Alcohol Sensor with Arduino

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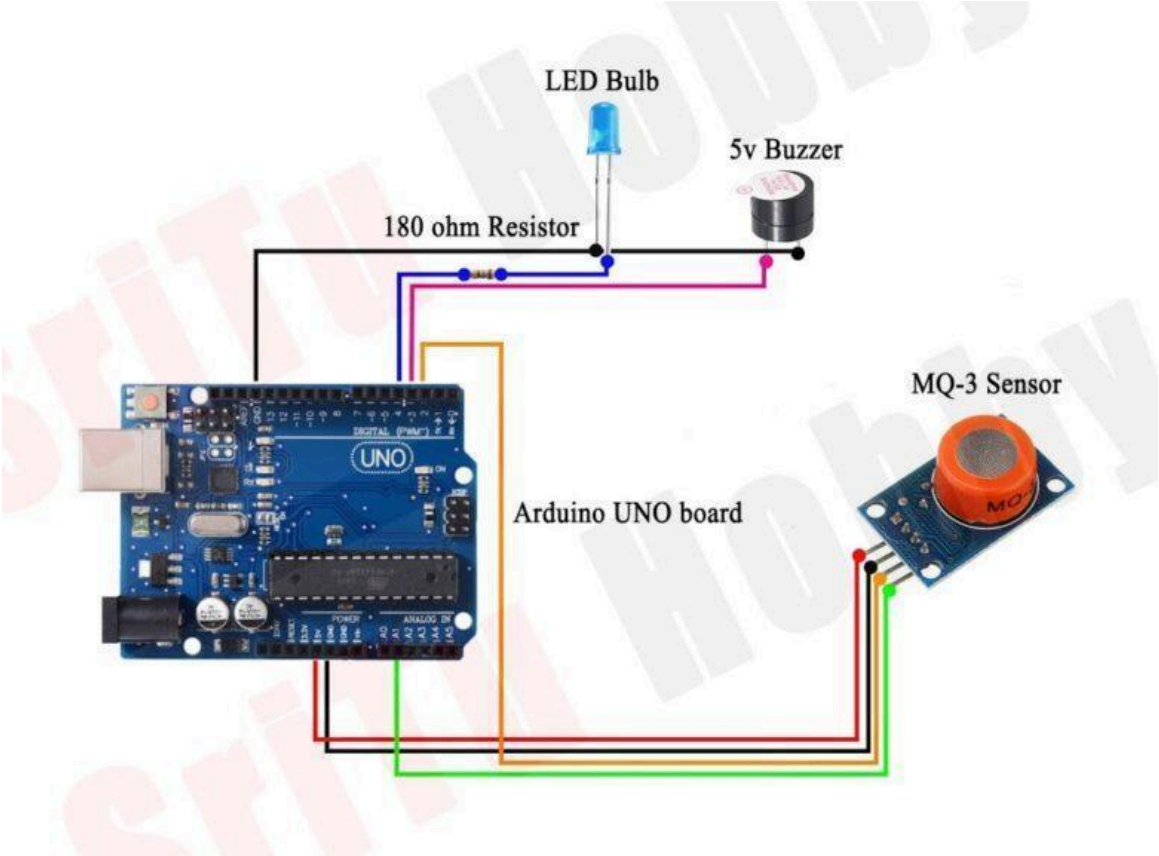
AIM:

Using this sensor, we are able to detect the presence of alcohol. The MQ3 sensor can be used to achieve this objective.

CIRCUIT DIAGRAM:

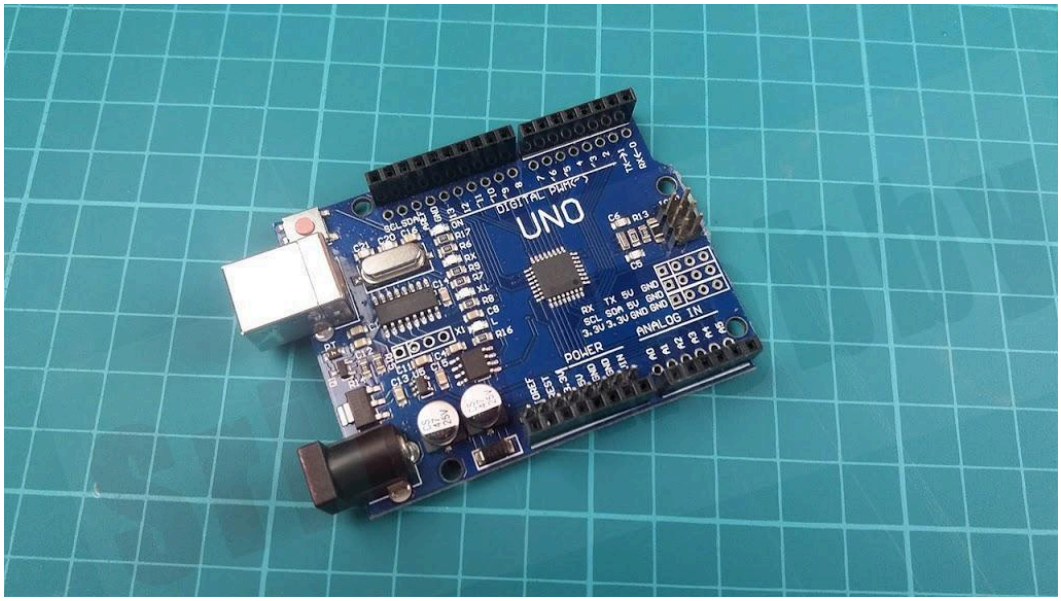


COMPONENTS:

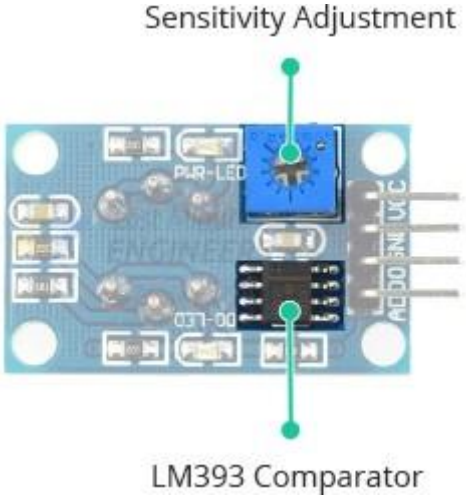
The required components are as follows.

- Arduino UNO board x 1
- MQ3 sensor x 1
- Breadboard x 1
- 5v buzzer x 1
- LED x 1
- 180-ohm Resistor x 1
- Jumper wires

Arduino UNO board.

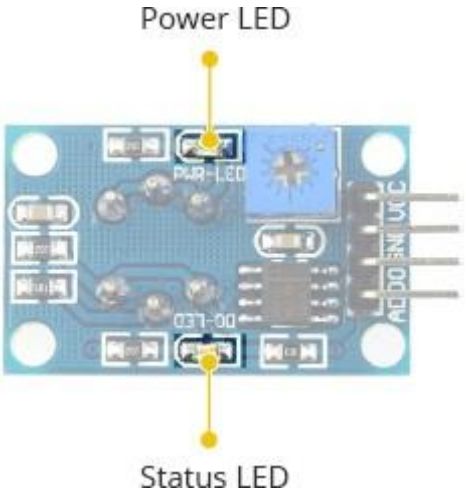


The analog output voltage provided by the sensor (at AO pin) varies in proportion to the alcohol concentration. The higher the alcohol concentration in the air, the higher the output voltage; Whereas lower concentration gives lower output voltage. The same analog signal is fed to a LM393 High Precision Comparator to digitize it and is made available at the Digital Output (DO) pin.



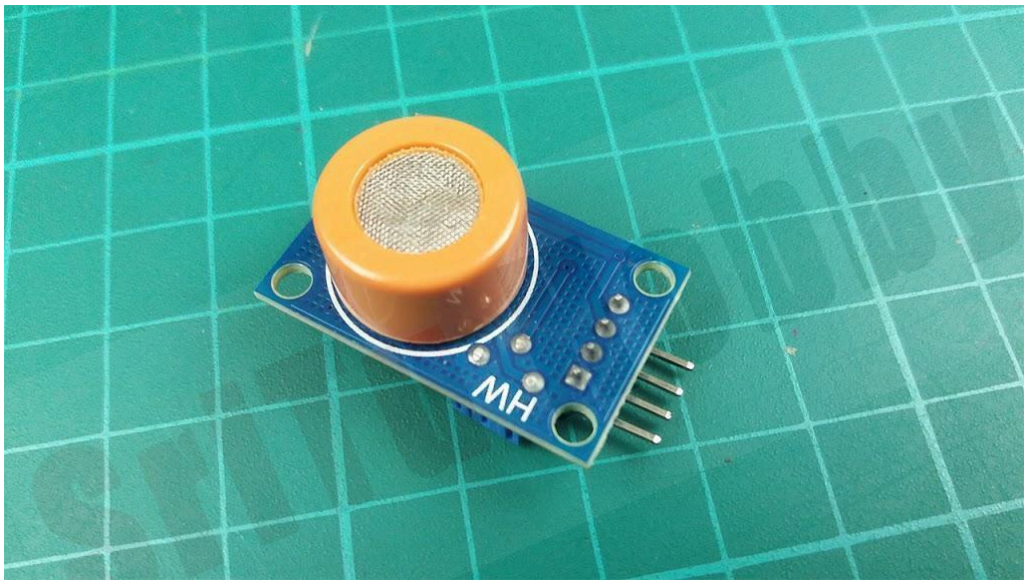
The module has a built-in potentiometer for adjusting the sensitivity of the digital output (DO). You can use it to set a threshold; so that when the alcohol concentration exceeds the threshold value, the module will output LOW otherwise HIGH.

This setup is very useful when you want to trigger an action when certain threshold is reached.



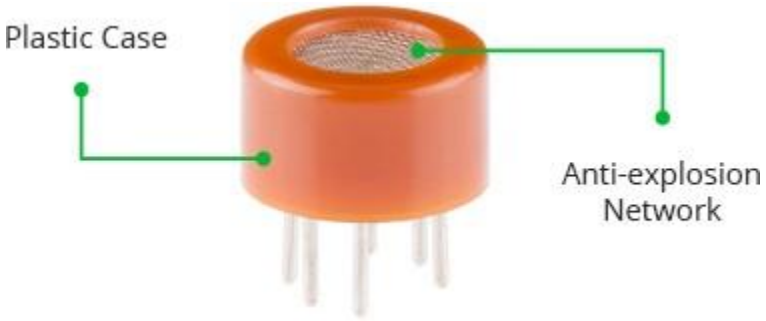
Apart from this, the module has two LEDs. The Power LED will light up when the module is powered. The Status LED will light up when the digital output goes LOW.

MQ3 sensor.

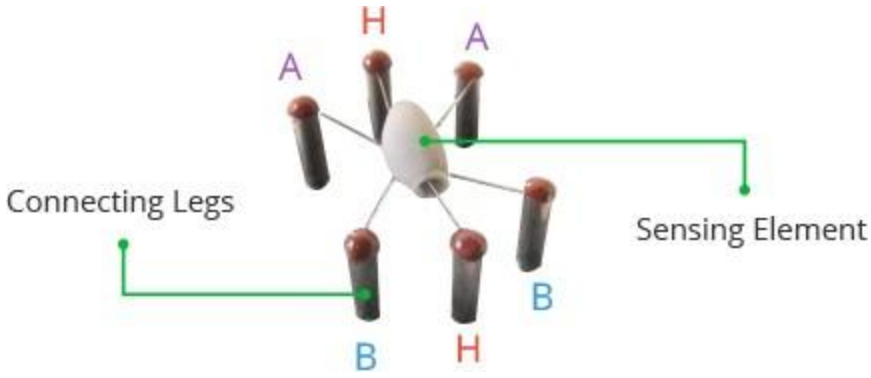


Internal structure of MQ3 Alcohol Sensor:

MQ3 is a heater-driven sensor. That's why it is enclosed in two layers of fine stainless steel mesh called an Anti-explosion network. It ensures that heater element inside the sensor will not cause an explosion, as we are sensing flammable gas (alcohol).

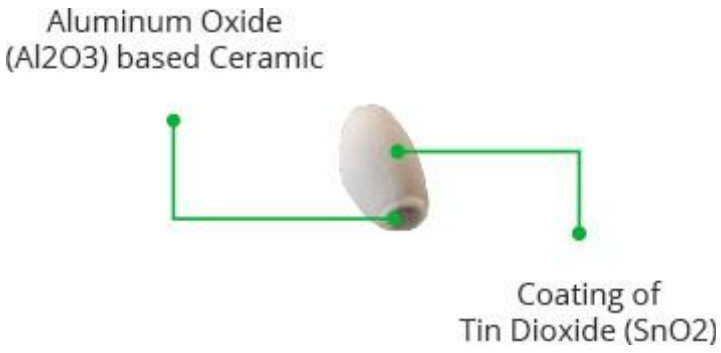


It also provides protection for the sensor and filters out suspended particles so that only gaseous elements are able to pass inside the chamber.



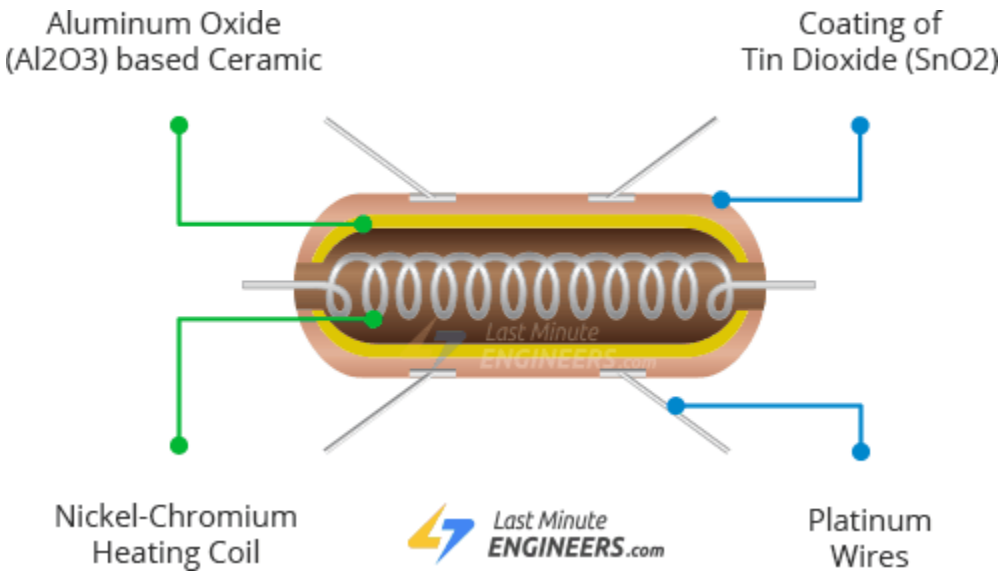
This is what the sensor looks like when outer mesh is removed. The star-shaped structure is formed by the sensing element and six connecting legs that extend beyond the Bakelite base. Out of six, two leads (H) are responsible for heating the sensing element and are connected via a Nickel-Chromium coil (a well known conductive alloy).

The remaining four leads (A & B) responsible for output signals are connected using Platinum Wires. These wires are connected to the body of the sensing element and convey small changes in the current that passes through the sensing element.



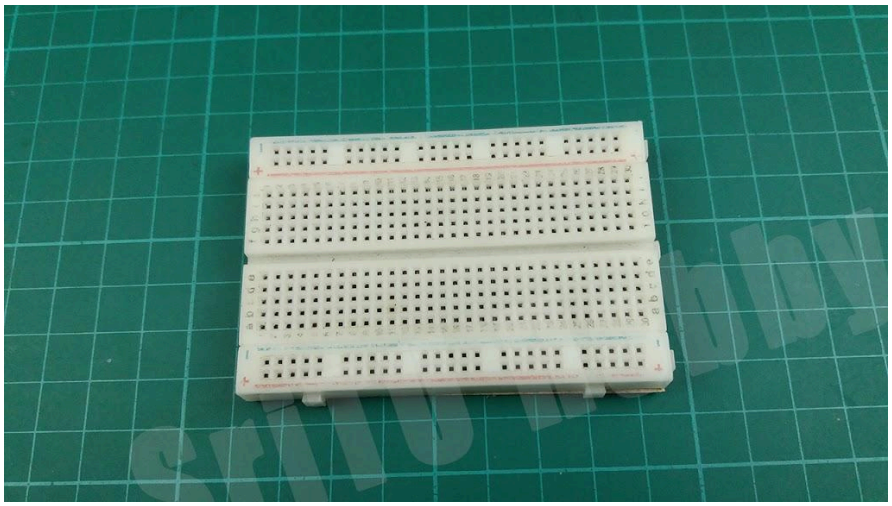
The tubular sensing element is made up of Aluminum Oxide (AL2O3) based ceramic and has a coating of Tin Dioxide (SnO2). The Tin Dioxide is the most

important material being sensitive towards alcohol. However, the ceramic substrate only increases the heating efficiency and ensures that the sensor area is continuously heated to the working temperaturature

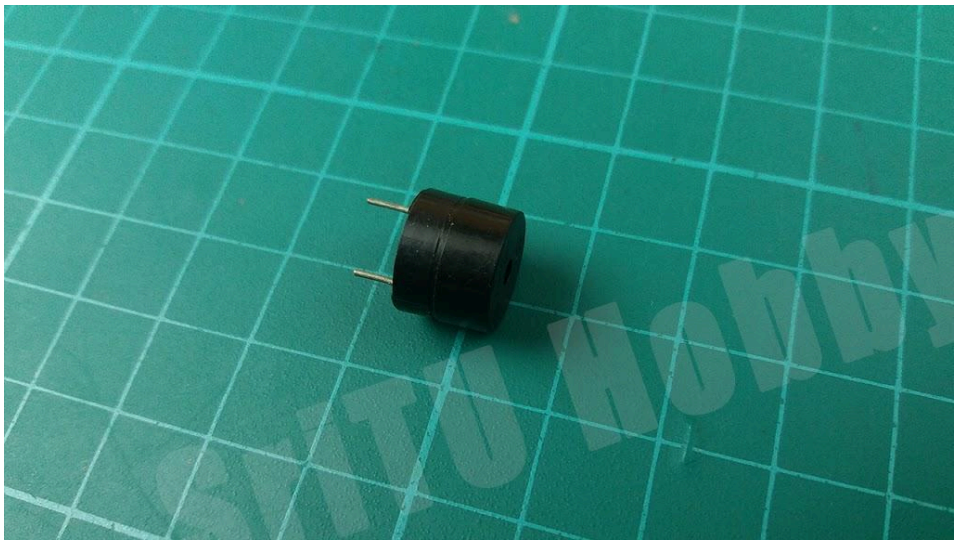


So, to summarize, the Nickel-Chromium coil and Aluminum Oxide based ceramic forms a Heating System; while Platinum wires and coating of Tin Dioxide forms a Sensing System.

Breadboard.



5V buzzer.



LED bulb

180-ohm Resistor

Jumper wires

CODE:

```
#define sensorDigital 2

#define LED 3

#define buzzer 4

#define sensorAnalog A1



void setup() {

  pinMode(sensorDigital, INPUT);

  pinMode(LED, OUTPUT);

  pinMode(buzzer, OUTPUT);

  Serial.begin(9600);
```

```
}

void loop() {

  bool digital = digitalRead(sensorDigital);

  int analog = analogRead(sensorAnalog);



  Serial.print("Analog value : ");

  Serial.print(analog);

  Serial.print("\t");

  Serial.print("Digital value :");

  Serial.println(digital);



  if (digital == 0) {

        digitalWrite(LED, HIGH);

        digitalWrite(buzzer, HIGH);
```

```
  } else {

        digitalWrite(LED, LOW);

        digitalWrite(buzzer, LOW);

  }



}
```

Code explanation

First, sensor-connected PIN, LED connected PIN, and buzzer connected PIN is defined.

```
#define sensorDigital 2
#define LED 3
#define buzzer 4
#define sensorAnalog A1
```

Second, these PINs are converted to OUTPUT and INPUT PIN. Also, the serial monitor is enabled in the void setup.

```
void setup() {
  pinMode(sensorDigital, INPUT);
  pinMode(LED, OUTPUT);
  pinMode(buzzer, OUTPUT);
  Serial.begin(9600);
}
```

In the void loop, the digital and analog values received through the sensor are inserted into two separate variables and printed on a serial monitor. Also, if the digital value is 0, the LED and the buzzer turn ON, and if the digital value is 1, the LED and the buzzer turns off.

```
void loop() {
  bool digital = digitalRead(sensorDigital);
  int analog = analogRead(sensorAnalog);

  Serial.print("Analog value : ");
  Serial.print(analog);
  Serial.print("t");
  Serial.print("Digital value :");
  Serial.println(digital);

  if (digital == 0) {
    digitalWrite(LED, HIGH);
    digitalWrite(buzzer, HIGH);
  } else {
    digitalWrite(LED, LOW);
    digitalWrite(buzzer, LOW);
  }
}
```

Cost and Expenses:

-Arduino
-LED
-MQ3 Sensor
Connecting Wires
Buzzer

Totals up to:1150