



Alert Dashboard for Accident Detection using IOT

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ABSTRACT

As the population increases, so does the number of road accidents. These are unpredictable and situations cannot be reported to surrounding hospitals in good time.

In most cases, The lack of availability of emergency medical services and the provision of first aid along with timely service can result in loss of life. Therefore, a system needs to be developed that addresses all of these problems. This work is to construct a system that detects road accidents and pass the information to the concerned for medical treatment. The developed system uses Internet of Things (IoT) to detect the accident and notification with the use of integrated smart sensors, GPS, a microcontroller fixed in the vehicle modules that can trigger at the time of an accident.

With the help of LoRa (Low Power and Long Range Technology) open frequency band the road accident information is sent to centralized server, Where information is saved in the form of records which display information like vehicle number, geo location in the dashboard. Later this information is fetched by concerned authorities and immediate ambulance service is provided for medical treatment.

The main aim of this project is to detect road accident and to inform the concerned authorities for emergency medical services.

Keywords: IoT(Internet of Things), LoRa(Low power and Long range), Gps module, Sensors, Dashboard, web server

INTRODUCTION

Background

Road safety remains a major development concern, a public health concern and a leading cause of death and injury worldwide, with more than 1.35 million deaths worldwide, as reported in the GlobalStatusreport on Road Safety 2018, with 90% of these casualties in developing countries and 11% in India alone. According to the India Road Accident Report 2019, the accidental deaths in India in 2019 were 1.51. 113 in number. It is indeed of great concern that despite the government's continued efforts in this regard and our commitment to halving the number of deaths, we have not been able to make any significant progress on this front. The Department of Roads and Motorways carries out several initiatives, including those related to road and vehicle technology, as well as road safety awareness-raising activities. The year 2019 was the culmination of our efforts in the field of road safety in the penalization of violations with the aim of the disciplining and responsible behavior of road users. The majority of accidents (78.4%) are caused by the driver's fault. These include speeding, driving under the influence of alcohol or drugs, and phone calls and case taking. Other causes of traffic accidents are third-party fault (7.1%) as the fault of cyclists, pedestrians or drivers of other vehicles. Fewer accidents occur due to government negligence (2.8%), motor vehicle failures (2.3%) and inclement weather (1.7%).

METHODOLOGY

Methodology is the flow of solving the objectives, below figure 1 shows the flow diagram which is used in developing system.[18]

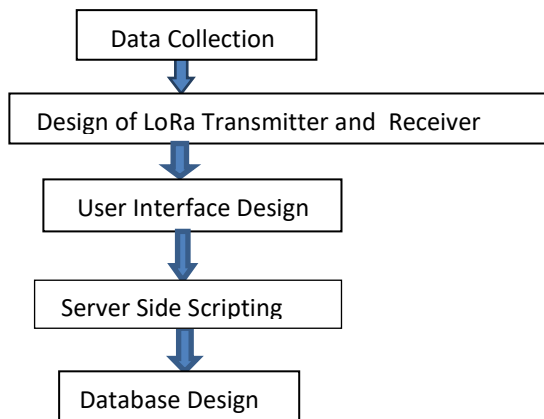


Figure 1 : Methodology Flow Diagram.

Accident detection

Authors of the paper [4] recommend to use vibration sensor at vehicle side and based on the status of the vibration sensor they will draw a conclusion regarding accident.

Authors of the paper[8] proposes to use tilt sensor to be mounted on vehicle and take decisions based on the values, along with vehicle inform also proposes to track heart beat information of the users to understand severity of the accident.

propose to use ultra sonic sensor to detect range between vehicles and take actions based on the range values returned by the sensor.[9]

Accident prevention

The paper [1] authors suggest detecting drowsiness of the driver by tacking the eye blink information and alerts driver if downiness is detected.

Authors of the paper [2],[3],[5],[8] have proposed to use speed detection and traffic rule violation procedures of the vehicle and attempts to inform concerned authorities to take action on such drivers in early state and hence accident could be avoided.

Accident alerting

The authors of article [6],[9],[5] propose to determine the geographical location of the accident using GPS and send the information to the relevant authorities via a Wi-Fi network also Bluetooth to be uploaded. Documents [10] to [17] underline the importance of LoRa technology in sensing agricultural parameters and in making decisions related to crops. These papers address the question of how WSN could be built with LoRa, the advantages of open frequencies. Volume in Data Collection Techniques . The authors of this study introduce EBM (EyeBlink Monitoring) technology, which alerts focus when the subject is sleepy. An implanted system that observers head movement and eye movement be dependent on the psychological state of concentration to alert drivers who are in the sleep cycle phase about fatigue. System results are not affected by a simple blink. [1]

In this study, researchers developing an robotic speed detection system that can detect a vehicle's speed and, if the speed limit is exceeded, can remove the license number from the vehicle and send it by mail . to a tollbooth to ennoble them. In this case, the Doppler effect is recycled to extent the speed. When speeding is detected, a camera takes a picture of a vehicle.[2]

In this paper, researchers designed and built a unique system that can easily detect highway speeding violations and help drivers comply with traffic laws by keeping a speed within the speed limit. RFID (Radio Frequency Identification), GSM (Global System for Mobile Devices) and PIC (Personal Identification Code) are all components of the designed system "18F45K22". This skill has returned reliable, economical, and efficient results.[3]

The authors proposed installing a new vibration detection device in the vehicle. If there is an accident, the vibration is activated and a GPS finder determines the location of the car. The incident was immediately reported to Patrol and Life Support so the accident could be rectified and the suspect tracked with a GPS tracker. [4]

The authors of this article have proposed a system to eliminate the aggressive Driving on motorways and alerting traffic authorities when a violation is detected. Many methods require human attention and involve numerous experiments that are difficult to carry out. In this publication, the researchers aimed to develop technology for early detection and warning of unsafe vehicles in patterns related to reckless driving.[5]

Vehicle accidents motive a variety of damage. Early detection and well timed motion will make a large distinction in twist of fate situations. Researchers proposed techniques to research automobile-established sensors or information to locate injuries. To get a comprehensive, clean picture, we want to correlate and examine blocks of sensor information in place of reading them independently. If we additionally examine the fitness information of travelers, that is a incredible assist when generous ready salvage operations. It won't be clean to correlate and examine all of those datasets in actual time. This calls for a massive gadget and framework. This article proposes an structure and layout method to research the information supplied via way of means of the sensors set up withinside the automobiles and the fitness information sent via way of means of the passengers' wearable gadgets to locate injuries in actual time. After detecting injuries, the gadget evaluates the effect of the twist of fate. It then indicators applicable human beings for rescue measures or incorporates out important measures (as defined via way of means of area experts) itself.[7]

Road twist of fate costs are very excessive today, mainly for two-wheelers. Timely clinical help can assist store lives. This gadget pursues to inform the close by clinical middle of the twist of fate to offer instant clinical help. The accelerometer established at the automobile detects the inclination of the automobile, and the pulse sensor at the user's frame detects the abnormality of the heartbeat to apprehend the severity of the twist of fate. Therefore, the systems make the choice and ship the records thru Bluetooth to the smartphone, that's related to the accelerometer and coronary heart charge sensor. The Android software at the cellular telecellsmartphone sends a textual content message to the closest clinical middle and for your friends. The app additionally stocks the precise region of the twist of fate, that can store time[8]

Many precious lives are misplaced in site visitors injuries each day. Common motives are driving mistakes and behind schedule responses from emergency offerings. It is important to have an powerful site visitors twist of fate detection and records verbal exchange gadget to store injured. A gadget that sends records messages approximately the region of the twist of fate to close by emergency offerings with a purpose to be capable of react in time is surely correct. In the studies literature, severa researchers propose some of automated twist of fate detection systems. These consist of twist of fate detection with smartphones, GSM and GPS technologies, advert hoc automobile networks and cellular applications. The implementation of an automated site visitors twist of fate detection and records verbal exchange gadget in each automobile is very crucial. This article gives a quick assessment of automated site visitors twist of fate detection strategies used to rescue victims. An automated site visitors twist of fate detection approach primarily based totally on less expensive ultrasonic sensors is additionally proposed.[9]

At present, due to the capricious atmosphere and seed costs, increasing yields is becoming an extremely turbulent task for ranchers. Because of the eccentric and abrupt difference in the atmosphere, the damage ratio will be high, and even the casualty rate will be high. To overcome this situation, we need a viable planning methodology. The answer for this issue is by following the procedures of exactness agribusiness otherwise called savvy horticulture. Accuracy Agriculture is a procedure of giving a right arrangement of contributions to the harvests or terrains as indicated by the earth changes. Exactness Agriculture pursues a characterized set of principles. They are gathering the information, preparing the information, sending the information to the incorporated machine and as indicated by the information got the choices will be taken by the master.[10]

Wireless sensor networks (WSN) has recently developed rapidly and has also been one of the main focuses of research in remote systems. Innovation. This rapid progress has been fueled by continued device miniaturization, runtime evolution, remote innovation, performance capacity, and refinement of conventions. Sensors that collect natural data from the environment have been reduced thanks to faster execution, improvement, and reduced team innovation. Improvements from new advances in remote sensing and falling costs have led to new uses of plastic for remote sensing management equipment. Research area in horticulture and crop production[11].

Recently, WSNs have been widely used in various rural applications. The potential applications of WSN and the particular problems and difficulties in transferring WSN to improve cultivation are verified. To focus on specific prerequisites, WSN-related devices, sensors, and adaptation strategies in rural applications are discussed in detail.[12]

The emphasis is on LoRa (Long Range), a standout amongst the most encouraging wide-zone IoT advances proposed by Semtech and further advanced by the LoRa Alliance. At the core of LoRa's prosperity is its versatile information rate twitter balance innovation taking into account adaptable long-extend correspondence with low power utilization and ease plan. Basically, this is accomplished by means of spread range various access procedures pleasing numerous clients in a single channel.[16]

LoRa Alliance has characterized the higher layers and system design on top the LoRa physical layers and named them Lora WAN. Together, these highlights make LoRa appealing to engineers who can construct total framework arrangements over it for both geological and private/mechanical kinds of IoT systems, in this manner optimizing its market selection. Regardless of this achievement, LoRa has not yet pulled in comparative dimensions of consideration from the scholarly and look into network with without a doubt, not very many friend assessed concentrates distributed to date.[17]

Existing System

In existing system vehicles which met with accident have no automated alert system hence it is difficult to provide timely service to people who are in trouble due to road mishaps. Hospitals receive information from people over a phone call with respect to road accidents; it is not possible to provide a emergency service due to poor communication.

Limitations of existing system

- Accident zones and hospitals are not inter connected
- Poor communication leads to loss of life
- Emergency service fails to do its duty
- Persons who are traveling in a new place find it difficult avail medical service in case of road mishaps

It is required to develop an automated system which helps in detecting the events such as accidents and populates the information to concerned authorities to take care of victims. In the country like India where we have huge population, often get to know people being killed in road accidents, in may cases victims have lost their life due untimely treatment.

PROPOSED METHODOLOGY

The proposed application works on the principle of IOT and LoRa technology. Lora stands for Long Range Low Power wireless communication technology. It works on the principle of radio communication, LoRa chips (Transceivers) enables to establish communication between Transmitter and receiver over particular frequency band (Free band), since free band being used for communication need to worry about license and other commercial overheads

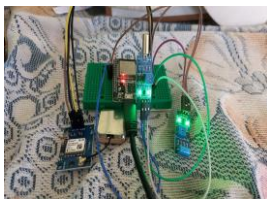


Fig 1:- Model connection

In the proposed system a tilt sensor being used at vehicle side which detects the sudden changes in the position of the vehicle i.e orientation of vehicle, we can measure the tilt being happened in angles. When a vehicle rams with other objects its position gets changes abruptly this is identified by the sensor which is connected to transmitter module, this information is sent to receiver which is connected with other base station, having received information from transmitter receiver sends details to hospitals which are nearby to it. Location details are sent by means of Longitude and Latitude. Hospital staff's get to know accident details in the web server and they could take further action.

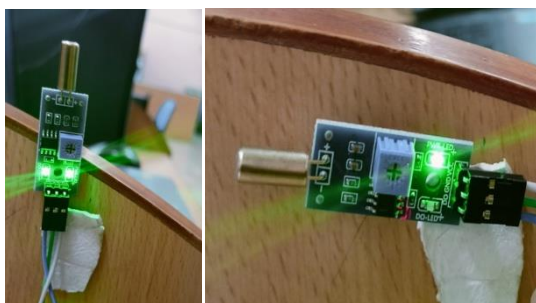


Fig 2: tilt sensor

This sensor has 3 pins called GNCD,VCC and D0 it operates at 3.3 to 5v, it returns value 1 if position of vehicle is straight otherwise 0 when it has fallen.

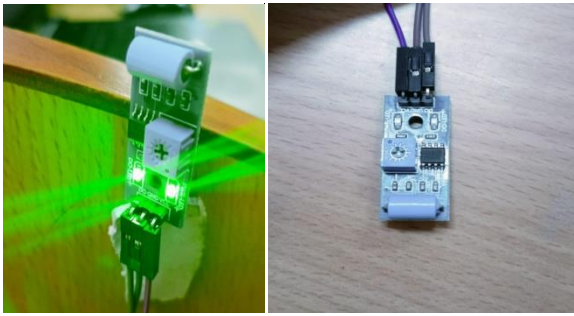


Fig 3:- Vibration sensor

Vibration sensor is another sensor which helps to fetch information like weather vehicle got hit by external force i.e. It got collided with other objects. Like tilt sensor this sensor too return integer value; when it returns integer value 1 it means object has not received any external forces and if it is 0 means object has received some external force and we conclude that vehicle has met with a collision.



Fig 4:GPS module

In order to get the geographical position of the place where the vehicle had an accident, we use the GPS module, this module takes a while after power on to connect to the satellites once the connection is established, it starts to provide the geographic location.

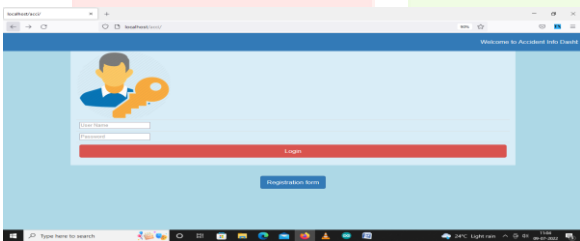


Fig 5:- login page for dashboard

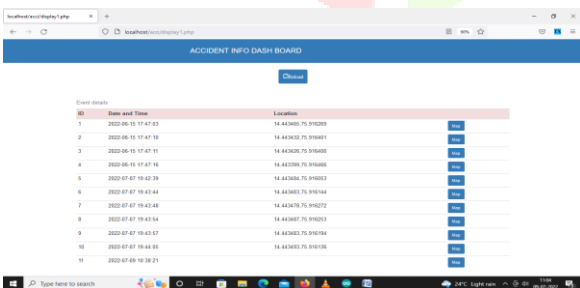


Fig 6:- Dashboard showing accident events details.

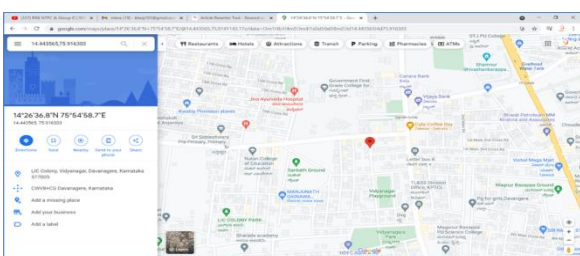


Fig 7:- showing the location of event occurred, location is viewed when the view button is clicked. We can see the view button in fig 6.

Advantages of proposed system

- It works on free band hence economical
- Timely medical service saves the life of people
- Travelers find it as life saver while travelling at new locations when they met with road mishaps.

RESULT ANALYSIS

The proposed approach using tilt sensor, vibration sensor and GPS module has delivered the interesting result by giving the information about the location where accident occurred to the dashboard with map as show in **Fig 6** and **Fig 7**.

CONCLUSION

The main aim of this methodology is to provide a safety like kit to vehicles so that accident events could be detected and informed as quick as possible and hence life of victims could be saved. To achieve this an Iot Based prototype is developed here ESP32 development board plays crucial role and sensors such as tilt helps to find out the accident event, to get the geolocation of the place GPS module is being used. Hole system is deployed in a vehicle model and tested for events. It works fine gives accurate results.

FUTURE ENHANCEMENT

This project can be further developed to improve facilities inside the ambulance. Developments can be made to monitor the condition of the patient to intimate the concerned people or authority.

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