GMR Institute of Technology
An Autonomous Institute Affiliated to JNTUK, Kakinada

GMRIT
Training Tomorrow's Engineers Today

PIR SENSOR BASED NIGHT SECURITY ALARM USING ARDUINO

A Term paper report submitted in partial fulfillment of the requirement for the Award of degree

BACHELOR OF TECHNOLOGY IN
COMPUTER SCIENCE AND ENGINEERING

Submitted
By
V.SWATHI KIRAN
17341A05H6
S.DIVYA TEJ
17341A05E8
P.V.SRI VAMSI
17341A05E1
A.SUNIL KUMAR
16341A0516

Under the esteemed guidance of

Mr. P. Srinivasa Rao
Assistant Professor,
Dept. of Computer Science &Engineering

Department of Computer Science and Engineering

GMR INSTITUTE OF TECHNOLOGY
(An Autonomous institute, affiliated to J. N. T. University Kakinada) NAAC
"A" Graded, NBA Accredited, ISO 9001:2008 CertifiedInstitution
G.M.R. Nagar, Rajam-532127, A.P 2019-20

GMR Institute of Technology
An Autonomous Institute Affiliated to JNTUK, Kakinada

GMRIT Training Tomorrow's Engineers Today

GMR INSTITUTE OF TECHNOLOGY

(An Autonomous institute, affiliated to J.N.T. University Kakinada) NAAC
"A" Graded, NBA Accredited, ISO 9001:2008 Certified Institution
G.M.R. Nagar, Rajam-532127, A.P

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that term paper report titled **"PIR SENSOR BASED NIGHT SECURITY ALARM USING ARDUINO"** *submitted by* **V.Swathi Kiran, S.Divya Tej, P.V.Sri Vamsi, A.Sunil Kumar** *bearing* **Reg. No 17341A05H6, 17341A0E8, 17341A05E1, 16341A0516** *has been carried out in partial fulfillment for the award of* **B.Tech** *degree in the discipline of Computer Science &Engineering to* **JNTUK** *is a record of bonafide work carried out under our guidance and supervision. The report embodied in this paper has not submitted to any other university or institution for the award of any degree or diploma.*

Signature of the Supervisor

Mr. P. Srinivasa Rao
Assistant Professor
Department of CSE
GMRIT, Rajam.

Signature of the H.O.D

Dr. A.V Ramana
Professor and Head
Department of CSE
GMRIT, Rajam.

ACKNOWLEDGEMENT

It gives me an immense pleasure to express deep sense of gratitude to my guide, **Mr. P. Srinivasa Rao** Assistant Professor, Department of Computer Science and Engineering of whole hearted and invaluable guidance throughout the report. Without his/her sustained and sincere effort, this report would not have taken this shape. He/she encouraged and helped me to overcome various difficulties that I have faced at various stages of my report.

I would like to sincerely thank **Dr. A.V.Ramana,** Professor & HOD, Department of Computer Science and Engineering, for providing all the necessary facilities that led to the successful completion of my report.

I take privilege to thank our Principal **Dr. C.L.V.R.S.V.Prasad** & Vice Principal **Dr. J. Raja Murugadoss**, who has made the atmosphere so easy to work. I shall always be indebted to them.

I would like to thank all the faculty members of the Department of Computer Science and Engineering for their direct or indirect support and also all the lab technicians for their valuable suggestions and providing excellent opportunities in completion of this report.

V.SWATHI KIRAN

S.DIVYA TEJ

P.V.SRI VAMSI

A.SUNIL KUMAR

ABSTRACT

Now-a-days thefting at houses is increasing and became a major issue. To avoid this we can use IoT applications like home security system.Home security system is to secure family and property.With the help of the PIR Sensor, it has become very easy to detect human/animal movements. In this project we will learn how to provide home security using PIR sensor and how we can interface a PIR Sensor with a microcontroller like Arduino. We will interface an Arduino with PIR module and blink a LED and beep a Buzzer whenever a movement is detected during night.The purpose of the proposed idea is to provide night time security for houses.PIR (Passive Infra Red) motion sensor is the primary sensor for motion detection, LDR (Light Dependent Resistor) is used to measure the light leveland the buzzer isfor alarm. The software that we use is Arduino. Home Security System can monitor home area that is surrounding by PIR sensor and make people panic by turning on the buzzer when trespassing surrounding area, that is detected by PIR sensor.

Keywords: IoT, PIR sensor, LDR sensor, Home Security

INTRODUCTION

Today, Internet application development demand is very high. So IoT is a major technology by which we can produce various useful internet applications. Basically, IoT is a network in which all physical objects are connected to the internet through network devices or routers and exchange data. IoT allows objects to be controlled remotely across existing network infrastructure. IoT is a very good and intelligent technique which reduces human effort as well as easy access to physical devices. This technique also has autonomous control feature by which any device can control without any human interaction. The goal of IoT is to extend to internet connectivity from standard devices like computer, mobile, tablet to relatively dumb devices like a toaster. IoT makes virtually everything "smart," by improving aspects of our life with the power of data collection, AI algorithm, and networks.

“Things” in the IoT sense, is the mixture of hardware, software, data, and services**.** “Things” can refer to a wide variety of devices such as DNA analysis devices for environmental monitoring, electric clamps in coastal waters, Arduino chips in home automation and many other. These devices gather useful data with the help of various existing technologies and share that data between other devices.

When we look at today’s state of technologies, we get a clear indication of how IoT will be implemented on a global level in near future. Use of the internet is increasing day-by-day. Commute and connectivity became easier in the present scenario. In near future, the number of internet connected devices would increase exponentially. Although there are some issues in IoT. These issues can be removed in near future. With such a rapid growth, the day is not too far that we can decide our dinner even before reaching home on the way.

Generally, in security systems that are used in homes, shops, offices, etc., infrared or laser transmitters and receivers are used for accuracy and reliability. But these methods require a lot of monetary investment and infrastructure support.A simple cost effective solution for Security Systems is implemented in this project where I will explain about a PIR based Security Alarm System, in which a PIR sensor is used instead of transmitter or receiver. This saves power consumption as well as it is a low cost implementation. PIR sensor is the short form of Passive Infrared Sensor.

Components Required: Hardware components:

1. Arduino UNO Board
2. PIR Sensor HC-SR501
3. LDR
4. 10K Resistor
5. LED
6. Buzzer
7. 9V Battery
8. Bread board
9. Jumper wires

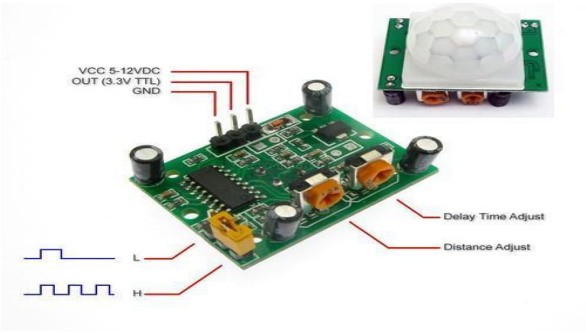
Software:

1. Arduino software

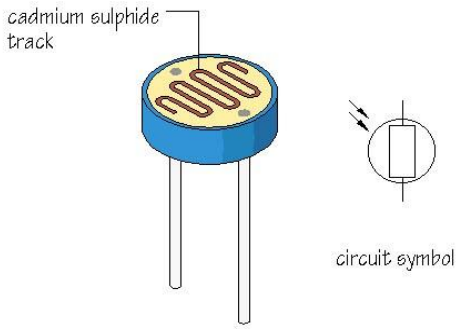
Usage of the components:

Arduino UNO Board: The Arduino Uno is a microcontroller board based on the ATmega328. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a USB connection, a power jack, an in-circuit system programming (ICSP) header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC to DC adapter or battery to get started.

PIR Sensor HC-SR501: PIR motion sensors consist of two main parts: a **pyroelectric sensing element** and a **fresnel lens**. The pyroelectric sensing element can detect infrared radiation. All objects with a temperature above absolute zero, emit heat energy in the form of infrared radiation, including human bodies. The white dome in front of the sensing element is a fresnel lens. This lens focusses the infrared radiation onto the sensor.



LDR: An LDR or light dependent resistor is also known as photo resistor, photocell, photoconductor. It is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. A typical light dependent resistor has a resistance in the darkness of 1MOhm, and in the brightness a resistance of a couple of KOhm.

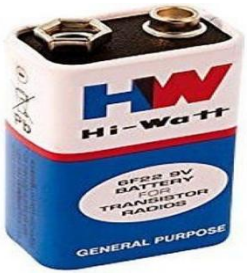


Resistor: A **resistor** is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

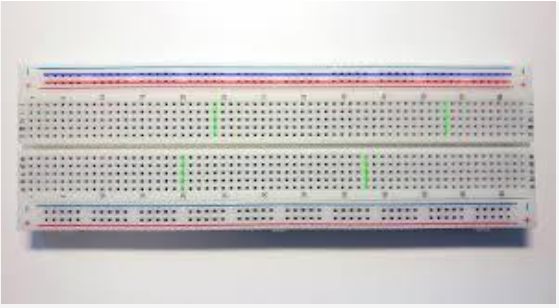
LED: A **light-emitting diode** (**LED**) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

Buzzer: The **buzzer** consists of an outside case with two pins to attach it to power and ground. When current is applied to the **buzzer** it causes the ceramic disk to contract or expand. Changing this causes the surrounding disc to vibrate. That's the sound that you hear.

Battery: IoT devices need high-capacity batteries that hold sufficient power to run the device in a small space, and with a long shelf life so they don't lose that power over time. Power-efficiency improvements so they consume less of that precious battery juice.



Bread board: A breadboard is a rectangular board with many mounting holes. They are used for creating electrical connections between electronic components and single board computers or microcontrollers such as Arduino and Raspberry Pi. The connections aren't permanent and they can be removed and placed again. The vertical columns of the breadboard are called **terminals**, while the horizontal long rows are called **power rails** because they are mostly used to connect the power supply to the breadboard. The positive rails are indicated by red lines, while the negative rails are indicated by black ones.

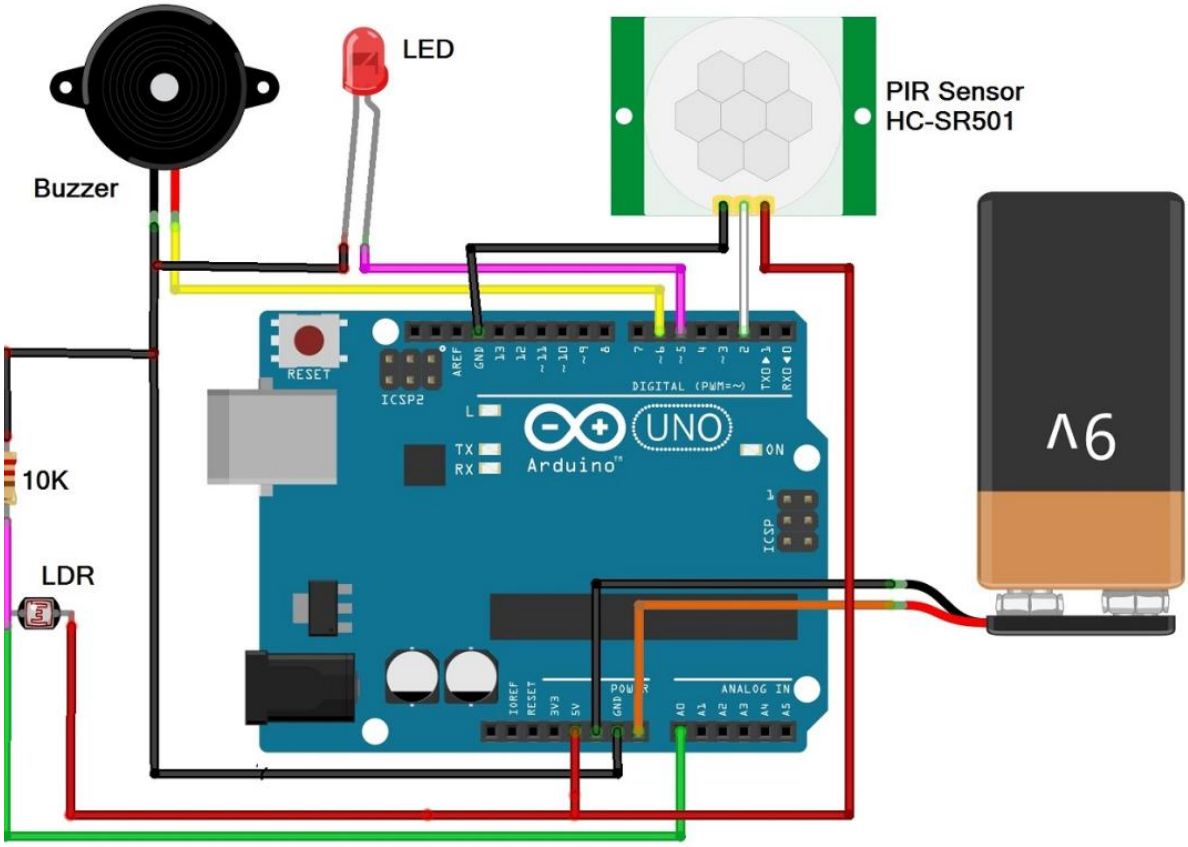


Jumper wires: Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

Arduino Software: The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics.

Circuit Diagram & Connections:

Assemble the circuit as shown in the figure below



1. For PIR sensor, connect ground pin to gnd of arduino, out pin to 2nd pin of arduino and vcc to vcc(5v) of arduino.
2. For buzzer, connect one end to gnd of arduino and other end to 6th pin of arduino.
3. For resistor, connect one end to gnd and other end to A0 pin of arduino.
4. For LDR, connect one end to 5v and other end to A0 pin of arduino.
5. For LED, connect one end to gnd and other end to 5th pin of arduino.
6. For battery, connect one end to gnd and other to vin of arduino.

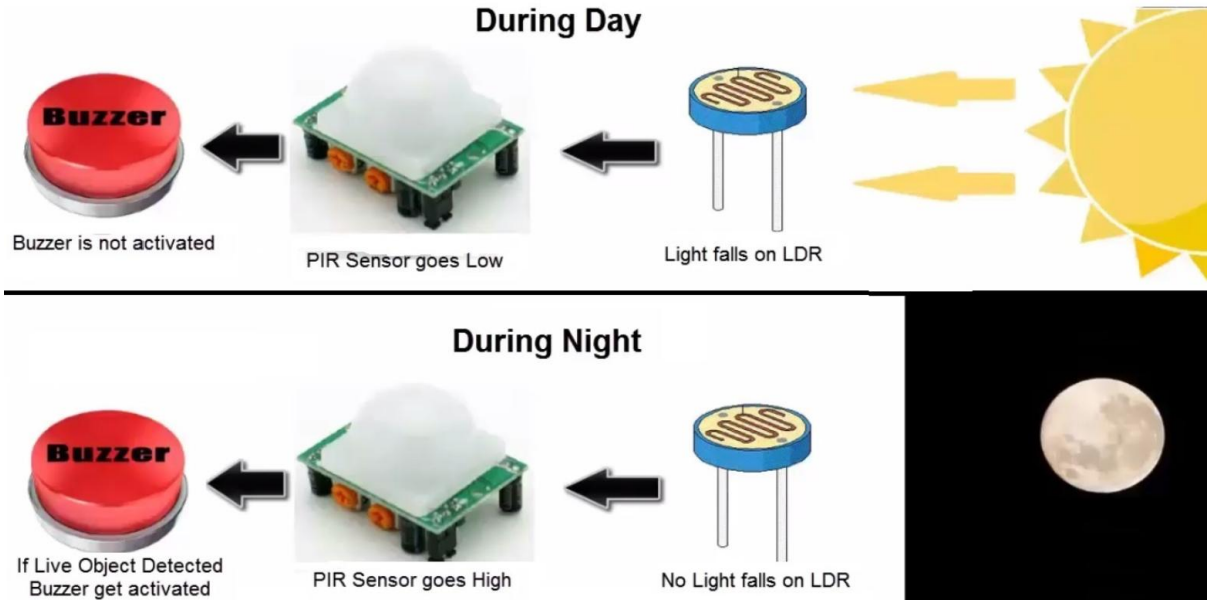
   With the help of USB cable connect arduino to the system and through arduino software dump the code into it and execute it, to get the output.

Working of PIR Sensor:

PIR sensors are more complicated than many of the other sensors because there are multiple variables that affect the sensors input and output. The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

Working of the Project:

The circuit is infact a dark activated switch that measures the ambient light level and will enable the system only when ambient light level is below a threshold value. Here an LDR (Light Dependent Resistor) is used to measure the light level. The alarm system is triggered when a "Logic High (H)" level signal is detected at its sensor input port. The best sensor you can use to detect an intrusion is the Passive Infrared (PIR) Sensor. The PIR Sensor detects the motion of a human body by the change in surrounding ambient temperature when a human body passes across, and effectively controls the switching when it detects a moving target.

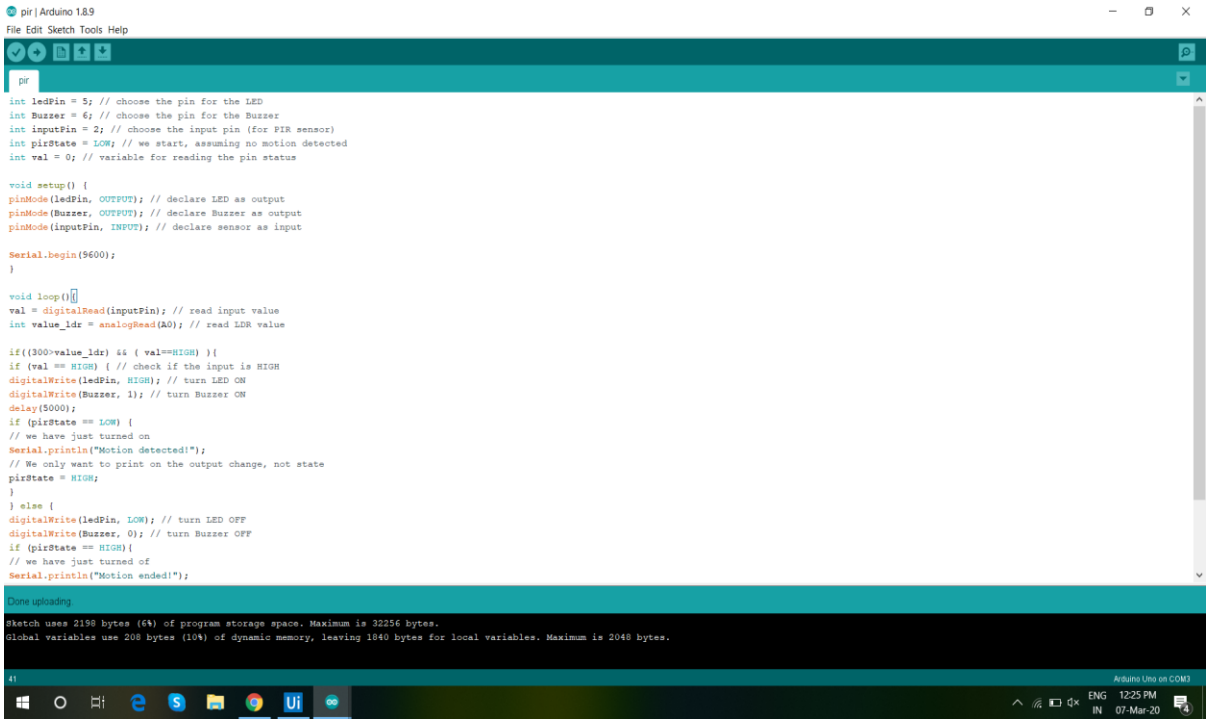


Source Code/Program:

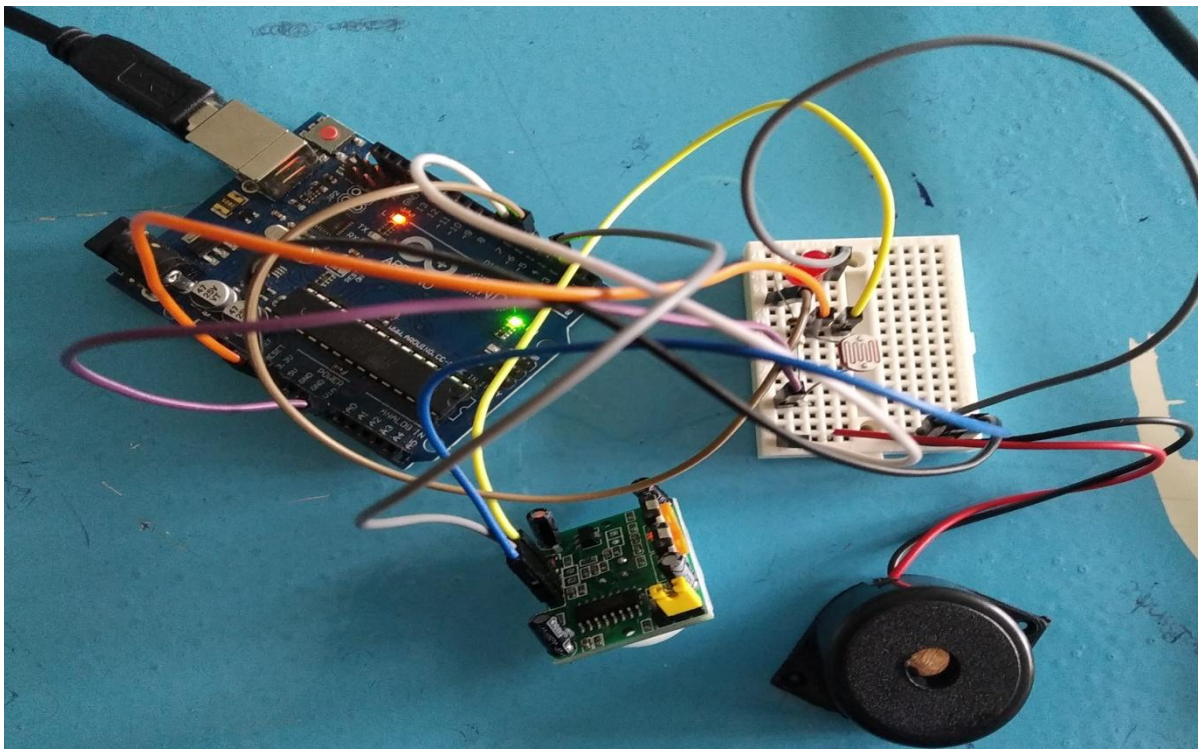
```
int ledPin = 5; // choose the pin for the LED
int Buzzer = 6; // choose the pin for the Buzzer
int inputPin = 2; // choose the input pin (for PIR sensor)
int pirState = LOW; // we start, assuming no motion detected
int val = 0; // variable for reading the pin status

void setup() {
pinMode(ledPin, OUTPUT); // declare LED as output
pinMode(Buzzer, OUTPUT); // declare Buzzer as output
pinMode(inputPin, INPUT); // declare sensor as input

Serial.begin(9600);
}

void loop(){
val = digitalRead(inputPin); // read input value
int value_ldr = analogRead(A0); // read LDR value

if((300>value_ldr) && ( val==HIGH) ){
if (val == HIGH) { // check if the input is HIGH
digitalWrite(ledPin, HIGH); // turn LED ON
digitalWrite(Buzzer, 1); // turn Buzzer ON
delay(5000);
if (pirState == LOW) {
// we have just turned on
Serial.println("Motion detected!");
// We only want to print on the output change, not state
pirState = HIGH;
}
} else {
digitalWrite(ledPin, LOW); // turn LED OFF
digitalWrite(Buzzer, 0); // turn Buzzer OFF
if (pirState == HIGH){
// we have just turned of
Serial.println("Motion ended!");
// We only want to print on the output change, not state
pirState = LOW;
}
}
}
}
```

OUTPUT:

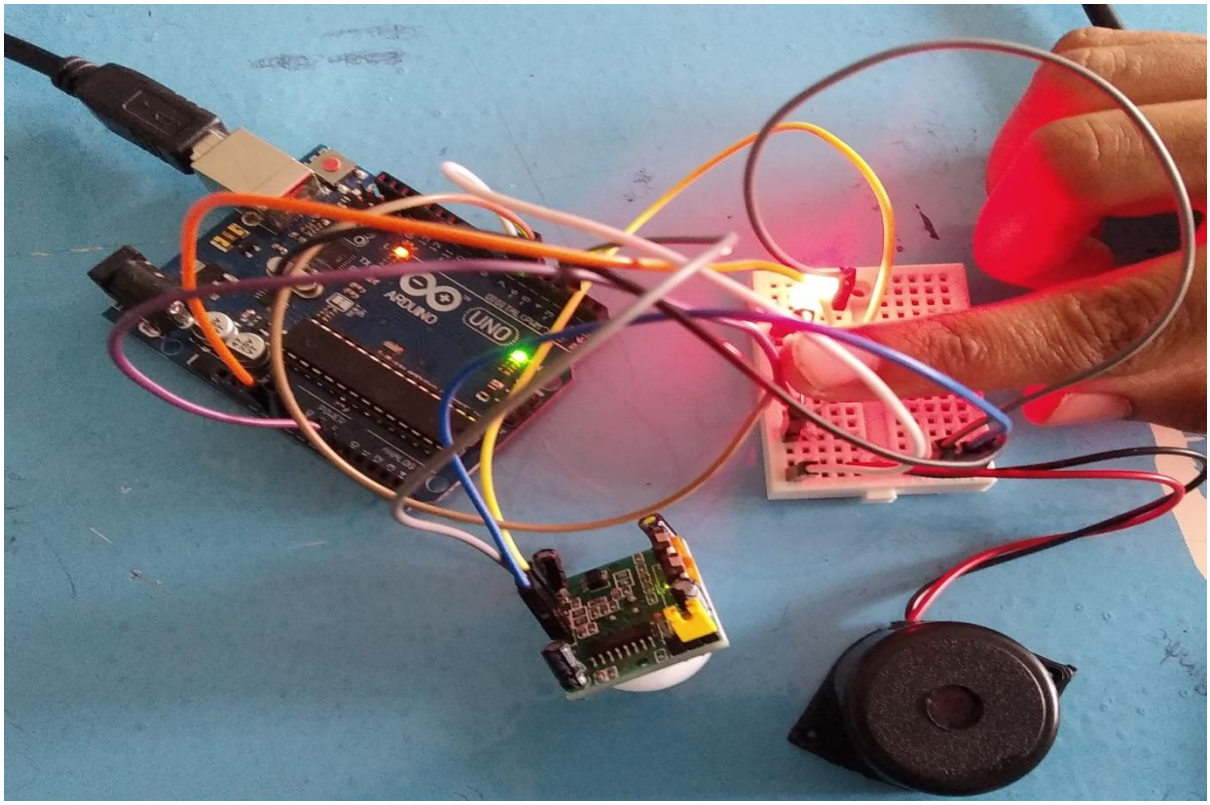
Uploading code into arduino



Connections between Arduino, LED, LDR, PIR, Buzzer, Resistor



Working of the project during night time (place finger on LDR so that light will not fall on LDR which indicates night)



Result: We can hear beep sound with LED glowing when PIR sensor detect any motion.

CONCLUSION

In this project we discussed about Home Security Alarm Using PIR Sensor & Arduino for Night time only. A night security light only turns on when it's dark and when movement is detected. The lamp & the buzzer turns on when it's dark & movement is detected. When there's light, the lamp is turned off, even when motion is detected. Home Security System can monitor home area that is surrounding by PIR sensor and make people panic by turning on the buzzer when trespassing surrounding area, that is detected by PIR sensor.