

Accident Detection for Release Airbag using GSM, GPS and MEMS using Controller

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Abstract –A large number of deaths are caused by Traffic accidents worldwide. In many situations the family members or emergency services are not informed in time. This results in delayed emergency service response time, which can lead to an individual's death or cause severe injury. Main concentration of this project is to find out the vehicle which is met with an accident by using MEMS sensor and GPS, GSM to release Air bag. Vehicle tracking system is one of the hot topics in embedded systems industry. By using this project a vehicle can be tracked anywhere on the globe. In this project Atmel controller communicates with LCD, GPS module and GSM modem. This system will be placed in a moving vehicle. The Atmel controller will poll GPS module in prefixed intervals and sends the vehicle location information (Latitude & Longitude) to central station over GSM network.

Whenever any accident occurs MEMS sensor detects position of vehicle, by using GPS, we will get particular location where accident occurs, and then GSM sends message to authorized members. The purpose of this work is to reduce the response time of emergency services in situations like accidents.

Key Words: Accident Detection, Accelerometer MEMS Sensor, GSM, GPS, Real Time Tracking.

1. INTRODUCTION

Vehicle is the main mode of any type of transportation. There is a need of proper ride as well as security is the main issue today's life's. There is a no any system which alert when accident was happened. There is a need to design system that will help to victim who suffering for accident. This system is design to help to send actual accident location and also send emergency message to people who is specified in emergency contact list of victim. It is possible an automatic vehicle accident detection by using GPS and GSM module design. We are concerned with the method to use GPS technology.

Here main advantage our system is that to provide immediate hospital service, police service and immediate location tracking of where accident occurs. Thus the main need of project our system is in police station, Hospital etc. Also the main need of our system is for the human life safety. System is useful in different area such as traffic, Hospital and Transportation etc. If an accident occur in rural area or populated area, this application is more useful for victims. In world there is increased use of vehicle, such resulting increased traffic as well as rise of road accident. This system provides fast availability of safety. The most likely reason for

an individual's death in an accident is lack of the first aid provision that is because of emergency services not receiving information about accident in time. Emergency response time is extremely vital when it involves incidents involving vehicle accidents. Analysis shows that if we decrease just 1-minute in accident response time that can increase chances of saving an individual's life up to six percent [4]. In order to reduce response time, implementation of enhanced traffic technologies would be necessary, which will help scale back response time and therefore reduce fatalities. The purpose of this research is to design and implement such an automated system that uses smartphone to detect vehicle accidents and report it to the nearest available responders to help counter these emerging problems and reduce casualties as much as possible. The detection system would help reduce fatalities due to vehicle accidents by decreasing the response time of emergency services. The system will also provide other emergency services like Fire Brigade, Police Department and Medical emergency services.

1.2. LITERATURE REVIEW

This literature review explains about relevant past research and project development which is used the almost similar system for this project.

T Kalyani [1], because the usage of vehicles is increasing drastically, the hazards thanks to vehicles is additionally increased. The better cause for accidents is high speed, drunk and drive, distracting minds, over stress and thanks to electronic appliances. This paper approaches with accident detection system that happens thanks to inattention of the one who is driving the vehicle. This introduces accident alerting system which alerts the one who is driving the vehicle. If the person isn't during a position to regulate the vehicle then the accident occurs. Once the accident shows to the vehicle this system will send instruction to registered mobile number.

S. Mutharasu [2], Arduino Based Vehicle Accident Alert System using GPS, GSM and Accelerometer. Accelerometer notices the sudden variation within the axes of car and GSM module send the active message on your itinerant with the situation of the accident. The proposed technology has made our day to day lives easier. Since every coin has two sides similarly technology has its benefits similarly as its disadvantages. The increase in technology has increased the speed of road accidents which causes huge loss of life. The poor emergency facilities available in our country just increase this problem. Our project goes to produce an answer to the present problem.

S. Mohanram [3], now days we are able to track vehicles using many applications which helps in securing personal vehicles, public vehicles, feet units et al. Furthermore there's a rapid increase within the occurrence of the Road accident. This paper is a couple of system which is developed to automatically detect an accident and alert the closest hospitals and medical services about it. This technique also can locate the place of the accident in order that the medical services may be directed immediately towards it. The goal of this paper is to make up a Vehicle accidental monitoring system using MEMS, GPS and GSM Technology. The system involves of accelerometer, MCU, GPS & GSM Module support in sending message. The accelerometer is employed to detect fall and Threshold Algorithm are accustomed detect accident. Short Message will involve GPS [Latitude, Longitude] which helps in locating the vehicles.

2. PROPOSED SYSTEM

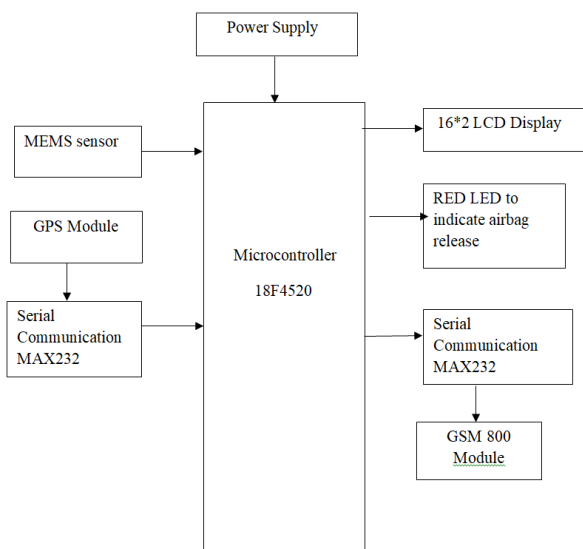


Fig -1: Block Diagram

This projects use PIC microcontroller to install all programs that will give instructions to conduct this system properly and will automatically detect accident by using position of MEMS Sensor. This system takes input from GPS and which goes into rs232. This Rs232 sends data into max232 and it converts the data format and sends it to the Rx (receiver pin) of microcontroller and this microcontroller stores this data in USART buffer and the data stored is sent again through Tx pin into max232 this max 232 sends the data into GSM via rs232. This is how vehicle tracking works using GSM and GPS. The lcd interfaced to the microcontroller also shows the display of the coordinates. This lcd display is only used to know the working condition of the vehicle tracking system

2.1 PIC 18f4520 microcontroller:

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip External
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000



Fig -2: PIC18f4520 Microcontroller

2.2MEMS Accelerometer Sensor:

Most accelerometers are Micro-Electro-Mechanical Sensors (MEMS). The basic principle of operation behind the MEMS accelerometer is the displacement of a small proof mass etched into the silicon surface of the integrated circuit and suspended by small beams. ADXL345 from Analog Devices is a triple-axis accelerometer with digital I2C and SPI interface. We added an on-board 3.3V regulator and logic-level shifting circuitry, making it a perfect choice for interfacing with any 3V or 5V microcontroller such as the pic. The sensor has three axes of measurements, X Y Z, and pins that can be used either as I2C or SPI digital interfacing. . The ADXL345 is the latest and greatest from Analog Devices, known for their exceptional quality MEMS devices. The VCC

takes up to 5V in and regulates it to 3.3V with an output pin.



Fig -3: MEMS Sensor

2.3GPS Module:

Nowadays, GPS technology has become more accurate, smaller, reliable, and economical. A very sensitive and accurate GPS signal acquiring device is required for the system. HI-204III Ultra High Sensitive GPS module is proposed for this project. Why we go for a GPS here is to provide additional information to the rescue about the location where the accident has been occurred. It would be quite useful to them to send rescue team without any delay. The receiver continuously tracks all satellites in view and provides accurate satellite positioning data. Since we had to provide more accurate and faster data so that it could be easy for emergency or rescue team to save a life. However the data will contain geographical details like latitudes and longitudes. Now days google maps provide a very good services for accessing a particular location using latitude and longitude coordinates. So the GPS with its 20 parallel channels and 4000 search bins provide fast satellite signal acquisition and short start up time which is <8 second in hot start and <40 second in cold start. Tracking sensitivity of -159dBm offers good navigation performance even in urban areas having limited sky view.



Fig -4: GPS Module

2.4. GSM module:

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands.



Fig -5: GSM Module

2.5. LCD display:

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

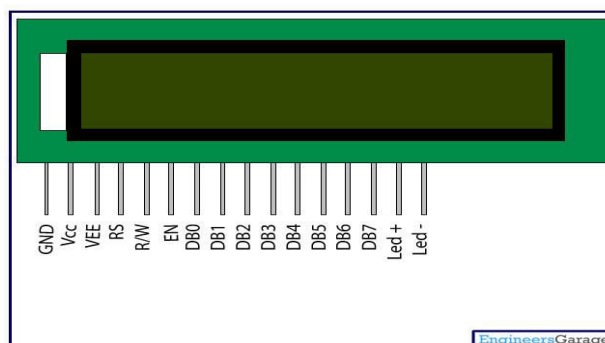


Fig -6: LCD Display

2.6. Buzzer:

A buzzer is also called as beeper, is an audio signal device, which may be mechanical, electromechanical,

or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. If embedded system is misplaced from dashboard, the IR sensor becomes active. The signal is sent to microcontroller to ring the buzzer. It is connected to the pin no.28 of microcontroller. Operating Voltage – 5V



Fig -7: Buzzer

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3. CONCLUSIONS

Main motto of the accident alert system project is to decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living.

ACKNOWLEDGEMENT

We take this opportunity to thank our project guide, Mrs.B.N.Ganthade for his guidance and support throughout the course duration. His efforts to clear our concepts and to help us code the entire algorithm were valuable for the development of this project. His role as a project Guide helped us to meet all our deadlines.

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