

Vehicle Position Finding using Vehicular Adhoc Network

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ABSTRACT: In modern days, there is large number of alarming statistic regarding the road accidents death. To address the problem we proposed a device which can be used at the time of emergency while driving a vehicle. The wireless communication concept i.e. zigbee and sensors are embedded by which immediate help can be deliver to user i.e. person who has met with an accident or in an emergency need. By using the Google earth application that will be developed with the help of android application for mobile system; an integrated cell phone GPSGSM system is proposed to track the target vehicle at the same time it can also communicate with nearby vehicles which are passing around the target vehicle. To identify if an accident happens, the remote module has Bluetooth device and accident detecting sensors are mounted on the vehicle. Here Bluetooth acts as medium for activating the GPS position of the cell phone and for communicating with the user mobile. Cell phone will automatically activate its application which will track the current location of the vehicle and then send it to the remote located predefined phone number and track the real time location of vehicle. After data is processed, Google earth application is used to see the current location and status of vehicle.

KEYWORDS: Zigbee, GPS, VANET, Android application

I. INTRODUCTION

As during these modern days, the vehicle communication technology has gained much of popularity in the field of industry. To achieve the safety and security V2P (vehicle to person) communication, V2V (vehicle to vehicle) communication can be used. These are very important things considered in transportation which plays the key role in vehicle driving. The vehicle communication is needed because the ratio of accidents were increased because of human error or having the less concentration on road during driving or applying sudden brake on roads. Last year in Delhi 325 lives were met with an accident. Last year in India during period from January to May 31, 14,000 cases of drunk and driving were reported in cities and 45,158 cases of speed over speeding were report only in capital city of India i.e. in Delhi. At every hour in India according to the survey done by the indianexpress.com, 16 deaths and 58 accidents are reported and met with fatal accidents. Many young lives were lost by not getting the proper help at the correct time. The most important goal of automobile trajectory monitoring systems is that it should be able to accurately detect the vehicle's location and the status of vehicle. These systems are implemented by using several hybrid techniques including wireless communication, geographical positioning and embedded applications.

In India, in recent past there is increasing number of vehicles on the roads which led to an increase in the number of road accidents. Regarding the number of accidents, there have been alarming statistics per day in India. In India in the year 2011 at least 1, 42,000 people died due to road accidents. Bad driving and poor road conditions are the main reason for this. There can be any sequence of action for Positive accident detection. Such as sending accident details via SMS which is defined by the user, making an automated Smartphone message to the emergency services.

II. RELATED WORK DONE

[1] In this paper, they have designed a system such that in any case of emergency situation such as crashing, the bicycle accident location will be send to the nearby hospitals/emergency services with the assistance of GSM. One of the most important safety technologies is called ABS (Anti- Lock Braking System) that is used in high end cars and trucks. In US and Europe ABS has already become a mandatory feature for vehicles. There is an electro-mechanical system that

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helps to reduce wheel skid in automobiles which controls the brake force applied to each wheel that is making it easier to stay in control while riding. The ABS at its heart for its longitudinal braking control and in order to stabilize the vehicle it also senses vehicle dynamics and drivers intention by avoiding rolling, skidding and loss of traction. The fig.1 below shows bike fitted with ABS. To determine the breaking force multiple sensor inputs are used in the active stability system that needs to be applied as per the corresponding requirement. Acceleration is measured by using acceleration position level sensor, by using brake level position sensor front and rear brakes are measured, by using steering wheel position sensor steering angle is measured and then calculates the break force along with driver accelerator input including wheel speed. They have designed E-Bike with Antilock Breaking System and for stability maintenance; all the necessary sensor inputs have been projected with corresponding outcomes considering the rider's comfort. It drastically fulfilled the very basic feature of four wheeler and crash vehicle tracking is done with the help of digital compass by using GSM module.



Fig.1. Bike with ABS Equipped

[2] In this paper based on V2V communications, they investigate the effect of relative speed of vehicles, association time (a.k.a. connection setup time), transmission range and message/data size in short range. Cars are recognized by matching templates which are cropped from taken input data online and by detecting highway scene features and evaluate how they relate with each other. By temporal differencing and by tracking motion parameters cars are also detected that are typical for cars. Given an input of a video sequence which is taken from a moving car, vision system gives an online description of road parameters that means locations and sizes of other vehicles in the form of images. To estimate the positions of the vehicles in the environment this description is then used and also finding their distances from the camera-assisted car. Four main components are there in the vision systems: the car detector, road detector, tracker, and process coordinator. For each potential car the process coordinator creates a tracking process as once the car detector recognizes a potential car in an image, and provides the tracker with information about the size and location of the potential car.

[3] In this paper they have designed Employee Security System in which the computer software is there enabling the company to track the vehicle's location. This system is based on GSM & GPS for tracking the vehicle. This system combines the installation of an electronic device in a vehicle. As shown in fig.2. The car unit is placed inside the car. He/she needs to swap the RFID card when the car picks up the employee. The micro controller matches the RFID card no. of the user with its database records and the employee's id, cab id and the cab position co-ordinates sent to the company unit via GSM module. The GSM Modem received the message through GSM. If employee himself/herself finds any problem, he/she will press the button. Microcontroller detects the action and signal is sent to the GSM which will coordinate with to the company unit and police. Microcontroller will send a signal to the relay which is turning off the car ignition and stop the car.

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Fig.2. Block diagram of security system

This module is made up of: A GSM Modem, a microcontroller device and a GPS receiver, The GPS Receiver retrieves the location information which is in the form of latitude and longitude real-time readings from satellites. The Microcontroller has two main tasks: to extract desired values and to transmit this data to the server using GSM modem by SMS by processing the GPS information.

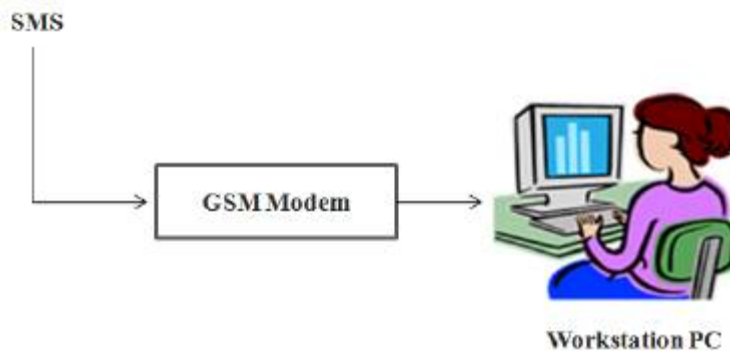


Fig.3.The system architecture

Drawback: Consist of GPS and GSM modules are interfaced with the microcontroller. So this module is bulky.

[4] In this paper, they have used GPS (Global Positioning System) for tracking of the vehicle in the Remote areas. This system consists of two modules. The first Module used is the tracking device which is attached to the moving automobile. This module composes of Microcontroller, a GPS receiver, and a GSM Modem. The GPS Receiver retrieves the location information i.e. latitude and longitude real-time reading from satellites. The Microcontroller has three main tasks: to read some engine parameters from automobile data port (OBD-II) On-Board Diagnostics port, to extract desired values processes the GPS information and transmitting this data to the server using GSM modem in the form of SMS. The second module consists of a GSM modem and workstation PC. The modem receives the SMS that includes workstation PC, GPS coordinates and engine parameters. The numeric parameters are saved as a Microsoft Office Excel file this text is processed using a Visual Basic program. Received reading of the GPS is then further corrected by Kalman filter. The Excel file is converted to KML (Keyhole Markup Language) format to transfer this information to Google Earth. Google Earth interpret KML file and it shows location of automobile and also the engine parameters on the map.

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III. PROPOSED METHODOLOGY

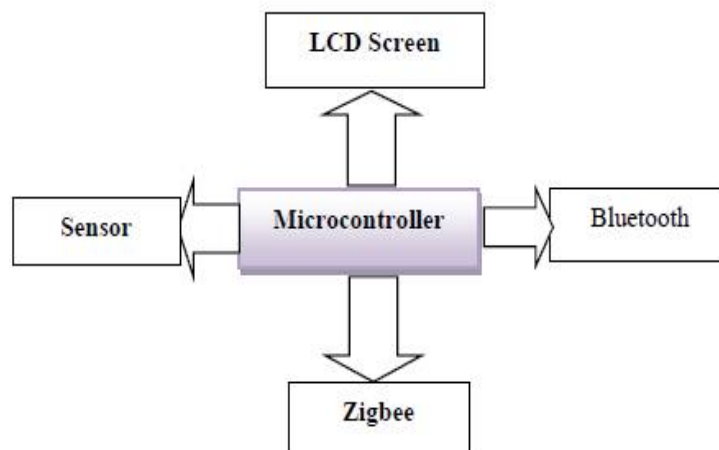


Fig.4: Block diagram

According to the block diagram, it is clear that the sensor will be attached with the microcontroller, which will take the appropriate condition as per the scenario of the vehicle. The LCD is used to update the real time status of the vehicle to the user whereas Zigbee module is used to send or receive the information to or from the vehicle. The use of Bluetooth module is to establish a communication between user mobile to the hardware. So it will show the real time localization of the vehicle on the receiver phone and at the same time communicate with the nearby vehicle sending the user information will display on the lcd of the nearby vehicle which is attach with the module. Proposed system is useful for the safety of the women's while driving and emergency need e.g. accident.

IV. TECHNOLOGY USED

A. ZIGBEE

The standard wireless based technology designed for a specific needs for very low cost is Zigbee. It is also suitable for high level communication protocols. Zigbee is also called as WPAN (wireless personal area network). For the set of small communication network in an area zigbee can be used. Zigbee is based on IEEE 802.15 standard technology. Zigbee is similar as like Bluetooth technology whose area of communication range is up to 20 meters with line of sight communication. It has low power consumption. Zigbee communication range can be increased up to 100 meters with large power consumption. It is reliable to transport and easy to use standard across the world and Zigbee work on 2.4 GHz radio frequency. The network of Zigbee uses mesh network with 128 bit symmetric encryption keys. Zigbee chip include microcontroller radios and that have 60 – 256 kb flash memory. The transfer rate of Zigbee is around 250 kbps which is very well suitable for intermittent data transmission from input devices like sensor. It consists of integrated battery having battery life of at least 2 years with certification.

There are three types of Zigbee are available there in global market , namely:

Zigbee coordinator (ZC): ZC is the root of the network tree and might bridge to other network. ZC sets up sensible parameters for network establishment.

Zigbee router (ZR):- ZR acts as intermediate router which supports in passing the data from one to the other router. Its main purpose is to extend the communication range of network which it gives as acting relays. ZR can also acts as ZED.

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Zigbee end devices (ZED):-ZED needs very less resource to operate and is cheaper than ZR or ZC. It works by knowing about the condition of network as by talking to its parent nodes.

B. GPS

To identify precise location on earth Global positioning system (GPS) is a network of satellites that transmit data, which can be used by calculating the distance taken from twenty four satellites. The position of an object is obtained by four or more satellites line of sight and in order to provide errorless location which moves around the earth twice a day with the help of GPS satellites. GPS are of two type 2D, to provide latitude and longitude in which only three satellites are required and other is 3D in these there are four or more satellites are required to provide altitude also. The GPS module which we are using in the research is EM- 506 which provides superior sensitivity and performance in even urban foliage environment. The GPS module provides the location to GSM which will again transmitted to the user through message. The features of EM-506 follows below:-

- 48 channel receiver
- Extremely sensitivity -163dBm.
- 2.5 meter position accuracy.
- Hot start in 1 second.
- 45.55mA at 4.5 – 6.5 volts.

IV. CONCLUSION

It is clear from the above study that we can create a VANET network using Zigbee Technology, with real time location detection system using GPS Technology. We can also create a user interface design using Android for getting the real time position of the vehicle using Google map. Here the zigbee is used as to create a wireless sensor network for data communication among vehicles.

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