GSM BASED VEHICULAR TRACKING SYSTEM

Final Year Project Report

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Declaration

We, hereby declare that this project neither as a whole nor a part there of has been copied out from any source. It is further declared that we have developed this project and the accompanied report entirely on the basis of our personal efforts made under the sincere guidance of our supervisor. No portion of the work presented in this report has been submitted in the support of any other degree or qualification of this or any other University or Institute of learning, if found we shall stand responsible.

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Submitted for the Degree of

Bachelors In Electronics & Telecom Management

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Dedication

We feel grateful to dedicate this project to our loving parents who have had faith in us throughout the completion of the degree and secondly to our hard working teachers and supervisor who have put in great effort along with us in completing this project on time.

Acknowledgement

We would like to pay our dearest regards and homage to our Project Supervisor Mr. Umair Sajid Hashmi whose personality, his supreme intellect and wisdom served as a beacon of hope and light-house to guide us in the darkest hours of project work and without his support and guidance this project would not have been possible. We would also like to thank Bahria University faculty, for the encouragement they have shown throughout.

Abstract

The objective is to develop a GSM based tracking system that would serve the need of the management of registered car companies with such plainness of operation that makes the whole system extremely easy to troubleshoot and provide security. The system permits localization of the automobile and transmits the position and other services to the owner on mobile phone via Short Message Service (SMS). A behavioral history of the vehicle is retrieved on the computer in the form of a database that can be analyzed by the authorized users. The designed system streamlines and eases the process of managing company vehicles.

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CHAPTER #1

PROJECT CONCEPT

1.1 The Main idea

The project name 'GSM Based Vehicle System' was imagined as a potential project to be regarded among a wide range of different project thoughts that were purchased forward during the term of project suggestions in fall 2011. All the project thoughts were properly investigated and were in comparison in perspective of potential for progression, interest platform and professional stability. All project thoughts were mentioned with some of the reliable substandard associates and exceptional senior citizens which provided useful recommend that let led us to last selection of this project as our last year purpose of our bachelor's level.

1.2 Objective

The primary purpose we had in our thoughts was to create GSM monitoring program available to a typical individual. We had in our thoughts to create such GSM centered monitoring program that would offer the need of every day individual with such plainness of function that creates the whole program incredibly simple to problems photograph. The primary objective with the concentrate on individual program it represents as a organization can keep monitor of its authorized automobiles by just setting up GSM device in the car interfaced with microcontroller and getting an SMS on the authorized mobile and getting achieves on a computer regarding the vehicle's location, it's speed

1.3 Designed Viewers and Examining Suggestions

We have designed this system review by supposing a few necessary factors. We estimated to arrive at out to individuals who have actual attention of the monitoring website and GSM as whole. We would like to recommend the fascinated individuals to have a careful qualifications of GSM and monitoring programs before examining any further. We would also like post that audience must also have a audio

understanding of development requirements of C++ and AT orders as it is crucial to hold the actual heart of our venture.

1.4 System Description

The Vehicle Tracking System (VTS) is a total security protection and fleet management solution that uses the latest GSM & GPS technology. This tracking project composes GSM Modems, a GPS receiver and Microcontrollers. This given application costs less for vehicle positioning and status and is effective in case of car robbery situations, for monitoring the cars by the owners of rent car companies. One of the best features of this design is its easiness with which it can be used. From anywhere the car company can get the desired information about the particular vehicle by logging in the information required.

1.5 Software/Tools Used

(i) 80C52 Microcontrollers

(ii) SIM900B GSM modules with evaluation kits

(iii) Keil Microvision for coding in C language

(iv) Proteus for hardware simulation

1.6 Challenges Faced During Project Work

As we moved further with our work, we faced quite a lot of problems from task to task. It is mandatory to mention here that we were given constant attention and support from our respected supervisor, without the encouragement it wouldn't have been possible to move ahead. The first problem we faced was the availability of the GSM kit, secondly was developing separate code for each activity in the project. That took us quite a long time. The last hurdle faced was the interference of the GSM Modem with the microcontrollers. All the problems were solved with patience's and we were able to complete the hardware on time.

1.7 Over view of the System Diagram

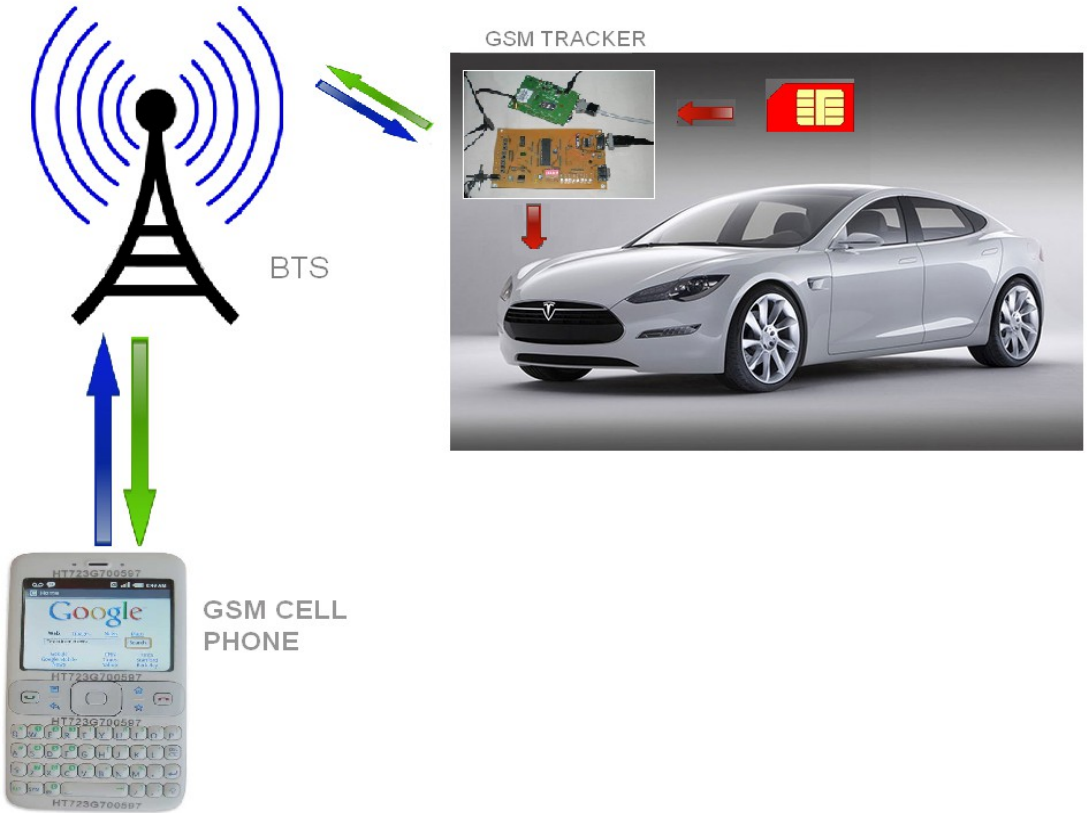


Fig. 1.1

The Vehicle Tracking System (VTS) is a complete protection security control remedy. By using the newest GSM & GPS technological innovation to secure and observe that particular automobile essentially anywhere and then we identify it within a few measures and also get notifies after durations about the posted rate restrict and place. This monitoring system is consisting of a GPS device, Microcontroller and a GSM Hub. GPS Receiver gets the place information from satellite by using permission and longitude. The Microcontroller processes this information and this processed information is sent to the user/owner using GSM modem.

1.8 Opportunity of Project

The basic aim of the designed system is to style a monitoring system which can monitor a automobile to a very great reliability with less cost. Further advancements in this venture can outcome in very great precise results that is why GSM automobile monitoring is currently one of the most well-known programs of the monitoring website across the planet. Telecommunications providers around the world are experiencing time synchronization from GSM alerts.

The programs, we are concentrating on is the GSM automobile monitoring. Some information about GSM automobile monitoring are detailed below:

- Primary program of GSM monitoring is that it performs where GPS indication are damage out and cannot find automobile effectively e.g. extremely heavy atmosphere, booming atmosphere and impure air etc. GSM alerts are produced by BTS which is fixed onto floor with some elevation but GPS alerts are produced by satellite so they reduce out on the above locations described.

- Another program of the GSM monitoring is to find the vehicle. Cash protection automobiles, fleets and other automobiles will have the GSM devices fixed inside them and an security that would instantly set off in situation of any difference by the vehicle from the formal path. In the same way for the robbery avoidance, anti-theft program along with GSM devices fixed on the vehicle that would allow an gadgets vehicle immobilizer to be triggered in situation of the robbery indication from the protection center.

CHAPTER # 2

LITERATURE REVIEW

2.1 (GSM) GLOBAL SYSTEM FOR MOBILE COMMUNICATION

2.1.1 Definitions

Global System for Mobile Communication is an open, digital cellular technology used for sending mobile speech and information solutions. GSM can handle speech phone calls and information rates of speed of up to 9.6 Kbit/s, together with the indication of SMS (Short Concept Service).

International System for Mobile Interaction is a digital cellular technique which is used for submitting mobile conversation and details alternatives. GSM can handle conversation phone calls and details rates of up to 9.6 Kbit/s, together with the sign of SMS.

GSM features in the 900MHz and 1.8GHz organizations in Europe and the 1.9GHz and 850MHz organizations in the US. The 850MHz group is also used for GSM and 3G in Modern Australia, United States and many southeast part of area United states nations. By having mixed range across most of the earth, GSM's globally walking around performance allows clients to convenience the same alternatives when viewing offshore as at home. This gives clients straightforward and similar numbers relationship in more than 218 countries.

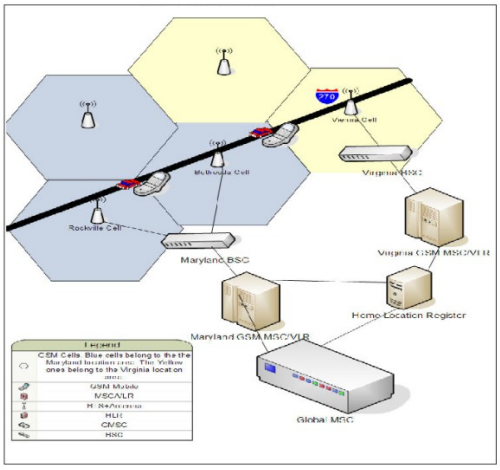
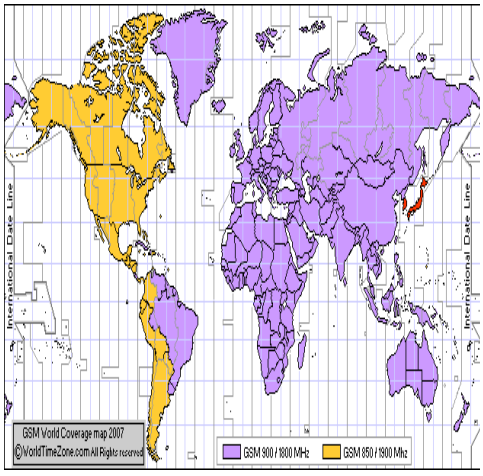


Fig. 2.1.1 (a)



(b)

2.1.2 GSM Services

GSM is becoming very popular way to communication information throughout the world. It is also offers entertainment services to its users worldwide. Around 80% of the world's population is using the networks of mobile.

2.2 GLOBAL POSITIONING SYSTEM (GPS)

2.2.1 Description

The International Ranking Program (GPS) is a globally, satellite-based, r / c stations routing system that gives the actual place of a vehicle, no matter where it is, what time it is, or what the weather is like. A total of 24 satellites TV orbit the World, supervised consistently by earth channels. The satellite TV broadcast alerts that can be recognized by GPS devices located in your automobiles and used to figure out their location with great reliability. GPS allows GPS device to figure out its actual place in longitude and permission, swiftness, route etc.

2.2.2 GPS Receiver

Each GPS satellite TV delivers channels notifies that allow the GPS gadgets to figure out where its (or your vehicles) position on the World and convert the calculations into geodetic authorization, longitude and speed. A system needs notifies from at least three GPS satellite TV to figure out your vehicle's position. GPS Devices commonly used in most vehicle tracking methods can only acquire information from GPS Satellite. They cannot hook up back with GPS or any other satellite TV.

A system according to GPS can only figure out its position but cannot produce it to primary management area. In order to do this they normally use GSM-GPRS Cellular methods relationship using extra GSM modem/module.

Fig. 2.2.2 GPS Receive In Working State

2.3 GSM MODEM (SIM 900B)

2.3.1 Definitions

A GSM hub is a specific form of hub which allows SIM functions and works over a signing up to a cellular proprietor, just like a cell phone. From the cellular proprietor point of view, a GSM hub looks similar to a mobile phone. SIM900B is a complete Quad-band GSM/GPRS element in a B2B kind and designed with a very successful single-chip brand name. It is an effective wifi element which is appropriate with the module- SIM300/340 and SIM340E.

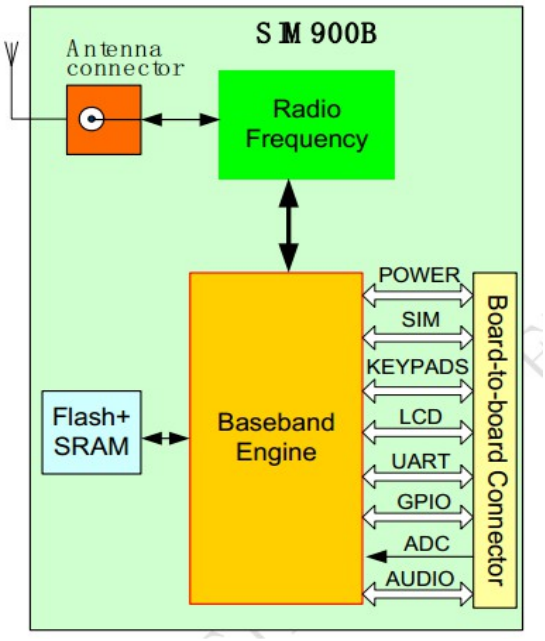


Fig. 2.3.1 SIM900B Functional Diagram

2.3.2 General features of SIM900B:

- Quad-Band 850/ 900/ 1800/ 1900 MHz
- SIM application toolkit
- Supply voltage range :3.1 ... 4.8V
- GPRS multi-slot class 10/8
- Control through AT commands
- Dimensions: 40* 33 * 3 mm
- Operating temperatures -35 °C to +70 °C

2.3.3 Compatibility

AT cellular command interface

2.3.4 Interfaces

- Serial program
- Embedded SIM Owner
- Antenna connector
- 60 PIN Board-to-board connector
- Interface with exterior
- RTC backup
- SPI interface

2.3.5 Mechanical dimensions of SIM900B:

The following figures show the mechanical dimensions of the SIM900B: (top, side and bottom view)

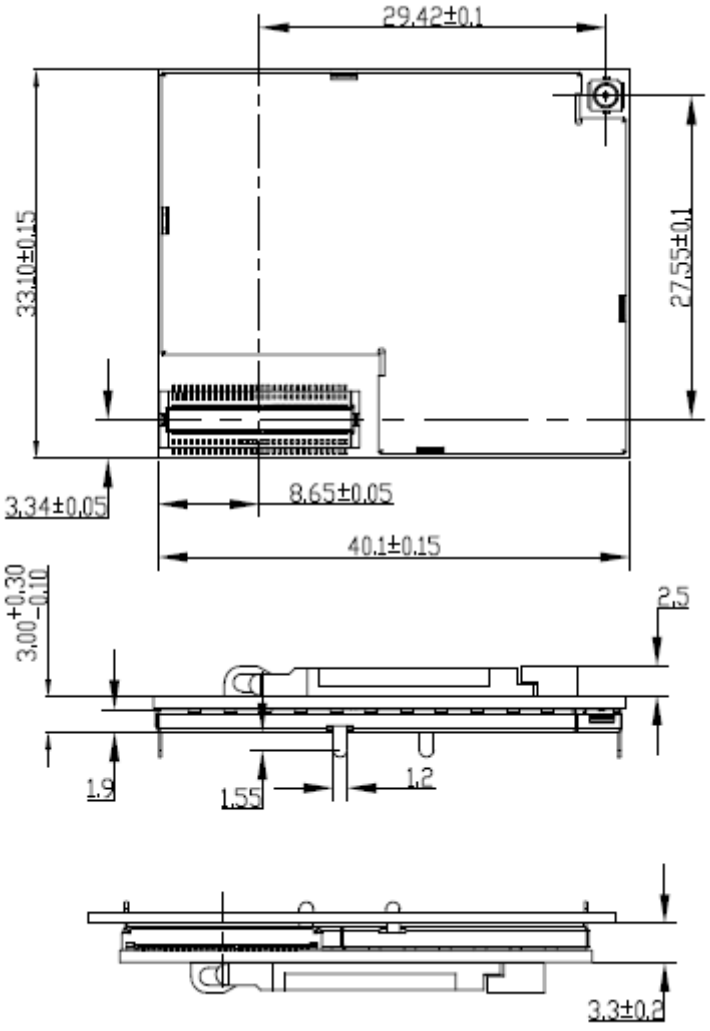


Fig. 2.3.6 (a) Top & side view of the module

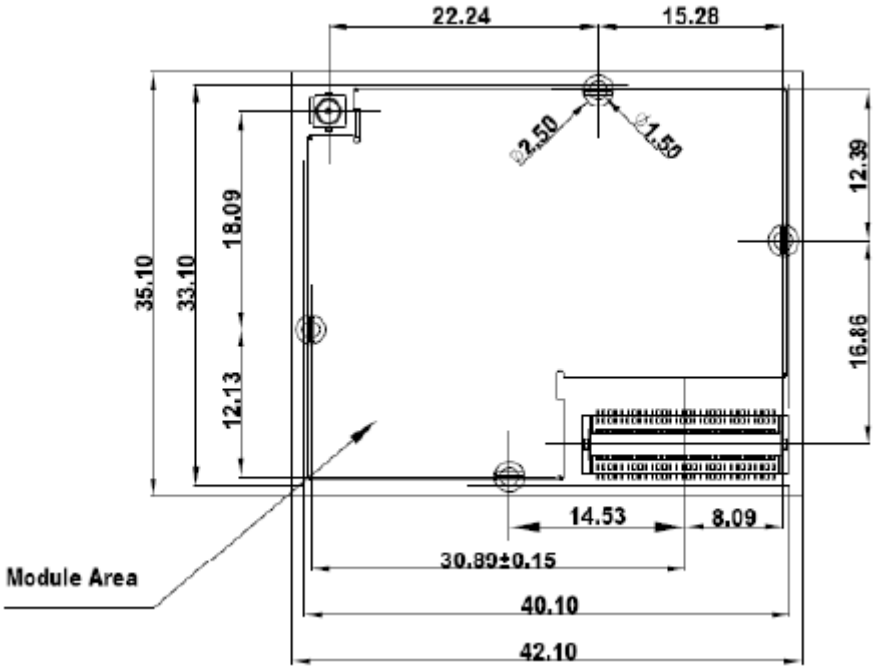


Fig 2.3.6 (b) Mechanical dimensions of module decal (unit: mm)

2.3.6 Antenna interface of the module

The aerial is solded to the pad and connected via contact springs.SIM900B has a grounding plane situated near to the aerial pad.

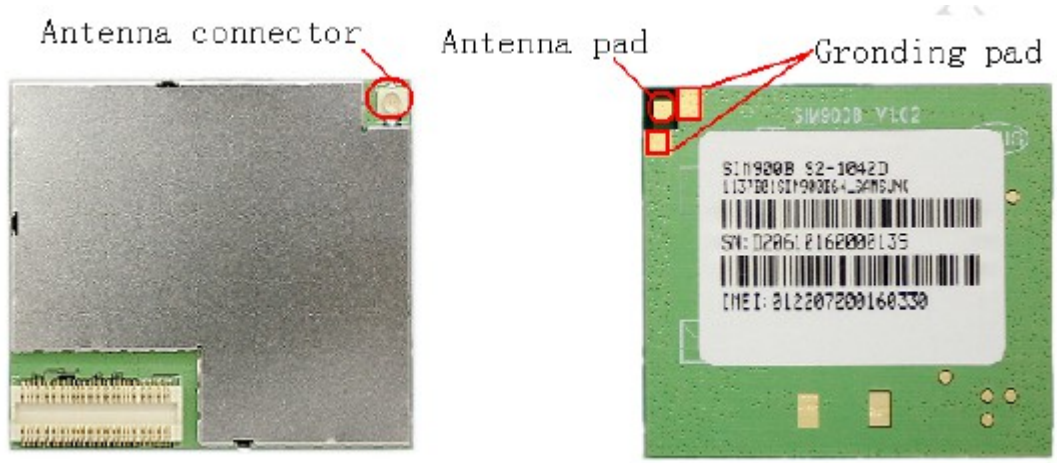


Fig. 2.3.7 The RF interface of the module

2.4 MICROCONTROLLERS

2.4.1 Definition

A µC is a small computing device on 1 incorporated routine which has a relatively simple CPU internally and electronic timers, I/O slots, and storage. Either system storage by using OR display is often provided on nick also on a generally little portion of RAM. Microcontrollers are developed for little or devoted programs.

2.4.2 Description

The AT89C52 is an 8-bit microcomputer with 8Kbytes of storage which performs highly and with low power. It is developed by Atmel which has high-density

nonvolatile storage area space technological innovation and is appropriate with the industry-standard 80C51 and 80C52 suggestions set and pin out. By planning a versatile 8-bit CPU with monolithic nick, the Atmel AT89C52 is a very efficient microcomputer which provides a highly-flexible and cost-effective remedy to offered management programs.

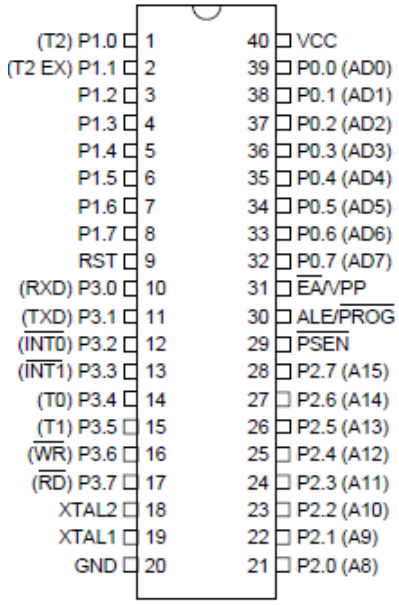


Fig. 2.4.2 Pin Configuration of 89C52 µC

Source: http://www.microcontrollerstudies.org

2.4.3 Characteristics of ATMEL 89C52 µC

- Three 16-bit Timer/Counters
- Eight Stop Sources
- Programmable Sequential Channel
- Endurance: 1,000 Write/Erase Cycles
- Three - level Program Storage Lock
- 8K Bytes of In-System Reprogrammable Display Memory
- 256 x 8-bit Inner RAM
- 32 Automated I/O Lines
- Fully Fixed Operation: 0 Hz to 24 MHz

2.4.4 Special Function Registers

- ACC (Accumulator Register)
- B Register
- TCON
- TMOD
- SCON
- SBUF
- PCON
- SP
- DPTR

2.4.5 Pin Description

Port Pin	Alternate Functions
P3.0	RXD (serial input port)
P3.1	TXD (serial output port)
P3.2	$\overline{\text{INT0}}$ (external interrupt 0)
P3.3	$\overline{\text{INT1}}$ (external interrupt 1)
P3.4	T0 (timer 0 external input)
P3.5	T1 (timer 1 external input)
P3.6	$\overline{\text{WR}}$ (external data memory write strobe)
P3.7	$\overline{\text{RD}}$ (external data memory read strobe)

Table 2.4.4 (a)

Port Pin	Alternate Functions
P1.0	T2 (external count input to Timer/Counter 2), clock-out
P1.1	T2EX (Timer/Counter 2 capture/reload trigger and direction control)

Table 2.4.4 (b)

2.4.6 Block Diagram

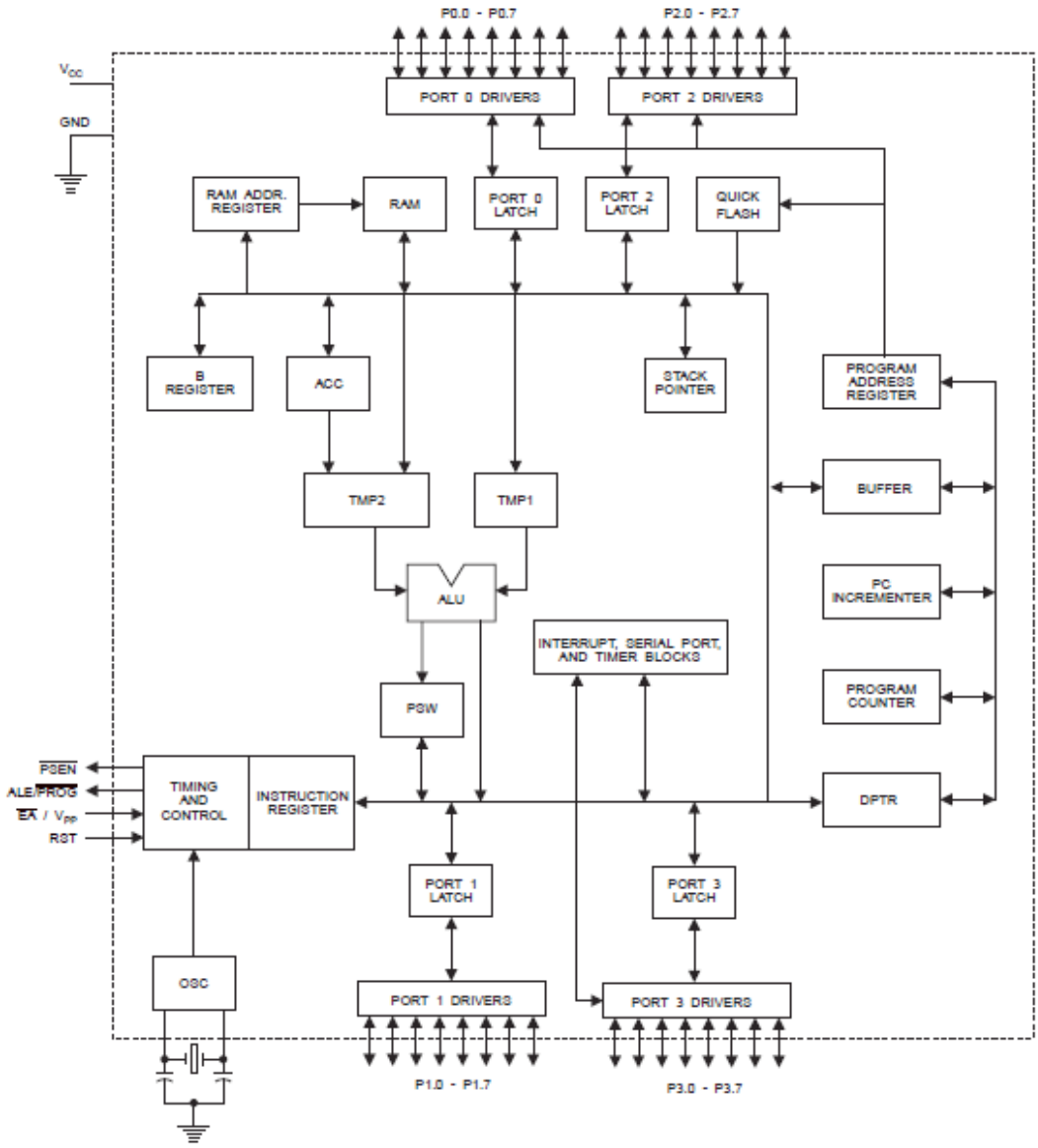


Fig. 2.4.5 Block Diagram

2.5 AT COMMANDS

2.5.1 Description

The orders are the AT commands which are recognized by the GSM modulator w ith these GSM Modem can be operated and do the desired function such as receiving/sending SMS (Short Message Service) or performing other functionalities.

We can access the following services with the help of these commands with is GSM Modem and a GPS receiver:

1. Information & configuration pertaining to mobile device/MODEM & SIM card
2. Messaging services
3. Multimedia services

2.5.2 Definitions

The following syntactical descriptions apply:

<CR> Buggy come back personality is the control range and outcome value terminator personality.

<LF> Linefeed personality is the personality acknowledged as range nourishes personality. The value of the ASCII is usually between 0 to 255 and S4 a parameter.

<...> Name encased in position supports is a syntactical factor. They do not appear in the control range.

[...] Optionally available sub parameter of a control. Brackets themselves do not appear in the control range. In AT orders which don't shop the of any of their sub factors, and so have not a Study control, which are known as measures kind orders, measures should be done on the foundation the suggested standard establishing of the sub parameter.

CHAPTER # 3

PLANNING

3.1 PLANNING

3.1.1 Target

The focus on of this strategy is to create GSM System available to a typical individual. We have in our thoughts to create such a GSM centered tracking system that would offer the need of every day individual with such plainness of function that creates the whole system incredibly simple to problems photograph.

3.1.2 Why we planned to do this project?

For companies that own a fleet of vehicles available for rent to their clients, it becomes difficult to track down the car and survey it while it's away. The proposed project is a single centralized framework that would integrate various processes like protection and monitor a car virtually anywhere and then locate it to within a few meters, lock and unlock the car through an simply trough a text or a call and also monitor the speed limit.

3.1.3 Technology

The Vehicle Tracking System (VTS) is a total security protection and fleet management solution that uses the latest GSM & GPS technology. This tracking system is composed of a GPS receiver, Microcontrollers and GSM Modems.

3.1.4 How to achieve the targets?

The goals were met as planned in the beginning of this project. We had put forth some targets in order to complete the project in time and in working state. The project was divided into different parts and each member had to perform each task in time then present it to the respected supervisor on time whether completed or not. The project is comprised of both software and hardware. The hardware was made available first then we head on to the working of the software then interfaced the hardware and the software. This way the whole project was carried out.

3.1.5 Applications

The provided program is a low price remedy for vehicle place and status, very useful in situation of car robbery circumstances and for monitoring adolescent drivers by their parents as well as in car tracking system applications.

The best feature of the system is its easiness with which it can be used. From anywhere one can get the information about that particular vehicle by logging in the information required i.e. the SIM card.

3.2 HARDWARE DESIGN

The hardware comprised of the following main parts:

1. SIM900B EVB (The GSM Modem Kit)
2. SIM900B
3. GPS Receiver
4. Microcontrollers
5. Antennas
6. PCB Boards
7. Connectors
8. For the hardware simulation Proteus was used.

3.2.1 SIM900B EVB

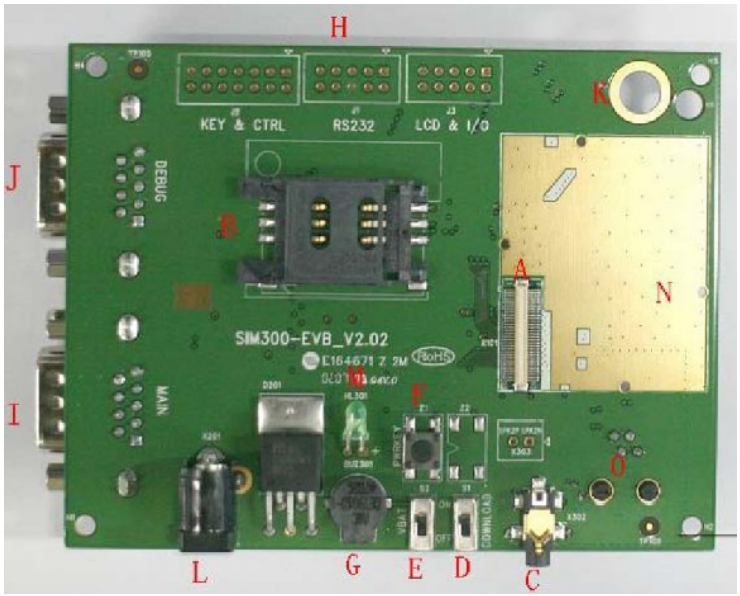


Fig. 3.2.1 (a) EVB Top View

Source: EVB Kit Manual

A: SIM900B module interface
B: SIM card interface
C: headset interface
D: Download switch, turn on or off download function
E: VBAT switch, switch the voltage source from the adaptor or external battery
F: PWRKEY key, turn on or turn off SIM900B
G: buzzer
H: expand port, such as keypad port, main and debug serial port, display port
I: MAIN serial port for downloading, AT command transmiting, data exchanging
J: DEBUG serial port
K: hole for fixing the antenna
L: source adapter interface
M: light
N: hole for fixing the SIM900B
O: headphones interface

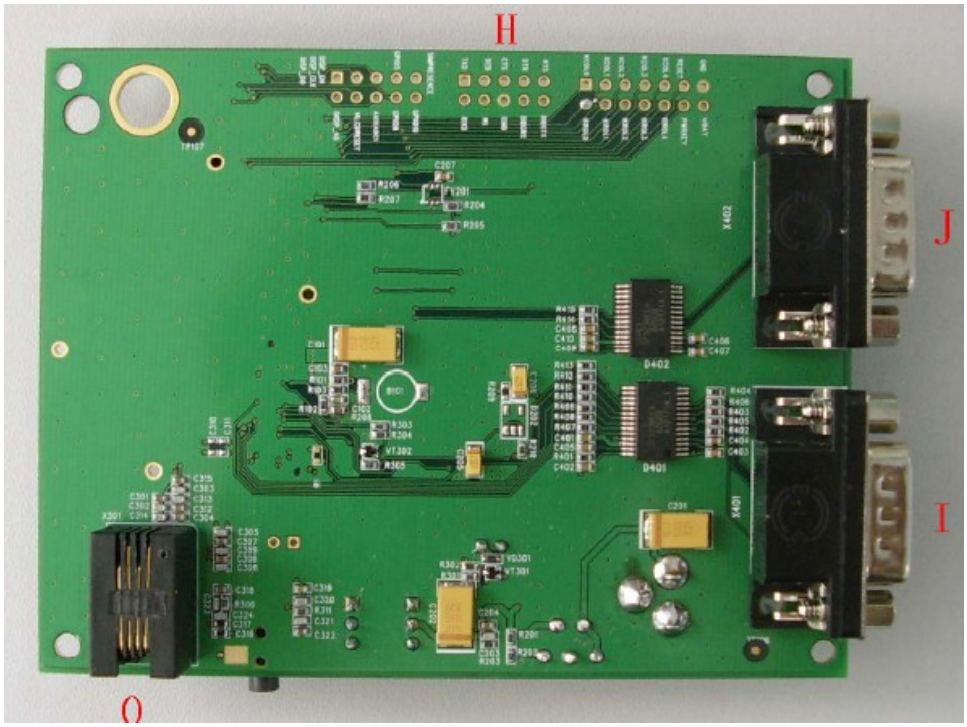


Fig. 3.2.1 (b) EVB Bottom View

Source: EVB Kit Manual

3.2.2 EVB Accessories

Fig. 3.2.2 EVB Accessories

Source: EVB Kit Manual

A: 5V DC source adapter

B: headset

C: antenna

D: antenna transmit cable

E: serial port cable

3.2.3 RS232 Interface

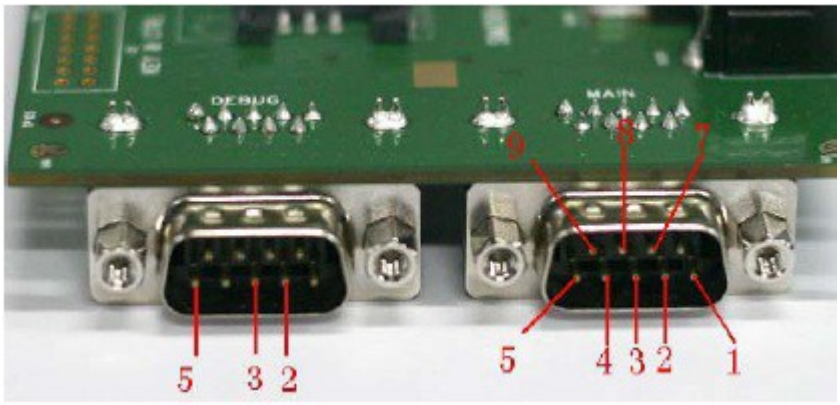


Fig. 3.2.3 RS232 Interface

Source: EVB Kit Manual

3.2.4 SIM Card Interface

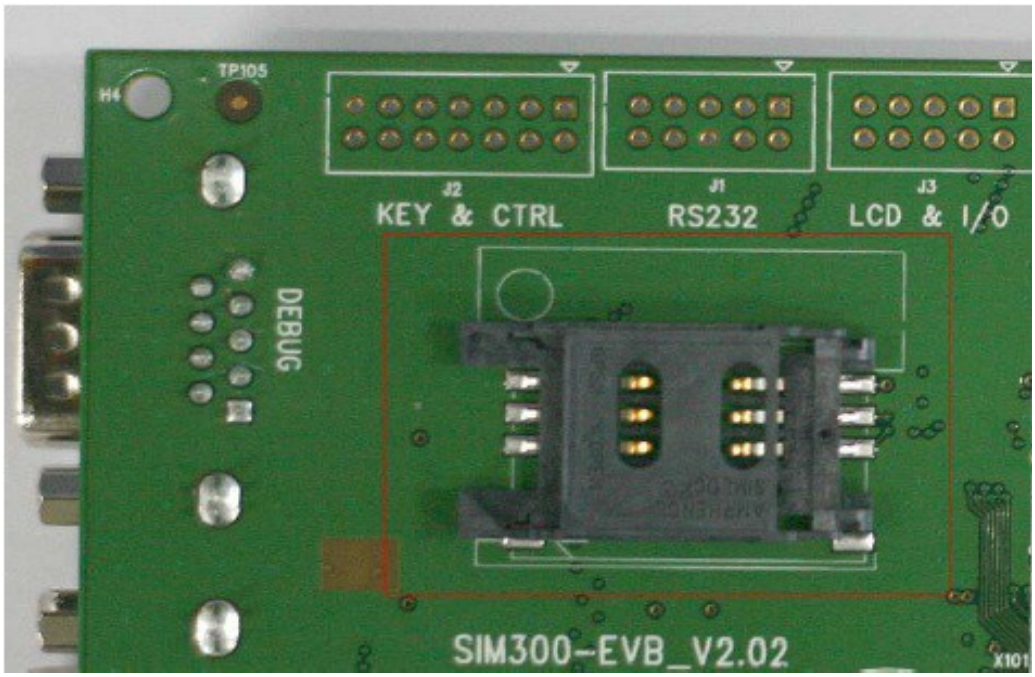


Fig. 3.2.4 SIM Card Interface

Source: EVB Kit Manual

3.2.5 Antenna Interface

Fig. 3.2.5 Antenna Interface

Source: EVB Kit Manual

3.3 SOFTWARE DESIGN

3.3.1 Description

Software is the essential part of any science project. This is the basic building block of any hardware. Without software application a hardware is useless or not in working state. Similarly, our project, ***GSM Based Vehicular Tracking System*** is totally based on both software and hardware.

Each activity carried out has its own part of software working which has AT Commands and programming in C language which is carried out in Keil Microvision.

3.3.2 AT Commands

The orders are recognized by the GSM hub. AT orders are guidelines used to management a hub. With the help of AT orders we can work our GSM hub to deliver and obtain information and doing other performance. The AT orders are published in the super terminal and then used into the SIM900B using a sequential wire. Every management range begins with "AT" or "at". That's why hub orders are known as AT orders. "AT" is the prefix that shows the hub about the start of a management range.

We are using AT Commands to be able to obtain text information, secure or discover the car, get the outcomes on the HyperTerminal on a pc, on the statistics offered which are nourish using AT Commands as well as C terminology.

3.3.3 Interfacing GSM Modem with HyperTerminal

We have to make sure that the AT commands are sent to the GSM Modem via HyperTerminal to see the possible outcomes and to check the working of the commands.

What is HyperTerminal?

HyperTerminal helps us to send data serially to the devices connected with the computer's COM port. The following steps are followed:

In Windows:

Go to:

Start > All Programs > Accessories > Communication > HyperTerminal

Add the name of the connection to be used and select the icon from the dialog box.

Fig. 3.3.2 (a) New Connection Dialog Box

Next is the selection of the COM port to which our device is attached.

Fig. 3.3.2 (b) Selection of COM Port

Next step is setting the Baud Rate from the specific properties to the frame size.

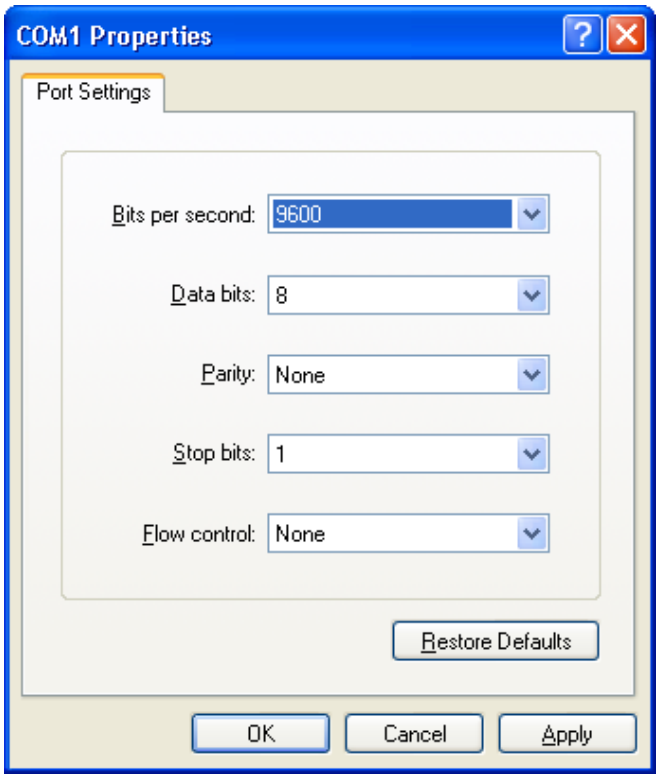


Fig. 3.3.2 (c) Setting Baud Rate

Now that our connection is set up, we can monitor the mobile phone by sending AT Commands.

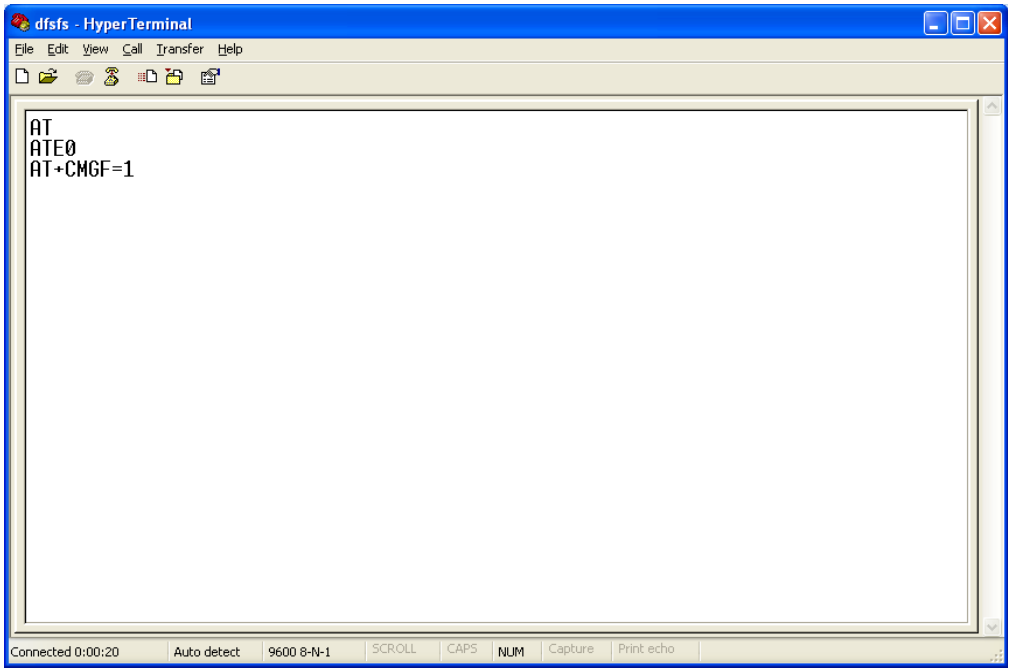


Fig. 3.3.2 (d) Sending AT Commands

3.3.4 Programming Tool

The C development terminology is a popular and commonly used development terminology for developing programs. Developers around the world use C terminology because it gives highest possible control and performance to the value writer. There is a huge programming done behind every technical gadget to make them work.

Our software part has 3 slave codes and 1 master program for the interface of the software and the hardware which we call the USART.

The programming has been done to get the continuous alerts of the speed of the vehicle after a certain interval then secondly to get the coordinates/location of the vehicle and finally for the locking and unlocking of the car via a call or an SMS.

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CHAPTER # 4

IMPLEMENTATION

4.1 Overview

In this venture AT89C52 microcontroller is used for interfacing to various components add-ons. The present style is an included program, which will consistently observe a going automobile and review the position of the automobile on need. To do this an AT89C52 microcontroller is serially interfaced to the GPS System. A GSM hub is used to indicate Latitudes and Longitudes of the vehicle from a faraway place. The GPS hub will continually offer details i.e. the authorization and longitude displaying the place of the vehicle. The GPS hub gives many aspects as the outcome. The same details are sent to the mobile at the other end from where the place of the vehicle is necessary.

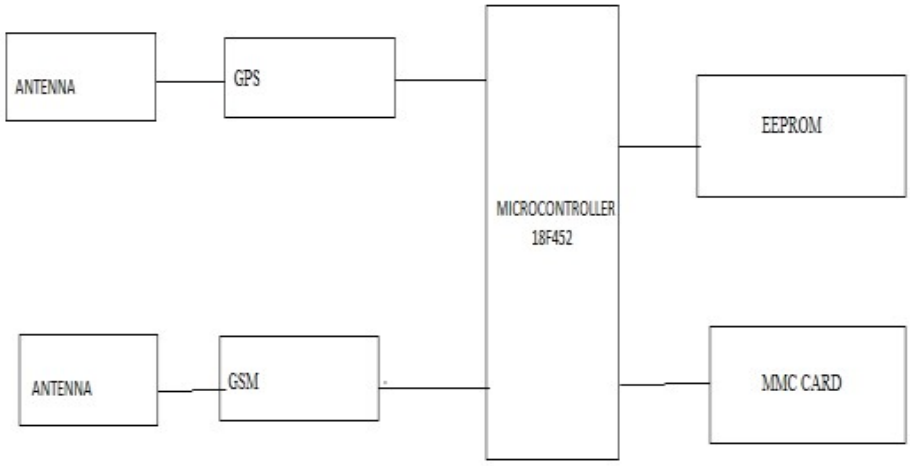


Fig. 4.1 Block Diagram

4.2 Working of the Project

We began firstly to create an assessment panel for the AT89C52 microcontroller; then we have used Keil Microvision for the selection of value as it is simple development in C than in construction terminology. We designed a value for USART – a built-in application given by AVR.

By changing appropriate baud rate, variety of quit and begin parts and equality parts we were able to serially broadcast the AT Commands to the application offered by the Windows - The HyperTerminal.

As far as performance is worried, we first of all simulated our value through application, in our situation it was Proteus, than after having appropriate outcomes in simulator we used the different requirements to our microcontrollers. Immediately getting appropriate outcomes has always been a trial due to many factors. The primary cause is individual mistakes.

Other small gadgets like capacitors are linked with MAX 232 IC are not effectively solded or they are of not the same value as suggested. We were able to connect with the HyterTerminal after conquering the individual mistakes.

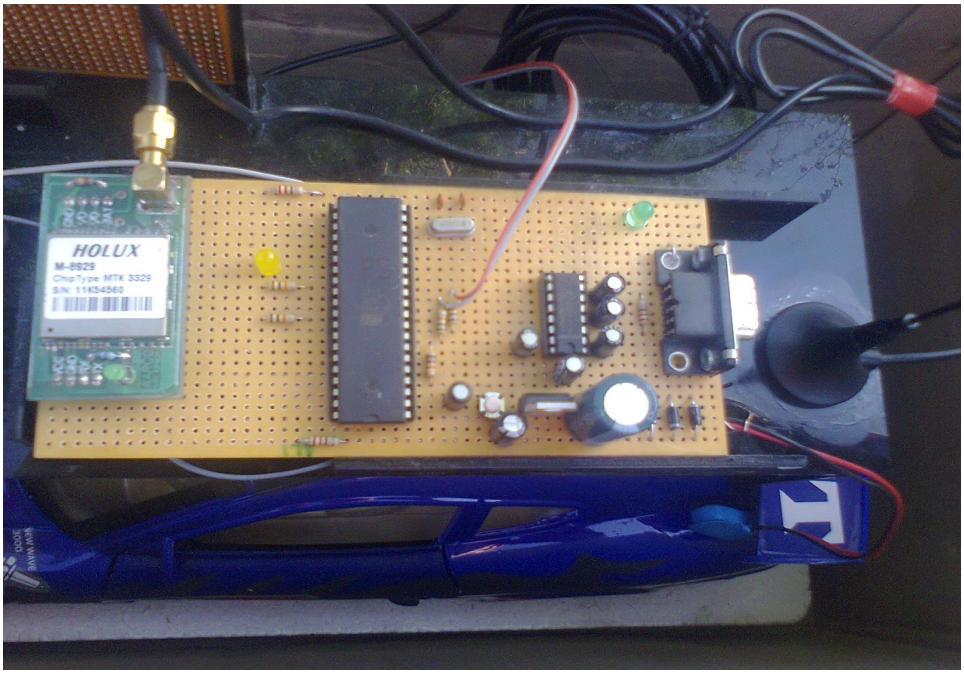


Fig. 4.1 (a) Microcontroller in working state on PCB

Hooking up with the GSM Modem was the next thing in line. This was a challenging aspect as there is no simulator device for this objective. With the help of Proteus we were able to create a exclusive sequential slot in and hook up our GSM Hub set on an assessment kit. To achieve this process it proved helpful on Proteus.

Different method of sequential interaction is done by the GSM Modem with the microcontroller we used as it includes handshaking between the linked gadgets. It has two more signal alerts like CTS and RTS. CTS take a position for obvious to deliver and RTS appears for willing to deliver. CTS is used for when we are submitting some AT Commands to GSM Modem, this indication must be set great to be able to provide indication to the GSM Modem that information is originating.

Fig. 4.1(b) SIM900B in the working state on the GSM Modem

Source: EVB Kit Manual

4.3 Different Connectors Used

4.3.1 RS 232 Connector

The RS-232 (Recommended Conventional 232) is an average for sequential binary single-ended data and control alerts linking between gadgets. It is a everyday sort of electrical connection used particularly in computer systems. It contains two similar lines of hooks or electrical sockets usually ornamented by a steel safeguard that provides technical support.

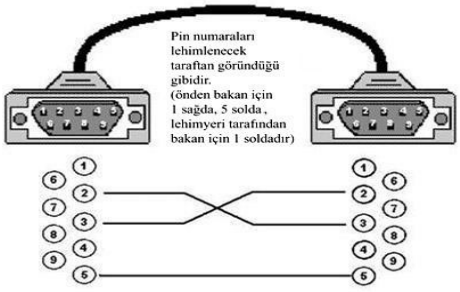


Fig. 4.3.1 (a) RS232 Connector

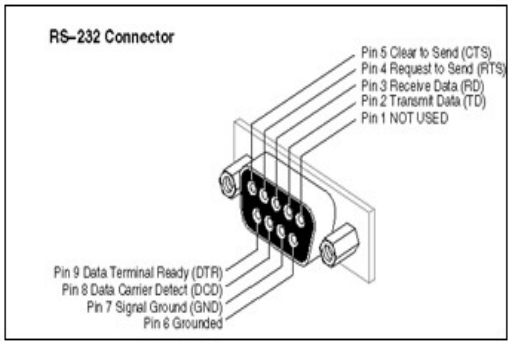


Fig. 4.3.1 (b)

4.3.2 Debug Serial Port Male Db9

This connector is called the male connector or the male plug as shown in the image. It contains the pins and the socket fits tightly into plug's shield.

Fig. 4.3.2

4.3.3 Main Serial Port Female DB9

This connector contains the socket which is called the female connector or socket which is shown in the image which is of a 9 pin Female Db.

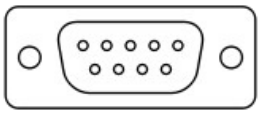


Fig. 4.3.4

4.3.4 Voltage Regulator

The voltage regulator mainly produces great regularity alerts. The regularity of these great regularity alerts generally depends upon the capacitive value of a resounding routine.

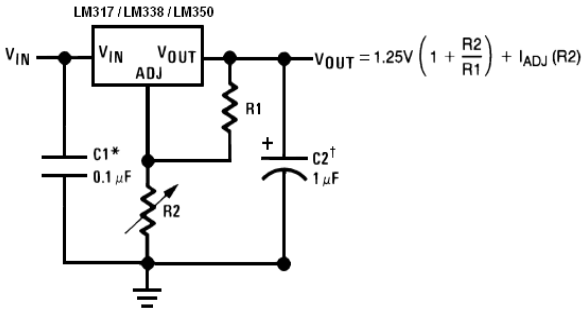


Fig. 4.3.5 (a)

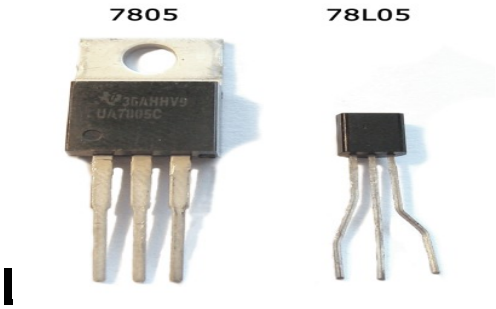


Fig. 4.3.5 (b)

4.3.5 Crystal Oscillator

A crystal oscillator is a regularity management element used as a regularity and time referrals source in various types of technology such as a devices system and digital system..

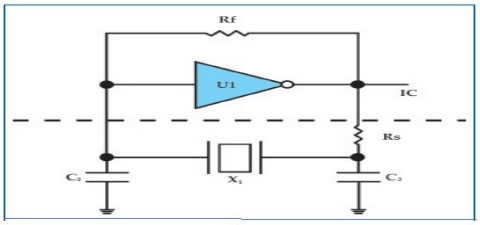


Fig. 4.3.6 (a)

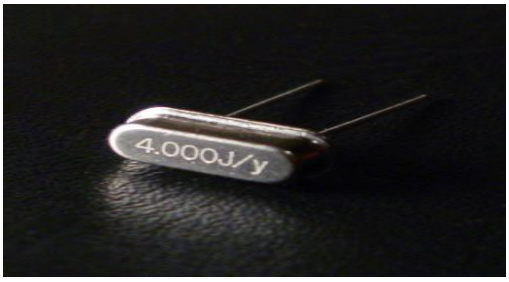


Fig. 4.3.6 (b)

4.4 SMS Service

The cellular companies change their client's SMS solutions based on number of texts sent from their cellular phone devices. There are other primary SMS solutions available where companies are asking for more than regular SMS charge. These solutions are being used in cooperation of TV Systems need SMS from the viewers. Most of time expenses are paid by the SMS mailer but for some solutions like shares and reveal prices, cellular financial features and pleasurable arranging solutions etc. individual of the SMS has to pay for the assistance.

4.5 Technology

The technological innovation used is according to determining power stages and aerial styles and it uses the idea that via a platform place a cell phone is always in interaction. As the user moves from one cell to another the BTS is changed.

Modern techniques determine the industry in which the mobile phone is situated and roughly assessment of the range to the foundation place. Further approximation can be done by interpolating notifies between close by airborne techniques. Certified services may achieve a perfection of down to 50 actions in locations where mobile traffic and stability of airborne techniques (base stations) is completely high. Non-urban and single locations may see miles between foundation programs and therefore determine locations less completely.

4.6 Application

The system is fitted on the vehicle. The whole controlling of the device is done by the mobile phone which provides wireless connection between the VTS device and the user.

We can check the billings and archives of a particular car on computer. Like for how many days it has been rented, which all locations it had travelled to, check the speed limits etc. And if the car is not returned on the particular day, the system can lock the car simply though a text and can be unlocked on the request of the customer.

The system mainly tracks the location of the vehicle, using GSM module. The tracking device stores all location and speed details. This not only helps to get alerts on the vehicle's speed limit but also on its area.

Source: http://www.vespacious.com/vehicle-tracking-systems.html

CHAPTER # 5

RESULTS AND ANALYSIS

5.1 Block Diagram of the Project

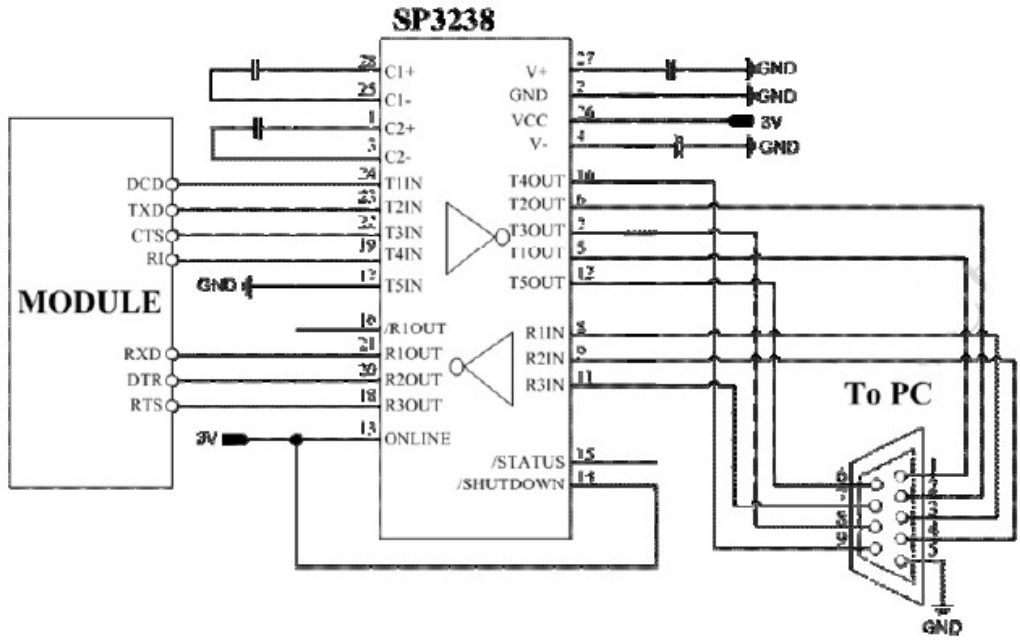


Fig 5.1 (a) Connection of the module with Microcontroller

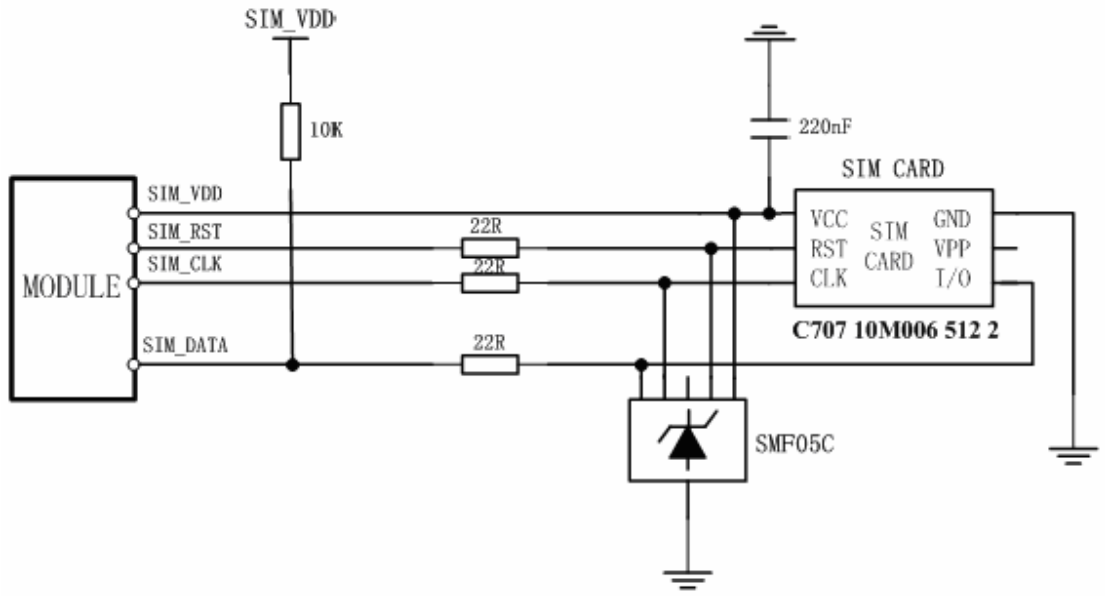
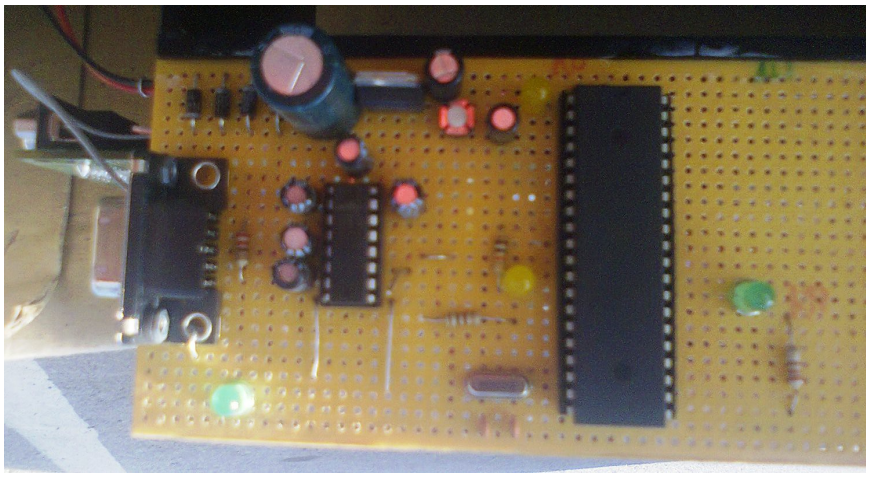
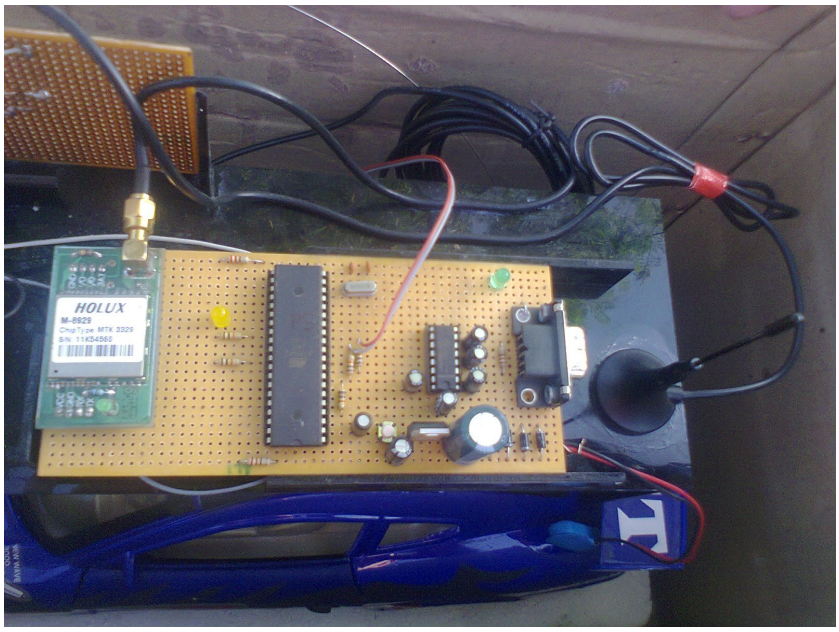
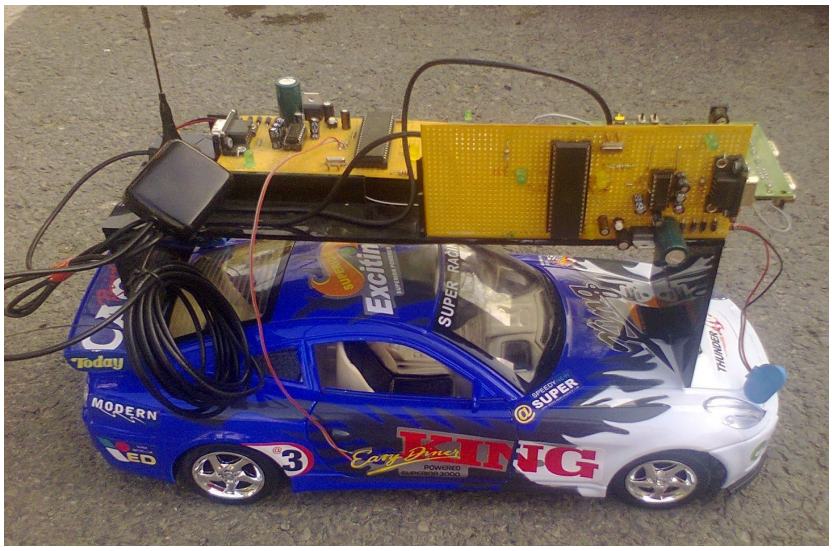


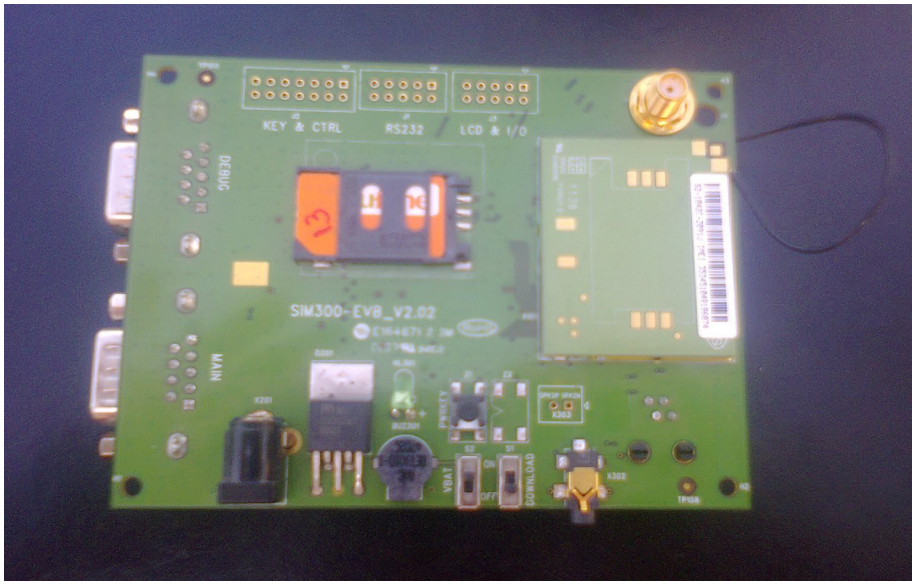
Fig 5.1 (b) Connection of the module with the SIM Card

5.2 Hardware Images

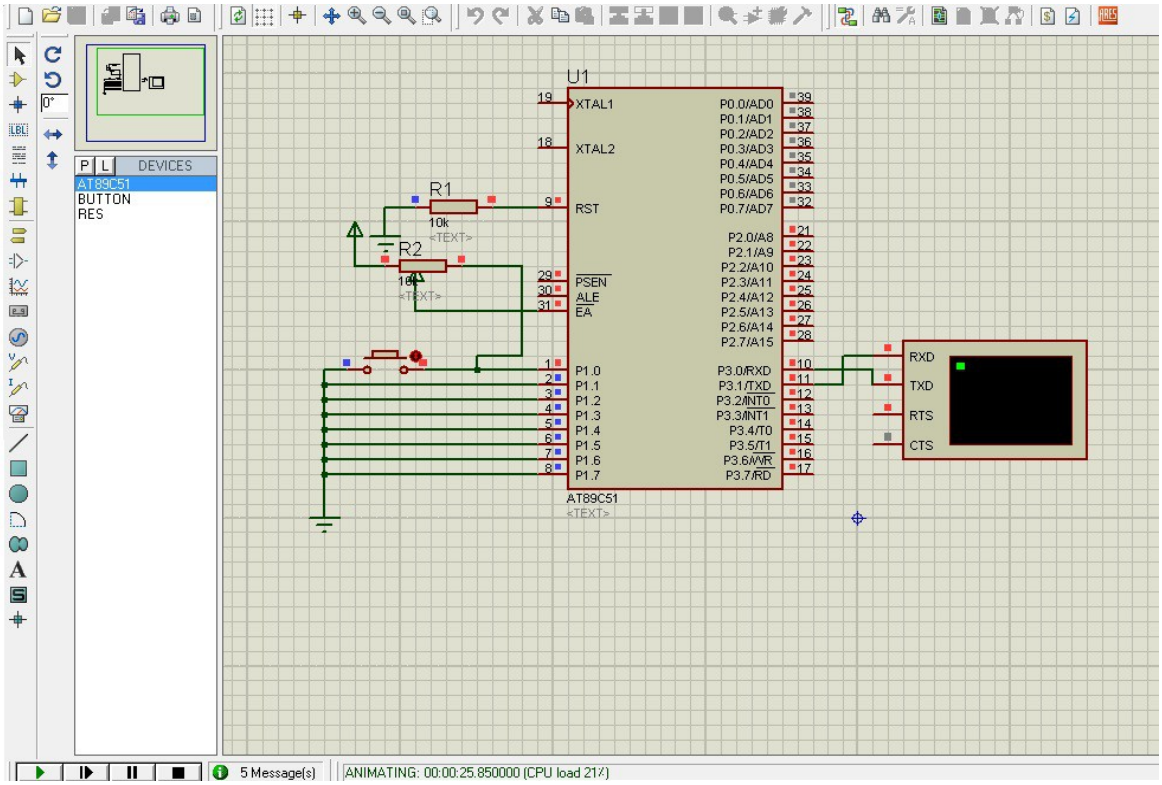


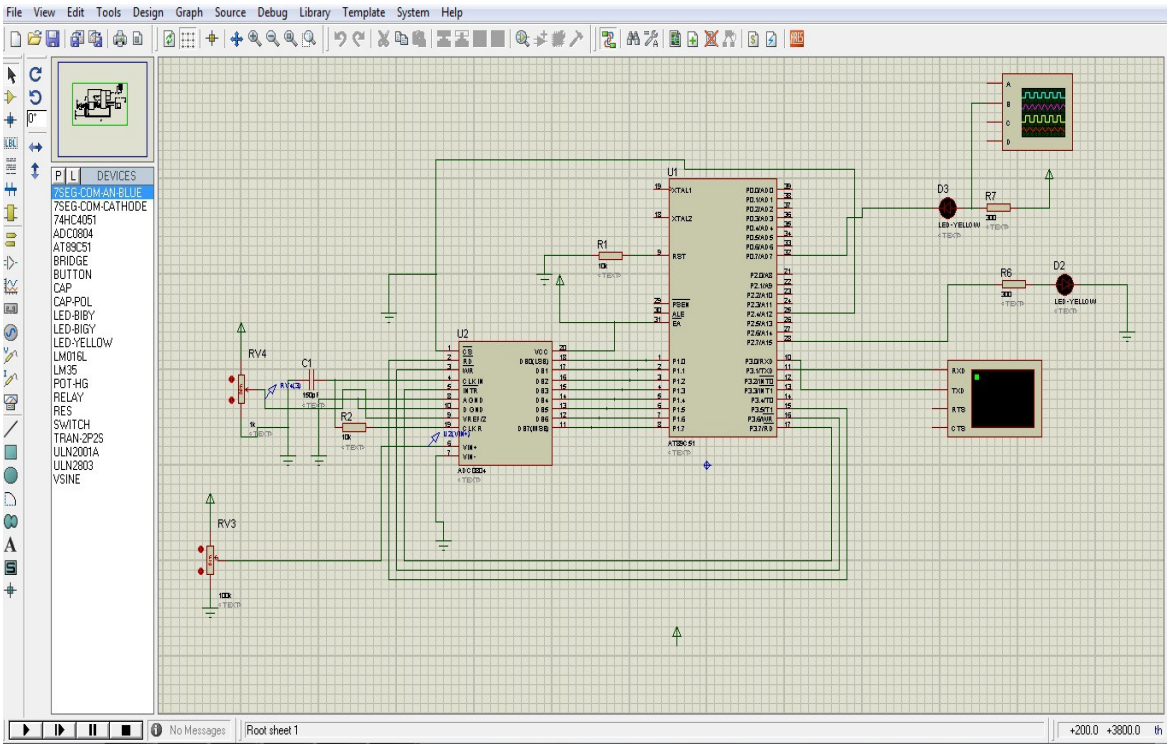


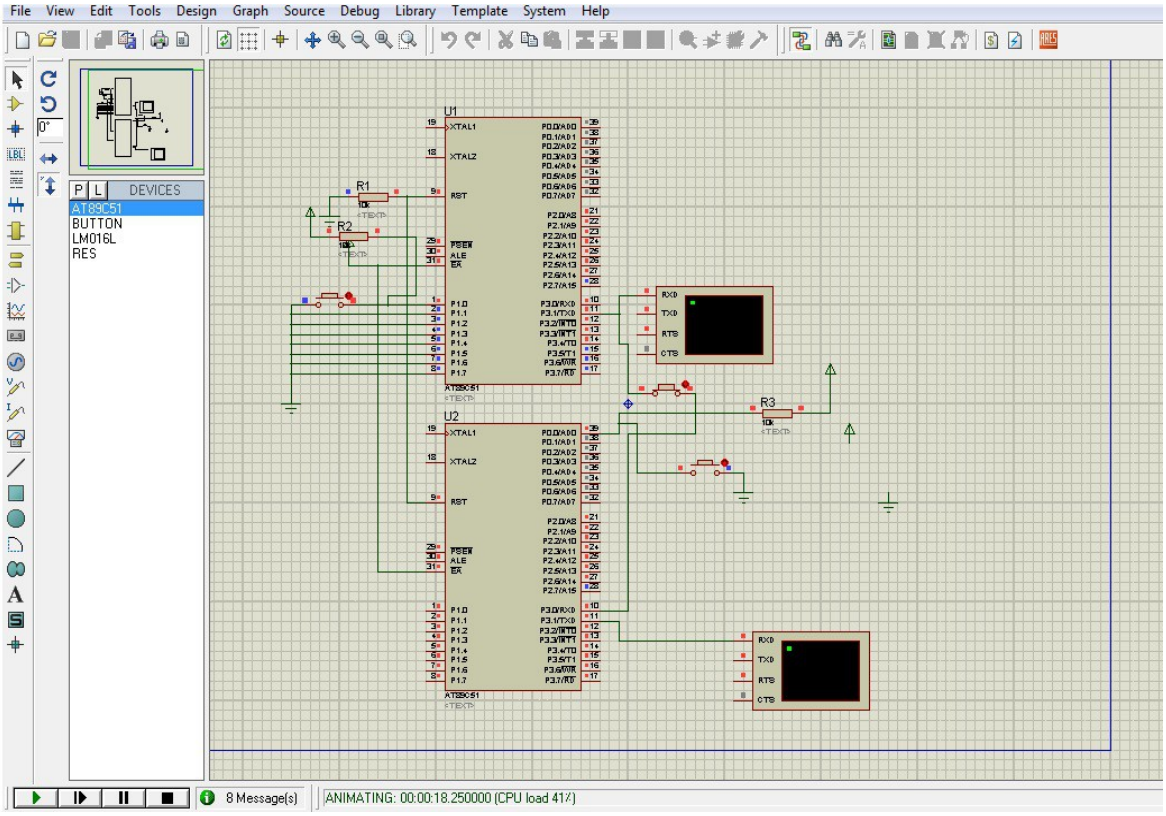




5.3 Simulation




File View Edit Tools Design Graph Source Debug Library Template System Help
DEVICES
7SEG-COM-AN-BLUE
7SEG-COM-CATHODE
74HC4051
ADC0804
AT89C51
BRIDGE
BUTTON
CAP
CAP-POL
LED-BIBY
LED-BIGY
LED-YELLOW
LM016L
LM35
POT-HG
RELAY
RES
SWITCH
TRAN-2P2S
ULN2001A
ULN2803
VSINE
U1
U2
R1
R2
R6
R7
D2
D3
RV3
RV4
C1
No Messages
Root sheet 1


File View Edit Tools Design Graph Source Debug Library Template System Help
DEVICES
AT89C51
BUTTON
LM016L
RES
U1
U2
R1
R2
R3
8 Message(s)
ANIMATING: 00:00:18.250000 (CPU load 41%)

5.4 Explanation

1. When the engine starts and the vehicle starts moving the system begins its working.
2. Sensors are activated.
3. After certain intervals, we start getting texts in the form of SMS.
4. The SMS will give us alert about the coordinates in which the vehicle is present and we get the same alerts of the computer as well on the HyperTerminal.
5. At the same time we are getting the alerts about the speed at which the car is travelling.
6. If the customer of the car doesn't return the car in time, the car can be locked via a call or a message by the management of the company and it can be unlocked on the request of the customer.
7. All the records can be stored on the computer for future use.

This way it becomes easier for the rent car companies to keep track of their vehicles and manage them wisely.

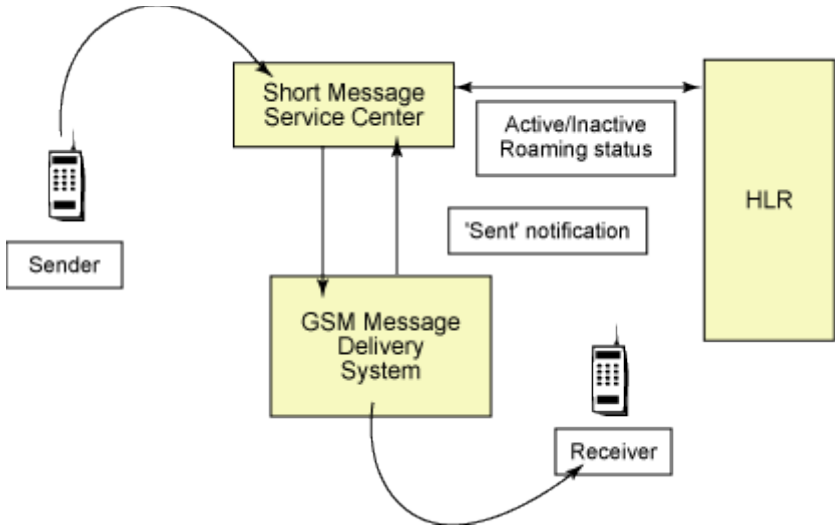


Fig. 5.4 Sending and receiving of SMS

5.5 Results

After implementing the whole hardware system and connecting it to the computer via serial interface we have observed the following:

The format of the SMS is as follows:
This is an example.

Cord: 000118.037, 060180
Speed: 000
CS: LK*

Cord: 000118.037, 060180
Speed: 000
CS: UL*

Cord -> Coordinates
CS -> Car Status
LK -> Lock
UL -> Unlock

We can change the format of the message by changing the parameters in the coding.

CHAPTER # 6

FUTURE ENHANCEMENTS AND CONCLUSION

6.1 Suggestions for Future Enhancements

The system we designed is a model built of an idea which has room for edition of further features into the system. The following recommendations are proposed for any interested students who would like modify this project further.

6 Instead of a GSM Modem one can use a mobile phone which supports the system.
7 Improvements in the software can be done which could work on manually sending texts and retrieving the data.
8 A Microprocessor may be used in place of a Microcontroller for more reliability.
9 Any other Microcontroller can be used instead of AT89C52.
10 LCDs can be used to show the coordinates, the speed alert and so on instead of getting notified by LEDs.
11 Video feature can be added on the driver side in the car.

6.2 Conclusion

We have established a system based on GSM and GPS for vehicles which give us alerts about the speed of the car after certain intervals through text messages. The interval can be increased or decreased by making changes in the programming which is done by us in C language in our case.

The system shows us the coordinates in which the car is located and the same data is also retrieved on the HyperTerminal on the computer. This also uses the GSM network for the updates.

The vehicle in which the system is fitted can be locked and unlocked on the request of the customer who as rented the car and if misused, the car company management can lock the car through a text or simply through a call made to the SIM which is fitted in the car.

The design starts its work when the engine of the car is turned on and it gets the voltage.

We implemented this project on a dummy car and got the desired results after facing many minor hurdles such as in programming.

Fig.6.2 System fitted onto the dummy car

REFRENCES

1. Microprocessor System Design, Dr. Shiue, Serial Communication
2. Mazidi Muhammad Ali, The 8051 Microcontroller & Embedded Systems (Princeton Hall Publications, 2008)
3. SMS Tutorial: introduction to GSM/GPS modems. www.developershome.com/sms
4. Holux, Holux M-89, GPS Specifications www.holux.com
5. Connexions, baud rate, serial communication http://cnx.org/content/m12293/latest/baudrate
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16 www.wonderware.ee/htm/wireless/GSM_Control_en_1008

Research Papers:

1. Design & Development of a GSM Based Vehicle Theft Control System

17 http://ieeexplore.ieee.org/search/freesrchabstract.jsp?tp=&arnumber=4777326&queryText%3Dvehicle+tracking+system+using+GSM%26openedRefinements%3D*%26filter%3DAND%28NOT%284283010803%29%29%26searchField%3DSearch+All

2. Balbach Oliver, tracking GPS above GPS satellites. IEEE, 1997

3. Real Time Web based Vehicle Tracking using GPS

18 Research paper by a student

Books:

- The 8051 Microcontroller and Embedded Systems by **Mazidi** (Course Book)
- Selected topics from the book **"GPS for Dummies"** by **Joel**

Other:

- The manual for AT command was referred that came along with SIM900B (EVB Kit)
- Data Sheet - ATMEL AT89C52

APPENDIX - A

OVERVIEW OF AT COMMANDS

Table 1: Types of AT commands and responses

Test Command	AT+<x>=?	The mobile equipment returns the list of parameters and value ranges set with the corresponding Write Command or by internal processes.
Read Command	AT+<x>?	This command returns the currently set value of the parameter or parameters.
Write Command	AT+<x>=<…>	This command sets the user-definable parameter values.
Execution Command	AT+<x>	The execution command reads non-variable parameters affected by internal processes in the GSM engine

ATV	TA RESPONSE FORMAT
ATX	SET CONNECT RESULT CODE FORMAT AND MONITOR CALL PROGRESS
ATZ	SET ALL CURRENT PARAMETERS TO USER DEFINED PROFILE
AT&C	SET DCD FUNCTION MODE
AT&D	SET DTR FUNCTION MODE
AT&F	SET ALL CURRENT PARAMETERS TO MANUFACTURER DEFAULTS
AT&V	DISPLAY CURRENT CONFIGURATION
AT&W	STORE CURRENT PARAMETER TO USER DEFINED PROFILE
AT+GCAP	REQUEST COMPLETE TA CAPABILITIES LIST
AT+GMI	REQUEST MANUFACTURER IDENTIFICATION
AT+GMM	REQUEST TA MODEL IDENTIFICATION
AT+GMR	REQUEST TA REVISION INDENTIFICATION OF SOFTWARE RELEASE
AT+GOI	REQUEST GLOBAL OBJECT IDENTIFICATION
AT+GSN	REQUEST TA SERIAL NUMBER IDENTIFICATION
AT+ICF	SET TE-TA CONTROL CHARACTER FRAMING
AT+IFC	SET TE-TA LOCAL DATA FLOW CONTROL
AT+IPR	SET TE-TA FIXED LOCAL RATE
AT+HVOIC	DISCONNECT VOICE CALL ONLY

Command	Description
A/	RE-ISSUES LAST AT COMMAND GIVEN
ATA	ANSWER AN INCOMING CALL
ATD	MOBILE ORIGINATED CALL TO DIAL A NUMBER
ATD><N>	ORIGINATE CALL TO PHONE NUMBER IN CURRENT MEMORY
ATD><STR>	ORIGINATE CALL TO PHONE NUMBER IN MEMORY WHICH CORRESPONDS TO FIELD <STR>
ATDL	REDIAL LAST TELEPHONE NUMBER USED
ATE	SET COMMAND ECHO MODE
ATH	DISCONNECT EXISTING CONNECTION
ATI	DISPLAY PRODUCT IDENTIFICATION INFORMATION
ATL	SET MONITOR SPEAKER LOUDNESS
ATM	SET MONITOR SPEAKER MODE
+++	SWITCH FROM DATA MODE OR PPP ONLINE MODE TO COMMAND MODE
ATO	SWITCH FROM COMMAND MODE TO DATA MODE
ATP	SELECT PULSE DIALLING
ATQ	SET RESULT CODE PRESENTATION MODE
ATS0	SET NUMBER OF RINGS BEFORE AUTOMATICALLY ANSWERING THE CALL
ATS3	SET COMMAND LINE TERMINATION CHARACTER
ATS4	SET RESPONSE FORMATTING CHARACTER
ATS5	SET COMMAND LINE EDITING CHARACTER
ATS7	SET NUMBER OF SECONDS TO WAIT FOR CONNECTION COMPLETION
ATS8	SET NUMBER OF SECONDS TO WAIT WHEN COMMA DIAL MODIFIER ENCOUNTERED IN DIAL STRING OF D COMMAND
ATS10	SET DISCONNECT DELAY AFTER INDICATING THE ABSENCE OF DATA CARRIER
ATT	SELECT TONE DIALING

APPENDIX - B

AT COMMANDS ACCORDING TO GSM

Command	Description
AT+CACM	ACCUMULATED CALL METER(ACM) RESET OR QUERY
AT+CAMM	ACCUMULATED CALL METER MAXIMUM(ACM MAX) SET OR QUERY
AT+CAOC	ADVICE OF CHARGE
AT+CBST	SELECT BEARER SERVICE TYPE
AT+CCFC	CALL FORWARDING NUMBER AND CONDITIONS CONTROL
AT+CCWA	CALL WAITING CONTROL
AT+CEER	EXTENDED ERROR REPORT
AT+CGMI	REQUEST MANUFACTURER IDENTIFICATION
AT+CGMM	REQUEST MODEL IDENTIFICATION
AT+CGMR	REQUEST TA REVISION IDENTIFICATION OF SOFTWARE RELEASE
AT+CGSN	REQUEST PRODUCT SERIAL NUMBER IDENTIFICATION (IDENTICAL WITH +GSN)
AT+CSCS	SELECT TE CHARACTER SET
AT+CSTA	SELECT TYPE OF ADDRESS
AT+CHLD	CALL HOLD AND MULTIPARTY
AT+CIMI	REQUEST INTERNATIONAL MOBILE SUBSCRIBER IDENTITY
AT+CLCC	LIST CURRENT CALLS OF ME
AT+CLCK	FACILITY LOCK
AT+CLIP	CALLING LINE IDENTIFICATION PRESENTATION
AT+CLIR	CALLING LINE IDENTIFICATION RESTRICTION
AT+CMEE	REPORT MOBILE EQUIPMENT ERROR
AT+COLP	CONNECTED LINE IDENTIFICATION PRESENTATION
AT+COPS	OPERATOR SELECTION
AT+CPAS	PHONE ACTIVITY STATUS
AT+CPBF	FIND PHONEBOOK ENTRIES
AT+CPBR	READ CURRENT PHONEBOOK ENTRIES
AT+CPBS	SELECT PHONEBOOK MEMORY STORAGE
AT+CPBW	WRITE PHONEBOOK ENTRY