VEHICLE TRACKING & LOCKING SYSTEM

BASED ON GSM AND GPS

by

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DECLARATION

We hereby declare that this submission is our own work and that, to our best of our knowledge and belief, it contains no material previously published or written by any other person nor any material which to a substantial extent has been accepted for the award of any other degree or diploma of any university or other institute of higher learning except where due acknowledgement has been made in the text.

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This is to certify that Project Report entitled "**Vehicle Tracking & Locking System Based on GSM and GPS**" which is submitted by **Rishabh Gupta (1306831121)**, **Robin Pilania (l306831123)**, **Rohit Bathla (1306831124)**, **Shubham Mishra (1306831151)** in partial fulfillment of the requirement for the award of the degree B.Tech in **Department of Electronics and Communication Engineering** of Dr. A.P.J. Abdul Kalam University (formerly GBTU) is record of the candidates' own work carried out by them under my supervision. The matter embodied in this thesis is original and has not been submitted for the award of any other degree.

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ACKNOWLEDGEMENT

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We also take the opportunity to thank the contribution of **Professor D.K. Sharma**, Head of Department of Electronics and Communication Engineering for his full support and assistance during the development of out project.

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ABSTRACT

The main aim of this project is to use a wireless technology for automobiles using GSM modem. The main aim of this project is to stop the automobile engine with the help of GSM modem when any person steals the vehicle, we can detect the location of the vehicle by sending SMS, then a programmable microcontroller PIC orders to GSM modem to send a SMS. GSM modem that stores the owner's number upon receiving SMS for the first time sends location of the vehicle via SMS to the authorized numbers. If owner replies to stop the engine, then the control instruction is given to the microcontroller through the interface that the output from which activates a relay driver to trip the relay that disconnects the ignition of the automobile resulting in stopping the vehicle. Owner of the vehicle can also tap the button provided in the vehicle if stealing happens at the gun point or forcefully.

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LIST OF ABBREVIATIONS

GSM	Global System for Mobile communication
GPS	Global Positioning System
LED	Light-Emitting Diode
LCD	Liquid Crystal Display
IC	Integrated Circuit
EEPROM	Electrically Erasable Programmable Read-only Memory
I/O	Input/Output

CHAPTER 1
INTRODUCTION

1.1 Current Scenario

Motor vehicle theft is the criminal act of stealing or attempting to steal a car (or any other motor vehicle). Nationwide in the India in 2014, there were an estimated 170,053[1] motor vehicle thefts, or approximately 5 motor vehicles stolen is stolen every 16 minutes. Property losses due to motor vehicle theft in 2014 were estimated at $1.5 billion.

Commonly used tools:

- Slide hammer puller to break into the door locks and the cylinder lock.
- Multimeters or a test light to find a power source.
- Spare wires and/or a screwdriver to connect the power source to the ignition and starter wires.
- A generic rod and hook toolkit to slip between the car window and car frame and to open the lock behind the window. A common one is called the "SlimJim".
- Many keyless ignition/lock cars have weak or no cryptographic protection of the unlock signal. Proof-of-concept "thefts" of top-of-the-line luxury cars have been demonstrated by academic researchers using commercially available tools such as RFID microreaders, but is unknown whether the attack has been used for actual theft.
- A fire arm or other weapon such as a baseball bat, or a utility knife or a box cutter to break open a window or threaten a passenger if inside the car.
- OBD key cloning kits.

Vehicles most frequently stolen:

The makes and models of vehicles most frequently stolen vary by several factors, including region and ease of theft. In particular, the security systems in older vehicles may not be upto the same standard as current vehicles, and thieves also have longer to learn their weaknesses. Scrap metal and spare part prices may also influence thieves to prefer older vehicles. In Bangkok, Thailand, the most frequently stolen vehicles are Toyota cars, Toyota Hilux and Isuzu D-Max pickups. In Malaysia, Proton models are the most frequently stolen vehicles, with Proton Wira being the highest, followed by the Proton Waja and the Proton Perdana.

1.2 Problems In Current Scenario

Some methods used by criminals to steal motor vehicles includes:

- Theft of an unattended vehicle without key(s): The removal of a parked vehicle either by breaking and entry, followed by hotwiring or other tampering methods to start the vehicle, or else towing. In London the police say that 50% of the annual 20,000 car thefts are now from high tech OBD (Onboard Diagnostic Port) key cloning kits (available online) and bypass immobilizer simulators.
- Theft with access to keys: Known in some places as "Taken Without Owner's Consent (TWOC)". The unauthorized use of a vehicle in which the owner has allowed the driver to have possession of or easy access to the keys. Oten, this is the adolescent or grown child or employee of the vehicle's owner who, at other times, maybe authorized to use the vehicle. This may be treated differently, depending on the jurisdiction's laws, and the owner may choose not to press charges. However, this method also applies to criminals who break into a car and find that the owner has left a spare set of keys in the glove box, and use these to drive the car away.
- Opportunistic theft: The removal of a vehicle that the owner or operator has lefl unattended with the keys visibly present, sometimes idling. Altematively, some cars offered for sale are stolen during a ‘test drive’. A ‘test drive’ may also provide a potential thief with insight into where the vehicle keys are stored, so that the thief may retum later to steal the vehicle.
- Carjacking: Refers to the taking of a vehicle by force or threat of force from its owner or operator. In most places, this is the most serious form of theft, since assault also occurs. In some carjacking, the operators and passengers are forced from the vehicle

while the thief drives it away him/herself, while in other incidents, the operator and/or passenger(s) are forced to remain in the vehicle as hostages. Some less common carjacking result in the operator being forced to drive the assailant in accordance with the assailant's demands.

- Fraudulent theft: Illegal acquisition of a vehicle from a seller through fraudulent transfer of funds that the seller will ultimately not receive (such as by identity thet or the use of a counter feitcashief's check), or through the use of a loan obtained under false pretenses. Many vehicles stolen via fraud are resold quicldy thereafter. Using this approach, the thief can quietly evade detection and continue stealing vehicles in different jurisdictions. Car rental and car dealership companies are also defrauded by car thieves into renting, selling, financing, or leasing them cars with fake identification, checks and credit cards. This is a common practice in areas near borders which tracking devices do nothing because jurisdiction cannot be applied into a foreign country to recover a lost vehicle.

1.3 Possible Solution

There are various methods of prevention to reduce the likelihood of a vehicle getting stolen. These include physical barriers, which make the effort ofstealing the vehicle more difficult. Some of these include:

- Devices used to lock a part of the vehicle necessary in its operation, such as the wheel, steering wheel or brake pedal. A popular steering wheel lock is The Club.
- Inmobilizers, allowing the vehicle to start only if a key containing the correct chip is present in the ignition. These work by locking the steering wheel and disabling the ignition.
- Chances of theft can also be reduced with various deterrents, which give the impression to the thief that s/he is more likely to get caught if the vehicle is stolen. These includes:
    - Car alarm systems that are triggered if a breaking and entry into the vehicle occurs.
    - Microdot identification tags which allow individual parts of a vehicle to be

identified.

- Kill switch circuits are designed to frustrate or slow down the efforts of a determined car thief. Kill switches are often located between crucial parts of the starting system, between the battery source and the coil, or the fuel pump. A car cannot start without first flipping these kill switches to closed position. Savvy car owners hide these kill switches in obscured areas, under the dashboard, beneath the seat, behind a chair, etc.
  - Signage on windows warning of the presence of other deterrents, sometimes in absence of the actual deterrents.

1.4 Outcome Of Our Work

The aim of this project is to use wireless technology to intimate the owner of the vehicle about any unauthorized entry. This is done by sending an auto-generated SMS to the owner. An added advantage of this project is that the owner can send back the SMS which will disable the ignition of the vehicle.

As the crime rate is going up, security system for vehicles is extremely essential. In this proposed system if someone tries to steal the car, the microcontroller gets an interrupt through a switch mechanism connected to the system and commands the GSM modem to send a SMS.

It is thus now possible for us to have total control over our vehicle usingVehicle Anti-theft system with the help of GSM module. Moreover, we can employ GPS module to get to know the current location of the vehicle. Hence this system can thus serve as a remote control to our vehicle. As soon as we get to know about an unauthorized access to our vehicle, we can get it stopped by sending an SMS using our Registered Mobile Numbers (RMNs).

The Electronic Lighter is used in our project will provide continues spark/ignition that will then stop the engine of the vehicle, as soon as the message is sent to the PIC18F2550.

Thus, owner of the vehicle from anywhere can switch off ignition of his car. This project can be further enhanced by integrating a GPS system, which will give exact position of the vehicle in terms of its latitude and longitude. Further this data can be sent to the owner via SMS who can enter this value on Google maps to get the exact location of the vehicle.

CHAPTER 2
TOOLS USED AND METHODOLOGY ADOPTED

2.1 List Of Components:

Table 2.1 Componentes Used

Sr. No.	Components	Quantity
1.	PIC18F2550	1
2.	GSM Modem SIM900	1
3.	GPS Modem GY-NEO6MV2	1
4.	LCD Display (16x2)	1
5.	LED	4
6.	Diodes	1
7.	Amplifiers (LM358)	3
8.	Registors	19
9.	Capacitors	4
10.	Relays	4
11.	Transistors	6
12.	Switch	1
13.	Piezoelectric	1

2.1.1 PIC18F2550

Ideal for low power (nanoWatt) and connectivity applications that benefit from the availability of three serial ports: FS-USB (12 Mbit/s), I^2C and SPI (up to 10Mbit/s) and an asynchronous (LIN capable) serial port (EUSART). Large amounts of RAM memory for buffering and Enhanced FLASH program memory make it ideal for embedded control and monitoring applications that require periodic connection with a (legacy free) Personal Computer via USB for data upload/download and/or firmware updates. While operating up to 48 MHz, the PIC18F2550 is also mostly software and hardware compatible with the PIC16C745 Low-Speed USB OTP devices.

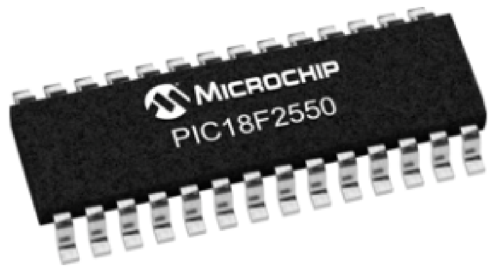


Fig. 2.1 Microchip PIC18F2550

Pin Diagram & Description

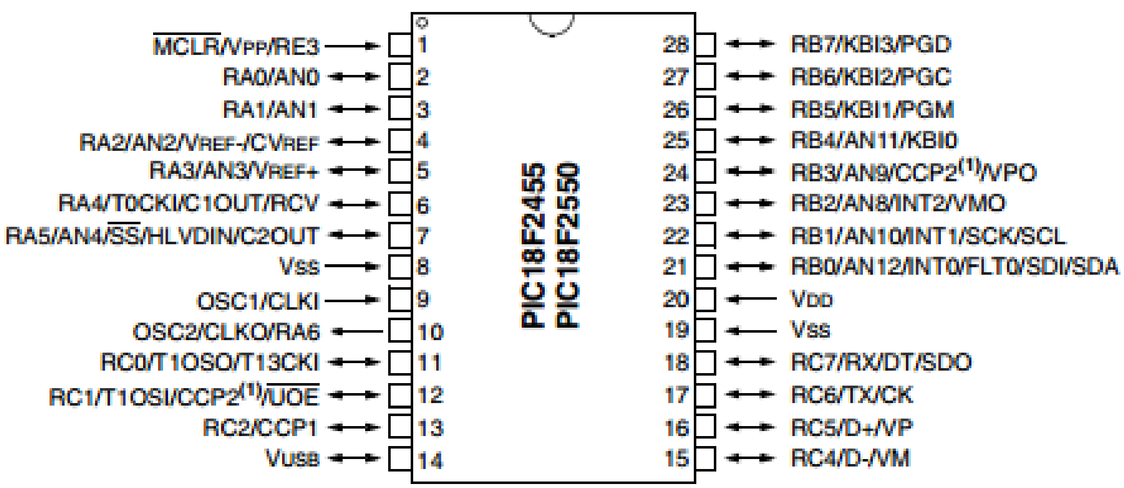
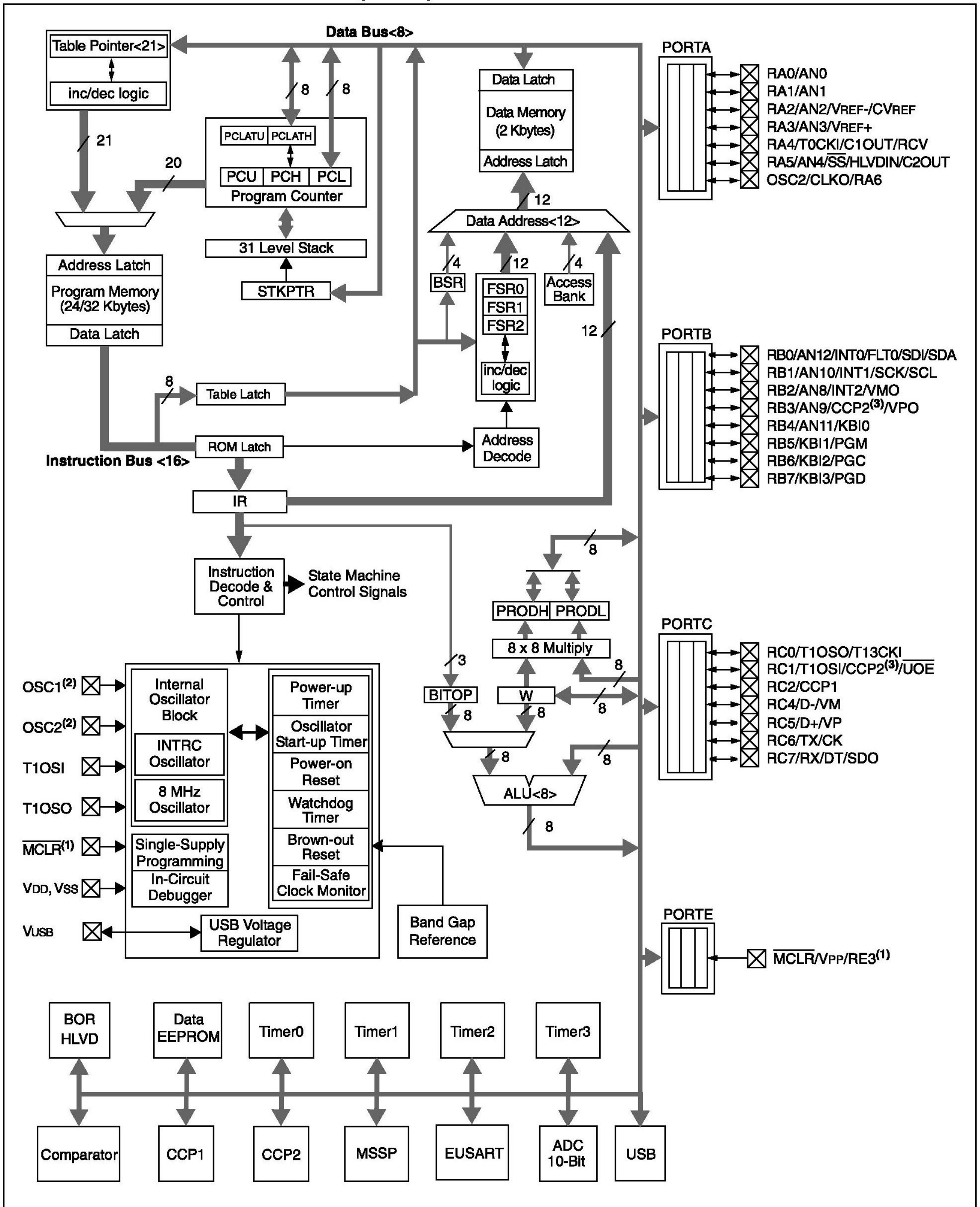


Fig. 2.2 Pin Diagram of PIC18F2550

Table 2.2 Features of PIC18F2550[2]:

Features	PIC18F2550
Operating Frequency	DC – 48 MHz
Program Memory (Bytes)	32768
Program Memory (Instructions)	16384
Data Memory (Bytes)	2048
Data EEPROM Memory (Bytes)	256
Interrupt Sources	19
I/O Ports	Ports A, B, C, (E)
Timers	4
Capture/Compare/PWM Modules	2
Enhanced Capture/ Compare/PWM Modules	0
Serial Communications	MSSP, Enhanced USART
Universal Serial Bus (USB) Module	1
10-Bit Analog-to-Digital Module	10 Input Channels
Comparators	2
Resets (and Delays)	POR, BOR, RESET Instruction, Stack Full, Stack Underflow (PWRT, OST), WDT
Programmable Low-Voltage Detect	Yes
Programmable Brown-out Reset	Yes
Instruction Set	75 Instructions; 83 with Extended Instruction Set enabled
Packages	28-pin PDIP 28-pin SOIC



Note 1: RE3 is multiplexed with $\overline{MCLR}$ and is only available when the $\overline{MCLR}$ Resets are disabled.

2: OSC1/CLKI and OSC2/CLKO are only available in select oscillator modes and when these pins are not being used as digital I/O. Refer to **Section 2.0 "Oscillator Configurations"** for additional information.

3: RB3 is the alternate pin for CCP2 multiplexing.

Fig. 2.3 Block Diagram of PIC18F2550[3]

Table 2.3 PIC18F2550 PINOUT I/O DESCRIPTIONS[4]:

Pin Name	Pin No.	Pin Type	Buffer Type	Description
	PDIP, SOIC			
MCLR/VPP/R3	1			Master Clear (input) or programming voltage (input).
MCLR		I	ST	Master Clear (Reset) input. This pin is an active low Reset to the device.
VPP		P		Programming voltage input.
RE3		I	ST	Digital input.
OSC1/CLKI	9			Oscillator crystal or external clock input.
OSC1		I	Analog	Oscillator crystal input or external clock source input.
CLKI		I	Analog	External clock source input. Always associated with pin function OSC1. (See OSC2/CLKO pin.)
OSC2/CLKO/RA6	10			Oscillator crystal or clock output.
OSC2		O	—	Oscillator crystal output. Connects to crystal or resonator in Crystal Oscillator mode.
CLKO		O	—	In select modes, OSC2 pin outputs CLKO which has 1/4 the frequency of OSC1 and denotes the instruction cycle rate.
RA6		I/O	TTL	General purpose I/O pin.
				PORT A is a bidirectional I/O port
RA0/AN0	2			
RA0		I/O	TTL	Digital I/O.
AN0		I	Analog	Analog input 0.
RA1/AN1	3			
RA1		I/O	TTL	Digital I/O.
AN1		I	Analog	Analog input 1.
RA2/AN2/VREF-/CVREF	4			
RA2		I/O	TTL	Digital I/O.
AN2		I	Analog	Analog input 2.
VREF-		I	Analog	A/D reference voltage (low) input.
CVREF		O	Analog	Analog comparator reference output.
RA3/AN3/	5			

VREF+				
RA3		I/O	TTL	Digital I/O.
AN3		I	Analog	Analog input 3.
VREF+		I	Analog	A/D reference voltage (high) input.
RA4/T0CKI/	6			
C1OUT/RCV				
RA4		I/O	ST	Digital I/O.
T0CKI		I	ST	Timer0 external clock input.
C1OUT		O	—	Comparator 1 output.
RCV		I	TTL	External USB transceiver RCV input.
RA5/AN4/SS/	7			
HLVDIN/C2O				
UT		I/O	TTL	Digital I/O.
RA5		I	Analog	Analog input 4.
AN4		I	TTL	SPI slave select input.
SS		I	Analog	High/Low-Voltage Detect input.
HLVDIN		O	—	Comparator 2 output.
C2OUT	—	—	—	See the OSC2/CLKO/RA6 pin
RA6				
				PORT B is a bidirectional I/O port. PORTB can be software programmed for internal weak pull-ups on all inputs.
RB0/AN12/IN	21			
T0/FLT0/				
SDI/SDA				
RB0		I/O	TTL	Digital I/O.
AN12		I	Analog	Analog input 12.
INT0		I	ST	External interrupt 0.
FLT0		I	ST	PWM Fault input (CCP1 module).
SDI		I	ST	SPI data in.
SDA		I/O	ST	2C™ data I/O.
RB1/AN10/IN	22			
T1/SCK/ SCL				
RB1		I/O	TTL	Digital I/O.
AN10		I	Analog	Analog input 10.
INT1		I	ST	External interrupt 1.
SCK		I/O	ST	Synchronous serial clock input/output for SPI
SCL		I/O	ST	mode.
RB2/AN8/INT	23			Synchronous serial clock input/output for I2C
2/VMO				mode.
RB2		I/O	TTL	
AN8		I	Analog	
INT2		I	ST	Digital I/O.

VMO		O	—	Analog input 8.
RB3/AN9/CC	24			External interrupt 2.
P2/VPO				External USB transceiver VMO output.
RB3		I/O	TTL	
AN9		I	Analog	
CCP2(1)		I/O	ST	Digital I/O.
VPO		I	—	Analog input 9.
RB4/AN11/	25			Capture 2 input/Compare 2 output/PWM 2
KBI0				output
RB4		I/O	TTL	External USB transceiver VPO output.
AN11		I	Analog	
KBI0		I	TTL	
RB5/KBI1/	26			Digital I/O.
PGM				Analog input 11.
RB5		I/O	TTL	Interrupt-on-change pin.
KBI1		I	TTL	
PGM		I/O	ST	
RB6/KBI2/PG	27			Digital I/O.
C		I/O	TTL	Interrupt-on-change pin.
RB6		I	TTL	Low-Voltage ICSP Programming enable pin.
KBI2		I/O	ST	
PGC	28			Digital I/O.
RB7/KBI3/PG		I/O	TTL	Interrupt-on-change pin.
D		I	TTL	In-Circuit Debugger & ICSP programming clock
RB7		I/O	ST	pin.
KBI3				
PGD				Digital I/O.
				Interrupt-on-change pin.
				In-Circuit Debugger & ICSP programming data
				pin
				PORT C is a bidirectional I/O port
RC0/T1OSO/	11			
T13CKI				
RC0		I/O	ST	Digital I/O.
T1OSO		I	—	Timer1 oscillator output.
T13CKI		O	ST	Timer1/Timer3 external clock input.
RC1/T1OSI/	12			
CCP2/UOE				
RC1		I/O	ST	Digital I/O.
T1OSI		I	CMOS	Timer1 oscillator input.
CCP2(2)		I/O	ST	Capture 2 input/Compare 2 output/PWM 2
UOE		I	—	output
RC2/CCP1	13			External USB transceiver OE output.

RC2		I/O	ST	
CCP1		I/O	ST	Digital I/O.
RC4/D-/VM	15			Capture 1 input/Compare 1 output/PWM 1
RC4		I	TTL	output.
D-		I/O	—	
VM		I	TTL	Digital input
RC5/D+/VP	16			USB differential minus line (input/output).
RC5		I	TTL	External USB transceiver VM input.
D+		I/O	—	
VP		O	TTL	Digital input
RC6/TX/CK	17			USB differential plus line (input/output).
RC6		I/O	ST	External USB transceiver VP input.
TX		O	—	
CK		I/O	ST	Digital I/O.
RC7/RX/DT/	18			EUSART asynchronous transmit.
SDO				EUSART synchronous clock (see RX/DT).
RC7		I/O	ST	
RX		I	ST	
DT		I/O	ST	Digital I/O.
SDO		O	—	EUSART asynchronous receive.
				EUSART synchronous data (see TX/CK).
				SPI data out.

2.1.2 GSM Modem

The GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS control, data transfer, remote control and logging can be developed easily.

The modem can either be connected to PC serial port directly or to any microcontroller through MAX232. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to intemet and do many applications for data logging and control.

In GPRS mode you can also connect to any remote FTP server and upload files for datalogging. The GSM modem is a highly flexible plug and play quad band SIM900A GSM modem for direct and easy integration to RS232 applications. Supports features like

Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.

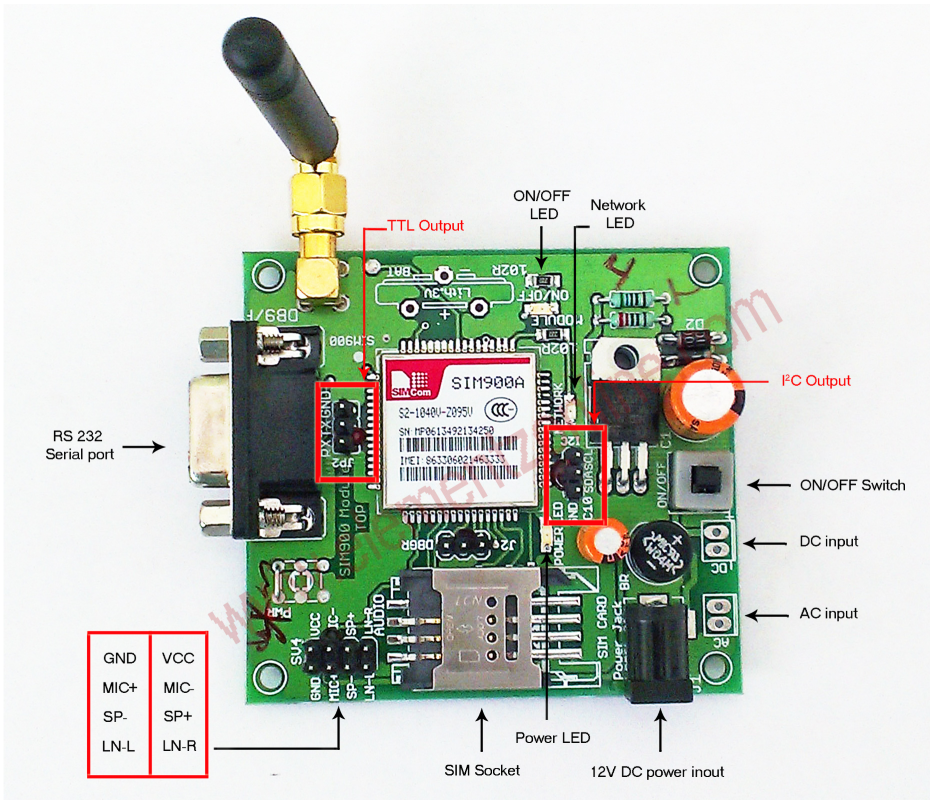


Fig. 2.4 GSM Modem[5].

Specifications of GSM

- Modulation: Modulation is a form of change process where we change the input information into a suitable format for the transmission medium. We also changed the information by demodulating the signal at the receiving end. The GSM uses Gaussian Minimum Shift Keying (GMSK) modulation method.
- Access Methods: GSM choose a combination of TDMA/FDMA as its method. The FDMA part involves the division by frequency of the total 25 MHz bandwidth into 124 carrier frequencies of 200 kHz bandwidth. One or more carrier frequencies are then assigned to each BS. Each of these carrier frequencies is then divided in time, using aTDMA scheme, into eight time slots. One time slot is used for transmission by the mobile and one for reception. They are separated in time so that the mobile unit

does not receive and transmit at the same time.

- Transmission Rate: The total symbol rate for GSM at l bit per symbol in GMSK produces 270.833 K symbols/second. The gross transmission rate of the time slot is 22.8 Kbps. GSM is digital system with an over-the-air bit rate of 270 kbps.
- Frequency Band: The uplink frequency range specified for GSM is 933-960 MHz (basic 900 MHz band only). The down link frequency band 890-915MHz (basic 900 MHz band only).
- Channel Coding: This indicates separation between adjacent carrier frequencies. In GSM, this is 200 kHz.
- Speech Coding: GSM uses linear predictive coding (LPC). The purpose of LPC is to reduce the bit rate. The LPC provides parameters for a filter that mimics the vocal tract. The signal passes through this filter, leaving behind a residual signal. Speech is encoded at 13 kbps.
- Duplar Distance: The duplex distance is 80 MHz. Duplex distance is the distance between the uplink and downlink frequencies. A channel has two frequencies, 80 MHz apart.

2.1.3 Two line LCD Display

We have used a two line LCD display i.e 16x2 LCD display which means it has two rows and 16 columns, thus the maximum number of character which it can display is 32.

The LCD panel's Enable and Register Select is connected to the Control Port. The Control Port is an open collector / open drain output. While most Parallel Ports have intenal pull-up resistors, there are a few which don't. Therefore by incorporating the two 10K extemal pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no intemal pull up resistors.

We make no effort to place the Data bus into reverse direction. Therefore we hard wire the R/W line of the LCD panel, into write mode. This will cause no bus conflicts on the data lines. As a result we cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into our program.

The 10k Potientionmeter controls the contrast of the LCD panel. Nothing fancy here. As with all the examples, I've left the power supply out. You can use a bench power supply set to 5V or use an onboard +5 regulator. Remember a few de-coupling capacitors, especially if you have trouble with the circuit working properly.

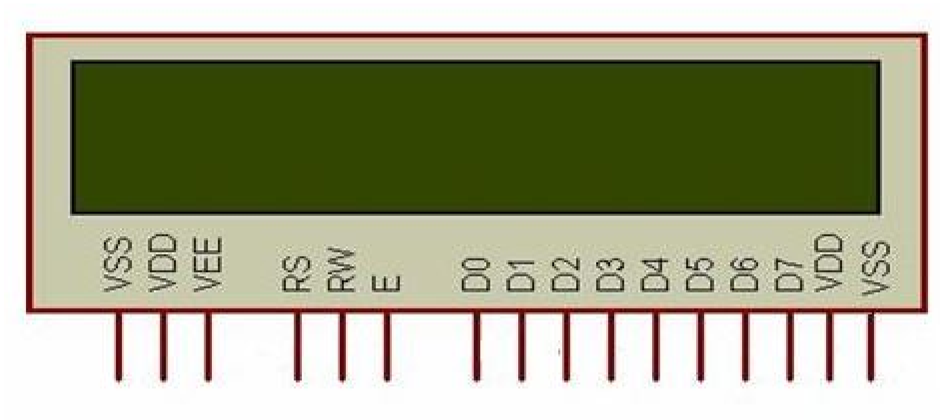


Fig. 2.5 Two line LCD display[6]

2.1.4 GPS: Global Positioning System

GPS or Global Positioning System[7] is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe. GPS provides continuous real time, 3-dimensional positioning, navigation and timing worldwide. The GPS system consists of three segments:

1. The space segment: the GPS satellites
2. The control system, operated by the U.S. military
3. The user segment, which includes both military and civilian users and their GPS equipment.

The working/operation of Global positioning system is based on the 'trilateration' mathematical principle. The position is determined from the distance measurements to satellites. From the figure, the four satellites are used to determine the position of the receiver on the earth. The target location is confirmed by the 4th satellite. And three satellites are used to trace the location place. A fourth satellite is used to confirm the target location of each of those space vehicles. Global positioning system consists of satellite, control station and monitor station and receiver. The GPS receiver takes the information from the satellite and uses the method of triangulation to determine a user's exact position.

Advantages of GPS:

- GPS satellite based navigation system is an important tool for military, civil and commercial users.
- Vehicle tracking systems GPS-based navigation systems can provide us with turn by turn directions.
- Very high speed.

Disadvantages of GPS:

- GPS satellite signals are too weak when compared to phone signals, so it doesn't work as well indoors, underwater, under trees, etc.
- The highest accuracy requires line-of-sight from the receiver to the satellite, this is why GPS doesn't work very well in an urban environment.

Errors of GPS:

There are many sources of possible errors that will degrade the accuracy of positions computed by a GPS receiver. The travel time taken by the GPS satellite signals can be changed by atmospheric effects; when a GPS signal passes through the ionosphere and troposphere it is refracted, causing the speed of the signal to be different from the speed of a GPS signal in space. Another source of error is noise, or distortion of the signal which causes electrical interference or errors inherent in the GPS receiver itself. The information about satellite orbits will also cause errors in determining the positions, because the satellites are not really where the GPS receiver "thought" based on the information it received when it determine the positions. Small variations in the atomic clocks on board the satellites can translate to large position errors; a clock error of 1 nanosecond translates to 1 foot or .3 meters user error on the ground. A multipath effect occurs when signals transmitted from the satellites bounce off a reflective surface before getting to the receiver antenna. During this process, the receiver gets the signal in straight line path as well as delayed path (multiple paths). The effect is similar to a ghost or double image on a TV set.

Fig. 2.6 GY-NEO6MV2 Flight Controller GPS Module[8]

2.1.5 Diode

The diode is a p-n junction device. Diode is the component used to control the flow of the current in any one direction. The diode widely works in forward bias. When the current flows from the P to N direction. Then it is in forward bias. The Zener diode is used in reverse bias function i.e. N to P direction. Visually the identification of the diode's terminal can be done by identifying he silver/black line. The silver/black line is the negative terminal (cathode) and the other terminal is the positive terminal (cathode).

2.1.6 LED: Light-Emitting Diode

LED falls within the family of P-N junction devices. The light emitting diode (LED) is a diode that will give off visible light when it is energized. In any forward biased P-N junction there is, with in the structure and primarily close to the junction, a recombination of hole and electrons. This recombination requires that the energy possessed by the unbound free electron be transferred to another state. The process of giving off light by applying an electrical source is called electroluminescence.

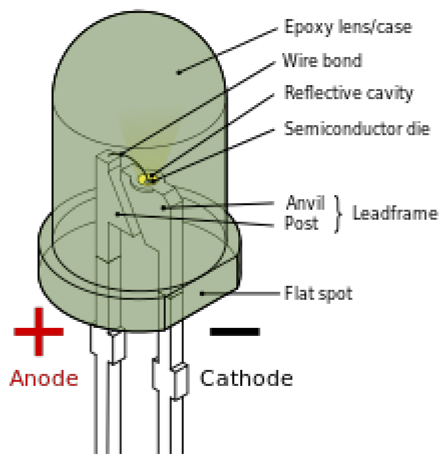


Fig. 2.7 LED[9]

2.1.7 SIM Card

What is a SIM card ?

A SIM card[10], also known as a subscriber identity module, is a subscriber identity module application on a smartcard that stores data for GSM/CDMA Cellular telephone subscribers. Such data includes user identity, network authorization data, personal security keys, contact lists and stored text messages. Security features include Authentication and encryption to protect data and prevent eavesdropping.

The smartcard with Subscriber identity module application is generally known as SIMCARD. But, in reality, the SIM is effectively a mass-market smartcard. When the SIM is viewed as a smartcard, it opens up security possibilities that resonate far beyond the mobile world.

By combining stored evidence of identity (such as a key) with personal information only the user will know (a password, for example), it offers the same two-tier authorization provided by smartcards. It is becoming clear that the SIM -- a feature unique to the mobile world -- has applications far beyond those for which it was origianlly designed. The clue is in the name -- Subscriber Identity Module. It was created to remotely authenticate users to the network and to the billing systems that allow operators to generate revenues from voice traffic. the GSM standards as specified by ETSI requires authentication of a mobile subscriber through a secure device (the SIM card).
TheSIM card performs the following valuable functions:
Identification of a subscriber. The IMSI progrmnmed on the SIM card, is the identity of a subscriber. Each IMSI is mapped to a mobile number and provisioned on the HLR to allow a subscriber to be identified.
Authentication of a subscriber: This is a process, where, using the authentication algorithm (COMPl28V3 for 2/2.5 G GSM, CAVE for CDMA and Milenage for 3G) on the S1M card, a unique response is provided by each subscriber based on IMSI, Ki (stored on SIM) and RAND (provided by network). By matching this response with values computed on the network a legal subscriber is logged onto the network and he or she can now make use the services of the mobile service provider.
Storage: To store phone numbers and SMS.
Applications: The SIM Tool Kit or GSM 11.14 standard allows creating applications on the SIM to provide basic information on demand and other applications for m-commerce, chatting, cell broadcast, phonebook backup, location based services etc.

2.1.8 Piezoelectric Sensor

A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, temperature, strain, or force by converting them to an electrical charge. The prefix piezo- is Greek for 'press' or 'squeeze'.

What is the Piezoelectric Effect?

Piezoelectric Effect[11] is the ability of certain materials to generate an electric charge in response to applied mechanical stress. When piezoelectric material is placed under mechanical stress, a shifting of the positive and negative charge centers in the material takes place, which then results in an external electrical field. When reversed, an outer electrical field either stretches or compresses the piezoelectric material.

The piezoelectric effect is very useful within many applications that involve the production and detection of sound, generation of high voltages, electronic frequency generation, microbalances, and ultra fine focusing of optical assemblies. It is also the basis of a number of scientific instrumental techniques with atomic resolution, such as scanning probe microscopes (STM, AFM, etc). The piezoelectric effect also has its use in more mundane applications as well, such as acting as the ignition source for cigarette lighters.

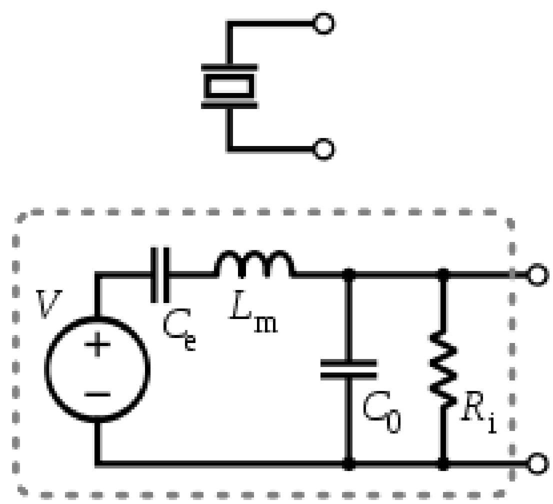


Fig. 2.8 Piezoelectric Sensor Circuit Diagram[12]

2.1.9 Relays

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays[13] are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".

Magnetic latching relays require one pulse of coil power to move their contacts in one direction, and another, redirected pulse to move them back. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts.

Magnetic latching relays can have either single or dual coils. On a single coil device, the relay will operate in one direction when power is applied with one polarity, and will reset when the polarity is reversed. On a dual coil device, when polarized voltage is applied to the reset coil the contacts will transition. AC controlled magnetic latch relays have single coils that employ steering diodes to differentiate between operate and reset commands.

Fig. 2.9 Relay

2.2 Software Tools

Software used in this project are mikroC PRO and Proteus Design Suite.

2.2.1 mikroC PRO

PIC and C fit together well: PIC is the most popular 8-bit chip in the world, used in a wide variety of applications, and C, prized for its efficiency, is the natural choice for developing embedded systems. mikroC PRO[14] for PIC provides a successful match featuring highly advanced IDE, ANSI compliant compiler, broad set of hardware libraries, comprehensive documentation, and plenty of ready-to-run examples.

Features of mikroC PRO:

mikroC PRO for PIC allows you to quickly develop and deploy complex applications:

- Write your C source code using the built-in Code Editor (Code and Parameter Assistants, Code Folding, Syntax Highlighting, Auto Correct, Code Templates, and more.)
- Use included mikroC PRO for PIC libraries to dramatically speed up the devel opment: data acquisition, memory, displays, conversions, communication etc.
- Monitor your program structure, variables, and functions in the Code Explorer.
- Generate commented, human-readable assembly, and standard HEX compati ble with all programmers.
- Use the integrated mikroICD (In-Circuit Debugger) Real-Time debugging tool to monitor program execution on the hardware level.
- Inspect program flow and debug executable logic with the integrated Software Simulator.
- Get detailed reports and graphs: RAM and ROM map, code statistics, assembly listing, calling tree, and more.
- mikroC PRO for PIC provides plenty of examples to expand, develop, and use as building bricks in your projects. Copy them entirely if you deem fit – that’s why we included them with the compiler.

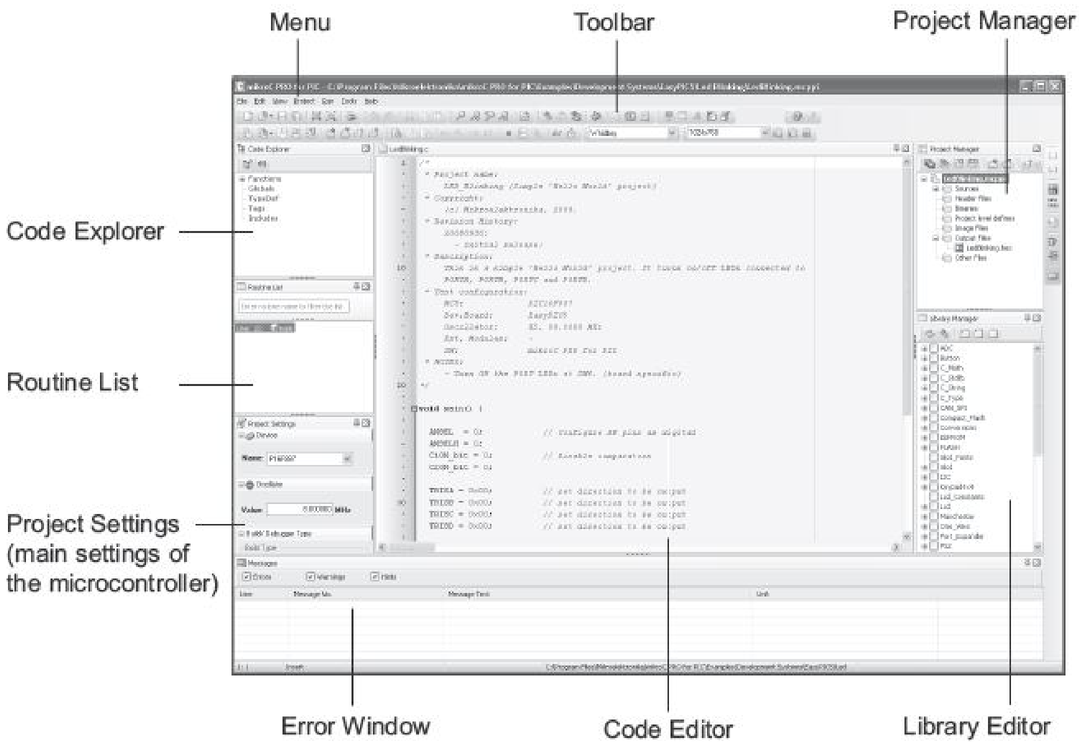


Fig. 2.10 IDE for mikroC PRO for PIC

2.2.2 Some AT Commands

Here are some of the tasks that can be done using AT commands[15] with a GSM/GPRS modem or mobile phone:

- Get basic information about the mobile phone or GSM/GPRS modem. For example, name of manufacturer (AT+CGMI), model number (AT+CGMM), IMEI number (International Mobile Equipment Identity) (AT+CGSN) and software version (AT+CGMR).
- Get basic information about the subscriber. For example, MSISDN (AT+CNUM) and IMSI number (International Mobile Subscriber Identity) (AT+CIMI).
- Get the current status of the mobile phone or GSM/GPRS modem. For example, mobile phone activity status (AT+CPAS), mobile network registration status (AT+CREG), radio signal strength (AT+CSQ), battery charge level and battery charging status (AT+CBC).

- Establish a data connection or voice connection to a remote modem (ATD, ATA, etc).
- Send and receive fax (ATD, ATA, AT+F*).
- Send (AT+CMGS, AT+CMSS), read (AT+CMGR, AT+CMGL), write (AT+CMGW) or delete (AT+CMGD) SMS messages and obtain notifications of newly received SMS messages (AT+CNMI).
- Read (AT+CPBR), write (AT+CPBW) or search (AT+CPBF) phonebook entries.
- Perform security-related tasks, such as opening or closing facility locks (AT+CLCK), checking whether a facility is locked (AT+CLCK) and changing passwords (AT+CPWD).
- (Facility lock examples: SIM lock [a password must be given to the SIM card every time the mobile phone is switched on] and PH-SIM lock [a certain SIM card is associated with the mobile phone. To use other SIM cards with the mobile phone, a password must be entered.])
- Control the presentation of result codes / error messages of AT commands. For example, you can control whether to enable certain error messages (AT+CMEE) and whether error messages should be displayed in numeric format or verbose format (AT+CMEE=1 or AT+CMEE=2).
- Get or change the configurations of the mobile phone or GSM/GPRS modem. For example, change the GSM network (AT+COPS), bearer service type (AT+CBST), radio link protocol parameters (AT+CRLP), SMS center address (AT+CSCA) and storage of SMS messages (AT+CPMS).
- Save and restore configurations of the mobile phone or GSM/GPRS modem. For example, save (AT+CSAS) and restore (AT+CRES) settings related to SMS messaging such as the SMS center address.

2.2.3 Proteus Design Suite

The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules. It is developed in Yorkshire, England by Labcenter Electronics Ltd with offices in North America and several overseas sales channels. The software runs on the Windows operating system and is available in English, French, Spanish and Chinese languages.

Proteus ISIS is the best simulation software in the world for various designs with electronics & microcontroller. It is mainly popular because of availability of almost all microcontrollers in it. So it is a handy tool to test programs and embedded designs for electronics hobbyist & expert. You can simulate your programming of microcontroller in Proteus 8 Simulation Software.

With Proteus we can

- Alter your 'hardware' by rewiring the circuit diagram, varying component values for resistors, capacitors etc.
- Removing or making new components to the design.
- You can change your firmware in the IDE of your choice and, once compiled, test the new code on the new system at the press of a button.
- Reprogramming microcontroller: In practical there is limitation to flash the memory of microcontroller but in Proteus you can burn program unlimited times.
- Attain confident that your program will work for real world applications.

  This brings you total freedom to experiment with diverse ideas and to discover the optimal design solution for our project. The schematic serves as a 'virtual prototpye' for the firmware and it's quick and easy to make changes to either.

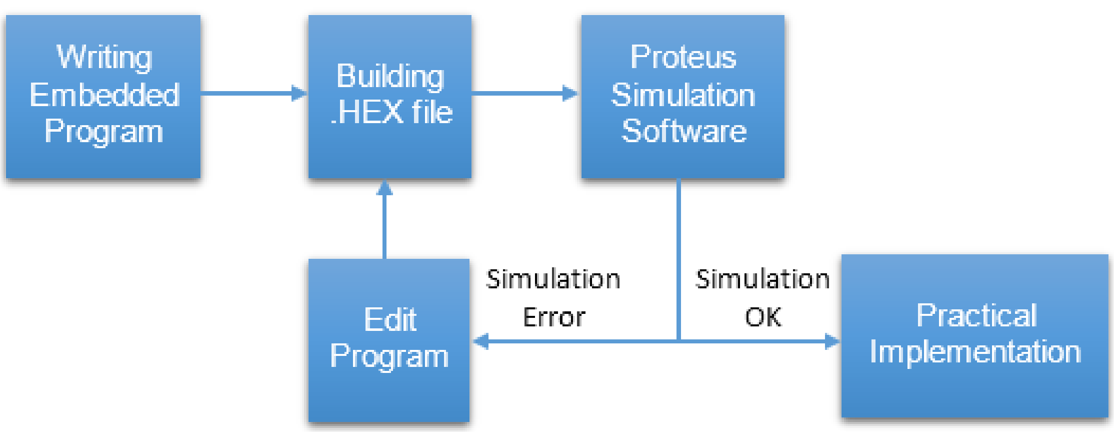


Fig. 2.11 Simulation Testing in Proteus[16]

CHAPTER 3
WORKING & PROGRAM CODE OF THE PROJECT

3.1 Working Of The Project

The proposed model is a prototype, which when placed inside a car can help in preventing theft and also can help in tracking the location of the vehicle.

Initially the project is connected with its power supply which are rechargeable cells connected with the battery of the vehicle. The cells are chosen rechargeable so that there is no load on the battery of the car during off period.

The purpose of not choosing the cells alone is that it will need more maintenance and it may happen a worst case scenario that the cells dies when the car is being stolen.

When the proposed system is implemented in the vehicle then it acts for four major functions:

1. Tracks the location of the vehicle.
2. The vehicle can be stopped whenever we want.
3. During the condition of extreme danger it can notify our friends via “Tap Sensor” & it will even stop the vehicle in few minutes.
4. Will notify regarding any accident/mishap to the registered numbers along with the location.

When the system is activated it can continuously work for the Tap Sensor and the location tracking system. By messaging “AA” to the SIM placed in the module by the authorized number (here we have used 3 authorized numbers), the GPS co-ordinates of the car will be received on your device.

Imagine you parked your car in your premises but upon sending “AA” the location of the car you received shows some other locality. So, even while sitting on your chair by messaging “BB” to the SIM placed in the module by the authorized number; you not only receives the new GPS location of the car but you will also be able to turn off the car's ignition.

In case of any sort of danger or gun point theft, we are placing a tap sensor in the car within the reach of the driver which he/she can tap without being noticed by the intruder, which will not only send an alert message to the other authorized number but it will also shutting down the engine of the car after a time span of 1 minute (this can can increased as per our need); giving enough time to the driver to run away.

Another feature that we are provding is that during any mishap/accident, the GSM module will send alert message to the other authorized number along with the GPS location of the car/vehicle.

As all the functions are controlled by GSM SIM, thus the advantage is that it can be connected worldwide easily and the tracking can be long ranged.

3.2 Programming Code

3.2.1 Main Setting Code

```
void mainsettings()
{
trisb.f0=1;
portc.f0=0;
trisc.f0=0;
trisa.f4=1;
trisc.f1=0;
portc.f1=0;
trisc.f5=1;
trisc.f4=0;
portc.f4=0;
trisb.f6=1;
portc.f0=0;
```

```
trisc.f0=0;
//T1CON        = 0x31;
cmcon|=7;
adcon0=1;
adcon1=0x0e;
lcd_init();
lcd_cmd(_lcd_cursor_off);
  lcd_cmd(_lcd_clear);
  lcd_out(1,1,"WELCOME");
   Delay_ms(200);
portc.f1=1;     //start gsm module

/////////////////////////////////
/*
GIE_BIT=0;
  UART1_Init(9600);              // Initialize UART module at 9600 bps
  Delay_ms(500);                 // Wait for UART module to stabilize
 config();                       /////////////configration gsm
GIE_BIT=1;    */
 /////////////////////////////////

  //tmr1ie_bit=0;    //////////////////
    //Delay_ms(1000);

//t0con=0xf8;
gie_bit=1;
//tmr0l=tmr0h=0;
//tmr1l=0xdc;
//tmr1h=0x0b;
```

```
//tmr1if_bit=0;
peie_bit=1;
//tmr1ip_bit=1;
//tmr1on_bit=1;
//tmr0ie_bit=0;
//tmr1ie_bit=1;
intedg0_bit=1;
int0ie_bit=1;
int0if_bit=0;

    msg=0;
  accn=0;

 // DELAY_MS(500);
    //tmr1l=0xdc;
//tmr1h=0x0b;
//tmr0l=0;
  //  tmr1ie_bit=1;
    kks=0;
   accn=0;///////////////////acceleration
   portc.f3=0;     /////stop relay
   delay_ms(20);
   trisc.f1=0;
   trisc.f2=0;
   trisc.f3=0;
  //portc.f1=1; //activate gps receiver
  // portc.f2=0; //deactivate gsm receiver

}
```

3.2.2 GPS Code[17]

```
void gps()
{
////////////////
portc.f1=0; //activate gps receiver
portc.f2=1; //deactivate gsm receiver
gie_bit=0;
peie_bit=0;
tmr1ip_bit=0;
tmr1on_bit=0;
tmr0ie_bit=0;
tmr1ie_bit=0;
A:
        while(!uart1_data_ready());
        uart_rd=uart1_read();
         //uart1_write_text("A");   /////////////////////////
           while(uart_rd!='$')
           {

           while(!uart1_data_ready());
           uart_rd=uart1_read();
          //  uart1_write_text("B");   /////////////////////////
           }

              while(!uart1_data_ready());
               uart_rd=uart1_read();
            if(uart_rd=='G')
            {
```

```
  while(!uart1_data_ready());
   uart_rd=uart1_read();
// uart1_write_text("C");  ////////////////////////
   if(uart_rd=='P')
{

  while(!uart1_data_ready());
   uart_rd=uart1_read();
  // uart1_write_text("D");  ////////////////////////

     if(uart_rd=='G')
{
 // uart1_write_text("E");  ////////////////////////
  while(!uart1_data_ready());
   uart_rd=uart1_read();
     if(uart_rd=='G')
{
     //  uart1_write_text("f");  ////////////////////////
  while(!uart1_data_ready());
   uart_rd=uart1_read();
         if(uart_rd=='A')
{
    // uart1_write_text("g");  ////////////////////////
  while(!uart1_data_ready());
   uart_rd=uart1_read();
}
else
{
 goto A;
```

```
}
}
else
{
 goto A;
}

}
else
{
 goto A;
}
}
else
{
 goto A;
}
}
else
{
 goto A;
}
for(i=0;i<=10;i++)
{
uart_rd=uart1_read();
while(!uart1_data_ready());
}
        for(i=0;i<=31;i++)
        {
```

```
                if(i<=15)
                {
                a1[i]=UART1_Read();
                }
                else if((i>15)&&(i<=31))
                {
                k=i-16;
                b[k]=UART1_Read();
                }
                do
                {
                Delay_us(100);
                }while(!uart1_Data_Ready());
                 }
                 j=i+1;
                 lcd_cmd(_lcd_clear);
                 lcd_out(1,1,a1);
                 lcd_out(1,j,"              ");
                 if(i>15)
                 {
                 k=k+1;
                 lcd_out(2,1,b);
                 lcd_out(2,k,"               ");
              }
portc.f1=1; //activate gps receiver
portc.f2=0; //deactivate gsm receiver
}
```

3.2.3 Interrupt Code

```
  void adfad() iv 0x0008 ics ICS_AUTO {
 // tmr1if_bit=0;
  if(int0if_bit)
  {
  //portc.f1=0; //activate gps receiver
  //portc.f2=1; //deactivate gsm receiver
  msg=1;
  tmr1ie_bit=0;
  int0ie_bit=0;
  gie_bit=0;
  peie_bit=0;
  }
 // ii=tmr0l;
  //tmr0l=0;
  //tmr1l=0xdc;
//tmr1h=0x0b;
}
```

3.2.4 Receive SMS Code[18]

```
void RecSMS() // Receiving the SMS and extracting the Sender Mobile number &amp; Message Text
{
  tmr1ie_bit=0;
  int0ie_bit=0;
  gie_bit=0;
  peie_bit=0;
  ///////////////
        portc.f1=1; //DEactivate gps receiver
```

```
portc.f2=0; //activate gsm receiver
if (UART1_Data_Ready())
{
 IncData = UART1_Read();
 //UART1_Write_Text(IncData);
 if(IncData == '+'){RcvdCheck = 1;}
 if((IncData == 'C') && (RcvdCheck == 1)){RcvdCheck = 2;}
 if((IncData == 'M') && (RcvdCheck == 2)){RcvdCheck = 3;}
 if((IncData == 'T') && (RcvdCheck == 3)){RcvdCheck = 4;}
 ////////////done
 if(RcvdCheck == 4){index = 0;RcvdConf = 1; RcvdCheck = 0;}

 if(RcvdConf == 1)
 {
    if(IncData == 0x0d){RcvdEnd++;}          //////'n'
    if(RcvdEnd == 3){RcvdEnd = 0;}
    RcvdMsg[index] = IncData;
    index++;
    if(RcvdEnd == 2)
    {
    RcvdConf = 0;MsgLength = index-2;index = 0;
    }
    if(RcvdConf == 0)
    {
       //PortD.F3 = 1;
       //UART1_Write_Text("Mobile Number is: ");
       for(x = 4;x < 17;x++)
       {
          MsgMob[x-4] = RcvdMsg[x];
```

```
      //UART1_Write(MsgMob[x-4]);
    }

   // UART1_Write_Text("Message Text: ");
    for(x = 45;x < MsgLength;x++)
    {
      MsgTxt[x-45] = RcvdMsg[x];
      //UART1_Write(MsgTxt[x-46]);
    }
    if(RcvdMsg[47] == 'B')     //////////////////msg to stop car
    {
    msg=2;
     // trisc.f4=0;
      //portc.f4=1; ///////stop relay
      portc.f0=1;
     }//L1ON();}
     else if(RcvdMsg[47] == 'A')
       {
    msg=3;
       }
      /////////////////lcd
      lcd_cmd(_lcd_clear);
      lcd_out(1,2,"X");
      lcd_chr_cp(RcvdMsg[46]);
      delay_ms(2000);
      ////////////////////lcd
    ClearBuffers();
  }
}
```

```
    }
      tmr1ie_bit=0;
  int0ie_bit=1;
  gie_bit=1;
  peie_bit=1;
}
//////////////////////////////
```

3.2.5 Send SMS Code

```
void sentsms()
{
//if(msg==2)
//{
//delay_ms(60000);
//}
 for(i=0;i<=3;i++)                ///////////////////
{
 uart1_write_text("AT+CMGS=");
 uart1_write(34);
 if(i==0)
  {
 //uart1_write_text("9690517749");
  uart1_write_text("8791002280");
  }
 else if(i==1)
  {
 uart1_write_text("7895375916");
  }
  else if(i==2)
```

```
{
uart1_write_text("8791002280");
}
 //uart1_write_text("9690517749");
uart1_write(34);
  UART1_WRITE(13);
 // UART1_WRITE(10);
 DELAY_MS(500);
  // uart1_write_text("CURRENT SPEED");
 // uart1_write_text(mm);
 // uart1_write_text(" R.P.S.");
 // UART1_WRITE(13);
 //UART1_WRITE(10);
 if(msg==1)
  {
  uart1_write_text("ACCIDENT OCCURRED AT ");
  }
  else if(msg==2)
  {
  uart1_write_text("CAR STOPPED AT ");
  }
   else if(msg==3)
  {
  uart1_write_text("CAR LOCATION ");
  }
  UART1_WRITE(13);
 UART1_WRITE(10);
 b[8]=0;
 uart1_write_text(a1);
```

```
  uart1_write_text(b);
  delay_ms(500);
   uart1_write(26);
   delay_ms(4000);
   }
  // UART1_WRITE(13);
  //UART1_WRITE(10);
}
```

3.2.6 Setting Code

```
 unsigned  int i,j,k,l,m,nn=0,ii,jj,kk,accn;
unsigned short ra,rs,msg;
char a1[16],b[16],cs[3],as[1],da[13],ass,uart_rd;
     unsigned long int v=0;
       bit kks;
       //////////////////////////////////////
       char IncData;
int x =  0;
 char RcvdMsg[60] = "",aa[10];
unsigned int count,cta,tmp1;
int RcvdCheck = 0;
int RcvdConf = 0;
int index = 0;
int RcvdEnd = 0;
char MsgMob[15];
char MsgTxt[10];
int MsgLength = 0;

void RecSMS();
```

```
void ClearBuffers();
void Config();
void readings();
void Sendsms(unsigned short dev, unsigned short sts);
////////////////////////////////////main program starts here
//#include"recsms.h"
//#include"sendsms.h"
//#include"smssettings.h"
//#include"readings.h"
////////////////////////////////
 void mainsettings(void);
 void sentsms(void);
 void gps(void);
  void config (void);
  void ClearBuffers(void);
  void RecSMS(void);
//unsigned int i=0,j=0;
char mm[10];

sbit LCD_RS at RB7_bit;
sbit LCD_EN at RB1_bit;
sbit LCD_D4 at RB2_bit;
sbit LCD_D5 at RB3_bit;
sbit LCD_D6 at RB4_bit;
sbit LCD_D7 at RB5_bit;

sbit LCD_RS_Direction at TRISB7_bit;
sbit LCD_EN_Direction at TRISB1_bit;
sbit LCD_D4_Direction at TRISB2_bit;
```

```
sbit LCD_D5_Direction at TRISB3_bit;
sbit LCD_D6_Direction at TRISB4_bit;
sbit LCD_D7_Direction at TRISB5_bit;

void ClearBuffers()
{
   strcpy(RcvdMsg,"");
   RcvdCheck = 0;
   RcvdConf = 0;
   index = 0;
   RcvdEnd = 0;
 //   strcpy(MsgMob,"");
   MsgLength = 0;
}
void Config()
{
   Delay_ms(2000);
   UART1_Write_Text("AT\r\n");
   Delay_ms(1000);
   UART1_Write_Text("AT+CMGF=1\r\n");
   Delay_ms(1000);
   UART1_Write_Text("AT+CNMI=1,2,0,0,0\r\n");
   Delay_ms(1000);
}
```

CHAPTER 4
CIRCUIT LAYOUT & IMPLEMENTATION

4.1 Circuit Layout

The entire circuit can be easily assembled on a general purpose P.C.B. board respectively. Layout[19] of desired diagram and preparation is first and most important operation in any printed circuit board manufacturing process.

The following points are to be observed while forming the layout of P.C.B.

1. Between two components, sufficient space should be maintained.
2. High voltage/max dissipated components should be mounted at sufficient distance from semi-conductor and electrolytic capacitors.

The most important points are that the components layout is making proper compromise copper side circuit layout. Printed circuit board (P.C.B.'s) is used to avoid most of all the disadvantages of conventional breadboard. These also avoid the use of thin wires for connecting the components; they are small in size and efficient in performance.

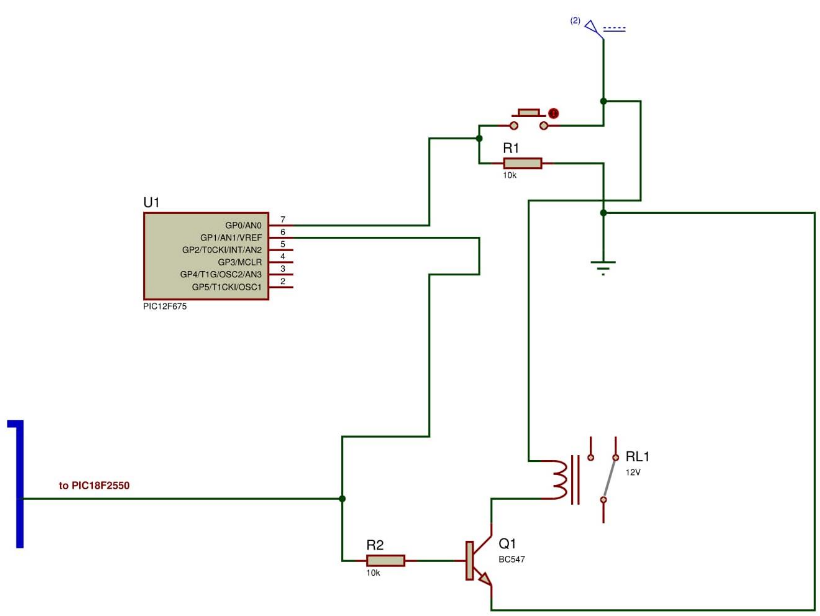


Fig. 4.1 Circuit Diagram of Tapping Circuit.

Block Diagram of Circuit

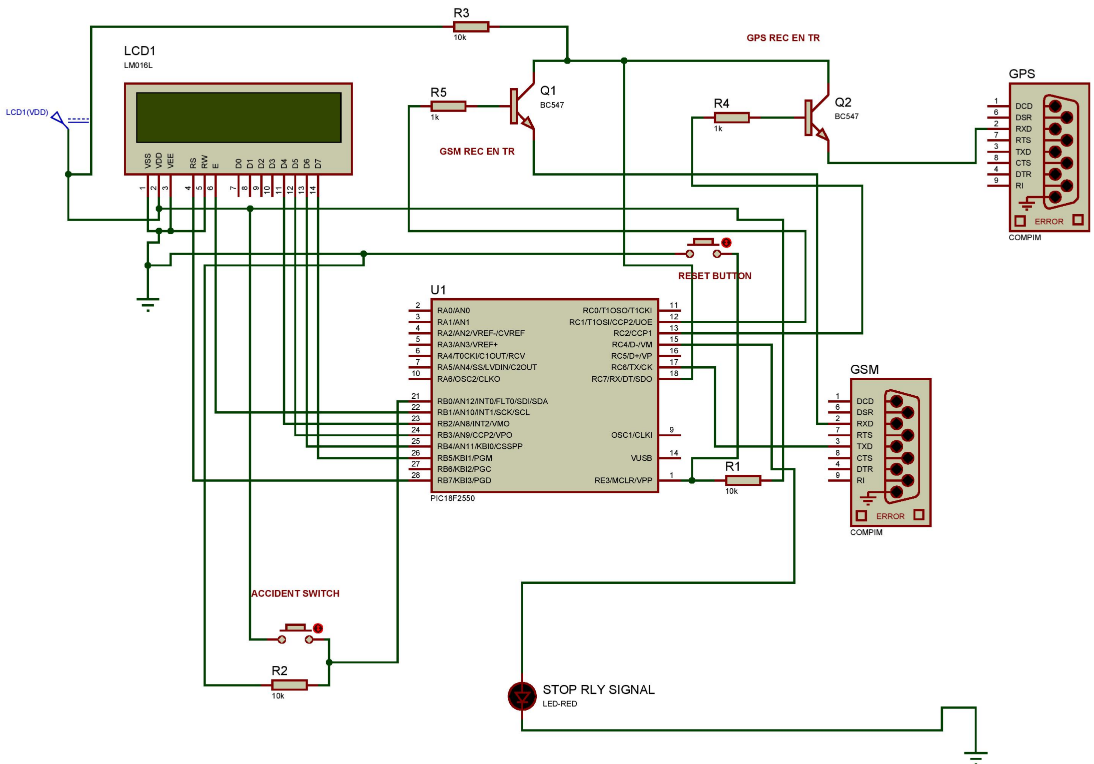


Fig. 4.2 Circuit Diagram.

4.2 Soldering

Soldering is the process of joining two metallic conductor the joint where two metal conductors are to be join or fused is heated with a device called soldering iron and then as allow of tin and lead called solder is applied which melts and converse the joint. The solder cools and solidifies quickly to ensure is good and durable connection between the jointed metal converting the joint solder also present oxidation.

CHAPTER 5
RESULT, DISCUSSION & FUTURE SCOPE

5.1 Result

We a team of 4 members have successfully completed our project on tracking down vehicle and locking it remotely using GPS and GSM technologies. We first tried to understand the working of our project through the schematic and then we proceeded to build the circuit as per the schematic. Initially we faced few problems with the GPS modem, as it won't work efficiently inside buildings. And also the GSM modem suffered problems with the coverage area of the Mobile Service Provider. So, we used Idea, as it has maximum coverage area. In order to solve this problem we can use dedicated servers and purchasing satellite space so that we can track down the vehicle anytime and anywhere. The overall developed circuit looks as in the following figure: Fig 4.2. The above circuit works mainly by receiving messages from a mobile phone. There are three messages/commands by which we can track and control the vehicle. They are,

- AA: Initiates the GPS modem and receives the Latitude and Longitude position and this information will be sent to the mobile from which it received the message.
- BB: When this message is sent, then the Microcontroller initiates the motor which is located in between the passage of fuel to stop and which in turn stops the vehicle.

The project can further be crafted by restricting the usage of limited mobile numbers to get access to the device. This can e made by altering the program.

The message which is sent to the mobile will be as shown in the following figure:

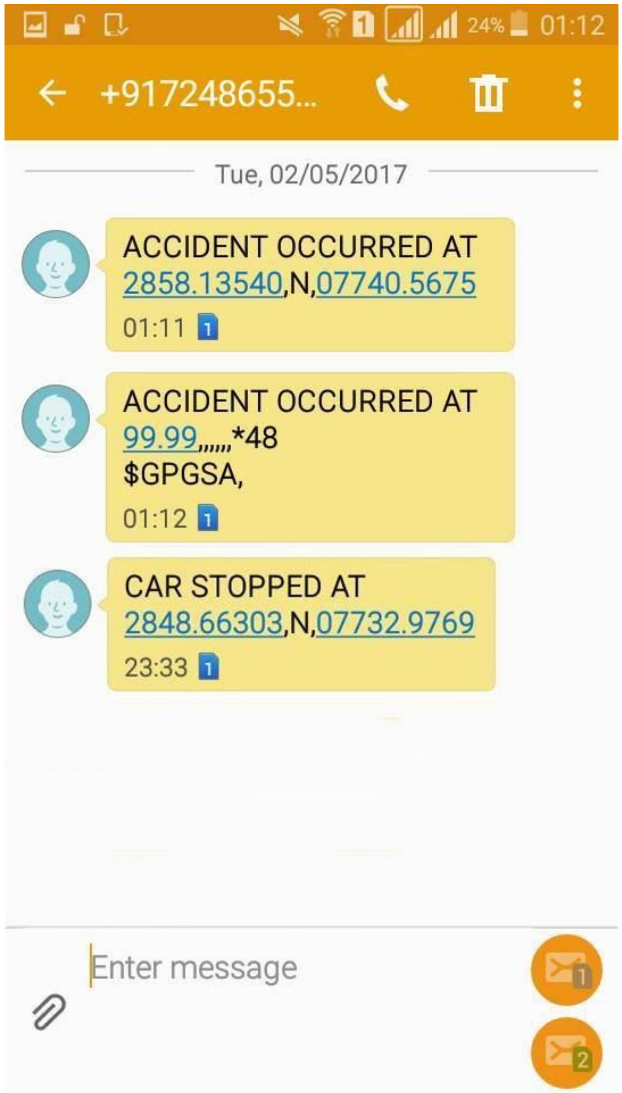


Fig. 5.1 Message Received through VTS kit.

With the knowledge in Electronics and Communication we have successfully completed our project with perfect results.

5.2 Discussion

- It is a specification of wireless network infrastructure. The system has been developed by the European Telecommunications Standards Institute.
- An object's position is determined using signal strength and triangulation from base

stations.

- This project can stop the vehicle when unauthorised person tries to steal the vehicle.
- Phone's International mobile equipment identity number, etc. are used to track the location of a vehicle.
- Base stations are capable of providing locations in areas like tunnel and dense areas.

5.3 Future Scope

The reliable intelligent driver assistance systems and safety warning systems is still a long way to go. However, as computing power, sensing capacity, and wireless connectivity for vehicles rapidly increase, the concept of assisted driving and proactive safety warning is speeding towards reality. As technology improves, a vehicle will become just a computer with tires. Driving on roads will be just like surfing the Web: there will be traffic congestion but no injuries or fatalities. Advanced driver assistant systems and new sensing technologies can be highly beneficial, along with large body of work on automated vehicles.

These findings suggest that the research into autonomous vehicles within the ITS field is a short term reality and a promising research area and these results constitute the starting point for future developments. Some of the suggestions towards extension and/or future related works are identified and are summarized below:

- New sensory systems and sensory fusion is to be explored to plug additional information to the control system.
- This work can be extended to include different maneuvers to make the driving system capable of dealing with all driving environments.
- Future issues may also include an algorithm for autonomous formation of the cooperative driving.

Thus, with the current and growing awareness of the importance of security, trustworthy vehicle autonomous systems can be deployed in few years.

CHAPTER 6
CONCLUSION

6.1 Conclusion

As the final product was developed and its performance was as per our expectations so it can be concluded that the project was successful and the method of theft control was feasible. The theft possibility is reduced to a sufficient amount, as compared to the traditional methods like central locking. If such a project is implemented on a mass scale then it can bring great benefit to the automobile industry.

It would be recommended that the size of the module must be variable as per the requirement (as compact as possible), so that expected outcome can be matched. However, the present prototype can be implemented for only demo purpose.

In order to convert the project to a fully implemented and perfect model from this prototype version, there is requirement of implementation with ECU of car and by utilizing the DC supply used to control the pumping of petrol.

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