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"Monitoring Parameters of Vehicle using wireless communication"

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Abstract - *Now a day's any consignment carried by a vehicle has to travel incommunicado till it reaches the destination. So, the fleet owner and the persons sending or receiving the consignment have to wait till the fleet arrives. To track the route of the vehicle and to monitor the various parameters like fuel consumption, location and the temperature of the engine in the vehicle, an intelligent device would come handy to suffice the problem of the fleet operators and the client. The objective of this project is to monitor parameters of a moving vehicle. To fulfill the requirements of such intelligent vehicle monitoring system, this architecture integrates (GPS)Global Position System ,(GSM) Global System for Mobile communications and a Microcontroller in the whole. The system can achieve the function of long distance real time monitoring and to control the vehicle..*

1.INTRODUCTION

Shipping industry developed the Tracking System first because they wanted to determine where each vehicle was at any time. Passive systems were developed in the beginning to fulfill these requirements. For the applications which requires the real time location information of the vehicle, these systems can't be employed because the information is stored in the internal storage and location information can only be accessed when vehicle is available. To achieve Automation of Vehicle Location system that can transmit the location information in real time, Active systems are developed. Real time vehicle tracking system incorporates a hardware device installed in the vehicle (In-Vehicle Unit) along with a remote Tracking server. The information is transmitted to Tracking server using GSM/GPRS modem on GSM network by using services like SMS or using direct TCP/IP connection with Tracking server through GPRS. Tracking server also has GSM/GPRS modem which receives vehicle location information through GSM network and stores this information in database. Also Vehicle tracking systems are popular in consumer vehicles as theft prevention system, monitoring and as a retrieval device. Police can simply follow the signal which is emitted by the tracking system and locate the stolen vehicle. When it is used as a security system, a Vehicle Tracking System can serve as either an addition to or a replacement for a car alarm. Some vehicle tracking systems can make it possible to control vehicle remotely, which includes blocking doors or engine in case of emergency. The existence of vehicle tracking device can be used to reduce the insurance cost, because the risk of losing the vehicle drops significantly.

2. PROPOSED SYSTEM

This project emphasizes on designing an intelligence device, which has two parts the transmitter and the receiver. The transmitter is setup in the vehicle and it consists of a microcontroller to which the GPS and the GSM modem are connected. The analog signals from the transducers, that are used to detect the proposed parameters, are sent to the microcontroller. The microcontroller acquires the position of the vehicle from the GPS and sends it to the receiver and also the analog values, through the GSM modem with the use of SMS. The receiver consists of a computer to which a GSM modem is connected to its serial port. The SMS is received by the GSM modem and then it is sent to the computer, which makes use of a map plotting software to plot the position of the vehicle along with its parameters.

3. TRANSMITTER IN THE VEHICLE

The fuel level transducer, Temperature transducer and the GPS are connected to the microcontroller. The GPS gives the location of the vehicle. All the data collected are sent to the GSM modem, which sends the data as an SMS message to the Receiver.

A. Parameters Monitored and Transmitted

1) Location of the Vehicle.
2) Speed of the Vehicle.
3) Fuel Level of the vehicle.
4) Engine Temperature of the Vehicle.
5) Pollution Content of the vehicle.

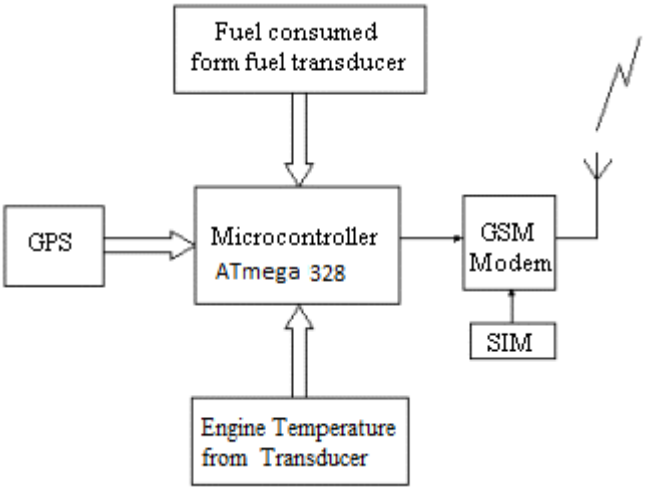


Fig -1: Block Diagram of the Tx end.

B. Use of GSM 900 Module

The GSM modem is a specialized type of modem which accepts a SIM card operates on a subscriber's mobile number over the network, just like cellular phone. It is a cell phone without display. Modem sim900 is a quad band GSM/GPRS engine that works on EGSM850MHz, DCS900MHz, PCS1800MHz and PCS1900MHz frequencies.

- Features of GSM
  1. Supply voltage range 3.4 - 4.5 V
  2. Operation temperature -30° C to +80° C
  3. Interface to external SIM 3V/ 1.8V

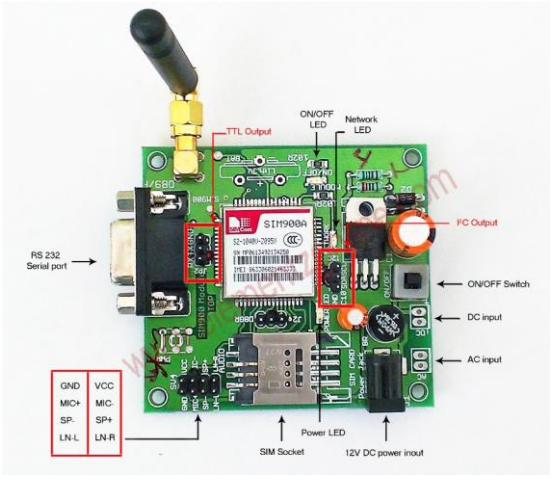


Fig -2: GSM 900 Module

C. Fuel level Management

The fuel level is measured using the flow transducer or level transducers, which is fitted in the fuel tank of the vehicle. The output of the fuel transducer is an analog signal. The analog signal is sent to the microcontroller, which converts it to digital signal. This digital signal is stored and sent and SMS to the headquarters through the GSM modem. We are using capacitive fuel level transducer GB606. In a capacitive fuel level sensing system, the capacitive sensors includes two conducting terminals electrodes and the gap between the two rods is fixed the fuel level can be found by measuring the capacitance between these two conductors immersed into the fuel. Since the capacitance is directly proportional to the dielectric constant that is in between the parallel rods or plates, therefore the fuel rising between the two parallel rods leads to change in the net capacitance value of the measuring tank as a function of fluid height.

D. Engine Temperature Measurement

- The (RTD) Resistance Temperature Detector accurately senses heat with an excellent degree of repeatability and interchange ability of elements. The RTD is composed of certain metallic elements whose change in resistance is a function of temperature. In operation, a small excitation current is through the element and the voltage, which is proportional to resistance, is then measured and it is converted to units of heat calibration .we are using HEL 705 Temperature transducer.
- Features of Temperature transducer
  1. Operating Range – 200°C to +600° C
  2. Accuracy of 0.5 ° C or 0.8% of temperature
  3. Operating Current 2mA Max

E. Getting GPS Data

The GPS module LS20030 computes the positioning and other useful information. It then transmits the data in some standard Format. The GPS antenna present in the GPS module receives the information from the GPS satellite in (NMEA) National Marine Electronics Association format and it reveals the position information. This information got from the GPS antenna needs to be sent to the Base station wherein it is decoded. With differential GPS signal input, the accuracy ranges from 1 to 5m; however, without differential input, the accuracy can be 25m.

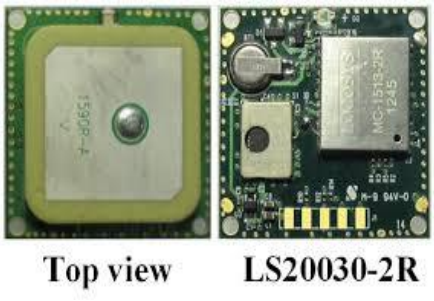


Fig -3: GPS LS20030 Module.

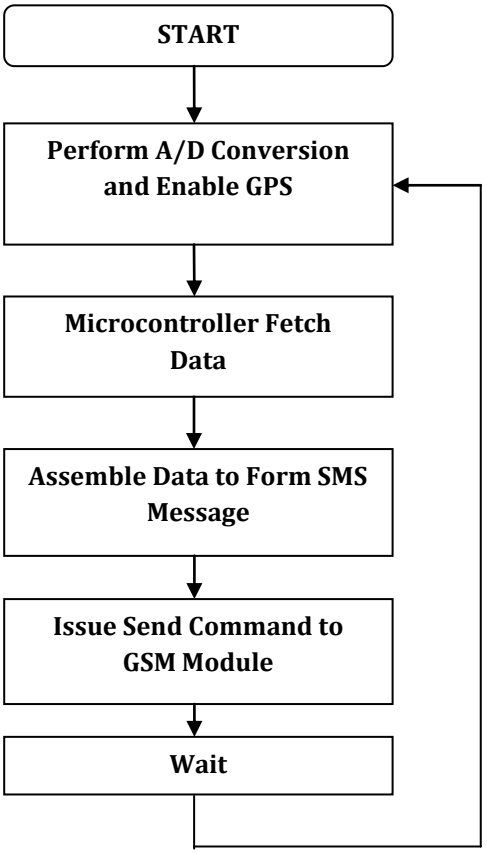
F. Pollution Content Of the Vehicle.

This parameter is intended to provide the user with a cost-efficient means of determining air quality. The sensor focuses on the major five components of the Environmental Protection Agency's Air Quality Index: ozone, particulate matter, carbon monoxide, sulphur dioxide, and nitrous oxide. The device will detect all of these pollutants except sulfur dioxide. The sensors used here are relatively inexpensive and can vary greatly from component to component so they need to be calibrated with known concentrations of the target gasses.

G. Microcontroller ATMEGA 328

ATmega 328 is the microcontroller used for receiving and formatting the data, suitable to be read by the GSM modem. It has a simple instruction set and is cost effective. It has 16KBytes of Flash program memory, 1k/2k bytes of SRAM, and 512 bytes of Data EEPROM, a 10-bit analog to digital converter module (8Channels), 3 timers, a synchronous serial port (SPI and 1^2C), a parallel slave port and interrupt sources. The ATmega 328 is programmed using a serial method. The serial mode will allow the ATmega 328 to be programmed while in the user's system. This allows increased design flexibility. Low Voltage ICSPTM or LVP for short applies to VDD to MCLR and uses the I/O pin RB3 to enter programming mode.

H. Process Flow



3. RECEIVER END

The receiver consists a computer whose serial port is connected to GSM modem. The SMS is received by the GSM modem and then it is sent to the computer, which makes use of a map plotting software to plot the position of the vehicle along with its parameters.

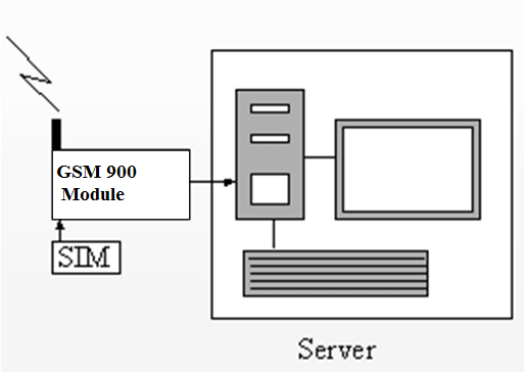


Fig -4: Block Diagram of the Rx end.

4. CONCLUSION

In this paper, a low-cost vehicle tracking as well as monitoring System is presented. The application included a transmitting module which contains a system to combine GPS and GSM devices to retrieve location and vehicle status information and sends it to the other stationary module; the second part is the receiving module which collects the transmitted information by SMS and also processes it to a compatible format to Google Earth to view the location and vehicle status online.

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