Implementation of Vehicle Safety and Accident Detection System Using ESP32

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ABSTRACT -The vehicle safety and accident detection system using ESP32 of an by using IOT technology is an a comprehensive solution designed to enchance road safety by detecting accidents in real time to emergency services,drivers,and authorities.This system integarates various sensors, including sp02,GPS,GSM,and vibration sensor,with a microcontroller to monitor vehicle condition and detect such as sudden deceleration,collisions, or fire hazards.upon detecting an accident,the system triggers automatic notification and sends critical data such as the vehicle location and status to emergency contacts via GSM or WI-FI.In addition to accident detection the system also offers continuous monitoring of vehicle health,preventing potential break downs.This IOT based solution ensures faster improved vehicle safety and provide valuable data for accident analysis,making it a vital tool for modern transportation systems.

Keywords- ESP32, GPS, SP02, VIBRATION SENSOR, LCD.

1. INTRODUCTION: Currently, road accident detection and response systems rely on manual intervention, where people often delay or fail to report accidents to emergency services. Traditional vehicles may have basic safety features such as airbags and seatbelts, but they lack the integration of real-time emergency notifications to assist accident victims swiftly. In many cases, the response time for medical assistance is delayed due to the lack of immediate information being shared with the necessary parties, such as family members and hospitals.

1.1 Manual intervention: Current road accident detection and response systems rely on manual reporting, which can lead to delays.

1.2 Limited safety features: Traditional vehicles have basic safety features, but lack real-time emergency notifications.

1.3 Delayed response times: The lack of immediate information sharing with emergency services, family members, and hospitals can lead to delayed medical assistance.

These are the three major problems we have noticed in existing system.

2. LITERATURE SURVEY:

1. IoT-Based Vehicle Safety and Accident Detection System: The increasing significantly in recent years due to road safety and the advancement of embedded system various methods to create systems capable of detecting collisions tracking vehicle and providing immediate assistance with microcontroller like ESP32 it has become feasible to develop low cost it has real vehicle these system typically integrates multiple sensors to monitor real time parameter and take appropriate action.

2. Real-Time Vehicle Accident Detection Using IoT and Machine Learning: The real time vehicle accident detection system using IOT technology and machine learning these another kind of system foe an accidents detection in real- time site by using GPS but this system uses a ML system it will helpful for IOT system it will helpful to finding the exact location of accident place but in sufficient data or lack of location tracing.

3. IoT-Enabled Smart Vehicle Safety System for Accident Prevention: The IOT based enabled smart vehicle safety system for accident prevention by using the IOT technology it provide the correct information exact location real-time location and it will check the vehicle condition and it will prevent from the accidents it will improve the road safety and reduce the accidents causes these system sends the SMS to emergency services, family members, friends, etc and it is helpful to the people in the world so many people facing the accident rate nearly 1.3 millions of people are die due to the accidents only this system will help to them we can implement the real time system this an a IOT technology system for an a accident detection internet of things is helpful for implementing an IOT. .

4. Wireless IoT-Based Accident Detection and Prevention System for Vehicles:

Wireless IoT-based accident detection and prevention systems for vehicles it means the wireless system uses for this like WI-FI, BLUETOOTH, ZIGBEE like that wireless communication used the IOT based technology for an finding of an accident detection and prevention system for vehicles .

5. Vehicle Accident Detection and Automated Emergency Response System Using IoT: The vehicle accident detection and automated emergency services response system it means the system send the data and location to the family members, friends, personal contacts etc it will send real time alert of this exact location to the site and automatically send location through SMS it will detect the accidents also by using these IOT .

6. Smart Traffic Management and Accident Prevention Using IoT: The smart traffic management and accident prevention using IOT internet of things this IOT will store the huge amount of the data and it will display on LCD smart traffic it will manage the accident and respond the to the accident location and the accident will be prevention we can the life of people and we can reduce the death rate of people and also in the year nearly the people are death due to accidents only because of traffic rules angry drunk Like these system smart traffic management and accident prevention take the action the smart traffic management and accident detection and prevention system using an IOT technology by this we reduce the accidents in the world.

3. PROPOSED METHODOLOGY:

The proposed system for vehicle safety and accident detection system using ESP32 by using an a IOT technology. The system uses an devices like ESP32 microcontroller, power supply, sp02, vibration sensor, buzzer, ignition key. The system is worked based on the IOT internet of things these ESP 32 provide the data and store the data for all other devices. Spo2 sensor uses it will check the health condition of the human it will check heart beat rate, and haemoglobin. Vibration sensor it will get sound from the buzzer any sudden changes or collision and for suppose accident will happen sends the alert to the emergency services to the personal contacts, hospitals, police stations. The LCD liquid crystal display it will display the speed of vehicle and health condition, For this system it will helpful to the society by using this system we can reduced the death rate of human life of this accident detection system.

BLOCK DIAGRAM:

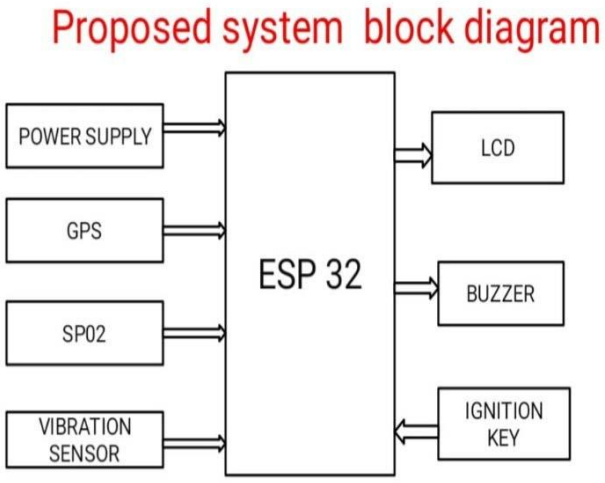


FIG 1: BLOCK DIAGRAM

ESP32 MICRO CONTROLLER:

The ESP32 microcontroller is a series low power ,low power microcontroller developed by Espressif system it is a highly versatile and popular chip used in a wide range of application .

SP02:

SpO2 is typically measured using a pulse oximeter, a non-invasive device that clips onto your finger, earlobe, or toe. It uses light sensors to pass two different wavelengths of light through the skin, detecting the amount of light absorbed by oxygenated and deoxygenated hemoglobin. From this, it calculates the percentage of oxygenated hemoglobin.

GPS MODULE:

GPS stands for Global Positioning System, and it's a satellite-based navigation system that allows devices to determine their location anywhere on Earth. It is used in a wide range of applications, including navigation, tracking, mapping, and location-based services.

LCD: LCD is to display important safety information,alert messages ,real time location,human heart beat rate and the hemoglobin,speed of vehicle.

BUZZER:

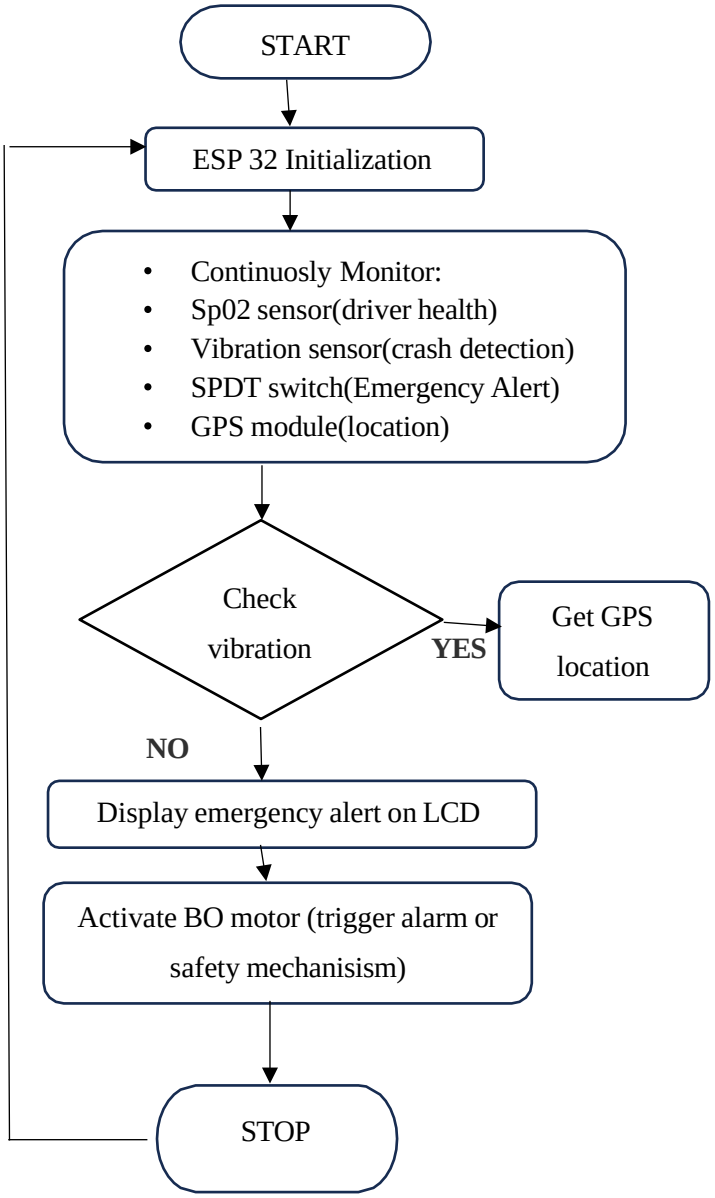
A buzzer is an audio signaling device that produces a sound when an electric current is applied. It alerts Immediate Attention and Warning, Automated Emergency

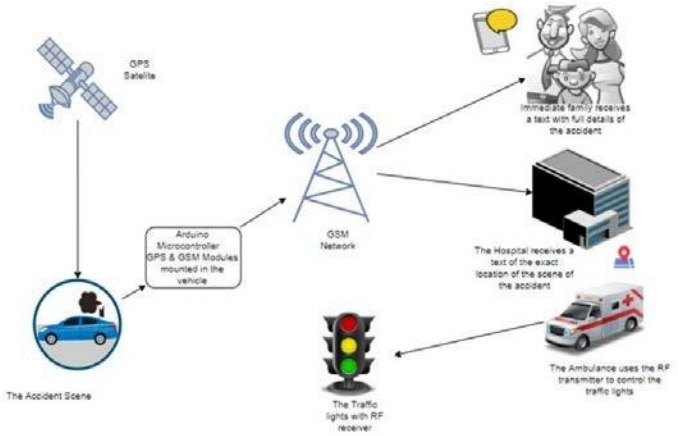
Alerts, Vehicle Proximity Alerts, Distraction Detection, Notification for Passengers and Others

VIBRATION SENSOR:

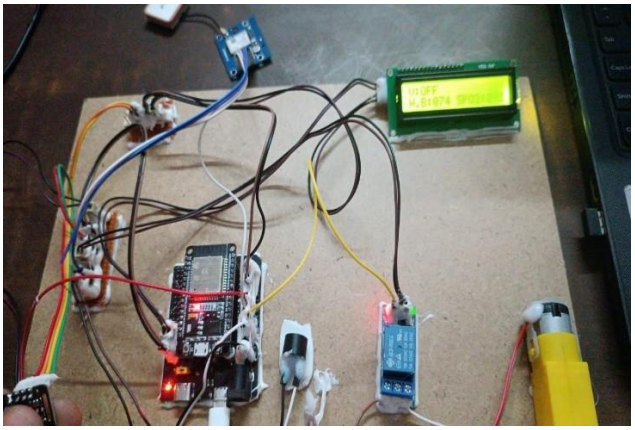
Vibration sensors typically work by detecting changes in motion or position and converting this physical change into an electrical signal. Crash detection and alerting,real time monitoring of the vehicles condition,enchancing overall vehicle safety.

1.2 ARCHITECTURE OF THE SYSTEM





HARDWARE IMPLEMENTATION :

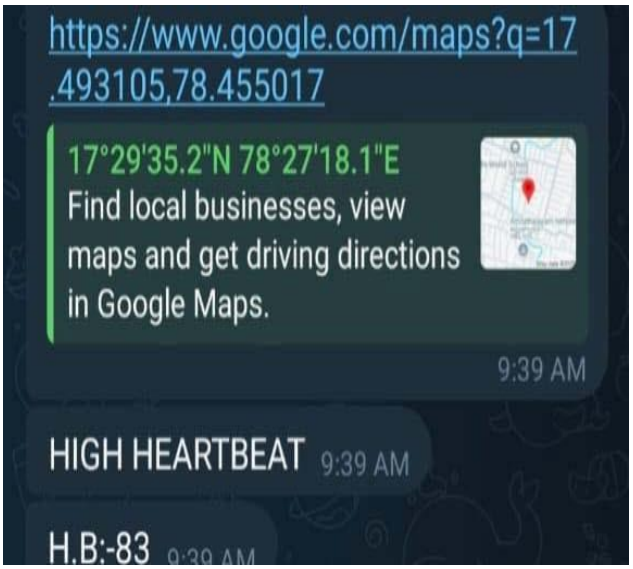


Physical Connection of system

RESULT:

Overall, The result of the proposed system of vehicle safety and accident detection system using ESP32 by using an IOT technology and this system integrates the various sensors, which is helpful for these system. The ESP32 processes data from sensors, upon detecting an accident it sends alert or messages to personal contacts and emergency services SMS. This system helps to sending data correct information to the SMS to emergency services and personal contacts and friends and family members. System over all helps to reduce the death rate of the humans in world It will help them by implementing in real time it is so helpful them so many people are die due to accidents nearly 1.3 millions of people are facing these problem. For them this another kind of system for accidents detection and vehicle safety system by using ESP 32.

Figure showing the location heartbeat , blood pressure.



CONCLUSION:

Vehicle safety and accident detection system which senses the position, collision of the vehicle and send the data information to the family members, friends, emergency services, at exact location real time site by using GPS(Global Positioning System). Sp02 sensor helps to check driver health condition then only vehicle start otherwise it doesn't start. Vibration sensor it will detect any sudden changes or collision it will get sound from buzzer.for this devices the LCD(Liquid Crystal Display) display the speed of the vehicle and spo2 conditions location. For this system we need first power supply to supply power to the other devices

Thereby, decreasing the death rates resulting from accidents.

FUTURE SCOPE:

The scope of the proposed system includes the integration of GPS for real-time location tracking. The ESP32 system has a promising future scope. As the number of vehicle on the road continues to rise the need for advanced safety features becomes increasingly important. This system can be expanded to include additional features such as vehicles tracking, driver behaviour monitoring, and real time traffic updates. Integration with smart cities and intelligent transportation system can also enhances the systems capabilities with growing adoption of IOT technology the proposed system has the potential to become a crucial component of futures vehicle safety and accident detection systems ultimately leading to reduced accident and improved road safety.

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