboard:

1. Connect Gnd pin of P.I.R sensor to BUS Gnd
2. Connect SIG pin to Arduino uno pin no 11

3. Connect VCC pin to BUS POS

Step 2: Connecting the Ultrasonic Sensor to Arduino UNO and breadboard

1. Connect ECHO pin of HCSR04 to Arduino UNO pin no 3
2. Connect GND pin of HCSR04 to BUS GND
3. Connect TRIG pin of HCSR04 to Arduino UNO pin no 4
4. Connect VCC of HCSR04 to Arduino UNO

Step 3: Connecting the GSM to Other Components**:**

1. Connect 5V pin of GSM to Bus POS
2. Connect GND pin of GSM to Bus GND
3. Connect RST pin of GSM to Arduino pin no 6
4. Connect RX pin of GSM to Arduino pin no 11
5. Connect TX pin of GSM to Arduino pin no 10

Step 4: Connecting the Buzzer to Other Components:

1. Connect negative pin of buzzer to TSBC337C
2. Connect positive pin of Buzzer to Bus GND

Step 5: Programming Arduino:

1. Download Arduino IDE 1.0.6 from https://www.arduino.cc/en/main/software.

2. Connect Arduino UNO R3 to computer using USB Cable.

3. Open Arduino IDE, choose your correct board from Tools—Boards

4. Choose Your Correct Port from Tools--Serial Port

5. Copy the following sketch which seems in your Web Browser to your Arduino Sketch Page.

6. Click on Upload or go to File—Upload

6. WORKING PRINCIPLE

The proposed System Provides the Security when someone detected in a particular area. PIR Motion sensor will detect the infrared ray of a human or movement of the object and gives a signal to Arduino at the same time Ultrasonic sensor also will detect the human distance and it will send the data to Arduino and Arduino will process the signal to GSM Module will send the message to Mobile Number with distance of person from the system. The buzzer will Siren.
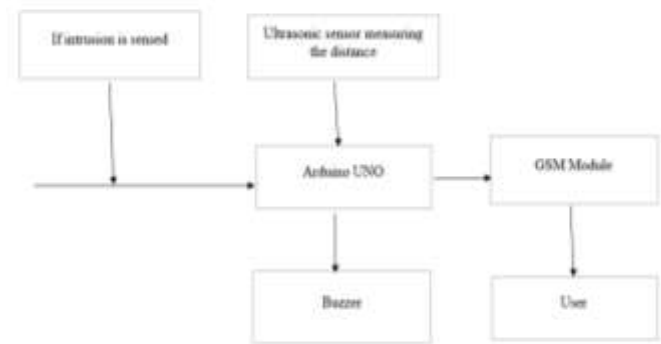

Fig -10: Working of Application

7. RESULT AND DISCUSSION

From this paper we are providing the security system which is cost-effective and it is handy so we can easily carry the application anywhere and it is easy to connect the hardware, after inserting the code we can easily use it.

Fig -11: Screenshot of intruder detection message

8. CONCLUSION

From this paper we conclude that the PIR Security system is cost-effective and it is easily available in market. This paper can be used anywhere either at home or offices or in any domestic applications. Thus by this attempt of circuit can be used as protecting device and can be used for security also. It can be used as an anti-theft device.

REFERENCES

[1] Abhishek N Vaghela, Bhavin D Gajjar, Subhash J "Automatic Switch using PIR Sensor" Patel Assistant Professor, Indus University, Ahmedabad, India 2017 IJEDR | Volume 5, Issue 1 | ISSN: 2321-9939

[2]https://www.elprocus.com/pir-sensor-basics-applications

[3] https://www.arduino.cc/en/reference/board

[4]https://components101.com/ultrasonic-sensor-working-pinout-datasheet

[5]https://www.collinsdictionary.com/dictionary/english/buzzer

[6]http://www.buzzerspeaker.com/faq/what%20is%20buzzer.htm

[7] https://en.wikipedia.org/wiki/Jump_wire

[8]https://en.wikipedia.org/wiki/Breadboard

[9] https://researchdesignlab.com/gsm-sim-900.html