_____

Best Surveillance System

Shweta Mahindrakar, Vinita Borole

Lecturer, Electronics & Telecommmunication Department,
Babasaheb Gawde Institute of Technology, Mumbai Central, Mumbai,
(shweta.mahindrakar@mmbgit.org)
(vinitaborole148@ gmail.com)

Abstract:- The GPS module fitted in the bus records the accurate longitudinal and latitudinal location of the bus. As the location of the bus changes it will keep on sending the new latitude and longitude value to the base center. This way each bus will update itself with the main server. Each bus will be identified by its own unique identification number. Now when an person who wants to travel by a particular bus number sends a message to the base center. The base center will reply him giving the current location of the bus by which the person wants to travel.This way the user of the system will know the real time location of the bus and in what time it can reach to the expected destination

Keywords: - GPS, GSM, Tracking System
_____*****_____

I.   INTRODUCTION:

Mumbai has several different bus systems. The largest is the BEST bus system that carries an average of 5 million people per day. People need to wait long time for buses. Sometimes the buses are cancelled or sometimes they getstuck into traffic. A person cannot predict in how much time the next bus will come if the person has just missed the earlier bus. But, now this problem can be solved using the BEST SURVEILLANCE SYSTEM where the system users will come to know what is the current location of the bus. With such facility people can opt for different modes of transport rather than waiting for a bus.
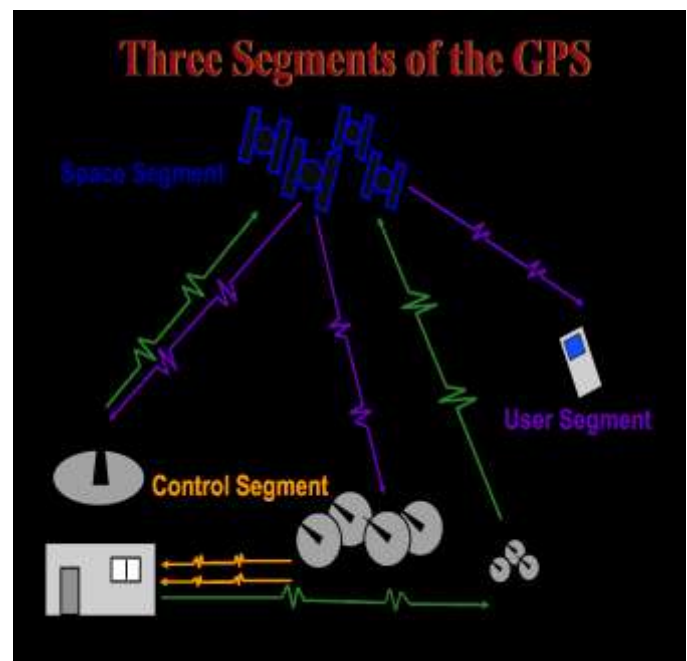
SYSTEM OVERVIEW :

The system will consist of a main base station with inbuilt GSM module and a receiver. Buses will consist of a GPS module and a transmitter. According to the day and time, the basic data will be stored calculated on an average basis in the main server.

The user can message the required bus number, source and destination. The message will be received by the main server. The main server will act as a transmitter and send the message to the bus number required by the user. Through GPS the exact location of the bus will be known which will be transmitted back to the main server. The receiver at base station will receive the information from bus transmitter. Then GSM module will pass on the exact details to the user.

INTRODUCTION TO GPS :

In earlier days mankind used stars to determine position. But over the years technologies have developed & various systems were developed for the purpose of activities like navigation and positioning.

In this way one standard precise format called GPS (Global Positioning System) was developed by U.S. Department of Defense for the purpose of navigation.

GPS uses approximately 24 satellites i.e. manmade stars and their ground stations as a reference point to calculate exact and accurate position.

Finding the exact position is the priority of our project, as GPS system plays the role of main element. In our project we can use the GPS system to find out exact position of bus and same position details can be informed to the user who has asked for it . Depending on these details, the time required for the bus to reach the bus stop can be calculated. Following image indicates the three segments of GPS i.e. space ,user and control segment. With reference to this segments object position can be decided.

Segmentation of GPS

_____

_____

II.   BASICS OF HANDHELD RECEIVERS:

As explained earlier in 'Introduction to GPS',GPS module uses approximately 24 satellites for positioning purpose but for evaluating signals it uses minimum four satellites. In this process it uses time signal for synchronization with UTC(Universal Time Co-ordinated).It helps us to decide standard time format.

In this way GPS evaluated signals are preamplified and transformed to a lower intermidiate frequency which is again convberted into a digital signal by using ADC(ex. 2-bit ADC). Hence by using above different methods i.e. preamplification,transformation of frequencies, ADC ; GPS can determine correct three dimensional position.
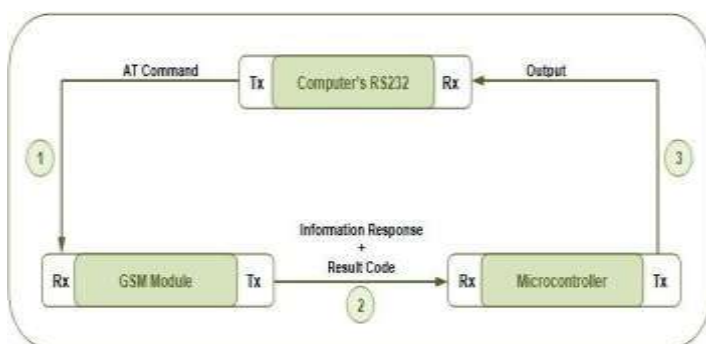
GSM MODULE:

In this surveillance system GSM acts as a specialized modem. It accepts SIM card and functions just like a mobile phone. The modem has serial USB and Bluetooth connection.

The computer can also use this modem for communication purpose if the GSM modem is connected to it. This modem can be also used for mobile internet connectivity, sending/receiving messages etc.

GSM modem acts as an interface that allows various applications such as "NowSMS" to send and receive the messages directly on a mobile phone. To perform this task GSM modem supports an "extended AT command set" as defined in ETSI GSM 07.05 and 3GPP TS 27.005 specification.

WORKING :

In this surveillance system we are interfacing the entire system with the microcontroller (P89V51RD2). As discussed earlier GSM module uses "AT Commands" for communication purpose. A window application called as "Hiper Terminal" is used to send this AT Commands to GSM module. Commands works in following triangular fashion:

Working of the System

In above diagram connection between 3 elements i.e. computer serial port, GSM module and microcontroller is shown.

Transmit pin i.e. Tx pin of the computer serial port is connected to the receive pin i.e. Rx pin of the GSM module.

Tx pin of the module goes to the Rx pin of the microcontroller

and again Tx pin of the microcontroller is connected to receive pin of the computer serial port.

Speed of data transmission in a system is called as "Baud Rate". Here microcontroller receives as well as transmit the signals at the baud rate of 9600.

For receiving the data signals controller can use two methods : i) Polling ii) Serial interrupt

In polling; microcontroller continuously scans serial port for incoming data from GSM module. But in our project we will use serial interrupt method instead of polling ; in which we will be monitoring and controlling flow of data by controller.

RF MODULE (TRANSMITTER & RECEIVER):

RF module frequency lies between 30KHz and 300 GHz. By using this radio frequency (i.e. RF) data signals can travel the longer distance. In this RF system digital data is represented by using modulation technique called as "Amplitude Shift Keying".

For transmission purpose we are using RF module instead of IR module(i.e. Infrared) because RF travels longer distance with less distortion. Secondly IR operates in line of sight mode while RF signal can travel even when there is an obstruction between transmitter and receiver. It uses specific frequency unlike IR signals which gets affected by other IR emitting sources and this makes the transmission more strong and reliable.
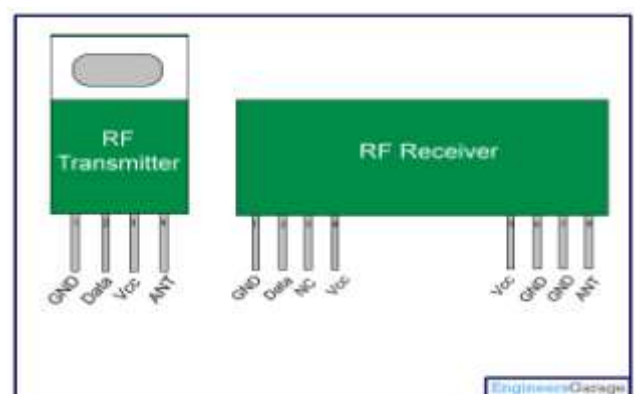
RF Trans-receiver

_____

_____

RF module consist of an RF transmitter and RF receiver. Operating frequency of Tx/Rx pair is 434 MHz. Forth pin of the RF transmitter acts as an antenna. Hence received signal data is transmitted by the RF transmitter through its antenna by using RF frequency. Transmission rate is 1Kbps-10Kbps.

Transmitted data is received by an RF receiver which operates at the same frequncy as that of transmitter.

Along with the RF module we are also using pair of encoder and decoder.

HT12E-HT12D,HT640-HT648 etc. are some commonly used encoder and decoder. Encoder is used for encoding parallel data while received data is decoded by using decoder.

Hence we can maintain the safety and security of the data by using this encoder/decoder.

III.   SOFTWARE IMPLEMENTATION:

The aim of the embedded C code on the transmitter side is to extract the data received by the microcontroller from the GPS to obtain the latitude and longitudinal location of the module.
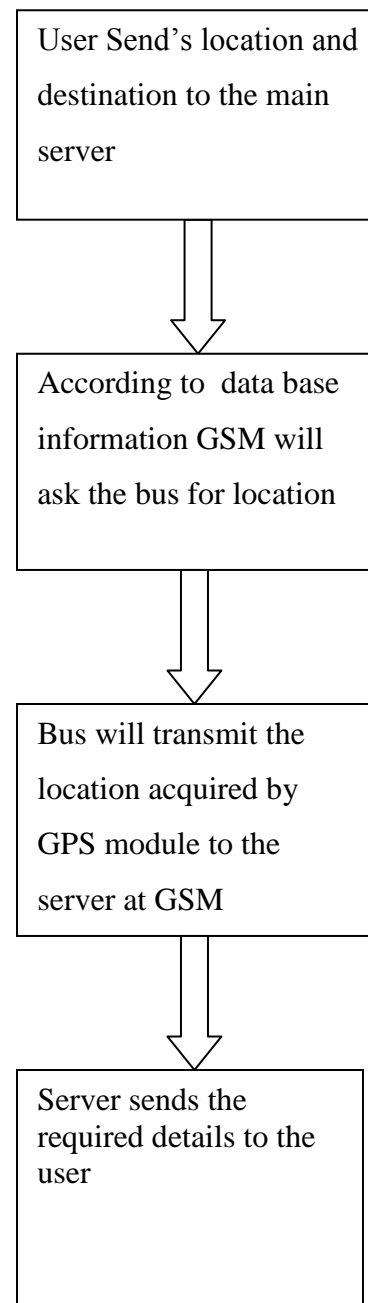
The module also provides the time (GMT) and the date which needs to be read from the module. The information provided by the module is refreshed every 1 second and hence we can get accurate and continuous flow of information. The values of the latitude and the longitude are to be displayed on the LCD continuously.

The GPS which we are using provides 3 strings namely $GPGGA, $GPVTG, $GPRMC, out of which we use the details from the $GPRMC string. The $GPRMC string consists of the time (GMT), date, latitude and the longitude of the current position of the GPS.

Hence we first select the GPRMC string and then write a code such that the latitude and longitude data is extracted and displayed on the LCD.

FLOW CHART:

The exact flow of the system can be represented by the block diagram as follows**:**

User Send's location and destination to the main server

↓

According to data base information GSM will ask the bus for location

↓

Bus will transmit the location acquired by GPS module to the server at GSM

↓

Server sends the required details to the user

IV.   FUTURE APPLICATIONS:

Though we have tried to develop a completely independent and sophisticated system, we belive there is still scope for some modification which may help to enhance features and application of our project.

In our project we are sending the details regarding the bus location and time taken by bus to reach the required destination.But as further development we could add more parameters like sending date and time.We can also interface it with camera or with the google map so that the moving bus can be pointed out on a real map.

_____

_____

V. CONCLUSION:

This project is all about vehicle positining and BEST SURVEILLANCE SYSTEM Using GPS Technology and GSM Technology is a high priority requirement of day to day life. In this paper, we have described the methodologies used for surveillance system. Project required finding the accurate latitude and longitude of the boat and for that GPS module was the best option.

REFERENCES :

1. BOOKS :
> [1] Kenneth J Ayala ―The 8051 Micro-controller: Architecture Programming and Application‖, Pen ram International Publishing India, Second Edition (2003)
> [2] 8051 Microcontroller and Embedded Systems, The (2nd Edition)" by Muhammad Ali Mazidi, Janice Mazidi and Rolin Mckinley.
> [3] GPS Theory and Practice‖ by B.Hofmann-Wellenhof, H. Lichtenegger and J. Collins

2. WEBSITES :

> [4] El-Medany,W.;Al-Omary,A.;Al-Hakim,R.;Al-Irhayim,S.;Nusaif,M.,"A Cost Effective Real-Time Tracking System Prototype Using Integrated GPS/GPRS Module," Wireless and Mobile
> [5] Communications (ICWMC), 2010 6th International Conference on,vol.,no.,pp.521,525,20-25
> [6] Sept.2010
> [7] International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol.3, No.3, June 2013
> [8] GSMWorld.[Online].Retrieved 15/7/2010 available:http://www.gsmworld.com/technology/faq.shtml
> [9] SIM 300 data sheet, SIM 300-HD_V1.06

_____