Alcohol Detection and Traffic Sign Board Recognition for Vehicle Acceleration Using CNN

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Abstract: ***Drunk driver detection is very important in today's life for security aspects. It is very tedious work for real-time scenarios. Recently numerous Internet of Things (IoT) based systems have achieved good accuracy for detecting such events with location details. Consequently, drunk driving is a major cause of traffic accidents in almost every nation globally. The goal of the Alcohol Detector in Car project is to keep passengers safe while driving. They should execute this project inside the vehicle. The advanced driver assistance systems, often known as ADAS, are able to conduct fundamental tasks like object identification and categorization in order to warn drivers about things like vehicle speed regulation and road conditions. Deep learning is now being used in ADAS technology as a result of recent advancements in both the hardware and software platforms. The presence of traffic signs is an essential component of road infrastructure. Consequently, the identification and categorization of traffic signs is a particularly critical problem for autonomous cars. There will be a variety of hardware and software components in this system, such as the MQ-3 sensor, which will detect the alcohol level and provide information to the processor, after which it will indicate a buzzer and display on the screen that the driver is intoxicated. If the driver is intoxicated, the vehicle will stop working, or the engine will turn off, ensuring there is no chance of being drunk and operating the vehicle. CNN has been used for feature extraction and classification. CNN has been used for classification with multiple hidden layers and custom optimization algorithms. Finally, comparative analysis demonstrates the effectiveness of the proposed system with various state-of-art methods and algorithms.***

Keywords—CNN, Traffic sign Board, AI-Based Recognition, Internet of Things.

I. INTRODUCTION

The advancement of employing an alcohol detector, a tool that monitors changes in the ambient air's alcoholic gas composition, is covered in this article. The sensor will then calculate how much alcohol is present in the user by counting the number of alcoholic vapours. Given that it measures an individual's breath alcohol content, this device is often known as a breath analyzer. Law enforcement mostly uses the equipment to ascertain whether or not a person has driven drunk. Depending on how much alcohol is present, the MQ-3 sensor will analyze its contents, which will cause the output voltage to increase. If the output voltage rises enough, the microcontroller's input pins will switch from active low to active high. Over 1.55 lakh people died in car accidents in 2021, according to research; 12,500 people die from alcohol-related causes per year on average. As a result of the new year's generation of cars, they need an automated system. Consequently, the traffic sign board will immediately identify the traffic sign and warn the vehicle of it. For instance, it will be informed of the signboard if a "U-TURN" sign is there. They will use this method to lessen traffic accidents. The tool will be able to distinguish between a traffic signboard and alcohol. This system makes use of both hardware and software.

Traffic sign recognition, which gives helpful information like directions and warnings for autonomous driving or driver assistance systems, requires the detection of traffic signs, which has historically been a challenge for intelligent cars. Traffic signs may be utilized as separate markers for mapping and localization in navigation systems for autonomous cars, which have recently given traffic sign recognition more attention. Contrary to the haphazard appearance of natural markers like corner points and edges, traffic signs adhere strictly to standards for their forms, colours, and patterns.

II. LITERATURE SURVEY

The Intelligent Vehicle Management System for the Prevention of Accidents Through the Detection of Drowsiness, Alcohol Consumption, and Overload [1]. The vehicle is equipped with a drowsiness detector that monitors the driver's level of fatigue throughout the duration of the driving session. Second, an alcohol detector will identify whether or not the driver has any alcohol on their person by determining whether or not they have any alcohol on their person. At long last, there is a device called an overload detector that can determine whether or not the car is carrying more weight than it should.

Smart helmets for motorcycles that are connected with Bluetooth may now detect accidents as well as alcohol [2]. There are a variety of onboard sensors that are used, including a breath analyzer, an impact sensor, an accelerometer (ADXL355), and a flex sensor (MQ3). The accelerometer monitors changes in tilt along the axes of X, Y, and Z and sends the data to a server using an internet application programming interface (API). While the individual is wearing the helmet, the breath analyzer determines the amount of alcohol that is present in their breath and notifies them if it is beyond the permissible limit.

An empirical study on Internet of Vehicle-based Accident Detection and Management Techniques by Using VANET [3] The Internet of Vehicle, often known as IoV, is the extension module of VANET that is developing at the quickest rate. It allows highly compatible cloud-based collaboration across disparate components, such as people, cars, and internet services. The purpose of this research is to discover and investigate the usage of wearable embedded smart helmet technology by motorcyclists to reduce the risk of head injuries and prevent accidents caused by drunk driving for the purpose of safe riding.

[4] An Internet of Things-based intelligent system for the detection and prevention of vehicle accidents in real time. The technology provides a way that is real-time, rapid, and economical for preventing accidents involving motor vehicles. If the driver does not reply to the warning within a certain length of time, our proposed system would take care of the issue by cutting off the flow of gasoline. The alarm is triggered whenever a reading is taken that is higher than the predetermined threshold values. A microcontroller based on the Arduino platform, as well as a MQ-3 sensor, an infrared sensor, an accelerometer, and a camera are all components of this device. Arduino serves as the controlling mechanism for each of these sensors.

An Internet of Things-based smart system for the detection and prevention of accidents [5]. A system that is capable of effectively assisting in the prevention of any disaster, and in the event that such conditions do exist, how the system detects and alerts the right authorities and persons so that they can solve the situation as promptly as possible. The technology utilises a GPS and GSM module to precisely locate the location of the accident and then sends a text message to the individual's loved ones as well as hospitals in the nearby area. Sending a text message to the area's hospitals won't be sufficient since it won't stop any other accidents from happening; nevertheless, our solution will fulfil this need as well.

Alcohol detection and ignition control with the use of internet of things health monitoring [6]. the amount of alcohol consumed and the pace of the person's heart The ignition system of the automobile will shut off if it is determined that the driver is operating the vehicle while under the influence of alcohol or drugs. This will make the drunk driver unable to operate the vehicle and will reduce the likelihood of an accident occurring. In addition, the present status of the driver is communicated to their friends via the internet of things if their heart rate varies in an irregular manner while they are driving. Since the real application in a vehicle is beyond the scope of this investigation, we are going to create the recommended system by making use of a DC Motor instead. The Node MCU acts as a controller in this configuration of the system.

System for Monitoring Sign Boards and Detecting Vehicle Accidents Using the Internet of Things [7]. is useful in precisely recognising the accident by employing a vibration sensor, alcohol detection, and an eye blink sensor, all of which are included in the system. Due to the fact that there is opportunity for development and as a potential future implementation, we may include a wireless webcam that is capable of capturing photographs, which will help in providing support to drivers. The solution to this issue will be provided by our project in the most effective manner. When a car is engaged in an accident, the vibration sensor quickly recognises the signal, and if the car rolls over, the vibration sensor detects the signal and sends it to the RASPBERRY PI controller. In both of these scenarios, the signal is immediately sent. The eye blink is used by the RASPBERRY PI Microcontroller to detect alcohol, and the system then notifies the parents or a rescue team through the internet of things.

In-Vehicle Alcohol Detection Using Low-Cost Sensors and Genetic Algorithms to Aid in the Detection of Drinking and Driving [8]. The authors provide a novel and non-intrusive method that can determine whether or not alcohol is present inside of a motor vehicle. The method that is being proposed makes use of a collection of inexpensive alcohol MQ3 sensors that are put inside the vehicle. The signals that these sensors produce are then collected, normalised, time-adjusted, and translated into 5-second window samples. After retrieving statistical features from each sample, a strategy for feature selection is then carried out making use of a genetic algorithm and a process known as forward selection and backwards elimination. Using the four features obtained via this methodology, an SVM classification model was constructed that can determine whether or not alcohol is present.

Model for the Detection of Drowsiness and Alertness, as well as Alcohol, in Vehicle Acceleration [9]. The prototype for the drowsiness alertness and alcohol detection for vehicle acceleration has been developed and tested successfully. It was produced by the combination of computer hardware and computer software. In addition to the module, the microcontroller that collaborates with computer vision contributes to both an improvement in the quality of service and a more attractive appearance. The presence of each module is rationalised and structured, resulting in the most efficient and effective functioning of the unit that is humanly feasible. The service makes it possible for trustworthy drivers to be safeguarded, and it also allows the kernel to interact with the dependable person in order to stop that person from driving. The model also recognises the accident involving the car.

The Internet of Things-based Vehicle Alcohol Detection System [10] is a system that can monitor drunk driving and prevent it. It is installed inside of vehicles and detects alcohol by using technologies that are connected to the Internet of Things. The system is comprised of a single-chip microprocessor with the model number STC12C5A60S2 serving as the control core, a MQ-3 alcohol sensor for collecting data on the air's alcohol concentration, a GU900E serving as a GPRS module for wireless connection, and an LCD display for displaying the detected value of the alcohol concentration. The specified level of intoxication serves as the basis for a number of control actions, including commanding the vehicle to be prohibited by the relay, startling by the sound and light alarm device, and conducting base station positioning and positioning brief message transmission by controlling the GU900E.

III. Proposed System Design

The purpose of this investigation is to provide a comprehensive overview of the technical work that has been done in the form of a project that illustrates how human driving may be made safer to reduce accidents and make roads safer to drive on for both drivers and commuters. Sensors that can determine the amount of alcohol in a drink are joined with a board for a microcontroller, such as a pic controller, in order to produce the task. The fact that the module can detect alcohol particles and has a sensitivity range of about two metres renders it suitable for installation in any kind of vehicle. It's possible that the defendants won't even notice the sensor, which is another another intriguing quality of this device. It cannot accept a complete setup in the form of a product in an automated system because it is too tiny.

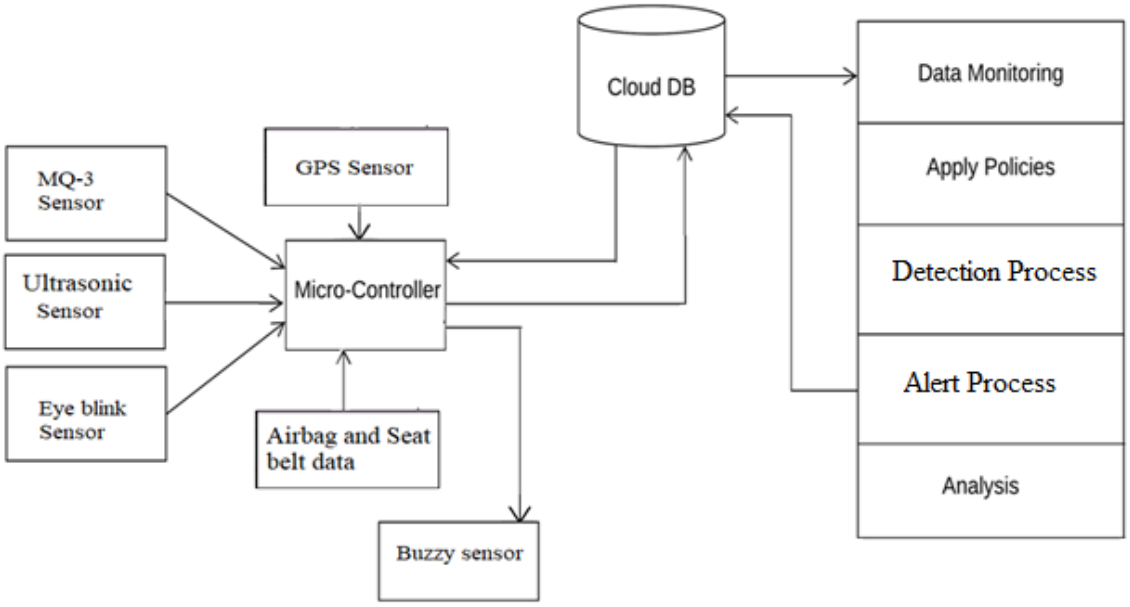

Figure 1: Proposed System Design

The proposed system is collaboration of various modules such IoT modules, database modules and GUI modules. In below section we described each module in detail

- **Alcohol detection module:** This module detects the alcohol of drivers using MQ-3, Ultrasonic, Eye Blink, Buzzer, GPS, MQ-6, Bump Sensor-Limit Switch sensor, it returns true if detected.
- **Seat belt detection module:** This module describes detection of seat belt using binary detection. It gives alarm if seat belt not wears by driver.
- **Accident detection module:** Accident detection has done by based on status of air bag either it is open or close. Based on that it generates the event of accident.
- **Emergency alerting module:** This module basically generates the nearest emergency location alerting when misshaping has generated such as accident. The nearest location is like nearest fire, hospitals and police stations etc.
- **Detection of Vehicle Location:** we deploy the GPS sensor in vehicle to tracking the vehicle location in specific time period. When any event occurs system also demonstrates the actual vehicle location on GUI.
- **IoT and Database Module:** This module describes the overall workflow of system. IoT module collects the event data from sensors and stores it into cloud database. All sensors is connected to pic microcontroller and it communicate with cloud database. The algorithm validates entire data according to defined policy and detect the event is occurred or not. The output devices should be buzzer event, Email send message system or message on GUI.

The gadget will be installed in the car and come with the following rules:

1. It will identify the motorist who has been drinking.
2. It will determine the amount of alcohol that the subject of the investigation has drank.
3. If it detects that the driver is under the influence of alcohol, it will disable the ignition.
4. It will make the individual aware of the situation by using an alarm.
5. It will recognize the traffic sign board with help of a camera.
6. If by mistake the person ignores the traffic sign then it will alert the person by alarm and show the traffic sign on the screen.
7. If the driver does not take the alarm seriously, then the vehicle will stop the engine and hence there will be no chance of accidents.
8. The system will keep informing that there is a traffic sign, so please follow it.
9. Additionally, the device will continue to alert the motorist to any nearby sharp turns and traffic signals. As indicated in the flow chart in fig.3 with a hardware chart, the entire system is made with the help of raspberry pi. Alcohol sensors, Web cameras, Microcontrollers, Screen, or Laptop screen are the components used in this system.
10. The main purpose of this system is to avoid the road accidents and to avoid alcohol while driving.

As shown in the hardware chart in Fig. 1, the raspberry pi serves as the basis for the entire system. An alcohol sensor, webcam, and other devices at the centre of the hardware diagram LCD display and microcontroller.

IV.COMPUTER VISION AND EXECUTION

Computer vision is used in this paperwork is shown in Fig 2. The camera is used for the detection or recognition of the traffic sign board with the constant frames recognizes traffic sign board.

In traffic sign recognition task, we solve it by using the help of deep learning library tensor flow. The training and testing were done with help of a dataset from GTSRB. The developing method can be compartment with the sixteen most popular traffic sign types. And for the detection of alcohol, we used the

alcohol sensor called MQ-3. Which will detect the alcohol and by buzzer and display it will notify the driver if he/she is alcoholic or not. In previous, they use to detect drowsiness and alcohol. In this we are combining traffic sign recognition and alcohol detection using CNN.

Figure 2: Counter set for the image

Automatic Driver Assistance Systems can really benefit from traffic sign classification. A subset of deep learning networks called convolutional neural networks (CNN). we to analyse and verify visual data. Due to its excellent accuracy and precision, it is used to train picture categorization and recognition models as shown in fig.3

Figure 3: Traffic sign board recognition

Upon testing three different subjects, we got the following results during different time periods.

Table I: Resuslt Analysis Of The Proposed System

Parameters	Existing System	Proposed System
Method used	CNN	Convolution Neural Network
Efficiency	90 to 95%	90 to 97%
Recognition Time	25 sec	20 sec

Figure 4: Prototype Model

This system is used to detect alcohol and to recognize the traffic signboard. In this we used a combination of some hardware and software as shown in the fig.6.in that we use the raspberry pi as the processor because it is cheaper with good processing power and little bit fast as compared to another processor.

MQ—3 Sensor is used for the detection of alcohol; the feature of this sensor is that it is highly sensitive to alcohol and less sensitive to benzine with fast response. In it, there is a measuring electrode and heaters are fixed into it which is made of plastic and stainless-steel net. For example, some air alcohols are collected in MQ sensor then it gets burn and because of that burn wafers by which it can detect alcohol.

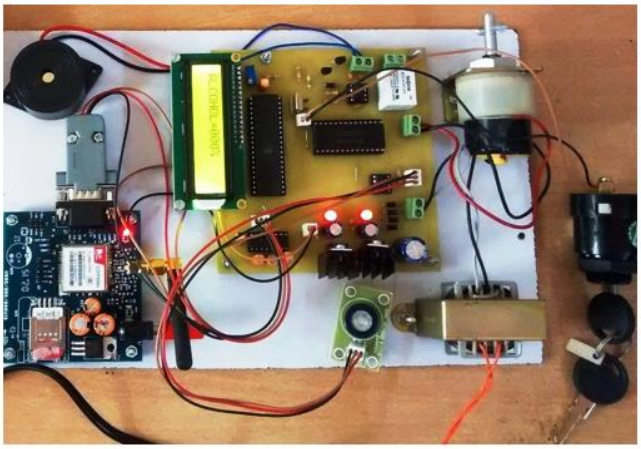

Figure 5: Components used for the prototype

Table II: The comparison table of existing system between our proposed systems.

Alcohol Level in Breath	100-200 ppm Low	200-300 ppm medium	300-400 Ppm High
Ignition System	Activated	Deactivated	Deactivated
Alarm sounded	Deactivated	Activated	Activated

V. Result and Discussions

The implementation was carried out using an open-source Java environment, with a 3.0 GHz CPU and 16 GB RAM, running Python 3.7. The RESNET-100 frmework has used for utilization for deep learning classifiers as well as various machine learning classification methods. The private blockchain custom implementation is designed with a multi-node environment for safe data storage and validation. We performed initial experiment analysis on blockchain implementation to validate the findings. Table 2 show the suggested system's classification accuracy and a comparison study with several state-of-the-art systems.

Table III : Assessment of proposed methodology using several state-of-the-art techniques and extraction and classification

Algorithms	Features	Accuracy
IoT ML [5]	IoT features and relational features	90.60
Computer vision and image processing [4]	Text and numerical	91.30
IoT [3]	TF-IDS	87.00
ML [9]	autoencoder	92.90
CNN (proposed)	Hybrid features	97.50

The classification performance for intruder identifying using suggested hybrid machine learning classification is shown in Table 2. We extract multiple features such as luminance, chrominance and IoT based relational features and input them to classifications for validation in the suggested work. The CNN has been utilized for intruder detection and has a high accuracy of up to 97.50 percent. During the detection and classification all nodes generate the majority voting and based on that it generates the report either connection is normal or abnormal.

VI. CONCLUSION

This study illustrates how Internet of Things technology and an unsupervised learning technique may be used to identify intoxicated drivers. According to the information presented in this paper, an efficient solution is presented in order to develop a smart system for vehicles. This system will monitor various parameters of the vehicle in between regular periods and will send this data to the base unit using a hardware platform that consists of a PIC microcontroller, an Alcohol sensor MQ-3, Ultrasonic, Eye Blink, Buzzer, GPS, MQ-6, Bump Sensor-Limit Switch, and GPS module. Additionally, the solution provides a GPS module. The proposed system would establish a connection to the base station via several methods, such as GPS, email, and parameter control, among others. Low volume and high dependability are both benefits that accrue to the Control system as a whole. The long-term objective of the system is to limit the number of accidents that are brought on by intoxicated driving via the regulation of accidents and the provision of essential information on automotive collisions. This technique enhances vehicle safety while also developing previously developed technologies, representing a successful breakthrough for the automotive industry. In preparation for future work, the system will be validated using IoT and machine learning for improved detection.

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