

# Vehicle Position Locator Without GPS

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## ABSTRACT

**Vehicle Position Tracking System Using Global System for Mobile communication (GSM) that helps to monitor the position of the vehicle. The monitoring part is carried out through the transmitter and the receiver and the position of the vehicle can be observed on the screen of the computer. The hardware has been interfaced to the computer and the position of the vehicle can be monitored on screen by using Visual Basic (VB) software.**

**The project aims to design a Short Message Service (SMS) - GSM based vehicle position tracking system where a SMS will be sent from the tracking centre to the receiver connected in the vehicle. The vehicle will be located in a particular area wherein a transmitter is fixed that continuously transmits the area id. The receiver connected in the vehicle will receive the area id and sends an auto reply message containing the area id and vehicle id to the tracking centre. The tracking centre having received the SMS will display the position of the vehicle on the computer.**

## I. INTRODUCTION

This project is new and authentic concept. Here we are going to develop such a type of tracking device which will use combination of wireless and SMS/GSM technologies.

With this system the user can monitor /search vehicle for its location which will be shown on the PC screen. The project can be divided into two different procedure viz getting own position by RF link and sending this information and own vehicle id to the monitoring PC using SMS/GSM link.

There will be multiple transmitters installed in the city transmitting their own area code which will be received by the vehicle as it comes within the range, the receiver unit in the vehicle will also have a mobile connected to microcontroller which will pass this information to the PC as SMS. This information will be used by the PC to show the position of the vehicle in a graphical manner.

## II. BACKGROUND OVERVIEW

Existing technology for vehicle locating system makes use of global positioning system. In these System satellites are used to track vehicle. There is a transmitter in the vehicle which will transmit signal to the satellite. The satellite receives this signal and calculates the position of

vehicle graphically and retransmits it to the nearest base station.

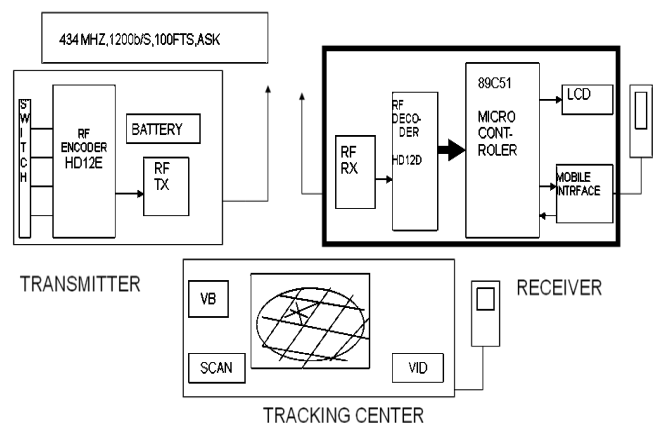
The cost to implement such technology is expensive which includes satellite. So in order to make it cheaper we are making use of SMS/GSM based technology.

This project is basically based on GSM technology; which is very popular in the cellular world. Earlier, for in global positioning a system for the tracking of vehicles, this made the system costlier. For the use of people & other small organization which were willing to have such a system with them for tracking of their vehicles. The overall pricing was so high that only big organization will be able to afford it. But, we have overcome this drawback by using the GSM technology for the vehicle tracking system. The GSM technology is widely used across the globe; it is very cheaper as compared to the satellite. Hence making is affordable for people. In our project, we are using SMS(Short Messaging Service) of GSM which could be very cheaply available in the market at a pricing of around 10p/sms. So, the vast pricing difference between the GPS based & GSM based vehicle tracking system.

## III. THE WORKING FLOW

The above proposed system will be divided into the following major sections...

- Transmitter
- Receiver
- Tracking centre



Tracking centre sends the VID(vehicle ID) as an SMS to the cell phone that is connected with the receiver being fixed in the corresponding vehicle which is currently present in a particular cell.

The cell phone upon receiving the message will pass it to the receiver system which will verify if it is the intended receiver.

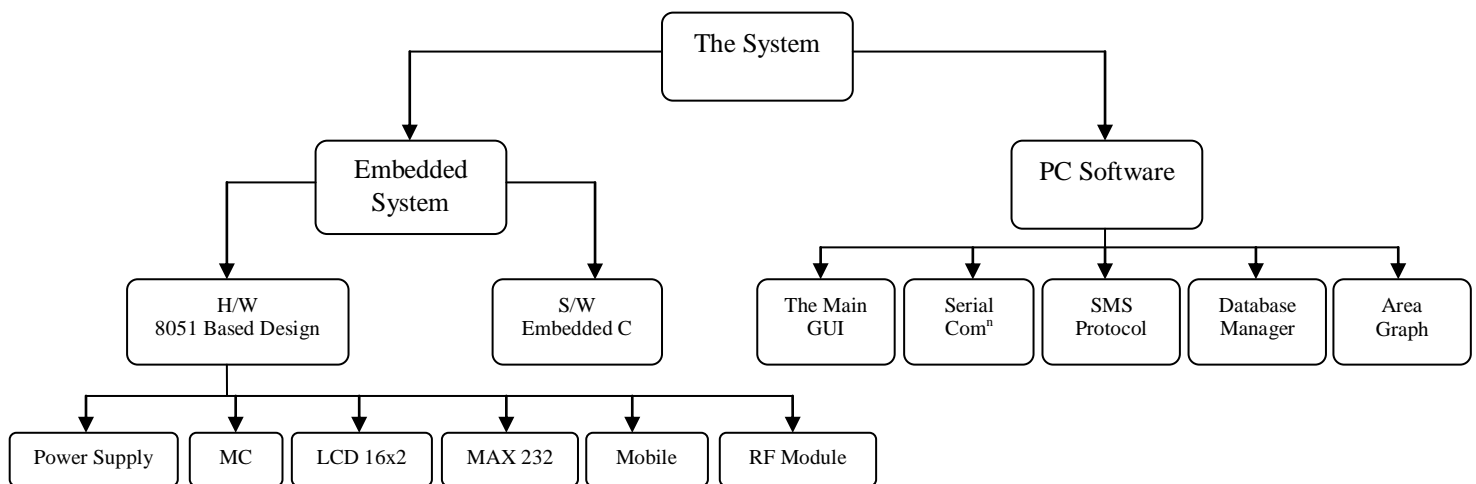
Once verified, the receiver will receive the Area ID being transmitted by the transmitter in that particular cell and prepare a frame that contains the Area ID + Vehicle ID to send as a reply message.

The tracking centre upon receiving the reply message will perform the decoding of message to trace the Area ID out of the frame and a graphical representation of current location of the vehicle is obtained at the tracking centre with the help of a GUI on PC.

#### IV. THE PROPOSED SYSTEM

##### A. System Overview

The above proposed system will be divided into the following sub modules or sections...



##### B. Block Diagram

The Block Diagram of the system is attached behind.

##### C. Explanations of Blocks

The following are the brief explanations of the working principle of the various major blocks or sections used in the system...

- **Power Supply**

This unit will supply the various voltage requirements of each unit. This will be used to generate desired 5V/12V DC from vehicle battery.

- **Microcontroller**

This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. In short we can say that the complete intelligence of the project resides in the software code embedded in the Microcontroller.

The controller here user will be of 8051 family. The code will be written in Embedded C and will be burned or programmed into the code memory using a programmer.

This unit requires +5VDC for it proper operation.

- **LCD 16x2**

It is called Liquid Crystal Display. We are going to use 16x2 character LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface.

This unit requires +5VDC for it proper operation.

- **MAX 232**

This section will be used to convert TTL logic into RS232 logic and vice-versa. In TTL---logic 1 is +5V and logic 0 is 0V. In RS232---logic 1 is -10V and logic 0 is +10V. This unit will provide interface that is required to communicate microcontroller with RS232 based devices using serial communication link. The MAX232 IC is dedicated for the logic conversion. This unit is also called as Logic Converter OR Level Converter.

This unit requires +5VDC for it proper operation.

- **RF Encoder HT12E**

This unit is used to encode the 4-bit data before transmitting it in the communication channel. Basically it generates a serial bit stream of the

parallel input data bits. It then sends data stream to RF transmitter unit.

This unit requires +5V to 12V DC for it proper operation.

- **RF Decoder HT12D**

This unit is used to decode the 4-bit after receiving it from the RF Receiver unit. Basically it generates a parallel data from the serial incoming bit stream. This unit requires +5 to 12VDC for it proper operation.

- **The RF Transmitter**

This unit performs very significant roll i.e. it is responsible for the modulation (ASK, CF-434MHz) of the message or data to be transferred. Once the data is modulated then is transmitted or launched in Air by the help of the antenna. The baud rate is generally 1200bps and the range will be up to 100 ft.

This unit requires +5V to 12V DC for it proper operation.

- **The RF Receiver**

This unit performs very significant roll i.e. it is responsible for the demodulation of the message or data after reception from air. This section is internally constructed with Amplifier unit, Filter unit, Peak Detector, Sample and Hold circuit and Level Shifter.

This unit requires +5VDC for it proper operation.

- **PC Serial Port Controlling**

Serial Port of PC is also referred as RS232 Port. The connector is of type 9 pin D-Type Male connector. Generally we will use only pin-2 (Rx), pin-3 (Tx) and pin-5 (GND) for any type of communication system.

In the software part we can use any one of the following methods...

**Using MSComm Control ActiveX** - The MSComm control provides serial communications for our application by allowing the transmission and reception of data through a serial port. MSComm is used as a serial port software interface. MSComm provides us the software interface and insulates us from the functioning of the underlying hardware.

**Using System.IO.Ports Namespace** – this is part of .net framework. This is an intrinsic way of serial port communication. In this namespace we will use SerialPort Class. This class provides synchronous and event-driven I/O, access to pin and break states, and access to serial driver properties.

- **AT-Commands**

AT commands are instructions used to control a modem. AT is the abbreviation of ATtention. Every command line starts with "AT" or "at". That's why modem commands are called AT commands. GSM/GPRS modems and mobile phones support an AT command set that is specific

to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (Send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages).

- **Database Manager**

A database management system (DBMS) consists of software that operates databases, providing storage, access, security, backup and other facilities. Databases are designed to offer an organized mechanism for storing, managing and retrieving information. They do so through the use of tables.

We can use any one of the following software & technology for database managing...

**MS Access 2007** - Access allows us to manage our information in one database file. It is easy to use. It is portable as can be easily copied & paste to any other system and can run without installing the software.

**MS SQL Server 2000** – it is rather complex at installation part and easy to use. The database developed on it can not be easily copied and paste on another system. Also it requires the software to be installed to use the database files.

#### *D. Technology & Programming Languages*

As microcontrollers are the core of these days digital circuit design in industry, this system uses it for the centralized operation and digital processing. The technology used here is embedded technology which is the future of today's modern electronics.

The followings are the various Programming Languages & Technologies that are going to be used in the proposed system...

*For Embedded System...*

- Embedded Technology,
- 8051 Family Based Controller,
- Embedded C - Keil Compiler,
- Eagle Software for PCB Designing,
- F-Bus Protocol for SMS Communication.

*For PC System...*

- VB.net 2008 Based Application Software,
- Serial Communication Protocol,
- SMS Communication using AT Commands,
- MSAccess2007 Based Database,

#### *E. Project Development Methodology or Steps*

The following will be development steps so as to achieve the working Prototype Model of the above proposed system...

- Defining the Problem,
- Understanding the Need & Usability in industry and society (Market Analysis),
- Developing Block Diagram,
- Designing Circuits of individual blocks,
- Testing circuits in LAB & Finalizing,
- Developing PCB on PC,
- Getting the PCB printed from market,
- Soldering the components,

- Performing various Basic Experiments to test the PCBs,
- Developing Flowchart for the entire process,
- Writing actual Software Program,
- Compilation & Burning,
- Testing and Debugging,
- Developing Flowchart for PC Side Software,
- Developing Data Flow Diagram,
- Writing actual code.
- Finally Running the system and,
- Documentation.

## V. SCOPE & APPLICATIONS

Only the imagination can limit the applications of the above proposed system.

Though the following are some examples...

- The main scope of this project is to track the location of vehicle.
- The future scope of this project is that, this system could be effectively utilized for a vehicle fleet management where the transport company can keep a track of its fleet of vehicles.
- The company is able to know the current location of the vehicle at any instant.
- The average speed of the vehicle could be calculated. Total time required to cover a particular distance.
- After having all the above information with the transport company they can able to improve the efficiency and their overall performance.
- Also the system can be utilized to track the stolen vehicles after finding out the location of the vehicle using this system. It will become easier to trace the vehicle.
- etc,

## VI. CONCLUSION

By the realization of the above proposed system one can learn many aspects of a digital electronics circuit. This will give the complete knowledge of designing microcontroller based system and developing embedded software.

We will also learn the software development strategies and various programming techniques for PC based applications.

By the implementation of this project, we are trying to make an effort to reduce the cost that is incurred while using the GPS systems. The most advantageous feature of this project is that the amount of money which needs to be spent in setting up the system is much less as compared to GPS systems and also it is very easy to setup. Only the user needs to have mobile devices and trans-receiver circuit installed in his vehicle to keep a tab on his vehicle.

## REFERENCES

### A. Embedded Books & Websites

- [1] Myke Predko, *Programming and Customizing the 8051 Microcontroller*, Edition 1999, Tata McGraw-Hill, Page:157-167.
- [2] Muhammad Ali Mazidi, Janice Gillispie Mazidi, *8051 Microcontroller and Embedded Systems*, Prentice-Hall, Page:183-193, 236, 243.
- [3] Dogan Ibrahim, *Microcontroller Projects in C for the 8051*, Newnes, Page:29-161.
- [4] Kenneth J. Ayala, *The 8051 Microcontroller ARCHITECTURE, PROGRAMMING and APPLICATIONS*, WEST PUBLISHING COMPANY, Page:131-197.
- [5] Michael J. Pont, *Embedded C*, Edition 2002, Addison Wesley, Page: 57-87,217.
- [6] [www.beyondlogic.org](http://www.beyondlogic.org)
- [7] [www.discovercircuits.com](http://www.discovercircuits.com)
- [8] [www.electronicsforu.com](http://www.electronicsforu.com)

### B. Electronics Books & Websites

- [1] Ramakant A. Gayakwad, *Op-Amps and Linear Integrated Circuits*, 4<sup>th</sup> Edition, Prentice-Hall, Page:342, 417, 455.
- [2] Robert L. Boylestad, Louis Nashelsky, *Electronic Devices and Circuit Theory*, 10<sup>th</sup> Edition, Prentice-Hall, Page:342, 417, 455.
- [3] R.P.Jain, *Digital Electronics*, Tata McGraw-Hill
- [4] [www.electronic-circuits-diagrams.com](http://www.electronic-circuits-diagrams.com)
- [5] [www.circuitstoday.com](http://www.circuitstoday.com)
- [6] [www.circuitlake.com](http://www.circuitlake.com)

### C. Software Books & Websites

- [1] Gary Cornell & Jonathan Marrison, *Programming VB.Net: A Guide for experienced programmers*, Second Edition 2002, ASPToday Publication, ISBN (pbk): 1-893115-99-2, 424 Pages.
- [2] Dave Grundgeiger, *Programming Visual Basic.Net*, First Edition 2002, O'Reilly Publication, ISBN: 0-596-00093-6, 464 Pages.
- [3] Evangelos Petroustos, Mark Ridgeway, *Mastering Microsoft Visual Basic 2008*, First Edition, Wiley Publishing, ISBN: 978-0-4701-8742-5.
- [4] James R. Groff, Paul N. Weinberg, *SQL: The Complete Reference*, First Edition, Osborne/McGraw-Hill, ISBN 0-07-211845-8.
- [5] Brian W. Kernighan, Dennis M. Ritchie, *The C programming Language*, First Edition 1988, Prentice-Hall, ISBN 0-13-110370-9.

### D. Other Books & Websites

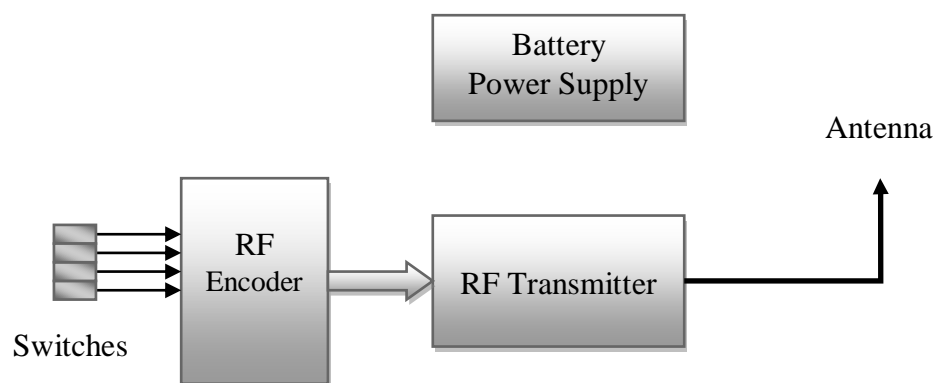
- [1] [www.alldatasheets.com](http://www.alldatasheets.com)
- [2] [www.wikipedia.org](http://www.wikipedia.org)
- [3] [www.keil.com](http://www.keil.com)
- [4] [www.hobbyprojects.com](http://www.hobbyprojects.com)

## THE SYSTEM BLOCK DIAGRAM

### The Monitoring Station



### Transmitter in Various Areas



## Receiver in Vehicle

