iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** III **Month of publication:** March 2025

DOI: https://doi.org/10.22214/ijraset.2025.67468

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue III Mar 2025- Available at www.ijraset.com

IOT Based Alcohol Detection and Engine Locking System with GPS

Ambati Tarun[1], Govind Sai Alekhya[2], Peddadi Govardhan[3], Pappu Anand Raju[4]
Department of Computer Science & Engineering with specialisation in Internet of Things, Raghu Engineering College, Visakhapatnam, India

Abstract: ***The Smart Alcohol Detection and Automatic Engine Locking System aims to improve road safety by blocking intoxicated individuals from operating vehicles and reducing reckless driving behaviours. By combining an alcohol sensor that measures breath alcohol concentration with an accelerometer that detects sudden and erratic acceleration the system identifies reckless driving behaviour. The system engages a relay to lock the engine by disabling the vehicle's ignition when alcohol levels surpass a set threshold.***
The system responds to rash driving by reducing speed or shutting down the engine and sends immediate alerts through a GSM module to inform authorities or emergency contacts. The system includes GPS tracking to provide location information when alerts are activated. The LCD display shows real-time updates about the system status directly to the driver. An Arduino Uno microcontroller serves as the project component that manages sensor inputs and executes appropriate output actions with efficiency.
Keywords: IOT, Alcohol detection, Accident Detection, GPS, GSM.

I. INTRODUCTION

The main objective is to improve road safety through preventing alcohol-related accidents and establishing real-time monitoring and response systems. The system includes a breathalyzer sensor that analyzes alcohol levels present in the driver's breath. The system will send an alert and lock the vehicle's engine if the detected alcohol level surpasses a set threshold which stops the vehicle from starting. The system employs GPS technology to monitor the vehicle's position while using GSM to establish real-time communication channels.
During an accident situation the system detects rapid changes in vehicle movement and sends an emergency signal with the vehicle’s current GPS location to pre-set contacts or emergency services. This solution works to decrease accidents involving alcohol while making emergency responses faster.

II. EXISTING SYSTEM

The system to be proposed is going to enhance road safety through the integration of alcohol sensing, detecting rash driving, immobilizing the engine, and providing real-time warnings into a single end-to-end solution. prevention of deaths from delays of human attempts to assist.

A. Drawbacks of Existing System

The most significant limitation of current systems is that they primarily deal with alcohol detection and engine locking but fail to integrate several safety features like rash driving behavior detection. No system today offers integration of alcohol detection, rash driving monitoring, engine locking, and real-time alerting to the authorities. This creates a gap in overall driver safety, as current solutions are not able to counteract reckless driving and fail to offer complete protection by notifying concerned authorities when there is a violation.

III. PROPOSED SYSTEM

The system to be proposed is going to enhance road safety through the integration of alcohol sensing, detecting rash driving, immobilizing the engine, and providing real-time warnings into a single end-to-end solution. prevention of deaths from delays of human attempts to assist.

A. *Working*

Before the vehicle is started, the driver undergoes a breathalyzer test through the alcohol sensor. The sensor tests for alcohol content in the driver's breath.

When the sensor finds that the blood alcohol level (BAC) exceeds the legal limit, the system will lock the ignition automatically, thus not allowing the engine to be started.

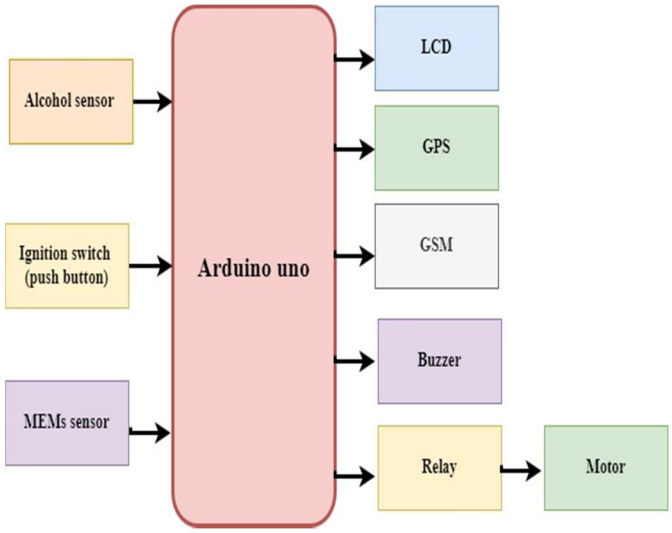
When alcohol is found, the relay system is enabled so the vehicle cannot be started or run.

As soon as the vehicle is turned on, the system keeps an ongoing check on driving behavior through an accelerometer. Sudden acceleration, sharp turns, or hard braking that suggest rash driving are identified.

In case alcohol is present or rash driving continues, the system will immediately send real-time messages to the authorities or emergency contacts through a GSM module, informing them about the situation.

During the process, the LCD display gives the driver continuous feedback regarding their alcohol content, driving habits, and system status.

IV. ARCHITECTURE



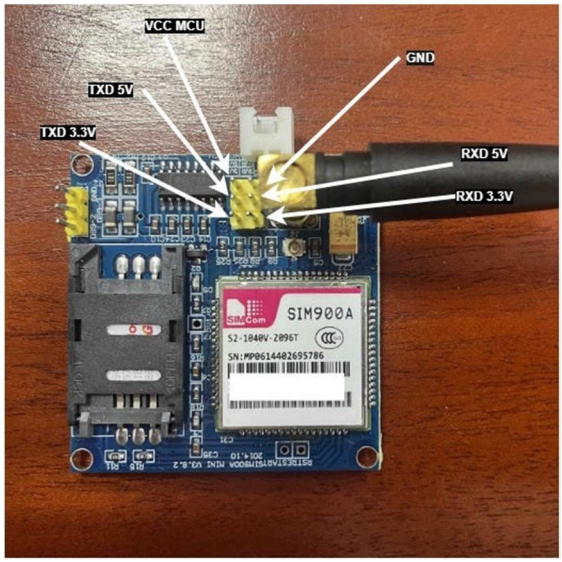
V. COMPONENTS USED AND DESCRIPTION

A. *Arduino UNO*

Arduino Uno is used as the brain unit, where it controls interactions between different elements and implements alcohol detection, accident sensing, and engine locking logic.

Arduino Uno is a microcontroller board implemented using the ATmega328P chip, which offers a practical and efficient method of interfacing sensors, relays, and communication modules. It computes outputs from the alcohol sensor to detect alcohol concentration on the driver's breath. If the alcohol content exceeds the permissible limit, the Arduino closes a relay to prevent the engine of the vehicle from being started. Moreover, the Arduino Uno is connected with the GPS module for real-time monitoring of the vehicle's position and the GSM module for SMS alerts in case of an accident or detection of alcohol. The board has its input/output pins connect and regulate these modules, process information, and implement necessary actions against current conditions.

B. GSM SIM900A



The GSM SIM800/900 module is an essential element in this project for facilitating communication between the vehicle system and other devices, like the owner of the vehicle, emergency contacts, or the authorities. It supports SMS (Short Message Service) and voice calls, and it is best suited for remote monitoring and alerting in the event of an accident or if alcohol is present.

.

C. GPS (Global Positioning System)

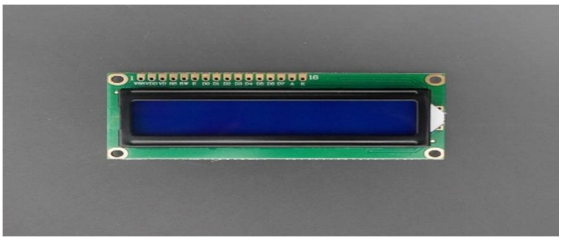
The GPS NEO-6 Module is a crucial part of your project, delivering real-time geographic location information to improve the safety and functionality of your IoT-based alcohol detection and accident detection system. The module is a high-precision GPS receiver that interfaces with the Arduino board to monitor the location of the vehicle and send notifications in the event of accidents.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue III Mar 2025- Available at www.ijraset.com

D. MQ-3 Breathalyzer

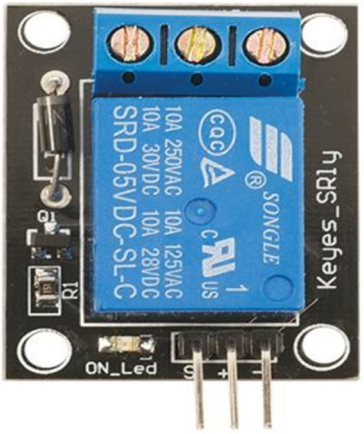
MQ-3 Breathalyzer sensor is an essential unit in IoT-based Alcohol Detection and Accident Detection System. The MQ-3 sensor is used for detecting the content of alcohol within a person's breath, crucial for the purpose of preventing alcoholic accidents and safeguarding drivers' safety. MQ-3 measures the level of ethanol (alcohol) concentration in the atmosphere, and for this reason, it is also best suited to be utilized as a sensor for breathalyzer.

*E. Liquid Crystal Display(LCD 16*2)*



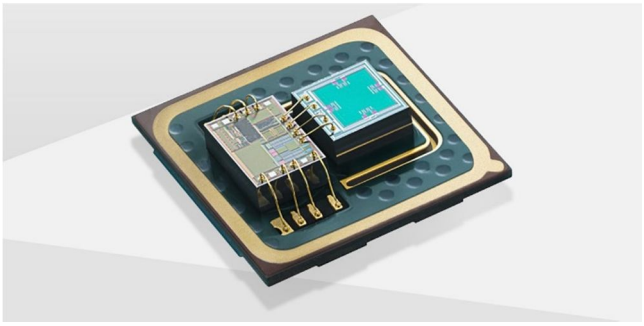
The 16x2 LCD Display is a vital part of our IoT-based Alcohol Detection and Accident Detection System, as it gives a graphical interface to deliver significant information to the user. This display is employed to exhibit real-time information and status notifications so that the driver or any other user may have an easy understanding of the system's action and the current vehicle status.

F. RELAY srd-05vdc-sl-c



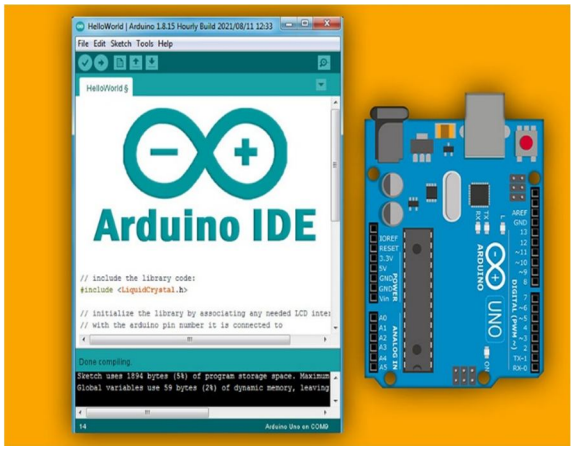
The SRD-05VDC-SL-C Relay is an essential component of our IoT-based Alcohol Detection and Accident Detection System because it allows for the control of high-power devices, like the engine locking mechanism, by a low-power signal from the Arduino. The SRD-05VDC-SL-C is an electromechanical relay in that it utilizes an electromagnet to change contacts. It is made to drive high-voltage or high-current loads (like the car engine relay or other actuators) from a low-voltage control signal from the Arduino.

G. Mems Sensor



MEMS Sensor (Micro-Electro-Mechanical Systems) is also important in accident detection based on a change in the motion of the vehicle. MEMS sensors are usually utilized in applications that need to detect movement, orientation, or vibration, and in this project, they can be utilized in detecting sudden acceleration, deceleration, or tilting, which could imply an accident.

H. Software(Arduino IDE)



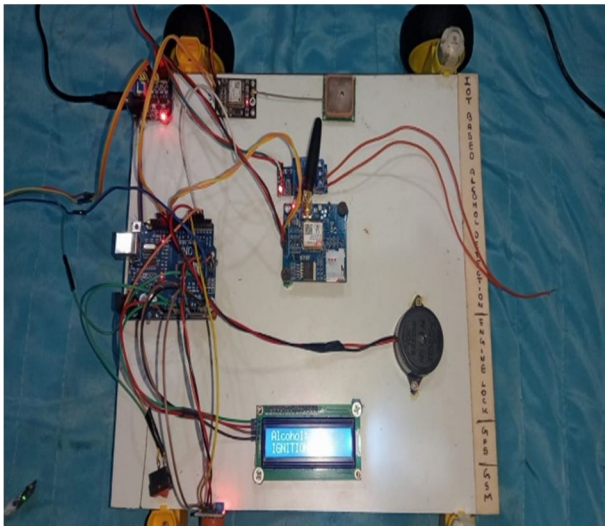
The Arduino Integrated Development Environment (IDE) is the main software that you will use to program and control the Arduino Uno microcontroller in your IoT-based Alcohol Detection and Accident Detection System. The Arduino IDE offers a simple interface to type, compile, and upload code to the Arduino board so that you can control and communicate with all of the system's components, including the MQ-3 breathalyzer, MEMS sensor, GPS module, GSM module, and the 16x2 LCD display.

I. Power Supply

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue III Mar 2025- Available at www.ijraset.com

9V HW battery (also known as a 9V battery) is crucial in supplying power to the whole system. As the devices in the system, including the Arduino Uno, GSM module, GPS module, and sensors (such as the MQ-3alcohol sensor and MEMS accelerometer), need a constant power supply, the 9V battery is utilized to supply the required power.

VI. WORKING

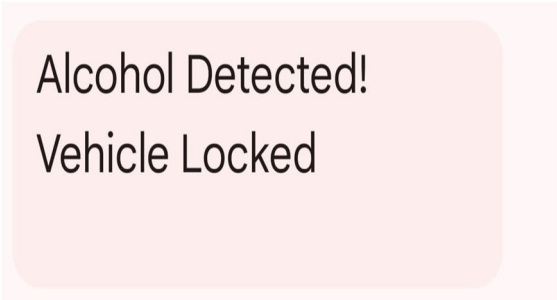


1) While initiating the car, the driver undergoes a breathalyzer test with the use of the alcohol sensor. The sensor tests the driver's breath for alcohol presence.
2) If the sensor finds that the blood alcohol concentration (BAC) is more than the allowable limit, the system will block the ignition system automatically, keeping the engine from being started.
3) Upon detection of alcohol, the relay system is switched on, guaranteeing that the car cannot be started or moved.
4) Once the vehicle is in operation, the system continuously tracks driving behavior through the use of an accelerometer. Sudden acceleration, hard braking, or sharp turns that signify rash driving are recognized by it.
5) Should alcohol be identified or rash driving continue, the system will immediately alert authorities or emergency contacts via a GSM module, informing them of the incidence.
6) During the process, the LCD screen gives the driver constant feedback regarding their alcohol level, driving style, and system status.

VII. RESULTS

A. *Prevention of Drunk Driving*

By employing the MQ-3 Alcohol Sensor to measure alcohol content in a driver's breath, the system can avoid driving under the influence (DUI). When alcohol is found above a certain level, the engine locking relay can be activated, which locks the engine of the vehicle, and the driver cannot start or continue driving.

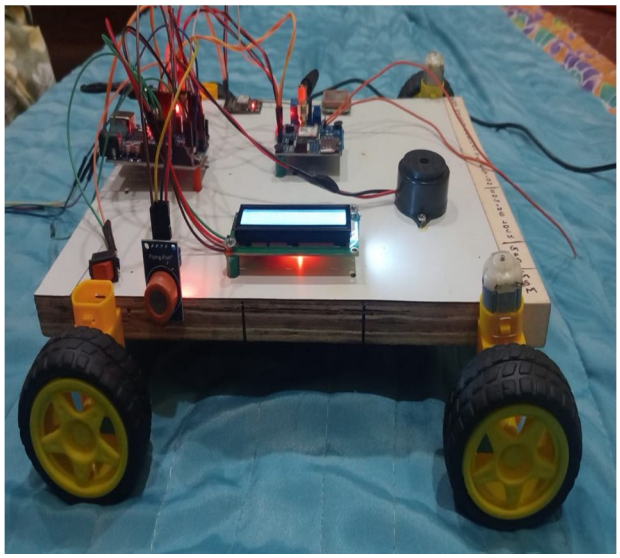


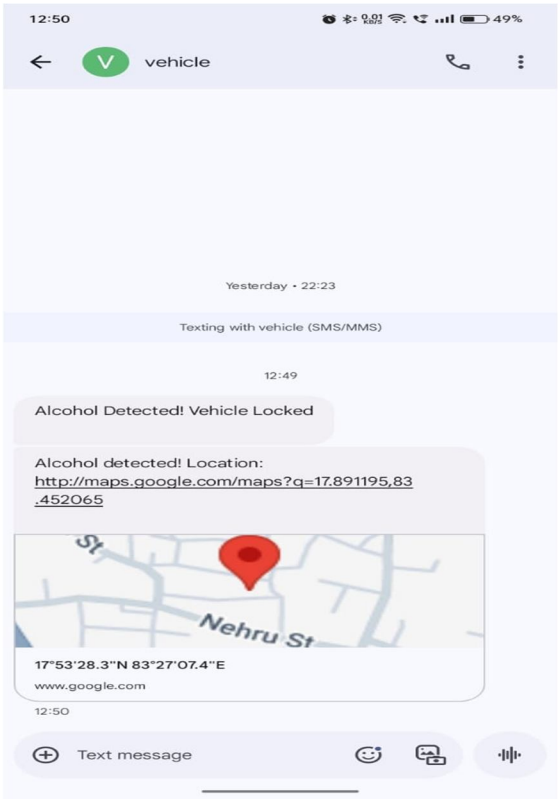
B. Immediate Accident Detection and Response

The MEMS accelerometer (employed for accident detection) is capable of recognizing abrupt motion changes, such as sudden deceleration or impact, which could signal an accident. As soon as the system identifies an accident, it can initiate a cascade of activities, including:

Sending an emergency SMS with the GPS coordinates to emergency services or predetermined contacts via the GSM SIM800/900 module.

Showing an accident warning message on the 16x2 LCD display.Activating the engine lock or initiating other emergency procedures (such as hazard lights).





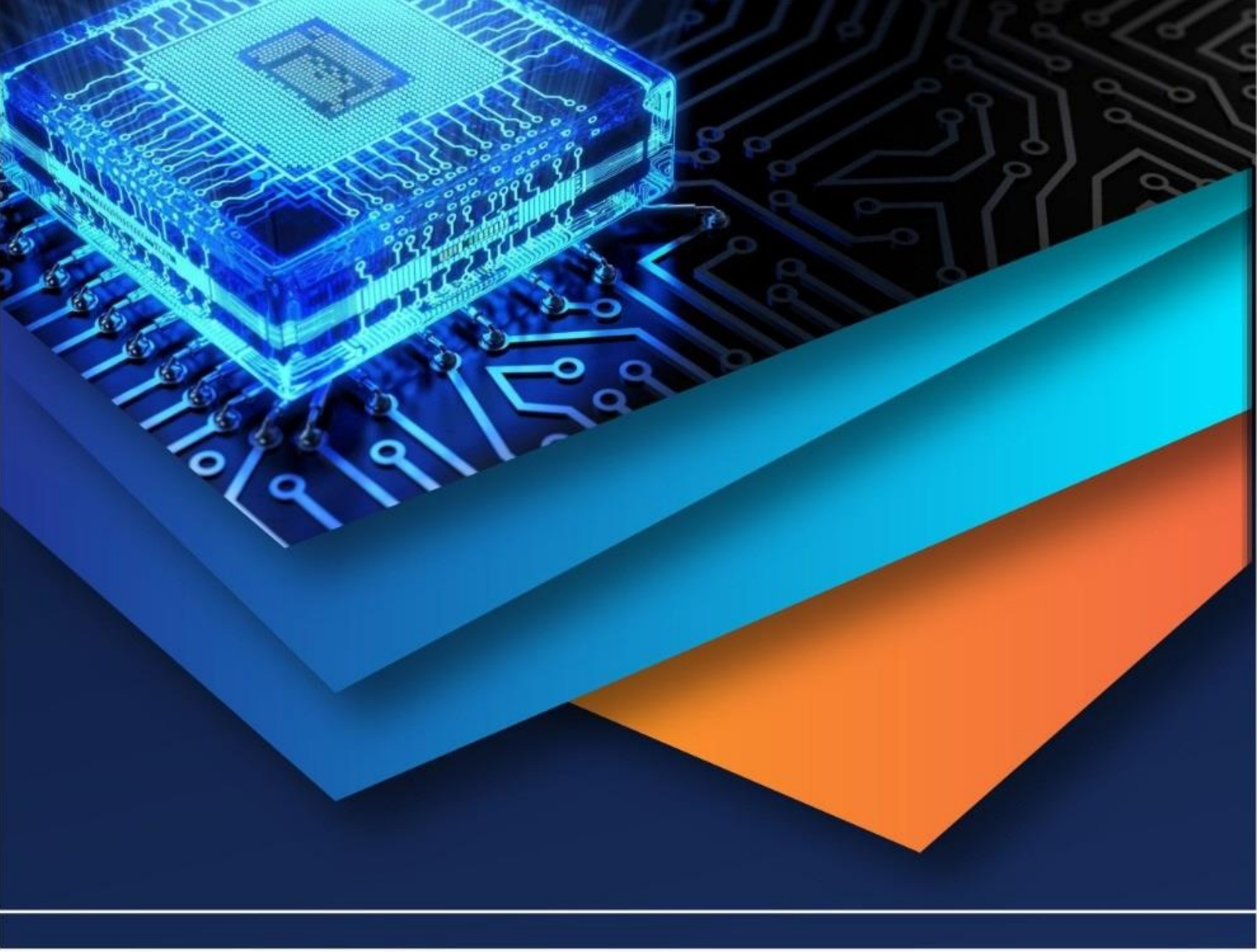
VIII. CONCLUSION

The IoT-based Alcohol Detection and Accident Detection System is a major advancement in vehicle safety through the integration of sophisticated technologies like alcohol detection, accident monitoring, real-time GPS tracking, and emergency response. With the integration of sensors like the MQ-3 breathalyzer, MEMS accelerometer, and GPS module with GSM technology, this system provides an all-around solution for minimizing road accidents, avoiding drunk driving, and providing quicker emergency responses.

REFERENCES

[1] A. Gupta, S. Ojha, V. Kumar, V. Singh, V. Malav, "Alcohol Detection with Vehicle Controlling," International Journal of Engineering and Management Research, vol. 6, no. 2, pp. 20-23, 2018.
[2] K. Nikitha, B.V. Nayana, and M.P. Kusuma, "Automatic Engine Locking System Using Alcohol Sensing," SJC Institute Of Technology, pp. 1-12, 2021.
[3] B. Kommey, E. Tamakloe, H. Nunoo-Mensah, and D. Opoku, "Smart Vehicle Ignition Interlock: A Car Ignition Interlock Device for Alcohol Impaired Driving," Proceedings on Engineering Sciences, vol. 4, no. 1, pp. 51-62, 2021.
[4] S. Yuvarani, A. Gayathri, K. J. Velmurugan, V. Meenakshi, S. Sadhana, and C. Srinivasan, "Quality of Service Factor Based Unfailing Route Formation in Wireless Sensor Network," International Conference on Intelligent and Innovative Technologies in Computing, Electrical and Electronics, pp. 617-622, 2023.
[5] M. Bondre, P. Pawar, A. Pardhi, M. Umare, S. Khan, and M. Sawade, "Vehicle Controlling and Engine Locking System with Alcohol Detection Using Arduino," International Journal, vol. 6, no. 3, pp. 1-5, 2021.
[6] S.S. Sarmila, iet al., "Alcohol Detection by using IoT and Locking the Car Ignition", SSRG International Journal of Computer Science and Engineering (ICEHS), Special Issue, May 2017

.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY