

# Intelligent Alcohol Detection And Emergency Vehicle Control System

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**Abstract-** Road accidents caused by drunk driving and sudden driver health issues are a serious global concern. Many accidents occur when drivers operate vehicles under the influence of alcohol or when they experience unexpected medical conditions such as dizziness, fatigue, or unconsciousness while driving. These situations can lead to loss of vehicle control and severe accidents.

To address this issue, this project proposes an Intelligent Alcohol Detection and Emergency Vehicle Control System that improves vehicle safety and helps prevent potential road accidents. The system uses an alcohol sensor to detect the presence of alcohol in the driver's breath before the vehicle starts. If the detected alcohol level exceeds the permissible limit, the system automatically prevents the vehicle from starting, thereby reducing the risk of drunk driving.

In addition, the system incorporates an emergency safety mechanism to handle situations where the driver feels unwell while driving. An emergency button placed near the steering wheel allows the driver to alert the system in case of a sudden health issue. Once the button is pressed, the control unit activates safety sensors to monitor the vehicle's surroundings and gradually brings the vehicle to a safe stop. This controlled stopping mechanism helps avoid sudden accidents and ensures the safety of the driver, passengers, and pedestrians.

Overall, the proposed system integrates alcohol detection technology with an emergency vehicle control mechanism to enhance road safety. It provides an effective solution to reduce accidents caused by impaired driving and unexpected driver health emergencies, thereby contributing to safer and smarter transportation systems

## I. INTRODUCTION

Road safety has become one of the most critical challenges in modern transportation systems. Every year, a large number of road accidents occur due to human errors such as drunk driving and sudden health problems experienced

by drivers. Driving under the influence of alcohol significantly affects a driver's ability to make decisions, slows reaction time, and reduces concentration. Similarly, unexpected medical conditions such as dizziness, fatigue, or sudden unconsciousness while driving can cause loss of vehicle control, leading to serious accidents. These incidents not only endanger the lives of drivers but also pose a serious threat to passengers, pedestrians, and other road users. According to various road safety studies, alcohol consumption is one of the leading causes of traffic accidents worldwide. Despite strict traffic regulations and awareness programs, many drivers still operate vehicles after consuming alcohol. Traditional safety measures such as traffic monitoring and law enforcement are not always sufficient to completely prevent such incidents. Therefore, integrating intelligent safety technologies into vehicles has become an important approach to improving road safety.

Recent advancements in sensor technology and embedded systems have enabled the development of smart vehicle safety solutions. Alcohol detection sensors can identify the presence of alcohol in a driver's breath, while microcontroller-based systems can control vehicle operations based on sensor inputs. In addition, safety mechanisms such as emergency control systems can help manage unexpected driver health issues during driving by safely slowing down and stopping the vehicle.

This research proposes an **Intelligent Alcohol Detection and Emergency Vehicle Control System** designed to enhance road safety by preventing drunk driving and managing emergency situations. The system uses an alcohol sensor to detect alcohol levels in the driver's breath before starting the vehicle. If the alcohol level exceeds the safe limit, the system prevents the vehicle from starting. Furthermore, an emergency button is incorporated to allow the driver to signal a health emergency while driving. Once activated, the system monitors the surroundings and gradually brings the vehicle to a safe stop.

The main objective of this system is to reduce road accidents by combining alcohol detection technology with an

emergency vehicle control mechanism. By integrating these features, the proposed system aims to create a safer and more intelligent transportation environment.

## II. LITERATURE REVIEW

Several studies have been conducted to improve road safety by using advanced technologies such as sensors, embedded systems, and intelligent vehicle control mechanisms. Researchers have proposed various systems to detect drunk driving and prevent accidents caused by driver impairment.

Many existing systems use alcohol sensors to detect alcohol in the driver's breath. These sensors are usually connected to a microcontroller that checks the alcohol level before allowing the vehicle to start. If the detected alcohol concentration exceeds the permitted limit, the ignition system of the vehicle is disabled. Such systems have proven to be effective in reducing accidents caused by drunk driving.

Some researchers have also focused on driver health monitoring systems. These systems use sensors to monitor the physical condition of the driver, such as heart rate, fatigue level, or driver alertness. When abnormal conditions are detected, warning signals are generated to alert the driver or automatically slow down the vehicle. In addition, several intelligent vehicle safety systems have been developed that integrate different sensors and control units to improve driving safety. These systems can monitor the environment around the vehicle and help in making safer driving decisions. Technologies such as automatic braking, obstacle detection, and driver monitoring have significantly improved vehicle safety in recent years.

However, many existing solutions focus only on a single problem, such as alcohol detection or driver health monitoring. There is a need for an integrated system that can handle both drunk driving prevention and emergency situations caused by driver health issues.

Therefore, the proposed **Intelligent Alcohol Detection and Emergency Vehicle Control System** aims to combine alcohol detection with an emergency vehicle control mechanism. This integrated approach helps prevent the vehicle from starting when alcohol is detected and also ensures safe vehicle stopping during unexpected driver health emergencies

## III. PROPOSED SYSTEM

The proposed **Intelligent Alcohol Detection and Emergency Vehicle Control System** is developed using an embedded system that integrates sensors, a microcontroller, and vehicle control mechanisms. The system mainly operates in two stages: alcohol detection and emergency vehicle control.

Initially, an alcohol sensor (MQ-3) is used to detect alcohol in the driver's breath before the vehicle starts. The sensor sends the detected alcohol level to the microcontroller. If the alcohol level is below the predefined safe limit, the system allows the vehicle to start normally. If the alcohol level exceeds the permitted limit, the microcontroller disables the ignition system and activates a warning alert to prevent drunk driving.

During vehicle operation, an emergency button placed near the steering wheel allows the driver to signal a health emergency. When the button is pressed, the microcontroller activates the vehicle control mechanism through the motor driver. The system gradually reduces the vehicle speed and safely stops the vehicle to avoid accidents.

Thus, the proposed system integrates alcohol detection and emergency vehicle control mechanisms to improve road safety and reduce accidents caused by impaired driving or sudden driver health issues.

## IV. METHODOLOGY

### 1) Alcohol Detection and Monitoring

The system uses an MQ-3 alcohol sensor to detect alcohol concentration in the driver's breath before the vehicle starts. The sensor continuously monitors the surrounding air and sends analog signals to the microcontroller. The collected data is compared with a predefined threshold value to determine whether the driver has consumed alcohol.

### 2) Ignition Control Mechanism

The microcontroller processes the sensor data and controls the vehicle ignition system. If the detected alcohol level is below the safe limit, the system allows the vehicle to start normally. If the alcohol level exceeds the permissible limit, the ignition system is automatically disabled and a warning alert is activated to prevent drunk driving.

### 3) Driver Emergency Detection

An emergency button is placed near the steering wheel to allow the driver to indicate sudden health issues such as dizziness, fatigue, or discomfort while driving. When the driver presses the button, a signal is sent to the microcontroller indicating a possible emergency situation.

#### 4) Emergency Vehicle Control and Safety Response

After receiving the emergency signal, the microcontroller activates the vehicle control mechanism through a motor driver. The system gradually reduces the vehicle speed and safely stops the vehicle. A buzzer or warning indicator may also be activated to alert passengers and nearby vehicles.

## V. RESULTS AND PERFORMANCE ANALYSIS

The system was implemented using an MQ-3 alcohol sensor, microcontroller, emergency button, motor driver, and buzzer. During testing, the alcohol sensor successfully detected the presence of alcohol in the driver's breath. When the detected alcohol level exceeded the predefined threshold, the microcontroller immediately disabled the ignition system and activated a warning alert, preventing the vehicle from starting. When the alcohol level was within the safe limit, the system allowed the vehicle to start and operate normally.

The emergency safety feature was also tested to simulate situations where the driver might experience sudden health issues while driving. When the emergency button was pressed, the signal was sent to the microcontroller, which activated the vehicle control mechanism. The system gradually reduced the vehicle speed through the motor driver and safely brought the vehicle to a stop, avoiding sudden braking.

The experimental results demonstrated that the system effectively detects alcohol levels and responds quickly to emergency signals. The integration of alcohol detection and emergency vehicle control improves overall driver safety and helps reduce the risk of road accidents caused by drunk driving or unexpected driver health emergencies.

## VI. ADVANTAGES OF THE PROPOSED SYSTEM

The **Intelligent Alcohol Detection and Emergency Vehicle Control System** improves vehicle safety by preventing drunk driving and providing emergency assistance during driving. The system ensures that the vehicle operates only when the driver is in a safe condition and helps reduce accidents caused by alcohol consumption or sudden health issues.

## Advantages:

1. Prevents drunk driving by detecting alcohol in the driver's breath.
2. Automatically disables vehicle ignition if alcohol level exceeds the safe limit.
3. Provides an emergency button to handle sudden driver health issues.
4. Gradually stops the vehicle safely to avoid accidents.
5. Improves overall safety for drivers, passengers, and pedestrians.
6. Provides quick response during emergency situations.
7. Simple and reliable system using embedded technology.
8. Cost-effective and easy to implement in vehicles.

## VII. FUTURE SCOPE

Future improvements can include integrating additional health monitoring sensors such as heart rate and fatigue detection sensors to automatically detect driver health conditions. GPS and GSM modules can be added to send emergency alerts and the vehicle location to nearby hospitals or family members. The system can also be connected with IoT technology to provide real-time monitoring and data analysis. Advanced safety features such as automatic obstacle detection and smart braking systems can further enhance vehicle safety.

## VIII. RESULT AND DISCUSSION

The system was tested using an MQ-3 alcohol sensor and microcontroller. The sensor detected alcohol and prevented the vehicle from starting when levels exceeded the safe limit. The emergency button successfully triggered a controlled vehicle stop during simulated emergencies. Overall, the system demonstrated reliable performance in improving driver safety.

## IX. CONCLUSION

This paper presented an **Intelligent Alcohol Detection and Emergency Vehicle Control System** designed to enhance road safety. The system integrates alcohol detection technology with an emergency vehicle control mechanism to prevent accidents caused by drunk driving and sudden driver health issues. By automatically disabling the ignition when alcohol is detected and safely stopping the vehicle during emergencies, the system provides an effective safety solution. The proposed system contributes to the development of safer and smarter transportation systems.

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