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# Accident Prevention And Detection System Using Iot

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ABSTRACT :

Road safety is a major concern globally due to the increasing number of traffic accidents, many of which are caused by drunk driving. In response to this, we propose a smart alcohol detection system that enhances road safety by preventing drivers from operating vehicles under the influence of alcohol. The system integrates various components, including an alcohol sensor, Arduino microcontroller, GPS, GSM, and an engine locking mechanism.

The alcohol sensor continuously monitors the driver's breath for alcohol levels. If the detected alcohol content exceeds the permissible limit, the system automatically activates the engine locking mechanism, preventing the vehicle from starting or continuing operation. The GPS module sends real-time location data, while the GSM module notifies designated contacts, including the vehicle owner or authorities, with an emergency message, enabling timely intervention.

Additionally, the system includes a buzzer that alerts the driver and nearby individuals when alcohol is detected, and an LCD display for showing relevant information. Several variations of the system integrate sensors for detecting driver drowsiness, vibration sensors for accident detection, and heart rate sensors to further ensure safety. The use of wireless communication and real-time monitoring makes this system adaptable for both pre- and post-accident scenarios.

**Keywords**: Alcohol detection, GSM, GPS, Engine locking, Arduino, Drunk driving prevention, Embedded system, Real-time monitoring, Road safety.

## Introduction :

Road safety is a vital global issue, with traffic accidents resulting in a high number of injuries and deaths each year. According to the World Health Organization (WHO), over 1.35 million people die each year in road traffic accidents, with an even greater number suffering serious injuries. Drowsy driving accounts for about 20% of these events, with impaired driving due to alcohol intake accounting for a sizable share as well. In the United States, for example, the National Highway Traffic Safety Administration (NHTSA) reported that drunk driving causes more than 10,000 deaths per year. These worrisome data underscore the critical need for more effective safety measures to avoid driver-related accidents, while traditional tactics like awareness programs and legal rules have proven ineffective in lowering fatalities.

To solve this issue, the proposed project seeks to create an automated real-time safety system that employs modern technologies such as computer vision, alcohol detection sensors, and the Internet of Things (IoT). The device will use face recognition to detect indicators of driver drowsiness and alcohol sensors to monitor blood alcohol concentrations. When the system detects tiredness or alcohol impairment, it promptly alerts the driver and prevents the car from starting or continuing to operate. In addition, GSM technology will be utilized to send real-time alerts to authorities or emergency contacts, allowing for immediate action. By addressing driver impairment before it causes an accident, this proactive approach aims to drastically reduce road fatalities and improve overall road safety.

## Problem Statement :

Driving under the influence of alcohol or tiredness is a primary cause of traffic accidents and fatalities worldwide. Despite a variety of preventative methods, including legislative limits and public safety campaigns, the number of accidents caused by impaired drivers remains disturbingly high. Current systems that rely exclusively on human judgment are frequently unreliable because drivers may not realize their impairment or choose to disregard it. As a result, there is an urgent need for an automated system that can monitor and assess the driver's state in real time and take appropriate action to prevent risky driving. This project tries to address this issue by building a system that detects driver weariness and alcohol levels, ensuring alerts are delivered, and prohibits the vehicle from functioning in risky conditions, thereby reducing the risk of road accidents.

## 3. Objective :

The project's goal is to develop a comprehensive driver safety monitoring system that includes alcohol detection, sleepiness monitoring, and accident detection. It detects alcohol levels and indicators of tiredness and locks the vehicle's engine if impairment is detected. In addition, the system will detect accidents and automatically deliver real-time alerts with GPS coordinates to emergency contacts via GSM technology. This integrated strategy improves road safety, lowers accident rates, and provides quick aid during crises, all while increasing driver awareness via real-time feedback.

## Literature Review :

1. **Driver Drowsiness Detection System**

**Authors:** Sai Krishna Paruchuri, Daniel Paul

**Focus Area:** Driver drowsiness detection.

This paper explores an Arduino-based approach for detecting driver drowsiness, employing IR sensors, cameras, and accelerometers. It focuses on monitoring eye closure rates and yawning to identify signs of drowsiness, with alerts issued via a buzzer or vibration system. The authors suggest future improvements, including integration with vehicle controls for automated safety responses[1]

2. **A Review Paper on Pre and Post Accident Detection and Alert System: an IoT Application for Complete Safety of the Vehicles**

**Authors:** Vaishali Shrivastava, Manasi Gyanchandani.

**Focus Area:** IoT applications in accident detection.

This paper investigates IoT-based technologies for vehicle safety, highlighting pre- and post-accident detection. It examines the role of accelerometers, gyroscopes, GPS, and GSM modules in accident detection and stresses the value of sensor fusion to enhance detection accuracy.

3. **Accident Detection and Monitoring System Using IoT**

**Authors:** Dr. D. Karunkuzhali, D. Madhubala, Y. Nisha, S. Rajeswari.

**Focus Area:** IoT-based accident detection and monitoring.

This study presents an IoT-based real-time accident detection system utilizing accelerometers, GPS modules, and GSM modules. It focuses on accurate accident detection and timely location-based alerts to improve emergency response times.

4. **A Comprehensive Study on IoT-Based Accident Detection Systems for Smart Vehicles**

**Authors:** Unaiza Alvi, Muazzam A. Khan Khattak, Balawal Shabir, Asad Waqar Malik, Sher Ramzan Muhammad.

**Focus Area:** IoT solutions for smart vehicle accident detection.

This paper reviews various IoT-based accident detection systems for smart vehicles, comparing technologies such as accelerometers and gyroscopes. The study emphasizes real-time monitoring and the use of cloud data management to enhance vehicle safety and accident response.

5. **Vehicle Tracking and Alcohol Detector with Engine Locking System with GSM and GPS**

**Authors:** M**.** Navya Sri, N. Saritha, N. Navya, Dr. N. Jagadeeshan.

**Focus Area**: Vehicle tracking, alcohol detection, and engine locking.

This paper examines a vehicle tracking system with an integrated alcohol detector and engine locking mechanism. It focuses on real-time tracking and engine immobilization if alcohol is detected, enhancing vehicle security and safety.

6. **Review Paper on Alcohol Detection and Vehicle Engine Locking System**

**Authors:** Dr. K. Ravi Kumar, Yellapu Neeraj Kumar, Midathana Kisran, Urikiti Teja, MD Shakeer.

**Focus Area:** Alcohol detection and vehicle engine locking system.

This paper reviews an alcohol detection system linked to a vehicle's ignition, preventing engine start if high alcohol levels are detected. The system integrates GPS and GSM to improve security by notifying emergency contacts when alcohol is detected.

7. **Alcohol Detection and Engine Locking System**

**Authors:** Nookala Venu, Vamshi M, Akhil V, Deepika K, Prashanth K, Raffiudhin M.

**Focus Area:** Alcohol detection and engine locking system.

This study describes an alcohol detection system with an engine locking feature, activated by an Arduino microcontroller, and real-time notifications to emergency contacts via GSM. The paper suggests further safety enhancements through accident detection integration.

8. **Alcohol Detection with Automatic Engine Locking System**

**Authors:** P. Sree Lekha, Dr. P. Venkata Prasad.

**Focus Area:** Automatic engine locking based on alcohol detection.

This paper describes a system that uses MQ-3 alcohol sensors connected to vehicle ignition to prevent operation when high alcohol levels are detected. It emphasizes reliability in detecting alcohol and automatically immobilizing the engine, contributing to road safety.

9. **Design & Development of Arduino-based Alcohol Sensing and Dizziness Detecting Braking System**

**Authors:** Md. Naimur Asif Borno, Prangon Das, Md. Touhid Islam, Mushfique Ahmed, Azim Miah, Nadia Kachmina

**Focus Area:** This study explores a system integrating alcohol detection with automatic braking using motion and alcohol sensors. The system, controlled by an Arduino, focuses on detecting intoxication or dizziness and applying brakes as a safety measure. Future development aims to enhance this system with additional safety technologies.

## System Architecture :

The system architecture of this IoT-based accident prevention and detection project consists of multiple sensors and components to assure driver safety and offer real-time notifications in the event of an emergency. At its heart is the Arduino UNO microcontroller, which acts as the central processing unit, collecting and processing data from a variety of sensors, including a pressure sensor for detecting accidents. The power supply unit guarantees that all components receive consistent power throughout operation.

The system includes a sleepiness detection module that uses an infrared sensor to scan the driver's eyes and head movements for indicators of fatigue. An alcohol detection sensor (MQ-3) examines the driver's breath for evidence of alcohol. If either of these sensors detects impairment, the system sounds a buzzer to inform the driver, and the motor driver shuts the vehicle's engine to prevent further movement.

In the event of a collision, the pressure sensor detects sudden impacts on the car and sends signals to the Arduino, which subsequently initiates the accident reaction. The GSM module rapidly delivers SMS notifications to pre-configured emergency contacts, including critical information like accident detection and vehicle location, which is tracked by the GPS module. This real-time communication improves emergency response by delivering immediate information about the accident's location and severity.

***Arduino UNO (Microcontroller) :***

The Arduino UNO (Microcontroller) features a central processing unit. The Arduino UNO serves as the system's brain, processing sensor data and making programmed decisions.

**Roles:**

- Collects data from sensors, including alcohol, drowsiness, and accidents.
- Runs algorithms to determine the driver's state and the status of the car.

Triggers appropriate reactions, such as SMS alerts, engine control, and buzzer activation.

***Sensors :***

**a) Drowsiness Detection Module :**

- **Type :** Infrared camera or ordinary camera.
- **Role :** Constantly watches the driver's eye movements, head tilts, and facial expressions for indicators of weariness.
- **Output :** If drowsiness is detected (e.g., closing the eyes for more than a few seconds), a signal is sent to the Arduino.

**b) Alcohol Detection Sensor :**

- **Type :** Sensor for alcohol gas.
- **Function :** Measures blood alcohol content (BAC) by detecting alcohol vapor in the driver's breath.

**Output :** If alcohol is detected above a specific level (e.g., 0.08% BAC), a signal is sent to the Arduino, which triggers alarms or disables the vehicle's engine.

**c) Accident Detection Sensor :**

- **Type :** Pressure sensor (such as the Flexiforce Pressure Sensor).
- **Role :** Detects sudden impact or abnormal pressure levels on the vehicle's body (which indicate a collision).
- **Output :** Alerts the microcontroller when pressure exceeds a specified threshold, signaling a potential accident.

***GSM Module :***

- **Type :** GSM SIM900A or Equivalent.
- **Role :** Sends SMS alerts to emergency contacts when an accident occurs or any Problem is occurs.
- **Output :** Sends real-time messages with accident and location information.

***GPS Module :***

- **Type :** GPS Module (NEO-6M or similar)
- **Role :** Monitors the vehicle's location, particularly during accidents.
- **Output :** Sends GPS coordinates to the Arduino, which are included in SMS warnings provided by the GSM module.

***Buzzer :***

- **Type :** Piezoelectric buzzer.
- **Role :** Alerts when alcohol is found or signs of drowsiness are observed.
- **Output :** An audible alert that notifies the driver and passengers.

***Motor Driver and Vehicle Engine Control :***

- **Type :** Motor driver IC (e.g., L298N).
- **Role :** Controls the state of the vehicle's engine.
- **Output :** The engine is disabled if alcohol or drowsiness is detected, preventing further vehicle operation.

***Power Supply:***

- **Type :** Typically a 12V DC power supply or battery.
- **Role :** Ensures that all components (microcontroller, sensors, and communication modules) work properly.
- **Purpose :** Provides electrical power to all system component.

## Flow Chart :

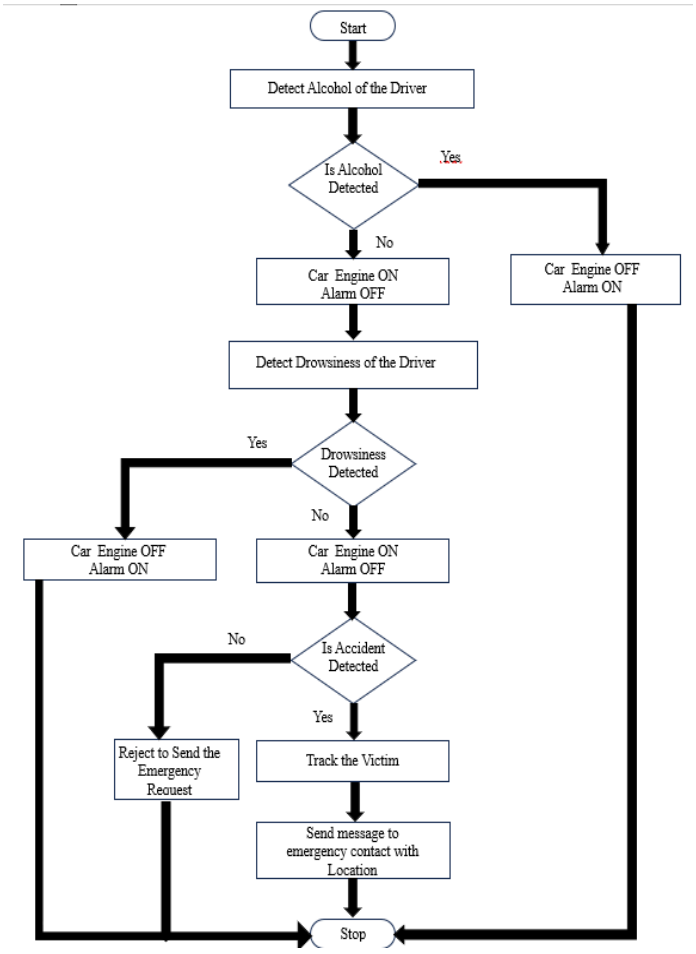


**Fig : Flow Diagram of Accident Prevention & Detection System**

***Advantages***

1. **Enhanced Road Safety:** The system detects alcohol and tiredness, preventing impaired driving and lowering the risk of accidents.
2. **Real-Time Monitoring:** The system continuously analyzes the driver's condition, including alcohol and tiredness, and gives real-time feedback to maintain safe driving behavior.
3. **Accident Detection:** The technology identifies accidents and sends timely alerts, allowing for faster rescue operations.
4. **Automated Engine Control:** The technology can shut the car's engine if the driver is impaired by alcohol or fatigue, preventing unsafe driving.
5. **Emergency Alert System:** When an accident occurs, the system provides real-time notifications to emergency contacts or authorities, allowing for faster medical aid.

## Conclusion :

The Accident Prevention and Detection System, which employs alcohol, sleepiness, and accident detection technology, represents a proactive approach to improving road safety. The system monitors the driver's state and the vehicle's status in real time by integrating sensors, GSM and GPS modules, and IoT capabilities. This automated technology not only prevents impaired driving by turning off the vehicle's engine, but it also provides a speedy response mechanism during accidents via location-based warnings. The system represents a significant improvement in road safety technology, as it has the ability to cut accident rates and permit speedier emergency responses. In the future, the system can be expanded with new functions such as health monitoring and environmental elements, making roads safer for everyone.

REFERENCES :


1. Sai Krishna Paruchuri, Daniel Paul, “Driver Drowsiness Detection System,” Masters Thesis, SUNY at Binghamton, 2020.

2. Vaishali Shrivastava, Manasi Gyanchandani, “A Review Paper on Pre and Post Accident Detection and Alert System: an IoT Application for Complete Safety of the Vehicles,” Maulana Azad National Institute of Technology, Bhopal, India, 2022.

3. Dr. D. Karunkuzhali, D. Madhubala, Y. Nisha, S. Rajeswari, “Accident Detection and Monitoring System Using IoT,” Department of Information Technology, Panimalar Engineering College, Chennai, 2021.
4. Unaiza Alvi, Muazzam A. Khan Khattak, Balawal Shabir, Asad Waqar Malik, Sher Ramzan Muhammad, “A Comprehensive Study on IoT Based Accident Detection Systems for Smart Vehicles,” National University of Sciences and Technology (NUST), Islamabad, Pakistan, IEEE, 2021.
5. M. Navya Sri, N. Saritha, N. Navya, Dr. N. Jagadeeshan, “Vehicle Tracking and Alcohol Detector with Engine Locking System with GSM and GPS,” Department of ECE, Malla Reddy Engineering College for Women (UGC-Autonomous), Hyderabad, India, 2021.

6. Dr. K. Ravi Kumar, Yellapu Neeraj Kumar, Midathana Kisran, Urikiti Teja, MD Shakeer, “Review Paper On Alcohol Detection And Vehicle Engine Locking System,” N. S. Raju Institute of Technology, Visakhapatnam, India, DOI: 10.47750/pnr.2022.13.S09.1180, 2022.

7. Nookala Venu, Vamshi M, Akhil V, Deepika K, Prashanth K, Raffiudhin M, “Alcohol Detection and Engine Locking System,” Balaji Institute of Technology and Science, Warangal, Telangana, India, 2020.
8. P. Sree Lekha, Dr. P. Venkata Prasad, “Alcohol Detection with Automatic Engine Locking System,” Department of EEE, Chaitanya Bharathi Institute of Technology (Autonomous), Hyderabad, 2021.
9. Md. Naimur Asif Borno, Prangon Das, Md. Touhid Islam, Mushfique Ahmed, Azim Miah, Nadia Kachmina Prioty, Manirul Islam, “Design & Development of Arduino-based Alcohol Sensing and Dizziness Detecting Braking System,” Department of Mechatronics Engineering, Rajshahi University of Engineering & Technology, 2021.