Project Report

CIT 312- Microprocessor and Assembly Language Sessional

Project Title – Smart Drunk Driving Prevention

Submitted To-

1. **Chinmay Bepery**
Professor
Department of CSIT
Faculty Of CSE
Patuakhali Science and Technology University.

2. **Md. Mahbubur Rahman**
Assistant Professor
Department of CSIT
Faculty Of CSE
Patuakhali Science and Technology University.

Submitted By-

1. Noshin Nazia
ID No. 2102022
Reg, No. 10149
Level-3; Semester- 1
Faculty Of CSE

2. Sanjana Tasnim Prome
ID No. 2002014
Reg, No.09531
Level-3; Semester- 1
Faculty Of CSE

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Patuakhali Science and Technology University, Dumki, Patuakhali- 8602.

SMART DRUNK DRIVING PREVENTION

(ALCHOHOL DETECTION & VEHICLE SAFETY SYSTEM)

1. Abstract

Drunk driving is one of the leading causes of road accidents worldwide. To minimize such incidents, this project presents a **Smart Drunk Driving Prevention System** using an alcohol sensor, microcontroller, and vehicle engine control mechanism. The system detects alcohol in the driver's breath and automatically disables the vehicle engine while activating an alarm and displaying a warning message. This project provides a low-cost, efficient, and reliable safety solution for modern vehicles.

2. Introduction

Driving under the influence of alcohol significantly impairs judgment and reaction speed. Existing safety systems do not always prevent drivers from operating vehicles after consuming alcohol. This project focuses on developing an automated technology that ensures the engine only operates when the driver is sober. The system continuously monitors the driver's breath, and upon detecting alcohol, it instantly activates visual and audible alerts and cuts off the engine. This ensures **accident prevention**, **driver safety**, and **public security**.

3. Objective

- To detect alcohol levels using an alcohol sensor (MQ-3 series).
- To automatically turn off the engine if alcohol is detected.
- To alert the driver through a buzzer and LCD display.
- To design a low-cost and reliable drunk driving prevention system.
- To integrate the system with real vehicle safety modules.

4. System Overview

A. The system uses:

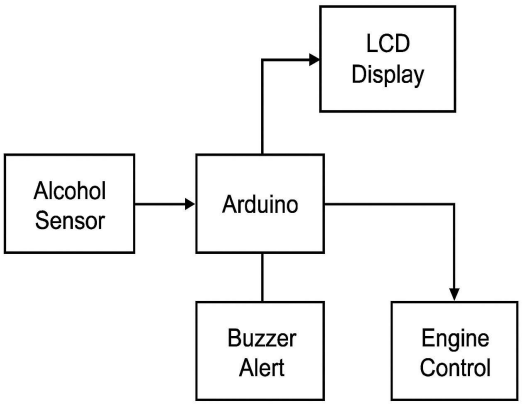
- **Alcohol Sensor** to detect ethanol level in breath
- **Arduino microcontroller** for decision making
- **LCD Display** to show system status
- **Buzzer** for audible alert
- **Engine control output (Relay/Pin)** to start or shut down the vehicle

B. When alcohol is detected, the system:

1. Displays **"ALCOHOL DETECTED"**
2. Turns engine **OFF**
3. Activates multiple buzzer alerts
4. Prevents vehicle from being driven

C. When no alcohol is detected, the engine is allowed to start normally

5. Block Diagram



6. Circuit Components

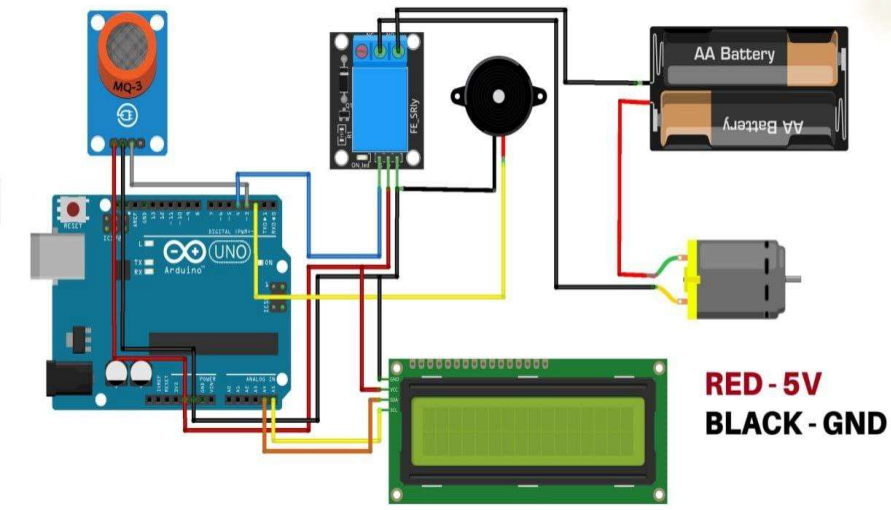
Hardware

- Arduino UNO/Nano
- MQ-3 alcohol sensor
- 16×2 LCD (I2C Module)
- Buzzer
- Engine control relay/module
- Connecting wires
- Power supply (5V)

Software

- Arduino IDE
- LiquidCrystal_I2C Library
- Wire Library

7. Circuit Diagram



8. Working Principle

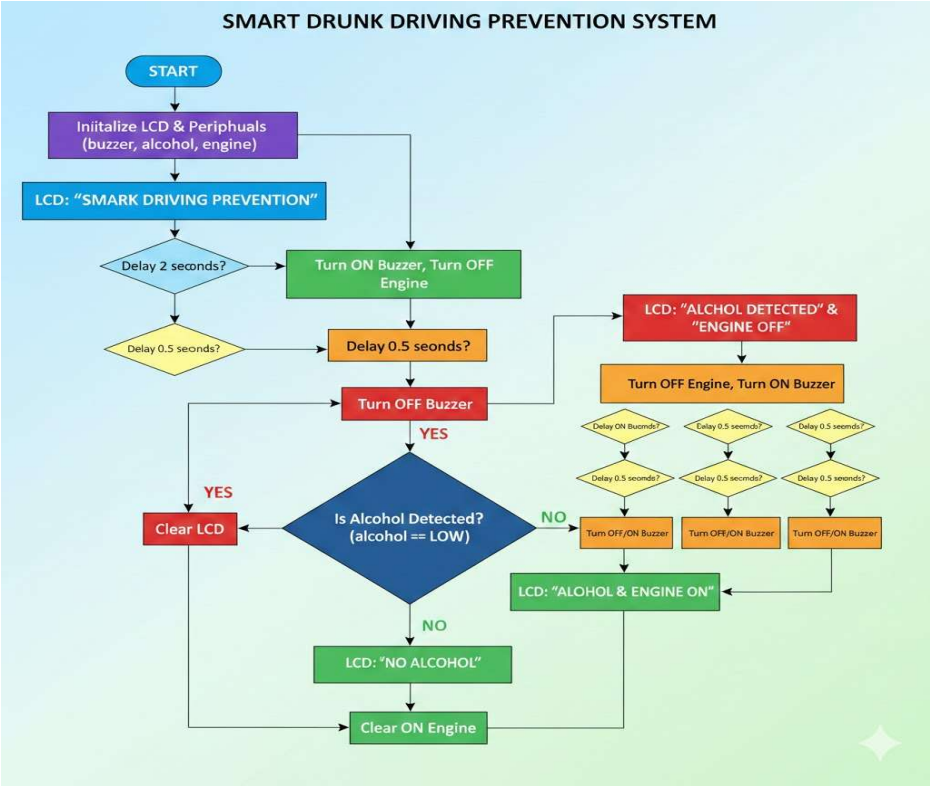
1. The alcohol sensor continuously monitors the driver's breath.

2. **If alcohol is detected (LOW signal)**:
    - LCD warns: *"ALCOHOL DETECTED"*
    - Engine output turns **OFF**
    - Buzzer sounds repeatedly

3. **If no alcohol is detected**:
    - LCD shows: *"NO ALCOHOL – ENGINE ON"*
    - Engine output stays **ON**

This ensures that a drunk driver cannot operate the vehicle.

9. Flowchart



START

|

▼

Read Alcohol Sensor

|

Alcohol Detected? No

| |

Yes ▼

| Display

Display "**NO ALCOHOL**"

Engine ON

"ALCOHOL DETECTED"

Buzzer ON

Engine OFF

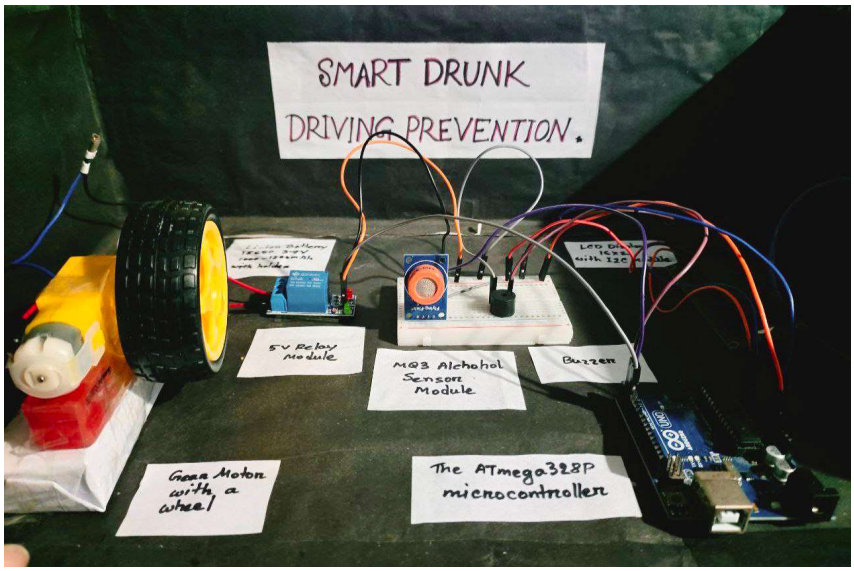
10. Arduino Program Code

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
int buzzer = 2;
int alcohol = 3;
int engine = 4;

void setup()
{
pinMode(buzzer,OUTPUT);
pinMode(alcohol,INPUT);
pinMode(engine,OUTPUT);
lcd.init();
// initialize the lcd
lcd.init();
// Print a message to the LCD.
lcd.backlight();
lcd.setCursor(0, 0);
lcd.print("SMART DRUNK");
lcd.setCursor(0, 1);
lcd.print("DRIVING PREVENTION");
delay(2000);
digitalWrite(buzzer,HIGH);
digitalWrite(engine,LOW);
delay(500);
digitalWrite(buzzer,LOW);
delay(500);
lcd.clear();
}
void loop()
{
if(digitalRead(alcohol)==LOW){
lcd.setCursor(0, 0);
lcd.print("ALCOHOL DETECTED");
lcd.setCursor(2, 1);
lcd.print("ENGINE OFF");
digitalWrite(engine,LOW);
digitalWrite(buzzer,HIGH);
delay(500);
digitalWrite(buzzer,LOW);
delay(500);
digitalWrite(buzzer,HIGH);
delay(500);
digitalWrite(buzzer,LOW);
delay(500);
digitalWrite(buzzer,HIGH);
delay(500);

digitalWrite(buzzer,LOW);
delay(500);
digitalWrite(buzzer,HIGH);
delay(500);
digitalWrite(buzzer,LOW);
delay(500);
lcd.clear();
}
else {
lcd.setCursor(3, 0);
lcd.print("NO ALCOHOL");
lcd.setCursor(2, 1);
lcd.print("ENGINE  ON");
digitalWrite(engine,HIGH);

}
}
```

11. Results & Output

- When the sensor detects alcohol, the engine immediately turns OFF.
- The system successfully displays warnings and activates the buzzer.
- When alcohol is not detected, normal engine operation continues.
- The system performed accurately in multiple tests

12. Visualization



13. Advantages

- Prevents drunk driving accidents
- Low-cost and easy to implement
- Automatic detection without human intervention
- Reliable and fast response
- Increases road and passenger safety

14. Applications

- Cars, Motorcycles and Private Vehicles
- Public Transportation (Buses, Microbuses)
- Trucks and Heavy Vehicles
- Driver Training Institutes
- Fleet Management Systems

15. Conclusion

The Smart Drunk Driving Prevention System ensures that a vehicle cannot be operated under the influence of alcohol. This automated safety mechanism can significantly reduce road accidents and save valuable human lives. By implementing this system in real vehicles, drunk driving accidents can be significantly reduced, helping to save thousands of lives every year. Its low cost, simplicity, and reliability make it highly suitable for real-world implementation in modern vehicles.

16. References

1] Arduino, "Arduino UNO Rev3 — Technical Specifications," *Arduino Documentation*. Available: https://docs.arduino.cc/hardware/uno-r3/

[2] Hanwei Electronics Co., "MQ-3 Gas Sensor Datasheet," *Winsen Sensor*, 2023. Available: https://www.winsen-sensor.com

[3] M. Schwartz, "LiquidCrystal_I2C Library for Arduino," *GitHub Repository*, 2014. Available: https://github.com/fdebrabander/Arduino-LiquidCrystal-I2C-library

[4] N. Kumar, "Basics of Actuators and Outputs in Microcontroller Systems," *Embedded Systems Journal*, 2021.

[5] World Health Organization, "Global Status Report on Road Safety," WHO, 2023. Available: https://www.who.int

[6] A. Sharma, "Alcohol Detection and Engine Locking System Using Arduino," *International Journal of Engineering Research*, 2022.

[7] S. Monk, *Programming Arduino: Getting Started with Sketches*, McGraw-Hill Education, 2016.

[8] Adafruit Industries, "Using I2C LCD with Microcontrollers," *Adafruit Learning System*. Available: https://learn.adafruit.com