

ABSTRACT

The project is a combination of GPS and GSM systems to form a real time traffic monitoring system. This system utilizes the GPS network to extract the co-ordinates, speed of the vehicle and the time. The base vehicle will be equipped with an accelerometer. Accelerometer is an analog type MEMS sensor. Accelerometer gives analog voltages corresponding to the inclinations in XYZ axes. A micro controller is used to control all the activities of the system. When there is any extra ordinary inclination or collisions an ALARM will be activated at the dash board panel if the alarm is not deactivated manually with in a pre defined period as SMS will be send to a centralized location which will contain the location and time vehicle. Thus this system acts as a real time accident monitoring system. Moreover the system has an added feature i.e a gas sensor which detects the LPG leakage for using it at bullet tankers and thus if any gas leakage occurs it will send an alert SMS and a warning alarm for the driver.

KEYWORDS:GPS, MEMS, GSM

INTRODUCTION

It is very common to know that an accident has occur and is very difficult to trace the position of the vehicle under accident and the number of LPG fitted vehicle is increasing day by day and the accident due to the leakage of this LPG fitted vehicles will cause a large destruction under this circumstances the effect of our project exist. This paper is a combination of two highly specified sensors. The first one is a triple axis accelerometer and the second one is the MQ6 sensor .Since this sensors have some protection features this project has substantial effects in future

Laser printers offer the best all-round solution. These are affordable, fast and good-quality. The printer used must have at least 600 dpi resolutions for all but the simplest PCBs, as you will usually be working in multiples of 0.06cm (tracks per inch). 600 dpi divides into 40, so you get consistent spacing and line width. It is very important that the printer produces a good solid black with no toner pinholes. If you are planning to buy a printer for PCB use, do some test prints on tracing paper to check the quality first. If the printer has a density control, set it to the blackest. Even the best laser printers don't generally cover large areas well, but usually this isn't an a\problem as long as fine tracks are solid.

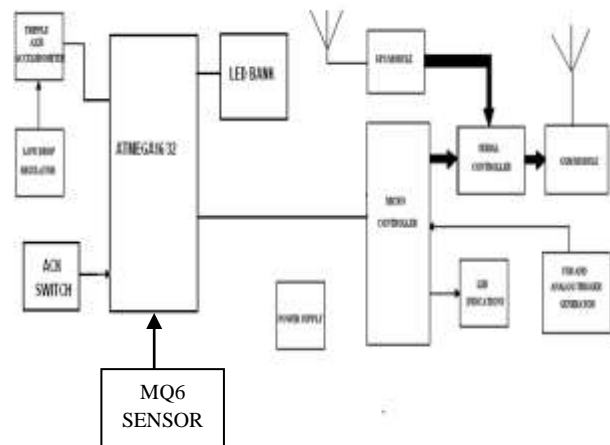


fig.1. block diagram

Block diagram mainly consist of two microcontrollers. One is At mega 16 and other is 8051. The At mega 16 is used to analyze the accident is done or not, i.e., the triple axis accelerometer which is connected to At mega16 will give the information about accident is done or not. i.e, in triple axis accelerometer, there are three axis is present. These sensors are identifying the accident condition by relating forces of sensors w.r.t. ground or earth.

If accidents happen, then the information will go to 8051.8051 is the microcontroller at which the GPS sensor is connected. The signal from At mega 16 receives the 8051 and the position of vehicle is identify using GPS. There are mainly 6 satellites are used for this purpose

A. ATMEGA 16

AVR microcontroller The AVR is a Modified Harvard architecture 8-bit RISC single chip microcontroller. It was developed by Atmel in 1996. Harvard architecture means that the program and data are stored in separate memory spaces which are accessible simultaneously.

Accelerometer is a MEMS family chip that can measure static or dynamic accelerations in terms of 'g'. Here the function of the accelerometer is to convert the tilt in XYZ directions to corresponding voltages.

Accelerometer used here works on 3.3V logic that is the VCC to this chip is 3.3V and the logic high of this chip is 3.3V so in order to interface it to TTL level controllers a regulator is needed to convert 3.3 to 5 and vice versa this is performed by the low drop regulator.

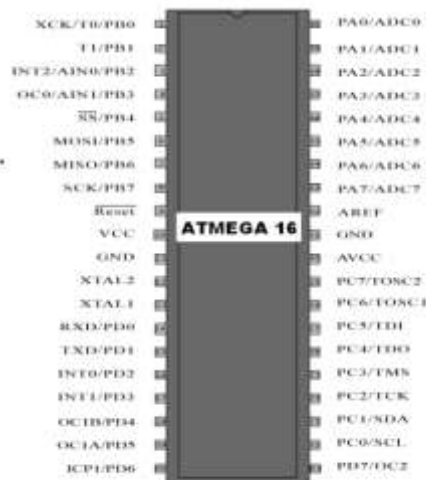


fig.2. 1– 32 Programmable I/O Lines of At mega16

B. DDRAM-Display Data RAM
Display data RAM (DDRAM) stores display data represented in 8-bit character codes. Its extended capacity is 80 X 8 bits, or 80 characters.

Below is a brief list of useful commands which are used frequently while working on the LCD.

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No.	Instruction	Hex	Decimal
1	Function Set: 8-bit, 1 Line, 5x7 Dots	0x30	48
2	Function Set: 8-bit, 2 Line, 5x7 Dots	0x38	56
3	Function Set: 4-bit, 1 Line, 5x7 Dots	0x20	32
4	Function Set: 4-bit, 2 Line, 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off Cursor off (clearing display without clearing DDRAM content)	0x08	8
7	Display on Cursor on	0x0E	14
8	Display on Cursor off	0x0C	12
9	Display on Cursor blinking	0x0F	15
10	Shift entire display left	0x18	24
12	Shift entire display right	0x1C	30
13	Move cursor left by one character	0x10	16
14	Move cursor right by one character	0x14	20
15	Clear Display (also clear DDRAM content)	0x01	1

table 1.Commands used in LCD

SERIAL COMMUNICATION

In simple words serial communication is the exchange of data between two devices serially i.e. through single or two wires.

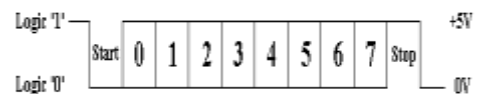


fig.3.RS-232 Waveform

The diagram above shows the expected waveform from the UART when using the common 8N1 format. 8N1 signifies 8 Data bits, No Parity and 1 Stop Bit.

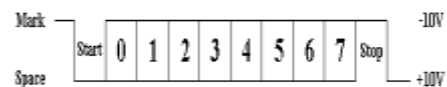


fig.4.TTL/CMOS Serial Logic Waveform

Flag is a status indicator flag for LCD. When we send a command or data to the LCD for processing, this flag is set (i.e BF =1) and as soon as the instruction is executed successfully this flag is cleared (BF = 0). This is helpful in producing and exact amount of delay for the LCD processing. The driver requires a single supply of +5V.

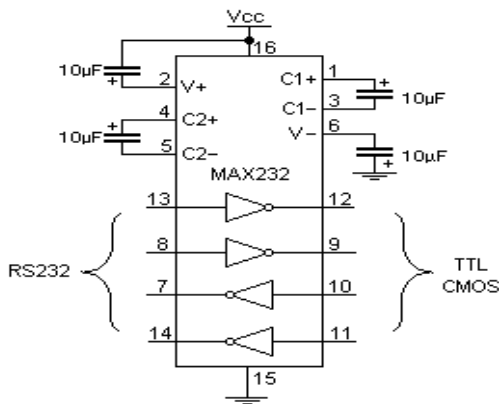


fig.5. RS-232 level converter

Standard serial interfacing of microcontroller (TTL) with PC or any RS232C Standard device , requires TTL to RS232 Level converter . A MAX232 is used for this purpose. It provides 2-channel RS232C port and requires external 10uF capacitors. The driver requires a single supply of +5V.

A. The GSM module

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobilecommunication (GSM) is an architecture used for mobile communication in most of the countries



fig.6. GSM/GPRS Module

B. Wireless MODEMs

Wireless MODEMs are the MODEM devices that generate, transmit or decode data from a cellular network, for establishing communication between the cellular network and the computer. These are manufactured for specific cellular network (GSM/UMTS/CDMA) or specific cellular data standard(GSM/UMTS/GPRS/EDGE/HSDPA) or technology (GPS/SIM).

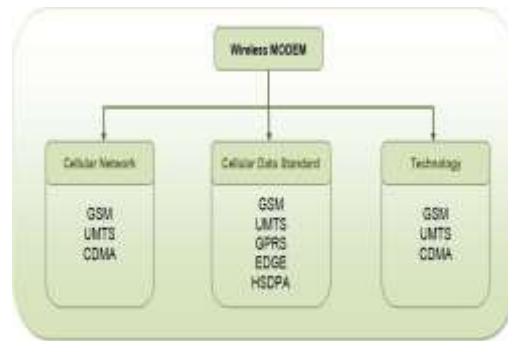


fig.7. Wireless modem

C. GSM/GPRS MODEM

GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network.

The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor.

D. GSM/GPRS Module

A GSM/GPRS module assembles a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microprocessor / microcontroller based system.



fig.8. GSM/GPRS Module

E. Mobile Station (Cell phones and SIM)

A mobile phone and Subscriber Identity Module (SIM) together form a mobile station. It is the user equipment that communicates with the mobile network. A mobile phone comprises of Mobile Termination,

communication through serial port of the computer. The interfacing of the GSM/GPRS module with the serial port of the computer involves following steps:

- 1) Connect RS-232 port of GSM module with the serial port of the computer. Insert a SIM card in the module.
- 2) Open HyperTerminal from Start -> All Programs -> Accessories -> Communications -> HyperTerminal.
- 3) Enter a name for the connection and press OK.
- 4) Now select the communication port (COM) at which GSM module is connected.
- 5) Create a new connection set on HyperTerminal. Set parameters, like baud rate as 9600, handshaking mode as none, parity bit as none, stop bit as 1 and data bit as 8. Now you can send and receive AT commands through the modem with hyperterminal.

A. GPS Receiver

GPS receivers receive almanac data from the satellite and also calculate their position by calculating its distance from then visible satellites and then by using triangulation method to calculate its position.

The data given by the **GPS receiver** includes many information like position (latitude and longitude), altitude, speed, time etc. In its standards, NMEA has specified to send a **series of data in a sentence**. A particular sentence is totally self-reliant and is independent from other sentences. There are standard sentences for particular type of data and for various categories of devices. NMEA has also provided the functionality for individual companies to write their sentences



fig.15. GPS Receiver

All standard devices have a **two letter prefix** that defines the device for which it is being used, for GPS receivers the prefix is **GP**. The two letter prefix is then followed by three letters which represent the content of the sentence. The proprietor sentences allowed by the NMEA always start with P

and are followed by a three letter sequence identifying manufacturer code and additional characters to define sentence type. For example a Garmin sentence would start with PGRM and Sony would begin with PSNY.



fig.16. NMEA Sentence Format

GPS units are made compatible to NMEA standards and are also compatible with serial ports using RS232 protocols. The serial configuration of a GPS receiver is summed as follows.

The circuit is all most all self explanatory. First of all the basic circuit for the working of the micro controller is set up. 31 and 40 are connected to VCC 20 to ground.

Serial communication we are using a Xtal of 11.0592Mhz frequency which when divided with internal pre scalars of 8051 produces exactly 9600 baud rate as the time synchronization is one of the core components of successful serial communication this very much essential.

CONCLUSION

Designed and set up a circuit for extracting GPS information from satellites and displaying them in an LCD display. A circuit to monitor the tilt occurred through an accelerometer is also designed. Detailed study about the software tools such as AVR studio, KEIL, DIPTRACE etc has been carried out. The circuit is enclosed using a proper enclosure and the prototype is tested and observed successful.

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