SMART ADAS: IOT-DRIVEN INTELLIGENT ASSISTANCE FOR SAFER AND SMARTER DRIVING

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ABSTRACT

Advanced Driver Assistance Systems (ADAS) are a suite of technologies designed to enhance vehicle safety and driver security by leveraging various sensors and advanced technologies to gather real-time data on the vehicle's surroundings and driver input. These systems aim to provide drivers with critical information, warnings, and automated interventions to prevent accidents and improve road safety. By utilizing sensors, ADAS can detect imminent collisions and take proactive measures such as pre-charging brakes, issuing warnings, or even autonomously applying brakes to mitigate or prevent crashes. Additionally, ADAS continuously monitors driver behavior and alertness, detecting signs of drowsiness or distraction and issuing timely alerts to enhance driver awareness. Integration with GPS and IoT further enhances its capabilities, enabling vehicle tracking and improved situational awareness. These intelligent systems contribute to safer driving experiences by assisting with lane-keeping, adaptive cruise control, blind-spot detection, and pedestrian detection, thereby reducing human errors and enhancing traffic management. The integration of AI and machine learning enables ADAS to adapt to various driving conditions, making it a key component in the development of autonomous driving technologies.

Keywords: Iot-Based, Advanced Driver Assistance System (ADAS), Vehicle Safety, Driver Security, Sensors, Collision Detection, Pre-Charging Brakes, Warnings, Drowsiness Detection, Distraction Detection, GPS Integration, Road Safety, Intervention, Technology, Driver Monitoring, Vehicle Tracking.

1.INTRODUCTION

Driver fatigue is a major contributor to road accidents, often caused by exhaustion, monotonous driving conditions, and adverse weather. According to reports from the National Highway Traffic Safety Administration (NHTSA) and the World Health Organization (WHO), approximately 1.35 million people lose their lives each year due to vehicle crashes globally. A significant number of these accidents occur due to reckless or impaired driving, often linked to alcohol consumption or drowsiness. Fatigue-induced crashes are particularly dangerous, as they result in a loss of vehicle control, leading to severe and often fatal consequences. When a driver falls asleep, reaction time slows dramatically, increasing the likelihood of collisions. Given the alarming rate of accidents caused by driver fatigue, there is an urgent need for smart vehicle systems that leverage advanced technologies to enhance road safety. Intelligent driver assistance systems, powered by artificial intelligence (AI), machine learning (ML), and the Internet of Things (IoT), can monitor driver alertness, detect signs of drowsiness, and provide real-time alerts or interventions to prevent accidents. These systems can integrate features such as facial recognition, eye-tracking sensors, and automated braking to enhance vehicle safety and minimize human errors. The implementation of such smart technologies in modern vehicles can significantly reduce the risks associated with driver fatigue, ultimately improving overall road safety and reducing the number of traffic-related fatalities worldwide. This paper implements a mechanism to alert the driver on the condition of drowsiness or daydreaming. A camera monitors the driver' eye blinking, eye closure, face detection, head posture, etc. with face landmark algorithm and Euclidean distance in the behavioral based approachThese characteristics help to measure driver fatigue and instantly alert him with the help of voice speaker and forwarding an e-mail to a person (owner of vehicle) who can make him conscious. An e-mail is being transmitted to a destination using IoT module, which relies on wireless transmission .But, the proposed system is being integrated by a credit card-sized computer known as Raspberry Pi3 and Pi camera which can trace an eye movement there by monitoring intensity of collision effects that happen at the time of accident and alerting the emergency ward of the hospitals or owners that are nearby to the accident spot along with GPS location of the accidentThe primary objective for driver security and vehicle safety is to reduce accidents and injuries by implementing advanced safety technologies, promoting responsible driving behavior, and ensuring rigorous safety standards in vehicle design and manufacturingadvanced safety technologies play a crucial role in preventing accidents and mitigating their severity. This includes features such as collision avoidance systems, automatic emergency braking, lane departure warnings, and cruise control. These technologies leverage sensors and AI to monitor the vehicle's surroundings, providing real-time assistance to the driver and enhancing overall safety.

PROBLEM STATEMENT:

An IoT-based system is designed to avoid countless mishaps due to drowsy drivers' behavioural and psychological changes by focusing on driver's eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents, it is also required to keep records of the location for taking supportive action.An IoT-based system is designed to avoid countless mishaps due to drowsy drivers' behavioural and psychological changes by focusing on driver's eye movements. In addition to monitoring the intensity of the collisions impacts during road accidents, it is also required to keep records of the location for taking supportive action extend the content. This IoT-based system employs advanced sensors to track not only drowsy drivers through eye movement analysis but also records collision impact intensity during road accidents. By integrating GPS technology, it captures and stores precise location data, enabling swift emergency responses and facilitating post-incident analysis. The system's comprehensive approach ensures a proactive stance on both driver safety, by addressing drowsiness, and vehicle security, through impact monitoring and location-aware record-keeping for effective intervention and continuous improvement. The system utilizes cutting-edge IoT sensors that continuously monitor driver behavior, particularly focusing on detecting signs of drowsiness through intricate eye movement analysis. Simultaneously, these sensors are adept at measuring the intensity of collision impacts in real-time during road accidents. The integration of GPS technology ensures accurate tracking and storage of the vehicle's precise location data.

In the event of an accident, this system enables swift emergency responses by providing immediate location information. Beyond immediate responses, the stored data facilitates in-depth post-incident analysis, shedding light on the circumstances leading to the accident and guiding preventive measures for the future. This immediate concerns of drowsy driving and collision impactsestablishes a foundation for continuous improvement in driver safety and vehicle security through informed intervention and ongoing enhancements to the system.

2.LITERATURE REVIEW

Bisogni et al. (2024) [1] Advanced Driver Assistance Systems (ADAS) are experiencing higher levels of automation, facilitated by the synergy among various sensors integrated within vehicles, thereby forming an Internet of Things (IoT) framework. Among these sensors, cameras have emerged as valuable tools for detecting driver fatigue and distraction. This study introduces HYDE-F, a Head Pose Estimation (HPE) system exclusively utilizing depth cameras. HYDE-F adeptly identifies critical driver head poses associated with risky conditions, thus enhancing the safety of IoT-enabled ADAS. The core of HYDE-F's innovation lies in its dual-process approach: it employs a fractal encoding technique and key point intensity analysis in parallel. These two processes are then fused using an optimization algorithm, enabling HYDE-F to blend the strengths of both methods for enhanced accuracy. Evaluations conducted on a specialized driving dataset, Pandora, demonstrate HYDE-F's competitive performance compared to existing methods, surpassing current techniques in terms of average Mean Absolute Error (MAE) by nearly 1°. Moreover, case studies highlight the successful integration of HYDE-F with vehicle sensors. Additionally, HYDE-F exhibits robust generalization capabilities, as evidenced by experiments conducted on standard laboratory-based HPE datasets, i.e., Biwi and ICT-3DHP databases, achieving an average MAE of 4.9° and 5°, respectively.

Suganthietal.(2023) [2] In conventional modern vehicles, the Internet of Things-based automotive embedded systems are used to collect various data from real-time sensors and store it in the cloud platform to perform visualization and analytics. The proposed work is to implement computer vision-aided vehicle intercommunication V2V (vehicle-to-vehicle) implemented using the Internet of Things for an autonomous vehicle. Computer vision-based driver assistance supports the vehicle to perform efficiently in critical transitions such as lane change or collision avoidance during the autonomous driving mode. In addition to this, the main work emphasizes observing multiple parameters of the In-Vehicle system such as speed, distance covered, idle time, and fuel economy by the electronic control unit are evaluated in this process. Electronic control unit through brake control module, powertrain control module, transmission control module, suspension control module, and battery management system helps to predict the nature of drive-in different terrains and also can suggest effective custom driving modes for advanced driver assistance systems. These features are implemented with the help of the vehicle-to-infrastructure protocol, which collects data through gateway nodes that can be visualized in the IoT data frame. The proposed work involves the process of analyzing and visualizing the driver-influencing factors of a modern vehicle that is in connection with the IoT cloud platform. The custom drive mode suggestion and improvisation had been completed with help of computational analytics that leads to the deployment of an over-the-air update to the vehicle embedded system upgradation for betterment in drivability. These operations are progressed through a cloud server which is the prime factor proposed in this work.

Raouf et al.(2022) [3] Recently, the advanced driver assistance system (ADAS) of autonomous vehicles (AVs) has offered substantial benefits to drivers. Improvement of passenger safety is one of the key factors for evolving AVs. An automated system provided by the ADAS in autonomous vehicles is a salient feature for passenger safety in modern vehicles. With an increasing number of electronic control units and a combination of multiple sensors, there are now sufficient computing aptitudes in the car to support ADAS deployment. An ADAS is composed of various sensors: radio detection and ranging (RADAR), cameras, ultrasonic sensors, and LiDAR. However, continual use of multiple sensors and actuators of the ADAS can lead to failure of AV sensors. Thus, prognostic health management (PHM) of ADAS is important for smooth and continuous operation of AVs. The PHM of AVs has recently been introduced and is still progressing. There is a lack of surveys available related to sensor-based PHM of AVs in the literature. Therefore, the objective of the current study was to identify sensor-based PHM, emphasizing different fault identification and isolation (FDI) techniques with challenges and gaps existing in this field

Fourie et al. (2022) [4] Advanced driver-assistance system(s) (ADAS) are more prevalent in high-end vehicles than in low-end vehicles. Wired solutions of vision sensors in ADAS already exist, but are costly and do not cater for low-end vehicles. General ADAS use wired harnessing for communication; this approach eliminates the need for cable harnessing and, therefore, the practicality of a novel wireless ADAS solution was tested. A low-cost alternative is proposed that extends a smartphone's sensor perception, using a camera-based wireless sensor network. This paper presents the design of a low-cost ADAS alternative that uses an intra-vehicle wireless sensor network structured by a Wi-Fi Direct topology, using a smartphone as the processing platform. The proposed system makes ADAS features accessible to cheaper vehicles and investigates the possibility of using a wireless network to communicate ADAS information in a intra-vehicle environment. Other ADAS smartphone approaches make use of a smartphone's onboard sensors; however, this paper shows the application of essential ADAS features developed on the smartphone's ADAS application, carrying out both lane detection and collision detection on a vehicle by using wireless sensor data. A smartphone's processing power was harnessed and used as a generic object detector through a convolution neural network, using the sensory network's video streams. The network's performance was analysed to ensure that the network could carry out detection in real-time. A low-cost CMOS camera sensor network with a smartphone found an application, using Wi-Fi Direct, to create an intra-vehicle wireless network as a low-cost advanced driver-assistance system.

González-Saavedra et al. (2022) [5] The design of advanced driver assistance systems (ADAS) involves a holistic and systemic vision that considers the bidirectional interaction among three main elements: the driver, the vehicle, and the surrounding environment. The evolution of these systems reflects this need. In this work, we present a survey of ADAS and describe a conceptual architecture that includes the driver, vehicle, and environment and their bidirectional interactions. We address the remote operation of this ADAS based on the Internet of vehicles (IoV) paradigm, as well as the involved enabling technologies. We describe the state of the art and the research challenges present in the development of ADAS. Finally, to quantify the performance of C-ADAS, we describe the principal evaluation mechanisms and performance metrics employed in these systems.

Menon et al.(2022) [6] In our world of advancing technologies, automobiles are one industry where we can see improved ergonomics and feature progressions. Artificial Intelligence (AI) integrated with Internet of Things (IoT) is the future of most of the cutting-edge applications developed for automobile industry to enhance performance and safety. The objective of this research is to develop a new feature that can enhance the existing technology present in automobiles at low-cost. We had previously developed a technology known as Smart Accident Precognition System (SAPS) which reduces the rate of accidents in automobile and also enhance the safety of the passengers. Current research advances this technique by integrating Google Assistant with the SAPS. The proposed system integrates several embedded devices in the automobiles that monitor various aspects such as speed, distance, safety measures like seatbelt, door locks, airbags, handbrakes etc. The real-time data is stored in the cloud and the vehicle can adapt to various situations from the previous data collected. Also, with the Google Assistant user can lock and unlock, start and stop, alert and do various automated tasks such as low fuel remainder, insurance remainders etc. The proposed IoT enabled real-time vehicle system can detect accidents and adapt to change according to various conditions. Further, with RFID keyless entry authentication the vehicle is secure than ever before. This proposed system is much efficient to the existing systems and will have a great positive impact in the automobile industry and society.

Antony et al.(2021) [7] Advanced driver assistance systems (ADAS) refer to technologies that automate, facilitate, and improve systems in the vehicles in order to assist drivers for better and safer driving. There are several ADAS technologies such as adaptive cruise control (ACC), lane departure warning systems, forward collision warning systems, traffic signal recognition system (TSR), tire pressure monitoring system (TMPS), night vision, pedestrian detection, parking assistance systems, automatic emergency brake systems, driver behavior monitoring, blind spot detection, electronic stability control (ESC), alcohol interlock systems, etc. Some of the ADAS technologies are intended for safety improvement, and some others are for convenience function. This chapter explains each of the different ADAS technology in detail with their deployment details. The development and deployment of these technologies relies mainly on the embedded systems and advanced signal processing technologies such as multiple signal classification (MUSIC) and light detection and ranging (LiDAR).

Zhirui et al.(2021)[8] Purpose - Advanced driving assistance system (ADAS) has been applied in commercial vehicles. This paper aims to evaluate the influence factors of commercial vehicle drivers' acceptance on ADAS and explore the characteristics of each key factors. Two most widely used functions, forward collision warning (FCW) and lane departure warning (LDW), were considered in this paper. Design/methodology/approach - A random forests algorithm was applied to evaluate the influence factors of commercial drivers' acceptance. ADAS data of 24 commercial vehicles were recorded from 1 November to 21 December 2018, in Jiangsu province. Respond or not was set as dependent variables, while six influence factors were considered. Findings - The acceptance rate for FCW and LDW systems was 69.52% and 38.76%, respectively. The accuracy of random forests model for FCW and LDW systems is 0.816 and 0.820, respectively. For FCW system, vehicle speed, duration time and warning hour are three key factors. Drivers prefer to respond in a short duration during daytime and low vehicle speed. While for LDW system, duration time, vehicle speed and driver age are three key factors. Older drivers have higher respond probability under higher vehicle speed, and the respond time is longer than FCW system. Originality/value - Few research studies have focused on the attitudes of commercial vehicle drivers, though commercial vehicle accidents were proved to be more severe than passenger vehicles. The results of this study can help researchers to better understand the behaviour of commercial vehicle drivers and make corresponding

CHAPTER-4

PROPOSED SYSTEM

The proposed system aims to enhance road safety by monitoring the driver for various abnormal conditions. Initially, an alcohol sensor checks for alcohol consumption during vehicle start. If the driver's alcohol level exceeds 30mg, the ignition is locked, denying access to the vehicle.To address drowsiness, an eye blink sensor continuously monitors the driver's blink status. If the sensor detects an extended duration without eye blinks, indicating potential drowsiness, the system intervenes by automatically stopping the vehicle.

Additionally, the system is designed to detect abnormal behaviours such as heart attacks. If any life-threatening condition is identified, the system promptly notifies the registered number along with the location, allowing for timely assistance. This comprehensive approach ensures the safety of both the driver and others on the road by actively responding to potential risks and impairments.

collision detection and prevention measures to further enhance road safety. Utilizing advanced sensors and technologies, the system constantly monitors the surroundings for potential collision risks.If an imminent collision is detected, the system engages preventive measures such as automatic braking or steering interventions to mitigate the impact. This proactive approach aims to reduce the severity of accidents and prevent collisions altogether.

Furthermore, the system's integration with the vehicle's control systems enables it to respond rapidly to potential dangers, contributing to a safer driving experience. By combining collision detection and prevention with the previously mentioned features, the overall system creates a robust safety framework, actively addressing various risks on the road.

The accident-avoidance system relies on a network of sensors to detect and respond to potential hazards in real-time. Various sensorscontinuously monitor the vehicle's surroundings.

When an obstacle or potential collision is identified, the system employs advanced algorithms to analyze the data and assess the risk. If there's an imminent threat, the system triggers immediate preventive actions. These actions can include automatic braking, steering adjustments, or alerting the driver to take evasive maneuvers.

The integration of sensor data with the vehicle's control systems allows for swift and precise responses, contributing to accident avoidance. This comprehensive approach enhances overall safety by actively assisting the driver in avoiding potential collisions and ensuring a more secure driving environment.

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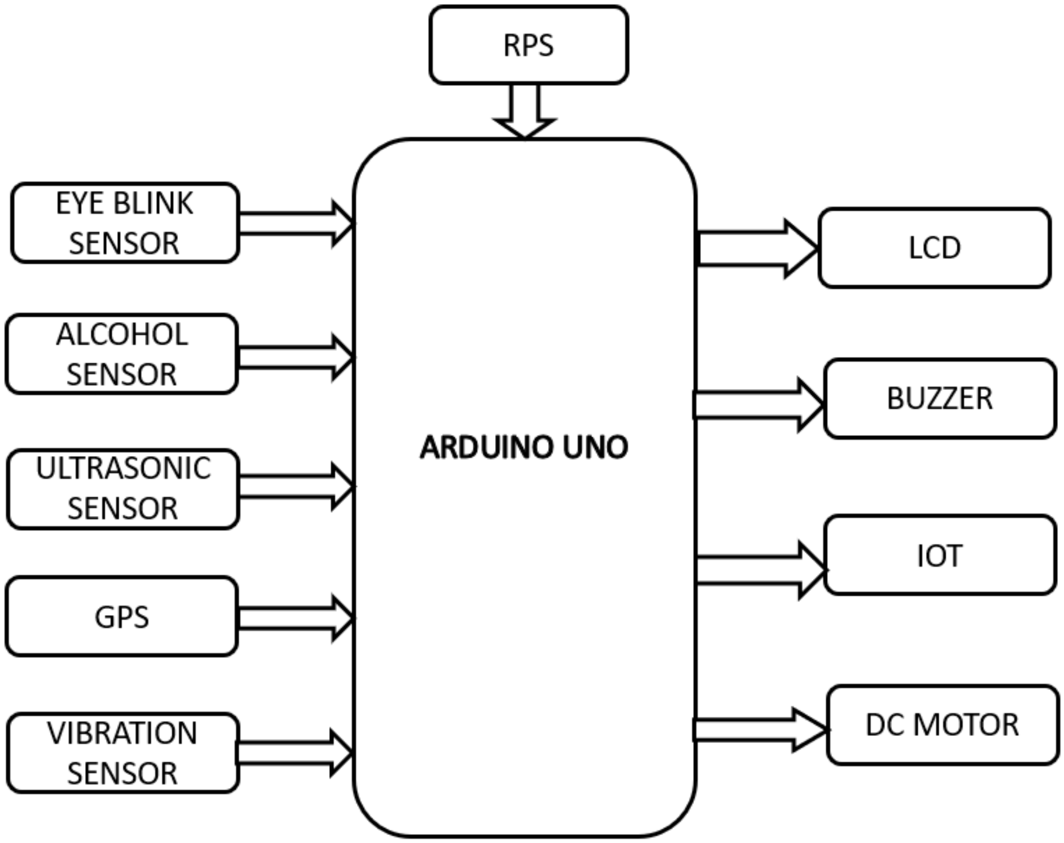
Block Diagram:



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Project Working:

In this system there are totally five Sections:

1.Regulated power supply [RPS]

2.Input Section

- Eye blink sensor
- Alcohol sensor
- Ultrasonic sensor
- GPS
- Vibration sensor

3.Output section

- LCD
- Buzzer
- IoT
- DC Motor

4.Arduino Microcontroller

5.Software

There are Five modules Controller, RPS, Input, Software and Output module. The power is supplied to the RPS module through an adapter. The adaptor converts 230 volts AC to 12 volts DC and this 12 volts DC is given to the RPS module. The RPS module consists of voltage regulator 7805 which converts the 12 volts DC into 5 volts DC, the capacitor is used to reduced Noice and LED is used which indicates whether the power is supplied or not. This 5 volts DC power supply goes to each and every module.

There are five input modules in ADAS system. They are Alcoholic Sensor, Vibration sensor, Ultrasonic sensor, Eye blink sensor and GPS tracking.

Alcohol sensor tells us weather the driver is alcoholic or not. If the driver is alcoholic then the sensor detects the smell and gives the sound to alert the driver. This sensor have three pins. They are Voltage, Ground and Data. The data pin is connected to controller.

Vibration sensor is also known as accident sensor. This is the sensor that measure the frequency of vibration in the vehicle. Those measurements can be used to detect the imbalance and predict future breakdowns.

GPS (Global Positioning System) tracking is used to monitor the location of the vehicle. This has three pins. They are Voltage, Ground and Data. The data pin is given to controller. When the GPS is on then the info is considered as default and gives to satellite.

Ultrasonic sensor is used for obstacle detection. This sensor consists of four pins. It detects if any obstacle occurs front and back of the vehicle. The driver is alerted by the beep or the dashboard display.

Eye blink sensor is used for drowsiness detection. It also consists of three pins (Voltage, data, GND). The Eye blink sensor is sensor that uses infrared light to detect eye blinks. The sensors receive reflected waves when eye is closed and a high output when eye is open. When the driver feels drowsy and close his eyes then the sensor detects and give beep sound as alert to the driver.

There are five output modules in ADAS. They are LCD, Buzzer, Relay module, IoT, Input driver board. LCD (Liquid crystal display) is used to display the output from the sensors. We use 16*2 LCD which means it displays 16 characters on 2 lines. LCD shows the status of the project. They are widely used for text-based information in electronics and embedded system.

Buzzer is a basic audio device that generates a sound as alert in all cases. Relay with motor means the DC motor is controlled by relay module. It shows weather the engine is in on or off position. The DC motor slowdown automatically when any alert occurs. IoT (Internet of things) which is used to store the information in webserver.

Input driver board is used to show the output of the eyeblink sensors. These are the output of the ADAS system. Microcontroller is the main part in embedded IoT based system. It collects the data from input sensor and process and then sends to output. Arduino UNO is used as microcontroller.

Schematic Diagram:

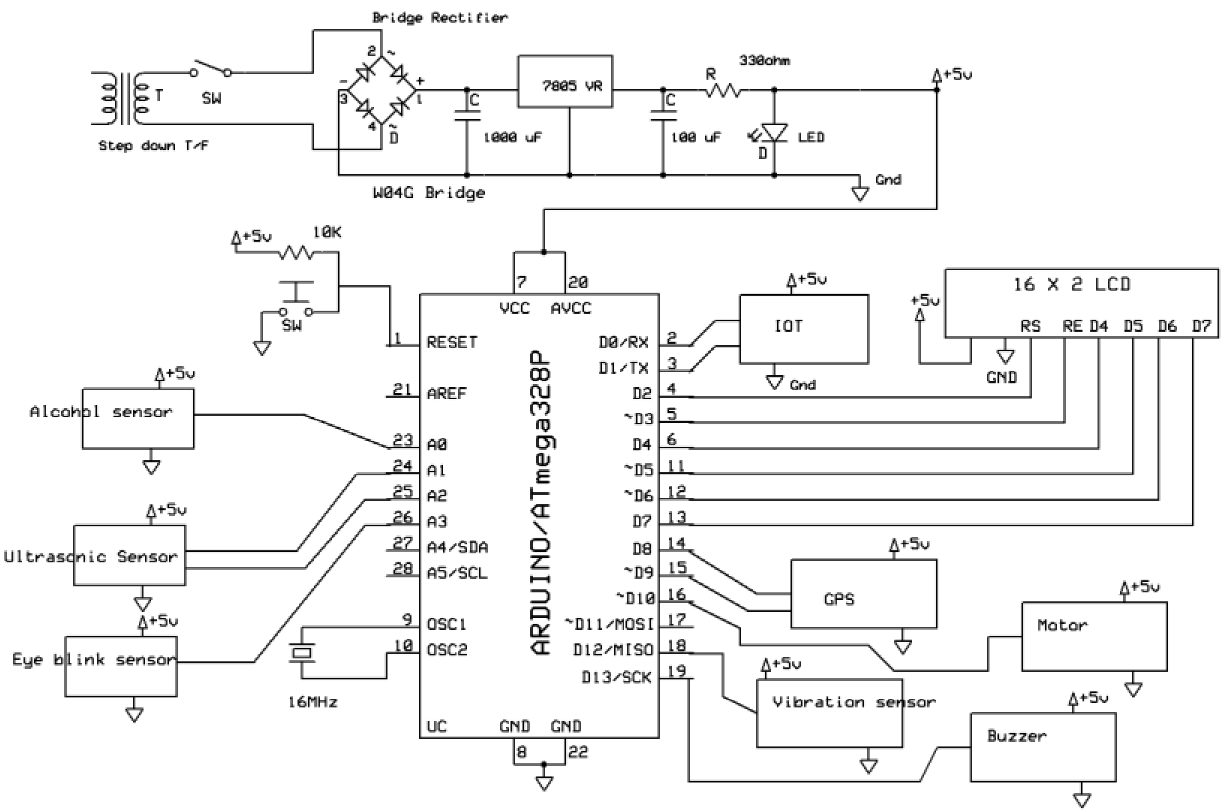


Figure4.3 Schematic diagram

This is the pin diagram where all the hardware components are been connected components. This ARDUINO microcontroller having 28 pins. In which 14 GPIO pins as digital pins and 6 GPIO pins. 16MHz crystal oscillator connected internally. The step down transformer, Bridge rectifier capacitor with 1000f Resisters and led are connected in Regulated power supply which provide the 5v to th e Arduino and all input/output modules.

16*2 LCD Monitor has connected with the Digital pins 2, 3, 4,5,6,7.

WIFI has connected to Digital Pins D0,D1 internal Transmitter and receiver pins.

Alcohol sensor connected to A0 pins of the Arduino micro controller.

DC Motor connected to digital pin A1 and A2

Vibration sensor connected to digital pin 8

Buzzer alarm connected to digital pin 12

GPS connected to pin13.

Helmet switch connected to A3.

IoT-based driver assistance system using various sensors such as alcohol sensor, helmet sensor, and vibration sensor. It uses the Wi-Fi module for communication with a remote server and the GPS module to obtain location information. The main loop continuously monitors the sensor states and takes appropriate actions. If alcohol is detected, the relay is activated and data is uploaded to the server. If vibration or helmet absence is detected, similar actions are taken. Additionally, the code handles scenarios where all conditions are met to deactivate the relay.

Logic Explanation:

1. **Libraries Inclusion:** The code begins by including the necessary libraries. The **LiquidCrystal** library is used for interfacing with the LCD display, and the **SoftwareSerial** library is used for software-based serial communication (for the GPS module).
2. **Pin Definitions:** The code defines pin assignments for various components such as alcohol sensor (**alc**), helmet presence sensor (**hel**), vibration sensor (**vib**), buzzer (**buzzer**), and two DC motor relays (**relay1** and **relay2**).
3. **Setup Function:** The **setup** function initializes the pins and components, sets up the serial communication, initializes the LCD display, and establishes a Wi-Fi connection using the **wifiinit** function.
4. **Loop Function:** The **loop** function contains the main logic of the program, where the code monitors the status of various sensors and takes actions accordingly.

- For the alcohol sensor (**alc**), if the sensor detects alcohol, it turns on the relay (**relay**) to trigger an action, updates the LCD display, and sends data to the server using the **upload** function.
- Similar logic is implemented for the vibration sensor (**vib**) and helmet sensor (**hel**).

The code also checks if all sensors are in a specific state (**HIGH** for vibration and helmet sensors and **LOW** for the alcohol sensor). If these conditions are met, it turns off the relay.

5. **Server Communication Functions (upload, readserver, and clearserver):** These functions are responsible for communicating with the server to upload sensor data and receive responses. They utilize the AT commands for Wi-Fi communication and HTTP GET requests to send and receive data.
6. **Wi-Fi Initialization Function (wifiinit):** This function initializes the Wi-Fi module by setting the mode and connecting to a specified Wi-Fi network.
7. **GPS Functions (get_gps, gps_convert, and gpsEvent):** These functions handle GPS data retrieval, conversion, and event handling.

- **get_gps**: Retrieves GPS data by continuously reading and parsing GPS strings until valid data is obtained.
- **gps_convert**: Converts GPS coordinates from degrees, minutes, and seconds to decimal format.
- **gpsEvent**: Handles GPS data events by reading and storing GPS strings.

8. **Buzzer Alert Function (beep):** This function briefly activates the buzzer to provide an alert.

ADVANTAGES:

- **Safety Enhancement:** ADAS features like collision warning, automatic emergency braking, and lane departure warning contribute to reducing the risk of accidents and improving overall road safety.
- **Accident Prevention:** Systems such as adaptive cruise control and blind-spot detection help prevent collisions by providing alerts and, in some cases, taking corrective actions automatically.
- **Improved Driver Awareness:** ADAS can enhance driver awareness through features like forward collision warning and traffic sign recognition, helping drivers stay informed about their surroundings.
- **Compliance with Regulations:** ADAS systems often help vehicles meet safety standards and regulations imposed by authorities, contributing to overall road safety.
- **Emergency Response**: If a driver is unresponsive due to a medical emergency like a heart attack, the system can trigger alerts and provide the vehicle's location to emergency services, facilitating faster response times and potentially saving lives.
- **Reduced Collision Severity: In** cases where a collision is imminent, collision detection systems can initiate actions like automatic braking or steering interventions to minimize the impact and reduce the severity of collisions, potentially saving lives and reducing injuries.
- **Asset Security:**Vehicle tracking enhances security by allowing owners to monitor the real-time location of their vehicles. In case of theft, it aids in quick recovery and reduces the chances of irreparable damage.

APPLICATIONS:

- **Collision Warning and Avoidance:** ADAS can provide warnings or assist in avoiding collisions by detecting obstacles, pedestrians, or other vehicles.

- **Traffic Sign Recognition:** Identifies and displays traffic signs, helping drivers stay aware of speed limits, stop signs, etc.

- **Driver Monitoring:** Monitors the driver's behaviour for signs of drowsiness or distraction, providing alerts when necessary.

- **Cross Traffic Alert**: Warns Traffic Sign Recognition: drivers of approaching traffic from the side when backing out of parking spaces.

- **Pedestrian Detection**:Uses sensors to detect pedestrians in or near the vehicle's path, providing warnings or initiating braking to prevent collisions.

- **Intersection Assistance**: Alerts drivers to potential collisions or unsafe conditions at intersections, enhancing safety during complex traffic scenarios.

- **Forward Collision Warning**: **-** Provides alerts to the driver when a potential front-end collision is detected, giving the driver time to react.

4.RESULTS

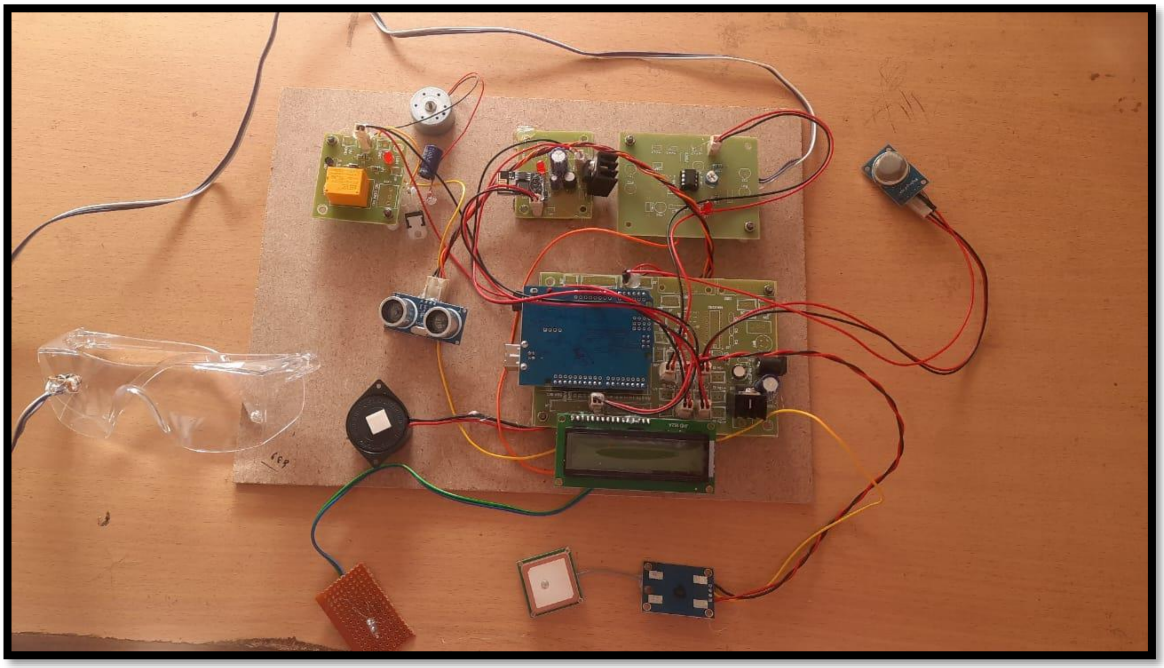


Figure**-1**

The above image shows the hardware equipment of the project. The kit is turned ON by giving the regulated power supply of 12v which is then converted to 5v dc current. The LED is the indication for 5v current. If there is 5v current then automatically the LED glows. The generated 5v dc current passes to every hardware component in the circuit.

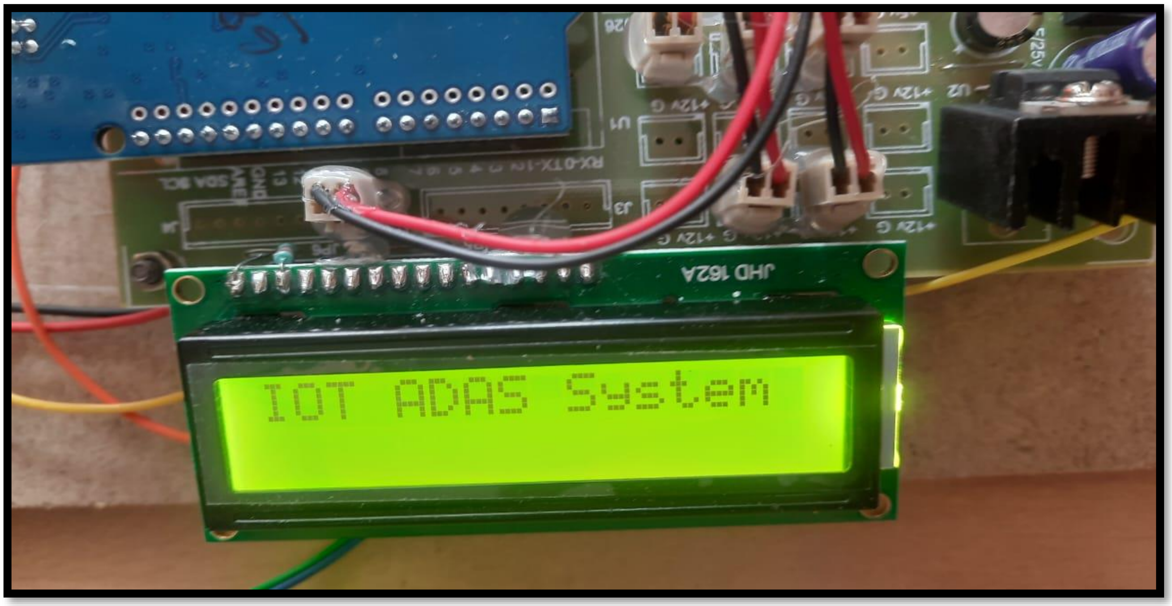


Figure-2

When we hit the reset button after providing the regulated power supply, the LCD displayed the IOT ADAS SYSTEM. The output is seen in the following image after we have connected the IoT module.

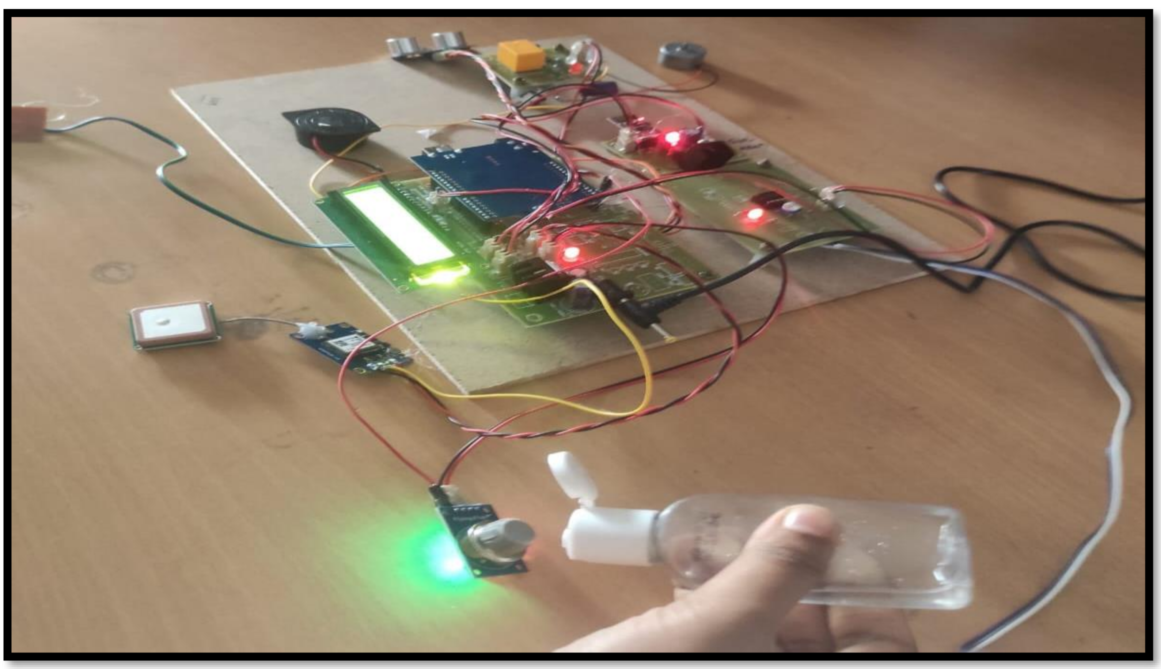


Figure-3

In the above image when a driver consumes alcohol, the alcohol sensor detects and gives an alert to the driver by using the buzzer.

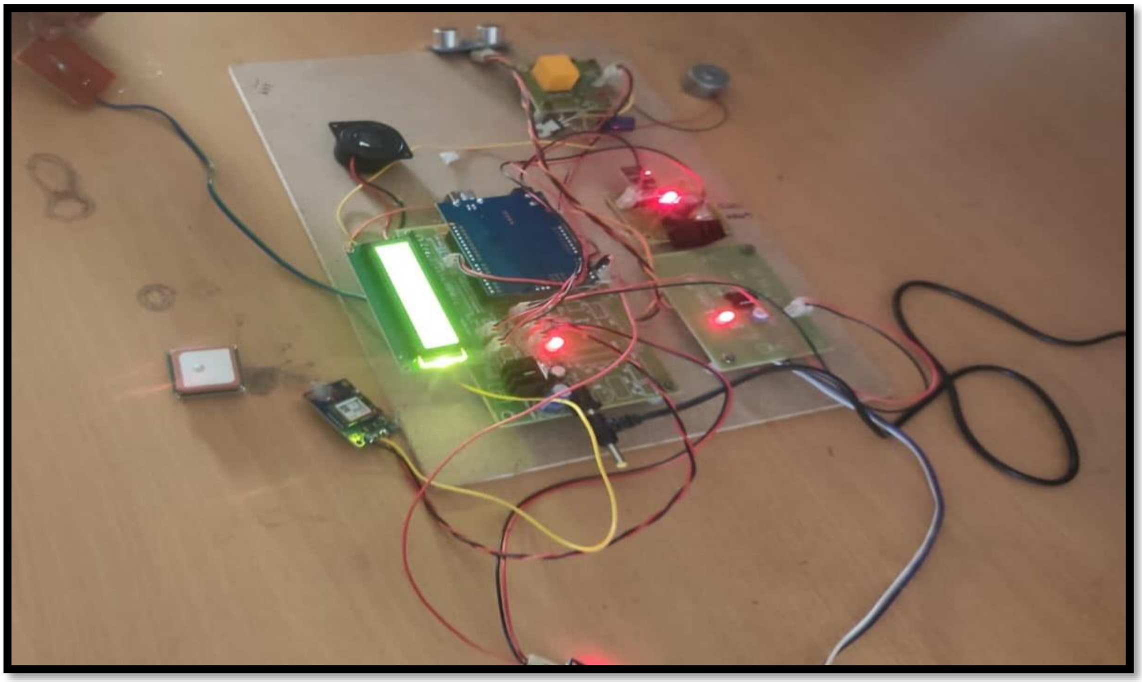
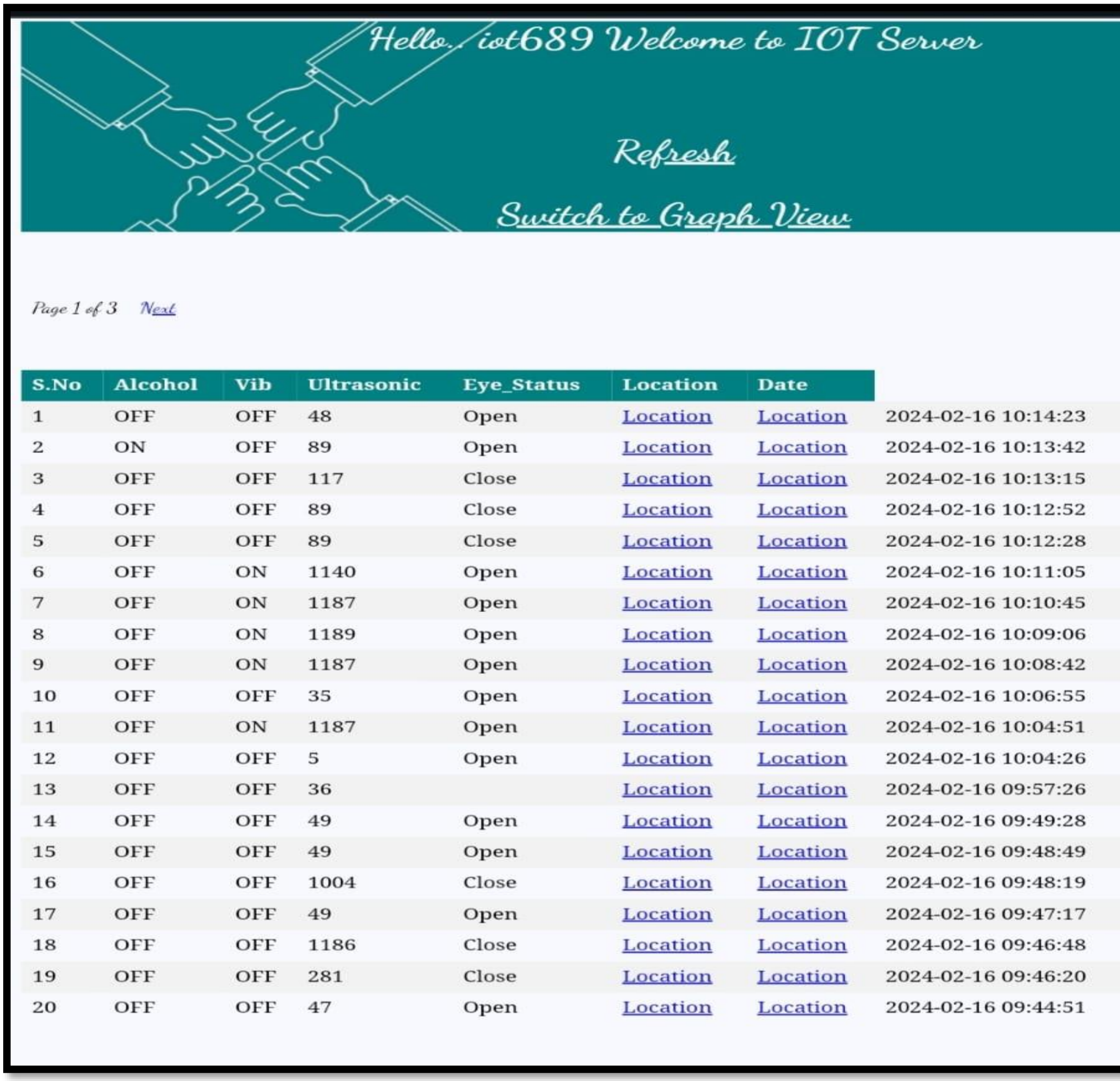


Figure-4

In the above image when an accident occurred to the vehicle then the buzzer is ON and the vehicle location is shared to the registered mobile number.



S.No	Alcohol	Vib	Ultrasonic	Eye_Status	Location	Date	
1	OFF	OFF	48	Open	Location	Location	2024-02-16 10:14:23
2	ON	OFF	89	Open	Location	Location	2024-02-16 10:13:42
3	OFF	OFF	117	Close	Location	Location	2024-02-16 10:13:15
4	OFF	OFF	89	Close	Location	Location	2024-02-16 10:12:52
5	OFF	OFF	89	Close	Location	Location	2024-02-16 10:12:28
6	OFF	ON	1140	Open	Location	Location	2024-02-16 10:11:05
7	OFF	ON	1187	Open	Location	Location	2024-02-16 10:10:45
8	OFF	ON	1189	Open	Location	Location	2024-02-16 10:09:06
9	OFF	ON	1187	Open	Location	Location	2024-02-16 10:08:42
10	OFF	OFF	35	Open	Location	Location	2024-02-16 10:06:55
11	OFF	ON	1187	Open	Location	Location	2024-02-16 10:04:51
12	OFF	OFF	5	Open	Location	Location	2024-02-16 10:04:26
13	OFF	OFF	36		Location	Location	2024-02-16 09:57:26
14	OFF	OFF	49	Open	Location	Location	2024-02-16 09:49:28
15	OFF	OFF	49	Open	Location	Location	2024-02-16 09:48:49
16	OFF	OFF	1004	Close	Location	Location	2024-02-16 09:48:19
17	OFF	OFF	49	Open	Location	Location	2024-02-16 09:47:17
18	OFF	OFF	1186	Close	Location	Location	2024-02-16 09:46:48
19	OFF	OFF	281	Close	Location	Location	2024-02-16 09:46:20
20	OFF	OFF	47	Open	Location	Location	2024-02-16 09:44:51

Figure-5

The driver's behaviours and vehicles data are uploaded in the server by using the GPS tracker and IoT module. Here the driver's close eyes and he is alcohol those are stored. At what time, date, Location they are drowsy and alcoholic it also been stored. The Ultrasonic sensor provides the data about when an obstacle is near and at what distance also. The vibration sensor vibrates when a dangerous and hazardous condition occur.

5.CONCLUSION

We Designed and Implemented the "IoT Based Advanced Driver Assistance System (ADAS) for Vehicle Safety and Driver Security". The main aim of this project is to protect Vehicle Safety and Driver Security.The integration of alcohol detection technology helps prevent drunk driving by alerting the driver. Driver drowsiness detection systems monitor driver behavior and provide warnings when signs of fatigue are detected, reducing the risk of accidents due to drowsy driving. Accident avoidance and collision detection systems use sensors to detect potential collisions and can automatically slow down the system to avoid accidents. GPS tracking provides real-time location information, which can be used for navigation as well as emergency services. Overall, this comprehensive ADAS package enhances road safety, reduces accidents, and improves the driving experience.

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