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Automatic Drunken Driven Detection System in Autonomous Vehicles

Saketh Yalamanchili[1], Teja Ekkurthi[2], Usha Sri Gada[3], Dr. M. Sandhya Rani[4]

[1]*Student, Electronics and Communications Engineering, Malla Reddy College of Engineering*
[2]*Student, Electronics and Communications Engineering, Malla Reddy College of Engineering*
[3]*Student, Electronics and Communications Engineering, Malla Reddy College of Engineering*
[4]*Associate Professor, Electronics and Communications Engineering, Malla Reddy College of Engineering*

Abstract - The "Automatic Drunken Driving Detection System for Autonomous Vehicles" project offers a cutting-edge solution to combat the pervasive issue of drunk driving, a primary contributor to global road accidents. Our innovative approach integrates the MQ-3 Sensor, capable of identifying elevated alcohol levels within a vehicle. Upon detection, the system activates visual and auditory alerts, furnishing vital information to both the driver and passengers. Distinguishing our system is its ability to take pre-emptive measures, potentially averting accidents resulting from impaired driving. This initiative represents a significant advancement in reducing the dire consequences of drunk driving and fostering safer road environments. The ultimate objective is to save lives and prevent accidents.

***Key Words*:** Impaired driving detection, Autonomous vehicle safety, MQ-3 Sensor, Accident prevention and road safety, Proactive safety technology.

1. INTRODUCTION

In today's world, road safety is a top concern because accidents happen far too often, posing risks to lives and property. Many factors contribute to accidents, including brake failures and weather conditions, but one recurrent and serious issue is drunk driving. Despite strict laws and penalties, enforcing measures to prevent drunk driving is a challenge [1].

A big part of the problem is that the police can't be everywhere to check if drivers are drunk, leading to accidents. Accidents involving drunk drivers are especially worrying because these drivers are impaired, leading to dangerous behavior that endangers their lives and others. Our project focuses on 'Drunken Driving Detection.' Drunk driving is a global problem, causing a significant loss of life and property [2]. Our 'Automatic Drunken Driven Detection System in Autonomous Vehicles' project aims to protect people in the car [3].

Our project isn't just about obeying the law, it's about making the roads safer. We've designed an innovative solution that can be integrated into vehicles to detect alcohol impairment in real-time, promoting responsible driving. It's a significant step in reducing the dangers of drunk driving and making roads safer for everyone [4].

2. EXISTING MODEL

Ignition Interlock Device

The ignition interlock device, a widely adopted technology, features a breathalyzer integrated into a vehicle's ignition system. To initiate the vehicle, the driver must provide a breath sample. If the device detects alcohol levels exceeding a specified limit, the vehicle remains immobilized [5]. It has a proven track record in reducing drunk driving incidents by directly preventing inebriated individuals from operating a vehicle. However, its focus is limited to alcohol detection, leaving other forms of impairment unaddressed. Additionally, there's a potential for circumvention if someone else provides a clean breath sample. While it serves as a valuable tool in the fight against drunk driving, it falls short in keeping pace with the evolving landscape of autonomous vehicles.

3. PROPOSED MODEL

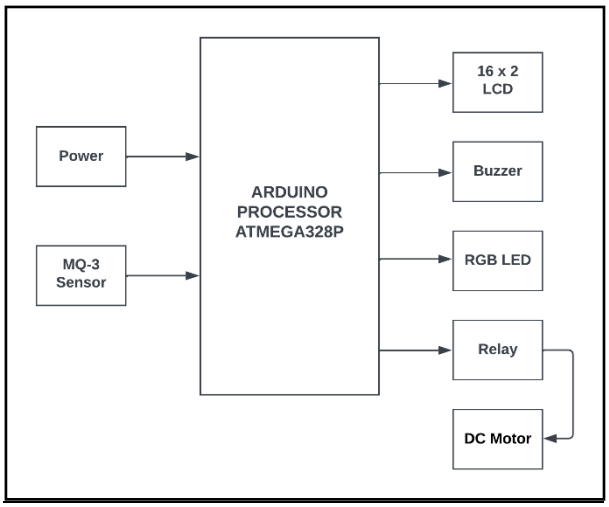

Fig - 1: Block Diagram of Automatic Drunken Driven Detection System in Autonomous Vehicles.

The proposed model is custom-tailored for autonomous vehicles and deploys the MQ-3 gas sensor for alcohol vapor detection. This innovative system continuously monitors the vehicle's cabin air for elevated alcohol levels and takes immediate action when detected. It triggers real-time alerts and safety measures, preventing the vehicle from moving, encouraging responsible decisions, and acting as a proactive safety barrier. Notably, it bridges the gap between evolving autonomous vehicle technology and ongoing road safety challenges. It's an affordable solution, emphasizing a comprehensive approach to reducing the impact of drunk driving. By combining real-time alerts, safety measures, and behavioral change encouragement, it strives to foster a safer road environment, effectively addressing the unique challenges posed by autonomous vehicles [6].

4. HARDWARE DESCRIPTION

This section gives brief description about hardware components

A. Power Supply

The power supply plays a vital role by furnishing electrical power to all electronic components. It meticulously delivers the precise voltage and current required for optimal operation, including sensors and displays. It serves as the essential electrical source that sustains the functionality of the entire system.

Fig - 2: Power Supply.

B. Alcohol Sensor

The alcohol sensor serves as a critical component in the system, functioning like a "breathalyzer" for detecting alcohol vapor. It measures the presence of alcohol in the air, and if it exceeds a defined limit, it initiates safety measures to prevent intoxicated driving.

Fig - 3: Alcohol Sensor.

C. 16 x 2 LCD

The LCD (Liquid Crystal Display) is the visual interface. It shows information in a clear, easy-to-read format. It's like the screen on your phone, but in this case, it displays messages about alcohol detection and safety status for the driver.

Fig - 4: 16 x 2 LCD.

D. Relay 5V

The relay acts as a switch. It's like a digital gatekeeper, controlling the flow of electricity to various components. When triggered, it can turn on or off devices like the motor, allowing for specific actions to be taken based on the alcohol detection results.

Fig - 5: Relay 5V.

E. Arduino ATmega328P

The Arduino ATmega328P serves as the central processing unit of your project, functioning as the core controller. It processes data, executes logical decisions, and oversees the coordination of all interconnected components. In essence, it acts as the pivotal control unit, managing critical functions such as alcohol detection and the implementation of safety measures.

Fig - 6: Arduino ATmega328P.

5. SOFTWARE DESCRIPTION

This section offers a concise overview of the software components integral to the project's functionality.

A. Arduino IDE

The Arduino Integrated Development Environment (IDE), also known as Arduino Software, provides a comprehensive platform for Arduino microcontroller programming. It includes a text editor for code writing, a message area for status updates, a text console for communication, and a toolbar with common functions. Arduino code is referred to as "sketches" and is saved with a .ino file extension. The IDE also offers libraries for code modules, supports third-party hardware, and features a serial monitor for debugging and real-time data exchange, streamlining the development process.

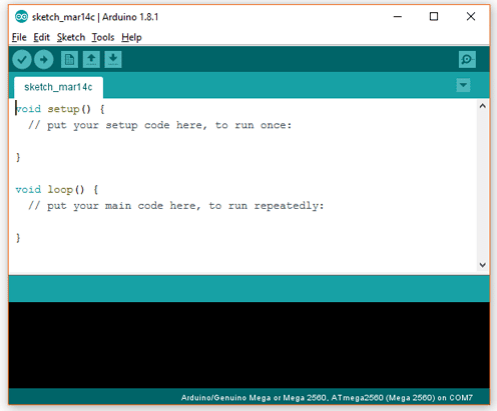

Fig - 7: Arduino Software.

6. ADVANTAGES

- Anti-Tampering
- Smooth Shutdown
- Direct Alcohol Detection
- Simplicity
- Accessible Components
- High Reliability
- Precision

7. APPLICATIONS

- Cars
- Buses
- Trucks

8. RESULT

Our project presents an innovative solution for detecting alcohol in the breath of drivers to mitigate the severe consequences it can pose. We designed and effectively implemented the system by utilizing an Arduino Uno ATMEGA328P microcontroller in conjunction with the MQ-3 sensor. In our rigorous testing and evaluation, the alcohol sensor demonstrated its ability to provide rapid responses when alcohol is detected, highlighting its effectiveness. Moreover, its long-term reliability emerged as a prominent feature of our proposed system. This technology has the potential to significantly contribute to accident prevention by integrating it into vehicles, thereby enhancing road safety and minimizing the risks associated with drunk driving.

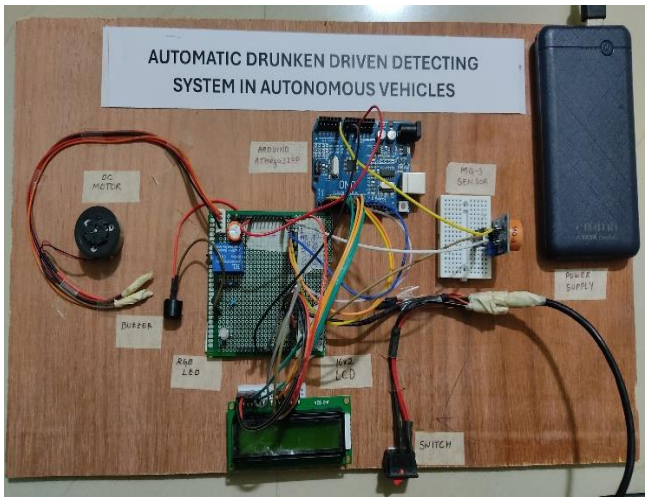

Fig - 8: Final Prototype of Automatic Drunken Driven Detection System in Autonomous Vehicles.

9. FUTURE DEVELOPMENTS

- Two-Wheelers Expansion.
- GSM and GPS Integration.
- Implement a finger-scanning breathalyzer for secure, alcohol-free ignition.
- Enhance security with facial recognition and behavior monitoring for impairment signs.

10. CONCLUSION

In conclusion, our system presents a vital contribution to road safety, addressing the enduring challenge of drunk driving. By harnessing the potential of autonomous vehicles and integrating the MQ-3 alcohol sensor, we offer a proactive solution. Our system not only detects alcohol impairment but also encourages responsible decisions. It complements existing efforts to reduce accidents, injuries, and fatalities, fostering a culture of legal responsibility and promoting public trust in self-driving technology. Furthermore, the system aligns with potential insurance incentives, lightening the load on law enforcement, and encouraging responsible alcohol consumption. In this way, our work exemplifies the possibilities that lie at the intersection of technology and safety.

ACKNOWLEDGEMENT

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