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VECHILE ACCIDENT DETECTION SYSTEM USING IOT

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Abstract: Accidents are quiet frequent these days because of the increase in traffic and reckless driving. The population is greatly affected by road accidents, which are a major cause of both fatalities and disabilities. Ongoing studies on accident detection systems are primarily concentrated on two aspects: reducing the time it takes to report an accident and enhancing the precision of accident detection. And in many cases, it's not the property loss but also the lives. Delayed communication between the hospital/ambulance and the police leads to this loss. To reduce this risk an automatic vehicle accident system is needed. The proposed model shows better performance in means of detecting an accident and helping the needs. The main function of this system is it detects when an accident occurs and inform the concerned people in less time.

Keywords: Sensors, vehicle accident detection

1.Introduction

The Internet of Things (IoT) allows for the connection of various hardware, particularly sensors, which can process information received from these sensors. This processing can enable the detection of accidents, with the resulting information being transmitted to relevant authorities like the police and medical emergency services. Automobile accidents and traffic congestion have increased as a result of the rising demand for cars. The people's lives are in terrible risk. This is a result of the dearth of world-class emergency facilities in our country.

In this work, a car accident warning system is introduced. The system under this design detects accidents in much less time and delivers the essential information, like the location, time, and angle of a vehicle accident, to a first rescue facility in a matter of seconds.

In an emergency, every single second counts in terms preserving human life. The percentage of the population using vehicles is rising. Accidents are on the rise as a result of the heavy traffic. This leads to the loss of life since the ambulance takes longer to get to the accident scene or from there to the hospital. As soon as possible, the accident sufferer must be taken to the hospital. Every time an accident occurs, the investigating unit must be notified. In order to reduce the amount of time needed for the investigation, it is also advantageous to inform the inquiry department.

2. Literature Survey

[1] They first described the proposed approach's CVIS applications principles before proposing an automated method for detecting automotive accidents. After that, create a brand-new image dataset that is better suited for vehicle accident identification techniques. created the YOLO_CA car accident detection model using deep learning techniques and CAD_CVIS. To increase the real-time and accuracy of YOLO-CA, they incorporate dynamic weights, loss function, and multiscale feature fusion in this model.

[2] Fog computing offers effective, localised data processing, which can be especially useful in applications with a tight deadline. Low latency, regional spread, and mobility assistance are some of its advantages. Since delays might cause fatalities, shorter response times are thought to be an especially crucial requirement for accident detection and emergency notification systems. The proposed method uses fog computing to get around problems with cloud-based systems. When analysed with same OBU- based results, the system derived in this work lowers the cost by utilising smartphone capabilities. The system also facilitates automated emergency response, management, lowers costs and shortens total response times. As a demonstration of feasibility, an Android application has been created to showcase the work. The evaluation's findings show that when compared to cloud-based systems, the fog-based ERDMS has lower latency, network utilisation, and execution times. The examination of the suggested strategy in a simulated environment—which is one of our study's limitations—cannot perfectly reproduce all real-world events. The generalisation of the total solution is therefore constrained.

[3] This paper introduces a novel IOV (Internet of Vehicles) system named "deep crash" that employs deep learning techniques. The deep crash system comprises a cloud-based deep learning server, a cloud-based administration platform, and an IVI (In-Vehicle Infotainment) telematics platform equipped with sensors for detecting vehicle collisions. The cloud-based deep learning framework is responsible for training the deep learning model to accurately identify instances of traffic collisions. Moreover, based on the collision prediction results, alert messages and notifications are transmitted through a cloud-based information platform, while the GPS provides the precise location of the traffic accident. The experimental deep learning analysis indicates an impressive accuracy rate of 96% in detecting traffic collisions. When a traffic collision event is detected, details about the incident are relayed to a cloud-based management platform for emergency announcements and related operations. The approximate duration required to transmit an emergency announcement from a vehicle to the cloud-based management platform is measured.

[4] The frequency of traffic accident fatalities is rapidly increasing, and prompt assistance could significantly reduce the loss of lives. Several solutions were explored to address the detection and prevention of accidents. These approaches involved the utilization of diverse sensors such as pressure, shock, and others, alongside machine learning techniques like neural networks, support vector machines, representation learning, and more. Several strategies for preventing accidents were also examined, including the identification of impaired and drowsy drivers, regulation of vehicle speed, and maintaining a safe distance from obstacles. In the event of an accident, emergency services are promptly notified to provide swift assistance. These systems offer numerous advantages, such as minimizing traffic accidents, accurately determining the accident location, and facilitating rescue operations. However, all these systems relied on either hardware or software-based technology, and there is a possibility that the sensors or devices themselves could sustain damage during a disaster, resulting in erroneous readings and outcomes.

[5] The proposed detection system operates continuously regardless of the occurrence of an accident, and if an accident does happen, it promptly notifies pre-defined emergency services and designated family members. To optimize rescue efforts, the system categorizes accidents into four types: collisions, rollovers, falls, and incidents with no accidents. The smartphone sensors and the sensordone sensors utilized in the proposed ADC system are responsible for measuring the values of the model variables. The system can be retrofitted to any car model. Three alternative categorization models based on GMM (Gaussian Mixture Model), NB (Naive Bayes), and DT (Decision Tree) are examined and compared to determine the most precise ADC model in relation to the suggested ADC system's accuracy. Efforts should be made to minimize delays in every aspect, including the execution time of the algorithm and the transmission time of messages. If possible, the period of automated notification following an incident should be shortened or compared to

other automatic notification systems. In comparison to factory-installed systems that considerably increase the cost of vehicles, this system is more affordable. Implementation of the system only requires a smartphone, a barometric altimeter, and a 4G Internet connection. As a future development for this ADC model, an additional accident category, specifically fire/explosion, should be included.

3.Methodology

3.1 Modules

ARDUINO: Arduino UNO is a microcontroller that has 14 digital input or output pins and 6 analog inputs. In this system the board is used to sense the changes of the surrounding. A accelerometer sensor is used which measures the acceleration of the connected body and different angles. The GSM and GPS module connected to the board are used to communicate between the system and the user of the system.

GSM MODULE: Sim 900a GSM Module is used to send or receive SMS while using the system. This module sends an alert message to the emergency contacts when an accident has occurred along with the latitude and longitude values of the location where the accident has occurred. This operates at frequencies between 900MHz and 1900MHz.

GPS MODULE: Neo 6M GPS Module is used in this system that helps the user in locating the accident area. The module uses NMEA standards that send latitude and longitudinal values of the accident location to the user. Using the value, the user can easily track the accident location and reach the place at minimum time.

LCD MODULE: An LCD module typically consists of a liquid crystal display panel and a driver circuitry that controls the display. It may have multiple rows and columns of characters or can even support graphics. The module's physical dimensions and pin configuration may vary, but it generally includes power and ground pins, data pins, control pins, and sometimes backlight pins.

3.2 Implementation

The two phases of our system are the accident detection phase and the notification phase. An entire implementation of a smartphone app has been made for the accident detection phase. A web-based system has been established for hospitals to use throughout the notification phase.

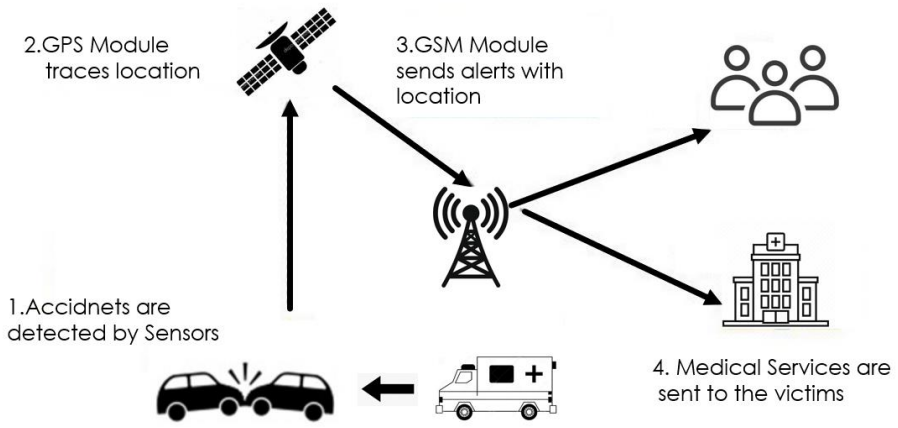

Fig.3.2.1 Model of Vehicle accident detection system

Detection phase implementation

The programming application has produced an Android application. The desired API level for the application is level 26, with a minimum API level of 17 for Android operating systems. For system access, a user must first register. The programme continuously gathers data from the sensors on the smartphone and uploads it to the cloud. The application generates an alarm for 10s whenever an accident is found.

Notification Phase Implementation:

When an accident is discovered, the cloud locates the closest hospital and notifies it of the incident. The hospital uses this interface to determine whether or not there is an emergency. The website receives information about accidents whenever they take place. The website displays information about the collision, including its location and details about the drivers and vehicles involved.

4.Result

Fig.4.1 Detecting the accident and sharing the location

The suggested system is an application that offers assistance to those in need. The emergency services will receive the help request thanks to this method, which enables them to give assistance to the people as quickly as possible.

5.Future enhancement

The proposed system is concerned with accident detection. But by giving the accident victims medicine on the scene, this could be prolonged. As technology advances, we can also prevent accidents by predicting them and warning users before they happen.

6.Conclusion

The proposed system in this research can save lives for those who were involved in accidents. Everyone can use this because it is simple to learn and inexpensive. This project is solely an IOT-based endeavour that relies on sensors. Therefore, even a little mishap can be quickly identified and the persons assisted. Because this technology is embedded within the car, connecting a smartphone or any other external device won't be necessary. In general, the advantages of this system include its ease of use, security, and low cost.

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