



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

VEHICLE SECURITY SYSTEM VIA SMS

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology Telecommunication (Hons.)

by

MASTURA AL-NUR BT ABDUL AZIZ

B071210323

901109-08-5756

FACULTY OF ENGINEERING TECHNOLOGY

2015

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **Vehicle Security System Via SMS**

SESI PENGAJIAN: **2015/16 Semester 1**

Saya **MASTURA AL-NUR BINTI ABDUL AZIZ**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. ****Sila tandakan (✓)**

SULIT

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TERHAD

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

TIDAK TERHAD

Disahkan oleh:

Alamat Tetap:

NO. 65 Lorong 3, Taman Sri Bahagia

Cop Rasmi:

Teluk Intan Perak

Tarikh: _____

** Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

DECLARATION

I hereby, declared this report entitled “Vehicle Security System Via SMS” is the results of my own research except as cited in references.

Signature :.....

Name : MASTURA AL-NUR BINTI ABDUL AZIZ

Date : 12 JANUARY 2016

APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Computer and Electronic Faculty of Engineering Technology) (Hons.). The member of the supervisory is as follow:

.....
EN. ABDUL HALIM BIN DAHALAN
(Project Supervisor)

ABSTRACT

Nowdays, telecommunication technologies application become wider to make human easy to communicate among them. Besides voice communication people also able to communicate through short message service (SMS). The SMS also can be as a switch to trigger a system and it is implemented in this project. Sometimes vehicle owner forgot to activated their security system after leave their vehicle and they also disable to know the status of their car. This lead to vehicle robbery. The limitation function of common remote control make the system difficult to used. Hence, this project goal to produce a system which able to control the vehicle security system via Shortage Message Service (SMS). A vehicle with central locking security system helps the user to lock and unlock through mobile phone. Only depends on the central locking is not enough to secure the vehicle, thus more development system makes based on Global System for Mobile Communications (GSM) technology are suggested in this project. It is a simple construction systems where it use a detection sensor to detect any motion of the vehicle. The system will be turned ON during the central locking is locked by the user. Then, if the sensor detect a motion inside the vehicle during the system is activated, it will directly send a signal to the microcontroller to trigger GSM sending a SMS to acknowledge the vehicle owner. There are three element in this system which is mobile phone as a remote control, GSM modem as a center of the system where it will receive the instruction and directly activate the circuit control. Then a microcontroller circuit act as the heart of the system.

ABSTRAK

Pada masa kini, penggunaan teknologi telekomunikasi semakin meluas dalam kehidupan seharian manusia untuk memudahkan mereka berkomunikasi. Selain dari komunikasi suara, khidmat pesanan ringkas (SMS) juga boleh digunakan. SMS boleh digunakan sebagai satu suis untuk mengaktifkan sesuatu sistem. Pengguna seringkali terlupa untuk mengunci kenderaan dan mereka sukar untuk mengetahui status kenderaan mereka. Ini mengundang kepada rompakan kenderaan. Selain itu, fungsi yang terhad bagi penggunaan alat kawalan jauh yang sedia ada menyukarkan pengguna. Oleh itu, sistem keselamatan yang sedia ada perlu diubah suai. Projek ini bertujuan bagi menghasilkan satu sistem yang boleh mengawal sistem keselamatan kenderaan melalui Sistem Pesanan Ringkas (SMS). Dengan hanya mengunci pintu kenderaan tidak cukup untuk menjamin keselamatan kenderaan, sistem keselamatan menggunakan teknologi Sistem Global untuk Komunikasi Mudah Alih (GSM) dicadangkan. Sistem ini ringkas sahaja, di mana pengesan gegaran digunakan untuk mengesan sebarang pergerakan. Sistem ini akan aktif jika kenderaan telah dikunci, iaitu setelah selak pintu kenderaan dikunci. Sekiranya terdapat pergerakan selepas kenderaan dikunci, mikrokontroller akan menghantar isyarat kepada GSM untuk memaklumkan hal ini kepada pemilik kenderaan melalui SMS. Projek ini melibatkan tiga bahagian iaitu telefon bimbit sebagai alat kawalan jauh, modem GSM sebagai pengantara yang menerima arahan serta mengaktifkan litar kawalan dan juga litar pengawal yang mengawal sistem.

DEDICATION

This report is dedicated to my family, who always stay by my side and taught me that to have the best knowledge is learned from my own experience life.

ACKNOWLEDGEMENTS

In the name of Allah, I am very thankful for this opportunity to express my highest gratitude firstly to my family for always supporting me spiritually throughout my life. Secondly, I would like to thank to my supervisor Mr. Abdul Halim B Dahalan and my Co-supervisor Mr. Mohd Saad B Hamid for their cooperation, guidance and hard work to ensure the completion of this project. Also thanks to Mr. Aminnurrashid B Noordin for helping me to complete my program design. To all my friend that have contributed so much. Last but not the least, special thanks to University Teknikal Malaysia Melaka (UTeM) for their kind effort to provide me with all facilities and technical expertise to make this project successfully.

TABLE OF CONTENTS

DECLARATION.....	iii
APPROVAL.....	iv
ABSTRACT.....	v
ABSTRAK.....	vi
DEDICATIONS.....	vii
ACKNOWLEDGMENTS.....	viii
TABLE OF CONTENTS.....	ix
LIST OF FIGURES.....	xii
LIST OF TABLE.....	xiv
LIST OF SYMBOLS AND ABBREVIATIONS.....	xv
CHAPTER 1.....	1
1.0 Introduction.....	1
1.1 Problem Statement.....	1
1.2 Objective.....	2
1.3 Scope.....	2
1.4 Project Significant.....	3
1.5 Summary.....	3
CHAPTER 2.....	4
2.0 Introduction.....	4
2.1 Application of GSM Technology.....	5
2.1.1 Documents Identification in a Library System	5
2.1.2 Heart Rate and Temperature Monitoring System.....	5
2.1.3 Control Borehole Pump Filling Reservoir or Tank Far Away.....	6
2.1.4 Cable Theft Prevention.....	7
2.2 Global System for Mobile Communication (GSM).....	11
2.2.1 Key features of GSM.....	11
2.2.2 GSM Security.....	11

2.2.3	GSM AT Command.....	12
2.3	Differences between Wireless Communications.....	13
2.4	Mobile Phone.....	14
2.5	Short Messaging Service (SMS).....	14
2.6	Other Equipment.....	15
2.6.1	SK40C.....	15
2.6.2	SIM900A GSM/GPRS Module.....	19
2.6.3	Proteus Software.....	22
2.6.4	mickroC PRO for PIC Software.....	23
2.7	Past Related Research.....	23
2.7.1	Controlling of Vehicle by using Mobile Bluetooth Technology.....	23
2.7.2	Vehicle Security System using Zigbee.....	24
2.7.3	Smartphone Based Vehicle Tracking and Control Via Secured Wireless Networks	25
2.7.4	Wireless Security Car using RFID System.....	26
2.7.5	Automobile Ssecurity System using GSM.....	27
2.8	Summary.....	28
CHAPTER 3.....		29
3.0	Introduction.....	29
3.1	Methodology Process.....	29
3.2	Project Implement.....	30
3.2.1	Block Diagram.....	30
3.2.2	Gantt Chart of the Project Implement.....	31
3.2.3	Flowchart of the Project Implement.....	33
3.2.4	Project Development.....	35
3.3	Software Development.....	37
3.3.1	Circuit Simulation.....	37
3.3.2	Circuit Layout.....	39
3.3.3	Program.....	40
3.4	Hardware Development.....	46
3.4.1	Circuit.....	46
3.4.2	Prototype.....	48
CHAPTER 4.....		49
4.0	Introduction.....	49

4.1	Result.....	50
4.1.1	Simulation Result.....	50
4.1.2	Hardware	50
4.2	Discussion.....	52
CHAPTER 5.....		56
5.0	Introduction.....	56
5.1	Conclusion.....	56
5.2	Recommendation.....	57
REFERENCES.....		59
APPENDIX A		

LIST OF FIGURES

Figure 2.1: Block Diagram for Documents Identification in a Library System.....	5
Figure 2.2: Block Diagram for Heart Rate and Temperature Monitoring System.....	6
Figure 2.3: Borehole Pump Filling Reservoir or Tank Far Away System.....	6
Figure 2.4: Cable Theft Prevention System.....	7
Figure 2.5: TDMA Frame.....	9
Figure 2.6: GSM System Architecture.....	9
Figure 2.7: Smart Card Anatomy.....	12
Figure 2.8: SK40C Module.....	16
Figure 2.9: Schematic Circuit for SK40C.....	17
Figure 2.10: Pin layout of PIC16F877A.....	17
Figure 2.11: SIM900A GSM/GPRS Module.....	20
Figure 2.12: SIM900A GSM/GPRS Module interface with Microcontroller.....	21
Figure 2.13: Schematic Circuit for SIM 900A GSM/GPRS Module.....	22
Figure 2.14: Proteus Image.....	22
Figure 2.15: Overall Operation.....	25
Figure 2.16: Wireless Security Car using RFID Operation System.....	26
Figure 2.17: Block diagram for Automobile Security System using GSM.....	28
Figure 3.1: Block Diagram of the Project.....	30
Figure 3.2: Flow Chart for Project Implementation.....	35
Figure 3.3: Process of Project Development.....	36
Figure 3.4: Schematic Circuit for Buzzer, Relay, LED and Sensor.....	38
Figure 3.5: Layout for Serial Communication, Buzzer, LED and Motion Sensor.....	39
Figure 3.6: Layout for Relay.....	39
Figure 3.7: microC PRO for PIC Screen.....	40
Figure 3.8: The Program Flow.....	41

Figure 3.9: Circuit process in this project.....	42
Figure 3.10.: PIC Burner.....	43
Figure 3.11: The PIC burner connected with Computer through USB Port.....	43
Figure 3.12: Import the Hex file into the PICkit Programmer.....	44
Figure 3.13: The Hex File of program was Chosen.....	44
Figure 3.14: The Hex File was Successfully Imported.....	45
Figure 3.15: Successfully load the Program.....	45
Figure 3.16: Finish Etching and Drilling the PCB.....	46
Figure 3.17: Complete PCB with Component.....	46
Figure 3.18: Prototype of Car.....	48
Figure 4.1: Door Switch.....	50
Figure 4.2: Lock Message Send from User.....	50
Figure 4.3: Unlock Message Send from User.....	51
Figure 4.4: An Interruption from Motion sensor or Relay Occurred.....	51
Figure 4.8 (a): The lock condition of the car.....	52
Figure 4.8 (b): The unlock condition of the car.....	53
Figure 4.9: The finger trigger the Motion sensor to active.....	53
Figure 4.10: Test the circuit with GSM connection.....	53

LIST OF TABLE

Table 2.1: AT Command List1.....	3
Table 2.2: Comparison of Various Wireless Standards.....	13
Table 2.3: Comparison Between Wireless Technology.....	14
Table 2.4: Function for each Pin.....	16
Table 2.5: PIC 16F877A Specification.....	18
Table 2.6: SIM900A Features.....	20
Table 2.7: Module Feature.....	21
Table 2.8 : Testing Parameters and Results.....	27
Table 3.1: Gantt chart of Project Implement.....	32
Table 3.2: Component Function.....	38
Table 3.3 : PCB Development Process.....	47
Table 4.1 : Checklist for GSM.....	54

LIST OF SYMBOLS AND ABBREVIATIONS

SMS	=	Short Messaging Service
GSM	=	Global System for Mobile Communication
SIM	=	Subscriber Identity Module
RFID	=	Radio Frequency Identification
ECG	=	Electro Cardiogram
ADC	=	Analog to Digital Converter
MS	=	Mobile Station
TS	=	Training Sequence
BTS	=	Base Transceiver Station
BSC	=	Base Station Controller
MSC	=	Mobile Switching Center
AuC	=	Authentic Center
EIR	=	Equipment Identity Register
LA	=	Local Area
IMEI	=	International Mobile Equipment Identity
PIN	=	Personal Identify Number
K	=	Authentication key
PUK	=	PIN Unblocking Key

IMSI	=	International Mobile Subscriber Identity
GPRS	=	GSM Packet Radio Service
OS	=	Operating System
RS232	=	Recommended Standard 232
DTE	=	Data Terminal Equipment
DCE	=	Data communication Equipment
CD	=	Carrier Detect
RD	=	Received Data
TD	=	Transmitted Data
DTR	=	Data Terminal Ready
DSR	=	Data Set Ready
RTS	=	Request To Send
CTS	=	Clear To Send
RI	=	Ring Indicator
PIC	=	Programmable Integrated Circuit
IC	=	Integrated Circuit
USART	=	Universal Synchronous Asynchronous Receiver Transmitter
CPU	=	Central Processing Unit
IF	=	Instruction Fetch
ID	=	Instruction Decode
EX	=	Execution
BDP I	=	Bachelor Degree Project I
BDP II	=	Bachelor Degree Project II

CHAPTER 1

INTRODUCTION

1.0 Introduction

A vehicle is a valuable property that need a high attention to care in term of security. Now day, man willing to do anything including stealing a vehicle especially car. Thus, a security system is require as a precaution. Unfortunately, the common vehicle security system only controlled by remote and the covered controlled area is too short and limited. This leads to development of vehicle security system through mobile phone, where user are able to control and monitor their vehicle by using Short Messaging Service (SMS). Global System for Mobile Communication (GSM) technology are used to improve the common remote control, where it can be set up to text mode to communicate. User are able to control the system even at a far place because the GSM has wide coverage area. As long the mobile phone network provider is available, the system can be controlled. By implement this technology, it will enhance the level of vehicle security system. Besides, at the same time this system will help user to be more alert.

1.1 Problem Statement

There are some issues that lead to the development of Vehicle Security System Via Short Messaging Service (SMS). Application of common remote control for vehicle security system is to limit in distance and functionality. A user disable to activate or deactivate the security system at a far distance or closed place. If the user forgot to lock their car, they have to go back to the car and lock it. It burden the user to go back if they already at a far distance.

Other than that, user did not know the status of their vehicle after parked due to the function of common remote control only for lock and unlock the door. If anyone try to stole the vehicle, the owner did not know because there is no system to alert them.

1.2 Objective

In this project, a improvement for the common vehicle security system will be implement. The main objective for this project is :

- i. to study interface between Global System for Mobile Communication (GSM) modem and circuit.
- ii. to implement GSM technology in vehicle security system.
- iii. to develop the security system for vehicle by using message.

1.3 Scope

Project development of Vehicle Security System Via SMS is focusing for a car application. The target user for this system will be people who have their own car. The main scope of this project is to control the vehicle security system through mobile phone by using GSM technology. The vehicle owner is able to activate or deactivate the system by using their mobile phone. The system is available as long there is coverage network for the Subscriber Identity Module (SIM). Another scope is the GSM technology were used due to it ability to used in a wide area. This project use GSM modem which support message application to control the circuit action even in a long distances. Lastly, the central lock and motion sensor as the input for the system. This system will activated when the central lock is locked. If the central lock is unlocked by unknown person or the motion sensor detect any motion after the owner activated the system, a message will sent to acknowledge the owner.

1.4 Project Significant

This Vehicle Security System via SMS created to ease the vehicle owner to activate or deactivate the vehicle security system at a far distance. Besides, they also can monitor the status of their vehicle. At the same time, this project give opportunity to consumer new lifestyle living in technology era where GSM technology is applied on this project.

1.5 Summary

This study will produce new remote control for vehicle using technology. This will be very reliable to any distances. There are two scope in this project, which is software development and hardware development which will be explained further in the methodology section.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Now days, the development of the security system technology is keep evolving very fast every year. The security system top priority is the safety issue where this system cover about the controlling and handling the devices. The design of the security system control show a great impact in term of production cost and maintenance cost. Based on this, the development of this project need to consider to meet the user requirement and affordable. Currently, most vehicle security system solutions have been done via the use of conventional technologies such as Bluetooth application, ZigBee and Radio Frequency Identification (RFID). Unfortunately, it is less secure due to its limitation distances. In this project, mobile phone is used to provide vehicle security system in a better way by implement the GSM technology. The hardware circuit is the crucial part where all the suitable component need to be consider before it can be assemble. In this project, PIC16F877A were used as the main controller of the circuit and the GSM used as a communication medium between circuit and mobile phone. The goal of this project is to ease the user to monitor their car status at a far distance and help user to activate or deactivate their security system through SMS. This chapter will cover about the study and the idea based on the previous project as well as the theory to accomplish the goals of this project. The software and component use will be explain each part in details.

2.1 Application of GSM Technology

2.1.1 Documents Identification in a Library System

This method provide an efficient services where it ease library user to get the information about the availability of a particular book and its location through Short Messaging Service (SMS). Besides, it also save time for library user to search the book by their own, where they can send a SMS request from home or any other places. As a response, the library database maintained by automatic update and conveys systems will send the reply SMS about the availability of the book, number of copies available and its location. (R.S. Kumar, and K. Kaliyaperumal, 2014).

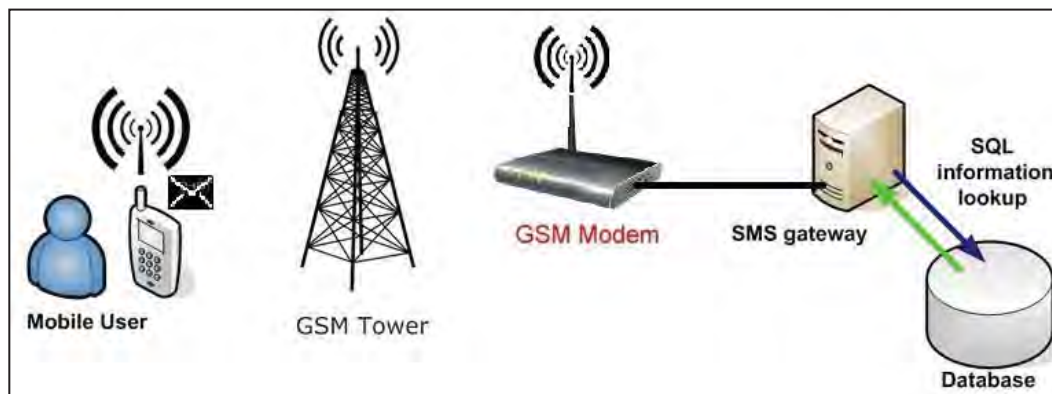


Figure 2.1 : Block Diagram for Documents Identification in a Library System.

2.1.2 Heart Rate and Temperature Monitoring System

GSM technology is also useful in medical applications where it offers less cost and size than Electro Cardiogram (ECG). GSM provide them with safe, accurate monitoring and the freedom of movement. In this system, the heart beat and temperature of patient are measured by using sensors as analog data. Then, it is converted into digital data using Analog to Digital Converter (ADC) which is suitable for wireless transmission. An AT89S52 microcontroller is used for temporary storage the data used for transmission. In the emergency case such as the patient location is far away from the

hospital, this system can be used to measure the heart rate and temperature of a individu. The information is transmitted to the medical advisory for the preliminary precautions. So, that patient can be under control and prevented from serious situation before reaching to the hospital. (Sk. M. Subhani, G.N.V. Sateesh, Ch. Chaitanya, and P. Babu, 2013).

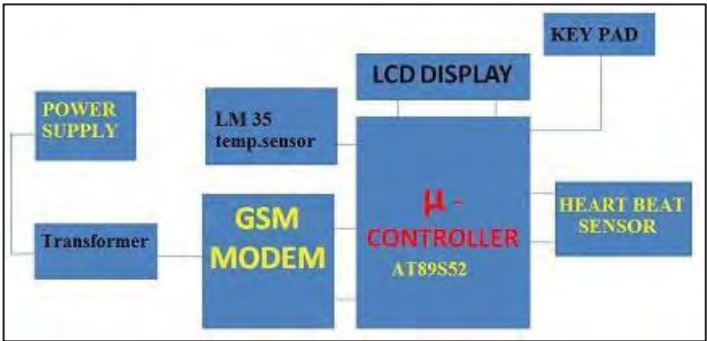


Figure 2.2 : Block Diagram for Heart Rate and Temperature Monitoring System

2.1.3 Control Borehole Pump Filling Reservoir or Tank Far Away

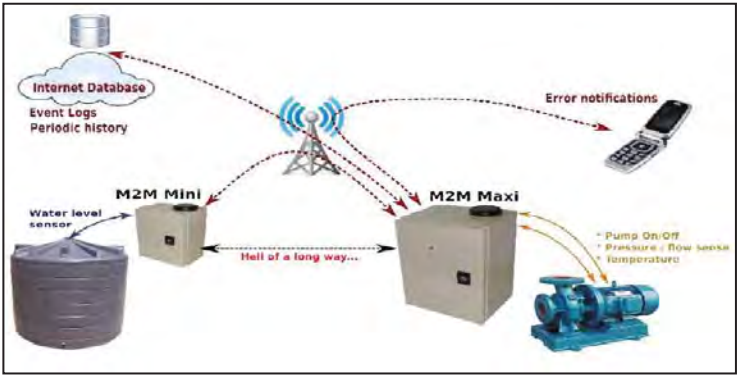


Figure 2.3 : Borehole Pump Filling Reservoir or Tank Far Away System

This system is to help a farmer wants to monitor borehole pump that is filling a drinking water tank. The GSM Commander is used to start and stop the borehole pump in order to fill a reservoir or tank that is far away from the borehole pump. The GSM Commander-1 is installed at the borehole control box and GSM Commander-2 at the

tank. When the tank water level is low, the GSM Commander-2 will place a dropped call to GSM Commander-1 in order to start the borehole pump for 45 minutes. Commander-1 will be powered from the 220V supply that is available at the pump, while GSM Commander-2 will be powered from a battery and also solar power as a back up source. (Anonymous, 2015).

2.1.4 Cable Theft Prevention

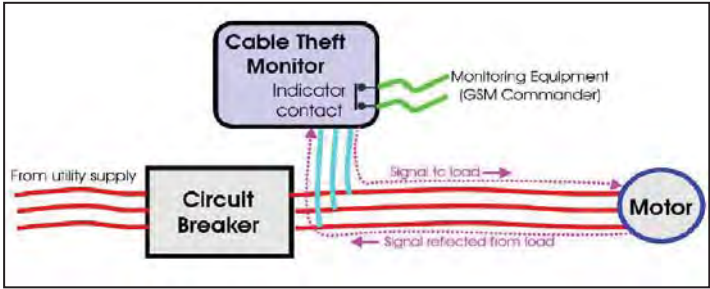


Figure 2.4 : Cable Theft Prevention System

The cable theft prevention system use the GSM Commander to monitor any cable theft. This system will monitor and protect a 3 phase pump cable, transformer cable, irrigation control cable, pivot cable, borehole pump cable or even a Telekom cable. In this case, this system is apply at farm, a wine farmer irrigates his grapes and is pumping the water over far distances to his various vineyards. The 3 phase cables to the irrigation pumps are often stolen and cause massive disruption and losses. The Cable Theft Monitor is installed with a GSM Commander to detect any cable theft events of unpowered cable. (Anonymous, 2015)

2.2 Global System for Mobile Communication (GSM)

According to D. Parkash, and Q. A. Zeng (2011) the GSM development started in 1982 where it is the one of the most successful mobile communication system worldwide. The main objective of GSM is to remove incompatibility among the system by allowing the roaming phenomenon for any cell phone. There are three version of GSM with different carrier frequency , it is :

- i. GSM 900 - The carrier frequency is 900MHz
- ii. GSM 1800 - Identical to the original GSM. The carrier frequency is around 1800MHz. It support the increasing numbers of subscribers. The bandwidth is three time larger than GSM900. The maximal transmission power of Mobile station (MSs) is reduced. Signal processing and switching technology can be reused without changes.
- iii. GSM 1900 - The carrier frequency is 1900MHz.

V. Jeyasri Arokiamary (2012) state that the higher the carrier frequency, which implies a smaller path gain and reduced transmission power reduce the sizes of the cell significantly. A GSM able to support speech transmission between MSs, emergency calls and digital data transmission. GSM was deployed using 890 to 915 MHz for uplink and 935 to 960 MHz for downlink transmission. The Time Division Multiple Access (TDMA) concept is used for time sharing to cover all the user. A time slot contains user and signalling information. In GSM frame, the middle of the time slot has the Training Sequence (TS) which used to adapt the needed parameters of the receiver. Besides, it also used to select the strongest signal in multipath propagation environment. GSM use traffic channel to transmit user data where it may be half duplex or full duplex. The data rate for half duplex is 22.8 kbps and 11.4 kbps for full duplex.