A Novel Approach to Accident Detection System using GSM

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Abstract— The increasing population of vehicles which necessitates the requirement of providing safety measures and also made to think about tracking of the vehicles always. It is useful in inventing technologies which supports the new trend walking along with our day to day life. The aim of this proposed system is to detect the road accidents and inform it to the relevant people like police control room or to the known persons of the people in vehicle under accident. Hence an embedded based system is designed to do this process automatically along with the location information obtained from GPS and to initiate call alert through GSM modem.

Keywords: Accident Detection, embedded system, GPS, GSM

I. INTRODUCTION

The requirement of providing safety measures is needed because of the increasing population of vehicles and also tracking of vehicles is most important. Therefore inventing technologies which supports the new trend walking along with our day to day life is essential. So there it lays, with the technical support of many in this system, the implementation for the design of accident detection system has been done. The ever growing expertise is provided to mix up the techniques to furnish the ideas. Therefore, this system also deals with the blend of electronics and its encroachment. The use of micro controller, speech synthesizer and various sensors make it sensible in the scenario of accident detection. Since, this system is meant for the accident detection, the use of Global Positioning System and Global System for Mobile communication makes it sensible.

The major drawback of the existing system is that the alert will be given by Short Messaging Service (Text message) only. This has been overcome by this system; the alert will be given as Voice Call as well as SMS to the nearby Police control/ Emergency service number/ the number which has been fed in the system

II. PROPOSED SYSTEM

A controller 89S52 is chosen, so that the accident occurrence is identified and all the automatic processes are initiated by the micro controller. A speech synthesizer IC, AR 9600 is used in order to transmit prerecorded voices to the police control room. Various sensors as mentioned in block diagram are used to detect the accident scenario.

III. TOOLS USED

A. Hardware Requirements

- WINDOWS XP with min of 1GB RAM and 80GB hard disk,
- Microcontroller 89S52,
- Flash Programmer Kit

B. Software Requirements

ASEM 5113 (Assembly Software),

- WILLAR DOWNLOADER software for burning the hex file,
- MATLAB 7.10 with image processing tool box
- Turbo c software

C. Circuit Diagram

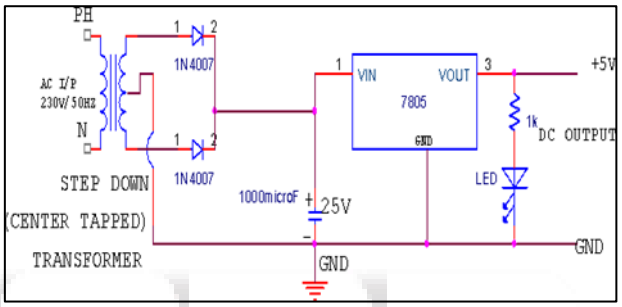


Fig. 3: a) Power supply

IV. CIRCUIT DIAGRAM

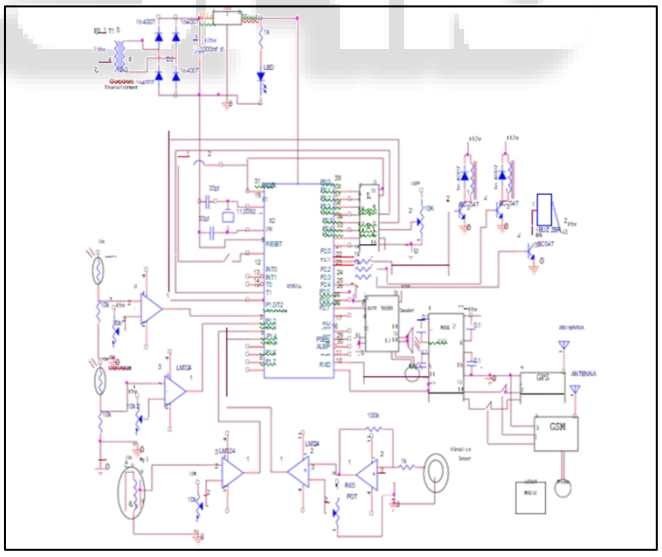
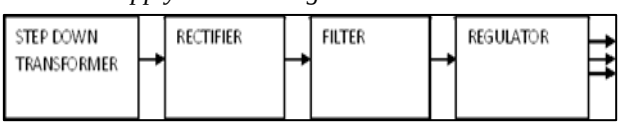


Fig. 4: a) Circuit diagram of the working model

A. Power Supply - Block Diagram



1) Step down transformer

Step down transformer converts a line voltage of 230 V into a voltage of 4.5 volts ac without any change in the frequency. It remains unchanged as 50 Hz. The current capability that it can withstand is about 500 mA. The

voltage will be usually slightly higher than the specified voltage. At load conditions the voltage will be the same as it has been mentioned in the transformer. The value specified in the transformer is just the RMS value of the voltage

2) Rectifier

Rectifier is of two types, as it is known already as center tapped rectifier and bridge rectifier in the case of full rectifier. It is known that we are not going for half wave rectifier because it will give an efficiency of only 40% approximately. Bridge rectifier needs four diodes whereas the center tapped rectifier requires only two diodes. We have used a center tapped transformer.

3) Filter

The rectified components are still Ac in nature because it never stays constant at a particular voltage so it may be told as a varying DC or pulsating DC. So it has to be properly filtered. In other words we can say that the line frequency has to be eliminated from the voltage. In order to get the pure DC we have to employ the capacitor filter. Because it is the cheapest filter available in the market. Even we can go for inductive filter. We are not doing so because it is bulky in nature and also by cost wise it is not compatible with capacitors.

V. DESCRIPTION OF THE SYSTEM WORKING

The vehicle is programmed for three different abnormal conditions,

1) Temperature
2) Fire
3) Vibration and
4) Smoke.

The controller initially senses a '1' or '0' from the input ports of the micro controller. As any one condition becomes abnormal, then it makes the control to activate the GSM for messaging and dialling. Dialling is carried out using ATD command and messaging is activated using AT+CMGS command. Simultaneously, the APR IC is also activated by giving a '0' pulse to it. So when the call is attended by the people, it gives a voice transmission over GSM network. GPS systems use RTCs to correlate position with time dependent parameters such as weather and traffic condition and most importantly, location coordinates.

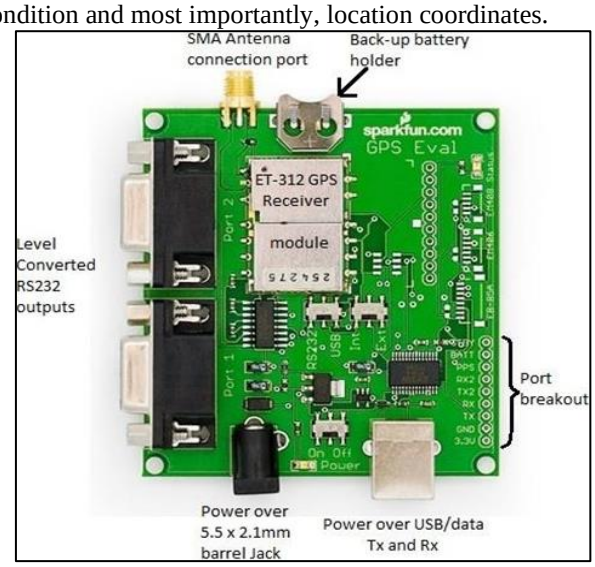


Fig. 5: a) GPS Board

The combination of clock and SRAM in the GPS helps GPS to decide whether the last received coordinates can be used depending on the time difference. In this proposed system, time and position information were extracted from a bundle data output by GGA messages using the microcontroller. The UTC time, latitude and longitude data are stored in the EEPROM and displayed on the LCD.

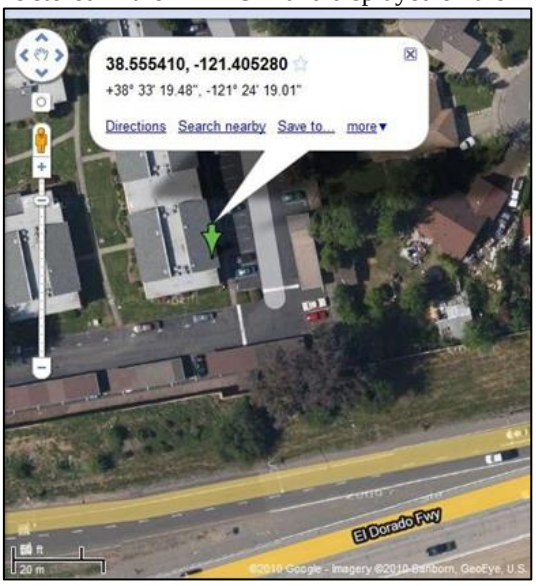


Fig. 5: b) GPS Accuracy Test 1

Motorola C168i has small size and serial communication capability makes it an ideal candidate for use with this system. The specifications of the phone are in fact suitable for a GSM transmitter with sufficient features to send data either as an SMS to a remote GSM module or using the WAP2.0 http connectivity to send it to an e-mail address.

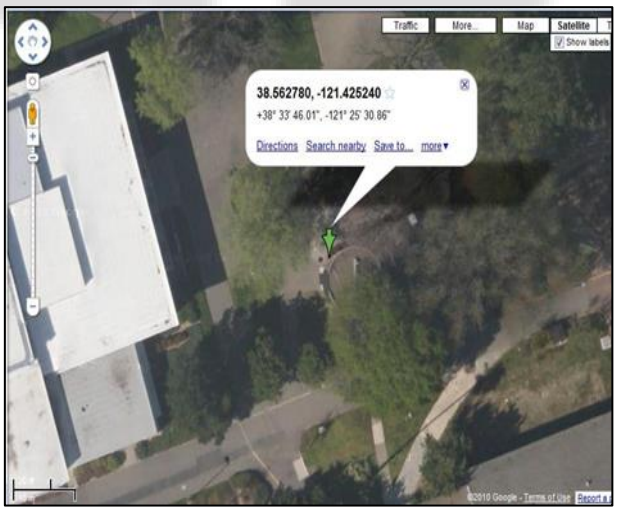


Fig. 5: c) GPS Accuracy Test 2

For our design, since it is user-interactive, the phone's data plan to be chosen depends on how often the user sends the data to the remote receiver which will be considerably less compared to an automated transmitter that sends the data on a periodic basis.

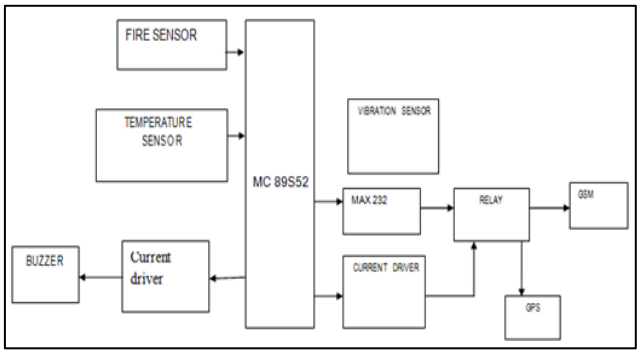


Fig. 5: d: Block diagram of the Controller

SMOKE SENSOR MQ5 is high sensitivity to LPG natural gas, town gas, Small sensitivity to alcohol, smoke, fast response, Stable and long life and Simple drive circuit. They are used in gas leakage detecting equipment in family and industry, are suitable for detecting of LPG natural gas.

A. *Vibration Sensor*

This is an electro- mechanical setup to detect the vibrations more than a force of about 0.1Nm2. . This will be like a spring arrangement consists of LED whose light directly falls on the LDR. Once a vibration occurs, the light deviates and we sense a '1' at micro controller port.

VI. WORKING MODEL

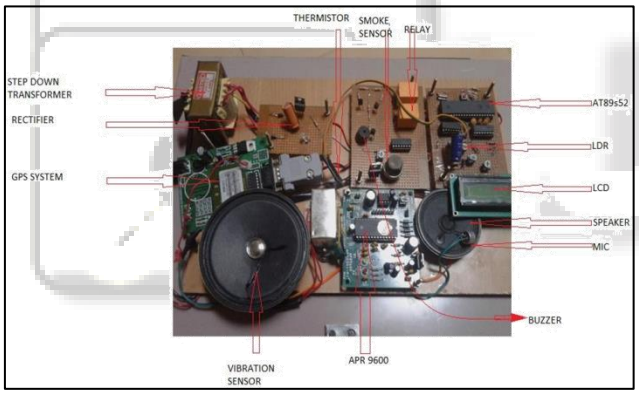


Fig. 6: a) Typical prototype model of the proposed system

A. *Advantages*

- Delay is less in giving the information to the rescue team.
- Fully automatic process. Initial investment in designing this system is moderately low.
- Very flexible language to program the controller.

B. *Applications*

- Can be used by all individuals who take travel very often.
- May be used by train authorities, as well all types of transports.
- May be very useful for lorry drivers who travel to a very distant place for business purposes.

VII. CONCLUSION

Thus the proposed system hardware prototype has been designed to implement the vehicle accident detection on roads or on any platforms. The messages as well as calls are initiated from the micro controller and the performance is evaluated, the results have been obtained consistently.

VIII. FUTURE SCOPE

This system further can developed using DSP processors like TMS320C50 for very faster performance.

This system may even designed in such a way that, this logins to the website of the vehicle manufacturer, to arrange for a stand by vehicle (This has been already implemented in United States by FORD Inc.)

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