WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Alcohol Sensing Alert with Engine Locking Project

Dr. G. Amudha[1], Thanuja P[2], Vinu Hashini V[3], Akuluru Harika.[4]

[1]Head of the Department, Department of Computer Science and Business Systems, R.M.D. Engineering College, Tamil Nadu - 601 206, hodcsbs@rmd.ac.in

[2,3,4] Student, Department of Computer Science and Business Systems, R.M.D. Engineering College, Tamil Nadu - 601 206, 23202054@rmd.ac.in[2], [3]23202060@rmd.ac.in, [4]23202002@rmd.ac.in

ABSTRACT

Driving under influence is the major cause of road accidents associated with serious injuries, fatalities, and property damage. For this reason, we have proposed an alcohol detection and engine control system to prevent a vehicle from being operated by an intoxicated person.

An alcohol sensor, placed on the steering wheel or near the driver, will continuously monitor the driver's breath. The detection of alcohol at startup will lock the engine so that the vehicle cannot start. When alcohol is detected during mid-journey, the system cuts off power to the engine, allowing for safe steering of the vehicle to the roadside.

This system is fueled by an AVR family microcontroller interfaced with an alcohol sensor, an LCD screen for status updates, and a DC motor to simulate engine operation. The microcontroller processes real-time data from the sensor and then acts upon these data. The LCD provides feedback with alerts such as "Engine Locked" or "Alcohol Detected."

This solution provides a proactive safety system that reduces risks of accident and drunk driving. It also continues to monitor the driving before and during the journey, promoting a good driving culture and enhancing road safety for the drivers, passengers, and pedestrians on the road.

Keywords: LCD Screen, DC Motor, Microcontroller Interface

I. INTRODUCTION

Drunk driving is a grave offense that results in fatalities, road accidents, and injuries, causing irreparable harm to individuals and communities. According to the World Health Organization (WHO), approximately 1.35 million people lose their lives each year due to road traffic accidents, with a significant percentage attributed to drunk driving. To combat this menace, we propose the Alcohol Sensing Alert with Engine Locking Project, a innovative system designed to prevent drunk driving.The project's conception is simple yet effective: detect the presence of alcohol in a driver's breath and lock the vehicle's engine if it exceeds the predetermined limit. . This system aims to reduce the number of accidents and fatalities on roads caused by drunken driving, promoting safety and responsible driving practices. When a driver enters the vehicle, they are required to blow into the breathalyzer device, which measures the alcohol content in their breath and calculates their Blood Alcohol Concentration (BAC) level. If the driver's BAC level is above the set limit (usually 0.08% in the United States), the engine will not start. If the driver attempts to start the engine multiple times and continues to have a high BAC level, the system may trigger an alarm or notify law enforcement. The Alcohol Sensing Alert with Engine Locking Project offers several benefits, including reduced accidents and fatalities caused by drunk driving, increased safety on roads, promotion of responsible driving practices, and prevention of irreparable harm to individuals and communities. By implementing this system, we can make a significant impact in reducing the devastating consequences of drunk driving and creating a safer and more responsible driving environment.

II. LITERATURE SURVEY

Prabu U et al. declared that their alcohol detection system "acts as an automatic safety device. It detects alcohol level in the driver's breath and prevents drunk driving. The idea mainly contributes to saving lives and reducing losses in properties caused by accidents related to alcohol.".

The authors have emphasized that their system is low-cost and easy to maintain, making it suitable for widespread adoption across various vehicles. Such vast receptiveness may yield a considerable decrease in DUI accidents, thereby enhancing road safety on a large scale.

D. Prema Raja et al identifies that sensor calibration and environmental factors may even lead to false positives or negatives. Also, continuous driver monitoring would raise potential privacy issues for which the design should be struck at a balance.

Sharanabasappa et al. proposed the employment of machine learning technique for increasing the reliability of the developed alcohol detection system. Data pattern analysis would lead the system to aid in decreasing false alarms as well as increase user trust in the functionality of the system.

The system for Sharanabasappa et al. presented can send instant notifications to the family members if any kind of violation detection occurred. This feature would make them aware in real time as well as allow them to be involved in the situation to ensure the safe as well as accountable driving condition.

A mechanism explained by Samuel Owoeye et al cuts off the fuel supply to an engine when alcohol levels surpass a set level-the engine effectively gets locked so that no intoxicated driver can start the vehicle and, consequently the possibility of accidents is reduced.

Avagaddi Prasad et al. discussed the facility of drowsiness detection using blink sensors within their system in addition to alcohol consumption. This ensures a more all-rounded approach to the eventual mitigation of accidents due to impaired driving.

M. Navya Sri, et al. developed a system that uses a GSM and GPS module for sending SMS alert to the authorities when alcohol is detected by the system. This feature avails timely support by sharing the vehicle location, enhancing their emergency response efforts.

Padmashree V. Kulkarni et al provided the significance of IoT communication in their self- locking engine system. Once it integrates GPS tracking, the system would immediately send real-time alerts and could, therefore, ensure prompt actions to cut down upon drunk driving and enhance road safety altogether.

Evjola Spaho, Orjola Jaupi, and Anxhela Cala designed an IR sensor-based Driver Monitoring System that detects alcohol along with the intoxicated and drowsy driver. The system automatically turns off the engine if the driver is intoxicated or drowsy, thereby making the roads very much safer to drive.

III. EXISTING SYSTEM

The traditional system to prevent drunk driving contains a mix of human effort, vehicle-based systems, and external monitoring. Nevertheless, these systems contain several disadvantages that the alcohol sensing alert with engine locking project aims to overcome.

- Breathalyzers are devices that measure the blood alcohol concentration (BAC) of a person's breath. However, they require manual operation and can be prone to errors.
- Ignition interlock devices are installed in vehicles and require drivers to blow into a breathe analyser before starting the engine. However, they can be circumvented by having someone else blow into the device.
- Some vehicles come equipped with systems that detect driver impairment, such as lane departure warning systems and automatic emergency braking systems. However, these systems are not specifically designed to detect drunk driving.

External monitoring systems, such as roadside checkpoints and police patrols, can detect drunk driving. However, they are resource-intensive and may not be effective in detecting all instances of drunk driving

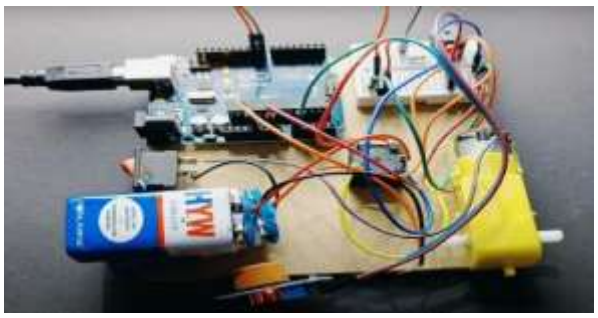

Fig 3.1 Prototype

IV. PROPOSED SYSTEM

The proposed system for the Alcohol Sensing Alert with Engine Locking Project will be a comprehensive integration of breath analysis, locking an engine, and real-time monitoring against drunk driving. It shall include the following components:

Accurate and Reliable: It utilizes high-accuracy breath analyzer sensor that determines the presence of alcohol from the driver's breath, thereby providing accurate results. Real-Time Monitoring: The system gives real-time monitoring and feedback to the driver as well as authorities in case a driver is found to be drunk, thereby making it possible to take prompt action. Engine Locking: The system immobilizes the engine of the vehicle if there is a detected intoxicated driver, thus preventing them from proceeding further and limiting the occurrence of further accidents. Data, trends, and patterns regarding drunk driving can be subjected to thorough analysis to tailor a range of interventions and prevention strategies. Convenience: the system is convenient to drivers, with minimal manual operation, and real-time feedback. Cost-Effective: the system is cost-effective because it eliminates the need for manual

testing and minimizes accidents caused by drunk driving. Improved Safety: safety on the roads is enhanced because the likelihood of accidents and injuries from drunk driving is reduced.

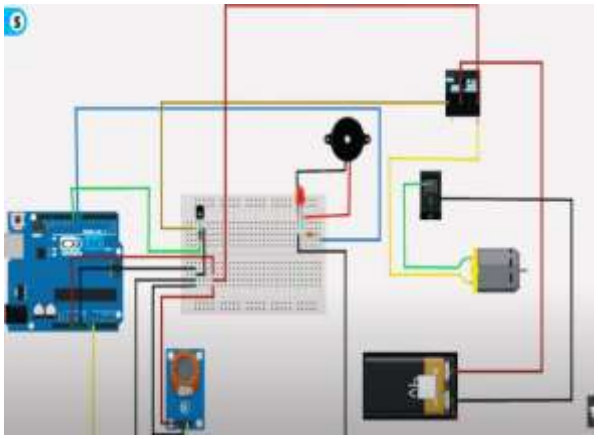

Fig 4.1 Circuit diagram

A. Architecture Diagram

Architecture diagram is a visual representation of software system components. The below diagram is the architecture of the system.

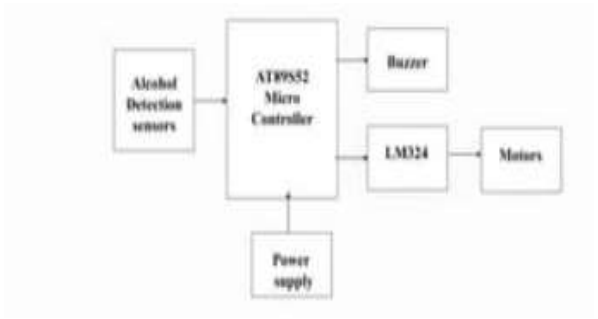

Fig.5.1 Architecture diagram

Its locking mechanism is one of the most important parts that prevent starting of the vehicle when alcohol levels exceed a given threshold. This is typically done by adding a relay module to the car's ignition system. A microcontroller like Arduino or Raspberry Pi is essentially acting as a switch, but it accepts the input from the alcohol sensor. The microcontroller sends an output signal to the relay. Once the alcohol concentration surpasses the safe limit, the relay breaks the circuit and the engine gets disabled.

Normally, if there is no alcohol in the vehicle, the microcontroller will open the relay, meaning the circuit will close and will allow the ignition system to activate, thus helping start the engine. In the case of a greater alcohol level than the threshold, it will send a signal to the relay to close the circuit as fast as possible so that the engine does not start. This ensures that the vehicle cannot be made to run under unsafe conditions; thus, this particular safety measure will work for the driver and other road users.

The relay-based locking mechanism is efficient and simple enough to be well-suited for implementation in a vehicle. This mechanism guarantees control of the ignition system with no need for further modification to the existing wiring of the vehicle. Further, the inclusion of visual or audio alerts, like LED indicators or buzzers, in the locking system can be added to notify the driver when the engine has locked up due to alcohol so on and so forth, thus enhancing the overall functionality and safety of the system.

V. FUTURE ENHANCEMENTS

Integrate the system with IoT technology to send real-time alerts to designated contacts (e.g., family, police) when alcohol is detected.

Add a biometric system (fingerprint or facial recognition) to authenticate the driver before the start of the vehicle, and make sure only authorized people are driving it.

Implement advanced, non-invasive alcohol detection techniques such as skin sensors by touch through contact with the steering wheel or through breath analysis using infrared.

Deploy GPS and geo-fencing that would alert the authorities or the vehicle owner if an intoxicated person is trying to leave a designated area in an intoxicated state.

AI algorithms and computer vision that would monitor the driver's behavior by watching for drowsiness, erratic driving, or any other risky behavior other than alcohol detection.

Get connectivity with the On-Board Diagnostics OBD-II interface to collect information like speed, braking patterns, or engine performance at the time of suspected alcohol use.

To provide an emergency override system, implement a safe mode for the vehicle to be used in special situations such as medical emergencies while alerting the authorities.

Add voice alert to the system for raising awareness to the driver upon detection of alcohol and locks off, requesting him to breathe into the sensor for a retest.

Forward data to the cloud for further analyses to identify trends, repeat offenders, and output preventive recommendations based on the behavior of the driver.

VI. CONCLUSION

An alcohol sensing alarm and engine locking system is critical in promoting road safety through the deterrence of drunk driving cases. It ensures that a vehicle does not start since its sensors monitor alcohol levels in the driver's breath, hence reducing incidents involving impairments. This alert mechanism acts as a warning to the drivers, who might not know that their alcohol levels have already crossed the limit. Locking for the engine is such a feature that doesn't allow the vehicle to be started, and hence the driver cannot take off from the place. It is much more effective when commercial or public transportation vehicles are used since many lives are involved in it. Adoption of such technology also sends a strong message about seriousness associated with impaired driving and hence encourages responsible behavior on roads. The degree to which such a system may diffuse can lead to drastic declines in traffic fatalities and injuries associated with alcohol consumption. In the long run, such integration will also enhance drivers' liability and social awareness about the risks associated with drunk driving. Conclusion Therefore, the alcohol sensing alert and the engine locking system marks an innovative step toward creating much more secured roads and more responsible driving behavior. Incorporating alternative biometric modalities supplements identification in mask-wearing scenarios, prioritizing privacy by focusing on identification only when masks are absent. In summary, this system offers accurate identification, enhanced security, and adaptability to mask-related challenges.

VII. REFERENCES

[01] Prabu U et.al, “A Comprehensive Study on Alcohol Detection and Engine Locking System using Arduino” *2024 4th International Conference on Pervasive Computing and Social Networking (ICPCSN)*, IEEE , 2024

[02] Sharanabasappa et.al, “Safe Drive: An Automatic Engine Locking System To Prevent Drunken Driving”, *3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology*, IEEE,2018.

[03] Samuel Owoeye et.al,” Development of Alcohol Detection with Engine Locking and Short Messaging Service Tracking System”,

2022 5th Information Technology for Education and Development (ITED Research gate, Nov 2022

[04] Avagaddi Prasad et.al.,” Drowsiness And Alcohol Detection with Engine Locking”, *2022 3rd International Conference on Communication, Computing and Industry 4.0 (C2I4)*, Research Gate, Dec 2022

[05] D Prema Raja.et.al,” Alcohol Detection and Emergency Alert System using IoT”, *2022 6th International Conference on Intelligent Computing and Control Systems (ICICCS)*, IEEE, May 2022.

[06] J. Gowrishankar et.al., “Arduino-Based Alcohol Sensing Alert with Engine Locking System”, Springer, Dec 2020.

[07] Rani et.al., “Automatic Engine Locking System for Drunken Driving”, Springer, Nov 2021.

[08] R. Sireesha et.al., "Internet of Things (IoT) based Engine Locking System", Research and Applications: Emerging Technologies 2023

[09] Pranjali, B. Priyanka, N. Bhagyashri and V. D Chaudhari, "Alcohol Detection System in Vehicle Using Arduino", International Research Journal of Engineering and Technology (IRJET), 2017

[10] D. E. Gbenga, H. I. Hamed, A. A. Lateef and A. E Opeyemi, "Alcohol detection of drunk drivers with automatic car engine locking system", Nova Journal of Engineering and Applied Sciences, vol. 6, no. 1, pp. 1-15, 2017.

[11] N. Shinde, A. Giri, S. Rima and P Singh, "Alcohol detection and vehicle engine locking system", International Journal of Industrial Electronics and Electrical Engineering, vol. 6, no. 3, pp. 1-4, 2018.

[12] P. Bhuta "Alcohol detection and vehicle controlling", International Journal of Engineering Trends and Applications (IJETA), vol. 2, no. 2, pp. 92-97, 2015.

[13] G Jiangpeng Dai et.al., “Mobile Phone Based Drunk Driving Detection,” *The Ohio State University Columbus*, Ohio, USA.

[14] Aishwarya S.R, Ashish Rai, Charitha, Prasanth M.A, Savitha S.C, "An IoT Based Accident Pre-vention and Tracking System for Night Drivers", *International Journal of Innovative Research in Computer and Communication Engineering*, Vol. 3, Issue 4, April 2015

Ministry of Road Transport and Highway, Road accidents in india-2015.Technical report,2015

[15] Robert B. Voas and James C. Fell, "Preventing impaired driving opportunities and problems", *Alcohol Research and Health*, Volume 34, 2016