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GPS AND GSM BASED ACCIDENT MONITORING SYSTEM

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ABSTRACT

Nowadays, traffic accidents are one of the leading causes of fatalities. Recently technological and population development, the usage of vehicles are rapidly increasing and also at the same time the occurrence accident is increased. Hence, the value of human life is ignored. Everyone can save their life by expediting the ambulance to the hospital in time but no one can prevent the accident. The objective of this project is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles. The total phenomenon of this scheme is known as 'Intelligence transportation system. In this system, when any accident occurs then the main server sends the exact accident location to the hospital or emergency vehicle. In this paper such a system is described the main application of early accident detection.

KEYWORDS:-*Vibration sensor, GSM module (SIM 900A), GPS receiver (NMEA), Microcontroller (ATMega32PU), LCD and an Alarm.*

I. INTRODUCTION

This paper presents how to reduce the number of accidents which are increasing day by day. Recently technological and population development, the usage of vehicles are rapidly increasing and at the same time the occurrence accident is also increased. Hence, the value of human life is ignored. No one can prevent the accident, but can save their life by expediting the ambulance to the hospital in time. A new vivid scheme called Intelligent Transportation System (ITS) is introduced. The objective of this scheme is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles. The concept of this scheme is to green the traffic signal in the path of ambulance automatically with the help of RF module. So that the ambulance can reach the spot in time and human life can be saved and the accident location is identified sends the accident location immediately to the main server. The main server finds the nearest ambulance to the accident zone and sends the exact accident location to the emergency vehicle. The control unit monitors the ambulance and provides the shortest path to the ambulance at the same time it controls the traffic light according to the ambulance location and thus arriving at the hospital safely. This scheme is fully automated, thus it locates the accident spot accurately, controls the traffic lights, provide the shortest path to reach the location and to the hospital in time. The intelligent traffic light controller that was introduced saves the waiting time and avoids the traffic load. With an embedded sensor network technology, the congestion road is detected and managed accordingly with controllers. Alarm device predict the accident vehicle using the algorithm developed. The acceleration sensors and angle sensors module provide the necessary data to the controller. The area of accident is detected using detection algorithm built in the controller. Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc. The vehicle system is placed inside the vehicle which detects the accident location by means of sending a message. With the help of GPS and GSM module anywhere in the vehicle is traced. GSM modem used to send an exact location of the vehicle.

II. PROPOSED MODEL

Over the last few years, number of researches is conducted on accident monitoring system for human security using GPS and GSM. Our system consists of five main units which coordinates with each other and makes sure that ambulance reaches the hospital without any delay. This system is divided into following units,

- **Vehicle Unit**
- **Ambulance Unit**
- **Traffic Unit**
- **Hospital Unit**
- **Main Server**

In the proposed system, vehicle unit installed in the vehicle that sense the accident. If vehicle met an accident, immediately send the location of the accident to the main server. From the control unit, a message is sent to the nearby ambulance. Control unit finds the shortest route to the accident spot, ambulance, hospital. Also send this path to the ambulance and it transmitted the information to the traffic unit through RF communication. Also, using this information the control unit controls all the nodes in the path of the ambulance and make it ON, which ensures that the ambulance reaches the hospital in time.

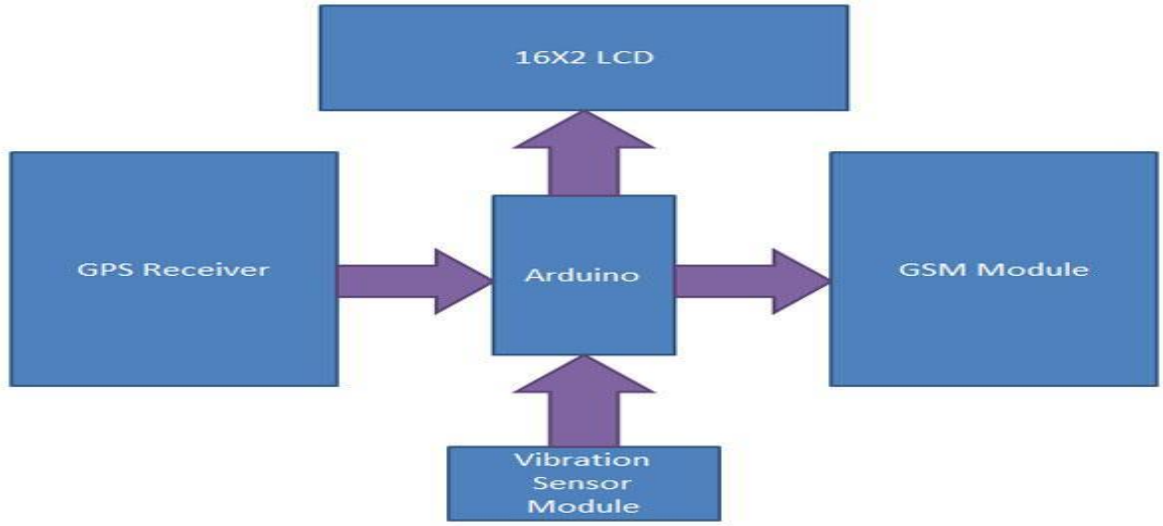

Fig. 1: Block diagram of GPS and GSM based accident monitoring system

The components are following as:-

2.1 GPS receiver:-

Satellite based navigation uses Global Positioning System (GPS) to send and receive the radio signals that serves the user with the required information. GPS is used in laptop, mobile, airplane etc. The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite using the speed of light. The receiver is on the surface of each of these spheres when the distances and the satellites' locations are correct. These distances and satellites' locations are used to compute the location of the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude.

Fig. 2: GPS receiver

2.2 Arduino

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs-light on a sensor, a finger on a button and turn it into an output-activating a motor, turning on an LED. The Arduino takes control and starts collecting the coordinates received from the GPS which are later sent to central emergency monitoring station by using the GSM module. The Arduino Software runs on Windows, Macintosh OSX and Linux operating system. Most microcontroller systems are limited to windows.

Fig. 3: Arduino

2.3 16*2 LCD-

A 16*2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5*7 pixel matrix. This LCD has two registers namely, command and data. The command register stores the command instructions given to the LCD. The data register stores the data to be displayed on the LCD.

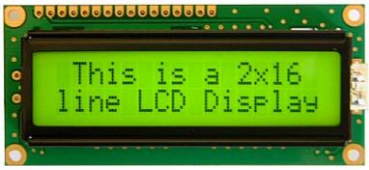

Fig. 4: 16*2 LCD

2.4 Vibration sensor module-

The vibration module based on the vibration sensor SW-420 and comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can be adjusted by on-board potentiometer. When this no vibration, this module output logic LOW the signal indicate LED light and vice versa.

Fig. 5: Vibration sensor module

2.5 GSM module-

A GSM network consists of the following components:

2.5.1- A Mobile Station: It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.

2.5.2- Base Station Subsystem: It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as a interface between the mobile station and mobile switching centre.

2.5.3- Network Subsystem: It provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipments wherein each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

Fig. 6: SIM900 GSM module

III. HOW IT WORKS

The project GPS and GSM based accident monitoring system works with a Microcontroller, GPS receiver, GSM module, vibration sensor. A vibration sensor is placed in front of the project. When any accident occur then vibration sensor sense the accident and give a signal to the microcontroller. As we know that Global Positioning System (GPS) to send and receive the radio signals that serves the user with the required information. So GPS track the location and after track the location, GSM module sends a message to the receiver. The picture shows that how we can track an ambulance.
Microcontroller is the central processing unit CPU of our project. Once microcontroller gets signal from the vibration sensor, then it will immediately turn on buzzer.

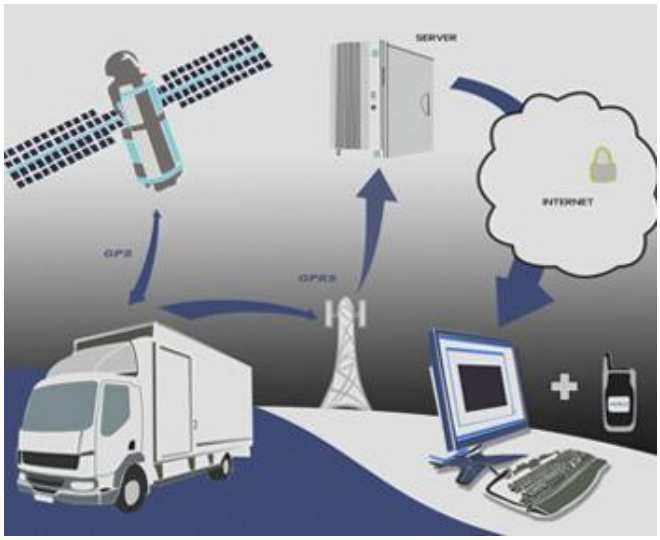

Fig. 7: Tracking an ambulance

IV. COMPARISON WITH OTHER MONITORING SYSTEMS

Our project GPS and GSM based accident monitoring system is very different from other types of monitoring systems. The Other types of monitoring systems do not have a key, but in our project we have a key.

1. Without Key:-

In the previous monitoring systems, there was no key. The drawback of that system is that the message was sent to the receiver end, even if the accident was normal.

2 .With Key:-

In this monitoring system, we have introduced a key in our system which will be pressed within 20 seconds after the normal accident occurs that is not causing any type of harm to the people.

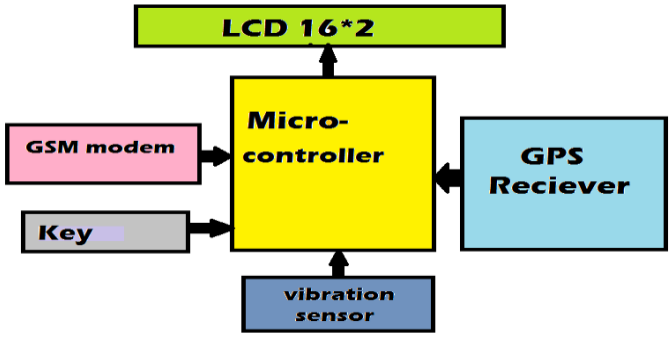

Fig. 8: Block diagram with key

The protius simulation of the system is shown below:-

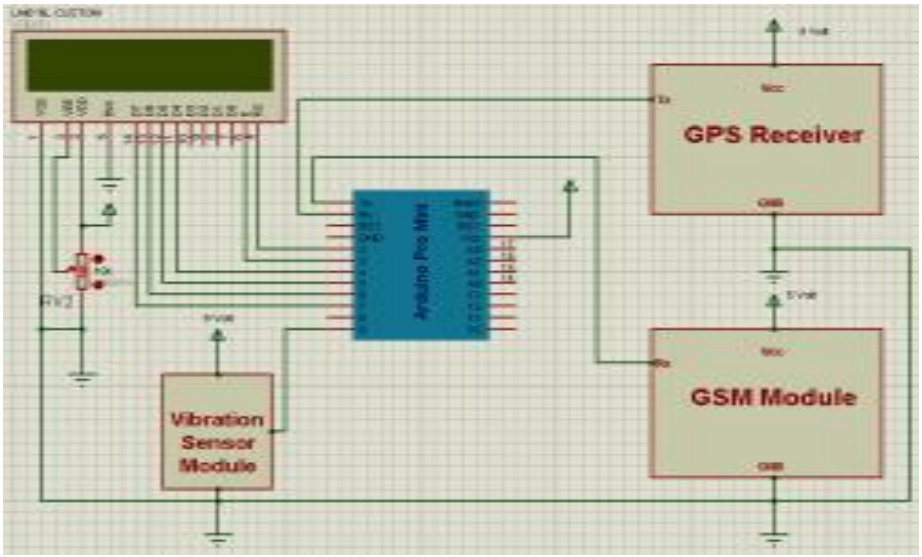

Fig 9: Protius simulation of the system.

V. RESULT

In this system we send a message to the receiver through the GSM module. After the accident, receiver receives the location with the help of a message.

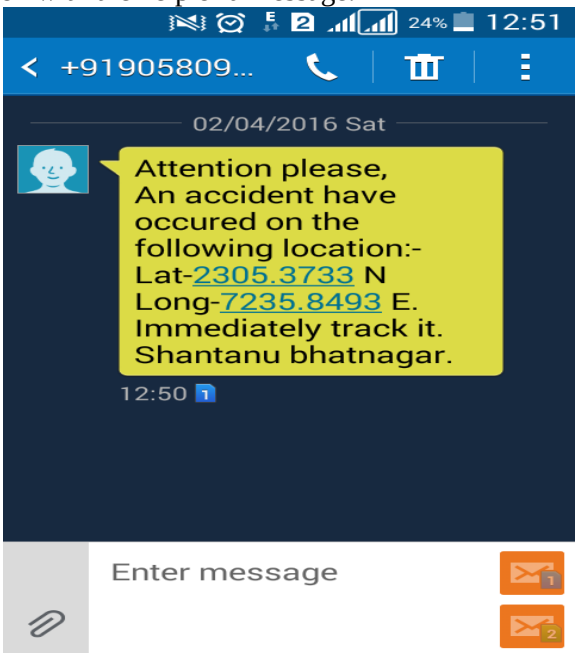

Fig 10: Message after the accident

VI. CONCLUSION

In this paper, a GPS and GSM based accident based accident monitoring system is presented. The integrated accident monitoring system makes the system more secure and reliable. The location from the GPS can be improved so as to get the accurate details. Our designed system has been tested at different locations and found to be effectively working by sending alert message to mobile phone user. In this paper, we proposed an accident monitoring prevention and safe place to live for human life.

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