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GPS Tracker and Alcohol Detector with Engine Locking System Using GSM

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Abstract: ***The GPS tracker and alcohol detector with an engine locking system using GSM technology is a project that focuses on promoting road safety and preventing accidents caused by drunk driving. The project utilises an ATmega328 microcontroller as the core processing unit, integrating various components to form a cohesive system. The system includes an MQ sensor responsible for detecting alcohol levels in the driver's breath, ensuring accurate and reliable results. In the event of detecting alcohol above a predefined threshold, the system triggers a series of actions. First, the GPS module pinpoints the exact location of the vehicle, providing crucial information for prompt response. Simultaneously, an SMS is sent to authorised authority members, alerting them about the situation and sharing the vehicle's GPS coordinates. This enables swift intervention and appropriate action to be taken.***

To further prevent the intoxicated driver from continuing to operate the vehicle, an engine locking mechanism is employed. A relay is utilised to immobilise the engine, rendering it inoperable until the situation is resolved. Additionally, an audible warning is sounded through a buzzer to alert the driver and draw attention to the abnormality. The LCD display is incorporated to provide real-time information, displaying essential parameters such as alcohol concentration, vehicle location, and system status. This visual feedback assists both the driver and the authorities in understanding the situation and facilitates efficient decision-making.

By combining these components, the GPS tracker and alcohol detector system with an engine locking mechanism offers a comprehensive solution to combat drunk driving. Its ability to detect alcohol levels, communicate with authorities, immobilise the engine, and provide location information helps ensure the safety of individuals on the road and reduces the risks associated with alcohol-impaired driving.

Keywords: GPS tracker, alcohol detector, engine locking system, GSM.

I. INTRODUCTION

Every hour, 40 people who are under the age of 25 die in road accidents. And as per the world health organisation, road traffic injuries caused about 1.24 million deaths worldwide in the year 2010, slightly down from 1.26 million in 2000. The main intention of this system is to avoid the rate of accidents which normally happen due to drunkenness of drivers. This system detects the drunkenness of drivers and prevents them from driving, so this tries to provide one type of security or safety mechanism to drivers and save lives. There are also a lot of accident causes such as high speed of vehicle, drinking.

These days, the majority of road accidents are caused by drunk driving. Drunken drivers are in an unstable condition and so rash decisions are made on the highway which endangers the lives of road users, the driver inclusive. However, effective monitoring of drunk drivers is challenging to the policeman and the road safety officers. Many research officer's efforts have been directed to the design of efficient systems that will monitor drunk driving.

This paper developed a prototype alcohol detection and engine locking system by using Arduino uno microcontroller interface with an alcohol sensor along with an LCD screen and a DC motor to demonstrate the concept.

India had earned distinction in having more number of casualties due to road accidents around the world. Road safety is appearing as a big social concern around the world, especially in India. Drinking and driving is a serious issue which probably would emerge as one of the most significant problems in the near future. The system proposed by us focuses on minimising the number of road accidents in the near future because of drunk driving.

The system detects the alcohol level present in the air inside the vehicle. At low level it sends an SMS to the preregistered contacts while at high level it locks the engine immediately and at the same time sends SMS along with the location to three pre-selected contacts.

Hence the system will reduce the number of road accidents and casualties due to drunk driving in future.

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II. LITERATURE REVIEW

1) Sahu, P., This paper describes the procedure of making driving safer than before which is achieved by using ATmega8 microcontroller and MQ-3 alcohol sensor. We have taken the driver's conditions in real time environment and we intend to detect the alcohol using alcohol sensor connected to microcontroller such that when the level of alcohol crosses a permissible limit, the vehicle engine system turns off and the GPS module captures the present location of the vehicle which is sent to preregistered phone numbers using GSM module.
2) Cahalan, D., I. Cisin, and Crossley, American Drinking Practices: A National Study of Driving Behavior and Attitudes. 1969, Rutgers University Press: New Brunswick, NJ Questions about drinking problems in early drinking surveys were often phrased in terms of lifetime occurrence -- "did this ever" occur? Phrasing the question in such terms obviously has the greatest chance of picking up positive responses. Asking questions on a lifetime basis was also encouraged by the clinical tradition of regarding alcoholism, along with other psychiatric conditions, as lifelong once incurred. Those of us engaged in longitudinal studies quickly realised that such questions greatly hindered studies of changes in drinking problem status over time -- with lifetime questions, respondents could never get better, they could only become invalid. In early studies, the time period specified for "current problems" varied, from 6 months, in studies based on the DIS, to as long as three years. The sporadic nature of many problems discouraged short time periods; in the end, the literature has settled down to 12 months as the usual time-period for "current" problems. This often raises problems for analyses of the relation between drinking patterns and drinking problems. It would usually be desirable to have the two domains measured on the time-period, but some drinking-patterns measures have been based on shorter periods -- the last seven days or two weeks or 30 days. On the other hand, measuring drinking patterns on a twelve-month base raises the issue of whether and how to measure and analyse variability in patterns within the period. A variety of expedients have been used to deal with this issue, but there has been no agreement on a particular solution. It should be noted that the alcohol survey tradition operates on a quite different epistemology from general medical epidemiology in terms of the relation of alcohol consumption to social and health problems. Whereas the classic problem in medical epidemiology is to demonstrate causation by correlating two conceptually unrelated phenomena, in the alcohol survey tradition the causal connection is built into the question a-priori. Often the respondent him/herself is asked whether there is a problem and to make the causal connection ("did your drinking have a harmful effect on your marriage or home life"). In other questions, the respondent is being asked about problematization by others ("a friend's feelings about your drinking threatened to break up your Relationship"). In a third type of question, the problem comes from the researcher. On its face, "I have often taken a drink first thing when I get up in the morning" or "I find I have to drink more now to get the same effect as before" do not describe problems; they become problematized only in terms of the researcher's interpretation of the behaviour. (The researcher's interpretation does reflect general clinical and cultural. Interpretations, raising the complication that the respondent, too, is likely to know s/he is giving an answer that will be seen as signalling a problem.)
3) Lim, T.S., W.Y. Loh, and Y.S. Shih, A comparison of Prediction accuracy, complexity, and training time of Anderson RR & Parrish JA (1981) The Optics of Human Skin. The Journal of Investigative Results of the EDA after drinking shows the comparison with two breath alcohol concentration equipment. Just after drinking alcohol, the values of the EDA have the tendency to decrease from non-alcohol conditions and slightly recover when time has passed. On the other hand, the values of the breath alcohol concentration increase just after drinking and as time's passing though taking more drinking, the values decrease by using both breath alcohol equipment. The horizontal axis shows the number of the beer (350cc with 5 % alcohol per one bottle) and passing time (minute).
4) AUDIT: The alcohol use disorders identification Test: Guidelines for use in primary health care. 1992, Geneva, Switzerland: World Health Organization. How to Calculate the Content of Alcohol in a Drink The alcohol content of a drink depends on the strength of the beverage and the volume of the container. There are wide variations in the strengths of alcoholic beverages and the drink sizes commonly used in different countries.

   A WHO survey45 indicated that beer contained between 2% and 5% volume by volume of pure alcohol, wines contained 10.5% to 18.9%, spirits varied from 24.3% to 90%, and cider from 1.1% to 17%. Therefore, it is essential to adapt drinking sizes to what is most common at the local level and to know roughly how much pure alcohol the person consumes per occasion and on average.

   Another consideration in measuring the amount of alcohol contained in a standard drink is the conversion factor of ethanol. That allows you to convert any volume of alcohol into grammes. For each millilitre of ethanol, there are 0.79 grams of pure ethanol. For example, 1 can beer (330 ml) at 5% x (strength) 0.79 (conversion factor) = 13 grammes of ethanol 1 glass wine (140 ml) at 12% x 0.79 = 13.3 grammes of ethanol 1 shot spirits (40 ml) at 40% x 0.79 = 12.6 grammes of ethanol.

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5) Ahmad, I.et. The system is developed to monitor the level of alcohol in the exhaled breath of a driver and the data is transmitted through the wireless communication to activate the engine locking system. The Arduino Mega microcontroller with MQ-3 alcohol sensor, DC motor and HC-05 Bluetooth module are used for the system development. The experimental results show that the presence status of passive in-vehicle driver breath alcohol detection could be transmitted through the Bluetooth module and received by the dedicated phone number for emergency notification purposes. Therefore, the prototype is useful for preventing fatal accidents due to the drunken driver.

6) Opeyemi, A. E. et. al. This study developed a prototype alcohol detection and engine locking system by using an Arduino Uno microcontroller interfaced with an alcohol sensor along with an LCD screen and a DC motor to demonstrate the concept. The system uses an MQ-3 alcohol sensor to continuously monitor the blood alcohol content (BAC) to detect the existence of liquor in the exhalation of a driver. By placing the sensor on the steering wheel, our system has the capacity to continuously check alcohol level from the driver's breath. The ignition will fail to start if the sensor detects the content of alcohol in the driver's breath. In case the driver got drunk while driving, the sensor will still detect alcohol in his breath and stop the engine so that the car would not accelerate any further and the driver can park by the roadside.

7) Owoeye, S. et. Al. The proposed system was developed to lessen the likelihood of accidents on our roads being brought on by intoxicated drivers. The device can prevent a drunk driver from operating the vehicle and, in the event of an accident, send a message to a pre-programmed number informing it of the location of the vehicle. The entire software is built around a microcontroller, an alcohol sensor, and a vibration sensor. The sensor is used to set an alcohol threshold at which an alarm will buzz, and when the set threshold is exceeded, the flow of fuel to the engine will cease, thereby bringing the car to a halt. In case of an auto crash, the microcontroller would receive input from the attached vibration sensor, and send the location of the vehicle to a pre-registered phone number on the subscriber identification module (SIM) of the paper. This paper is a prototype of what is proposed in a vehicle where the DC motor serves as the fuel pump.

8) Kulkarni, P. V. et. Al In this paper the author introduces this system which will make the vehicle driving more safe and secure when compared to the current system. We are using alcohol content in the driver's breath to control the access to the vehicle. In this system whenever the alcohol consumed by the driver exceeds the permissible limit the speed of the vehicle will be reduced and the ignition of the vehicle will be turned off. The Global Positioning System (GPS) unit will trace the current location of the vehicle and through IoT communication an alert message will be sent to police or family members or to respective authorities. This paper deals with reducing the number of accidents caused due to drunken driving.

9) Nanda, I. et.al, The author has tried to project an Automatic Engine lock system on behalf of taking responsibility to control driving safely as much as we can. The alcohol detection system works on a simple principle. If a driver has been drinking, the alcohol sensor will sense by playing a Buzzer. With the use of GPS, we will be able to trace the location of the vehicle and a message will be sent to the registered number by using the GSM module. The main work is done by MQ3 alcohol detecting sensor and the programmable brain Arduino Uno. If the sensor sensed the particular value of alcohol present in the air from a nominal distance then the sensor throws a high signal digitally and the buzzer has been blown. This way we can identify if the driver is alcoholic or not by this paper and thus, the motor driver will be stopped immediately.

10) Gupta, A.et. al This paper deals with the design & development of an embedded system, which is being used to prevent/control the theft of a vehicle. The developed instrument is an embedded system based on GSM technology. Here, we have made an attempt to develop an instrument based on Atmega 8 microcontroller and operated using GSM technology. The device is a simple and low cost vehicle theft control embedded system. The entire system is installed in the engine along with GSM Modem. When the owner of the automobile finds that the automobile is missing, a SMS can be send by his/her mobile which is authenticated by device to stop & lock the engine of the automobile The information is passed onto the central processing insurance system which is in the form of the SMS, the microcontroller unit reads the SMS and sends it to the Global Positioning System (GPS) module using the triangulation method. GPS module feeds the exact location in the form of latitude and longitude to the user's mobile. By reading the signals received by the mobile, one can control the ignition of the engine; say to lock it or to stop the engine. The main concept in this design is introducing mobile communications into the embedded system. The entire designed unit is on asi angleboard.

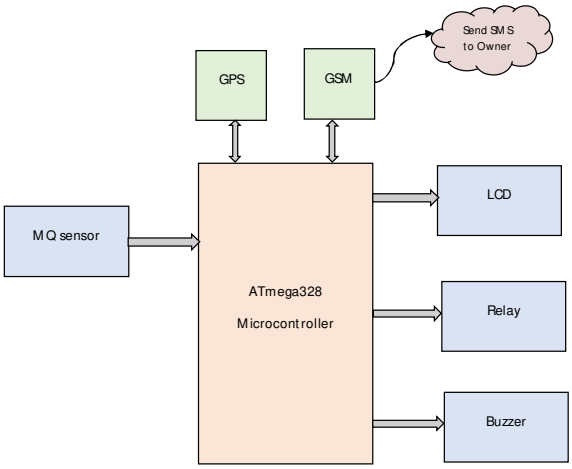
III. METHODOLOGY

In Our Proposed System we used an ATmega328 microcontroller. Here we used an MQ sensor for alcohol detection. Here we used Relay for locking the Engine of vehicle. We used GPS for sending the location of vehicle to the owner and GSM for sending the message Here we buzzer to alert the driver. After sending the message by the owner, the engine becomes locked.

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These all parameters will display on LCD.

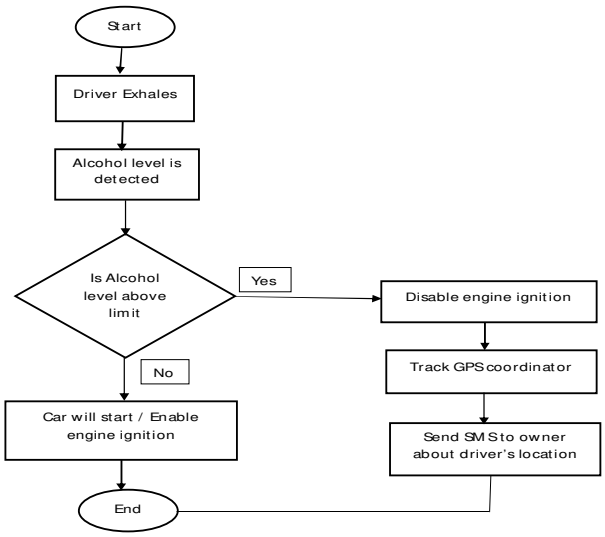
A. Block Diagram



B. Description

In this paper we are using the Atmega328 microcontroller. The MQ sensor and GSM are connected as input devices to the microcontroller. The GPS Buzzer Relay and The LCD are used as an output device which is connected to the microcontroller as output. Here we used a MQ sensor for alcohol detection and the GSM is used for sending the message and GPS is used for the send location. The LCDs are used to display the parameters of input devices.

C. Flow Chart



D. Working

The system continuously monitors the surrounding air using the MQ sensor for alcohol detection. The sensor measures the concentration of alcohol vapours in the air and provides an output signal based on the detected levels. The system compares the output signal from the MQ sensor with a predefined threshold value. If the alcohol concentration exceeds the threshold, it indicates that the driver is under the influence of alcohol. When the alcohol concentration exceeds the threshold, the system triggers the engine locking mechanism. This is achieved by activating a relay, which cuts off the ignition or fuel supply to the vehicle's engine. As a result, the engine becomes immobilised, preventing the vehicle from starting or running.

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The system incorporates a GPS module that receives signals from GPS satellites. By analysing these signals, the module determines the precise latitude and longitude coordinates of the vehicle. This information is used for real-time tracking of the vehicle's location. Simultaneously, the system sends an SMS alert to pre-configured authority members, such as law enforcement or vehicle owners. The SMS contains information about the detected alcohol concentration as well as the GPS coordinates of the vehicle. This ensures that the relevant authorities are immediately notified of the situation. To draw the driver's attention to the high alcohol levels, the system activates a buzzer, which emits a loud and distinct sound. This alerts the driver to the presence of alcohol and serves as a warning. Additionally, the system displays relevant parameters, such as alcohol concentration, GPS coordinates, system status, and any error messages, on an LCD screen. Once the alcohol concentration falls below the predefined threshold, the system allows the engine to be started or resumed. The engine locking mechanism is reset, and the system continues monitoring for any changes in alcohol levels.

IV. SYSTEM REQUIREMENT

A. Hardware Requirement

1) Atmega 328 IC microcontroller
2) Relay
3) MQ sensor
4) GPS
5) GSM
6) LCD
7) Buzzer

B. Software Requirement

1) Arduino IDE
2) Proteus

V. IMPLEMENTATION

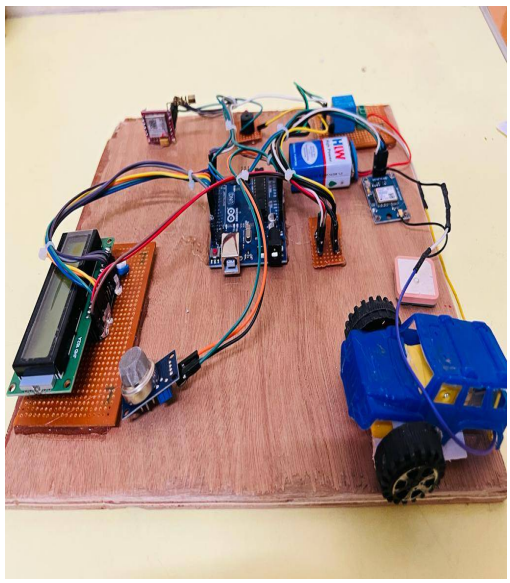


Fig. shows the experimental setup of the system

VI. RESULT

As the system is designed with the help of the sensor the input is identified by the breath of the human and it is measured by the sensor and compared with the limits of the consumption. If it crosses a threshold limit, the automatic lock on vehicle and stops if the vehicle is running. If the alcohol concentration falls below the predefined threshold, the system allows the engine to be started or resumed. The engine locking mechanism is reset, and the system continues monitoring for any changes in alcohol levels.

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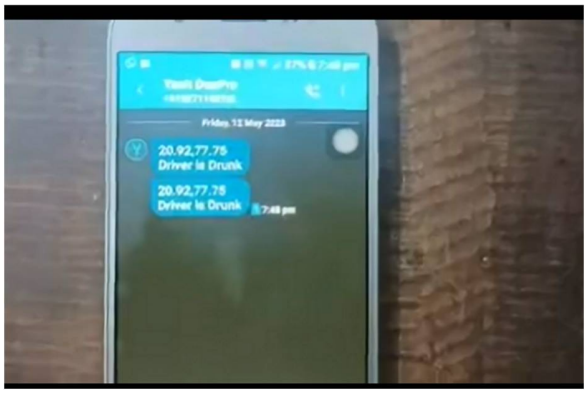


Fig. shows that the driver is drunk.

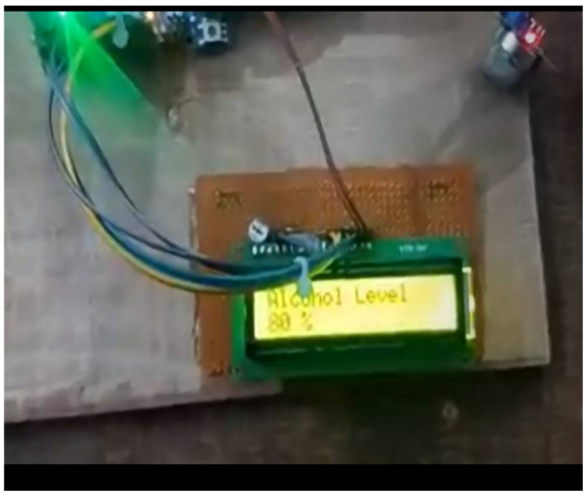


Fig. shows the percentage of alcohol consumed.

VII. CONCLUSION

The GPS Tracker and Alcohol Detector with Engine Locking System using GSM technology is a significant advancement in ensuring road safety and preventing drunk driving incidents. By integrating a sensor to measure alcohol levels and a system to automatically lock the vehicle's engine if the alcohol consumption exceeds the specified limits, the project offers a proactive approach to address the issue of drunk driving. The system provides real-time alcohol detection based on the breath of the driver, enabling immediate action to be taken if alcohol consumption is detected above the defined threshold. By combining the alcohol detector, engine locking system, GPS tracking, and SMS alerts, the project offers a comprehensive solution to mitigate the risks associated with drunk driving. The automatic locking of the vehicle's engine and the SMS alerts to authority members ensure that appropriate measures can be taken promptly, reducing the chances of accidents caused by drunk driving. However the system has some weaknesses too.

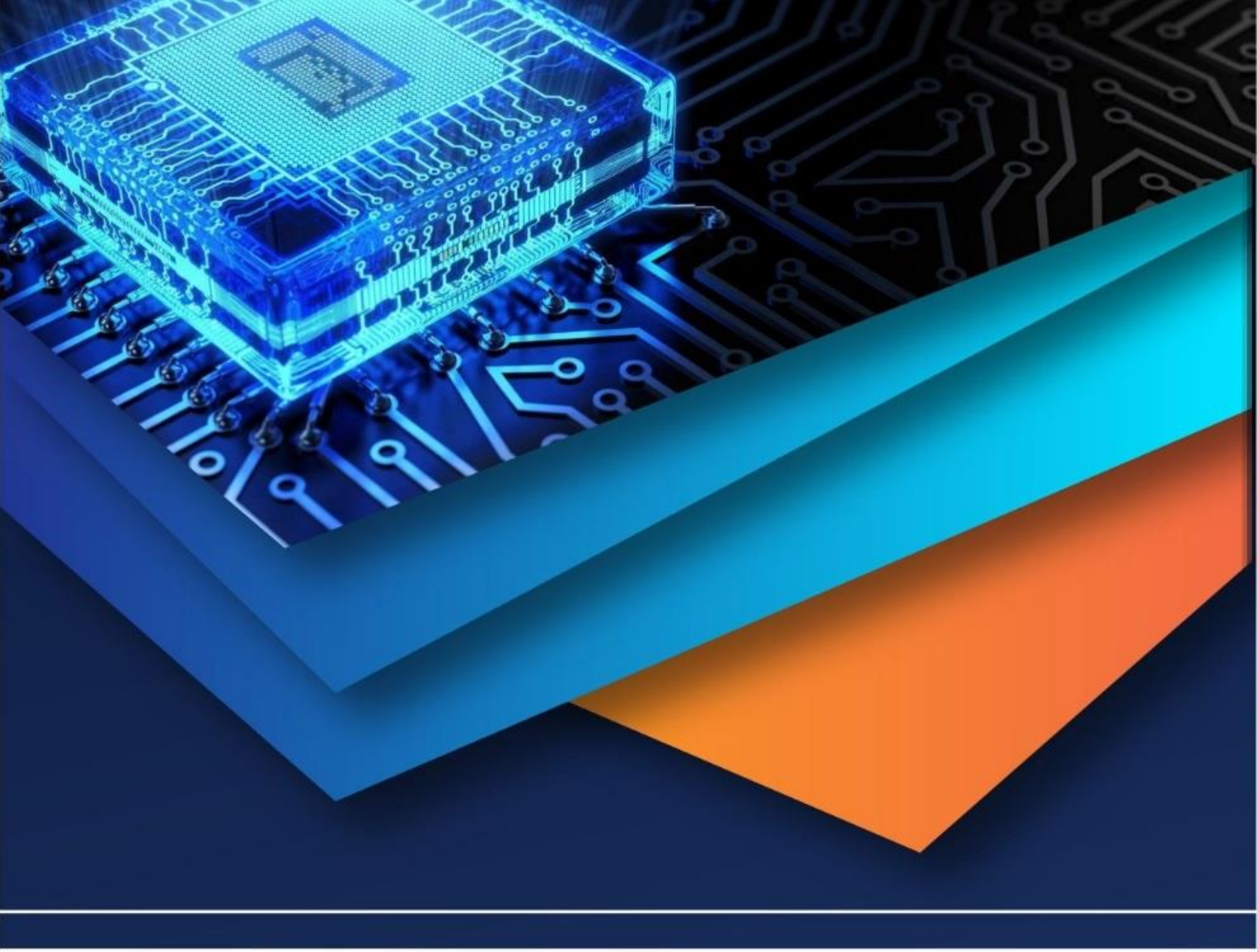
The system relies on the accuracy and sensitivity of the alcohol detection sensor to determine the alcohol levels. While modern sensors are designed to be reliable, certain environmental factors or variations in breath samples could affect the accuracy of the readings. Also, the specifications of the alcohol detection sensor may have limitations in terms of the concentration range it can accurately measure. It's crucial to choose a sensor that offers a suitable range for detecting alcohol levels commonly associated with impairment. The integration of the system into different vehicle models and electrical systems may pose challenges, as each vehicle may have unique configurations. Ensuring compatibility and adaptability across a wide range of vehicles requires careful consideration and customization. AS Compared to Standard Methods/Technologies, the project's strength lies in its proactive approach to prevent drunk driving incidents through immediate engine immobilisation and alerting authorities. Traditional methods rely on law enforcement or personal vigilance to detect and apprehend drunk drivers. The project's use of technology provides a more efficient and automated system that can potentially reduce response times and improve overall road safety.

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