Project Report

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Problem Statement:To develop a microcontroller based prototype which can detect the drink and drive issue of the driver by detecting the consumption of alcohol by the drivers.

Scope of the Solution

The scope of the solution encompasses the development of a microcontroller-based prototype for alcohol detection in drivers, with a focus on utilising the provided code and materials. The project aims to achieve the following objectives:

1. **System Integration and Testing:**
   - **a.** Integrate the provided gas sensor, Arduino Uno R3, LCD 16x2, Piezo buzzer, green LED, red LED, resistors, and DC motor into a cohesive system for alcohol detection.
   - **b.** Develop and modify the provided code to work seamlessly with the integrated components, ensuring accurate alcohol level detection and appropriate responses.
   - **c.** Conduct rigorous testing to validate the system's functionality, including sensor accuracy, LED and LCD displays, buzzer alerts, and motor control based on alcohol levels.

2. **User Interface and Feedback:**
   - a. Implement a clear and intuitive user interface on the LCD display to show real-time alcohol detection status, such as "ALCOHOL DETECTED" or "SAFE."
   - b. Integrate visual indicators using the green and red LEDs to provide immediate feedback to the driver.
   - c. Utilize the Piezo buzzer for audible alerts, signaling the driver when alcohol is detected and the car is being stopped.

3. **Alcohol Detection Logic:**
   - **a.** Fine-tune the provided code logic to accurately interpret data from the gas sensor and determine alcohol levels based on the specified threshold (sensorThresh = 400 in the provided code).
   - **b.** Implement conditional statements to control the LEDs, LCD display, buzzer, and DC motor according to the detected alcohol levels.
   - **c.** Ensure the system responds promptly and effectively to alcohol detection events, activating visual and audible alerts and stopping the simulated car when necessary.

4. **Safety Measures and Error Handling:**
    a. Implement safety features, such as fail-safes and error handling mechanisms, to prevent false positives or negatives in alcohol detection.
    b. Incorporate delay mechanisms to avoid rapid and unnecessary triggering of alerts, ensuring stability and reliability in system responses.

By focusing on these key aspects and utilising the provided code and materials, the scope of the solution aims to deliver a functional and user-friendly alcohol detection system for vehicles, effectively addressing the specified problem statement.

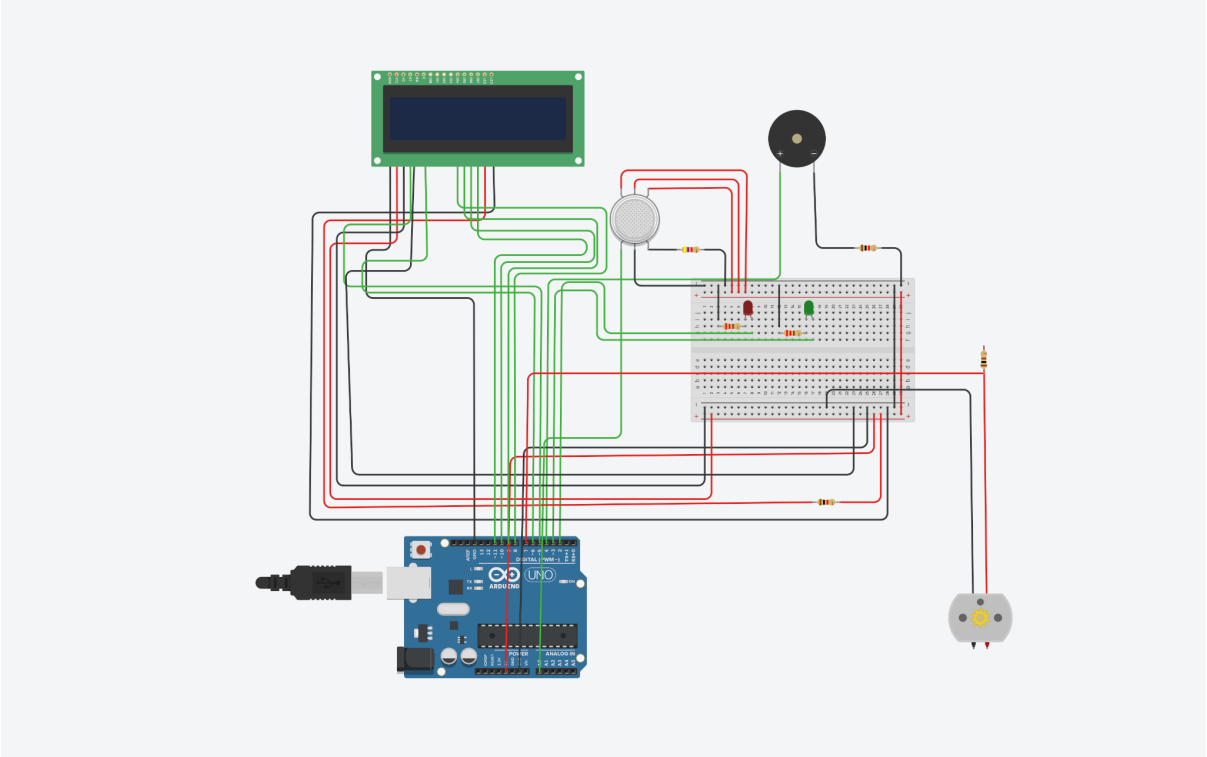
Material Required:

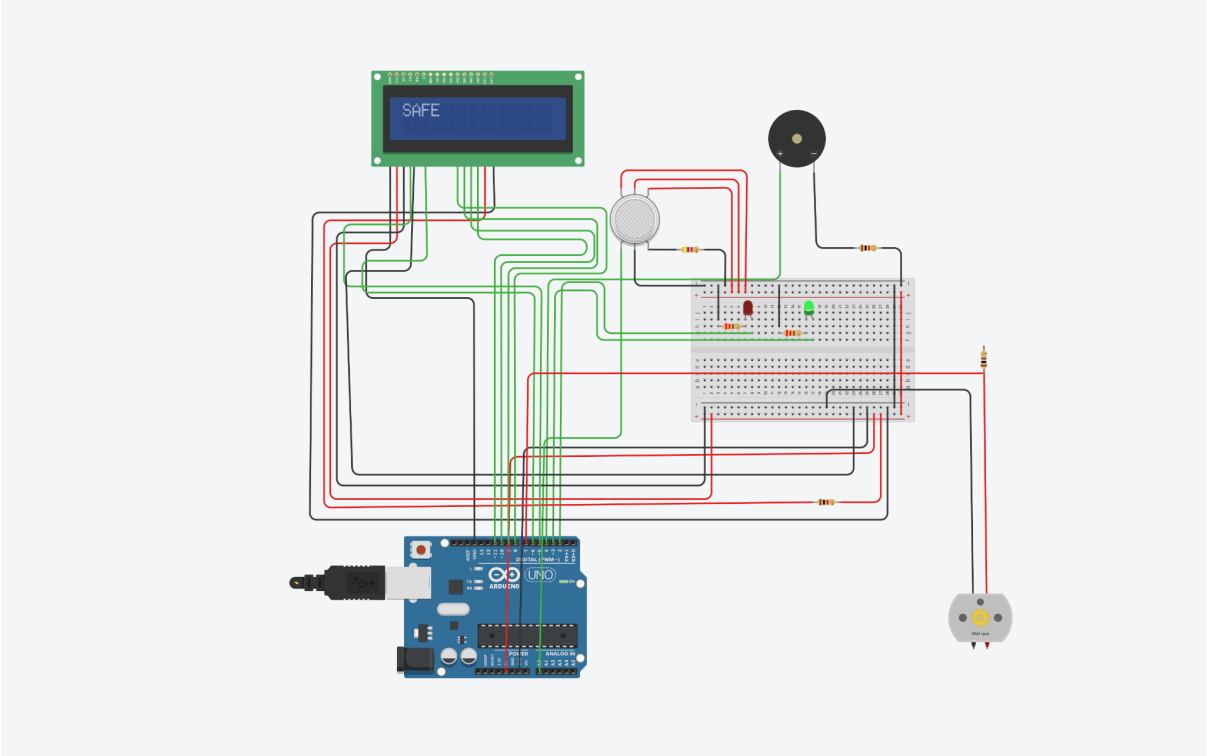
Name	Quantity	Component
GAS1	1	Gas Sensor
U1	1	Arduino Uno R3
U2	1	LCD 16 x 2
PIEZO1	1	Piezo
D1	1	Green LED
D2	1	Red LED
R1 R5	2	1 kΩ Resistor
R2	1	4.7 kΩ Resistor
R3	1	220 Ω Resistor
R4	1	221 Ω Resistor
M1	1	DC Motor
R6	1	100 Ω Resistor

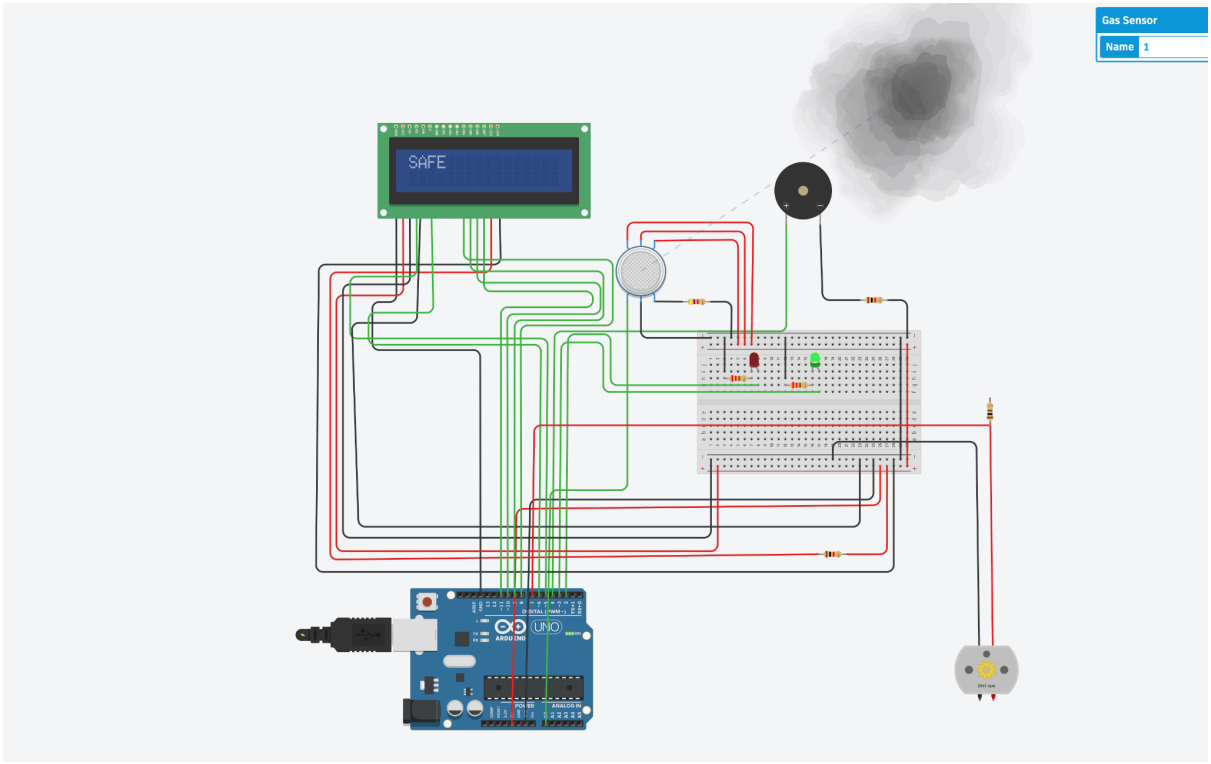
Additionally, we use:

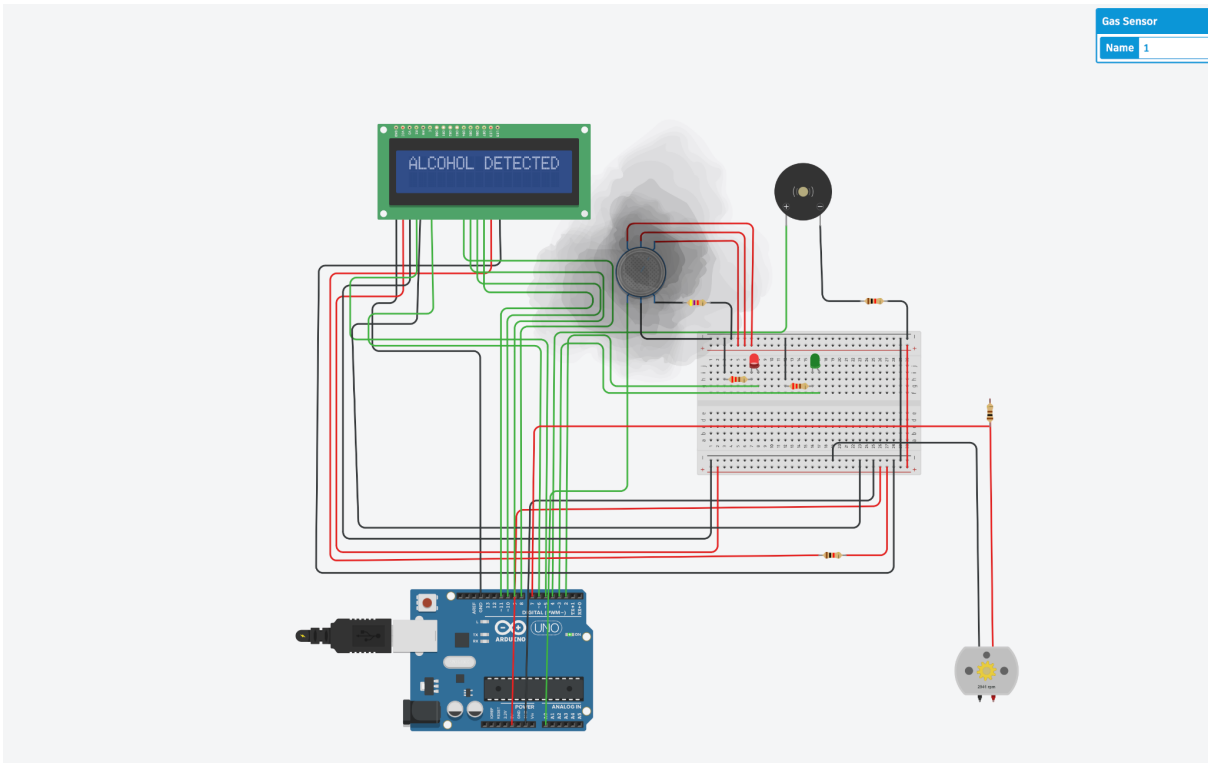
1. TinkerCAD Software
2. Arduino IDE

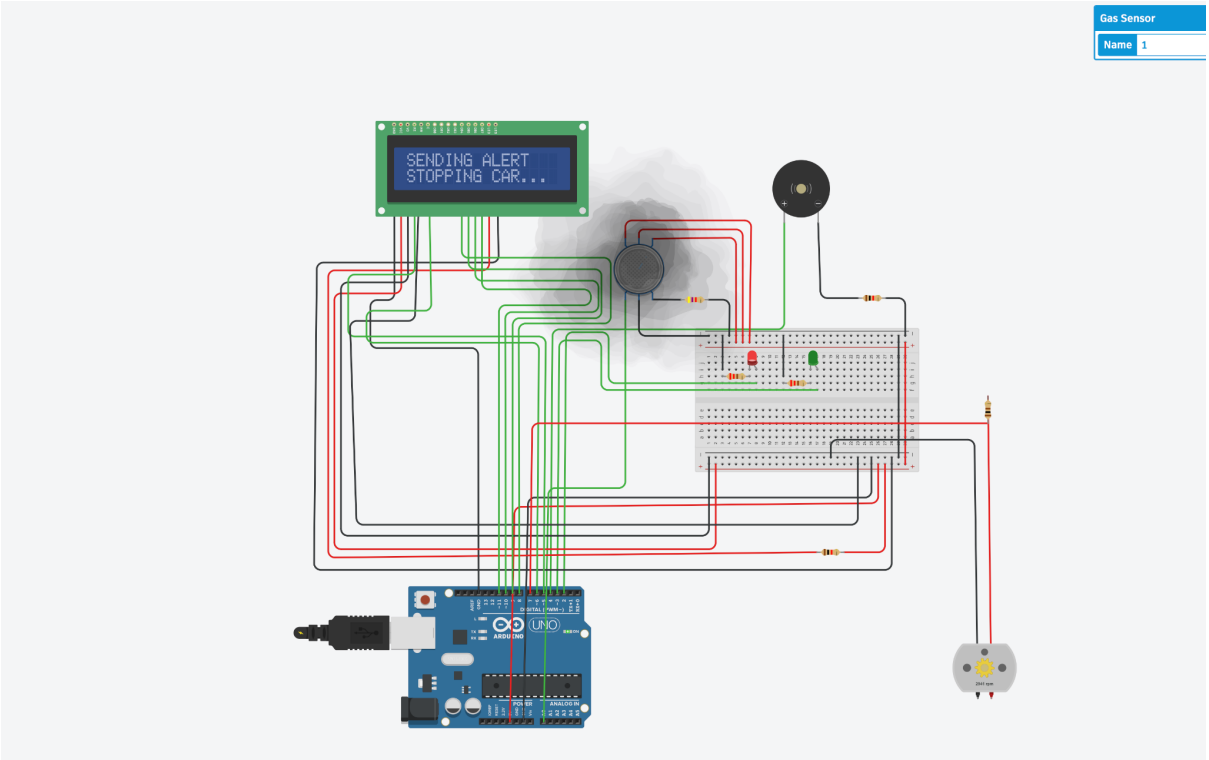
TinkerCAD Simulated Circuit:






Gas Sensor
Name 1
SAFE


Gas Sensor
Name 1
ALCOHOL DETECTED



Code for the Solution:

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(5, 6, 8, 9, 10, 11);

int redled = 2;
int greenled = 3;
int buzzer = 4;
int sensor = A0;
int sensorThresh = 400; // Threshold value for drunk
int speed = 7;

void setup()
{
        pinMode(redled, OUTPUT);
        pinMode(greenled, OUTPUT);
        pinMode(buzzer, OUTPUT);
        pinMode(sensor, INPUT);
        pinMode(speed, OUTPUT);
        Serial.begin(9600);
        lcd.begin(16, 2);
}

void loop()
{
        int analogValue = analogRead(sensor); // Value read by gas sensor
        Serial.print(analogValue);
```

```
        if (analogValue > sensorThresh) // Condition if drunk
    {
        digitalWrite(redled, HIGH);
        digitalWrite(greenled, LOW);
        // Play the buzzer with a frequency = 4000Hz for 10 seconds.
        tone(buzzer, 4000, 10000);
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("ALCOHOL DETECTED.");
        delay(1000);
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("SENDING ALERT");
        delay(500);
        lcd.setCursor(0, 1);
        lcd.print("STOPPING CAR... ");
        delay(1000);
        lcd.clear();
        digitalWrite(speed, LOW);
        delay(5000);
    }
    else // Condition if safe
    {
        digitalWrite(greenled, HIGH);
        digitalWrite(redled, LOW);
        digitalWrite(speed, HIGH);
        noTone(buzzer);
        lcd.clear();
        lcd.setCursor(0, 0);
        lcd.print("SAFE");
        delay(1000);
        lcd.clear();
        delay(1000);
    }
}
```