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A Review on Emergency Activation in Automobiles using IoT

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Abstract:
For the various application used in an automobile, emergency application is an important part which is discussed here. Using IoT every automobile is connected to the nearby hospital in case of emergency. This is done by installing sensors to the automobile, which detect the situation of emergency in case of accidents. By knowing the location of the automobile when prone to accident, it is advantage to save time and treat the accident victims.

Keywords: GSM-global system for mobile communication, GPS-global positioning system, HTTP-hypertext transfer protocol, IoT-Internet of things, ITL-intelligent traffic lights, TCP-transmission control protocol, and VANETs-vehicular ad hoc network.

I. INTRODUCTION

The use of automobiles has also increased the traffic hazards and the road accidents. In present days the rate of accidents can be increased rapidly. Due to employment the usage of vehicles like cars, bikes can be increased, because of this reason the accidents occur. People are going under risk because of their over speed, due to unavailability of advanced techniques, the rate of accidents can't be decreased. To reduce the accident rate in the country this paper introduces an optimum solution. Automatic alert system for vehicle accidents is introduced; the main objective is to control the accidents by sending a message to the registered mobile and nearby hospital, using wireless communications techniques. When an accident occurs at a city, the message is sent to the registered mobile and nearby hospital through the application developed in the phone with the information of accident occurred location, and the accident-prone persons information. When a person met with an accident which might be a very critical situation as their lives are on stake where no one can rely on passerby or the strangers for the needful help and cooperation. So, it is very important to get to the optimal solution that might be a life line for the individual. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents is introduced in this paper. This design is a system which can detect accidents in significantly less time and sends the basic information to first aid center within a few seconds covering geographical coordinates, the time and angle in which a vehicle accident had occurred. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. Thousands of people are dying because ambulances takes too long to answer emergency calls. Human life is too precious to be lost in road accidents which are one of the major causes for fatalities in India. A switch is also provided in order to terminate the sending of a message in rare case where there is no casualty, this can save the precious time of the medical rescue team that is by providing an option in the notification whether accident occurred or not. By this method one can terminate the process of false accidents, where in no casualty is required. There is delay involved in each and every stage of the process right from detecting accident, dispatching an ambulance till the patient is safely handed over to the casualty. We wanted to automate the whole process to reduce the delays in each stage. This system is used to integrate the user and ambulance services with the use of internet to save time and life. System constitutes of client and server application when the accident detection module reports an accident by using three axis accelerometers to the cloud sever that would automatically dispatches the nearest ambulance by processing the GPS coordinates and providing specific route to the certain accident spot. The android application used by the ambulance driver assists the driver to reach the location quickly and safely. We also wanted to help two-wheeler driver to use phone in very secure way so that he/she can primarily concentrate on road without any hassle.

II. LITERATURE SURVEY

In this framework, we work on accident detection technics by referring following papers, in [1] author proposed solution to detect accident sound sensor, flame sensor using raspberry pi. Which is also used to keep track of the accelerometer readings. In [2] GPS and GSM framework used for accident detection with help of vibration sensor and send quick message to the relatives. Another work of dispatching emergency services to appropriate location is done by using Analytic Hierarchy Process (AHP) in [3]. In paper [4] the author proposed all this system fully automated using different sensor on every stage to send message for relative and hospital. In [5] author designed a system which used alcohol sensor, vibration sensor. And GPS and GSM module were used forming an IoT network and cloud server to store all information. In [6] framework includes a microcontroller-based low-cost Accident Detection Unit (ADU) that contains GPS and GSM modem used for sending SMS and Alarm. In paper [7] author has talked about how to control traffic which help in accident reduction using intelligent traffic lights ITL.

In paper [8], author proposed a project by how network problem can be overcome with the help of smart cities. In paper [9] VANETs is used to connect between different automobiles while travelling and make all the vehicle connected. In paper [10] mobile is used which access the help of wretch server to send emergency alert without any external aid. In this paper we study all above paper and basic idea to detect accident by system which available to every two-wheeler easily and reduce delay in providing emergency

services to victim. So here we came up with new idea which implement fully automated system for all process.

Internet of Things

The accident alert system is an android app which is interconnected with IOT. At first user have to install the app and have to register his details and have to enter his emergency contacts. The IOT device must be placed outside the vehicle. If there is any occurrence of accident then the sensors in this device will detect the accident and then forward this information to the smart phone which is connected to it via Bluetooth. Now the remaining mechanism is done by app where app will automatically trigger an alarm upon receiving this information from the IOT. If the Driver fails to turn off this alarm within a specified time limit, the app sends a message to the contacts loaded by him which also contains the location of the accident to his emergency contacts and to the nearby hospital. The android app developed will be having link to other application like Ola and Uber, since ambulance pick up time might be late to the location. This android app will send notification to the nearby Ola or Uber driver of emergency. It's up to the driver intention to help the accident-prone victims to help, company should give rewards for his act of humanity and gain respect and increase his commodity of service.

Sensors

Flame Sensors - Flame Detection Sensor Module is sensitive to the flame, but also can detect ordinary light. Usually used as a flame alarm. Detects a flame or a light source of a wavelength in the range of 760nm-1100 nm. Vibration sensor **-**to protect door or window is used it generates a loud beep when somebody tries to break the door or window. The alarm stops automatically after three minutes. The circuit uses a piezoelectric element as the vibration sensor. It exploits the piezoelectric property of the piezo electric crystals.

Working modules

Arduino which is the major control unit to detect or alert when an accident occurs. It collects the data from vibration sensor, flame sensor, and reflects the output through a message. This vibration sensor and flame sensor will receive signals of the vehicle which in turn acts as an accident detection module. Arduino gathers the information from all other modules and sends the message to the receiver though GSM/GPS module of the phone via Bluetooth. To find the location on the earth the whole is divided into some coordinates. This GPS module will find the location of the vehicle and the information fetched by the GPS receiver is received through the coordinates and the received data is and the information is transmitted to the saved contact through GSM module.

GSM – Global System for Mobile Communication Module is used as a media which is used to alert emergency facilities from anywhere by sending information. It is also surprisingly economic and much less expensive; as a result, GSM is preferred most for this mode of communication.

Alarm and Switch

A buzzer or beeper and a led is a signaling device. It gives an audible warning when an accident occurs. If it is a false alarm or if the driver feels that he does no longer want instantaneous help, there is a switch in the system that he can use to quit the working of the system.

Vehicular Ad Hoc Networks (VANETs)

It has been created to facilitate communication between vehicles themselves and between vehicles and infrastructure. VANETs may soon allow vehicles to easily communicate among themselves and also with fixed infrastructure. This will not only improve road safety, but also raise new commercial opportunities such as infotainment for passengers. Car accident prevention, safer roads, pollution and congestion reduction are some of the goals of VANETs.

Android application

The Android application made is used to get information of the person driving the automobile. His basic information such as his name, address, contact number, family members contact information, his blood group are fed during the login of the application. In case of accident the application in the phone gets initiated with data acquired from the Bluetooth via accident detection module. Accident detection module involve sensors and microcontroller, which is connected to Bluetooth module to send data to phone. The user will get a notification to confirm the accident by showing accident detected. If the accident detected is false the user can always abort the process by selecting no. If the user didn't reply for the notification pop up the process will automatically proceeds with the operations. Application in the phone detects the location of the phone and search for the nearest hospital and send the location of the accident area to the hospitals ambulance driver, since the driver and the hospital might be far away from the location of accident the application also sends notification of emergency to the nearest Ola/Uber driver. This way immediate surveillance to the emergency situation in case of an accident is achieved.

III. CONCLUSION

SL NO	Author	Title	Advantage	Disadvantage
1	Shiva Nagaraju, & at all IJRASET VOL-8, 2018	Accident alert using IOT and Android application	Rate of accidents deaths decrease	Depends on Mobile Network
2	T Kalyani, & at all IJITEE VOL-8 March 2019	Accident detection and alert system	Information is obtained in case of accident	Only alert system is breached
3	Anisur Rahman Khan, & at all IJESC VOL-8, 2018	Automatic accident detection	Rate of accident deaths decrease	Insignificant for minor accidents

4	D. Deva Hema1, & at all IRJET VOL-5 ,2018	Accident Tracking & Emergency Response Management using IoT	Rate of accidents deaths decrease	Depends on Mobile Network
5	Mr. Dinesh Kumar & at all JETIR VOL-2, May 2015	Accident Detection and Reporting System	portable and low cost	Depends on Mobile Network
6	M.Rama Mohan Rao, & at all IJSRR ,2015	An IoT Enable Real Time Communication and Location Tracking System for Vehicular Emergency	Switch which helps to deactivate the application in case of minor accidents	Depends on mobile Network
7	J. Vijaya raj, & at all IJPAM VOL-119 ,2012	Traffic congestion control of vehicles based on edge detection using image processing	Accident is decreased with implementation of intelligent traffic lights	Sensors used for image processing is of high of cost
8	Nicola Bui, & at all IEEE VOL-1 Feb 2014	Internet of Things for Smart Cities	Decreasenetwork problem for data transfer through IOT	High Cost
9	Carolina Tripp Barba, & at all, 2102	Smart city for VANETs using warning messages, traffic statistics and intelligent traffic lights	Rate of accidents deaths decrease. Decrease in network problem for data transfer through IOT.	High Cost
10	Chris Thompson, & at all, 2010	Using Smartphones and Wireless Mobile Sensor Networks to Detect Car Accidents and Provide Situational Awareness to Emergency Responders	Low cost	Not all accidents are detected

This paper elaborated on the design of a completely automated IoT based accident detection and emergency response system. In this work, the system is physically present on the vehicle. Hence, the working of the system does not rely on any external devices. The complete information regarding the accident and the necessary health data of the victim is shared with the individual parties such as the emergency contacts and the hospital. This guarantees that the action taken is more efficient and ensures that the required medical assistance is made available. Alerting the emergency contacts helps create further awareness of the situation. Automation of the whole accident detection and ambulance dispatch, along with assisting the ambulance driver or Ola/Uber driver to the accident site with the route by using Google map up to the site by the use of android application is achieved. The whole process resulted in minimizing the delay of the ambulance to approach the accident site for the treatment of the victim. Therefore size, cost and reliability are much less to install any additional component especially designed for this particular purpose of accident detection. We can rely on the application since no much expenses are witnessed for this setting up of the application. It is economical and advantageous to not to be liable for such prone incidents.

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