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VEHICLE TRACKING AND ALCOHOL DETECTOR WITH ENGINE LOCKING SYSTEM USING GSM AND GPS

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ABSTRACT
Drunk driving is a significant cause of road accidents worldwide, with a considerable percentage of accidents attributed to drivers with elevated blood alcohol content. To address this issue, we propose a smart alcohol detection system that utilizes Arduino integrated with GSM and GPS modules to detect and respond to drunk driving in real time. The system automatically senses alcohol content in the driver's breath using an MQ-3 alcohol sensor. Upon detecting alcohol levels above the permissible limit, the system stops the vehicle and sends an SMS notification with the vehicle's location to a pre-designated contact, ensuring rapid intervention. In this design, an Arduino Uno microcontroller processes the sensor data and controls a DC motor to simulate vehicle functionality. If the driver's breath alcohol content exceeds the safe limit, the motor is disabled, preventing the vehicle from moving, while notifying authorities or family members. An LCD display is also used to provide real-time feedback on the system status, enhancing user interaction. This system presents an affordable, scalable solution aimed at reducing road accidents caused by drunk driving.

Keywords: Drunk Driving Prevention, GSM, GPS, MQ3 Alcohol Sensor, Arduino, Road Safety.

I.INTRODUCTION

Drunk driving remains one of the leading causes of road accidents, contributing to thousands of fatalities annually. Drivers under the influence often make poor decisions, leading to unsafe road conditions for themselves and others. Despite existing legal frameworks and enforcement efforts, effectively monitoring and curbing drunk driving remains a challenge for law enforcement agencies. Current detection methods involve manual breathalyzers, which require physical interaction and are limited by time and resources. To address these issues, we propose an intelligent alcohol detection and prevention system that combines an Arduino Uno microcontroller with an MQ-3 alcohol sensor to detect alcohol in a driver’s breath. When alcohol is detected above the legal threshold, the system stops the vehicle and sends a notification via GSM, including the vehicle's location through GPS. This system aims to automate the monitoring process, making roads safer by preventing intoxicated drivers from operating vehicles.

This paper outlines the design and implementation of the system, along with its potential to significantly reduce accidents caused by drunk driving, particularly in regions where manual enforcement is limited.

II.RELATED STUDY

Previous research on preventing drunk driving accidents has focused on various detection techniques. Many solutions have utilized microcontrollers like PIC 16F877A, but these designs tend to be more costly and less effective for real-time applications. Earlier designs also lacked seamless integration with communication technologies, limiting their real-world applicability. In contrast, our proposed system is built on a cost-effective and robust architecture using the AT89S52 microcontroller, combined with a GSM module for real-time notifications. Additionally, the system uses the MQ-3 alcohol sensor to monitor air quality in the vehicle, which triggers a series of responses, including stopping the vehicle and notifying the authorities if excessive alcohol is detected.

In comparison to existing models, our system offers improved accuracy, affordability, and ease of use. This system eliminates the need for manual enforcement, providing a more reliable solution that can be installed in vehicles as a preventive measure against drunk driving.

III.LITERATURE REVIEW

The increasing rate of road accidents due to drunk driving has spurred extensive research into vehicular safety technologies. One promising avenue is the development of integrated systems that combine alcohol detection with real-time vehicle tracking and engine control mechanisms. These systems aim to provide both accident prevention and timely intervention by utilizing embedded technologies such as GSM (Global System for Mobile Communications) and GPS (Global Positioning System). This review examines the existing literature surrounding such systems, highlighting advancements, challenges, and potential improvements.

1. Alcohol Detection Systems in Vehicles

Alcohol detection systems have become a focal point in combating drunk driving, particularly in regions where manual breathalyzer testing is either insufficient or inefficient. Early detection methods primarily involved breathalyzers used by law enforcement, requiring driver participation. These methods, while effective, suffer from limitations, including the inability to continuously monitor drivers in real time. In recent years, research has shifted toward in-vehicle detection systems that automatically monitor alcohol levels in the driver's breath and provide feedback to prevent vehicle operation.

Multiple studies have utilized various types of alcohol sensors, including MQ-series gas sensors (e.g., MQ-3), which have been shown to provide reliable detection of alcohol concentration in the air. Kumar et al. (2018) explored the use of MQ-3 sensors integrated with microcontrollers to monitor driver alcohol levels, which are then used to trigger alerts or disable vehicle operation. However, the authors highlighted that while alcohol detection is effective, integration with other vehicle systems for real-time intervention remains a challenge.

2. Vehicle Engine Control Systems

Incorporating alcohol detection with vehicle engine control mechanisms presents a proactive solution to drunk driving. Various studies have experimented with different microcontroller platforms, including Arduino and PIC controllers, to process alcohol sensor data and stop the vehicle if intoxication is detected. Gupta et al. (2020) developed a system where the detection of alcohol levels above a predefined threshold results in the automatic deactivation of the vehicle's engine. This approach allows for immediate prevention of drunk driving, though it raises concerns about safety during situations such as driving at high speeds or in dense traffic.

Further research suggests that integrating such systems with a gradual engine slow-down mechanism could prevent abrupt vehicle halting, ensuring passenger safety. Systems that combine alcohol detection with controlled engine shutdown protocols could prove more effective, particularly in public transportation vehicles.

3. GSM and GPS in Vehicle Tracking

The addition of GSM and GPS modules to alcohol detection systems allows for real-time communication and vehicle tracking. GSM technology is widely used for sending alerts via SMS to pre-designated contacts, such as family members or law enforcement, when high alcohol levels are detected. Sharma et al. (2017) demonstrated a system where GSM modules send an SMS notification along with the vehicle's GPS coordinates to predefined recipients when a driver is found intoxicated. The inclusion of GPS ensures that the vehicle’s location is continuously monitored, providing critical information in case of emergencies or accidents.

The combination of GPS tracking and GSM-based communication systems has also been explored in anti-theft vehicle tracking systems, with potential applications in drunk driving prevention. In these systems, real-time GPS data allows authorities or vehicle owners to track vehicle movement and intervene when necessary. These embedded solutions are cost-effective and scalable, making them suitable for both private and commercial vehicles.

4. Embedded Systems for Road Safety

The use of embedded systems in vehicle safety technologies is becoming increasingly popular due to their flexibility, low cost, and ease of integration with various sensors and communication modules. Research by Patel et al. (2021) explored the use of embedded systems in road safety applications, specifically focusing on the integration of alcohol detection, engine control, and communication modules within a unified platform. The authors emphasized that embedded systems are ideal for real-time processing and response, crucial in drunk driving scenarios where immediate action is required.

Embedded platforms, such as Arduino or ARM-based systems, provide the necessary computational power while maintaining low energy consumption, making them suitable for long-term deployment in vehicles. Embedded systems also allow for future upgrades, such as incorporating additional sensors (e.g., fatigue or drowsiness detection) or enhancing communication protocols (e.g., 4G/5G networks for faster alert dissemination).

5. Challenges and Future Scope

While current research shows significant progress in developing integrated vehicle tracking and alcohol detection systems, several challenges remain. One major issue is the accuracy and reliability of alcohol sensors in varying environmental conditions. Factors such as temperature, humidity, and sensor placement can affect sensor readings, leading to false positives or negatives. Addressing these challenges requires the development of more robust sensor technologies and better calibration methods.

Another challenge is the integration of alcohol detection systems with existing vehicle architecture. Most research prototypes focus on external systems that may not be compatible with commercial vehicles without extensive modification. Future work should explore ways to seamlessly integrate these systems into vehicle control units, allowing manufacturers to adopt them as standard safety features.

Lastly, while GSM and GPS provide basic communication and tracking capabilities, there is room for improvement in terms of speed and reliability. Future systems could benefit from advanced communication networks (such as 5G) and cloud-based platforms for real-time data sharing and remote vehicle control. In addition, machine learning algorithms could be incorporated to predict and prevent risky driver behavior beyond alcohol consumption, such as drowsiness or distraction.

IV.OVERVIEW OF PROPOSED SYSTEM

The main component of the proposed system is the MQ-3 alcohol sensor, which is strategically placed within the vehicle to continuously monitor alcohol levels in the driver's breath. The sensor sends data to the microcontroller, which compares the alcohol levels to a predefined safe limit. If the detected alcohol concentration exceeds this limit, the system initiates two actions: first, the

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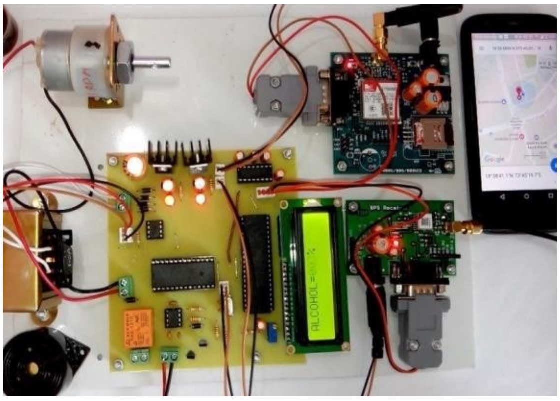
vehicle's engine is disabled to prevent further movement; second, an SMS alert is sent to pre-registered contacts, providing the vehicle's current GPS location.



Key components of the system include:

- **Arduino Uno Microcontroller:** Processes the sensor data and controls the motor simulating the vehicle.
- **MQ-3 Alcohol Sensor:** Detects alcohol levels in the air.
- **GSM Module:** Sends SMS notifications to predefined contacts in case of high alcohol levels.
- **GPS Module:** Provides real-time location data of the vehicle.
- **LCD Display:** Displays system status and detected alcohol levels.

The system also features a manual override, allowing for emergency shutdown if necessary. This makes the design versatile for different environments, whether for private vehicles or public transportation.

V.CONCLUSION

The proposed system offers an effective and affordable solution for preventing accidents caused by drunk driving. By integrating alcohol detection with vehicle control mechanisms and real-time communication, the system enhances road safety and minimizes the risk of accidents. This solution is not only applicable in private vehicles but can also be deployed in public transportation systems, where passenger safety is paramount. The integration of GSM and GPS ensures timely intervention by notifying authorities or family members about the driver’s condition and location.

Future improvements to the system could include integration with other sensor types to detect driver fatigue or distraction. Additionally, real-time data from multiple vehicles could be shared with law enforcement agencies to monitor road safety at a larger scale. With the increasing focus on smart transportation, this system presents a significant advancement in the application of embedded systems for road safety.

VI.REFERENCES

1. Juha Hyyppa, et al "Map updating and change detection using vehicle-based laser scanning", Urban Remote Sensing Event, 22 May 2009.

2. Tessa Tielert, Moritz Killat, Hannes Hartenstein, Raphael Luz, Stefan Hausberger, Thomas Benz, "The impact of traffic-light-tovehicle communication on fuel consumption and emissions", Internet of Things (IOT), 29 Nov.-1 Dec. 2010.

Chi-Man Vong, et al "Framework of vehicle emission inspection and control through RFID and traffic lights", System Science and Engineering (ICSSE), 2011 International Conference, 8-10 June 2011.

3. Yuxiang Sun, Nan Wu, et al"Development of driving support system for electric vehicle by using image

4. processing technology", Control, Automation and Systems (ICCAS), 2012 12th International Conference, 17-21 Oct 2012.

5. N. P. Jain, P. N. Jain, T. P. Agarkar, "An embedded, GSM based, multiparameter, realtime patient monitoring system and control — An implementation for ICU patients", Information and Communication Technologies (WICT), 2012 World Congress on 30 Oct.-2 Nov 2012

6. Mehaseb Ahmed Mehaseb et al"WSN Application Traffic Characterization for Integration within the Internet of Things", Mobile Ad-hoc and Sensor Networks (MSN), 2013 IEEE Ninth International Conference, 11-13 Dec 2013.

7. Chi-Man Vong, Pak-Kin Wong, Zi-Qian Ma, Ka-In Wong,"Application of RFID technology and the maximum spanning tree algorithm for solving vehicle emissions in cities on Internet of Things", Internet of Things (WF-IoT), 2014 IEEE World Forum, 6-8 March 2014.

8. Bill Montgomery, "IoT benefits beyond traffic and lightingenergy optimization", IEEE Consumer Electronics Magazine, Volume: 4, Issue: 4, Oct. 2015

9. M.SuryaDeekshith Gupta, Vamsikrishna Patchava, Virginia Menezes,"Healthcare Based On Iot Using Raspberry Pi", Green Computing And Internet OfThings(Icgciot), 2015

International Conference On 8-10 Oct 2015.

10.Swati Rajesh Parekar, Manoj M. Dongre, "An intelligent system for monitoring and controlling of street light using GSM technology", Information Processing (ICIP), 2015 International Conference on 19 Dec 2015.