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 SENSING AND ENGINE LOCKING SYSTEM

ARJUN JOSHI[1], AKHILESH M[2], KUSHAL L[3], LOHITH M[4], MADAN PATEL H.S[5]

[1] FACULTY, ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSURU, INDIA [2] STUDENT(4VM21EE001), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSURU, INDIA [3] STUDENT(4VM21EE025), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSURU, INDIA [4] STUDENT(4VM21EE027), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSURU, INDIA [5] STUDENT(4VM21EE028), ELECTRICAL AND ELECTRONICS ENGINEERING, VVIET, MYSURU, INDIA

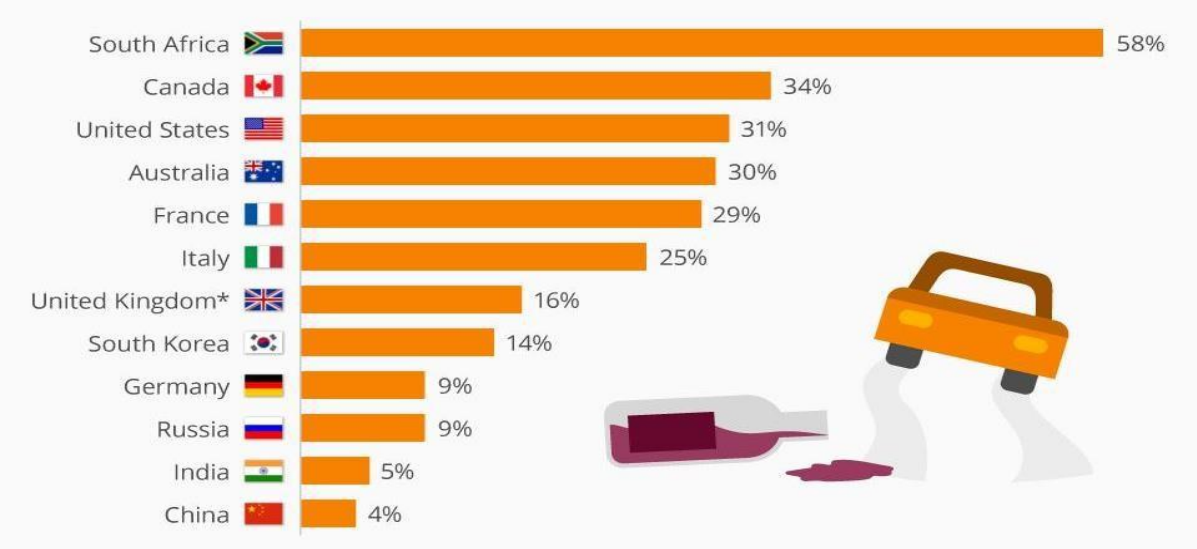
ABSTRACT:

In recent years, alcohol-related accidents and fatalities have remained a significant concern worldwide. Drunk driving poses a substantial threat to road safety, necessitating the development of advanced systems to prevent intoxicated individuals from operating vehicles. This paper presents a comprehensive overview of alcohol sensing and engine locking systems, which are innovative solutions designed to address this critical issue. The system's design, components, working principles, benefits, challenges, and potential future advancements are discussed in detail.

KEYWORDS: Arduino UNO, MQ3 Sensor, Buzzer, LED, DC motor, Relay, Switch.

INTRODUCTION:

In the relentless pursuit of road safety, technology has emerged as a powerful ally in combating one of the most pervasive threats to public well-being – impaired driving. Alcohol-related accidents continue to exact a heavy toll on lives and property globally, prompting the exploration of advanced solutions that go beyond traditional enforcement methods. Among these innovations, the integration of alcohol sensing technology with engine locking systems has garnered significant attention for its potential to proactively address the issue of impaired driving.



LITERATURE SURVEY:

Killoran, A., et al.: Review of effectiveness of laws limiting blood alcohol concentration levels to reduce alcohol-related road injuries and deaths. Final report. Centre for Public Health Excellence (NICE), London (2010).

- Overall, there is sufficiently strong evidence to indicate that lowering the legal BAC limit for drivers does help reduce road traffic injuries and deaths in certain contexts.
- The BAC law appears to act as a general deterrent and the beneficial effects are not just restricted to the drivers at the BAC levels involved.

Tejaswini Patil, Aliya Tabassum AUTOMATIC ENGINE LOCKING SYSTEM ALCOHOL DETECTION FOR DRUNK & DRIVE WITH GSM National Conference on Advances in Engineering and Applied Science.

- The input for the system is from Detection Sensors either from Alcohol Breath or any other mechanism.
- As vehicle automobiles are beyond the scope of this project, we are simulating the process by activating the relay and with the help of dc motors.
- The system will continuously monitor level of alcohol concentration in alcohol detection sensor and thus turn off the engine of vehicle if the alcohol concentration is above threshold level.

Muthu Lakshmi M, Santhiya K, Prof. Dhivya P - SMART HELMET SYSTEM USING ALCOHOL DETECTION FOR VEHICLE PROTECTION, IJIRTSE, ISSN: 2395-5619, Volume – 2.

- Drunken driving protection system.
- Alcohol sensing by MQ3 Sensor.

Keerthana K, Ramya G DRUNK DRIVING DETECTION USING CARIGNITION LOCKING 2018 International Journal of Pure and Applied Mathematics.

- The prepared signal and demonstrate the information to users in LCD.
- Alcohol Sensor is put in the steering to screen the breath level if the liquor content in breath is 0.08% then car motor won't start.
- Arduino uno is arranged and associated with the sensor additionally LCD display and one dc motor is associated

"Alcohol Detection and Accident Prevention of Vehicle", IJIERE, Volume-2, Issue-3, 2015.

- Alternating method for design of Alcohol Sensing Engine Locking System by ATMEGA 16 microcontroller instead of using Arduino Uno.

Phani, S.A., et al.: Liquor detection through automatic motor locking system: in built (LDAMLS). Int. J. Compute. Eng. Res. (IJCER) 4(7), 2250–3005 (2014)

- Reliability – embedded systems must be able to handle any situation without human intervention

ALCOHOL SENSING TECHNOLOGIES:

1.Breath technology: When it comes to measuring a person's blood alcohol concentration, most Americans are familiar with punitive breathalyzers that require drivers to blow into a tube or other sensor. In contrast, the breath system being developed by the DADSS Program is designed to passively and unobtrusively analyse alcohol in a driver's breath, so drivers can simply enter the vehicle and breathe as they normally would. The sensor is being developed by Senseair, a leading global provider of air and gas sensing technology.

2.Touch technology: A touch system that uses tissue spectroscopy to measure alcohol in the driver's finger or palmar side of the hand. This technology significantly broadens the options for integrating such a system into commercial vehicles while remaining invisible to any driver under the legal limit. Tissue spectroscopy was identified in 2007 as one of the most promising technologies to seamlessly and reliably detect and prevent drunk driving in vehicles and remains so today.

ENGINE LOCKING MECHANISMS:

Here, the focus shifts to the mechanisms employed to prevent an intoxicated individual from operating a vehicle. Engine locking systems, often integrated with alcohol sensing technologies, can immobilize the vehicle if the presence of alcohol is detected. This section explores different engine locking mechanisms, including electronic control unit (ECU) integration, starter motor interruption, and smart key interlock systems.

SYSTEM INTEGRATION AND ARCHITECTURE:

This section provides insight into the integration of alcohol sensing technologies and engine locking mechanisms into a cohesive system. It explores the hardware components, software algorithms, and communication protocols required for seamless operation. The architecture's robustness and ability to withstand various environmental conditions are highlighted.

SYSTEM WORKFLOW:

Detailing the step-by-step process of the alcohol sensing and engine locking system, this section covers initial alcohol detection, data processing, decision-making algorithms, and the subsequent action of immobilizing the engine. It highlights the system's speed, accuracy, and adaptability in real-time scenarios.

BENEFITS AND IMPACT:

The benefits of implementing such a system are discussed, including reduced drunk driving incidents, decreased accident rates, and improved road safety overall. The potential impact on insurance policies, legal enforcement, and public awareness campaigns is also examined.

CHALLENGES AND LIMITATIONS:

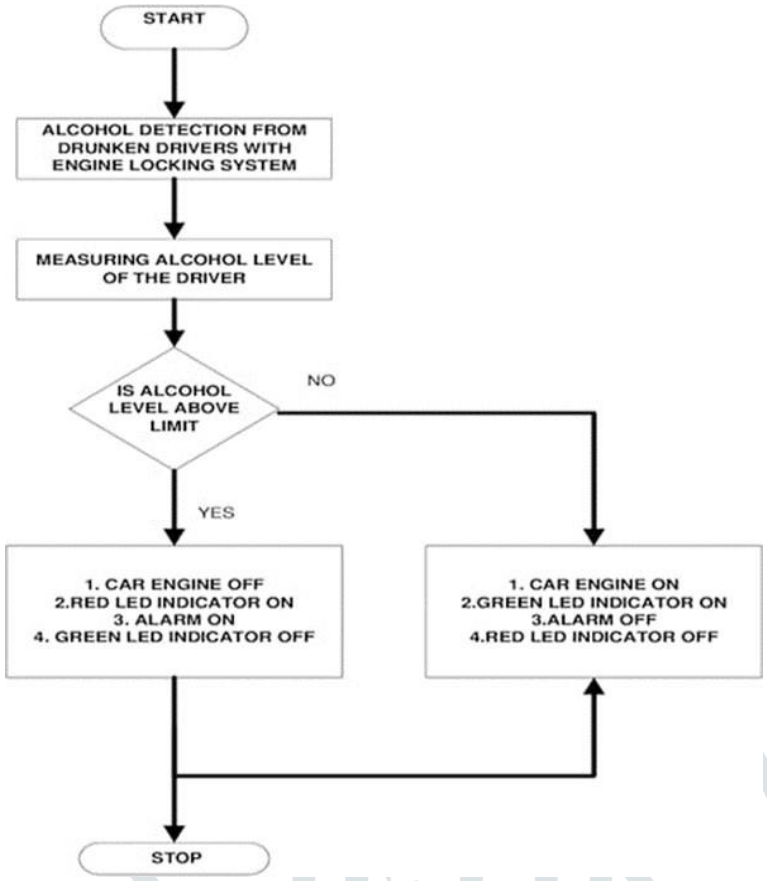
This section addresses challenges related to system reliability, false positives/negatives, user acceptance, and potential ways to mitigate these issues. Ethical considerations regarding privacy and potential misuse are also explored, along with the need for regular system maintenance.

CASE STUDIES:

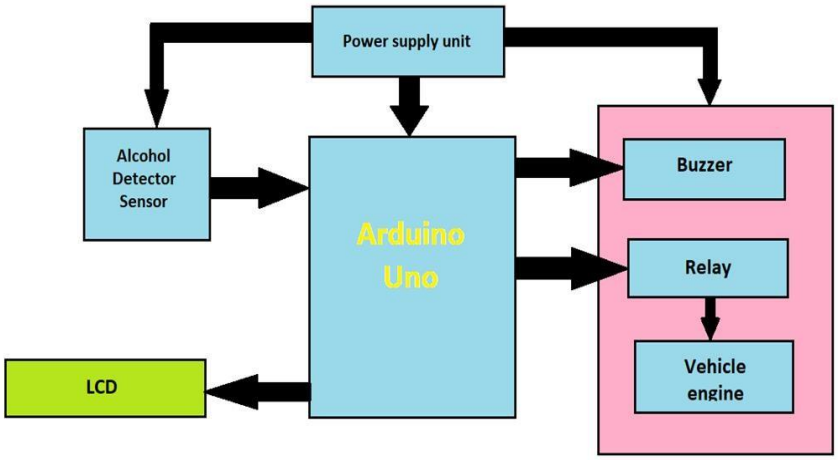
Real-world examples of regions or jurisdictions where alcohol sensing and engine locking systems have been implemented are analysed. The case studies highlight the effectiveness of the technology in diverse settings and provide insights into user experiences and acceptance.

METHODOLOGY:

The method that combines engine locking with alcohol detection reduces the number of accidents caused by intoxicated drivers. Alcohol is detected in the ambient air using the MQ-3 sensor. The sensor output is dependent on the alcohol content; a higher alcohol concentration causes the MQ-3 sensor's conductivity to rise, which in turn provides the ARDUINO with a readout. The DC motor will be stopped by Arduino if the reading exceeds the threshold level. In order to alert other drivers that the car in front of them is dangerous, the red LED will also flash if the distance is shorter than the recommended distance. Currently, the notice will be transmitted to the civil forces indicating that the specific vehicle is unsafe and can be a threat to other people.



BLOCK DIAGRAM:



COMPONENTS REQUIRED:

Arduino uno, MQ3 sensor, Relay module, Buzzer, DC Motor, LCD, Battery, Jumper

Alcohol Sensor (MQ3 sensor):

This module is in charge of determining the amount of alcohol present in the immediate surroundings. The Arduino receives output signals from the alcohol sensor and processes them.

Arduino Uno:
The Arduino is the system's brain, managing all of its operations. It gets signals from the alcohol sensor as input. When the alcohol level data above a certain threshold, the microcontroller interprets the data and determines if driving while intoxicated is a possibility.

LCD Display:
The user receives input via the LCD display, which shows the engine's lock or unlock status as well as the user's alcohol content. Data is sent from the Arduino to the LCD so that pertinent information may be shown.

Power Supply:
Provides electricity to all system components. Ensures steady and continuous functioning. Battery provides the power supply.

Buzzer/Alarm:
An auditory alert may sound if the alcohol level exceeds the threshold or the engine is locked, offering extra warning signs.

Relay Module:
Relay Module: This is an illustration of a relay module that is used to regulate the engine lock and the DC motor. Control Interface: Depending on the levels of alcohol content, the microcontroller provides control signals to the relay module.

DC Motor:
DC Motor: The motor that physically locks and unlocks the engine.
Mechanical Lock: To engage or disengage the engine, a mechanical locking mechanism is attached to the DC motor.

ADVANTAGES:

- The alcohol sensing and engine locking system can help prevent accidents due to drunk driving.
- The alcohol sensing with engine locking system can be very helpful for police.
- The alcohol sensing with engine locking system provides automatic safety system for cars and other vehicles.

DISADVANTAGES:

- Breath analyzers using alcohol detection are available at high prices.
- Moreover, they have shorter lifetime.
- Breath analyzers require continuous re-calibration.

APPLICATIONS:

Fleet Management: Companies that manage vehicle fleets, such as taxi services or delivery companies, can use alcohol sensing and engine locking systems to ensure that their drivers are not under the influence of alcohol while on duty.

Public Transportation: Public transportation vehicles, such as buses and trains, can be equipped with alcohol sensing systems to ensure that operators are sober while on duty, thereby enhancing passenger safety.

School Buses: Alcohol sensing and engine locking systems can be employed in school buses to prevent drivers from operating the vehicle if they have consumed alcohol.

Law Enforcement Vehicles: Police cars and other law enforcement vehicles can be equipped with these systems to ensure that officers are not under the influence of alcohol while on duty.

Vehicle Rental Services: Rental car companies can use alcohol sensing and engine locking systems to prevent individuals who have been drinking from renting and driving vehicles.

FUTURE DEVELOPMENTS:

Envisioning the future of alcohol sensing and engine locking systems, this section discusses potential advancements such as AI-driven algorithms for improved accuracy, integration with autonomous vehicles, and sensor miniaturization. It also explores the role of government regulations in shaping the adoption of these systems.

CONCLUSION:

The conclusion summarizes the key findings of the paper, emphasizing the significance of alcohol sensing and engine locking systems in enhancing road safety. It underscores the need for collaborative efforts among technology developers, policymakers, and the public to achieve a safer driving environment.

REFERENCES:

- Killoran, A., et al.: Review of effectiveness of laws limiting blood alcohol concentration levels to reduce alcohol-related road injuries and deaths. Final report. Centre for Public Health Excellence (NICE), London (2010)
- Lee, J.D., et al.: Assessing the feasibility of vehicle-based sensors to detect alcohol impairment. National Highway Traffic Safety Administration, Washington, DC (2010)
- James, N., John, T.P.: Alcohol detection system. IJRCCT 3(1), 059–064 (2014)
- Phani, S.A., et al.: Liquor detection through automatic motor locking system: in built (LDAMLS). Int. J. Compute. Eng. Res. (IJCER) 4(7), 2250–3005 (2014)
- Federal Highway Administration. Highway Statistics 2014 - Policy (2014). https://www.fhwa.dot.gov/policy information/statistics/2014/
- "Alcohol Detection and Accident Prevention of Vehicle", IJIERE, Volume-2, Issue-3, 2015.
- Keerthana K, Ramya G DRUNK DRIVING DETECTION USING CARIGNITION LOCKING 2018 International Journal of Pure and Applied Mathematics.
- Tejaswini Patil, Aliya Tabassum AUTOMATIC ENGINE LOCKING SYSTEM ALCOHOL DETECTION FOR DRUNK & DRIVE WITH GSM National Conference on Advances in Engineering and Applied Science.
- Muthu Lakshmi M, Santhiya K, Prof. Dhivya P- SMART HELMET SYSTEM USING ALCOHOL DETECTION FOR VEHICLE PROTECTION, IJIRTSE, ISSN: 23955619, Volume – 2.
- Prof. Kulkarni P.H, Ms. Ravina Wafgaonkar, Mr. Gaurav Ahirrao ALCOHOL DETECTION AND AUTOMATIC DRUNK AND DRIVE AVOIDING SYSTEM International Journal of Engineering Research and Applications April 2014.
- M.H. Mohamad, Mohd, Amin Bin Hasanuddin, "Vehicle Accident Prevention System Embedded with Alcohol Detector", IJRECE, Volume 1-Issue 4.

BIOGRAPHIES:

Author 1: Arjun Joshi

Received the B.E. degree in Electrical and Electronics Engineering in the year 2019 from SDM institute of technology ujire and post-graduation degree in Power System Engineering from The National Institute of Engineering (NIE), Mysuru in the year 2021.he is working as Assistant professor in department of Electrical and Electronics engineering at Vidya Vikas Institute of Engineering and Technology, Mysuru, Karnataka. He has 2 years of teaching experience. He published one International Journals. His research interest includes Power System Operational Planning and Control, Distribution System Network Reconfiguration, Service Restoration, Distribution System Automation and Distribution Generation, electric vehicle technologies, power quality.

Author 2: Akhilesh M

I am currently pursuing B.E Degree in Electrical and Electronics Engineering in the year 2023 from Vidya Vikas Institute of Engineering and Technology, Mysuru – 570028, Karnataka.

Author 3: Kushal L

I am currently pursuing B.E Degree in Electrical and Electronics Engineering in the year 2023 from Vidya Vikas Institute of Engineering and Technology, Mysuru – 570028, Karnataka.

Author 4: Lohith M

I am currently pursuing B.E Degree in Electrical and Electronics Engineering in the Year 2023 from Vidya Vikas Institute of Engineering and Technology, Mysuru – 570028, Karnataka.

Author 5: Madan Patel HS

I am currently pursuing B.E Degree in Electrical and Electronics Engineering in the year 2023 from Vidya Vikas Institute of Engineering and Technology, Mysuru – 570028, Karnataka.