

IDENTIFICATION OF ACCIDENT AND ALERTS USING IOT BASED SYSTEM

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ABSTRACT

Due to heavy traffic or carelessness of drivers may leads to an accident. At the time of accidents, individual or group of people may suffer from a serious injury and sometimes immediate first aid can't provide at the exact time. The proposed system acts as an accident identification system for gathering the information about the vehicle and immediately transferred the information to give the alert message to nearby control room available. The Radio frequency circuit embedded with vibration sensor is used attached in the user vehicle. Similar kind of Radio frequency receiver is used in the control room for receiving the information. When a user meet with an accident, the vibration sensor detect and gives the signal to RF transmitter and this signal is immediately forwarded to the nearest control room. The proposed system gathers the accident information and providing the alert information immediately to the control room. This process helps to save the lives of lot of people met with accident.

Keywords: Radio frequency, Global positioning system, Short message service, Internet of Things.

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INTRODUCTION

According to the survey in 2020, nearly 1214 road crashes occurring every day in India. Many of the accident create drastic damages to people and some of them lost of lives due to the problems [2]. Every year, usages of automobile have been dramatically increasing and at the same time rate of road accidents are also gradually increasing. Now days, the main reason of accident are due to the carelessness of driver, violation of traffic rules [4]. If the emergency information reached at correct time, then life of many people met with accident have been saved. Due to the scare of emergency facilities, there is need of automatic alert system to rescue the people met with the accidents [8].

The proposed system overcome the above said issue and provides the accident information at correct time and first aid be given to rescue the

RELATED WORKS

Apurva Mane et al. [1] suggested the vehicle alert system based on the geographical coordinates obtained using the GPS. The automatic system provides the alarm about the accidents and their locations. Accelerator is fitted in the car, provides the alarm and while dangerous driving such as crash or roll over has been detected. The signal from the accelerator is used for the further monitoring. Based on the geographic coordinates received from the micro controller, the location of the accident is tracked and immediately the information passed to the control room. Based on the information provided by GSM and GPS, the accuracy of the accident information predicted is the only limitation of the suggested technique.

injured peoples. Even though in many countries are using the web camera to monitor the vehicles in the suspected area. Based on the monitoring in the control room, first aid initiation can be taken to help the injured people. This methodology can't be used in large dense people countries like India [9]. The suggested system collect the vehicle information collect the vehicle information and immediately transferred to the control room and then all the process involved have been automated to give the accurate information. The proposed IOT based system integrates all the components such as, hardware components, sensors, actuators and network connectivity and also reduces the risks involved in the manual process [10].

Bhagya Lakshmi et al. [3] developed the alert system based on SMS delivered to nearest control room. The position of the vehicle is tracked and send to the pre-programmed numbers and alert message is send to the ambulance or nearby help center. After getting the alert message, the ambulance will reach the location. The limitation of the system is based on the network used for alerting the system.

Sawant et al. [5] proposed the accident detection system for the carelessness of persons travelling in vehicle. If the accident happens due to carelessness or not in a position to control the vehicle. Immediately,

the alert message will send to the registered mobile number. The limitation of this method is due to network problem, if there is any delay happens in reaching the message, then less chance to protect the peoples in the crucial time.

Patil *et al.* [6] suggested the vehicle tracking for accident detection system. The authors used both accelerator and ultrasonic sensor for capturing the accidents details. Finally, wireless camera is used to capture the image of accidents occurred. Based on the obstacle detected during the accident, ultrasonic sensor gathers the information and sends to the micro controller. Even though, the suggested method provides optimum solution, time required for completing the overall process is more.

Nimisha Chaturvedi *et al.* [7] designed an accident prevention system based on the microcontroller. The phone number of nearest police or the nearest emergency help center is stored in the ROM embedded in the microcontroller. With the help of method, emergency facilities can be reached at the correct time. Depend upon the microcontroller used; the accuracy of message will reach to the control room.

Sagar reddy *et al.* [18] used the integrated system to provide the alert information about the accident through the registered email. Based on the vibration sensor, it will alert the driver is out of control. The alert message is send to the registered user via through the mobile number and then location is shared to the GPS system. Response time for altering the control system is depend upon the GPS location shared.

After analyzing the related works, there is need of automated system for alerting the accident information to control center. The proposed IOT based system gathers the vehicle information and immediately passed to nearest help centre. This process saves the life of many people injured in accidents.

METHODOLOGY

The suggested IOT based system detects the accident and sends the information to nearby first aid center in less time. In many developing countries the road accident is characterized by human powered vehicles without resource segregation of traffic [11]. This caused considerable concern for the engineers and planners. Unless action is taken, the road accidents are predicted to cause the leading death. Unnatural accidents are causedso approximate measures are developed A person's uncontrolled event results in personal injury. The highest percentage of all deaths due to road traffic accidents.It not only affects the crash but also increases the risk involved.With this system, an application is created with the hardware components so that the information is transferred to the traffic controller [12].IOT is used to integrate all the hardware and software components.IOT refers to a rapidly expanding network of connected objects capable of gathering and exchanging data using embedded sensors [13].

Step 1: Signal Identification and Signal Processing: The Vibration sensor sense the activity of accident and the vehicle information stored in the registered user is immediately transferred to the microcontroller.

Step 2: Locating the position of vehicle: The position of vehicle is located using the GPS system. Longitude and Latitude axis of the geographical location is tracked and forwarded to the nearest emergency service.

Step 3: Receiver Control: The RF transmitter sends the accident information to the microcontroller. RF receiver receives the information and immediately process give the alert message to the control room.

Step 4: Alert Message generated using GSM module: The microcontroller send the alert message about the vehicle and user details of the registered number. With this detail, the control room can easily track the location of vehicle and emergency information is shared to health center to rescue the injured people at the correct time.

Step 5: Display panel for output-The LCD Panel is used to display the user details for the control room. Notification of alerts can be identified and processed through the LCD panel without any delay.

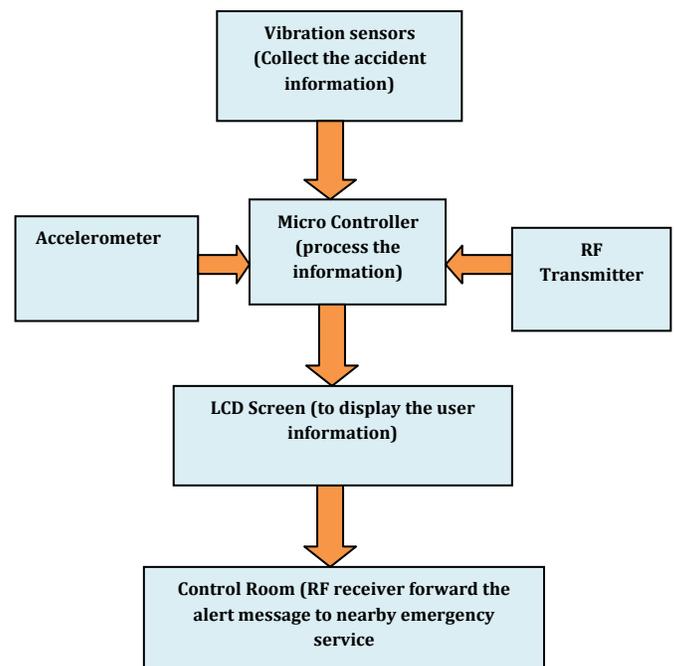


Fig.1: Block diagram for the proposed system

Results and Discussion

A. Field survey data

An ultrasonic sensor generates the sound of high frequency wavelength from the sounds detected and evaluates the echo which the sensor receives back [14]. It is used to measure the distance of an object and also to determine the time interval between the sending the signal and receiving the echos [15]. Detect the high frequency sound not able to hear from the human beings, which come from the object and send back by the sensor. The sound waves is transmitted to a particular distance, if any obstacles is detected, the echos is returned back and the time taken for the bounce back is used to determine the distance between the source and designated object [16]. Usually the bats used the similar kind of principles of echolocation concept for detecting the food and prey. Some sensor uses a separate transmitter and receiver, but in the ultrasonic

sensor, both the process has been combined. The distance is calculated based on the below mentioned formula.

$$D = \frac{1}{2} TD * S \quad (1)$$

In the above mentioned equation (1), D-represents the distance, TD-indicates the time and S-denotes the sound speed. The main intention of ultrasonic sensor is used to measure the distance of transmitter and receiver [17].

B. Accelerometer Sensor

The acceleration sensor is used to find out the acceleration due to the free fall of multiple axes or single for find the direction and magnitude of the objects. The main advantage of this sensor is easily embedded in the micro machine also used in the portable device to find out the position of the device [18]. This sensor is used in the various fields such as automobile, laptop etc. Accelerometer is used in laptop for protecting the hard drives from damages. If laptop is fall down suddenly, in order to protect the damage, the hard disk will automatically turn off. It is used in the cars for the notification car crashes and deploys airbags at the correct time for avoiding the damage to the users. The extension of accelerometer is used in mobile phone as motion sensor for changing the display in various modes.

C. LCD Display

A liquid-crystal display (LCD) is used as output display for indicating the vehicle of user information to the control room. The LCD is use to display the contents in the fixed format like the seven segment display. Both crystal and liquid is used as the combination for the display purpose, at some particular temperature, liquids contents in the molecule will combine and form as crystal. The glass plates inner surface is coated with electrodes contain the symbols and letter formed in the pattern.

D. ARDUINO

The Arduino is micro controller to allow the users for upload program in the device. It contains the input and output pins. Inputs can be collected from the sensors and then projected output is displayed through LCD. Arduino is one of the best interactive devices connected with the laptop or other interface. It can be used as IDE, the instruction is fetched to the microcontroller, and then the open source platform can easily integrate with the hardware and software components. Now a days, the world is changing towards the usage of IOT devices, the Arduino board is required to integrate all the components.

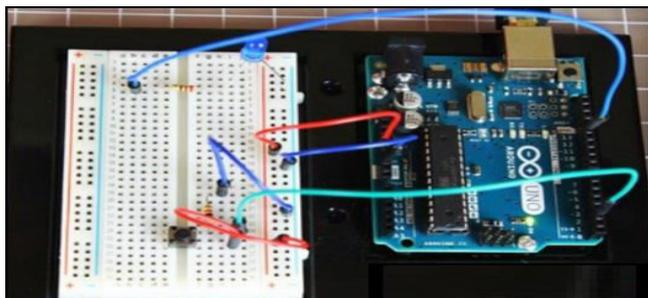


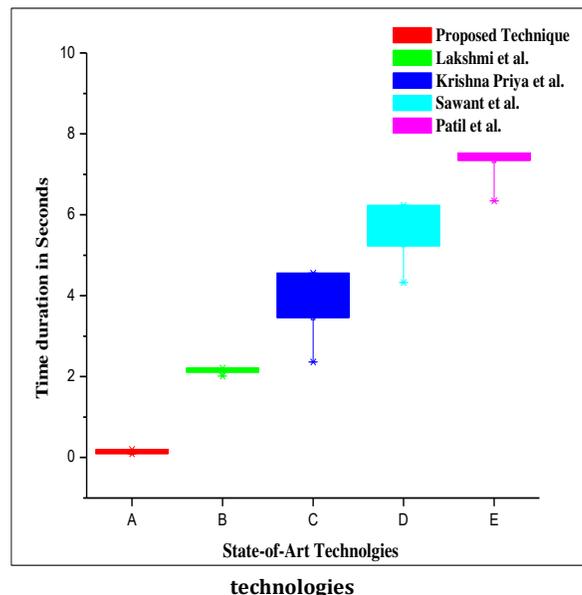
Fig. 2. IOT based accident identification and alerting system Segmentation

E. Comparison Parameters

The proposed IOT based accident identification and alerting system is compared with the similar state-of-art technologies. Limitations of the related works are clearly highlighted in the literature survey. Accuracy of the proposed techniques is measured in terms of response time taken for delivering the accident information to the control room. The time taken for gathering the alert information and forwarding the data to the nearby emergency have been considered and compared with the related techniques.

The proposed technique takes less time (0.101) seconds for gathering and delivering the accident information to help center. In the related works, some of the techniques used SMS service and other using the GPS system. Because of the network problem, if there is any delay happens, the emergency/first aid can't reach at correct time. But the proposed system combined the concept of both service, even any one of the method fails, the vehicle or user information reached at the correct time for rescue the injured peoples.

Fig.3. Response time of proposed technique with state-of-Art



CONCLUSIONS

The suggested IOT based automatic vehicle accident identification and alerting system. This method gathers the accident information in less time and forwards the information immediately to the nearby first aid center. The mechanism involved in the method is very reliable and easy. In the existing techniques either the GPS or the SMS mechanism is used to deliver the accident information. The proposed technique combined both the concept of global positioning and short message service either if any one of the method fails, even in that case the user or the vehicle information will reach to the control room at the exact time for saving the life of the injured peoples in the accident.

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