

Alcohol Detection System

Problem Statement

The increasing number of road accidents due to drunk driving is a major concern globally. Drivers under the influence of alcohol pose a significant threat to themselves, passengers, and other road users.

There is an urgent need for a real-time system that can reliably detect if a driver has consumed alcohol and prevent them from operating a vehicle, thereby enhancing road safety and potentially saving countless lives.

This project aims to address this critical issue by developing a microcontroller-based prototype that detects the presence of alcohol vapours and triggers an alert mechanism.

Aim

The primary aim of this project is to design and develop an affordable, user-friendly prototype that senses alcohol vapors in the driver's breath. By integrating a sensitive alcohol sensor with an Arduino UNO microcontroller, the system will monitor alcohol levels and, upon detecting values above a defined threshold, activate an alert mechanism such as a buzzer or LED.

This will serve as a proof of concept for potential integration into vehicles as an ignition interlock system, effectively preventing drunk driving incidents.

Scope of the Solution

The scope of this project is to demonstrate a functional prototype that can detect alcohol vapours in close proximity. While the current implementation uses an MQ3 sensor and simple buzzer alert, future iterations can be expanded to automatically disable vehicle ignition, send notifications to emergency contacts, or even integrate with advanced vehicle security systems.

Required Components

Hardware:

- Arduino UNO Board

- MQ3 Alcohol Sensor
- Buzzer or LED
- Breadboard & Jumper Wires
- USB Cable

Software:

- Arduino IDE
- Fritzing/TinkerCad
- PCB Design Software (Eagle, KiCad)

Working Principle

The MQ3 sensor detects alcohol concentrations in the air. It provides an analog output proportional to the amount of alcohol detected. The Arduino UNO continuously reads this sensor output and compares it to a predefined threshold value. If the measured value exceeds the threshold, the Arduino activates the buzzer or LED, alerting the driver or system that alcohol has been detected.

Results and Observations

After assembling and testing the prototype, the system demonstrated the ability to detect alcohol vapors effectively. When exposed to an alcohol source such as a small quantity of spirit or breath containing alcohol, the sensor output rises significantly. Once the analog reading crosses the calibrated threshold value, the buzzer or LED is activated, providing immediate feedback.

Conclusion

This project demonstrates a simple yet effective method to detect alcohol consumption by drivers.

The prototype successfully detects alcohol vapors and triggers an immediate alert, aligning with the aim to prevent drunk driving incidents.

References

- Techatronic: Alcohol Detector using Arduino and MQ3 Sensor

(<https://techatronic.com/alcohol-detector-using-arduino-and-mq3-sensor/>)

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