PATUAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

Course Code: EEE-212

SUBMITTED TO:

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Alcohol Detector Robot

1.ABSTRACT : The alcohol engine lock system with an MQ3 sensor is a proactive solution to prevent drunk driving accidents, aligning with the idea that "prevention is better than cure." This technology stops engines from operating if alcohol is detected, aiming to protect all road users. Although some see it as an infringement on personal freedom, prioritizing road safety outweighs these concerns. Proven effective in various countries, this system helps reduce alcohol-related accidents and emphasizes the importance of taking preventive steps for everyone's safety on the road.

2.INTRODUCTION :

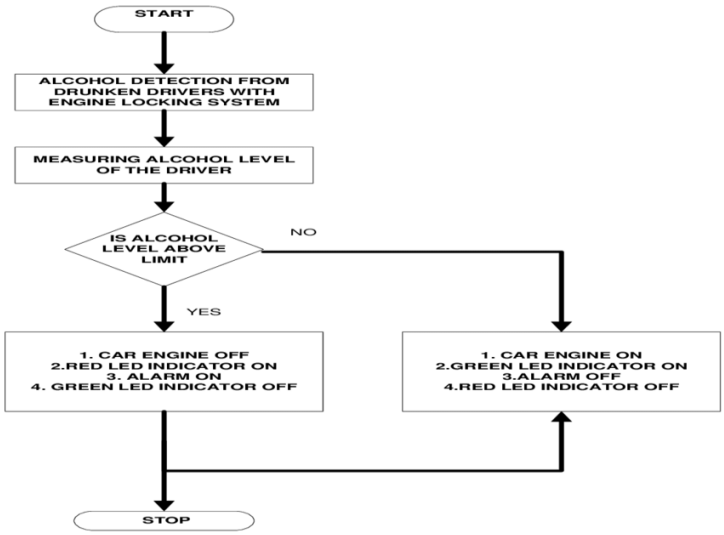
The alcohol detector and engine locking system is designed to prevent drunk driving, which is a major cause of accidents and fatalities on the road. It has been implemented in various forms in different countries, and in some places, it is mandatory for certain drivers, such as those with prior DUI convictions or commercial drivers. Drunk driving is a serious problem in many countries around the world. According to the National Highway Traffic Safety Administration (NHTSA), in 2019, 10, 142 people died in alcohol-impaired crashes in the United States alone. To address this issue, various technologies have been developed to prevent drunk driving, including the alcohol detector and engine locking system. This report will discuss the working principles, advantages, and limitations of this technology.

3.WORKING PRINCIPLE :

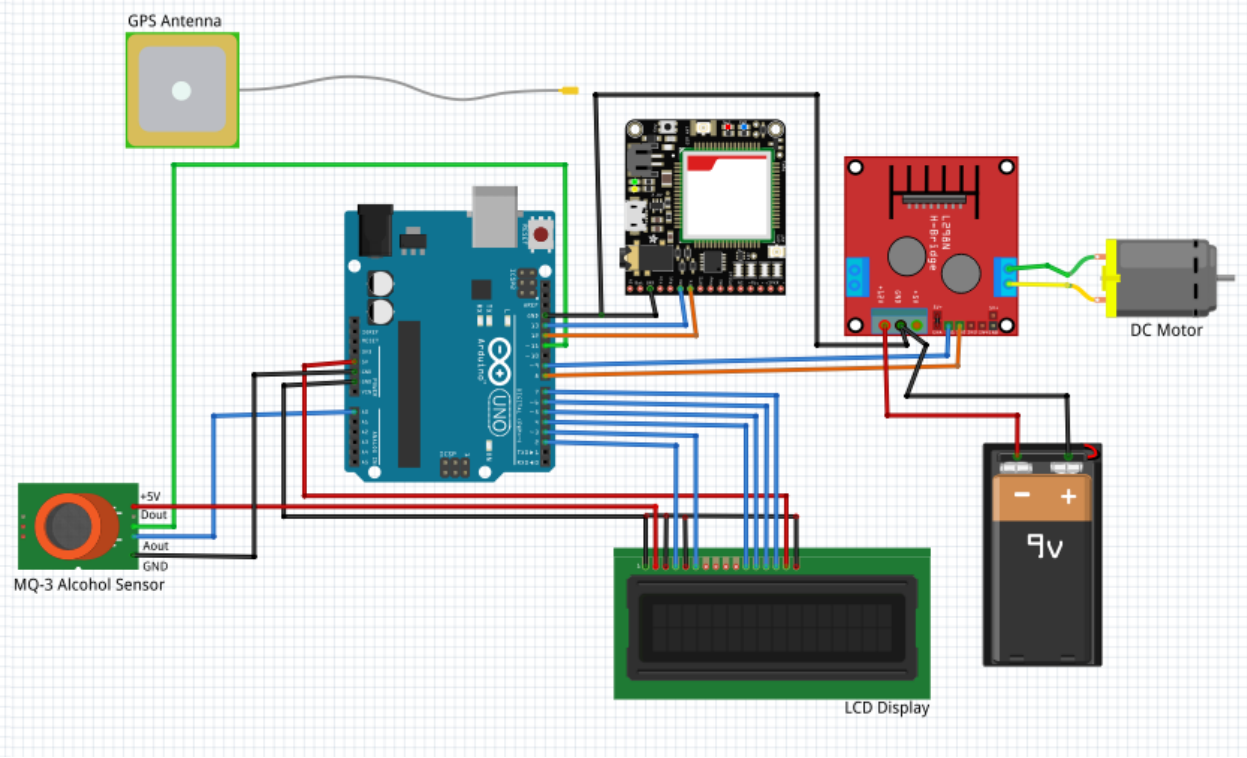
The alcohol detector and engine locking system is a safety feature that is designed to prevent drivers from operating their vehicles if their blood alcohol content (BAC) level is above a certain limit. The system typically consists of a breathalyzer device that measures the driver's BAC level and a computer system that controls the engine and ignition.

When a driver enters the vehicle, they are required to blow into the breathalyzer device. The device measures the alcohol content in their breath and calculates their BAC level. If their BAC level is above the set limit (usually 0.08% in the United States), the engine will not start. If the driver attempts to start the engine multiple times and continues to have a high BAC level, the system may trigger an alarm or notify law enforcement.

4.Flowchart :

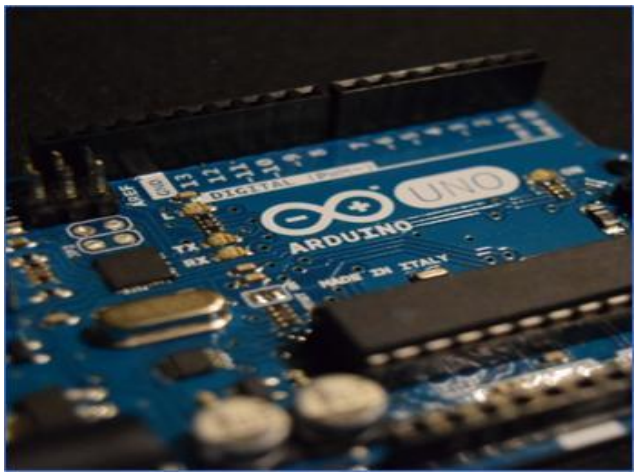


5.CIRCUIT DIAGRAM :



6. EQUIPMENTS REQUIRED :

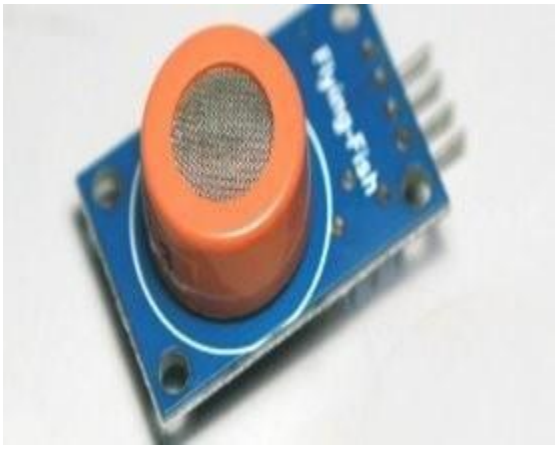
- ARDUINO UNO



The Atmega-328P-based Arduino Uno is a development board for microcontrollers.

The Arduino produces a variety of different functions,including microcontroller units, computer circuit units, and primarily tiny computers that can run simple software programmes . These units are sufficiently low-powered and can be steam powered for years by various batteries, but they are prepared to measure information much more quickly than a person's brain can process or suppose.

- MQ 3 SENSOR

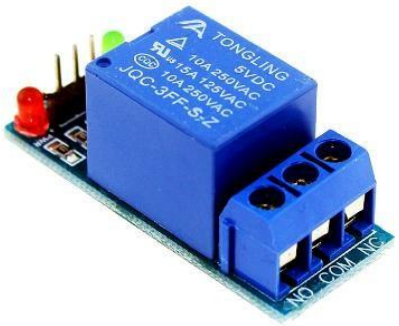


Tin Dioxide (SnO2) is a thin layer that makes up the MQ-3 sensor. It is sorted out in a way that gives alcohol great affectability and benzene low affectivity. Because of its instantaneous driving circuit, it offers a dynamic response, superior quality, and a longer lifespan. It has a distinct interface style. Port pins 1, 2, and 3 on the sensor tend to the yield, GND, and VCC separately.

- Motor :

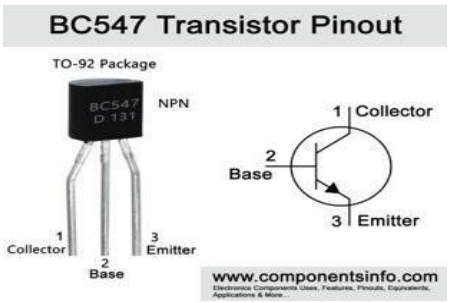
The motor is a lightweight, battery-operated DC geared motor that provides good torque and speed at lower voltages, reaching around 200 rpm with a single Li-Ion cell. It requires minimal or no lubrication, making it ideal for DIY projects. This motor is affordable, compact, easy to install, and well-suited for mobile robot cars, commonly used in 2WD platform.

- **RELAY :**



The relay in the alcohol engine lock system with an MQ3 sensor ensures safe, reliable control of the high voltage and current needed for the engine lock. It isolates and protects the microcontroller and other electronics from voltage spikes and disturbances, enhancing system safety and reliability.

- BC 547 TRANSISTOR :



The BC547 transistor is commonly used for current amplification, quick switching, and pulse-width modulation (PWM). It can control motor or actuator speed in projects and also functions as an easy on/off switch for DC devices.

- 9V Battery :

In the alcohol engine lock system with an MQ3 sensor, the 9V battery powers the microcontroller and electronic components, ensuring stable and reliable operation. Its advantages include compactness, portability, a long shelf life, and consistent power delivery for dependable system performance.

- NodeMcu Wifi Module :

In the alcohol detector and motor engine project, the NodeMCU WiFi module enables wireless connectivity, allowing the system to send real-time data, such as alcohol levels detected by the MQ3 sensor, to an IoT platform or a mobile app (e.g., Blynk). This connectivity allows for remote monitoring, alerts, or control of the system through a smartphone or other devices, enhancing user access and safety monitoring.

- LED :

In an alcohol engine lock system with an MQ3 sensor, an LED provides visual feedback, indicating the system status and whether the engine is locked or unlocked.

- BUZZER :

In the alcohol engine lock system with an MQ3 sensor, the buzzer provides audio feedback to indicate the system status and whether the engine is locked or unlocked. It enhances safety by preventing drunk driving and can also offer audio alerts for maintenance and troubleshooting.

- RESISTOR :

In the alcohol engine lock system with an MQ3 sensor, resistors limit electrical current to protect components like the LED, ensuring they operate safely within their limits and preventing damage from excess current.

- BREAD BOARD

6.Programme:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);  // I2C address 0x27, 16 columns, 2 rows

int mq3_pin1 = A0;      // First MQ3 sensor analog pin   // Second MQ3 sensor
analog pin
int buzzer_pin = 11;    // Buzzer digital pin
int relay_pin = 6;      // Relay module pin to control the motor
int threshold = 370;    // Adjust this threshold value based on your sensors

void setup() {
  // Set pin modes
  pinMode(mq3_pin1, INPUT);     // Set first MQ3 pin as inpu     // Set second
MQ3 pin as input
  pinMode(buzzer_pin, OUTPUT);  // Set buzzer pin as output
  pinMode(relay_pin, OUTPUT);   // Set relay pin as output (for motor control)

  // Initialize Serial communication
  Serial.begin(9600);
  Serial.println("Alcohol Sensor and Motor Control Test Starting...");

  // Initialize the LCD
  lcd.init();                   // Initialize the LCD
  lcd.backlight();              // Turn on the LCD backlight
  lcd.clear();                  // Clear any previous data on the LCD
  lcd.setCursor(0, 0);          // Set the cursor to the first row
  lcd.print("System Starting"); // Display message on the LCD
  delay(2000);                  // Wait for 2 seconds
  lcd.clear();                  // Clear the LCD for further use
}

void loop() {
  int sensor_value1 = analogRead(mq3_pin1); // Read value from first MQ3 sens //
Read value from second MQ3 sensor

  // Print the sensor readings to the Serial Monitor for debugging
  Serial.print("MQ3 Sensor 1 Value: ");
  Serial.println(sensor_value1);

  // Check if either sensor value exceeds the threshold
  if (sensor_value1 > threshold) {
    digitalWrite(buzzer_pin, HIGH);  // Turn buzzer on
    digitalWrite(relay_pin, HIGH);   // Turn motor off (assuming relay is active
HIGH)
```

```
    // Print to Serial Monitor
    Serial.println("Buzzer ON - Engine OFF - Alcohol detected!");

    // Display "Alcohol Detected" on the LCD
    lcd.setCursor(0, 0);        // Set cursor to the first row, first column
    lcd.print("Alcohol Detected");  // Display "Alcohol Detected"
    lcd.setCursor(0, 1);        // Set cursor to the second row, first column
    lcd.print("Motor OFF       ");   // Display "Motor OFF"
  } else {
    digitalWrite(buzzer_pin, LOW);   // Turn buzzer off
    digitalWrite(relay_pin, LOW);    // Turn motor on (assuming relay is active
HIGH)

    // Print to Serial Monitor
    Serial.println("Buzzer OFF - Engine ON - No alcohol detected.");

    // Display "No Alcohol" on the LCD
    lcd.setCursor(0, 0);        // Set cursor to the first row, first column
    lcd.print("No Alcohol      ");   // Display "No Alcohol"
    lcd.setCursor(0, 1);        // Set cursor to the second row, first column
    lcd.print("Engine ON       ");    // Display "Motor ON"
  }

  delay(500); // Add a delay for better stability
}

#include <ESP8266WiFi.h>
#include <WiFiClientSecure.h>
#include <ESP8266HTTPClient.h>

#define MQ3_PIN A0           // Analog pin for MQ3 alcohol sensor
const char* ssid = "sakib";  // Wi-Fi SSID
const char* password = "12345678"; // Wi-Fi password

// Telegram bot credentials
const char* botToken = "7684402346:AAGWObm7273kvUFtzlPspJTCL9EnKiBxop4";  // Bot
token
const char* chatID = "5069903325"; // Your chat ID

void setup() {
  Serial.begin(115200);

  // Initialize MQ3 sensor pin
  pinMode(MQ3_PIN, INPUT);
```

```
  // Connect to Wi-Fi
  Serial.println("Connecting to Wi-Fi...");
  WiFi.begin(ssid, password);

  while (WiFi.status() != WL_CONNECTED) {
    delay(1000);
    Serial.print(".");
  }

  Serial.println("\nWi-Fi connected!");
  Serial.print("IP Address: ");
  Serial.println(WiFi.localIP());
}

void loop() {
  // Read MQ3 sensor value
  int sensorValue = analogRead(MQ3_PIN);
  Serial.print("MQ3 Sensor Value: ");
  Serial.println(sensorValue);

  // Determine message based on alcohol level
  String message;
  if (sensorValue > 180) {
    message = "Alert!%20Alcohol%20Detected:%20" + String(sensorValue);
    Serial.println("Alert! Alcohol Detected");
  } else {
    //message = "Safe!%20Alcohol%20Level:%20" + String(sensorValue);
    Serial.println("Safe!");
  }

  // Prepare to send Telegram message
  WiFiClientSecure clientSecure;
  clientSecure.setInsecure();
  HTTPClient telegramHttp;

  // Construct Telegram API URL
  String telegramURL = "https://api.telegram.org/bot";
  telegramURL += botToken;
  telegramURL += "/sendMessage?chat_id=";
  telegramURL += chatID;
  telegramURL += "&text=" + message;

  // Send data to Telegram
  if (telegramHttp.begin(clientSecure, telegramURL)) {
```

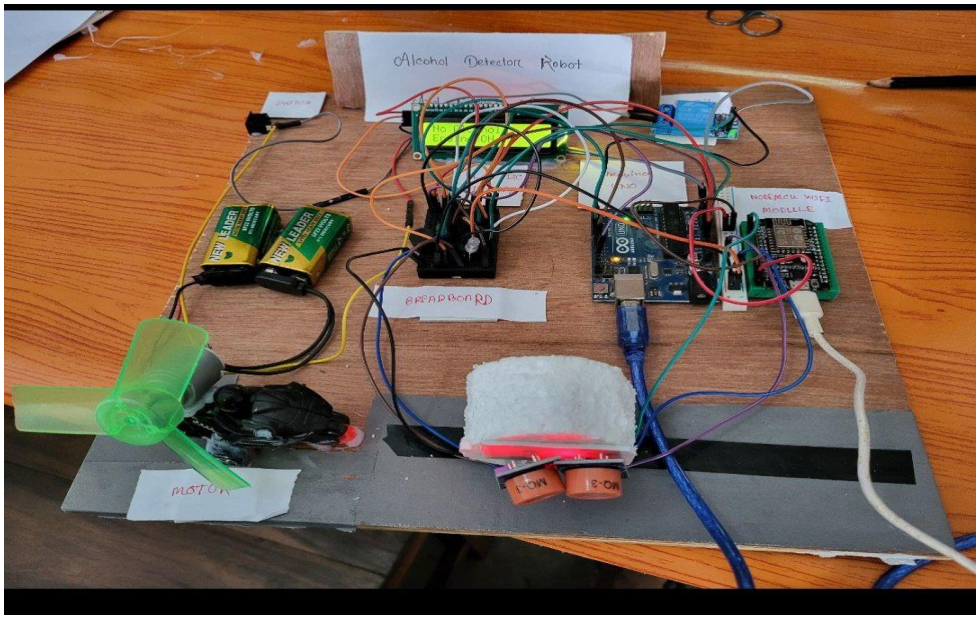
```
    int telegramResponseCode = telegramHttp.GET();

    if (telegramResponseCode > 0) {
      Serial.print("Telegram Response code: ");
      Serial.println(telegramResponseCode);
    } else {
      Serial.print("Error code: ");
      Serial.println(telegramResponseCode);
    }

    telegramHttp.end();
  } else {
    Serial.println("Unable to connect to Telegram.");
  }

  delay(2000); // Wait before the next loop
}
```

7. OUTPUT WHEN ALCHOL IS DETECTED :



8.Advantages:

The alcohol detector and engine lock system helps prevent drunk driving by accurately measuring BAC levels and preventing vehicle operation if above the limit, reducing accident risk. It acts as a deterrent by reminding drivers of drinking and driving consequences. Additionally, it can be used as a probationary tool for individuals with DUI/DWI convictions, ensuring compliance with probation terms.

9.Limitations:

The system has limitations, such as potential misuse if a sober person blows into the device or if the device is tampered with. High installation costs may limit accessibility, and some drivers may view BAC monitoring as a privacy invasion.

10.Future Developments:

1. **Integration with Biometric Sensors**: Future systems may use biometric sensors to detect physical indicators of impairment, such as pupil size changes, body temperature, or heart rate.
2. **Real-Time Monitoring and Reporting**: Advanced systems could transmit real-time data to law enforcement or other parties, enabling immediate action if impairment is detected.
3. **Improved Accuracy**: New sensor technology could enhance accuracy, detecting alcohol at lower levels or distinguishing it from other substances like mouthwash or sanitizer.
4. **AI Integration**: AI algorithms could analyze data from biometric sensors, GPS, and vehicle systems to improve impairment detection and reduce false positives.
5. **Wireless Connectivity**: Future systems may connect wirelessly with vehicle systems, smartphones, or wearables for enhanced functionality and user interaction.
6. **User Customization**: Advanced systems may allow users to customize settings, such as impairment thresholds or engine lock conditions, based on individual needs or circumstances.
7. **Enhanced User Interfaces**: Improved interfaces may offer a better user experience, making these systems more accessible and easier to use.

11.Costing:

Arduino Uno	1100
NodeMCu Wifi Module	800
LCD I2C Display	340
2 MQ3 Alcohol Sensor	360
3(9 V Battery)	240
Breadboard	100
Relay 5v Module	90
Motor	50
Fan And Bike	100
Jumpire Ware	150
Fooden Board	50
Total=	3480

10.CONCLUSION

In conclusion, the alcohol detector and engine locking system is an important safety feature that can potentially save lives and prevent accidents. It accurately measures a driver's BAC level and prevents them from operating their vehicle if their level is above the legal limit. However, the system also has limitations, such as the possibility of drivers attempting to bypass it and the cost of installation. Overall, the alcohol detector and engine locking system is a valuable tool in preventing drunk driving, but it is not a substitute for responsible driving behavior and public education campaigns about the dangers of drunk driving.

11.REFERENCE :

- Accident & Alcohol Detection Surveillance Robot
  M. Rajani Devi and V. Jyothi
  https://iopscience.iop.org/article/10.1088/1742-6596/2089/1/012065/meta
- Alcohol detector using Arduino
https://techatronic.com/alcohol-detector-using-arduino-and-mq3-sensor/