

Practical 8: Programs using Gas sensors

Aim:

To detect smoke/fire using Gas sensor

Simulation Environment: TinkerCAD (Free online simulator)

Components: Arduino UNO, Gas sensor, LED, resistor and Breadboard

Theory:

Gas sensors are devices designed to detect and measure the concentration of gases in the surrounding environment. They are widely used in various applications, including industrial safety, environmental monitoring, medical diagnostics, and home automation. Gas sensors play a crucial role in ensuring the safety of individuals and detecting potential hazards.

The working principle of gas sensors can vary depending on the type of sensor and the specific gas it is designed to detect.

The basic principle used in a smoke detector, whether in a real-world device or a simulated one in Tinkercad, is the change in electrical conductivity or resistance in the presence of smoke particles. The principle can be understood through the following steps:

1. Gas Sensing Element:

- In a real smoke detector, a specialized gas sensing element is used. This element often consists of a material that interacts with smoke particles in the air.

2. Change in Conductivity or Resistance:

- When smoke particles are present, they interfere with the normal operation of the gas sensing element. This interference leads to a change in the electrical conductivity or resistance of the sensing element.

3. Voltage Divider Circuit:

- The gas sensor is typically part of a voltage divider circuit. In the case of a simulated circuit in TinkerCAD, a variable resistor is often used to represent the gas sensor.

4. Arduino Interface:

- The output of the voltage divider circuit is connected to an analog pin on an Arduino. The Arduino reads the analog value, which corresponds to the resistance or conductivity of the gas sensor.

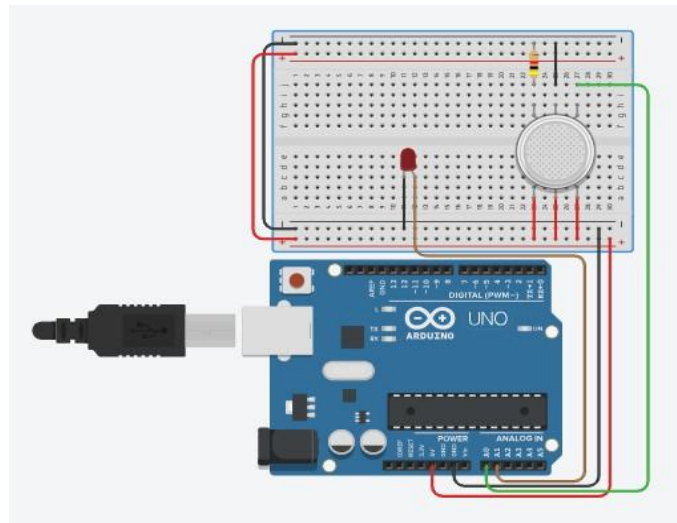
5. Threshold Detection:

- A threshold value is set in the Arduino code. If the analog value exceeds this threshold, it indicates that the resistance of the gas sensor has changed significantly, suggesting the presence of smoke.

6. Alarm Activation:

- When the threshold is surpassed, the Arduino activates an alarm signal. In the Tinkercad simulation, this is often represented by turning on an LED.

Circuit Diagram:



Arduino	Gas Sensor	LED	Resistor
5V	B1		
	B2		
	B3		
GND	H1	Cathode	Other End
	A1		One End
A0	A2		
A1		Anode	

Code:

```
int LED = A1;
const int gas = 0;
int MQ2pin = A0;

void setup()
{
  Serial.begin(9600);
}

void loop() {
  float sensorValue,MQ2pin;
  sensorValue = analogRead(MQ2pin); // read analog input pin 0

  if(sensorValue>= 470)
  {
    digitalWrite(LED,LOW);
    Serial.print(sensorValue);
    Serial.println(" |SMOKE DETECTED");
  }
  else
  {
    digitalWrite(LED,HIGH);
    Serial.println("Sensor Value: ");
    Serial.println(sensorValue);
  }
  delay(1000);
}

float getsensorValue(int pin)
{
  return (analogRead(pin));
}
```