Accident Detection System using Arduino

Prof.Pankaj A Bhoite [1], Koli Gopal[2], Wadile Sagar[3], Tejaswini Sisodiya[4], Patil Satish[5]

[#]*Electrical Engineering, North Maharashtra University,Jalgaon.*

[1]pankajbhoitebpr@gmail.com

Abstract*— With the growing population the use of vehicles has become superfluous and this has led to the accidents increasing at an alarming rate resulting in a large loss of property and human life. This project aims at finding the occurrence of any accident and reporting the location of accident to the previously coded numbers so that immediate help can be provided by ambulance or the relatives concerned. GSM technology is used to intimate the vehicle position in the form of latitude and longitude coordinates through sms. The location spot is retrieved using Global Positioning System which is a navigational system using a network of satellites orbiting the earth. Sensors such as accelerometer, ultrasonic sensor and limit switch to detect signal in case of an accident occurrence and send a signal to the connected microcontroller. The controller in turn operates the relay to blow the airbag and automatically lock the brakes. Meanwhile a message reaches to the necessary help and thus ambulance service and required aid can reach in the shortest time possible. This system can also aid companies in the rental vehicle business to keep a track of the vehicular activity by sending message at regular intervals to the authorized numbers.

***Keywords*— Microcontroller, GSM, GPS, Bluetooth Module, LCD, Ultrasonic Sensor.**

I. INTRODUCTION

In today's world there is a severe increase in the use of vehicles. Such heavy automobile usage has increased traffic and thus resulting in a rise in road accidents. This takes a toll on the property as well as causes human life loss because of unavailability of immediate safety facilities. Complete accident prevention is unavoidable but at least repercussions can be reduced. Proposed system makes an effort to provide the emergency facilities to the victims in the shortest time possible. In big organizations the drivers make illegal use of the vehicles thus resulting in financial, time loss of the organization. Apart from these purposes the system can be used for tracking of stolen vehicles or travelling luggage, fleet management and vehicular sales etc. The system incorporates a single-board embedded system that contains GPS and GSM modems connected with a microcontroller. The entire set-up is installed in the vehicle. A vibration sensor is used. It measures the vibration at the location it is placed. The signal is then compared with the standard values which further confers the accident of the car, unnecessary shock or vibration produced by machines, tilt of the car with respect to the earth's axis can be identified with the level of acceleration. Global Positioning System (GPS) is used to identify the location of the vehicle. GSM is used to inform the exact vehicular location to the pre-coded numbers. Message will give longitude and latitude values. From these values location of accident can be determined. GSM modem provides a two way communication by using a SIM card. Such a module works the same as a regular phone. The project aims at intelligent security system providing situational awareness and agile safety.

II. BLOCK DIAGRAM

Microcontroller (PIC16F877A): A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications.

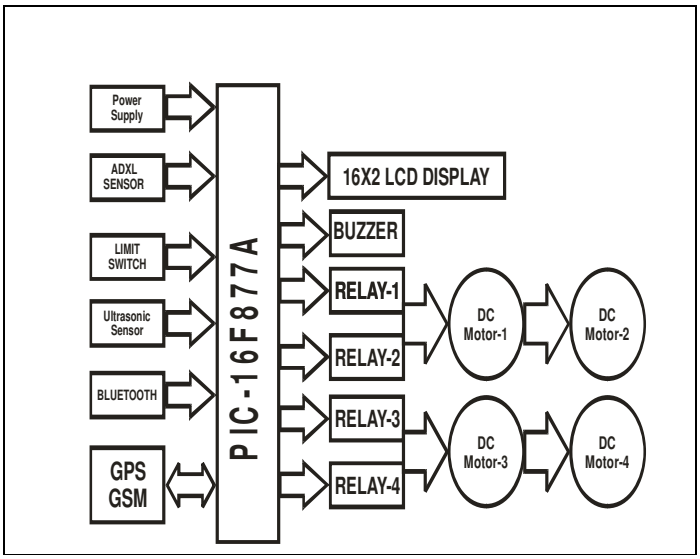

Fig1Block Diagram of ADS

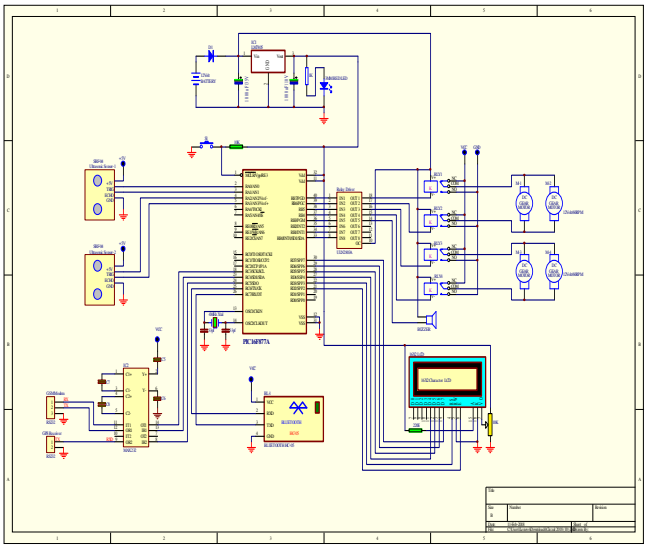

Fig2 Circuit Diagram of ADS

GPS:

Global Positioning System (GPS) satellites broadcast signals from space that GPS receivers, use to provide three-dimensional location (latitude, longitude, and altitude) plus precise time. GPS receivers provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth.

A. *GSM (SIM 900 MODEM):*

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.

B. BLUETOOTH MODULE (HC-05):

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily.

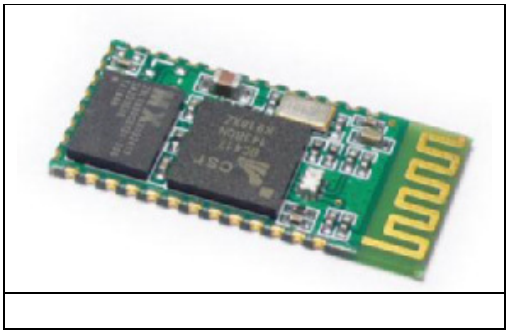

Fig3Blutooth Module

III.WORKING

In this project we are going to use an accident detection unit which will be implemented in the vehicle i.e. on the front and rear bonnet of the car. This accident detection unit consists of PUSH ON SWITCH i.e. a limit switch. In case of accident, if the car is hit to some other vehicle or an object then PUSH ON SWITCH i.e. limit switch 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. 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.

Initially the GPS continuously takes input data from the satellite and stores the latitude and longitude values in microcontroller's buffer. If we have to track the vehicle, we need to send a message to GSM device, by which it gets activated. It also gets activated by detecting accident on the limit switch connected to vehicle. Once GSM gets activated it takes the last received latitude and longitude positions values from the buffer and sends a message to the particular number or laptop which is predefined in the program. Once message has been sent to the predefined device the GSM gets deactivated and GPS gets activated.

IV.RESULTS

Whenever accident of the vehicle occurs, then the device sends a message with the information of accident location and the time to the predefined numbers so that help can be made available. The message sent with the help of the GSM module will appear like this - Message for accident: Accident occurred. Please send help." This system shows the location of vehicle where the accident has occurred with the help of the GPS module connected to it and hence that information is added in the accident alerting message.

Fig

Conclusions

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 per cent safety rather than having no precents 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.

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