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Intelligent Vehicle Accident Prevention System Using IoT and Cloud Computing

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ABSTRACT

A large number of deaths are caused by Traffic accidents worldwide. The global crisis of road safety can be seen by observing the significant number of deaths and injuries that are caused by road traffic accidents. In many situations the family members or emergency services are not informed in time. This results in delayed emergency service response time, which can lead to an individual's death or cause severe injury. The purpose of this work is to reduce the response time of emergency services in situations like traffic accidents or other emergencies such as fire, theft/robberies and medical emergencies. By utilizing onboard sensors of a smartphone to detect vehicular accidents and report it to the nearest emergency responder available and provide real time location tracking for responders and emergency victims, will drastically increase the chances of survival for emergency victims, and also help save emergency services time and resources.

Keyword: traffic accidents, location tracking, emergency services.

1. INTRODUCTION

The number of deaths due to traffic accidents is very high. Looking at the number of deaths and injuries due to road traffic accidents shows the global crisis of road safety. Nearly 1.3 million people are killed every year and about 50 million injured worldwide due to road accidents, which averages to 3,287 lives lost every day. More than 50 percent of road traffic deaths affect young adults between the age of 15-44. Around 400,000 individuals under the age of 25 dies in road traffic accidents every year. Even in countries with very good road safety measures, the number of road accident deaths is getting higher every year [1]. More than 90% of road traffic deaths occur in middle-income countries. In low-income countries the figure is even higher. In Pakistan the last 10 year of statistics shows that an average of 15 individuals lost their lives due to traffic accidents daily. According to data from Pakistan Bureau of Statistics on traffic accidents in Pakistan from 2004 to 2013 [2], the overall deaths in road accidents are about 55 percent, which according to the specialists is very high. According to the data, total 51,416 individuals died in 97,739 road accidents across the country. Furthermore, the data shows that deaths per accident are 55 per cent around the country [3].

The most likely reason for an individual's death in an accident is lack of the first aid provision that is because of emergency services not receiving information about accident in time. Emergency response time is extremely vital when it involves incidents involving vehicle accidents. Analysis shows that if we decrease just 1-minute in accident response time that can increase chances of saving an individual's life up to six percent [4]. In order to reduce response time, implementation of enhanced traffic technologies would be necessary, which will help scale back response time and therefore reduce fatalities.

The purpose of this research is to design and implement such an automated system that uses smartphone to detect vehicle accidents and report it to the nearest available responders to help counter these emerging problems and reduce casualties as much as possible. The detection system would help reduce fatalities due to vehicle accidents by decreasing the response time of emergency services. The system will also provide other emergency services like Fire Brigade, Police Department and Medical emergency services.

In this work we are utilizing android smartphone to detect accidents and report it to the nearest available emergency responders with the exact location of victims in emergency. On an emergency responder side, the system will inform responders about the incidents that occur near to them and provide them with real time tracking of emergency victims on a Google map. This will help emergency responders keep track of victim's location and rescue them as soon as possible.

2. LITERATURE SURVEY

Automatic Traffic Accident Detection and Notification with Smartphones

AUTHORS: Hamilton Allen Turner,Chris Thompson,Jules White

Traffic accidents are one of the leading causes of fatalities in the US. An important indicator of survival rates after an accident is the time between the accident and when emergency medical personnel are dispatched to the scene. Eliminating the time between when an accident occurs and when first responders are dispatched to the scene decreases mortality rates by 6%. One approach to eliminating the delay between accident occurrence and first responder dispatch is to use in-vehicle automatic accident detection and notification systems, which sense when traffic accidents occur and immediately notify emergency personnel. These in-vehicle systems, however, are not available in all cars and are expensive to retrofit for older vehicles.

Accident Alert andVehicle Tracking System

AUTHORS: Kiran Sawant,Imran Bhole,Prashant Kokane, Piraji Doiphode

Vehicle accidents are one of the most leading causes of fatality.The time between an accident occurrence and the emergency medical personnel are dispatched to the accident location is the important factor in the survival rates after an accident.By eliminating that time between an accident occurrence and the first responders are dispatched to the scene decreases mortality rates so that we can save lives.One approach to eliminate that delay between accident occurrence and first responder dispatch is to use An Accident Alert and Vehicle Tracking System, which sense when a traffic accident is likely to occur and immediately notify emergency occurred.

Car Accident Detection and Notification System Using Smartphone

AUTHORS: Hamid M.Ali,Zainab S.Alwan

Every day around the world, a large percentage of people die from traffic accident injuries.An effective approach for reducing traffic fatalities is: first building automatic traffic accident detection system, second,reducing the time between when an accident occurs and when first emergency responders are dispatched to the scene of the accident.Recent approaches are using built-in vehicle automatic accident detection and notification system.While these approaches work fine, they are expensive, maintenance complex task,and are not available in all cars. On the other hand, the ability to detect traffic accidents using smartphones has only recently become possible because of the advances in the processing power and sensors deployed on smartphones.

GSM Based Vehicle Tracking and Accident Detection System

AUTHORS: E Krishna Priya,P Manju,V Mythra

The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities. The accident detection project will provide an optimum solution to this drawback.An accelerometer can be used in a car alarm application so that dangerous driving can be detected. It can be used as a crash or rollover detector of the vehicle during and after a crash. With signals from an ultrasonic sensor, a severe accident due to an obstacle can be recognized.

Accelerometer based System for driver safety

AUTHORS: V.Sagar Reddy et al

The system has the advantage of tracking or identifying vehicles location just by sending a SMS or email to the authorized person. The system is designed by using Raspberry Pi (ARM11) for fast access to accelerometer for event detection. Is there any event is occurs the message sent to the authorized person so they can take immediate action to save the lives and reduce the damages. Images captured by the camera on the vehicle are emailed to the concerned person (for example the owner of the vehicle) along with the type of accident and the time of the accident.

3. PROPOSED SYSTEM

The proposed work is an effective solution for the easy transmission of data by introducing an IoT into the present vehicle alert system. This central server also consists of an auto-emailing module which sends the victims' location and information to emergency contacts stored in case of accidents.In this Proposed system,an IoT based vehicle accident detection and rescue information system is developed in order to detect vehicle accident and send the location information of the accident place to vehicle owner, nearest hospital and police station through message service and mobile call .The accident is detected through impact and vibration sensor. The vibration/acceleration of the vehicle is detected to confirm the cause of the accident. As soon as the accident is detected the buzzer (alarm) is ON. The switch is scanned first; if it is a minor accident then the switch is ON so that messaging is terminated. If it is a major accident, the switch remains OFF and the message is sent automatically to the rescue team.

BLOCK DIAGRAM
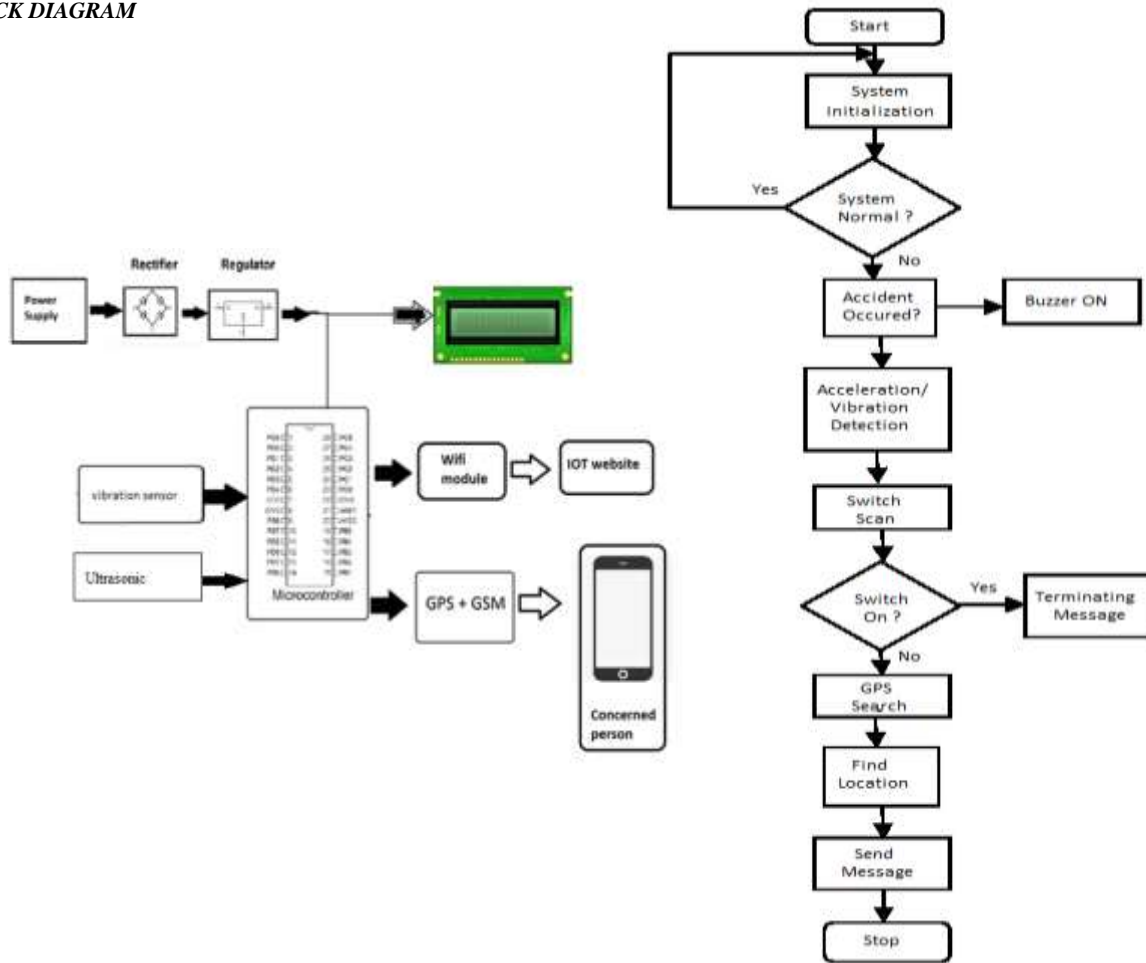
Roads are the predominant mode of transportation. Due to lack of maintenance majority of accidents takes place which is mainly due to potholes. A pothole is a structural failure in road surface. The pressure to the road surface increases due to the increased traffic which creates potholes. In order to reduce accidents occurred by vehicle accident they propose a pothole detection method where we detect the pothole and update its location in Google maps. The module contains two sections, hardware containing the sensors and the software updating the cloud database and plotting the location of the potholes on Google maps.

4. CONCLUSION

Hence the automatic alarm device for vehicle accidents has been implemented using AtMega162 microcontroller. The proposed system deals with the accident alerting and detection.8051 microcontroller is the heart of the system which helps in transferring the message to different devices in the system. Impact sensor will be activated when the accident occurs and the information is transferred to the registered number through GSM module. Using GPS the location can be sent through tracking system to cover the geographical coordinates over the area. The accident can be detected by a impact sensor which is used as major module in the system.

5. FUTURE ENHANCEMENTS

For future work, more research is needed in order to make the accident detection part more reliable and accurate which will help in reducing false positives. Adding additional sensors in combination with accelerometer for accident detection like gyroscope, microphone, camera (to automatically take pictures of the accident) and a voice recognition module to detect noises during a vehicle crash like noise when air bags are deployed, will drastically increase the reliability and accuracy of the system.

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