Alcohol Detection & Engine Locking with GPS

[1]Sarvesh Dubey, [2]Saurabh Yadav, [3]Aadarsh Singh, [4]Suraj Gupta, [5]Yayati Shinde

[1,2,3,4] B.E student at Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India
[5]Asstt. Prof. Mechanical Engg dept., Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India
[1,2,3,4] Bharati Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India

---***---

Abstract - *This research presents the design and implementation of an integrated safety system for vehicles aimed at enhancing road safety, deterring impaired driving, mitigating rash driving behaviors, and preventing vehicle theft. The system incorporates multiple features, including alcohol detection, rash driving detection, anti-theft measures, GPS tracking, and alerting/notification systems. The alcohol detection component utilizes an MQ3 sensor to accurately measure alcohol concentration in the driver's breath. When the concentration exceeds predefined thresholds, the system triggers appropriate responses, including engine immobilization and alerts. Rash driving behaviors are detected using accelerometers and gyroscopes, which analyze vehicle motion data in real-time. Instances of aggressive driving, such as sudden acceleration, harsh braking, and sharp turns, prompt the system to activate alarms and notify the driver. An engine locking mechanism immobilizes the vehicle's engine in response to detected alcohol presence or rash driving behaviors, enhancing safety and preventing further operation of the vehicle. Anti-theft measures, including motion sensors and immobilizers, detect unauthorized access or tampering with the vehicle and trigger alarms and notifications to deter theft attempts. GPS tracking enables real-time monitoring of the vehicle's location and transmission of location data to designated contacts or authorities in emergencies, accidents, or theft incidents. The system's alerting and notification system ensures timely warnings to the driver and relevant stakeholders regarding detected safety threats, facilitating quick responses and mitigating risks.*

Keywords- Arduino Uno, alcohol detector, MQ3, LCD, Buzzer, *Motor, GPS, GSM, ESP32 cam, Anti-theft.*

I. INTRODUCTION

Drinking and driving is a major cause of road accidents. However, effective monitoring of drunken driving is challenging for the policeman and road safety officers. Drunk driving is one of the major reason behind road accident worldwide. In all of the road accident cases worldwide drivers have been observed to have access alcohol content in their blood. The system introduced by us aims at reducing the road accident in future due to drink and drive. This paper presents the progress in using the alcohol detection and engine locking system through using Arduino uno connected to GSM and GPS for providing exact location. The system allow for automatic sensing of alcohol in breathe we also use a motor to demonstrate as a vehicle. We use a GPS module with GSM Sim 800l to send SMS message to the concerned person in case alcohol is detected the system consists of an Arduino uno along with MQ3 alcohol sensor for detection and GSM, GPS module for notification. When the system detects the presence of alcohol in the vehicle its immediately locks the engine of the vehicle.

II. LITERATURE SURVEY

The first paper outlines an alcohol detection system for vehicles, employing alcohol sensors alongside GPS and GSM modules [1].

Another paper explores a smart helmet system, integrating alcohol detection for enhanced vehicle safety [3].

A separate study introduces techniques like alcohol detection, heart rate monitoring, and personal identification to mitigate accidents [4].

Instead of Arduino, the project employs the 16F877A microcontroller [5].

Furthermore, one paper delves into driver behavior analysis, safety applications, and anti-theft measures [6].

Another study proposes an accident vehicle detection system utilizing image processing [8].

Additionally, researchers discuss body area sensing and alcohol detection mechanisms in a different paper [9].

Our paper focuses on an alcohol detection system for vehicles utilizing an MQ3 alcohol sensor and an Arduino-powered buzzer with GSM and GPS for location transmission and also have adxl rash driving sensor for rash driving detection, anti-theft detection. All this alert will be received on telegram bot and picture will s=be sent through ESP CAM to bot.

PROBLEM STATEMENT

Driving under the influence of alcohol is a leading cause of road accidents and fatalities globally. According to the World Health Organization (WHO), alcohol-related accidents account for a significant portion of road traffic deaths worldwide. In addition to alcohol consumption, reckless driving behavior such as speeding, harsh

acceleration, and abrupt braking also contributes to road accidents.

PROPOSED SYSTEM

The proposed system consists of various hardware components integrated with an Arduino Uno board. These components include an MQ3 alcohol sensor for alcohol detection, various sensors for rash driving detection (such as accelerometers and gyroscopes), an engine locking mechanism, anti-theft sensors, a GPS module for location tracking, and a GSM SIM module for communication.

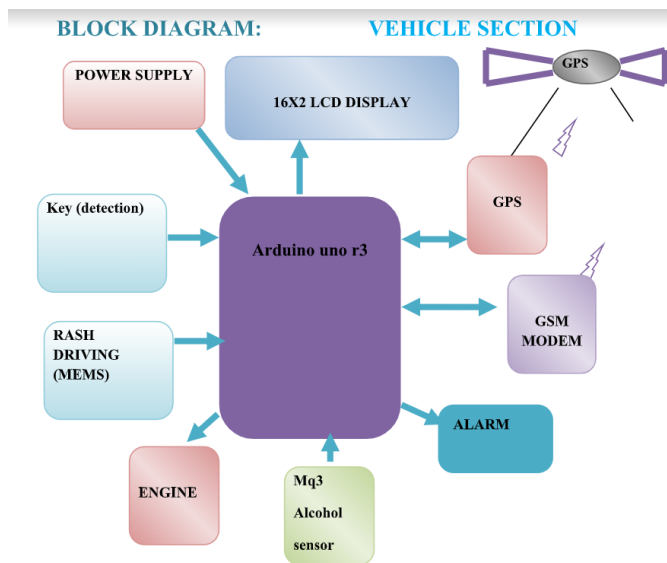## III.   HARDWARE MODULES

Figure1. Hardware Modules

The entire system adopted the Arduino uno board, the principle of the hardware chart as shown in fig1. The core functions modules are Arduino uno alcohol sensor module (MQ3), LCD display, buzzer, GPS module, GSM modem, key detection, MEMS (Ras Driving sensor).

ARDUINO: - The arduino board is the central unit of the model. The rest of the components are linked to the board and programmed as per their functionality to operate in synchronization.

ALCOHOL SENSOR : - It is used to detect the alcohol. The analog output of which is applied to the arduino board.

LCD:- If alcohol is sensed or found it displays the message indicating alcohol detected .

GPS:- If alcohol or any other sensor detected any changes it gives the current location of the vehicle.

GSM:- It provide network to the entire system and helps to send the sms to the user's phone.

Key detection:- It is a lock based sensor which helps to demonstrate the anti-theft functionality of this model.

MEMS:- If rash driving is detected it notifies the user and alarm beeps.

1.   ARDUINO UNO

The Arduino Uno is a popular microcontroller board based on the ATmega328P processor. It's widely used in the maker and hobbyist communities for prototyping and creating various electronic projects. The Uno board features digital input/output pins, analog inputs, PWM outputs, UART communication, SPI communication, and I2C communication. It's relatively easy to use and program, making it an excellent choice for beginners and experienced developers alike. Additionally, the Arduino IDE (Integrated Development Environment) provides a user-friendly platform for writing, compiling, and uploading code to the Uno board.

Figure 2. Arduino Board

FEATURES

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage	7-12V Input
Voltage (limits)	6-20V
Digital I/O Pins	14
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

2.   ALCOHOL SENSOR (MQ3)

The MQ3 alcohol sensor operates based on the principle of detecting the concentration of alcohol vapor in the air. This sensor provides an analog output corresponding to the alcohol concentration, which is then processed by the Arduino Uno board. The system calibrates the sensor and adjusts its sensitivity to ensure accurate detection of alcohol levels. When the alcohol concentration exceeds a predefined threshold, the system triggers an alarm and sends notifications to the driver and designated contacts via the GSM SIM module.

Figure 3. Alcohol Sensor

3. GPS

The GPS module enables real-time tracking of the vehicle's location. Location data is transmitted to the GSM SIM module, which can send this information to designated contacts or authorities in case of emergencies or suspicious activity. This feature enhances vehicle security and facilitates quick response in critical situations.

Figure 4. GSM Module

4. LIQUID CRYSTAL DISPLAY

LCD screen is the electronic display module and have a wide ranges of applications. A 16*2 LCD display is very basic module and it is very commonly use in various devices and circuit. LCD modules preferred to seven segments and other multi segments LEDs. The reason being: LCDs are economical; easily programmable; have no limitation of displaying special and even custom characters (unlike in 7 segments), animations and so on. A 16*2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is shown in 5*7 pixel framework. It consists of 2 registers, one is command and other one is data.

Figure 5. LCD Display

5. GSM MODEM (Sim 800l)

The SIM800L module can send and receive SMS messages. It's commonly used in applications where text-based communication is needed, such as remote monitoring systems, security systems, and notification systems. The SIM800L is a highly integrated GSM/GPRS module that provides voice, SMS, and data communication capabilities for embedded systems. It is widely used in applications such as remote monitoring, asset tracking, and vehicle tracking systems.

Specification
Supply voltage: 3.8V - 4.2V
Recommended supply voltage: 4V
Power consumption:
sleep mode < 2.0mA
idle mode < 7.0mA
GSM transmission (avg): 350 mA
GSM transmission (peek): 2000mA
Module size: 25 x 23 mm
Interface: UART (max. 2.8V) and AT commands
SIM card socket: microSIM (bottom side)
Status signaling: LED
Working temperature range: -40 do + 85 ° C

Figure 6. GSM Sim (800 L)

6. RASH DRIVING (ADXL 335)

The ADXL335 is a three-axis accelerometer sensor developed by Analog Devices, renowned for its versatility and reliability in motion sensing applications. Offering precise measurements of acceleration along the X, Y, and Z axes, this sensor provides analog voltage outputs proportional to the detected acceleration. With its wide measurement range of up to ±3 g, the ADXL335 can capture both subtle movements and high-acceleration events, making it suitable for various applications requiring motion detection and orientation monitoring. One of the key advantages of the ADXL335 is its low power consumption, making it ideal for battery-operated devices and applications where energy efficiency is critical. Furthermore, its compact size and surface-mount package allow for easy integration into electronic systems with limited space constraints.
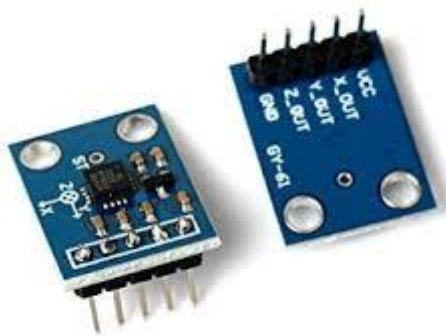

Figure 8. Alarm

Figure 7. Adxl 335

7. ALARM

The PS series buzzer is a type of electronic acoustic transducer that converts electrical signals into audible sound. These buzzers are commonly used in various electronic devices and systems to provide audible alerts, notifications, or alarms. The PS series buzzers typically feature a compact design, low power consumption, and easy integration into circuitry, making them suitable for a wide range of applications.
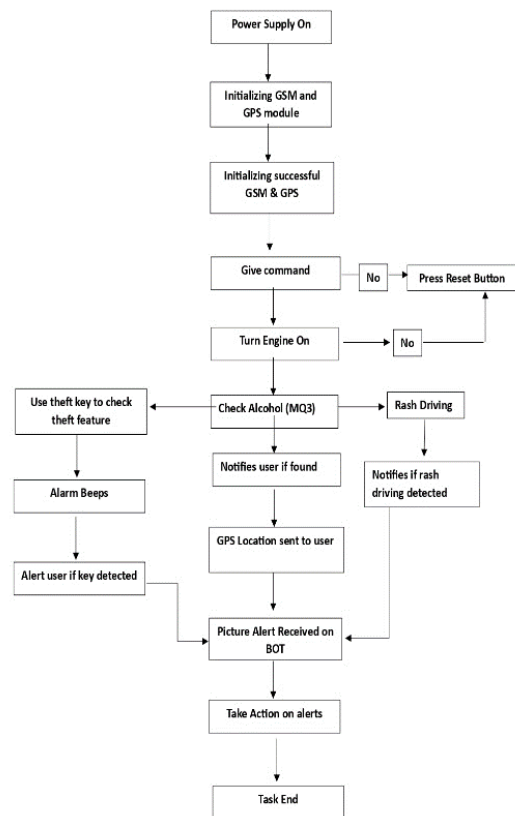
IV. SYSTEM FLOW CHART

Fig 4.1 Flow Chart

11

ADVANTAGES

1. To prevent Road accidents.
2. Increases road safety.
3. Easy and efficient to test the alcohol content in the body.
4. Quick and accurate results.
5. Helpful for police and provides and automatic safety systems for cars and other vehicles as well.
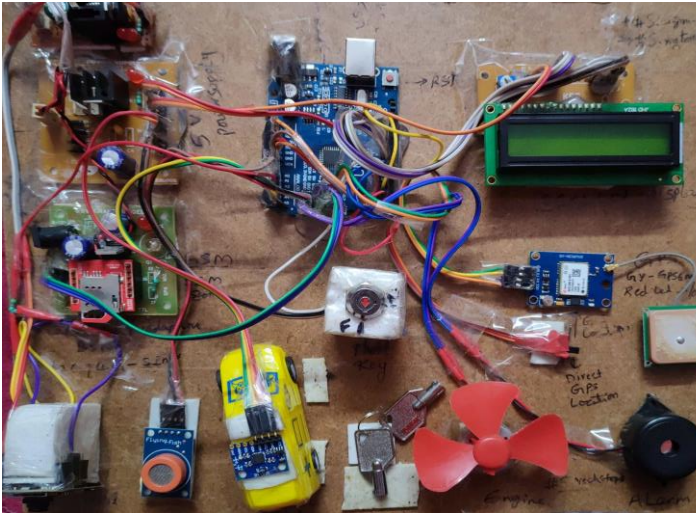
V. RESULTS & DISCUSSION

Figure 9. Hardware Settup

Figure 10. Output

Figure 11. ESP cam Output

This system has Arduino uno as microcontroller which controls all the functions of the system. First we need to supply power to the system through adapter which gives the supply to Arduino board through bridge rectifier then the system scans for alcohol presence if found it beeps and sends the sms to the user and with the help of GPS module it also send the location to the user with the help of GSM Sim modem 800l. after that we need to reset the system by pressing the reset button on the Arduino. After that with the help of lock key one can detect the anti theft system if we turn on the key the system will consider it as theft and it will send the location, alert and the picture of that particular time then again we need to reset the sysem. We can now check tha Adxl 335 (Rash driving) of the vehicle if found it will send the notification and alert with picture to the user. The system can be turn off wirelessly with the help of sending sms code's which is already been transmitted into the Arduino with the help of code. So the system provide all round support in almost every situation. The system gives correct output during the test and cleared the required test within time period.

VI. CONCLUSION

We have provided a very effective solution to develop an intelligent system for vehicles that can detect alcohol. It is possible to hide the sensor from the suspects since it has a fine sensitivity range of 1 meters. The system has an advantage of small volume and reliability. Advances in public safety are gaining acceptance due to the growing public perception that vehicle safety is more important. The future scope of the system is to control accidents caused by alcohol consumption. The safety of humans is improved by this system. Providing the effective development in the automobile industry to reduce the accidents caused by alcohol.

VII. REFERENCES

[1] Lea Angelica Navarro, Mark Anthony Diño, Exechiel Joson, Rommel Anacan, Roberto Dela Cruz Electronics Engineering Department, Technological Institute of the Philippines- Manila Manila, Philippines-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]

[2] Cahalan, D., I. Cisin, and Crossley, American Drinking Practices: A National Study of Driving Behaviour and Attitudes. 1969, Rutgers University Press: New Brunswick, NJ.

[3] MUGILA.G, MUTHULAKSHMI.M, SANTHIYA.K, Prof.DHIVYA.P- SMART HELMET SYSTEM USING

ALCOHOL DETECTION FOR VEHICLE PROTECTION[International Journal of Innovative Research in Science Engineering and Technology (IJIRTSE) ISSN: 2395-5619, Volume – 2, Issue – 7. July 2016]

[4] Dhivya M and Kathiravan S, Dept. of ECE, Kalaignar Karunanidhi Institute of Technology- Driver Authentication and Accident Avoidance System for Vehicles[Smart Computing Review, vol. 5, no. 1, February 2015]

[5] Babor, AUDIT: The alcohol use disorders identification Test: Guidelines for use in primary health care. 1992, Geneva, Switzerland: World Health Organization.

[6] Lee, Assessing the Feasibility of Vehicle-Based Sensors To Detect Alcohol Impairment. 2010, National Highway Traffic Safety Administration: Washington, DC.

[8] A. ISuge, H.Takigawa, H.Osuga, H.Soma, K.Morisaki, Accident Vehicle Automatic Detection System By Image Processing Technology , ©IEEE 1994 Vehiclee Navigation & information Systems Conference

[9] Paul Baskett , Yi Shang , Michael V. Patterson , Timothy Trull , Towards A System for Body-Area Sensing and Detection of Alcohol Craving and Mood Dvsregulation , © 2013 IEEE.