

## Gas Sensor

- Aim:**
- Conduct an experiment to determine the sensitivity of the gas sensor.
  - Design an application for air-o-monitor for using gas sensor.

### Component Required

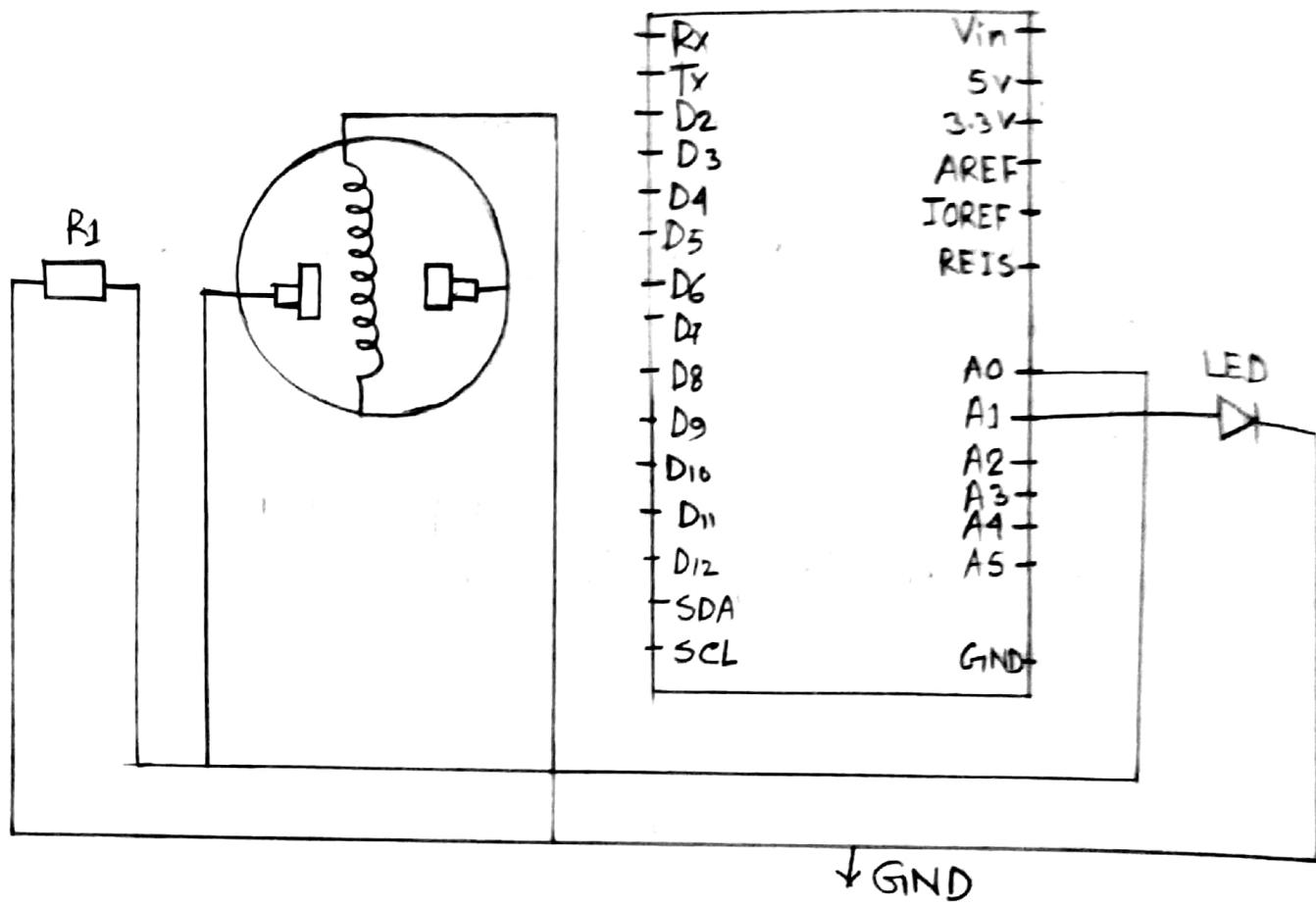
Sn	Component	Requirement
1	Breadboard	1
2	Arduino	1
3	Gas Sensor	1
4	Resistor	1
5	LED	1
6	Connecting wire	

### Working Principle

This sensor contains a sensing element mainly aluminium-oxide based ceramic, coated with tin-dioxide, enclosed in a stainless steel mesh. Sensing element has six connecting legs attached to it. Two legs are responsible for heating the sensing element, the other four are used for output signals.

Oxygen get absorbed on the surface of sensing materials when it is heated on the air at high temperature. The donor electrons present in tin oxide are attracted towards this oxygen, thus preventing the current flow.

## Block Diagram:



### Procedure:

- 1) Take an Arduino connect LED, Gas sensor resistor to the arduino.
- 2) In gas sensor, there are 3 pin ground, VCC and output is connected to A0.
- 3) Here we see when the smoke or gas is taken near to the gas sensor the buzzer/led beeps.
- 4) And denotes the presence of gas.

### Observation:

SN	Observed	Alarm
1	Gas taken near	Beeps
2	Gas taken far	Doesn't beep

Gas type: Carbon Methane

### Result:

Sensitivity of the gas sensor was determined and observed successfully.

Code:

```
int LED=A;  
const int gas=0;  
int MQ2pin=A0;  
  
void setup(){  
    serial.begin(9600);  
}  
  
void loop(){  
    float sensorValue, MQ2pin;  
    sensor value = analogRead(MQ2pin);  
    if (sensor value >= 470){  
        digitalWrite(LED, LOW);  
        serial.print(sensor value);  
        serial.println("smoke detected");  
    }  
    else {  
        digitalWrite(LED, HIGH)  
        serial.println("sensor value :");  
        serial.println(sensor value);  
    }  
    delay(1000);  
}  
  
float getsensorvalue(int pin){  
    return (analogRead(pin));  
}
```

## Digital Sensor (PIR Sensor)

Aim:

- Conduct an experiment to understand the PIR and door sensor.
- Analyse the application of digital sensor.

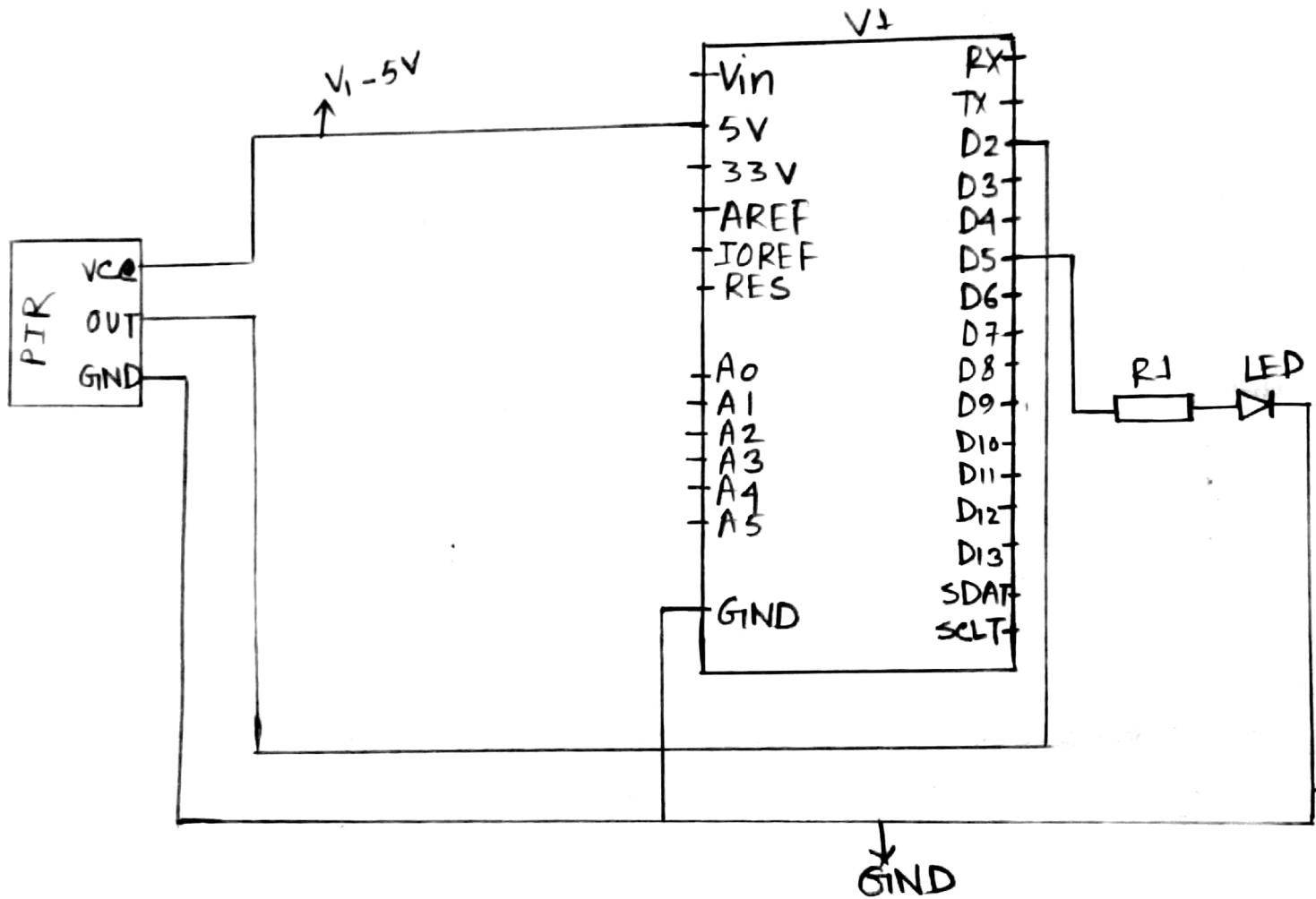
### Component Required

SN	Component	Requirement
1	Breadboard	1
2	PIR sensor	1
3	Arduino	1
4	Resistor	1
5	LED	1
6	Connecting wire	

### Working Principle

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. 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 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

# Block Diagram:



In the sensing area the reverse happens whereby the sensor generates a -ve differential change. The change pulse are what is detected.

### Procedure:

- 1) Take an arduino, connect it to PIR sensor, resistor and LED.
- 2) PIR sensor is then connected to 5V in Vcc, ground in GND and output to the DS.
- 3) Here the object is brought near the PIR sensor the LED/buzzer detects.
- 4) There denotes the presence of some object.

### Observation

SN	Output	Object	LED
1	0	Yes	ON
2	1	No	OFF

### Result:

Sensitivity of the PIR sensor was determined & observed successfully.

Code:

```
int led = 5;
int sensor = 2;
void setup() {
    pinmode (led, output);
    pinmode (sensor, Input);
    serial.begin (9600);
}

void loop () {
    int sensorval=digitalRead(sensor);
    Serial.println (sensorval);
    if (sensorval == HIGH) {
        digitalWrite (LED, HIGH);
    } else {
        digitalWrite (LED, LOW);
    }
}
```

## Soil Moisture Sensor

**Aim:**

- Conduct an experiment to determine the sensitivity of the soil moisture sensor.
- Design an irrigation system using soil moisture sensor.

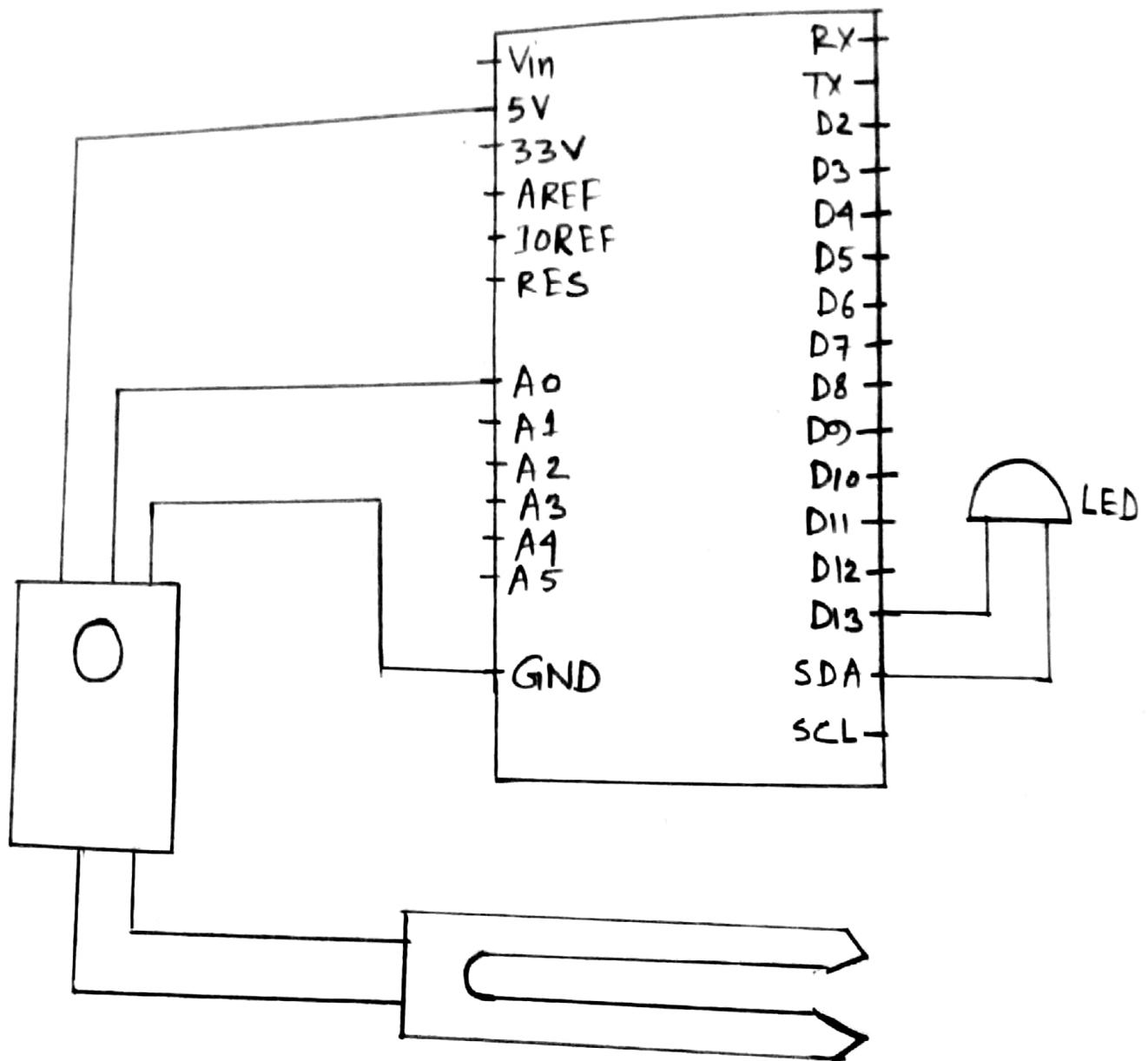
**Components Required:**

SN	Component	Requirements
1	Arduino	1
2	Soil Moisture	1
3	IR Sensor	1
4	Connecting Wire	-
5	LED	1

**Working Principle:**

The soil moisture sensor uses capacitance to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is a function of the water content. The sensor creates a voltage proportional to the dielectric permittivity. Therefore the water content of soil, the sensor averages the water content over the entire length of the sensor. There is a 2cm zone of influence with respect to the flat surface of the sensor, but it has little or no sensitivity at the extreme edge. The soil moisture is used to measure the loss of moisture over time due to evaporation.

# Block Diagram!



### Procedure:

- 1) Take an arduino, soil moisture, LED and IR sensor connect to it.
- 2) Connect IR sensor with VCC 5V, GND to ground & output to A0.
- 3) Here the soil moisture is connected to IR and to arduino.
- 4) Here LED is connected.
- 5) When the soil moisture detects the water level, it beeps & turns motor on.
- 6) The water level is observed.

### Observation:

SN	Soil Type	Range	Reading
1	Wet	519	motor turned off
2	Dry	613	motor turned on

### Result:

Sensitivity of the soil sensor was determined and observed successfully.

Code:

```
int sensorPin = A0;
int sensorValue = 0;
int LED = 13;
void setup() {
    pinMode(LED, OUTPUT);
    serial.begin(9600);
}
void loop() {
    sensorValue = analogRead(sensorPin);
    delay(1000);
    serial.print("sensor = ");
    serial.println(sensorValue);
    if (sensorValue < 500)
        digitalWrite(LED, HIGH);
    else
        digitalWrite(LED, LOW);
}
```

## HeartBeat Sensor

**Aim:**

- Conduct an experiment to determine the sensitivity of the heartbeat sensor.
- Analyze the application of heartbeat sensor to determine the pulse rate.

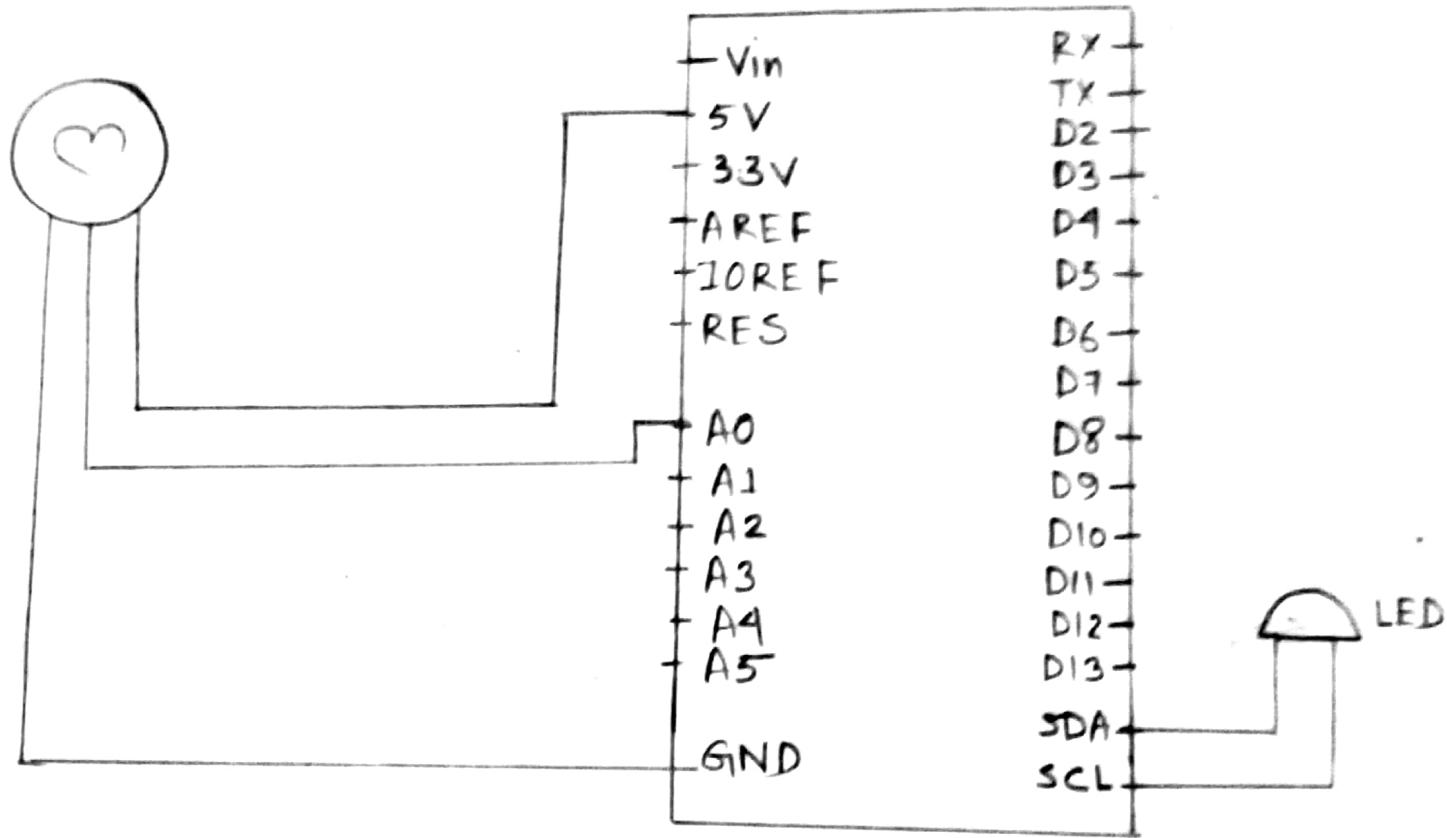
### Component Required

SN	Component	Requirement
1	Arduino Uno	1
2	Heartbeat Sensor	1
3	LED	1
4	Connecting Wires	-

### Working Principle

When a heartbeat occurs, blood is pumped through the human body and get squeezed into the capillary tissues. The volume of these capillary tissues increases as a result of the heartbeat. But in between the heartbeats this volume inside capillary tissue decreases. The change in volume between the heartbeats affects the amount of light that will transmit through these tissues. The change is very small but we can measure it with the help of Arduino.

# Block Diagram



### Procedure:

- 1) Take an arduino, connect it to the heartbeat sensor, LED.
- 2) Connect the arduino in heartbeat here ground is connected to GND, VCC is connected to +5V and third wire is connected to A0.
- 3) Now when the object or sensor, is touched, it felt-fells the beat, and shows the reading.
- 4) Readings are noted and it is observed.

### Observation

SN	Output	Sensor
1	0	When not touched
2	60	When pressed in
	61	the sensor
	62	
	57	

### Result:

Sensitivity of the sensor was determined and output was verified.

Code:

```
int const PULSE-SENSOR-PIN = 0;
int signal;
int Threshold = 550;
void setup () {
    pinMode(LED-BUILTIN, OUTPUT);
    serial.begin(9600);
}
void loop () {
    signal = analogRead(PULSE-SENSOR-PIN);
    serial.println(signal);
    if (signal > 15) {
        digitalWrite(LED-BUILTIN, HIGH);
    }
    else {
        digitalWrite(LED-BUILTIN, LOW);
    }
    delay(1000);
}
```