JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Alcohol Detection and Engine Autolocking System

1. V Rama Krishna Assistant professor CSE department Anurag University

2. Akshay Reddy Kethidi 20EG105203 AU, 3. Bajjuri Sai Charan 20EG105206 AU,

4. Goutham Raj Koru 20EG105216 AU

Abstract—In contemporary times, a significant portion of accidents on the road can be attributed to the perilous practice of driving under the influence of alcohol. In response to this pressing issue, we have embarked on a groundbreaking project designed to curtail such accidents. This project employs cutting-edge technology to detect alcohol consumption by drivers through the analysis of gaseous substances present in their breath.

Central to our project is the use of sensors strategically placed on the steering apparatus of the vehicle, precisely where the driver's breath is directed. These advanced sensors are adept at quantifying the alcohol content in the driver's breath. Should the alcohol level surpass a predefined threshold, the system will promptly issue a command to immobilize the vehicle's engine, rendering it inoperable.

The significance of our work lies in its potential to substantially diminish the frequency of accidents stemming from alcohol impairment. By implementing an innovative system that seamlessly integrates alcohol detection with engine locking, we aim to drastically reduce the instances of accidents associated with drunk driving.

In essence, our project stands as a formidable solution in the ongoing battle against alcohol-related accidents, offering a technologically advanced means of enhancing road safety and safeguarding lives.

Keywords—Arduino UNO; MQ-3 Alcohol sensor; Relay Module; Arduino IDE

I. INTRODUCTION

A significant number of accidents are directly attributed to the perilous combination of alcohol consumption and driving. When individuals consume alcohol and take to the wheel, they often exhibit reckless and high-speed behavior due to dizziness and instability, jeopardizing not only their own lives but also the safety of other road users. This issue transcends geographical boundaries, posing a global challenge.

In India, various laws have been enacted to curb this dangerous practice. These regulations include punitive measures such as arrests and prosecution for those found guilty of driving under the influence. However, the effectiveness of these laws remains limited, failing to make a substantial impact on individuals who persist in making the same life-threatening mistake repeatedly, thereby endangering countless lives.

Addressing this issue demands a multifaceted approach that combines stringent legal measures with public awareness campaigns, education, and technological innovations. Only through comprehensive efforts can we hope to significantly reduce the grave threat posed by drink and driving on our roads.

As per Ministry of road transport and highways, road accidents are in year 2021 are as follows:

From Fig.1 We can observe that the number of people losing lives is more, apart from accidents which are caused due to over speeding the drunk and drive are the major reason for accidents and the number of deaths is what it matters, and that drove us to make this project.

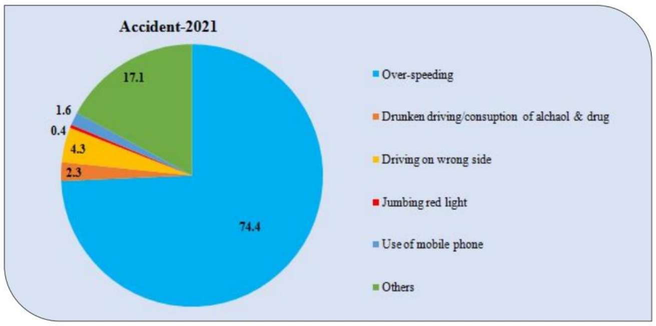

Fig. 1 Pie Chart representing the accidents

Drunken Driven Protection System used alcoholic sensor in helmet so that it detects the alcohol continuously. If the alcoholic sensor detects, the buzzer will alarm and locks the engine.

The "Road Accident Avoiding System Using Drunken Sensing Technique" introduces an innovative mechatronic system equipped with MQ-3 alcohol sensors designed to detect alcohol presence in a person's breath. This system achieves alcohol detection by seamlessly integrating the alcohol sensor with a microcontroller. Additionally, a prototype ignition system with spark plugs is incorporated to serve as the ignition mechanism. The pivotal parameter for this system is the Blood Alcohol Content (BAC), with a set limit of 0.08mg/L, aligning with governmental regulations regarding illegal alcohol consumption.

Notably, this research's standout feature lies in its ability to swiftly and accurately analyze a driver's alcohol content, outperforming alternative techniques. By providing rapid and precise detection, it significantly reduces the risk of accidents associated with impaired judgment and compromised reflexes due to alcohol consumption.

Furthermore, the "Programmed Engine Locking System by Automatically Detecting Drunken Drivers" also utilizes the MQ-3 alcohol sensor to assess a person's alcohol levels. Subsequently, it employs this data to automatically immobilize the vehicle's engine, preventing an intoxicated individual from operating the vehicle.

Both of these initiatives underscore the importance of harnessing advanced technology to enhance road safety. By seamlessly integrating alcohol detection with engine immobilization mechanisms, they play a crucial role in mitigating the grave consequences of drunk driving, thereby safeguarding lives and diminishing accidents on our roadways.

A significant limitation in the current system is its inability to detect alcohol consumption while the vehicle is in motion. This deficiency poses a risk since individuals might consume alcohol after unlocking the vehicle. To address this concern, we have implemented a gradual deceleration feature for the vehicle when alcohol is detected while the engine is running.

This enhancement ensures that even if a driver starts consuming alcohol after initially unlocking the vehicle and starting the engine, the system will respond by progressively slowing down the vehicle. By doing so, we aim to provide an additional layer of safety and discourage intoxicated driving throughout the entire journey, reducing the potential for accidents and promoting responsible behavior behind the wheel.

II. DESIGN OF CONCEPT

The conceptual design of the system employs a Top-Down methodology to provide a comprehensive understanding of its operation. This system design encompasses several key block units, as depicted in Figure 2. The development of the system is divided into distinct phases:

1. **Sensor Information:** In this initial phase, data collected by the sensors is processed and converted into discrete impulses.

2. **Impulse Generation:** The processed sensor data is then translated into impulses, which serve as critical input signals for the subsequent stages.

3. **Arduino Control:** These impulses are transmitted to an Arduino microcontroller, where a specialized code interprets and processes the data. The Arduino takes on the pivotal role of controlling the vehicle's engine based on the received information.

4. **Engine Locking:** One of the primary functions of the system is to facilitate engine control. The Arduino, utilizing the provided code and predetermined alcohol threshold levels, takes the necessary action to lock or unlock the vehicle's engine as deemed appropriate.

This systematic approach ensures that the entire process, from sensor data collection to engine control, is well-structured and clearly defined. It lays the foundation for a reliable and efficient system aimed at preventing accidents caused by alcohol-impaired driving.

The components used in this setup include:

1. **Arduino UNO:** This serves as the central microcontroller, responsible for processing data and controlling various aspects of the system.

2. **MQ3 Alcohol Sensor:** An important sensor that detects alcohol levels, providing crucial input data for decision-making.

3. **Relay Module:** This component is used to control the flow of electricity to other devices or systems, often employed to manage the engine or motor in this context.

4. **TT Gear Motor:** A specialized motor designed for precise control and movement, typically used for various mechanical applications.

5. **Motor Controller L298N:** The L298N is a versatile dual H-Bridge motor driver enabling simultaneous control over speed and direction for two DC motors, supporting voltages from 5 to 35V and

peak currents up to 2A. It also facilitates bipolar stepper motor management, including NEMA 17 models.

III. Working Principle

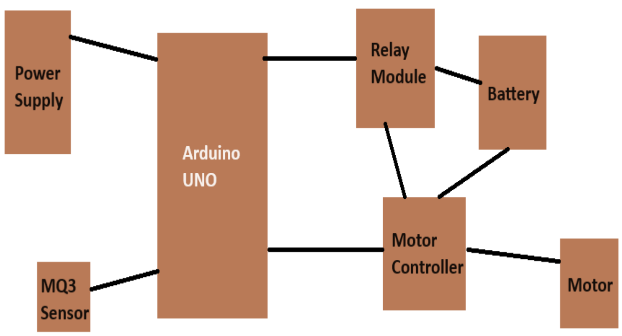

Fig. 2 Block diagram

A. *Sensitivity Level Characteristics*

The sensitivity level characteristics of the system encompass various metrics for measuring alcohol content, including percentage, voltage, and parts per million (ppm). These metrics are interrelated, allowing for versatile assessment. The proposed system provides a precise estimate of the alcohol consumed by the driver, often represented in ppm, which correlates with Blood Alcohol Content (BAC).

Voltage values fluctuate based on the resistance level within the alcohol sensor. These values are then processed by the microcontroller. The system's functionality, as detailed in the table, is achieved by programming it to initiate an engine lock when the alcohol content surpasses 40%. This threshold serves as the limit for permissible alcohol consumption.

Analog readings obtained from the sensor are utilized by the microcontroller to determine if the data exceeds the specified limit. This systematic process ensures that the vehicle remains immobilized when the alcohol content exceeds the predetermined safety threshold, promoting responsible and safe driving practices.

B. *Level of Drunkenness*

The testing results and data analysis follow a structured approach based on three default constraints. In the first scenario, where the driver has not consumed any alcohol, the vehicle's engine remains operational, allowing the driver full control. In instances where the driver has consumed a moderate amount of alcohol, the proposed system permits the engine to start but limits the vehicle to a reduced speed as a safety precaution. However, in cases where the driver has consumed an excessive amount of alcohol, rendering them unfit to operate the vehicle safely, the system takes control by shutting off and locking the engine. This proactive measure ensures that the vehicle remains stationary and prevents any attempt at driving, prioritizing safety and discouraging impaired driving practices.

IV. Implementation

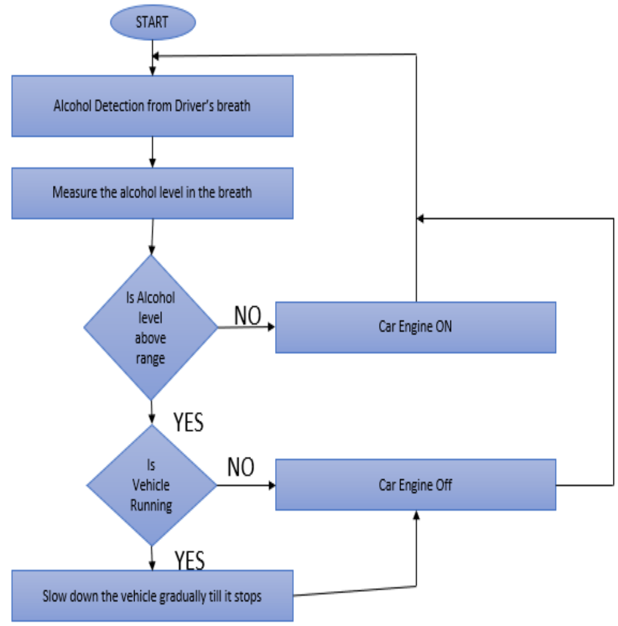

Fig. 3 System Flowchart

The system initiates by initializing system components and creating variables to track sensor input, motor speed, and a temporary value for speed adjustment. In the main loop, it continually monitors sensor input. If alcohol levels exceed the threshold while the vehicle is operational, the system enters a sequence: it progressively decreases the motor speed in intervals until reaching 0, subsequently stopping the engine. In the presence of alcohol above the threshold, the system maintains the engine in off state. This design prioritizes safety by implementing a response mechanism to alcohol detection, gradually reducing motor speed and eventually halting the engine to prevent potential risks associated with driving under the influence. The stepwise approach ensures a controlled slowdown and cessation of vehicle operations, promoting safety for both the driver and others on the road.

V. Conclusion

The Alcohol Detection and Engine Autolocking System offers a robust solution to combat the perilous issue of drunk driving. By seamlessly integrating alcohol detection technology with engine control mechanisms, it provides a proactive means of preventing accidents and promoting road safety. The system's ability to accurately measure alcohol levels and respond in real-time enhances its effectiveness. With its potential to immobilize a vehicle when the driver exceeds safe alcohol limits, it serves as a powerful deterrent against impaired driving. This technology stands as a vital step forward in reducing accidents and protecting lives on the road, ultimately contributing to safer and responsible driving practices.

VI. References

[1] P. Manikandan, V. Muneeswaran, G. Ramesh, Ravuru Siva Rakesh, Peddysetty Chakraesh, Nagireddy Sumanth Reddy, Noorbonala Sahul, Drunk and Drive Controller for Vehicles.
https://ieeexplore.ieee.org/document/9404713
DOI: 10.1109/ICACITE51222.2021.9404713

[2] Sharanabasappa, J.N Sayed Farooq, V.N Soundarya, Vikram S Rao, K S Chandraprabha, Safe Drive: An Automatic Engine Locking System to Prevent Drunken Driving.
https://ieeexplore.ieee.org/document/9012404
DOI: 10.1109/RTEICT42901.2018.9012404

[3] N.P. Dharani, Mohammed Ismail, M. Vidhya, Drunk and Drive Detection System for Safety Driving
https://ieeexplore.ieee.org/document/10080037
DOI: 10.1109/CCET56606.2022.10080037

[4] T Vaishnavi, G. Elumalai, S. Varalakshmi, V. Nivedita, T. Chandrasekar, Ravi Ranjan Manjul, Development of Alcohol Detection with Engine Locking and Short Messaging Service Tracking Syste.
https://ieeexplore.ieee.org/document/10250721
DOI: 10.1109/ICAISS58487.2023.10250721

[5] Pooja K V Shekar, Prakriti Rajesh Sanil, Shravya S Shetty, Shravya U, Manjunatha Badiger, Smart Driver Warning and Alert System using Visual Features.
https://ieeexplore.ieee.org/document/10125651
DOI: 10.1109/ICOEI56765.2023.10125651