Alcohol Detection System Using MQ-3 Sensor and Arduino

1. Project Title

Alcohol Detection System Using MQ-3 Gas Sensor with Arduino

2. Objective

To develop a low-cost alcohol detection system using an MQ-3 gas sensor and Arduino, which can detect the presence of alcohol vapors in the breath and trigger a response (such as activating a buzzer or LED).

3. Aim

To design and implement a breath alcohol detection system using the MQ-3 sensor and Arduino, providing a reliable and real-time indication of alcohol presence.

4. Components Required

- Arduino UNO / Nano (1)
- MQ-3 Alcohol Sensor (1)
- Jumper Wires
- Breadboard (1)
- LED or Buzzer (1, optional)
- Resistor 220 Ohm (optional)
- USB Cable (1)

5. Circuit Diagram / Wiring

MQ-3 Pin Connections:

VCC -> 5V (Arduino)

GND -> GND (Arduino)

AOUT -> A0 (Arduino)

Optional Output:

LED connected to Pin 2 via 220 Ohm resistor to GND.

6. Working Principle

The MQ-3 sensor contains a heating element and a chemical layer that reacts with alcohol vapors. When exposed, the sensor's resistance changes, and it outputs a varying voltage. This voltage is read by Arduino to detect alcohol levels.

7. Arduino Code

```
#define MQ3pin A0

int sensorValue;

void setup() {
  Serial.begin(9600);
  pinMode(2, OUTPUT);
  Serial.println("MQ3 warming up");
  delay(200);
}

void loop() {
  sensorValue = analogRead(MQ3pin);
  float val = sensorValue * (5.0 / 1023.0);

  Serial.print("Alcohol Level (V): ");
  Serial.println(val);

  if (val > 3.5) {
    digitalWrite(2, HIGH);
```

```
  } else {
    digitalWrite(2, LOW);
  }

  delay(2000);
}
```

8. Output

- Displays alcohol voltage level on Serial Monitor.
- Turns on LED/Buzzer if voltage > 3.5V.

9. Applications

- Vehicle ignition interlock
- Industrial worker safety
- Personal breathalyzer
- Alcohol-free zone enforcement

10. Advantages

- Low cost and simple
- Real-time alcohol detection
- Expandable with communication modules

11. Limitations

- Sensitive to temperature and humidity
- Needs calibration for ppm
- Not legally certified

12. Future Enhancements

- Add display
- SMS or mobile alerts
- Vehicle engine interlock

13. Result

The project successfully detects the presence of alcohol vapors using the MQ-3 sensor. When alcohol is detected, the Arduino activates a warning indicator, demonstrating an effective and responsive alcohol detection system.