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ACCIDENT PREDICTOR SYSTEM USING GSM

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ABSTRACT

Speed is one of the basic reasons for vehicle accident. Many lives could have been saved if emergency services could get accident information and reach in time. This project deals with accident detection system when the accident occurs it uses various components and alerts the Rescue team for help. Efficient automatic accident detection with an automatic notification to the emergency service with the accident location is a prime need to save the precious human life**.** The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. The goal of the project is to detect accidents and alert the rescue team in time.

KEYWORDS:- *Bumper Switch,GSMmodule (SIM900A),GPSreceiver(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 accidents 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

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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 thelocationandtothehospitalintime.Theintelligenttrafficlightcontrollerthatwasintroducedsavesthe 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.RESEARCH AND TECHNICAL PAPERS

2.1.1 ACCIDENT DETECTION AND REPORTING SYSTEM USING GPS, GPRS AND GSM TECHNOLOGY (@2012 IEEE):

This paper proposes to utilize the capability of a GPS receiver to monitor the speed of a vehicle and detect an accident basing on the monitored speed and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre.

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At high speeds the distance between starting to brake and a complete stand still is longer. The braking distance is proportional to the square of speed. Therefore, the possibility to avoid a collision becomes smaller. There is a tabular column for predicting the maximum speed after considering the deceleration factors. As such, if the speed is less than these maximum speeds, than it would be assumed that some other deceleration force worked on the vehicle to reduce the speed and an accident has occurred. Speedometer can also be used to find the speed drops in vehicles, but an analogue to digital converter is required to acquire speed from it. So, a GPS is used to track the speed of vehicle every instance. The vehicle speed is calculated at every instance by GPS. If there is decrease in new speed values then it raises an ALARM for accident detection. Then 5 sec will be given to abort the emergency Else the emergency is sent to Alert Service Centre and plot the location of accident by the GSM number received. There after rescuing the individual.

2.1.2 REAL TIME DETECTION AND REPORTING OF VEHICLE COLLISION (@2017 IEEE):

This paper proposes to utilize the capability of Accelerometer and Gyroscope to obtain the data and detect an accident basing on the orientation angle and orientation. Then send the location of the accident from GPS data processed by a micro- Controller by using the GSM network to the nearest hospital provided over the network and alerts their family members too. The accelerometer detects the direction of vehicle collision by bi-directional axis and an axis towards gravitational force with full scale +/-8g. The collision of a vehicle leads to a drastic change in vehicle speed and shows a direct impact on acceleration force along that axis of crash. As the Z-axis is oriented along the gravitational force direction, only X-axis and Y-axis of accelerometer is required to determine the happening and direction of vehicle collision. The gyroscope is used to calculate the tilt of collision vehicle and is given a full range of +/-500 degree/sec. Angle greater above 46 degree and below -46-degree results in rollover of car. Other than the threshold f roll and pitch values, the weight and centre of gravity of vehicle plays an important role in rollover. Once the threshold is reached, the notification system will be activated informing the family and nearby hospital about the occurrence of vehicle rollover. In addition, they use GPS tracker too for recording false assumptions from

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the GPS data acquired. The notification system notifies the information to family emergency contacts and nearest hospital. Notification system is activated once the threshold for detection is reached. Location is identified by GPS.

2.1.3 VEHICLE ACCIDENT DETECTION SYSTEM BY USING GSM, GPS AND SENSORS (@2019, IRJET):

This paper proposes to utilize the capability of a Piezoelectric sensor to detect an accident basing on the voltage produced by collision and send the location and time of the accident from GPS data processed by a micro-Controller by using the GSM network to the Alert Service Centre. The Piezoelectric sensor produces a DC voltage proportional to impacts on collision on vehicle. When the voltage increases above threshold value the sensors get triggered. The Latitude and Longitude are detected using GPS and it is sent as message to rescue team through GSM module. The message is received by another GSM module. Google Map Module: It displays Google map shows you exact location of accident and its details. It gets detail SMS from accident location. Hence there is small variation in coordinates .An OFF switch is also provided at times of need to avoid false message.

III.PROPOSEDMODEL

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.

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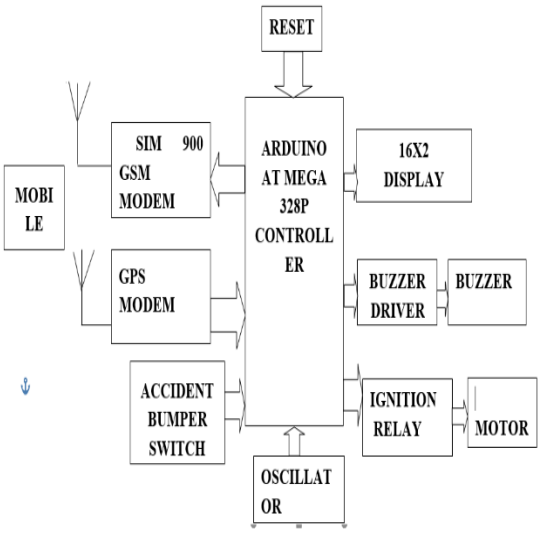

Fig.1: Block diagram of GSM based accident detection

The components are following as:-

3.1. 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:GPSreceiver

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3.2.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.

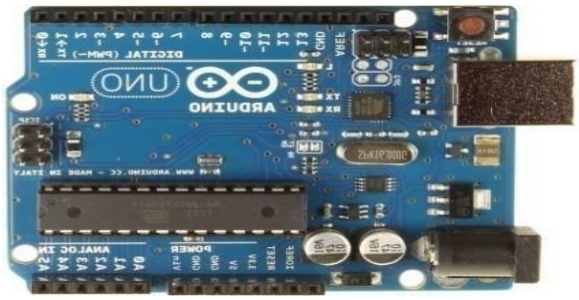


Fig. 3: Arduino

3.316*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*2LCD

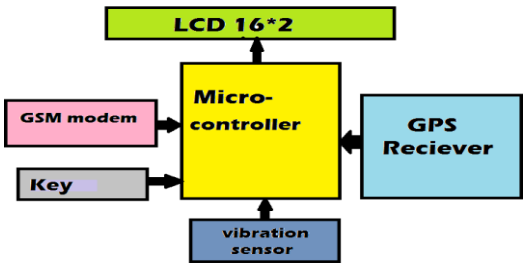
3.4Bumper Switch-

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

3.5. GSMmodule

A GSM network consists of the following



components:

Fig.8: Block diagram with key

3.5.1- 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

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the network.

3.5.2-BaseStationSubsystem:

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 an interface between the mobile station and mobile switching centre.

3.5.3- 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 **Fig.5:** Vibration sensor module 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: SIM900GSMmodule

IV.HOWITWORKS

The project GPS and GSM based accident monitoring system works with a Microcontroller, GPSreceiver,GSMmodule,vibrationsensor. Avibrationsensorisplacedinfrontoftheproje ct.Whenany 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.

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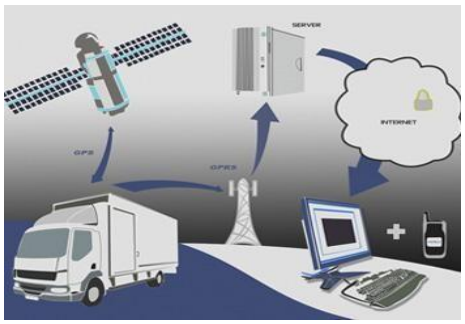

Fig.7: Trackinganambulance

V.COMPARISONWITHOTHERMONITORINGSYSTEMS

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.With out 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 with in 20 seconds after the normal accident occurs that is not causing any type of harm to the people.

The protius simulation of the system is shown below:-

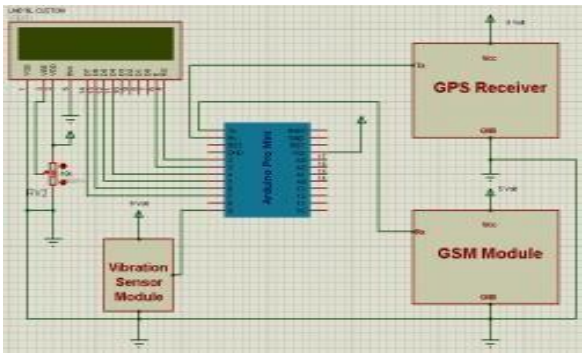

Fig9:Protius simulation of the system.

VI.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. The message should be sent to the corresponding rescue teams as a Google map link sharing the location of the accident.

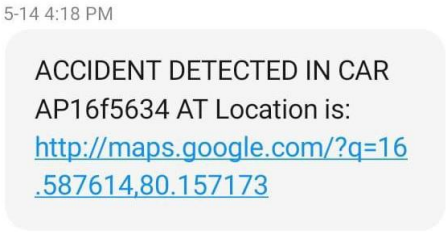

Fig.10: Messageaftertheaccident

Fig 11: Live Location After Accident

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VII.CONCLUSION

A system to detect an event of accident has been developed. The proposed system deals with accident alerting and detection. It reads the exact latitude and longitude of the vehicle involved in the accident and sends this information to nearest emergency service provider. Arduino helps in transferring the message to different devices in the system. Accelerometer monitors the accident happening direction and gyroscope is used to determine rollover of the vehicle. 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.

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