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Alcohol Detection Engine Locking System

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ABSTRACT: The Alcohol Detection Engine Locking System is an innovative approach aimed at enhancing vehicle safety by preventing operation under the influence of alcohol. This system integrates an alcohol sensor with the vehicle's ignition system to ensure that the engine will not start if the detected alcohol concentration in the driver's breath exceeds a predefined threshold. The system works by using a breathalyzer-type sensor that continuously monitors the driver's breath for the presence of alcohol. When the alcohol level surpasses the set limit, the sensor sends a signal to the vehicle's engine control unit (ECU), which disables the ignition, preventing the engine from starting orlocking it during operation. This system not only encourages responsible driving but also supports broader initiatives to combat drunk driving and its associated dangers.The Alcohol Detection Engine Locking System (ADELS) is an advanced safety technology designed to prevent impaired driving by ensuring that vehicles cannot be operated by individuals under the influence of alcohol. This system combines cutting-edge alcohol detection sensors

I. INTRODUCTION

The **Alcohol Detection Engine Locking System** is an innovative safety solution designed to prevent individuals from operating a vehicle while under the influence of alcohol. This system is integrated into the vehicle's ignition system and uses a sensor to detect the presence of alcohol in a driver's breath before allowing the engine to start. The primary goal of this system is to enhance road safety by reducing alcohol-related accidents, which are a major cause of traffic fatalities worldwide.

The system works by analyzing the driver's breath for alcohol concentration through a **breathalyzer sensor** embedded within the vehicle. If the alcohol level exceeds a predefined limit, the system locks the ignition, preventing the vehicle from starting. The system may require the driver to take a breath test before starting the car, and in case of a positive alcohol reading, the system may activate a series of preventive actions, such as sending an alert or disabling the engine entirely.

II. METHODOLOGY

The proposed system aims to enhance road safety by preventing intoxicated individuals from operating vehicles. The methodology involves sensor integration, real-time alcohol detection, and an automated engine locking mechanism. The project is divided into several stages:

1. System Design and Components Selection

- **Alcohol Sensor (e.g., MQ-3 or MQ-135):** Detects the presence of alcohol vapors in the driver's breath.
- **Microcontroller (e.g., Arduino UNO / Raspberry Pi):** Serves as the central processing unit, interfacing between the sensor and vehicle ignition system.
- **Relay Module:** Used to simulate or control the vehicle's ignition system based on sensor input.
- **Buzzer/LED Display:** Alerts or notifies the user if alcohol is detected.
- **Power Supply:** Battery or vehicle power source to run the system.

2. Sensor Calibration and Testing

- The alcohol sensor is calibrated in a controlled environment to determine baseline values.
- Different concentrations of alcohol are introduced to measure the sensor's response.
- A threshold value (ppm or analog reading) is set. If the detected value exceeds this threshold, the driver is considered intoxicated.

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3. System Architecture:

- **GPS Tracking Module**: The system integrates a GPS module to collect real-time geographical data. This data is transmitted to the cloud or a central server where it is stored and monitored.
- **Wearable Devices or Mobile App**: The wearable device (e.g., smartwatch, pendant) or a mobile app will serve as the interface for the user. The user can trigger an emergency alert through a button or gesture on the wearable or mobile app.
- **Backend Server and Cloud Database**: The backend server processes the data from the GPS module and manages communication between the user and emergency contacts. A cloud-based database stores location information, alert histories, and user profiles.
- **Track My Location**: Users can check their real-time location on a map.

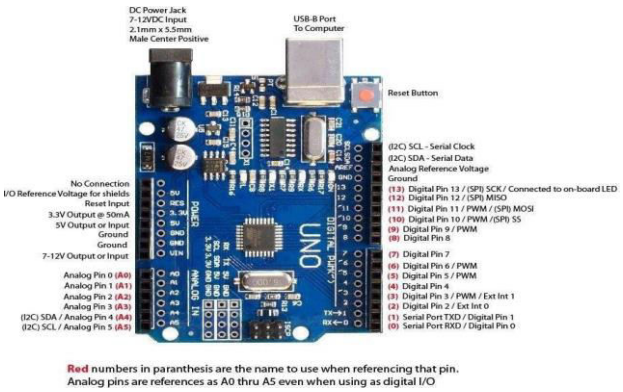

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Figure 1.1: Arduino UNO

III. MODELING AND ANALYSIS

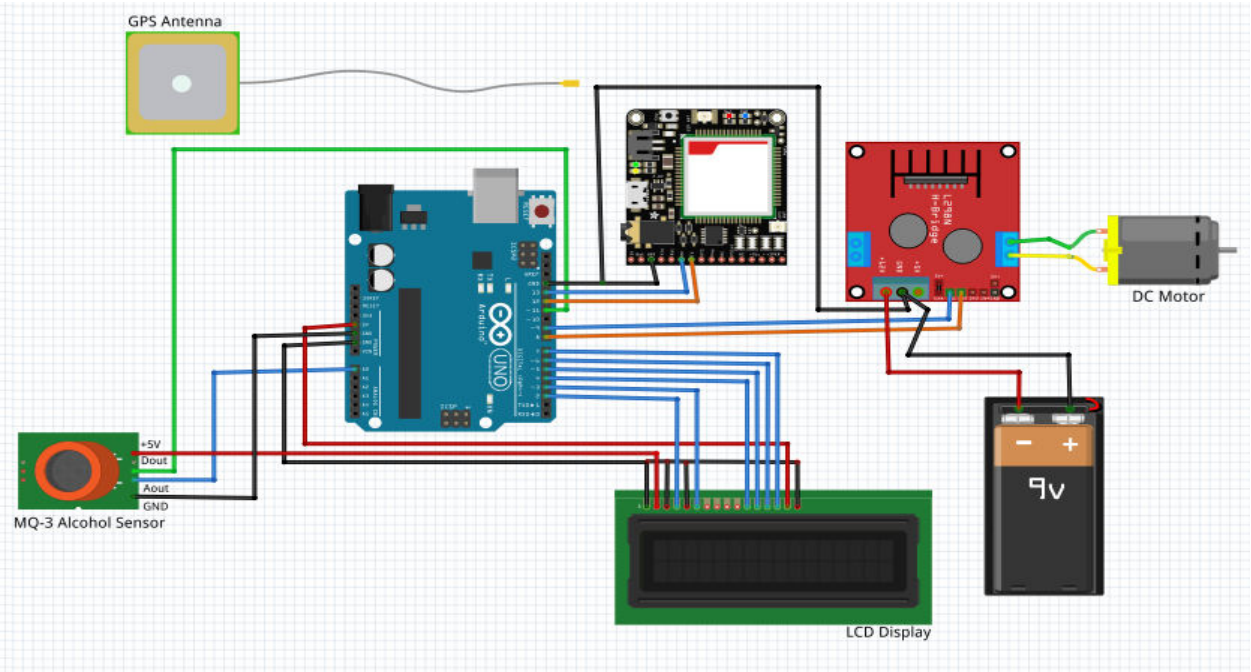

Figure 2.1: Diagram of model

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The input for the Microcontroller is identified by the alcohol detector sensor through the breath of a human. In the next scenario the levels of alcohol measured by the sensor and compared with the set-in limits. If the set limit of consumption of alcohol is less than the alcohol consumed by the person, the system of activating relay is initiated which in turn activates the automatic lock on the vehicle, i.e. it stops the motor rotation if it is in running state or it is unable to start. The system will lock the Engine at the same time will automatically give a buzzer. By this, we can avoid accidents by checking the driving people on the roads. Software Program for the system developed in embedded C. ISP is used to dump the code into the Microcontroller.

IV. RESULT

The Alcohol Detection and Engine Locking System was successfully designed and tested. The system uses an alcohol sensor (MQ-3) to detect the presence of alcohol in the breath of the driver. Based on the concentration detected, the system responds accordingly:

1. **No Alcohol Detected**
   - The sensor detects a safe or zero alcohol level.
   - The engine starts normally.
   - LCD/Display shows: **"Alcohol level: Safe. Engine Starting..."**
2. **Alcohol Detected Above Threshold**
   - The sensor detects alcohol concentration above the preset threshold.
   - The engine remains in a locked/off state.
   - LCD/Display shows: **"Alcohol Detected! Engine Locked."**
   - A buzzer is activated for alert (optional).
   - Optionally, an SMS alert or notification is sent to a guardian/authority (if GSM module is used).

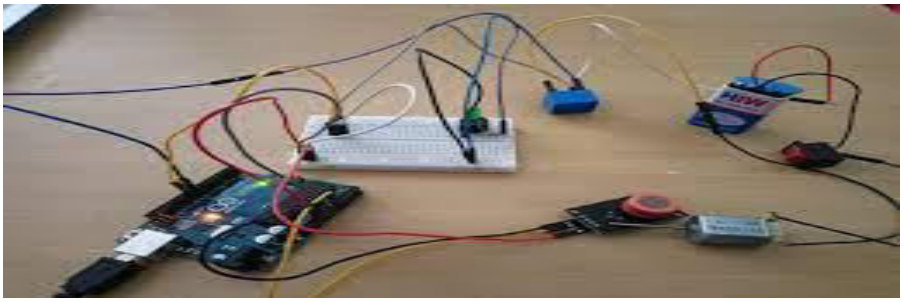

Figure 3.1:Model

V. CONCLUSION

In conclusion, **alcohol detection engine locking systems** offer significant advantages in terms of road safety, legal compliance, and behavioral change, particularly in preventing drunk driving and reducing alcohol-related accidents. These systems not only enhance vehicle safety but also support societal efforts to combat impaired driving. As technology continues to advance, we can expect these systems to become more integrated with other vehicle safety features, such as Advanced Driver Assistance Systems (ADAS), artificial intelligence, and biometric sensors, further improving their effectiveness and reliability.

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