Accident Alarm System using GSM, GPS and Accelerometer

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ABSTRACT: The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accident take place frequently which causes huge loss of life and property because of the poor emergency facilities. Our project will provide an optimum solution to this draw back by using GSM, GPS and Accelerometer. In addition to, it also takes the precaution to prevent the accident by using alcohol sensor and Temperature sensor used to detect fire. The system will send the accident location acquired from GPS along with the time. This will help to reach the rescue service in time and save the valuable human life.

KEYWORDS: GSM-GPS system, Accelerometer, Alcohol Sensor, Temperature Sensor and Piezoelectric Sensor.

I. INTRODUCTION

Nowadays accidents occur in all the places but major accidents occur in school zone and college zone because of high speeding of vehicles. The main objective of the system is to provide security for the vehicle user and also detects the accident if occurred and informs the respective authority through wireless technologies. If any accident occurs in highway or any other place, the accident information system will get activated and message will be transmitted to respective authority.

Statistical report says that the accident occur due to the following reasons; drunk driver not using the seat belt properly. This automatic accident detection system will overcome the above mentioned problems in an effective way. According to this system, whenever a person sits in driver seat of the vehicle, the system checks for the following parameters with the driver. The Alcohol sensor, which checks a person has consumed alcohol or not. In case of any accident, the vibration in vibration sensor increases beyond the limit and information is sent to GSM module. The GSM can send message to respective authority. Thus this system ensures the life security.

II. RELATED WORK

Many researchers had made the project related on accident alarm system. This technology includes: GPS, GSM, communication and others. But we use SIM 908 module which is the combination of two devices named GSM and GPS. The Accident alarm system has two parts, first is controlling device which sends the messages and the other is mobile unit which receives the messages. The system processes, interfaces, connections, data transmission and reception of data between the controlling device and mobile unit are working successfully. These results are compatible with SIM 908 technology. The accident alarm system is an electronic device, installed in all types of car, robots and line follower.

This system includes piezoelectric sensor which measures vibration and detects accidents. It also includes accelerometer which measures static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion. Furthermore, this system is also used for detecting the alcoholic drivers with the use of alcohol sensor (MQ3). The temperature sensor is also a part of accident alarm system which detects the fire. This project is

totally based on embedded system. If any of these sensors activated then the message of current location will automatically send to the pre-loaded mobile number.

III. PRESENTATION OF THE MAIN CONTRIBUTION OF THE PAPER

The system has five modules. The first module is SIM 908, the combination of GSM and GPS module in which the GPS receiver retrieves the location information from the satellite in the form of latitude and longitude real-time readings and the GSM sends the location and other information in the form of SMS. The second module is accelerometer which gives the axial information regarding the vehicle position with respect to X, Y and Z axis.

The third module is piezoelectric vibration sensor which helps us to indicate in how much pressure the crash on the vehicle have occurred. The fourth module is alcohol sensor which helps us to indicate wither the driver is drunken or not. The fifth module is temperature sensor which helps us to indicate wither the car have caught the fire or not. So this is the overall review of each important modules used in this project and combindly they are used to achieve the goal of project.

Figure 1: Working of System

A. *BLOCK DIAGRAM:*

The block diagram of Accident Alarm System using GSM, GPS and Accelerometer is shown in the figure 2. It consists of the Power supply section, Microcontroller ATMEGA328, SIM 908, Accelerometer, Piezoelectric vibration sensor, Temperature sensor and Alcohol sensor. The GSM board has a valid SIM card with sufficient recharge amount to send SMS. The circuit is powered by +5V dc.
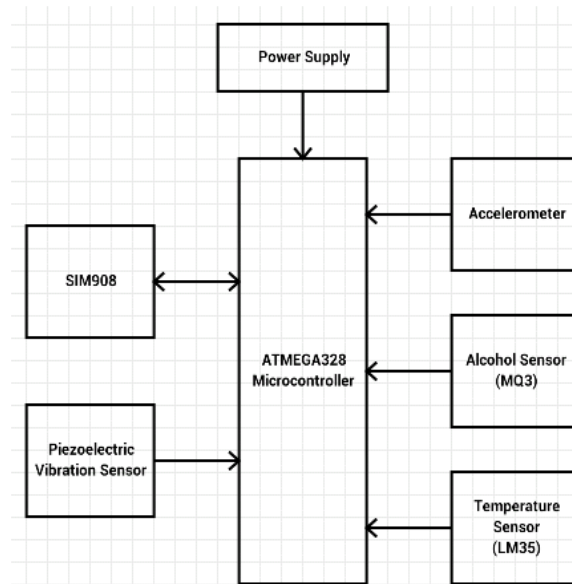
Figure 2: Block diagram of system

IV. PROPOSED METHODOLOGY AND DISCUSSION

A. *POWER SUPPLY UNIT:*

The power supply circuit consists of a transformer connected to a bridge rectifier which is then passed on to the LM 7805 regulator through a filter and then send to the LM 317 regulator.

B. *ATMEGA 328 (Microcontroller):*

The ATMEGA328 is a single chip micro-controller created by Atmel and belongs to the MEGAAVR series. The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable timer with internal oscillator, and five software selectable power saving modes.

C. *SIM 908:*

SIM908 module is a complete Quad-Band GSM/GPRS module which combines GPS technology for satellite navigation. The compact design which integrated GPRS and GPS in a SMT package will significantly save both time and costs for customers to develop GPS enabled applications. Featuring an industry-standard interface and GPS function, it allows variable assets to be tracked seamlessly at any location and anytime with signal coverage.

D. *ACCELEROMETER:*

Accelerometers can be used to measure vehicle acceleration. They allow for evaluation of overall vehicle performance and response. This information can then be used to make adjustments to various vehicle subsystems as needed.

E. *ALCOHOL SENSOR:*

Sensitive material of MQ-3 gas sensor is SnO_2, which with lower conductivity in clean air. When the target alcohol gas exist, the sensor's conductivity is more higher along with the gas concentration rising. Use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration.

F. *TEMPERATURE SENSOR:*

The LM35 series are precision integrated-circuit 2 temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Thus the LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

G. *PIEZOELECTRIC SENSOR:*

A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, strain or force by converting them to an electrical charge. Piezoelectric sensors have proven to be versatile tools for the measurement of various processes.

H. *FLOWCHART OF SYSTEM:*

The given flowchart gives us the basic idea about how our system works. First of the initialization of the system is carried out in which it checks if the system is working properly or not. If the system is not working properly then it will check the 4 different conditions and tries to identity which problem is occurring. Then it tracks position of vehicle through GPS and send SMS through GSM module.
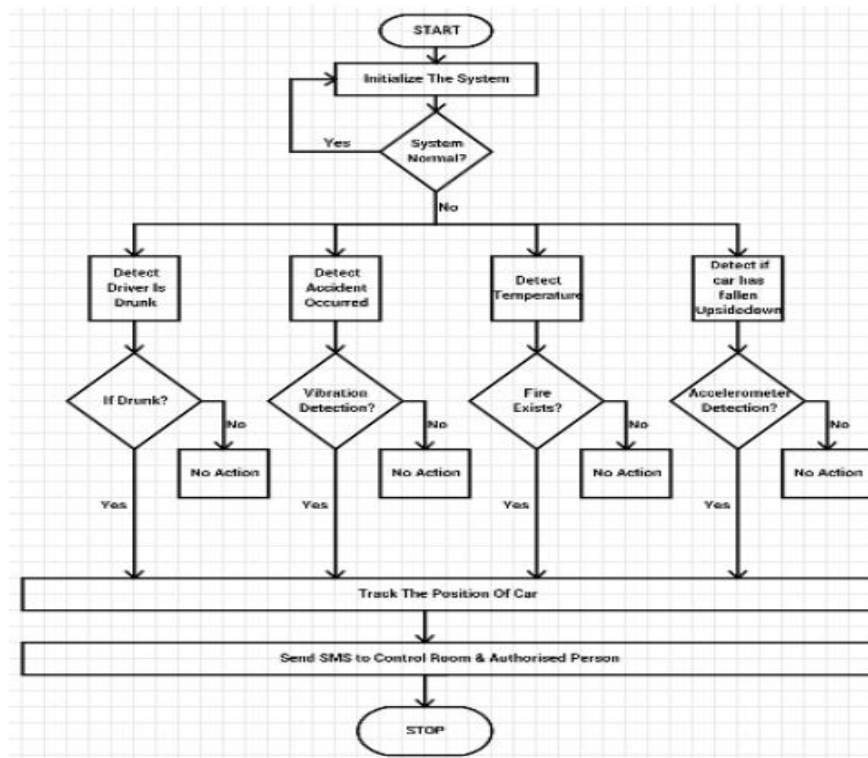
Figure 3: Flowchart of the project

V. SIMULATION RESULTS

Figure 4 shows the prototypic model of the vehicle enabled with SIM 908, Alcohol sensor, Temperature sensor and Vibration sensor. Whenever any accident occurs mean piezoelectric detects the vibration and sends the information to the microcontroller , by using GPS, we will get particular location where the accident occurs, then GSM sends message to authorized members & 108. It indicates if fire has been caught in the vehicle and also indicates if the vehicle have became upside down. It indicates it in similar way by sending SMS. It also indicates if the driver is drunk.
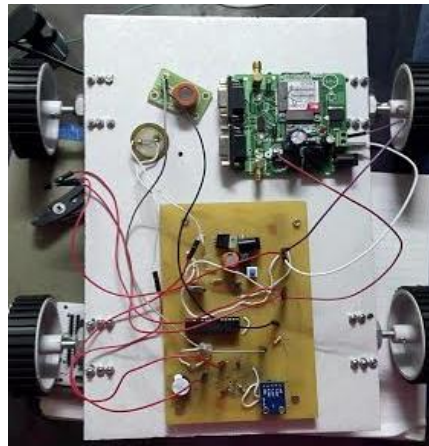
Figure 4: Prototypic model of the vehicle enabled with SIM 908

Figure 5 shows that control room and authorized person can get this type of message due to alcoholic detection and / or fire detection. And from that they can easily get the location of accidental car in terms of latitude and longitude. Figure 6 shows the typical temperature and humidity characteristics. Ordinate means resistance ratio of the sensor (Rs/Ro), Rs means resistance of sensor in 0.4mg/l alcohol under different temp and humidity. Ro means resistance of the sensor in environment of 0.4mg/l alcohol, 20℃/65%RH.
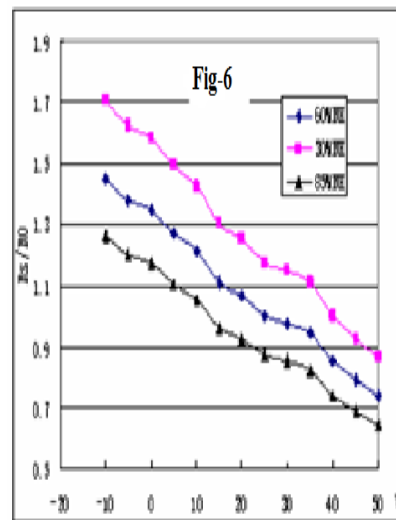

Figure 5: Message sent on mobile   Figure 6: Characteristics of Temp/ Humidity

VI. CONCLUSION AND FUTURE WORK

To minimize the deaths and severe conditions due to accidents the GPS and GSM technologies are used where immediate action would be taken by the ambulance and police service which might reduces the severity. On the whole this system proves to be very cost effective and efficient. The experimentations and results prove that the system is easily implementable in real time. In future, the system can be interfaced with the airbag system of vehicle to prevent occupants from striking to the interior parts of the vehicle such as steering or window. A camera can be interfaced to the controller module that takes the photograph of the accident spot that makes a help for the tracking of the vehicle.

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BIOGRAPHY

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