Experiment – 5

Aim: Design a circuit for motion detection using a PIR sensor, and Arduino board, and any additional components that are required (such as a buzzer and bulb).

Components

- Arduino Uno R3
- Small Breadboard
- Jumper cable
- LED
- PIR Sensor
- Piezo

Theory

1. Arduino Uno R3

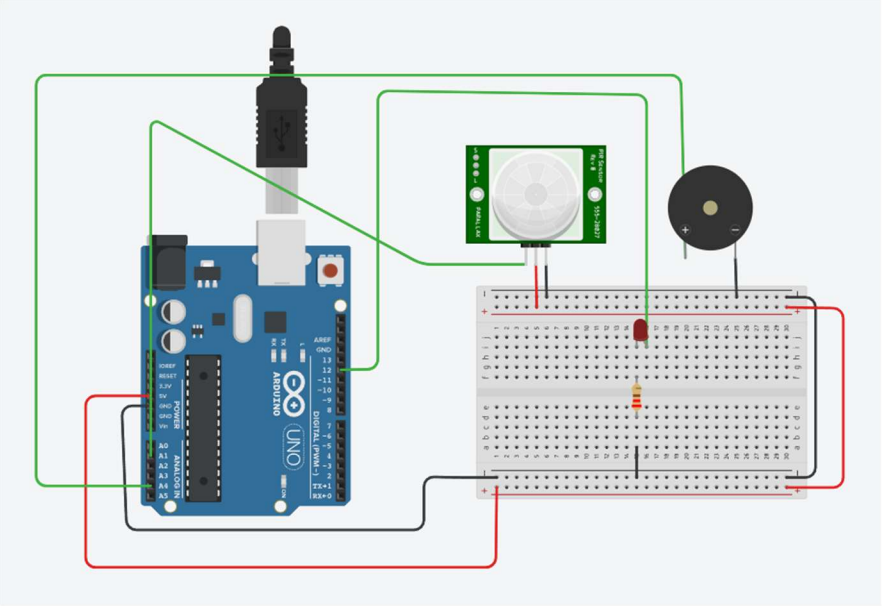
   The Arduino Uno R3 is the main microcontroller in this circuit. It acts as the brain of the setup, executing the programmed code to control the LED. It provides both power and signal to the circuit, making it an essential component for automation and control projects.
2. Small Breadboard

   The small breadboard is used for easy and temporary circuit connections without soldering. It allows the LED and other components to be connected securely while maintaining flexibility for modifications.
3. Jumper Cable:

   Used to make electrical connections between the Arduino, breadboard, and components.
4. The LED

   The LED (Light Emitting Diode) is the primary output component in this circuit. It emits light when current flows through it, and its blinking pattern is controlled by the Arduino using programmed delays.
5. PIR Sensor: A motion sensor that detects infrared radiation, commonly used for motion-activated systems.
6. Piezo: A buzzer that generates sound when given an electrical signal, used for alerts and alarms.

Circuit Design



Procedure to Design a Motion Detection Circuit using PIR Sensor and Arduino on Tinkercad

Step 1: Add Components to the Workspace

1. Search for Arduino Uno R3 and drag it onto the workspace.
2. Search for a small breadboard and place it next to the Arduino.
3. Search for a PIR sensor and place it on the breadboard.
4. Search for an LED and place it on the breadboard.
5. Search for a Piezo buzzer and place it near the LED.
6. Use jumper cables to establish connections between components.

Step 2: Build the Circuit Connections

PIR Sensor Connections:

1. VCC pin → Connect to 5V on Arduino.
2. GND pin → Connect to GND on Arduino.
3. OUT pin → Connect to digital pin 7 on Arduino.

LED Connections:

1. Anode (+) of LED → Connect to digital pin 8 on Arduino.
2. Cathode (-) of LED → Connect to one side of a 220Ω resistor.
3. Other side of the resistor → Connect to GND.

Piezo Buzzer Connections:

1. Positive (+) pin → Connect to digital pin 9 on Arduino.
2. Negative (-) pin → Connect to GND.

Step 3: Code for Motion Detection

```
void setup()
{
 pinMode(A1, INPUT);
 pinMode(A4, OUTPUT);
 pinMode(12, OUTPUT);
 Serial.begin(9600);
}
```

```
void loop()
{
 if(analogRead(A1)) {
        tone(A4, 250);
  digitalWrite(12, HIGH);
  Serial.println("It's not a Drill");
  delay(1000);
 } else {
  digitalWrite(12, LOW);
        Serial.println("just a Security check");
  noTone(A4);
 }
}
```

Step 4: Simulate the Circuit

1. Click “Start Simulation” in Tinkercad.
2. Trigger the PIR sensor by clicking on it or adjusting motion settings in the simulation.
3. When motion is detected, the LED lights up and the buzzer sounds.

Conclusion

This project demonstrates how to use an Arduino Uno with a PIR sensor to detect motion and trigger an LED and buzzer for alerting. The PIR sensor acts as the primary input, while the Arduino processes the signal and activates the LED and buzzer when motion is detected. This setup is useful for home security, automatic lighting, and smart alarm systems. Using Tinkercad, we can simulate and refine the circuit before implementing it with real hardware.