CHAPTER 1

INTRODUCTION

1.1   INTRODUCTION

Nowadays car is the most important transport for people. Car is an automobile for human to move one destination to another destination. Due to the complex' designs that consist of many part, the price of the car is expensive. There are many cases or reports due to the car theft and it keep increase time by time. Therefore there are many ways that have been taken by car owner to protect the car from being stolen or hijacked. Hence, every vehicle it is important to have or install a security system. Most of the alarm system is using it built in siren to give notification to the car owner. The owner of the car only knows their car status in this range which is based on their alarm sirens only. An alternative method is needed to increase the range of effectiveness and the owner will have better security notification if their vehicle.

Cellular mobile phone is the most important things for people nowadays. People can keep on communicate without range limit. . The use of harmonised spectrum across most of the globe, combined with GSM's international roaming capability, allows travellers to access the same mobile services at home and abroad. Short message service is a mechanism of delivery of short messages over the mobile networks. People can send short messages to any other GSM mobile user around the world without limitation using GSM. Real-time monitoring and fast-accurate alarm system have gained popularity among car user and had been widely been applied in order t maximize the effectiveness of the car security system.

Because of it unlimited range of distance, car monitoring can be done using GSM. Using GSM module it can acts as the medium of interfacing between alarm system and wireless communication system and it is also an advantage of the alarm system. The blend of GSM technology and car security system will make the alarm is the best protection mechanism for the vehicle.

1.2   PROBLEM STATEMENT

Malaysia is one of the countries with huge crime nowadays, Royal Malaysia Police (RMP) utilizes crime index as a warning sign to calculate the capabilities of crime prevention. The two main types of crime occurring, the first is chaotic crimes and the other is property crimes. Chaotic crimes are crimes of occurrence violent for example murder, thieves, raped and also even more, meanwhile assets crimes are crimes of property loss. This kind of crimes comprise of theft, vehicle robbery, motorcycle theft, snatch theft, robbery, home violating and so extra. Although the violent crimes attract the awareness of mass media and community in Malaysia nowadays yet the property crimes recorded around ninety percent among community currently. The total vehicles in Malaysia on the year 2013 are 21.25 million units. Figure 1.1 below indicates the information of total vehicles on road and also Figure 1.2 displays the percentage of crimes appears.
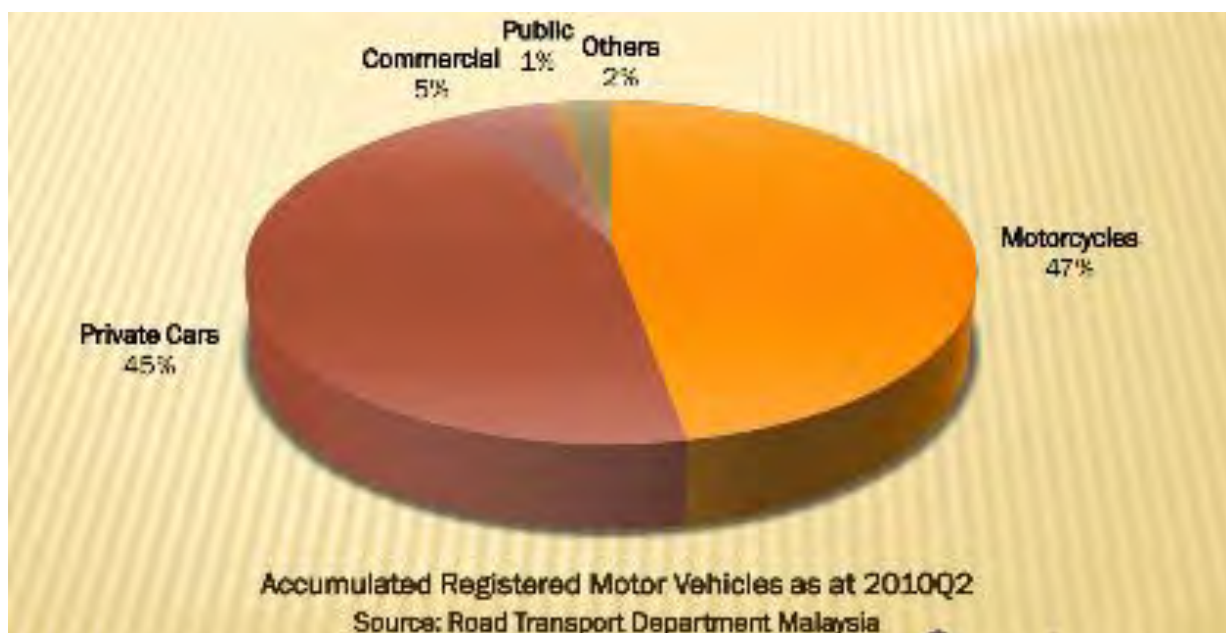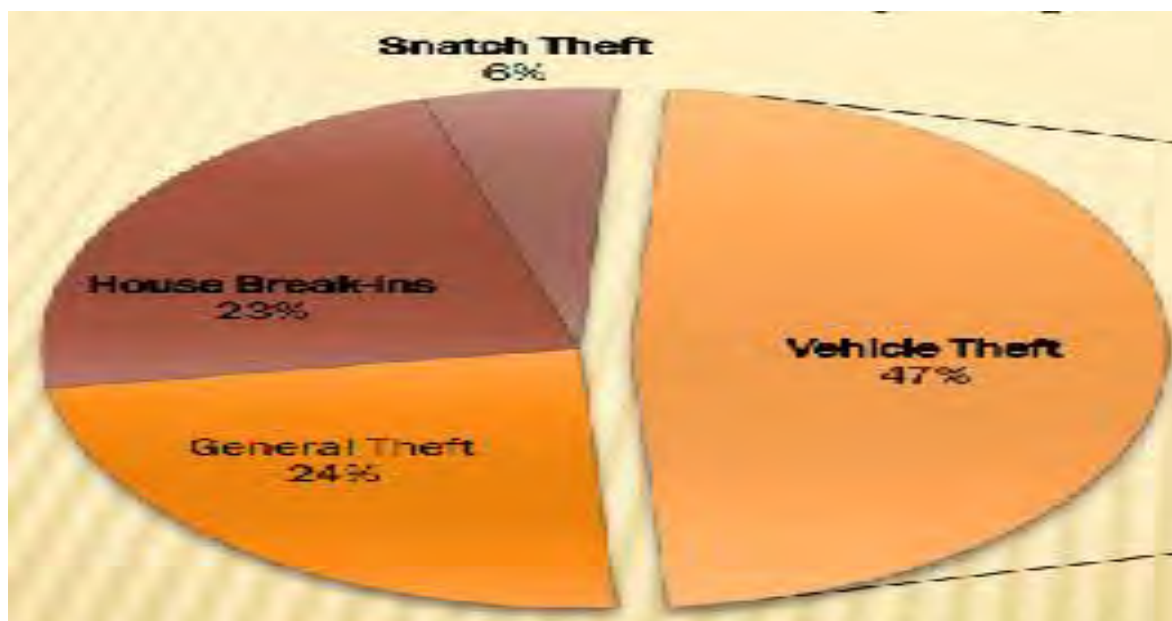
Figure1.1: Total Vehicle on the Road

Figure 1.2: Crimes Pie Chart

The effects of theft are raise the quantity claim insurers paying, produces other violent crimes, consumer do not aware choosing stolen vehicles from the car seller and extra. This can be preventing by utilizing the improved locking system to the automobiles. Most common improved locking equipment is GSM/GPS built securing system along with the users could just fix it in the vehicles so they may locate their vehicles from any location so this method also will likely be useful for the police to track the vehicle.

Most of the transportation owners require an effective, reliable and also cost effective product to protect their vehicle. This type of product typically desired several characteristics for example sensors and also alarm triggering which is likely to be more efficient if the technique installed a GSM or GPS module onto it. Therefore, within this project, an automobile security monitoring system designed to stay away from the decrease of assets in Malaysia. Even though, it is just a simplex connection however ii is more efficient, reliable, user friendly and cheaper than other simplex security system in market place.

Security system is important to protect the car from theft and others bad elements. It is hard for the owner to monitor and protect their vehicles from far. Most of the car security system is not a good feedback features. It has a small range limitation between car and the owner. With the small limitation range, the system is not effective security system.

1.3   OBJECTIVE OF PROJECT

To have an objective is important in order to achieve the desired output. There is a few objective need to be determined followed as a guide through the whole completion process of this project.

There are three major objective of this project. These three objectives are needed to be done in order to make the project achieved. The objective of project is to:

- Develop a notification security system that can wrap the entire main parts of the vehicle and send messages to the users instantly using GSM.

1.4   SCOPE OF PROJECT

Scope of project is important to achieve the objective of the project, there are several scopes that have been outlined. The scopes of the project are:

  I.   To make the circuit of the microcontroller and the GSM model.
 II.   To design coding for the microcontroller
III.   To simulate and analyze the system

1.5   METHODOLOGY

Figure below shows that the design methodology, which is it explains the flows overall of the project.
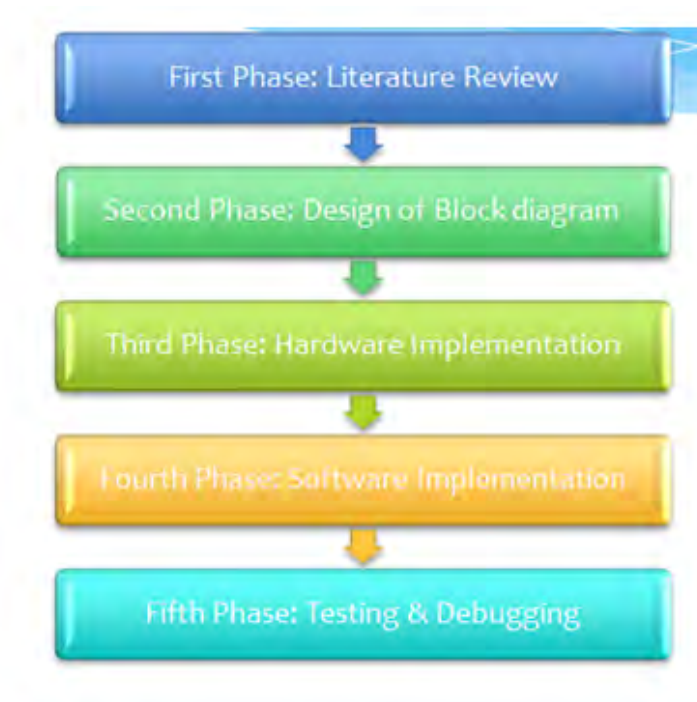
Figure 1.3: Project flow chart

The first phase of project is literature review, where the research part starts. This phase comprises the research using multiple resources such as articles journal papers, thesis and reference books obtained from university library, online and newspapers. Then, the idea to design the project and the features of the device obtained.

The second phase of the project is the design of block diagram. The design comprises of the components used and it shown on figure 1.4. The components comprises of power supply, voltage regulator, sensors (door, vibration, motion, key), LCD, PIC16F877A, buzzer, MAX232 and GSM Modem. The function of the components in the block diagram explained below

❖ Power Supply

This is the main supply of the device and it will supply 9 V DC into the circuit.

❖ Voltage Regulator

The function is to regulate voltage and will supply only 5 V to other components in the circuit

❖ MAX232

This component is a specialized circuit to make standard voltage RS 232 standard require.

❖ Vibration Sensor

Detect force entry by the thieves and this device provide internal and external defense parameter

❖ Door Sensor

Sensor is used to detect whether the door open or close.

❖ Key Sensor

The sensor at the key part when the alarm will activated when someone try break in and start the engine.

❖ Buzzer

Buzzer or alarm will activate when the vibration sensor mode is on.

❖ LCD

The sensing mode will display on LCD.

❖ GSM

Message will be send to the user's mobile when the sensor is activated. Using radio waves, it will send and receive data.
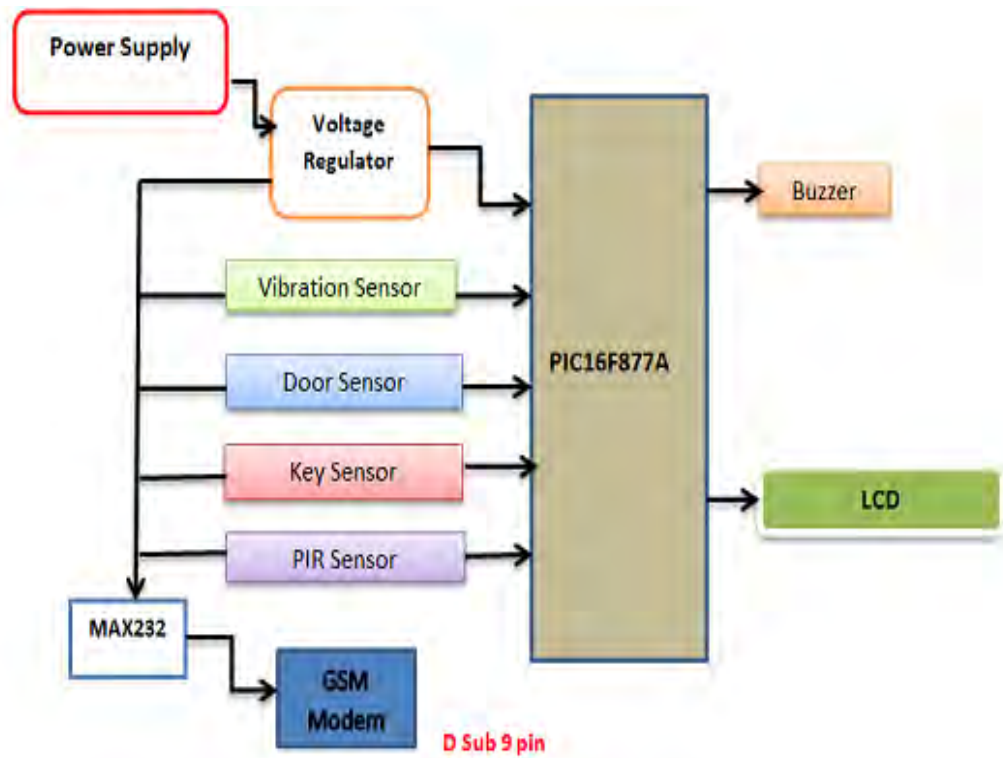
Figure 1.4: Block Diagram of the System

The third stage is hardware implementation, which the hardware constructed and also development done by using the MULTISIM application also circuit debugging began. The hardware is examined and also connectivity checking as well completed. The hardware part comes with microcontroller, MAX232, sensing unit, LCD and also GSM unit. A microcontroller is a perfect-designed computer system on a microchip also has various features, such as input/output peripheral, storage and the processor core. MAX232 is RS232 level converter, which will converts the RS232 level into 0V and 5V.

Sensors are used to detect the parameters sensed in the automobile for example PIR motion sensing unit to sense movements of people, creatures together with objects in the range in fact the main purpose of this sensor to protect vehicle, that might say like burglar alarm whereas the vibration sensing unit is utilized to produce useful security by combined it into the automobile security system for measuring linear velocity, displacement, proximity and acceleration. Other sensors are door indicator and then key sensor, whereby the door sensor utilized to detect

door is open or close as well as the key sensor utilized to detect the car engine activation, where it is connected to the starter and it enable sending powerful electric source to start the car. The LCD shows two rows of 16 character types also utilized to show the form of sensor activated of the hardware designed. The GSM executes over a owner to a cellular operator by using sim card. In this project, the GSM utilized to send out the information of the sensing unit sensed as the messages to the user's cell phone.

The fourth phase is the software program implementation, whereas the algorithms of the whole equipment design also functionality written using PCW application. PCW software is commonly used and provides an overall, integrated tool for debugging and developing programs for PIC microcontrollers. This type of encoding progression tool has an intelligent code optimizing C compile. Therefore, it contributes greatly to the software developer to focus on the design features as well as features rather than concentrate on the MCU structure. This application also maximizes the code reuse and minimizes the lines of new code with the integrated features, standard C operators and also peripheral drivers. The built-in library allows the PIC to access directly the hardware functions, which working with C language.

The fifth stage, which is the final phase of the task is testing and also debugging. The hardware and software examined in order to achieve the targets. The design of this project consists of five relatively modular parts:- power supply, microprocessor, sensors, buzzer and GSM module. The operating of the system certified by setting 12V input to the power supply as well as the voltage regulator regulate a 5V input to the sensors also microcontroller, subsequently transmitting message to the user's mobile stating sensor's parameter activated. By measuring the voltage at the output, together with buzzer activation of the vibration sensing unit, displaying on the LCD along with the obtained type of sensors activation message, we guaranteed that the system accomplishing its own functions

1.6 Summary

In this project, in able to complete the task and the objective, many steps we have done according to the fixed steps. The tasks need to be accomplished and complete to the weekly timeline project duration. In the meantime, in the methodology part approach there are five main criteria that have been divided. The five main criteria is literature review, design layout of total system, hardware development, software development and also debugging part. Generally, overall overview regarding to the project and also comparison between the systems that are available out there and decide the suited system for the vehicle in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

In this chapter, it contains the past and present other studies related to the projects of Development of GSM Based for Car Security System. Just before to make a first step of the project, the related projects and works that available in the market will be consider carefully. It is important to generate a product that is cheaper and convenient to the consumer.

Literature review and theoretical knowledge studies will be carried out due to the complete of project. The steps have to be done to fully understanding and innovative skills to successfully complete the project. There are useful for the project, such as articles, thesis, multiple of reading resources used, and also reference paper that obtained from inside and outside university library, paper, and online.

All characteristic of the project related were analyzed thoroughly to gain better understanding of present needs of the consumer in overall aspect like safety and money. Hence, characteristic identified to implement this task or essential features research. The parameters of the studies and projects that have done by other researchers were also given attention to prevent errors.

2.2   Review of Past and Present Projects

"GSM Based Vehicle Security and Monitoring System", Muhammad Ali mazidi,Janice gillispie mazidi, Kenneth j.Ayala, Ramesh s.gaonkar, D.V.Prasad, Lawrence Harte (Thesis)

The project was to design and create a car security and monitoring system based on GSM technology. The project design contains the GSM modem and microcontroller which based on the controlling unit. The system will automatically locks the car when received message from the owner. Whenever the owner decided to start the car, the owner has to turn on the ignition switch. The predefined message will send to the owner when the switch is pressed and the microcontroller has detected the switch. Hence, the owner has the overall control of the car in his hand. The system in this project consist such as crystal circuit, MAX 232, ignition switch, reset circuitry, microcontroller, driver circuit, motor, ignition switch and GSM modem.
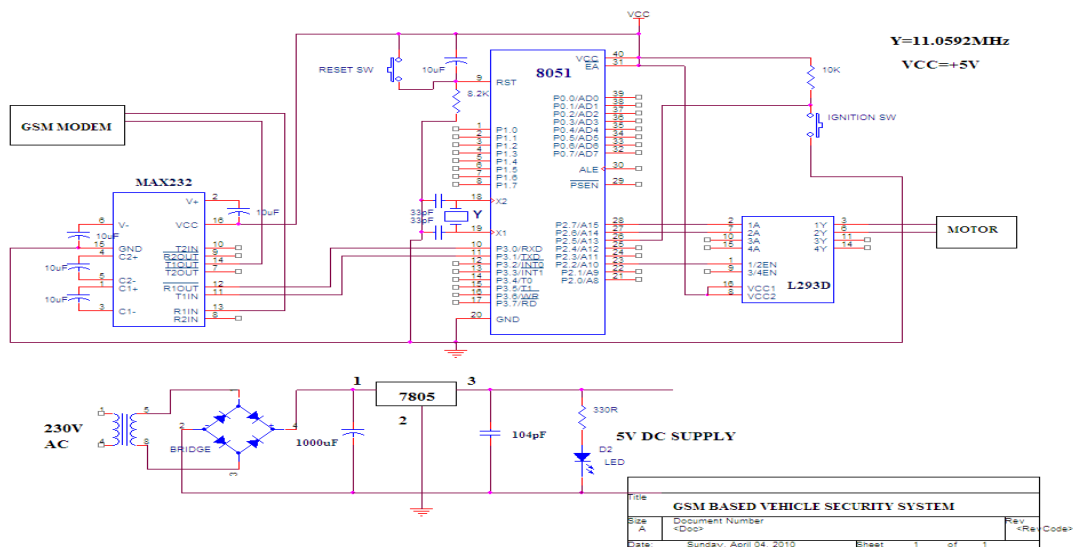
Circuit design:

Figure 2.1: Circuit Design Diagram

"GPS and GSM Based Vehicle Tracing and Employee Security System" by S S Pethakar, N Srivastava and S D Suryawanshi-JANUARY2013 (Journal)

This project and this paper were made to provide high security to vehicle and employee due to crimes such as rape cases, kidnapping, burglary and others. Global Positioning System (GPS) is the main equipment in this project. GPS is to locate the current location of the particular employee and also the vehicle using specialized application and also able to view using Google map. The employee that traveling using vehicle need to swap the id card onto the system once he or she get into the vehicle. RFID card number with database will be match by microcontroller and will send the information data of the employee to the company. The information will be send suing GSM module and the message will be receive by GSM modem at the company. There is the button in the system if the employee having any problem, microcontroller will detect and send information coordinate to the GSM to the company and also police. Relay will be turn off the car ignition and will stop the vehicle once the microcontroller give instruction. Latitude and longitude will be located once the message from GSM received and employee's information will be displayed.
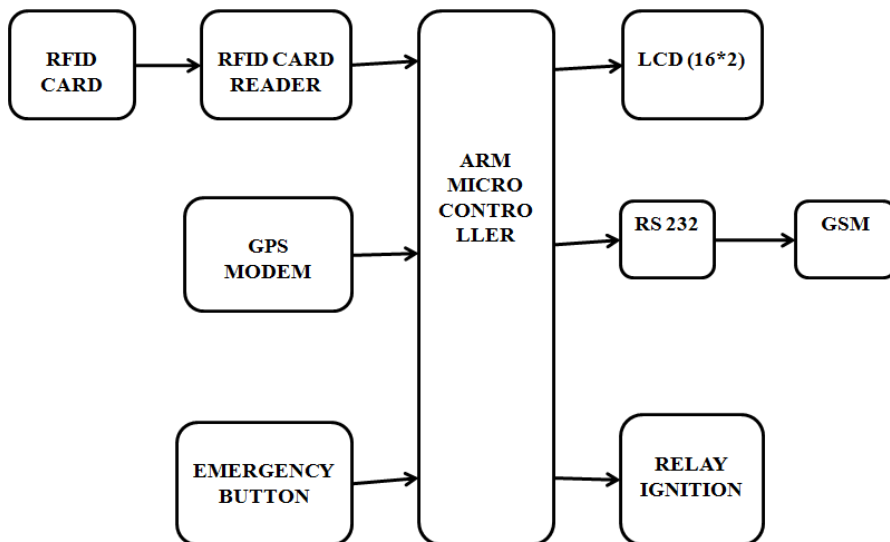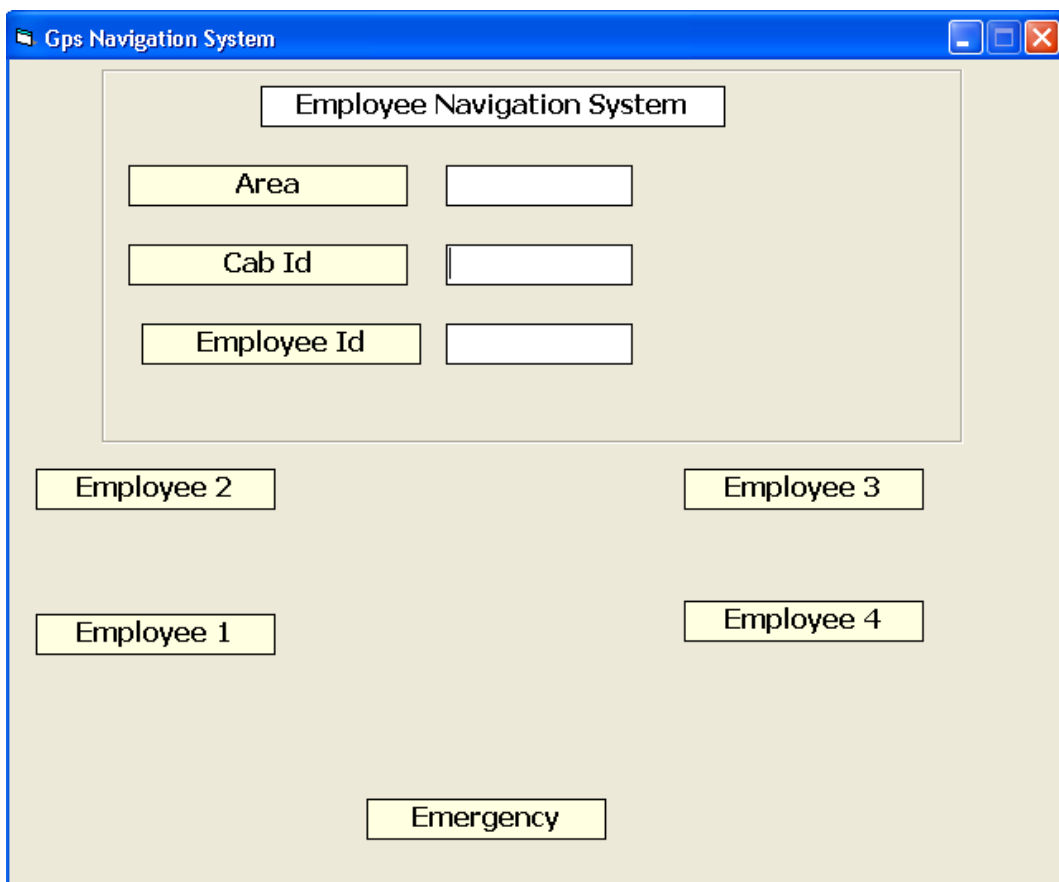
Figure 2.2: Block Diagram of the System

Figure 2.3: Software Interface

"Car Security Control System via SMS" Muhammad Fazly Bin Jamal MAY2008 (Thesis)

This paper is about to design and provide security for the user vehicle used. The locking system of the vehicle using mobile notification system and upgrade the security system in all aspect of range control feedback functions by implemented connection between GSM modem and PC with microcontroller. The architecture of the system is divided into five parts which are modem, microcontroller, model of the car, car alarm system, and also a bootloader. The microcontroller that he used is PIC18452 and it is the brain of the system created and manipulated the output by control the input of the system. The firmware that the system used is MicroC to activate the system. The flowchart below is the software implementation.
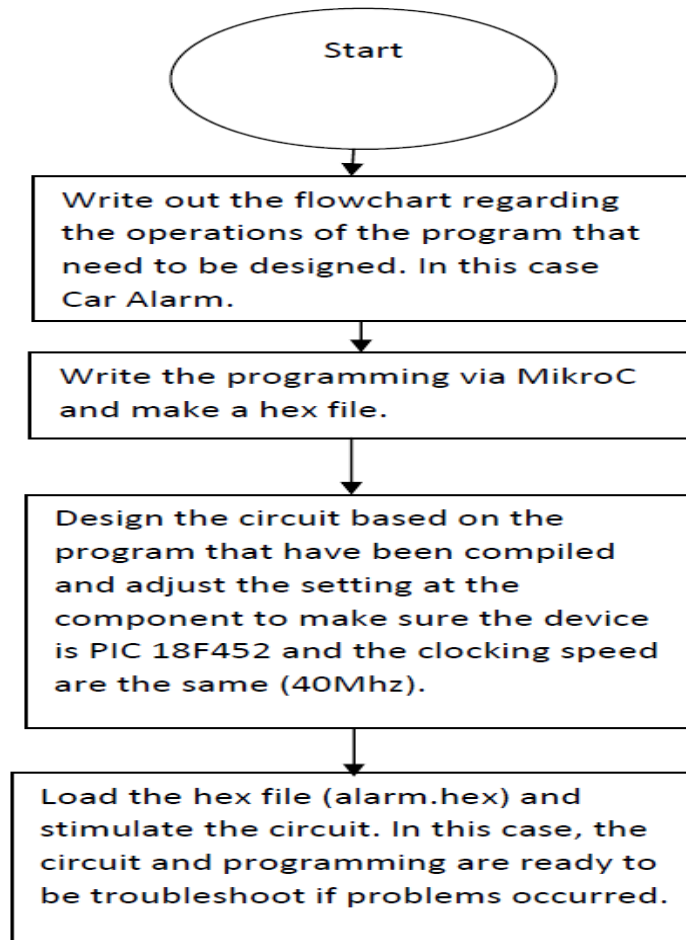
Figure 2.4: System Flowchart

The car alarm is an ordinary system car alarm that used regular concept. However, GSM modem is used to send messages to the user mobile as the notification. The project is using a small car and consist indicator and sensor as the demonstration. MAX232 is the bootloader to create port communication between GSM modem and PC. Below is the circuit diagram of the system.
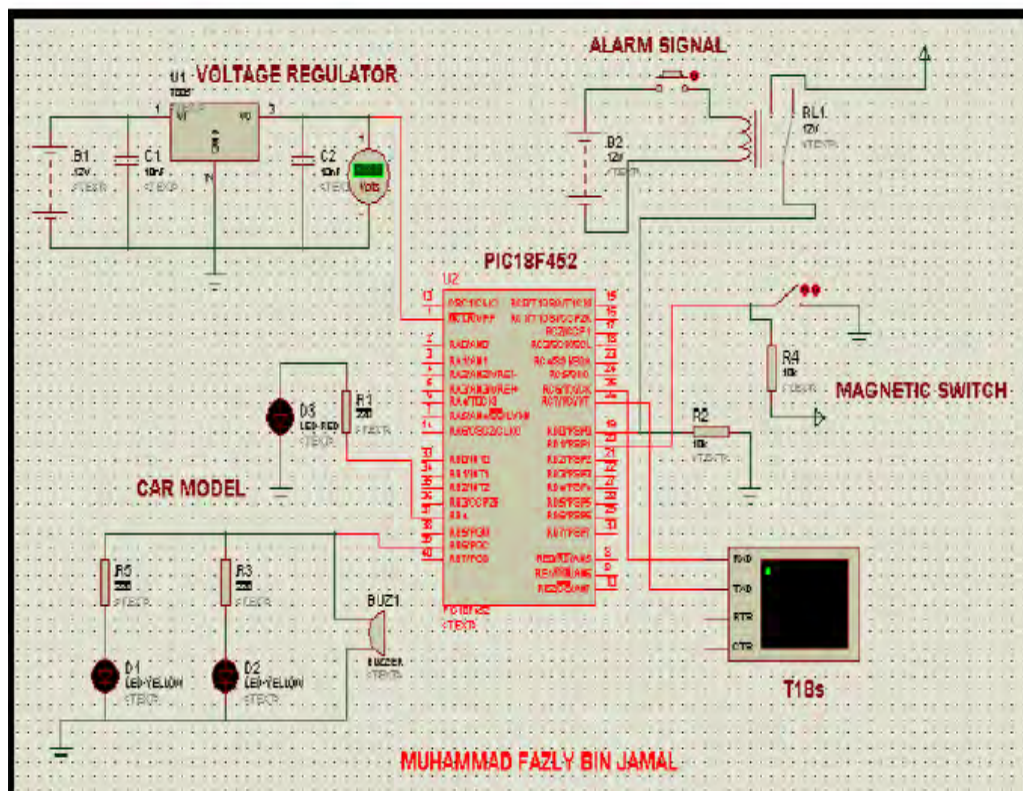
Figure 2.5: Circuit diagrams

"Design of A GSM Cell-Phone Based Vehicle Monitoring& Theft Security System" by Amol S. Dhotre, Abhishek S. Chandurkar & S. S. Jadhav (Journal)

This was a project that has been designated to develop an advanced vehicle locking system in real time. This project was also to make a theft security and vehicle monitoring by enhancing locking system. There are three types the different theft detection between this project and others which are vibration sensor, battery removal sensor and rider sensor. Timer circuit connected to IR receiver, electromagnetic relay and buzzer. The timer circuit functioning as a timing control for buzzer and to buzz when the first time the sensor detected. The relay will turned on and the buzzer by signal from IC.   The system get the power is from 9V DC from separate battery, hence the system will able to work without vehicle battery.
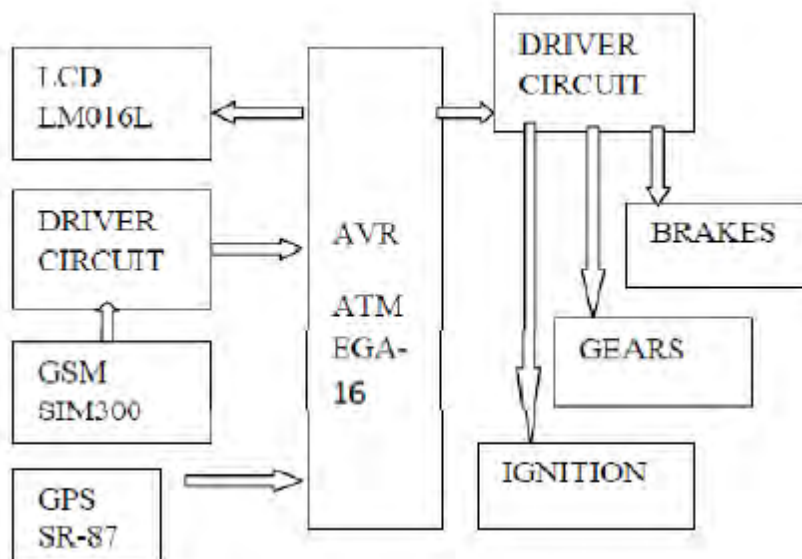
Figure 2.6: Block Diagram of the System

"GSM Based Car Security System" by Ruchita J. Shah, Anuradha P. Gharge October 2012(Journal)

This paper is about a project to make a system that can save the vehicle of the user. The system design is based on the GSM which can provide security to the vehicle and the system will switch on the buzzer and the system alert send the message to the user. The security system consist of five sensing parameter which are obstacle sensing, vibration sensing, micro switches, battery sensing and also revolution sensing. The buzzer will on at every single sensing mode and message will be send using GSM. The system is a well function and reliable even it is just one way communication. Microcontroller AT89S52 is the brain of the system and it is cheaper in the market and also using other devices such as GSM module, LCD, buzzer, vibration sensor, revolution sensor, battery sensor, and also optical sensor. The system is functioning when the LCD display "HELLO" and it also will display five parameters which is detection of vibration occurs, front doors open, optical detected, and revolution happen. If the parameters sense any detection the buzzer will automatically buzz and will send the message to the user mobile phone via GSM. Below is the block diagram of the circuit and the hardware of the system.
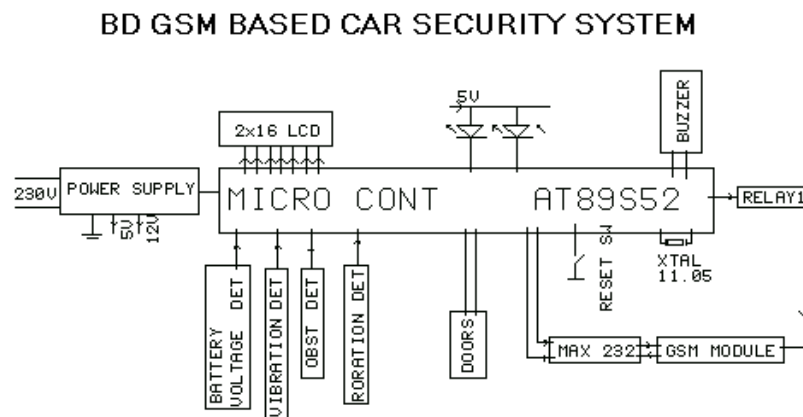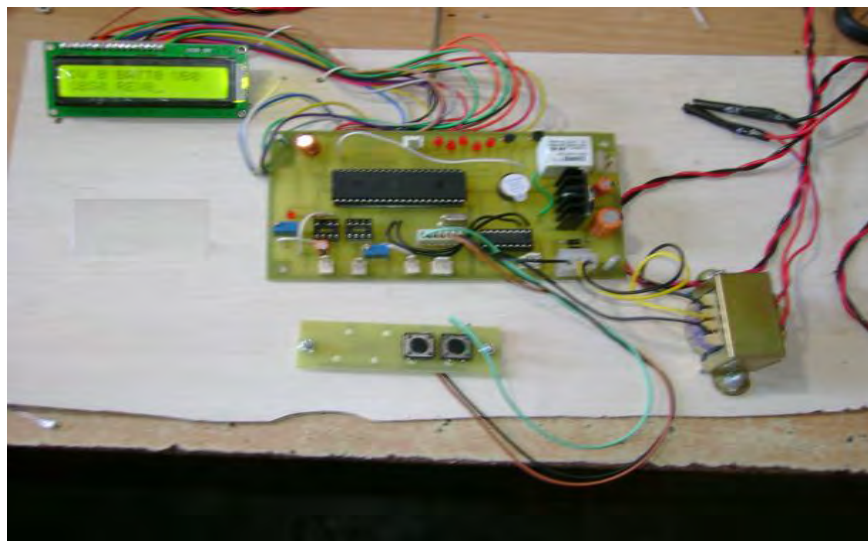
Figure 2.7: Circuit block diagram

Figure 2.8: System hardware

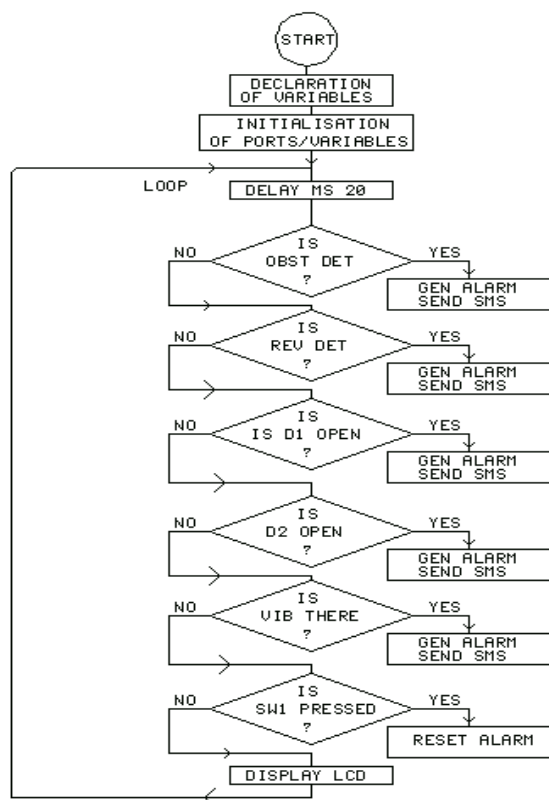Below is the initializing working software procedure:

Figure 2.9: Flowchart of the system

"Design of SMS-Enabled Car Security System" by K.A. Amusa, O.O.Muga, A.A.Adetomi-NOVEMBER2012 (Journal)

This system was made to generate security based on GSM mobile equipment to the car and the system activation and deactivation based on Short Message Service (SMS). The car security system with intelligence calling is a great innovative to track down the car by calling the system. The implementation and design of the system is shown in the figure below.
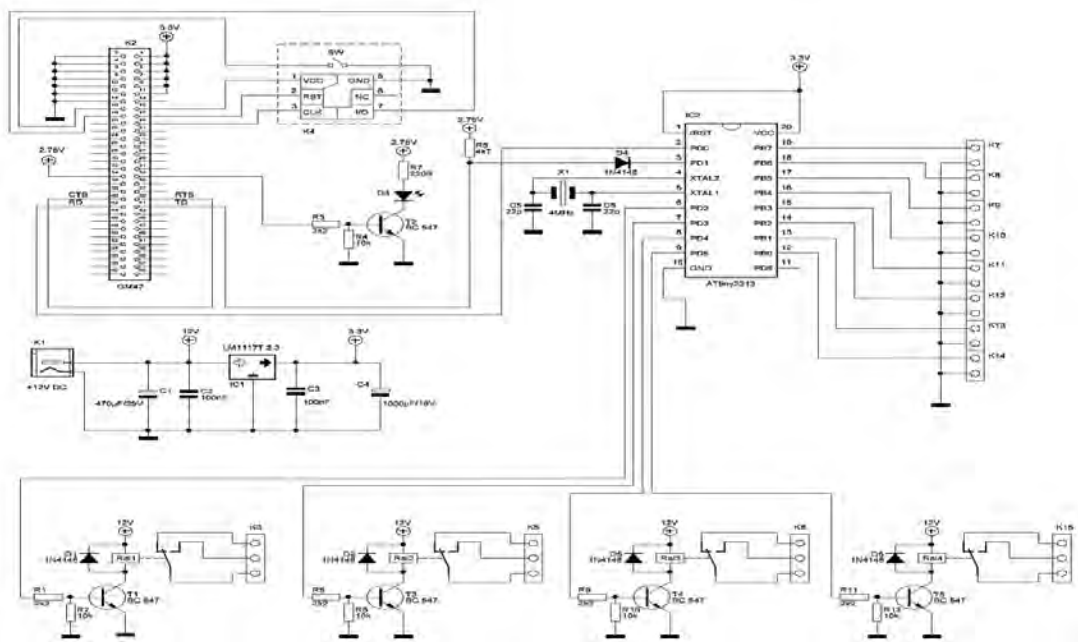
Figure 2.10: System Hardware Circuit Diagram

2.3   Communication System

Communications is sending of information from one place to another place. In communication there are two ways of communications, either primitive or contemporary ways. Transmitter, signal network or medium, and receiver is the basic communication system. Figure 2.11 below is the simple communication system diagram.
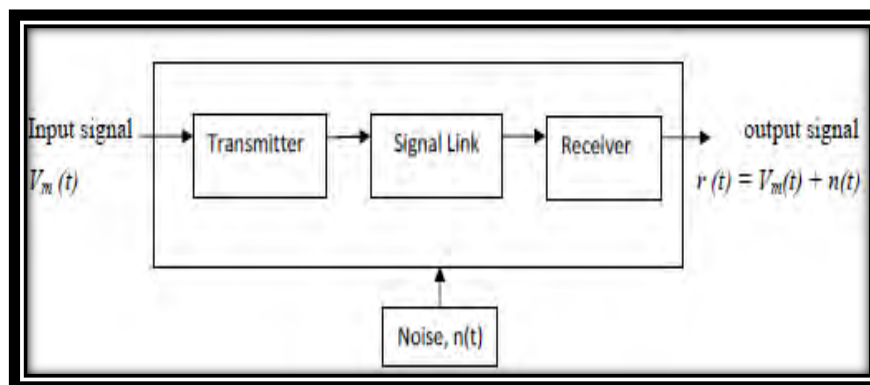
Figure 2.11: Basic Communication System Diagram

2.4   Signals type

Transmitter will transmits any data information in the form such as image, music, video, and also data. There are two types of signal divided consists which are digital signal and analog signal. The digital signal also known as discrete signal and consist discrete number of level. While the analog signal have a difference amplitude values and changes in constant range. Figure below will show the type of signals.
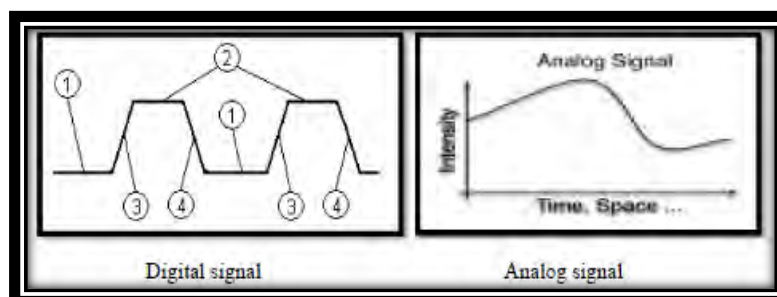

Figure 2.12: Type of Signal Waveform

2.5   Microcontroller

Microprocessor has no RAM, ROM and other peripheral on the chip; it has only the CPU (Central Processing Unit) inside them. On the other hand, microcontrollers are designed to perform specific application, where the input and output is defined.

A microcontroller is a perfect-designed computer system on a chip .The microcontroller has various features, such as input/output peripheral, memory and processor core. The memory, CPU (Central Processing Unit) and other peripherals of input/output are not in the features of microcontroller.
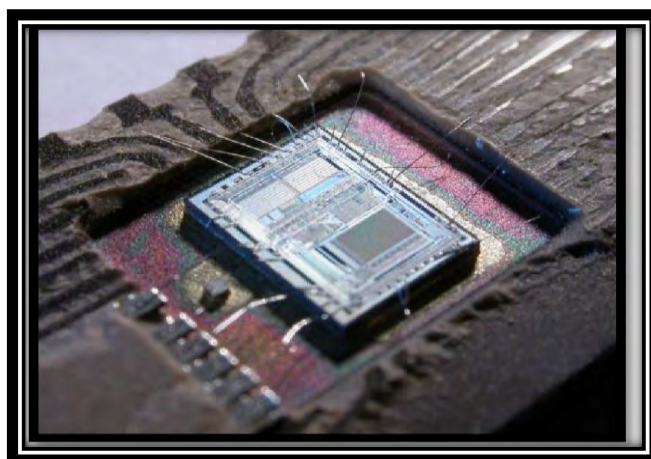

Figure 2.13: Microcontroller

A microcontroller does not use an exterior address or data bus because it incorporates the usage of non-erasable memory and RAM on the same chip package as the CPU, when it is compared to the general-purpose CPUs. The reduced quantity of port pins could be positioned in a smaller, inexpensive and compact package. The cost of embedded microchip in one piece is reduced by incorporating the memory and other important features of the peripherals on the embedded system. Therefore, testing them as single component always increase the cost of the chip. Consequently, less number of chips allows the circuit board designed to be cheap and small. This

will reduce the labour needed for assembling purposes and examining the printed circuit board [3].

The microcontroller that was used in this project is PIC 16F877A,where is it commonly find, easy to use and comprises of 40 port pins, which are used for modification and features development of the vehicle security system. Figure 2.14 and 2.15 shows the operating pins of IC and PIC16F87XA features for PIC 16F877A [2].
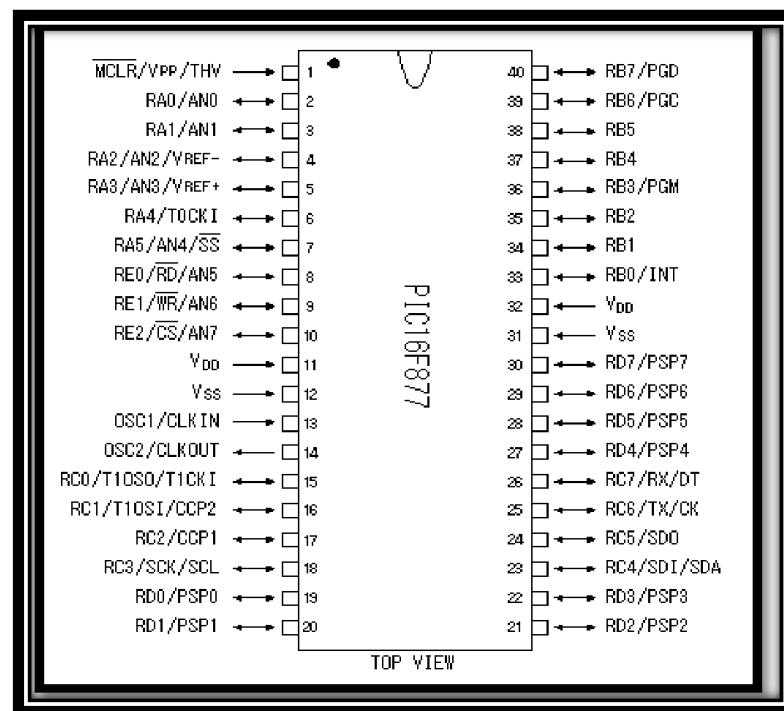

Figure 2.14: Pins Operating