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SecureDrive:Alcohol Analysing System for Vehicles

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Abstract-- The increasing frequency of road accidents and associated fatalities presents a significant and alarming concern. Alcohol consumption by drivers is a major contributing factor to these accidents, particularly in countries like India. To address this issue, this paper proposes a sophisticated system for alcohol content detection in drivers. The system utilizes advanced technology, incorporating MQ3 sensors seamlessly integrated into the vehicle's steering mechanism to analyze the driver's breath and determine their blood alcohol level. An important feature of this system is its ability to prevent the vehicle from starting if the detected alcohol content exceeds a predefined threshold. Moreover, the system can accurately identify the driver while disregarding passengers. Sensors connected to an Arduino microcontroller allow the system to emit a distinctive buzzer sound if the driver is alcohol-impaired or attempting theft. This enhances the precision of identifying alcohol-impaired drivers and prevents potential car theft incidents.

Keywords-Alcohol consumption, MQ3 sensor, vehicle starting prevention, blood alcohol level, Arduino microcontroller.

I. INTRODUCTION

The consumption of alcohol imposes substantial burdens on public health, the economy, and society at large. In the year 2010, the 12-month prevalence of Alcohol Use Disorders (AUDs) in India stood at 2.6%, with alcohol dependence being reported at 2.1%. Moving forward to 2012, a substantial drunk driving was directly responsible for 33.1% of all road traffic fatalities. According to the National Mental Health Survey of India conducted between 2015 and 2016, the prevalence of AUDs in adult men was recorded at 9%. Furthermore, research in India indicated that alcohol played a significant role in 5.4% of all-cause deaths, were linked to alcohol consumption [1][2].

The author also mentions that alcohol consumption in India is steadily increasing year after year.. Furthermore, a consistent upward trend in alcohol consumption in India is evident, with per capita alcohol consumption surging from 2.4 liters in 2005 to 5.7 liters in 2016. In the same year, India witnessed approximately 500,000 distinct road accidents, resulting in the tragic loss of approximately 180,000 lives and causing injuries to around 500,000 individuals, with a predominant proportion being adults. An observational study examining the root causes of road traffic injuries in India revealed that approximately 20% of drivers involved in these accidents were driving when under the influence of alcohol. Additionally, a separate investigation into blood samples from road fatalities indicated the presence of alcohol in the bloodstream of roughly 23% of the victims. Moreover, one out of every six individuals with road-related injuries in southern India was found to have alcohol in their system [3][4][5]. Addressing the serious issue of drunk driving, our project aims to tackle one of the major causes of road fatalities in India. Drunk individuals often endanger lives by operating vehicles despite their intoxication. To combat this problem, we propose an innovative system that automatically shuts off the vehicle's engine as soon as a certain level of alcohol is detected in the driver's breath. Once alcohol presence is detected, the microcontroller swiftly stops the engine and triggers a siren, alerting nearby individuals to the situation. Additionally, a prominent message displaying 'Alcohol Detected' flashes on a digital screen installed in the system, enabling people to grasp the severity of the matter and promptly inform the authorities to prevent any potential incidents. By implementing this system in vehicles, we not only prevent fatalities and property damage caused by drunk driving but also significantly reduce the overall number of accidents resulting from this dangerous behavior. Furthermore, the quick response of the system ensures enhanced safety for occupants of other vehicles and pedestrians, as the vehicle is promptly immobilized, mitigating potential harm.

II. LITERATURE REVIEW

The use of MQ-3 alcohol gas sensors in combination with microcontrollers like ESP8266 for alcohol detection in vehicles has gained attention in the field of automotive safety. This methodology involves monitoring alcohol levels in a

vehicle's cabin, triggering alarms, and sending alerts to vehicle owners via cloud-based platforms like UBIDOTS. This approach enhances road safety by providing real-time feedback and enabling prompt action when alcohol levels exceed predefined limits[6]. Iris recognition technology with alcohol detection for vehicle safety. It involves capturing and encoding iris images using Gabor Filter and other algorithms, then interfacing with a microcontroller and relay circuit to manipulate the vehicle's ignition system based on the driver's alcohol consumption status. The approach integrates image processing, normalization, and matching techniques, enhancing alcohol-related safety measures in vehicles[7].
A comprehensive drunk driving detection system was presented for mobile phones. It consists of four key components: monitoring daemon, calibration, data processing, and alert modules, utilizing accelerometer and orientation sensors. The algorithm analyses lateral and longitudinal acceleration patterns, using multiple rounds of pattern matching for increased accuracy. The system is designed to detect abnormal driving behaviour and trigger alerts or contact authorities when necessary, enhancing road safety[8].

The utilization of ATmega 328 microcontroller in conjunction with an MQ3 alcohol sensor for alcohol detection and control in embedded systems is a notable approach. This involves sensor-triggered relay activation, controlling motor operations, and ensuring safety by monitoring alcohol levels in the environment. It emphasizes the pivotal role of microcontrollers in achieving effective system[9].

[10] employs multiple sensors and methods to bolster vehicle safety. It uses an MQ3 alcohol sensor to detect alcohol, enabling ignition shutdown. Furthermore, it integrates a heart rate sensor to monitor the driver's pulse rate and can slow down or halt the vehicle if an irregular pulse rate is observed. Additionally, a human identification system with infrared and carbon dioxide sensors ensures passenger presence and safety, issuing warnings to the driver as needed. This comprehensive strategy aims to reduce accidents and enhance road safety.

This integrated system incorporates several key components, including the Arduino UNO microcontroller, MQ3 alcohol sensor, LCD display, DC motor, buzzer, and LEDs, with the primary objective of preventing accidents caused by drunk driving. In the event of alcohol detection, the system takes swift action by instantly shutting down the vehicle's engine as a safety precaution. Furthermore, the system boasts an Android application that provides an interface for vehicle owners and drivers to register, exchange information, and report potential threats, thereby contributing to the enhancement of road safety measures [11].

The system described is an advanced vehicle security solution that combines GSM technology with embedded technology. It utilizes components such as the Arduino microcontroller, GSM modem, LCD display, and relay. Users can input a password through an interface, and if it's correct, the system starts the vehicle's engine. In case of unauthorized access attempts, it sends immediate alerts to the vehicle owner via GSM communication. This innovative system aims to significantly reduce the risk of vehicle theft and enhance overall security [12].

[13] describes an IoT-based drunk driving detection and engine locking system with real-time location in app. The system uses an MQ-3 sensor to detect the presence of alcohol in the driver's breath. If the sensor detects an alcohol concentration above a certain threshold, the system sends a signal to the Arduino microcontroller, which locks the engine and prevents the car from being started. The system also uses a GPS module to track the car's location and send it to a mobile app in real time. This allows the driver's family members or friends to track their location and ensure their safety.
This comprehensive system [14] utilizes a range of components, including alcohol sensors, comparators, microcontrollers, buzzers, GPS, and GSM modules, to not only detect alcohol levels but also to significantly improve road safety. It integrates GPS for location tracking and GSM for remote communication, allowing it to promptly notify authorities and family members of instances of drunk driving. Moreover, it incorporates a fuel supply blocker mechanism that adds an extra layer of safety by disabling the engine when alcohol is detected.

An economical approach is presented for detecting driver alcohol consumption and preventing vehicle operation. This system incorporates an Arduino microcontroller, an alcohol sensor, and a relay module. It functions by assessing breath alcohol levels, with the engine immobilized if levels surpass a predefined threshold, promoting safe driving practices [15].

III. METHODOLOGY

Using an Arduino Uno microcontroller and an MQ3 alcohol sensor, we propose a comprehensive system designed to detect alcohol presence in a driver's breath, ensuring safe and responsible driving practices. The system employs various components, including an Arduino microcontroller, LCD display, alcohol sensor, LED indicator, buzzer, DC motor for engine control, and a 5-volt DC power supply.

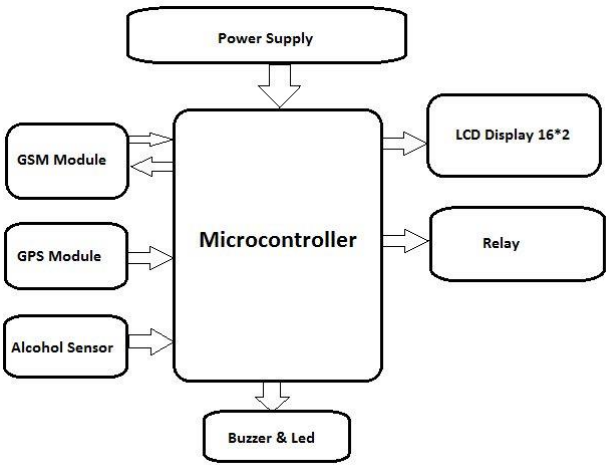

Fig.1. Block Diagram

Upon activation, the LCD initially displays "No Alcohol detected," allowing the vehicle's engine to start. Simultaneously, a GPS module is activated to track the vehicle's location. If the alcohol sensor detects alcohol above a predefined threshold, the system responds by activating an LED indicator and sounding a buzzer. It then promptly immobilizes the engine, displaying "Alcohol Detected" on the LCD.

In addition to these features, we have integrated a GPS module to track the vehicle's real-time location. Furthermore, a GSM module ensures immediate communication of alcohol detection alerts to a preconfigured recipient, including the vehicle's precise coordinates. This comprehensive system not only prevents drunk driving but also enhances safety by enabling remote monitoring and swift response, minimizing the potential for accidents and their associated consequences.

IV. RESULTS

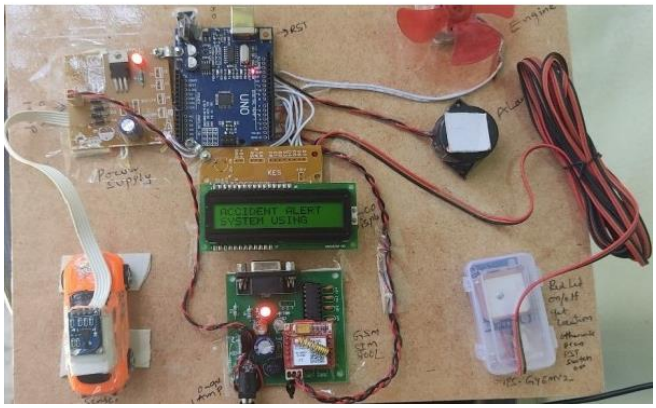

Fig. 2. Circuit

In cases where an inebriated individual endeavors to assume control of a vehicle, our alcohol detection system promptly identifies the presence of alcohol. Upon alcohol detection, the system initiates an immediate engine shutdown and activates an alarm, effectively notifying nearby individuals of the situation. To enhance awareness further, a liquid crystal display (LCD) screen positioned within the vehicle prominently displays the message "Alcohol Detected," enabling swift and appropriate responses from those present.

V. LIMITATIONS

Reduced system effectiveness could be caused by a driver's awareness of the alcohol detection device in their car, since they may purposefully obstruct or tamper with the sensor. Furthermore, the COVID-19 pandemic has brought a new difficulty, as people frequently drive while wearing masks. This has the potential to impair the system's capacity to identify alcohol in a driver's breath. Furthermore, the system's reliance on alcohol detection and erratic vehicle movements may cause problems when passengers, rather than the driver, are intoxicated. In such instances, the system may accidentally lock the engine, causing delays on the road. These considerations emphasize potential limitations and obstacles in deploying such a system, emphasizing the importance of thorough and adaptable alcohol detection systems.

VI. CONCLUSION

Our project represents a significant achievement in addressing the critical issue of drunk driving through the development of a cost-effective and highly efficient system. The primary objective is to significantly reduce the tragic loss of life and property resulting from accidents caused by intoxicated drivers. Widespread implementation of this system has the potential to proactively prevent such disasters. Upon detecting alcohol, our system acts swiftly to deactivate the vehicle's engine, thus preventing potential harm. Moreover, it extends its impact by alerting nearby individuals, enhancing awareness, and facilitating prompt intervention. The precision of the sensor employed in our project is exceptional and can be tailored to specific needs, further amplifying its effectiveness. Through the introduction of this innovative solution, our aim is to make a substantial contribution to the fight against drunk driving, safeguarding both lives and valuable assets.

REFERENCES

[1] Gaurav Jyani, Shankar Prinja, Atul Ambekar, Pankaj Bahuguna, Rajesh Kumar, Health impact and economic burden of alcohol consumption in India, International Journal of Drug Policy, Volume 69,
2019, Pages 34-42, ISSN 0955-3959,
https://doi.org/10.1016/j.drugpo.2019.04.005.
[2]Eashwar VMA, Umadevi R, Gopalakrishnan S. Alcohol consumption in India- An epidemiological review. J Family Med Prim Care. 2020 Jan 28;9(1):49-55. doi: 10.4103/jfmpc.jfmpc_873_19. PMID: 32110564; PMCID: PMC7014857.
[3] Devajana Chinnappa Nanjunda, Impact of socio-economic profiles on public health crisis of road traffic accidents: A qualitative study from South India,
Clinical Epidemiology and Global Health,
Volume 9, 2021, Pages 7-11, ISSN 2213-3984, https://doi.org/10.1016/j.cegh.2020.06.002.
[4] Ankit Kumar Yadav, Nagendra R. Velaga,
Alcohol-impaired driving and road safety: Examining the impact of alcohol on driving errors of Indian drivers,
Safety Science, Volume 145, 2022, 105516, ISSN 0925-7535, https://doi.org/10.1016/j.ssci.2021.105516.
[5] Ankit Kumar Yadav, Sajid Shabir Choudhary, Nishant Mukund Pawar, Nagendra R. Velaga,
Can't drive, I'm drunk – Exploring factors influencing the intention to drink and drive among Indian drivers, IATSS Research, Volume 46, Issue 4, 2022, Pages 467-478, ISSN 0386-1112, https://doi.org/10.1016/j.iatssr.2022.07.004.
[6] Dr. Pavan Shukla , Utkarsh Srivastava , Sridhar Singh , Rishabh Tripathi, Rakesh Raushan Sharma, 2020, Automatic Engine Locking System Through Alcohol Detection,

INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) Volume 09, Issue 05 (May 2020)
[7] L. A. Navarro, M. A. Diño, E. Joson, R. Anacan and R. D. Cruz, "Design of Alcohol Detection System for Car Users thru Iris Recognition Pattern Using Wavelet Transform," 2016 7th International Conference on Intelligent Systems, Modelling and Simulation (ISMS), Bangkok, Thailand, 2016, pp. 15-19, doi: 10.1109/ISMS.2016.60.
[8] J. Dai, J. Teng, X. Bai, Z. Shen and D. Xuan, "Mobile phone based drunk driving detection," 2010 4th International Conference on Pervasive Computing Technologies for Healthcare, Munich, Germany, 2010, pp. 1-8, doi: 10.4108/ICST.PERVASIVEHEALTH2010.8901.
[9] Review Paper On Alcohol Detection And Vehicle Engine Locking System. (2022). *Journal of Pharmaceutical Negative Results*, 10085-10092, doi:10.47750/pnr.2022.13.S09.1180.
[10] Dhivya, M and S. Kathiravan. "Driver Authentication and Accident Avoidance System for Vehicles." Smart Comput. Rev. 5 (2015): 30-37.
[11] Gole, H., Ingle, S. and Salunkhe, R., ALCOHOL DETECTION ENGINE LOCKING SYSTEM WITH DRIVER HIRING SERVICE. e-ISSN: 2582-5208.
[12] Pany, Jayanta Kumar, and RN Das Choudhury. "Embedded automobile engine locking system, using GSM technology." International Journal of Instrumentation, Control and Automation (IJICA) 1.2 (2011). ISSN : 2231-1890.
[13] M. A. Hossain, F. Jahura, M. A. Rahman and T. Ahmed, "IoT-based Drunk Driving Detection and Engine Locking System with Real-Time Location in App," TENCON 2022 - 2022 IEEE Region 10 Conference (TENCON), Hong Kong, Hong Kong, 2022, pp. 1-5, doi: 10.1109/TENCON55691.2022.9978102.
[14] Ranjana, P., Rajeswari Mukesh, Achhint Kumar, N. N. S. S. Sujith, and C. H. Sathyasai. "Vehicle, engine lock system for theft and alcohol detection." Int. J. Recent Technol. Eng 7, no. 5 (2019): 363-367.
[15] Gowrishankar, J., PushpaKarthick, P., Balasundaram, G., Kaliappan, E., Prabaharan, N. (2021). Arduino-Based Alcohol Sensing Alert with Engine Locking System. In: Raj, J.S. (eds) International Conference on Mobile Computing and Sustainable Informatics . ICMCSI 2020. EAI/Springer Innovations in Communication and Computing. Springer, Cham. https://doi.org/10.1007/978-3-030-49795-8_29