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IOT Based Accident Alert System

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Abstract: Transportation has great importance in our daily life and it's development has made many of our chores much easy. IoT based accident alert system aims to provide real-time warnings to drivers as they approach hazardous areas using ESP32 Ultrasonic Sensors and RF Transmitter and Receiver has gained attention. When a vehicle or a car comes near the accident prone area, ESP32 alongwith Speaker and Audio amplifier which is situated in a car produces a beep sound through which the driver in the car gets an alarm sound that thereis an accident prone area nearby.
Keywords: IOT Internet of Things

I. INTRODUCTION

The IoT-Based Accident Alert System aims to provide real-time warnings to drivers as they approach hazardous road signs and areas, empowering them with the critical information needed to mitigate risks. These accidents, stemming from diverse factors such as high-speeddriving, driver distraction, and rapidly changing road conditions, transcend geographical boundaries and persist as a global concern. Traditional road safety measures have often struggled to provide timely information to drivers, leaving them ill-prepared to respond effectively in dynamic situations. Accidents are an unfortunate reality that can occur in diverse environments, ranging from home settings to industrial complexes. Traditional alert systems, however, often face limitations in terms of speed, accuracy, and the ability to provide real-time information to relevant authorities. The IoT-Based Accident Alert System seeks to address these challenges by leveraging the interconnected nature of IoT devices to create a network that can rapidly detect and communicate accidents to designated responders.

A. Aim and Objectives of the project

1) The aim of an IoT (Internet of Things) based accidental detection system is to enhance safety and provide timely assistance in the event of accidents or emergencies. This system leverages IoT technology to monitor various environmental conditions and detect incidents that could lead to accidents or emergencies
2) Early Detection: The primary aim is to detect accidents or emergencies as early as possible
3) Minimize Response Time: By automating the alert process, the system aims to reduce the response time, whichcan be critical in saving lives or minimizing the severity of injuries.
4) Driver-centric Warnings: Design and integrate an intuitive user interface to deliver audio warnings directly todrivers, providing clear and actionable instructions to exercise caution, reduce speed, or take other necessary actions to mitigate potential risks.
5) Instant Alert Dissemination: Implement a reliable communication infrastructure that enables the seamless andinstantaneous transmission of alerts from IoT devices to vehicles as they approach or enter danger zones.
6) Real-time Hazard Detection: Develop a robust IoT sensor network capable of continuously monitoring road conditions, identifying dangerous road signs, and pinpointing hazardous areas in real time .

II. RELATED WORK

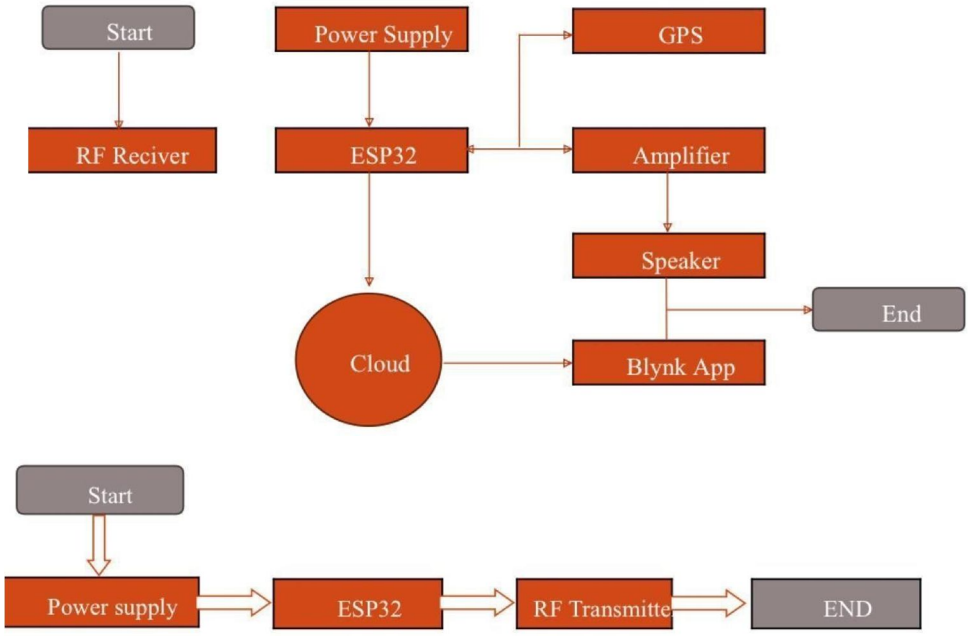
In [1] authors proposed a system to collect location information to manage and focus using GPRS provided by GoogleEarth. In [2] related studies on accident rescue, including machine learning techniques and IoT used with different approaches. Kim et al. (2018) foundthat the speed of the vehicle or the number of vehicles has a greater effect on the road using the sensor big data measured from the atmospheric measurement vehicle and the local road traffic data. In [3]The android application uses Google Maps API(Application Programming Interface) for locations to be inserted using coordinates as latitude and longitude. The accident prone spots data are collected and used as latitude and longitude coordinates in the application. Geo-Fencing is used with Geo Fire to locate accident prone spots.
In [4] Over the years, different researchers have tried to address the different issues of road accidents in manner rangingfrom study and identification of Road Safety levels in different regions, identification of black spots based on accident severity, analysis of different parameters for predicting accident severity across different regions and development of application for reporting accidents.

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In [5] Aishwarya S.R explained an IoT based vehicle accident prevention and tracking system for night drivers .In this paper provides Eye Blink Monitoring System (EBM) that alerts the subject during state of drowsiness.[6] Sadhana B have explained Smart helmet intelligent safety for motorcyclist using raspberry pi and openCV. The idea is obtained after knowing that there is increased number of fatal road accidents over the years. This projectis designed to introduce safety systems for the motorcyclist to wear the helmet properly.[7] Sarika R. Gujar explained advanced Embedded System of Vehicle Accident Detection and Tracking System. The main objective of this system is to first detect the accident location and call for the emergency services. Vehicle accident detection is possible with the help of sensors. A GPS and GSM module helps to trace the vehicle. [8] Shailesh Bhavthankar explained Wireless System for Vehicle Accident Detection and Reporting using Accelerometer and GPS. In this paper, Accelerometer sensor is used to detect crash and GPS give location of vehicle. In case of any accident, the system send automated message to the preprogrammed number such as family member or emergency medical services via GSM. [9] Jagdish A.Patel explained Raspberry Pi based smart home. This paper aims at designing a basic home automation application on Raspberry Pi through Interfacing camera as security purpose and the algorithm for the same is implemented in developed in python environment which is the default programming environment provided by Raspberry Pi.

III. PROPOSED ALGORITHM

A. *Architecture*



B. *Advantages*

We can monitor the speed of the vehicle.We can find the location of the vehicle.
Alert message to mobile phone for remote information.Mobile number can be changed at any time.

C. *Applications*

1) Automotive and transport vehicles.
2) Security, remote monitoring and transportation and logistics.
3) This system also can be interfaced with vehicle alertingsystem.

D. *Methodology Used*

1) Agile Methodology such as scrum and kanban used it is where requirement are evolve and frequent iteration arenecessary .
2) The two sensors are used for sensing purpose when the two objects comes closer to each other
3) The audio storage device used for storing the alert sound .

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An Accident Alert System typically involves the use of a microcontroller to monitor various parameters and detect signs of an accident.Here's a general overview of how an IOT-based Accident Alert System might work:

E. Microcontroller

The brain of the system, responsible for processing data and making decisions based on predefined algorithms.Sensors: Microcontroller is compressed micro computer manufactured to control the functions of embedded system im office machines , Robots , home appliances , motor vehicles , and a number of other gadgets .

A microcontroller is comprises components like -memory , peripherals and most importantly a processor.

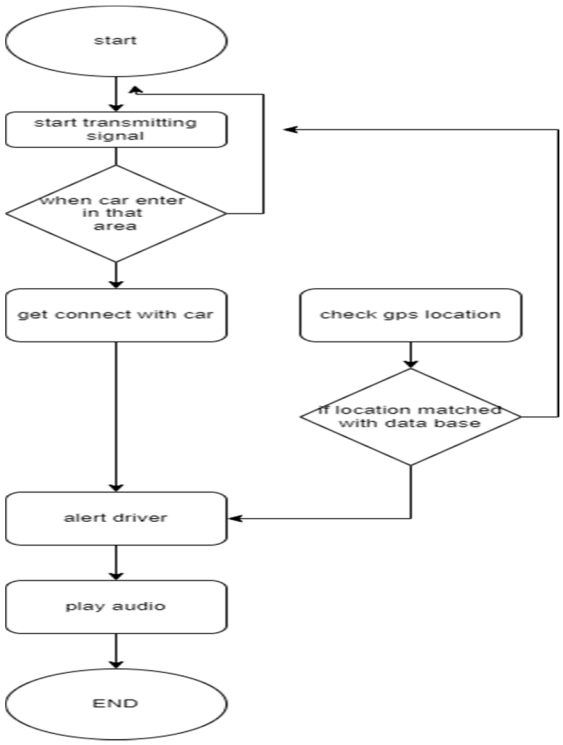
IV. WORKING OF THE SYSTEM

1) The ESP32 microcontroller is programmed to monitor the location of the vehicle using a GPS module.
2) When the vehicle enters a danger area, the ESP32 sends a signal to the RF transmitter.
3) The RF transmitter transmits the signal to the RF receiver.
4) The RF receiver receives the signal and triggers the audio playback and storage module.
5) The audio playback and storage module plays a pre-recorded message, such as "School ahead, go slow."
6) The ESP32 also sends a notification to the Blynk app.
7) Users may have the option to create accounts or log in using existing credentials. User authentication ensures personalized features such as saving favorite zones and receiving customized notifications.
8) The application utilizes mapping libraries (e.g., Google Maps or Mapbox) to visualize accident-prone zones.
9) The app communicates with a backend server using APIs to retrieve real-time accident data.
10) The application may implement mechanisms to receive real-time updates from the server. This ensures that users have the latest information about accident alert zones.

V. FLOWCHART

The project incorporates two ESP32 devices—one integrated into the transmitter device and the other in the receiver device.

The transmitter consistently emits signals within a specified range. This signal activation occurs when a car enters the designated range. A seamless integration of GPS coordinates is established between the transmitter and receiver. When the location coordinates align, an alert is triggered on the user's mobile device. Simultaneously, an audio alert is activated within the car, enhancing the overall safety and user experience



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VI. ANALYSIS

1) The IoT-Based Accidental Alert System for Road Safety represents a significant step forward in addressing the global issue of road accidents. By combining cutting-edge technology with a focus on real-time hazard detection and driver-centric warnings, the project has the potential to make a substantial impact on road safety.
2) One of its most compelling features is its ability to provide drivers with timely information about potential hazards, thereby mitigating accidents caused by a lack of awareness or inadequate reaction time.
3) This proactive approach to road safety has the potential to save lives and reduce the economic and social costs associated with accidents.

VII. FUTURE SCOPE

1) Firstly, the system can benefit from the integration of more advanced sensors and data analytics algorithms.
2) Secondly, the scalability of the system can be further explored. Expanding the coverage to encompass a broader geographical area or increasing the density of IoT sensors can extend the system's reach and impact. Which is possible by integrating the localor government authorities.
3) Lastly, partnerships with automotive manufacturers to integrate the system into vehicle infotainment systems or advanced driverassistance systems (ADAS) represent an exciting avenue.

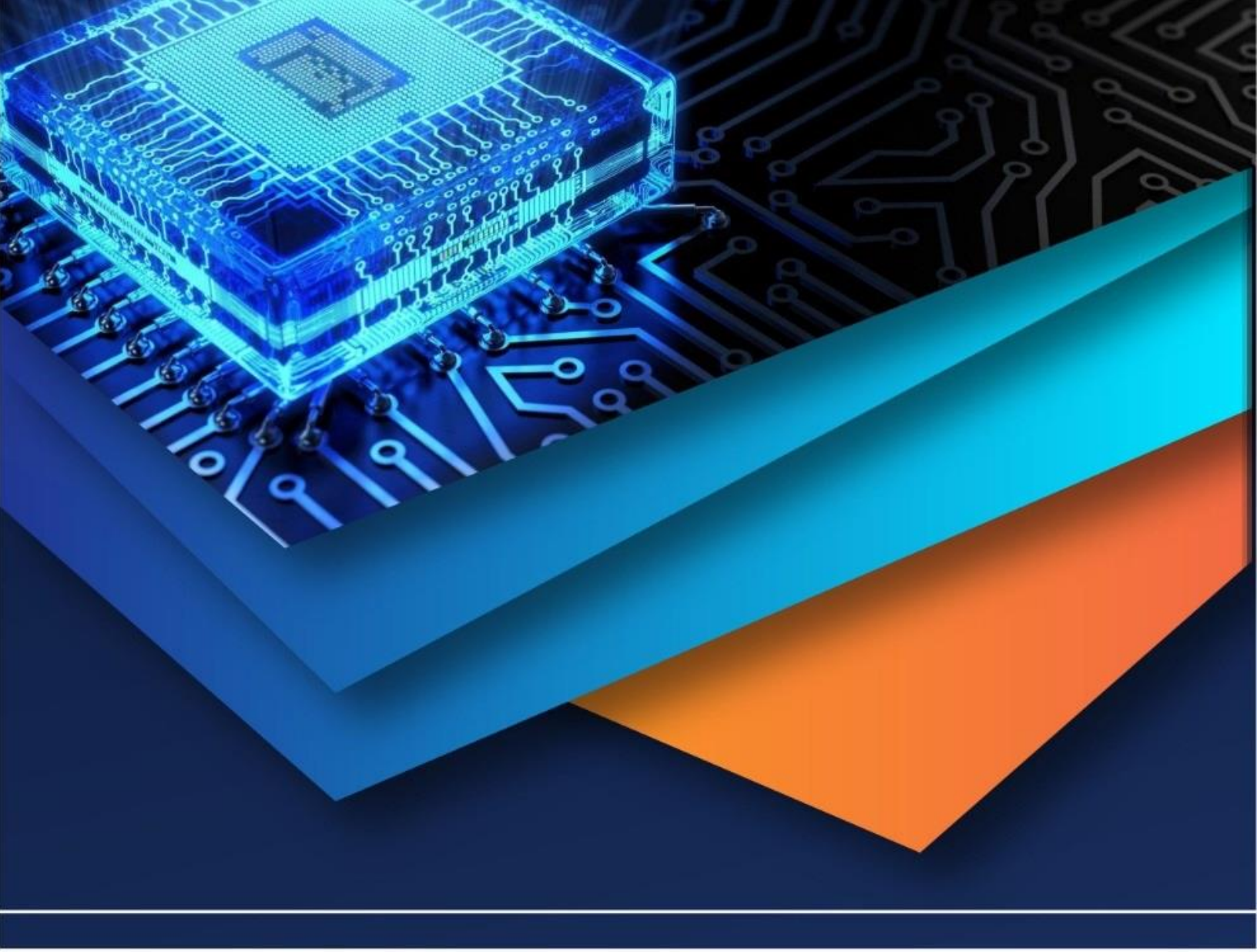
VIII. LITERATURE SURVEY

Sr No.	Title	Authors	Methodology
1.	Accident Prevention & Alerting System Using Raspberry Pi	1.Mr. Hardik Chotalia, 2.Mr. Deep Bansode, 3.Mr. Shivsai Panchal, 4.Mr. Sagar D. Dhawale	The IoT-based Car Accident Prevention and Alerting System using Raspberry Pi is a solution designed to enhance road safety. The system utilizes a Raspberry Pi along with sensors like IR, MEMS, ultrasonic, vibration, alcohol, GPS, and MPC30008. Its primary objective is to detect accidents and promptly notify emergency services to minimize response time and save lives. The system continuously monitors both the vehicle's surroundings and the driver's condition through an array of sensors. In the event of an accident being detected, the system immediately sends an alert to emergency services containing information such as the vehicle's GPS location. To further enhance safety measures, the system also includes a DC motor and motor drive for controlling vehicle speed and direction.
2.	IoT Based Vehicle Accident Detection and Tracking System Using GPS	Swetha Bergonda, Shruti Gadgip, Sushmita, Savita Soma	Transportation has great importance in our daily life and it's development has made many of our chores much easy. IoT based vehicle accident detection system using GPS and WIFI has gained attention. When accident occurs, this system sends short message to WhatsApp of a mobile number via Wi-Fi over internet.. The message will give the information of longitude and latitude values. Using these values the position of the vehicle can be estimate.

IX. CONCLUSION

In conclusion, our project is all about making roads safer. We've come up with a smart system that can spot danger on the road in real-time and warn drivers immediately. We've chosen the right tools like sensors and speakers to make it work smoothly.
By using this technology, we're aiming to save lives and reduce car crashes. It's a step towards making our roads much safer for everyone.It has the potential to make a significant impact on road safety and improve the overall quality of life for communities around the world.

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