

BRACT's

Vishwakarma Institute of Information Technology, Kondhwa(BK), Pune-48

Department of Computer Engineering



Analog and Digital Electronics Mini

Project On

## **INTRUDER DETECTION SYSTEM USING ARDUINO UNO**

SY BTech Computer

Engineering Year: 2021-22

Division: A      Batch: A3      Group No: 04

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# ABSTRACT

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The need for home security alarm systems nowadays is a serious demand.

As the number of crimes are increasing every day, there has to be something that will keep us safe. We are all aware of the high end security systems present in the market but they are not easily available to everyone. We therefore intend to provide a solution by constructing a cost efficient electronic system that has the capability of sensing the motion of the intruders and setting off the alarm.

The project involves the use of Arduino Uno R3, PIR sensor, Red LED, 220  $\Omega$  Resistor, Piezo and a simple program. The sensor detect any motion in its permissible range and triggers the alarm.



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# OBJECTIVES OF PROJECT

In this advanced technological era, there is a high rate of crimes under technical hands. So, it's the high time for the development of tackling tools to maintain law and order. Recently, home security systems have become mandatory as the crimes like burglary are at hike. For this accomplishment, the sensors form the foundation of the artificially intelligent devices. The PIR sensors have been employed to sense human movements in home security systems. It passively takes IR radiations as input and thereafter generates signal to be read by microcontroller . The low cost, small in size, low power consumption makes it an ideal choice for use .



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# INTRODUCTION

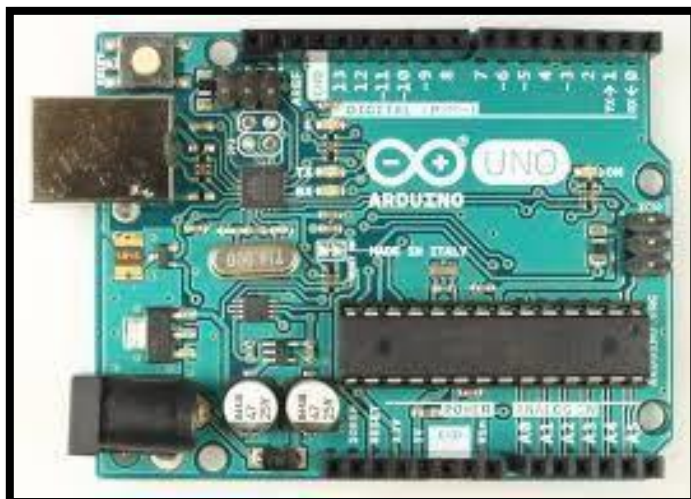
For everyone who owns or rents a home, home security should be a top concern. Every individual needs a safe and secure residential space. Most of the market's security systems; however, are either costly or unsafe. Many times there are a number of loopholes present in the security systems and security devices which can be breached easily.

We have designed an interesting and cheap home security alarm. This Gadget helps you to protect your house from thieves. In this project we are going to use an Arduino Uno R3 Board, P.I.R Sensor module, LCD and some other components. This Project can either powered with 9V Battery or with U.S.B of your computer. This is a basic motion-sensing alarm that detects when someone enters the area. When an intruder is detected, it activates a siren. Our body generates heat energy in the form of infrared which is invisible to human eyes. But it can be detected by electronic sensor. This type of sensor is made up of crystalline material that is Pyroelectric.

In this project, we are using P.I.R. Motion Sensor Module as an infrared sensor that generates electric charge when exposed in heat and sends a signal to Arduino. According to level of the infrared in front of sensor, Arduino displays the status on L.C.D and start buzzing speaker and glows the L.E.D. A simple program is running on Arduino which checks sensor if anything is moved or new object has been detected

# HARDWARE & SOFTWARE REQUIREMENT

Name	Quantity	Component
U1	1	Arduino Uno R3
PIR1	1	PIR Sensor
D1	1	Red LED
R1	1	220 $\Omega$ Resistor
PIEZO1	1	Piezo



# Hardware Requirement

## Hardware Components

Arduino Uno R3

- Arduino Uno R3 is one kind of ATmega328P based microcontroller board. It includes the whole thing required to hold up the microcontroller; just attach it to a PC with the help of a USB cable, and give the supply using AC-DC adapter or a battery to get started.
- The term Uno means “one” in the language of “Italian” and was selected for marking the release of Arduino’s IDE 1.0 software. The R3 Arduino Uno is the 3rd as well as most recent modification of the Arduino Uno.
- Arduino board and IDE software are the reference versions of Arduino and currently progressed to new releases.

## ○ SPECIFICATIONS

Microcontroller	ATmega168
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

## PIR SENSOR

- PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range.
- They are small, inexpensive, low -power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or business .They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors

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## SIMULATION SOFTWARE



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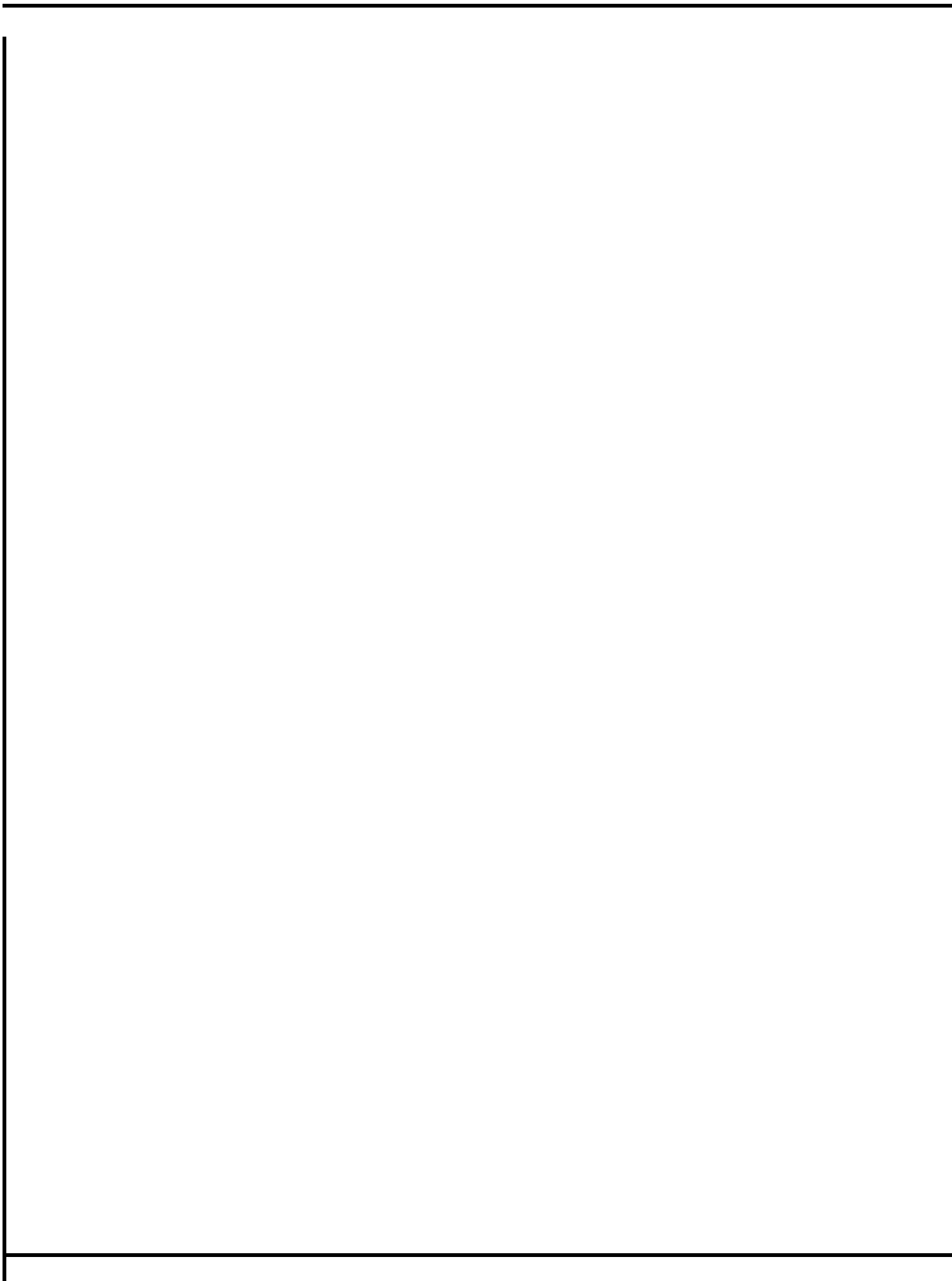
# TINKERCAD

Tinkercad is a free, easy-to-use app for **3D design, electronics, and coding**. It's used by teachers, kids, hobbyists, and designers to imagine, design, and make anything! Users can quickly learn how to use the Tinkercad software through basic tutorial lessons that focus on the basics of the Tinkercad tool.

## TINKERCAD







# IMPLEMENTATION LOGIC

// C++ code

```
int pirPin=A0; int
pirStat=0; int
pirValue=0; int
ledPin=8;
int alarmPin=4;

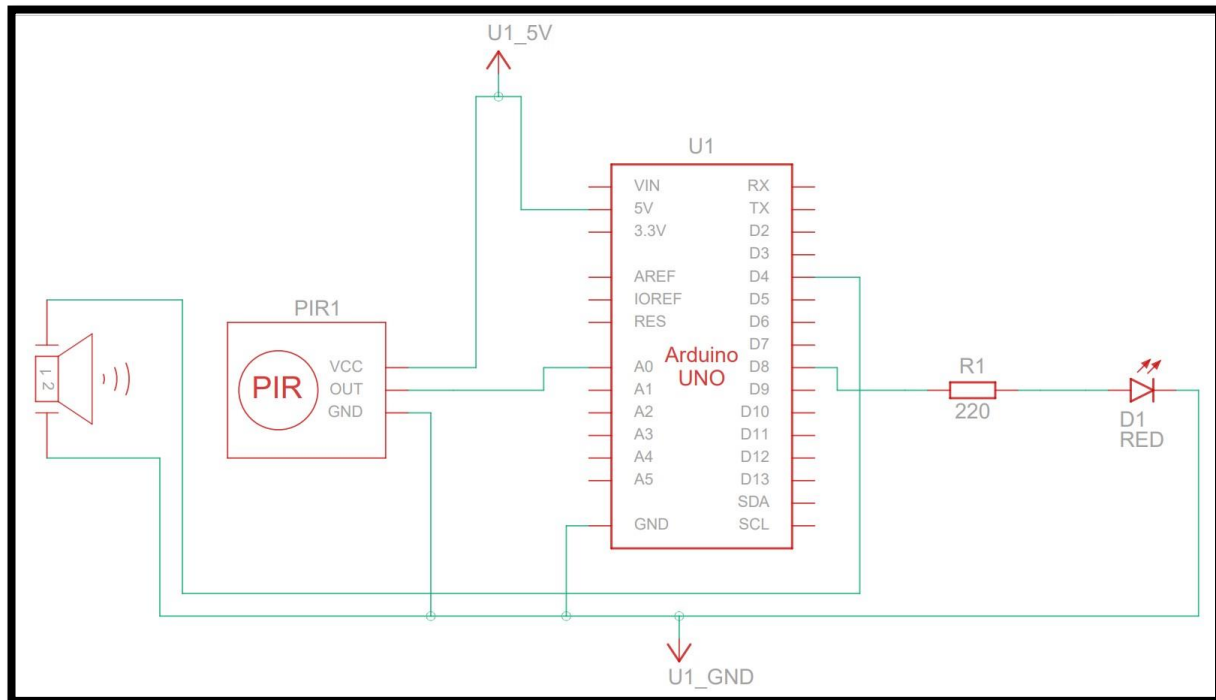
void setup()
{
  pinMode(pirPin, INPUT);  pinMode(ledPin,
OUTPUT);  pinMode(alarmPin, OUTPUT);
  Serial.begin(9600);
}

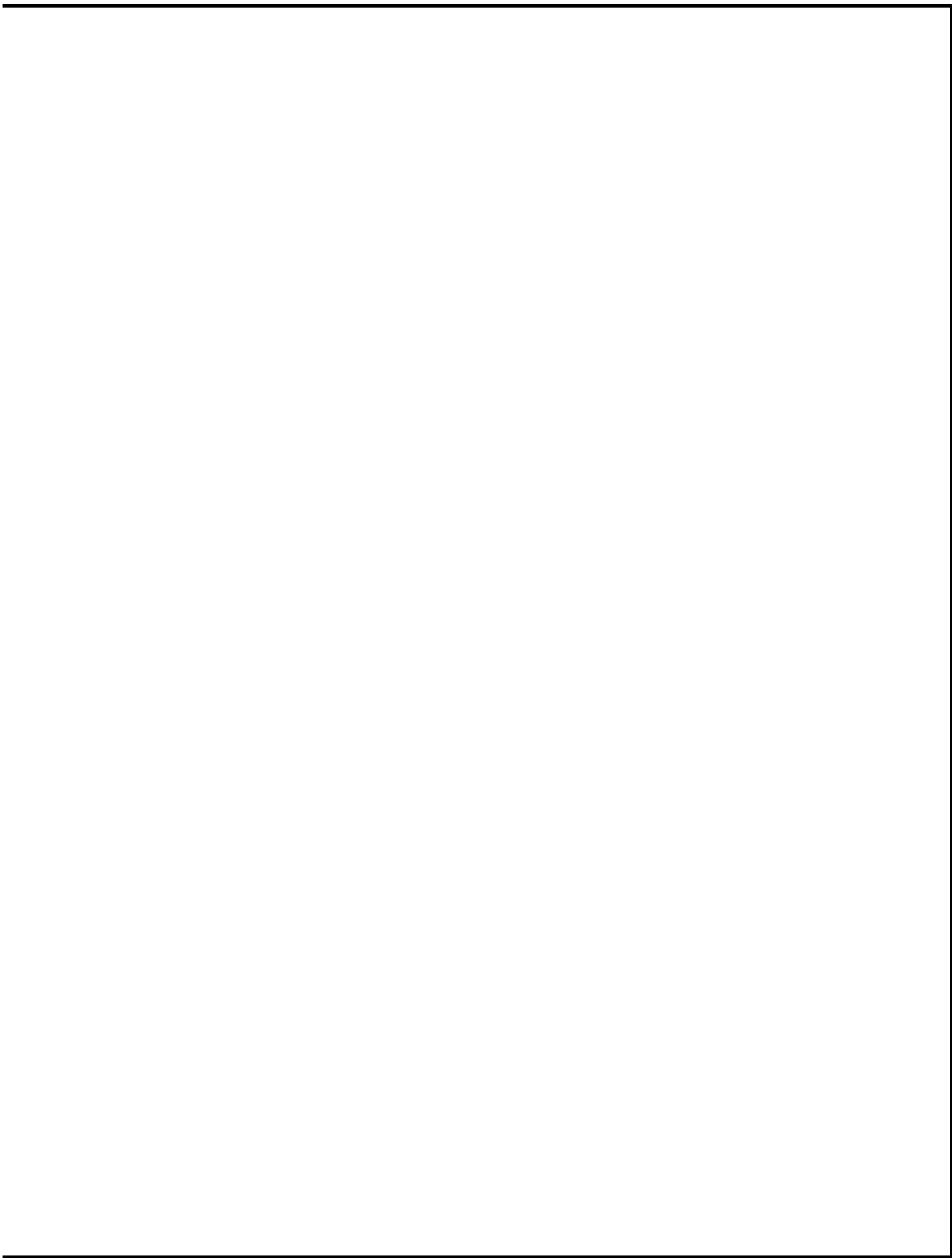
void loop() {
  pirStat=analogRead(pirPin);
  pirValue=map(pirStat,0,1023,0,255);

  if(pirValue > 100) //based on sensitivity
  {
    digitalWrite(ledPin,HIGH);
    tone(alarmPin, 900,900);
  } else{
    digitalWrite(ledPin,LOW);
    noTone(alarmPin);
  }

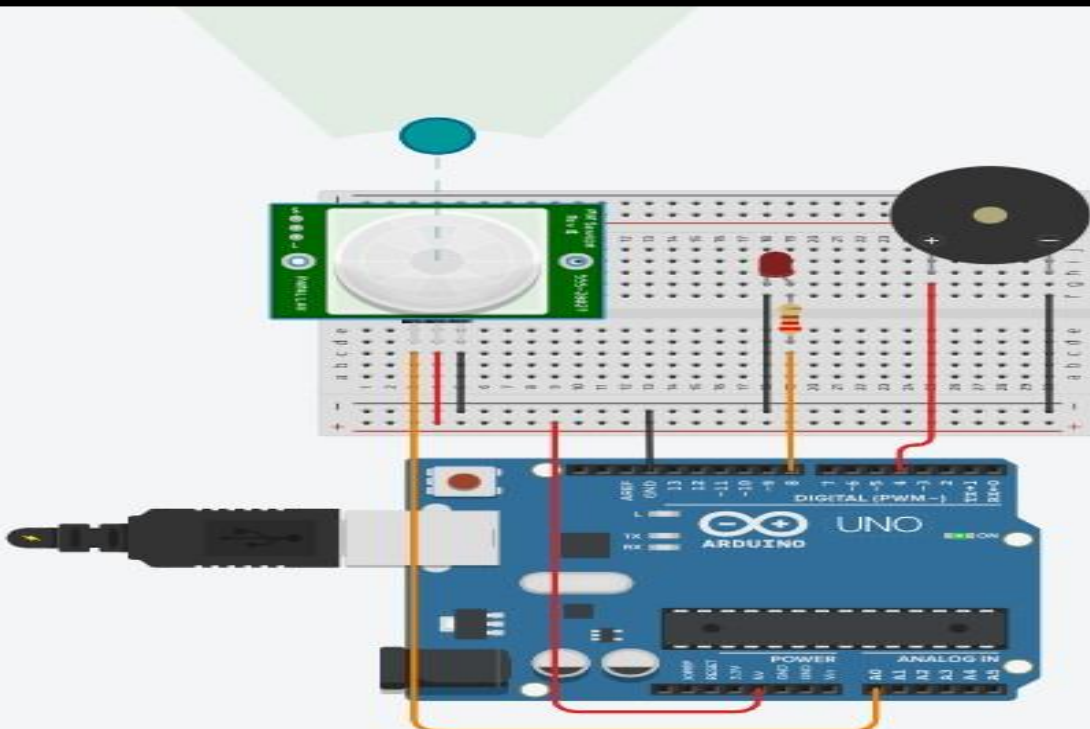
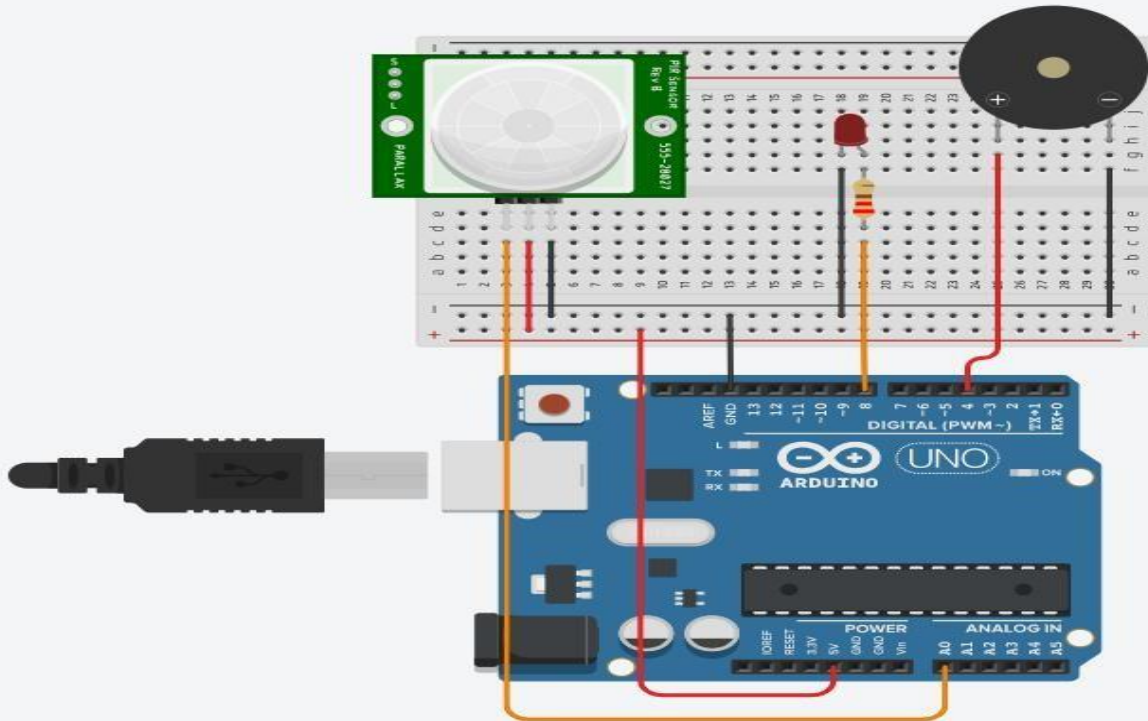
  Serial.println(pirValue);
}
```

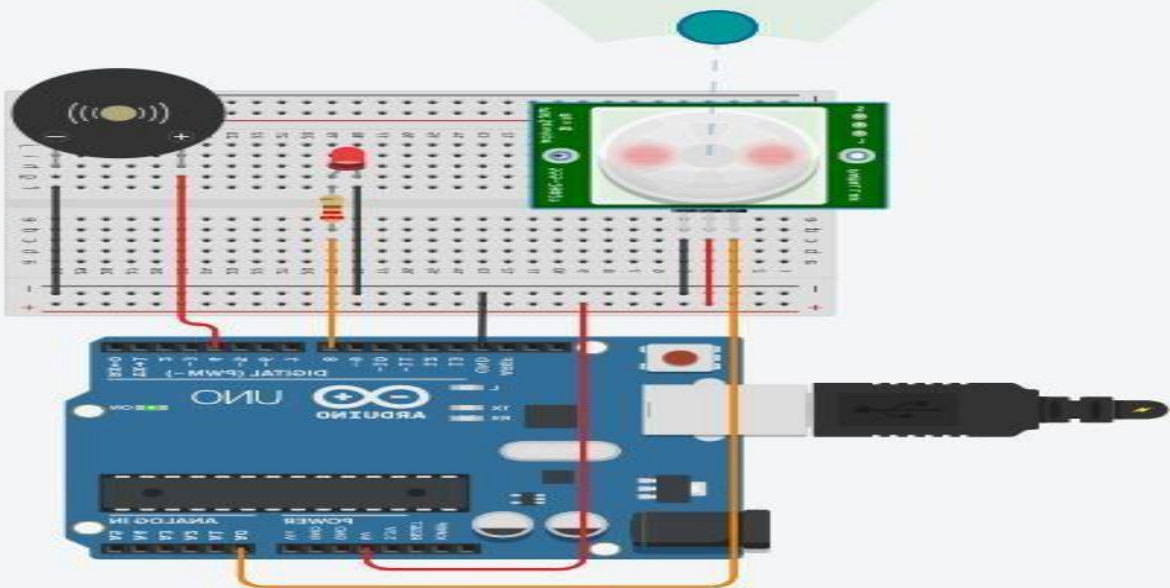
# CIRCUIT DIAGRAM





## Screen Snapshots of Project





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COMPONENTS	COST
Arduino Uno R3	1089
PIR Sensor	110
BIG FLAME LED Diode Emitting Light (Red , S.ELECT034) -100 Pieces	63

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220E 0.25W CFR Resistor (50 Pcs)	26
Piezo	249

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**PROJECT COST ESTIMATION**

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COST ESTIMATION OF CORE COMPONENTS = **Rs 1,537**

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## CONCLUSION

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The importance of Arduino UNO in electrical applications and projects. It allows users a simple pathway to creating interactive objects that can take input from switches and sensors, and control physical outputs like lights, motors, or actuators.

Home security systems have become mandatory as the crimes like burglary are at hike. For this accomplishment, the sensors form the foundation of the artificially intelligent devices. The PIR sensors have been employed to sense human movements in home security systems. It passively takes IR radiations as input and thereafter generates signal to be read by microcontroller. The low cost, small in size, low power consumption makes it an ideal choice for use.

We understood the importance and how to work on a simulator. Simulation modeling solves real-world problems safely and efficiently. It provides an important method of analysis that is easily verified, communicated, and understood. These provide valuable solutions by giving clear insights even into complex systems.

We learned how to draw a circuit diagram and analyze necessary connections. It is important to draw a circuit diagram before actual designing to ensure efficient working and cost-cutting. Circuit diagrams are used for the design (circuit design), construction and maintenance of electrical and electronic equipment.

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## **FUTURE ASPECTS OF PROJECT**

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- Intrusion alarms and detection systems are usually among the top priorities when security teams devise a comprehensive security plan.
  - We can determine the position of the intruder and then send a SMS to the concerned authorities.
  - Devices are becoming smarter, more interoperable and more interconnected, both in the intrusion arena and beyond, courtesy of the internet of things (IoT).
  - Customers demand intrusion detection systems that communicate and integrate seamlessly with their access control, fire detection and video management systems.
  - Such integrations have been well-received by customers seeking greater functionality from their security systems.
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## REFERENCES



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- <https://www.tinkercad.com/projects?product=circuits>
  - <https://docs.arduino.cc/hardware/uno-rev3>
  - [https://en.wikipedia.org/wiki/Passive\\_infrared\\_sensor](https://en.wikipedia.org/wiki/Passive_infrared_sensor)
  - <https://learn.adafruit.com/using-piezo-buzzers-with-circuitpython-arduino>
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