Accident Detection and Vehicle Tracking System

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Abstract—Now-a-days, it became very difficult to know that an accident has occurred at any place and to locate the position where it has happened. It’s very difficult for the lives of victims until anyone noticed and informed it to the ambulance or to any hospital and if it occurs in remote areas there will be no hope to survive. To overcome these, GSM and GPS technologies are used. The GPS based vehicle accident identification module contains a GPS modem and vibrating sensor connected to the microcontroller. When an accident occurs [MEMS], the vibration sensor gives the signal to the microcontroller, which sends the information to the LCD display and cell phone through GSM network. The vehicle is tracked for every five minutes using GPS and the position of the vehicle is also send to the mobile in terms of latitude and longitude which is processed by the pc.

Keywords—MEMS, GPS, GSM, Vehicle Accident alert.

I. INTRODUCTION

Due to lack of emergency alert systems, many people unable to get medical services on time, leading to high death rate in accidents, so there is a necessity to develop such system which will inform us regarding the accident of the vehicle so that the medical facilities can be provided at the accident spot without delay so this may save the life of the victim. The main intention of this project is to find the accident spot at any place and inform to the relatives of the victim, police station, ambulance through GPS & GSM networks. The GPS based vehicle accident identification module contains MEMS, GSM module and GPS modem connected to the microcontroller. Global System For Mobile (GSM) technology is used establishes the cellular connection. GPS is used to trace the position of the vehicle in terms of latitude and longitude. This embedded vehicle tracking system is installed in the vehicle itself. It can be installed in front or rear part of the vehicle. Whenever the accident is happened the vibration sensor will sense the vibration and if it is above the threshold value then it sends signal to the GPS module which tracks the position of the vehicle and then to the GSM modem which sends the message to the mobile numbers regarding the position of the vehicle.

II. PROPOSED SYSTEM

In this project we are going to design a system which can monitor the condition of vehicle while travelling and it will inform about the accident to the family members, hospital faculty, police station etc. For this purpose we are going to use GSM (Groupe Special Mobile) for sending message to the respective mobile numbers and GPS (Global Positioning Satellite) for tracking the position of the vehicle.
II. PARTS OF THE SYSTEM

1) The main control module: In this design, we choose an ATmega16 microcontroller which is the production of Atmel. The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega16 provides the following features: 16K bytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 512 bytes EEPROM, 1K byte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, On-chip Debugging support and programming, Internal and External Interrupts, a serial programmable USART.

2) GSM Modem: A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. Its frequency Tri-band GSM/GPRS 900/1800/1900 MHz. It has Plug-in modules for direct interfacing with micro controllers. It can be controlled via at commands. Supply voltage range is 3.4 to 4.5v. Normal operation temperature: -20 °c to +55 °c. It has an embedded powerful TCP/IP.

3) GPS Modem: The Global Positioning System (GPS, a process used to establish a position at any point on the globe). Following two values can be determined anywhere on Earth:
1. One’s exact location (longitude, latitude and height co-ordinates) can be determined.
2. The precise time (Universal Time Coordinated, UTC) accurate to within a range of 60ns to approx. 5ns.

Speed and direction of travel (course) can be derived from these co-ordinates as well as the time and time values are determined by 28 satellites orbiting the Earth. GPS receivers are used for positioning, locating, navigating, surveying and determining the time.

GPS was developed by the U.S. Department of Defense and can be used both by civilians and military personnel.

4) ADXL335 sensor: The MMA7660FC is a ±1.5 g 3-Axis Accelerometer with Digital Output (I2C). It is a very low power, low profile capacitive MEMS sensor featuring a low pass filter; compensation for 0g offset and gain errors, and conversion to 6-bit digital values at user configurable samples per second. The device can be used for sensor data changes, product orientation, and gesture detection through an interrupt pin (INT). The device is housed in a small 3mm x 3mm x 0.9mm DFN package. The sensor has three power modes: Off Mode, Standby Mode, and Active Mode. The Off Mode offers the lowest power consumption, approximately 0.4 μA and can only be reached by powering down the analog supply. When Standby Mode is active the device outputs are turned off providing a significant reduction in operating current. During the Active Mode, continuous measurement on all three axes is enabled.

IV. SYSTEM DESIGN AND ITS OPERATION
Accident detection and vehicle tracking system uses GSM module at vehicle section and mobile at user used for transmission and reception of information using Global service for mobile communication. Our system detects the accident and requests for emergency services with the help of GSM and GPS. Here in this system we are using the controller and modules like GPS, GSM, switches, accident circuit. Whenever vehicle met with an accident when an authorized one is using, accident/collision detector detects it and makes controller to respond by blowing the accident alarm using buzzer in vehicle, if everyone in vehicle is fine then has to stop the emergency alarm using the switch within the specified time to avoid unnecessary emergency calling. If nobody attends the switch within the span, a message is sent to police and emergency service using GSM about the information of vehicle, accident location using GPS so that necessary help can be provided at the spot within specified interval of time.

V. SOFTWARE SPECIFICATION

In this we are using AVR studio for programming microcontroller. In our tracking system we used Google Earth software for tracking and viewing the status of the vehicle [25]. Google Earth currently supports most GPS devices. The engaged GPS Module has NMEA 0183 Protocol for transmitting GPS information to a PC. This protocol consists of several sentences, starting with the character $, with a maximum of 79 characters in length. The NMEA Message to read data with both position and time is: $GPRMC. Therefore, only the $GPRMC information is used to determine the location of the vehicle to reduce SMS text. The status of the vehicle along with $GPRMC information is sent by the GSM modem of type MediaTek MT3329. Consequently, the recipient GSM, also has NMEA 0183 Protocol, receives the transmitted SMS to obtain GPS coordinates and status information of the vehicle.

VI. FLOWCHART

![Flowchart of the system](chart.png)
VII. CONCLUSION

In this paper, a low-cost Accident detection and vehicle tracking system is presented. Hence a modest attempt is made to bring multi feature system for vehicles is successful. The work presented here makes to decrease the death rate in accidents and avoiding unnecessary requests to emergency service centers. This system makes easy to provide security to vehicle and also to track the vehicle location. The whole system can be made more compact and flexible. All the modules and sensing system can be brought under a single chip for the system.

REFERENCES


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