



Bac Based Alcohol Detection System

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Publication History: Received: 25.02.2026; Revised: 20.03.2026; Accepted: 25.03.2026; Published: 28.03.2026.

ABSTRACT: Road accidents caused by drunk driving remain a significant global concern. This paper proposes a smart alcohol detection system designed to prevent such incidents by monitoring the driver's alcohol level and taking necessary actions to ensure road safety. The system employs an alcohol sensor (MQ3) to detect alcohol concentration in the driver's breath. If the detected level exceeds a predefined threshold, the system triggers alerts using a buzzer and LED indicators and can take preventive actions such as disabling the vehicle's ignition.

The system is built using an ESP8266 microcontroller and integrates Internet of Things (IoT) technology to enable real-time monitoring and data transmission. By implementing this system in vehicles, we aim to reduce the risk of accidents caused by impaired driving and contribute to safer roads.

KEYWORDS: Blood Alcohol Concentration (BAC), alcohol detection system, breath analyzer, ethanol sensor, MQ-3 sensor, gas sensor, alcohol sensing module, embedded system, microcontroller

I. INTRODUCTION

"Don't drink and drive. It's one test you can't afford to fail." Drunk driving is a major global concern and a leading cause of road accidents, resulting in severe injuries, loss of life, and property damage. It is recognized as a critical public safety issue, with statistics indicating that between 2008 and 2017, approximately 76,446 fatalities occurred in 211,405 road accidents due to alcohol consumption. Driving under the influence (DUI) not only endangers the driver but also puts passengers, pedestrians, and other road users at risk. Studies suggest that every thirty minutes, a life is lost due to alcohol-related accidents, leaving families devastated and communities affected.

This paper presents an Android-based Alcohol Detection System, which aims to prevent accidents caused by drunk driving. The system is designed to monitor the driver's breath for alcohol content using an MQ3 alcohol sensor. If the detected alcohol level exceeds a predefined threshold, the system immediately triggers an alert, disables the vehicle's engine, and sends a real-time location notification to a pre-registered emergency contact via the Internet of Things (IoT). By implementing this system, we aim to enhance road safety by preventing intoxicated individuals from driving, thus reducing accidents and safeguarding lives. The proposed solution integrates IoT-based monitoring, realtime alerts, and vehicle control mechanisms to offer a practical and effective approach to combating drunk driving.

OBJECTIVE

Drunk driving is one of the leading causes of road accidents, often resulting in severe injuries and fatalities. Under the influence of alcohol, drivers experience impaired judgment, reduced reaction time, and a lack of control over their vehicles, increasing the risk of accidents. To address this issue, we propose an intelligent alcohol detection system that continuously monitors the driver's alcohol level and takes preventive action. If the alcohol concentration exceeds the permissible limit, the system automatically disables the vehicle's engine to prevent the driver from operating the vehicle while intoxicated. This solution aims to enhance road safety and reduce accidents caused by impaired driving.

II. PROPOSED SYSTEM

This paper proposes an intelligent alcohol detection system designed to enhance vehicle safety by preventing intoxicated individuals from driving. The system utilizes an ESP8266 microcontroller, an MQ3 alcohol sensor, an Internet of Things (IoT) module, an LED indicator, and a buzzer to detect alcohol levels in a driver’s take preventive actions accordingly. When the alcohol sensor detects a concentration exceeding the predefined threshold, the system immediately triggers an alert through the buzzer and LED indicator. Additionally, the vehicle’s engine is automatically disabled to prevent the driver from operating the vehicle while intoxicated. Through IoT integration, real-time notifications, including the vehicle’s location, can be sent to pre-registered emergency contacts.

By implementing this system, we aim to reduce the risk of drunk driving accidents and improve overall road safety. The proposed solution is designed to be integrated into cars and other vehicles, offering an effective and automated approach to preventing impaired incidents

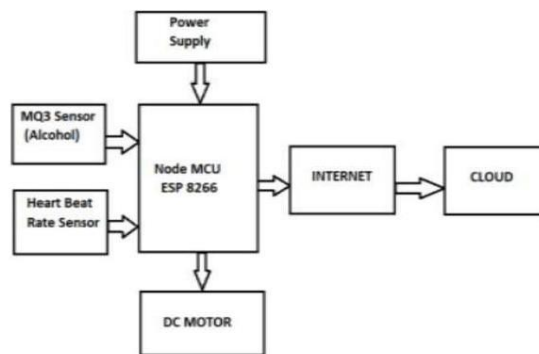
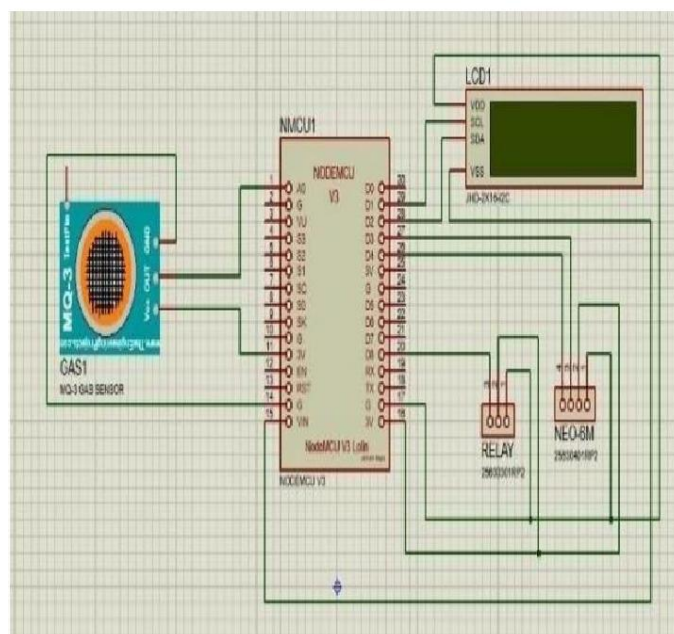


Fig 1: Block diagram



III. WORKING OF THE SYSTEM

The core component of the proposed system is the NodeMCU ESP8266 microcontroller, which serves as the central processing unit. All the system components, including the MQ3 alcohol sensor, GPS module, IoT module, relay, DC motor, LED indicator, and buzzer, are interfaced with the NodeMCU ESP8266 to ensure seamless operation.

As soon as the system is powered on, the MQ3 alcohol sensor begins detecting the alcohol concentration in the driver’s



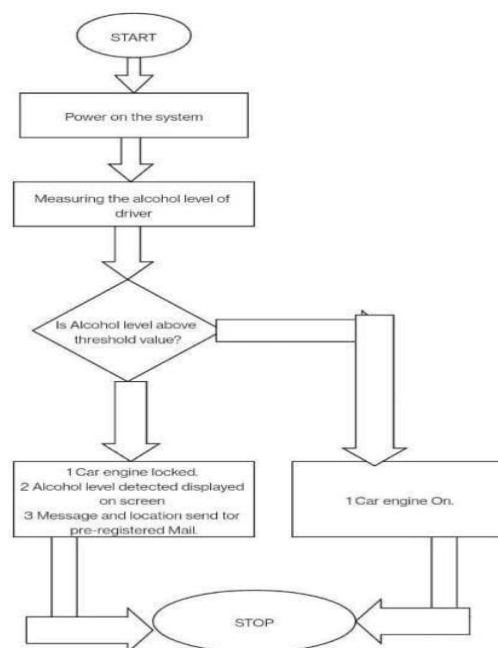
breath. If alcohol is detected, the sensor transmits the data to the NodeMCU ESP8266, which then compares the measured alcohol level with a predefined threshold value.

If the detected alcohol level exceeds the threshold, the system prevents the vehicle from starting by deactivating the relay connected to the ignition system.

If alcohol is detected while the vehicle is in motion, the system gradually slows down the vehicle and triggers an alert. Additionally, a notification containing the real-time location of the vehicle is sent to a pre-registered email via IoT connectivity.

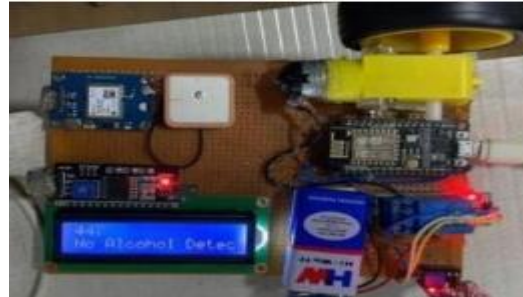
The system operates in real-time, continuously monitoring the driver's alcohol levels. It remains active at all times and does not enter a sleep state to ensure continuous detection and safety. Once the alcohol level surpasses the permissible limit, the system activates an alarm and locks the engine using the relay and DC motor. Additionally, the system integrates a GPS module, which continuously tracks the vehicle's location. The NodeMCU ESP8266 processes this data and transmits it to the cloud. The owner or designated recipient receives an email alert with a Google Maps link, enabling them to track the exact position of the vehicle.

All recorded data, including alcohol level readings, GPS coordinates, and system alerts, are stored in the cloud for future analysis and reference. This integration ensures that authorities or concerned individuals can take immediate action if required.





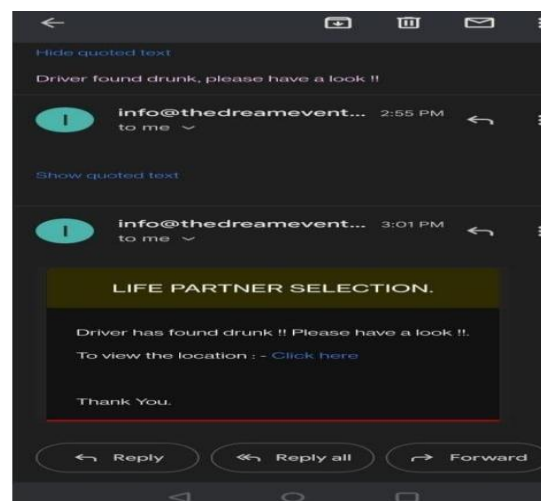
System image



Once system is on and alcohol is not detected



Sanitizer used to check the working of system as it contains alcohol.





IV. ADVANTAGES

1. **Automated Vehicle Safety Enhancement:** The proposed Android-Based Alcohol Detection System offers an automated safety mechanism for vehicles, effectively preventing drivers under the influence of alcohol from operating the vehicle. This proactive approach enhances road safety by reducing the likelihood of accidents caused by impaired driving.
2. **Accident Prevention:** By inhibiting the operation of vehicles by intoxicated drivers, the system directly contributes to the prevention of accidents related to drunk driving, thereby safeguarding lives and property.
3. **Efficient and User-Friendly Alcohol Monitoring:** The system provides an efficient and user-friendly method for monitoring a driver's blood alcohol content (BAC), ensuring compliance with legal BAC limits and promoting responsible driving behavior.
4. **Accurate and Prompt Detection:** Utilizing reliable sensors and real-time data processing, the system delivers accurate and immediate detection of alcohol levels, ensuring timely intervention to prevent potential accidents.

V. APPLICATIONS

1. **Integration in Public and Private Transport:** This system can be implemented in various public and private vehicles to monitor the driver's alcohol consumption and prevent intoxicated individuals from operating a vehicle, thereby enhancing road safety.
2. **Deployment in Corporate and Public Spaces:** The system can also be utilized in corporate offices, industries, shopping malls, public parks, and other public spaces to detect alcohol consumption among individuals, ensuring a safe and regulated environment.

VI. CONCLUSIONS

Drunk driving remains a significant contributor to road accidents, leading to substantial loss of life and property. Despite stringent laws and regulations aimed at curbing this menace, incidents related to alcohol-impaired driving persist. To address this issue, we have developed a real-time alcohol detection system centered around the NodeMCU ESP8266 microcontroller. This system integrates seamlessly with a vehicle's electronic framework to monitor the driver's alcohol levels continuously. Upon detecting levels that exceed the predetermined threshold, the system intervenes by disabling the vehicle's ignition, thereby preventing the driver from operating the vehicle while impaired.

Implementing this system offers several benefits:

Enhanced Safety: By preventing intoxicated individuals from driving, the system safeguards not only the driver and passengers but also pedestrians and other road users.
Durability and Cost-Effectiveness: The system boasts a long lifespan with minimal maintenance requirements and low power consumption, making it a sustainable solution for vehicle safety.
Data Logging and Accountability: Sensor readings are periodically uploaded to the cloud via IoT connectivity. In the event of an incident, this data serves as crucial evidence for law enforcement agencies, aiding in investigations and reinforcing accountability.
To maximize the system's impact on reducing drunk driving incidents, it is recommended that regulatory bodies mandate the installation of such devices in all vehicles. Automobile manufacturers should be encouraged or required to integrate these systems during the production process. Widespread adoption of this technology has the potential to significantly decrease the rate of alcohol-related accidents, thereby enhancing overall road safety.

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