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Research Article

ACCIDENT DETECTION AND RESCUE PROCESS USING BLACBOX SYSTEM

V.NAVEENKUMAR[1], C.MANIKANDAN[2], T.NIVETHA[3]
[1,2,3]Department of Electronics and Communicaion Engineering
Email id :naveenkumarv@gmailcom[1] ,manikandan45@gmail.com[2]
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ABSTRACT
To build an integrated system for emergency rescue services in the event of road accidents by black box system. The project focuses on building an infrastructure which vehicle safety authorities can enhance the crash reports post-crash analysis, record of the event and reduces the time to arrive at the crash location. Vehicle to vehicle communication has been implemented instead of GSM. Panic switch use to control the sending information. The information sent from one vehicle to network station .The information has been sent to nearby base station or police station or hospital or home. The data from the car is stored in server.

Key words: GSM, Crash Detector, GPS, Android phone, sms notification to hospital Accident Protection, GSM Modem, GPS Modem, Vibration Sensor.

INTRODUCTION

The ability to accurately detect a vehicles location and its status is the main goal of Automobile trajectory monitoring systems. Also the high demand of automobiles has also increased the traffic hazards and the road accidents. This is because of the lack of best emergency facilities available in our country 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. These systems are implemented using several hybrid techniques that include wireless communication, geographical positioning and embedded applications. Our project aims to present a technology automatically detecting the accident and a hardware tracking device based on GSM/GPS technology informing at the occurrence of accident with sufficient details like exact location and time at which accident happened. This project will establish a communication between the control station and the unit installed in vehicles. Vehicles will have GPS/GSM enabled tracking modules and will be tracked in real time using cellular networks. The software embedded in the microcontroller will control the various operations of the device by monitoring waveform from the vibration sensor. In case of accident the device will send an alert message along with location data from GPS module to control station using GSM network. It is a comprehensive and effective solution to the poor rescue response in case of accident. The accident reporting can automatically find a traffic accident, search for the spot and then send the basic information to the rescue agency covering geographical coordinates and the time and circumstances in which a traffic accident took place. At the server end, a control function will extract relevant data and store it in a database, to which

accident information from prototypes will be polled in real time. Our system combines advanced hardware design and sophisticated control technology into a compact, reliable package. Now-a-days lots of accidents happen on highways due to increase in traffic and also due to rash driving of the drivers. And in many situations the family members or the ambulance and police authority is not informed in time. This result in delaying the help reached to the person suffered due to accident. Our project Real Time Vehicle Tracking and Accident Detection with GPS is designed to avoid such situations. Road accidents constitute the major part of the accident. Our project Real Time Vehicle Tracking and Accident Detection with GPS is designed to avoid such Situations.

Related Work

Our device is completely independent. It does not use the internal satellite navigation of the car. It has its own GPS module and antenna. We have built the device around the idea that it can be plug-and-play, low power consumption and will be compatible with the vast number of vehicles regardless of make and model at the same time be very reasonably priced

so that it can be widely deployed. Physical Damage to the car is one of the trigger events. In the likelihood that a vehicle has damaged key areas of the car it will act as a trigger. Our it's simply a push button that gets pressed. It is placed with some protection between the chassis and the frame of the car. If an impact is strong enough to go up to the chassis.. This will also avoid triggering in the event of minor nonlife threatening collisions that happens more often. Since it is only a push button trigger it can be placed in many places of the vehicle so that angular, roof collapse and side-impacts are covered as shown in and shows possible impact switch (red) placements inside the car frame (green). Device contains two Maxim DS18B20 Digital Temperature sensors. A trigger occurs if cabin temperature exceeds 80°C and engine temperature trigger is at 120°C. We know that this is different for different vehicle and regions and therefore can be adjusted accordingly in the programming. Another trigger comes from the Electro Conductivity sensor. It is to be placed on the floor of the car inside the cabin which would send a Logic HIGH to the device if it is covered in water (example: car or motorbike plunged in to the water). We have used Grove Moisture sensor as our electro conductivity sensor. Contains Latitude, Longitude, Speed (in km/h), Altitude and number of Satellites are Available. Temperature for both cabin and engine bay is also recorded in a file to figure out events such as a blown engine that resulted in fire is actually an instant occurrence or did it gradually came to that condition. Lastly we have Acceleration and Tilt data to be recorded on a file at 100Hz, because a speed bump may last only a fraction of a second. Sensor used is a single unit MPU6050, which is a combination of accelerometer and gyroscope. Data saved are Yaw, Pitch, Roll in degrees and Vertical, Horizontal and Lateral G-Forces. This will allow crash investigators find out how the vehicle was being driven and what road surface conditions it was being driven over.

Proposed Design

To build an integrated system for emergency rescue services in the event of road accidents by black box system. The project focuses on building an infrastructure which vehicle safety authorities can enhance the crash reports post-crash analysis, record of the event and reduces the time to arrive at the crash location. This paper proposes a new dimension in order to allow early response and rescue of accident victims; saving lives and properties. Proposed system uses the capability of GPS and GSM along with the android phone to provide a solution which can be used to precisely detect the accident spot and to send the emergency notification to the nearby hospital's ICU and to the victim's relatives Sensors and the switches/other components used in system is distributed throughout the car hence provides more flexibility while mounting into the vehicle. Using the open source android adds another advantage. In this project we are going to use an accident detection unit which will be fitted inside the front and rear bonnet of the car. This accident detection unit consists of PUSH ON SWITCHES. In case of accident, if the car is hit to some other vehicle or an object then PUSH ON SWITCHES senses obstacles and send signal to interrupt pins of Microcontroller. Microcontroller is the central processing unit CPU of our project. Once microcontroller gets signal from push on switches, then it will immediately turn on the buzzer. In the event of an accident it is reported to the police or a hospital by the locals in the area if they have discovered the wreckage or the incident happened on sight. Usually the caller is uncertain of the injuries and according to a research in delay of ambulance to crash location reveals that even with emergency services in place it can take up to 5 minutes or more in the developed countries for an ambulance to arrive. These lives could have been saved if medical facilities are provided at the right time. The exact location of the vehicle is sent to our remote devices (mobile phones) using GSM modem.

Techniques: Vehicle to vehicle communication has been implemented instead of GSM. Panic switch use to control the sending information. The information sent from one vehicle to another network station. The information has been sent to nearby base station or police station or hospital or home. Radiation jammer use to control the incoming calls when driving.

Proposed Implementation

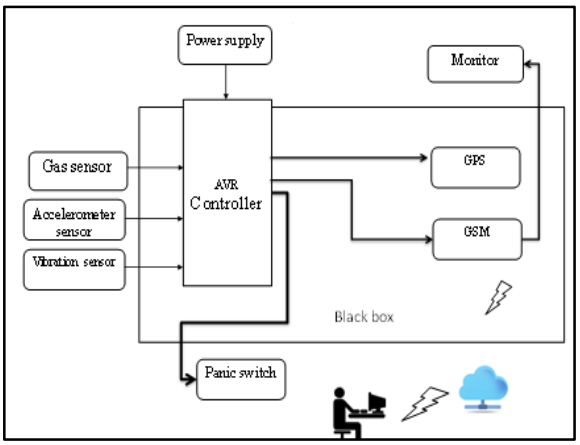

Fig.1. block diagram of block box detection

Working

In this project we are going to use an accident detection unit which will be fitted inside the front and rear bonnet of the car. This accident detection unit consists of PUSH ON SWITCHES. In case of accident, if the car is hit to some other vehicle or an object then PUSH ON SWITCHES senses obstacles and send signal to interrupt pins of microcontroller. Microcontroller is the central processing unit CPU of our project. Once microcontroller gets signal from push on switches, then it will immediately turn on the buzzer. A key will be provided for the driver. If the accident is very normal, or driver has hit the wall in some situations like parking then driver will press the key. This will inform the microcontroller that this is a very normal accident. But if driver is not in situation to press the switch or if the accident is really a major accident then driver will not press the key. Then microcontroller will get the coordinates from the GPS modem then it will send this information to the GSM modem, GSM modem is used to send this information via SMS. SMS will be sent to the family member of the driver, so that they can take immediate action to help the persons suffering due to this accident. Our project Real Time Vehicle Tracking and Accident Detection with GPS is designed to avoid such situations. The proposed system can also be used for traffic estimation and accidents.

Hardware Used

MICROCONTROLLER

We are using AT89S52 controller. When PUSH ON SWITCHES senses the obstacles, they send signal to interrupt pin of microcontroller. It operates on AT commands.

LCD

16x2 LCD is used. LCD displays latitude and longitude values of location.

GPS

GPS satellite transmits data that indicates its location and the current time. GPS continuously sends latitude and longitude values to microcontroller.

GSM

GSM SIM 300 is used. GSM receives co-ordinates from microcontroller and sends message to mobile number store in our system.

Software Used

1. Keil

The keil software is design to solve the complex problems facing embedded

Software developers. Microcontroller operates on hex commands. Keil compiler is very good for converting hex commands into machine language.

Advantages:1. Easy to detect the exact location of the vehicle.2. It provides security to the vehicle in very reasonable cost.3. Intelligent high-tech safety system.4. It saves the precious time required to save the accident victims.

Applications:1. Used in automotive and transport vehicles from lighter vehicles like cars, to heavier automotive like ships and aero planes.2. Security and remote monitoring of vehicles especially during military operations.3. This system is also can be interfaced with Vehicle airbag system such that when the sensors detect the accident, the air bags get opened.4. School transport vehicle accident detection.5. This project can be used for cab or car of companies.

Conclusion & Future Scope

In this project, we have successfully designed vehicle accident detection and tracking system by using GSM and GPS. When accident occurs, it senses by PUSH ON SWITCHES. The coordinates of location of accident obtained by GPS, are sent via GSM network to user defined mobile number. It is the fact that implementation of system will increase cost of vehicle but it is better to have some percent safety rather than having no percent of safety.. The proposed method is verified to be highly beneficial for the automotive industry. The proposed system can also be used for traffic estimation and accidents survey in the country by health department with slight modification.