

POINT TO POINT TEXT COMMUNICATOR

RAIS BIN ABDUL MAJID

**This report is submitted in partial fulfillment of the requirements for the award of
Bachelor of Electronic Engineering (Telecommunication Electronics) With
Honours**

**Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka**

May 2008



UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : POINT TO POINT TEXT COMMUNICATOR
Sesi Pengajian : 2004/2008

Saya RAIS BIN ABDUL MAJID

mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan () :

SULIT*

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

TERHAD*

(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijangkakan)

TIDAK TERHAD

Disahkan oleh:


(TANDATANGAN PENULIS)

Alamat Tetap: No 22 Lorong Tanjung 1/1,
Taman Nilam Tanjung, 14110 Simpang
Ampat, S.P.S Pulau Pinang.

(COP DAN TANDATANGAN PENYELIA)

ZAHARIAN BT MANAP
Pensyarah
Fakulti Kejuruteraan Elektronik dan Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 13/05/2008

Tarikh: 13/05/08

“I hereby declare that this report is result of my own effort except for works
that have been cited clearly in the references.”

Signature :.....
Name : RAIS BIN ABDUL MAJID
Date : 05 MAY 2008

“I hereby declare that I have read this report and in my opinion this report is sufficient in terms of the scope and quality for the award of Bachelor of Electronic Engineering (Telecommunication Electronics) With Honours.”

Signature



Supervisors Name : PN ZAHARIAH BINTI MANAP

Date

: 13/05/08

TO MY BELOVED FATHER, MOTHER, FAMILY

&

NURULZAWANI...

ACKNOWLEDGEMENT

I would like to thank to ALLAH, as with His blessings, I managed to complete this Final Year Project. To my beloved father and mother who always pray for my peaceful and success. I would also like to convey my heartiest appreciation to my project supervisor Puan Zahariah Binti Manap for her advise, precious guidance and co-operation. Besides that, I would also like to thank other lecturers and technicians in Faculty of Electronic and Computer Engineering for giving me the advices and the opportunity to handle this project as well as their encouragement. Thanks also to my friends who have lend me their helping hand that made the task of the project much easier and able to complete on time.

“THANK YOU”

ABSTRACT

Point to Point Text Communicator is a device that can be used to communicate with another identical device by sending and receiving short messages. The system is a low cost system that can be used to send and receive short message without involving a billing process as the solution to the existing system that involves billing even for a short distance. The purpose of this project is to design the transmitter and receiver device and develop a program for the microcontroller. The device consists of a keypad, a transmitter, a receiver and an Liquid Crystal Display (LCD). The input from the user will be entered by using the keypad in terms of character. The character then will be encoded into a binary code by the microcontroller. The binary code will be converted into an RF signal by the transmitter. In this project, a Peripheral Interfacc Controller (PIC) is used as the microcontroller. The program for the PIC was developed by using the software of PICC PCW. This system operates at the frequency of 315MHz due to the frequency of transmitter and the receiver. The maximum distance between the transmitter and the receiver is 100m.

ABSTRAK

Alat Perhubungan Teks Titik ke Titik merupakan peranti yang digunakan untuk berkomunikasi dengan sebuah lagi peranti yang sama dengan cara menghantar dan menerima pesanan teks ringkas. Sistem ini melibatkan kos yang rendah dan boleh digunakan untuk menghantar dan menerima pesanan teks ringkas tanpa melibatkan sebarang pembayaran bil sebagai penyelesaian kepada pesanan teks ringkas sedia ada yang melibatkan bil walaupun pada jarak yang dekat. Tujuan projek ini adalah untuk merekabentuk peranti pemancar dan penerima dan membangunkan program untuk pengawal mikro sistem perhubungan teks. Sistem ini terdiri daripada suatu papan kekunci, modul pemancar, modul penerima, dan Paparan Cecair Kristal (LCD). Masukan dari pengguna akan dimasukkan dengan menggunakan papan kekunci dalam bentuk aksara. Kemudian aksara akan ditukarkan ke dalam bentuk kod penduaan oleh pengawal mikro. Kod penduaan kemudian akan ditukarkan kepada isyarat frekuensi radio (RF) oleh pemancar. Untuk projek ini pengawal persisian antara muka (PIC) digunakan sebagai pengawal mikro. Program bagi PIC telah dibangunkan menggunakan perisian PICC PCW. Sistem ini beroperasi pada frekuensi 315MHz kerana bergantung kepada frekuensi modul pemancar dan frekuensi modul penerima. Jarak maksima operasi penghantaran dan penerimaan adalah sejauh 100m.

TABLE OF CONTENTS

CHAPTER	ITEM	PAGE
	PROJECT TITLE	i
	REPORT STATUS	ii
	DECLARATION	iii
	SUPERVISOR APPROVAL	iv
	DEDICATION	v
	ACKNOWLEDGEMENT	vi
	ABSTRACT	vii
	ABSTRAK	viii
	TABLE OF CONTENTS	ix
	LIST OF TABLES	xii
	LIST OF FIGURES	xiii
	LIST OF ABBREVIATIONS AND ACRONYMS	xv
	LIST OF APPENDIX	xvii
I	INTRODUCTION	1
	1.1 Project Introduction	1
	1.2 Project Objective	2
	1.3 Problem Statement	2
	1.4 Scopes of Work	3
	1.5 Methodology	3
	1.6 Report Structure	3

II	LITERATURE REVIEW	5
2.1	Basic Communication	5
2.2	Transmission Modes	6
2.3	Relationship between Mobile & Wireless	7
2.4	Mobile and Wireless Messaging	8
2.4.1	Asynchronous versus Synchronous Messaging	8
2.4.2	Push versus Pull	9
2.5	Types of Messaging	10
2.5.1	Email	10
2.5.2	Paging	11
2.5.3	Short Message Service (SMS)	12
2.5.4	Enhanced Message Service (EMS)	14
2.5.5	Multimedia Message Service (MMS)	15
2.6	Important Issues for Wireless	16
2.7	Social Impact of SMS	17
2.7.1	Academic impact	17
2.7.2	Criminal impact	17
2.7.3	Social development	18
III	METHODOLOGY	19
3.1	Introduction	19
3.2	Input of the System	20
3.3	Microcontroller of the System	22
3.4	Output of the System	27
3.5	Transmitter Module	28
3.6	Receiver Module	29
3.7	Point to Point Text Communicator Circuit	31

IV	RESULT	37
	4.1 Circuit Simulation and Measurement Analysis	37
	4.2 Final Product	39
	4.3 Functionality and Troubleshoot	40
	4.4 Innovation of Point to Point Text Communicator	42
	4.5 Discussion	43
V	CONCLUSION AND SUGGESTION	44
	5.1 Conclusion	44
	5.2 Future Works	45
	REFERENCES	46

LIST OF TABLES

NO	TITLE	PAGE
3.1	LCD Pin Function	28
4.1	Power Supply Measurement	39
4.2	Checklist of Troubleshoot	42
4.3	Comparison to the Previous Project	43

LIST OF FIGURES

NO	TITLE	PAGE
3.1	Basic Communication Systems	20
3.2	Block Diagram of Point to Point Text Communicator	21
3.3	Keypad Matrix 4x4	22
3.4	Keypad 4x3	22
3.5	Flow Chart of Microcontroller	23
3.6	Programming PIC	24
3.7	Pin Diagram for 16F877A (40pin)	25
3.8	Compiling phone.c Source Code	26
3.9	Compiling the LCD Source Code	27
3.10	LCD	28
3.11	Transmitter Flow Chart	29
3.12	Transmitter Module	30
3.13	Receiver Flow Chart	30
3.14	Receiver Module	31
3.15	Point to Point Text Communicator Circuit	32
3.16	Voltage Regulator	33
3.17	Power Supply and Oscillator Circuit	34
3.18	Power Supply and Oscillator PCB Layout	35
3.19	Power Supply and Oscillator 3 Dimension Layout	35
3.20	Keypad, PIC, LCD and RF Circuit	36
3.21	Keypad, PIC, LCD and RF PCB Layout	37
4.1	Power Supply Circuit	39
4.2	Point to Point Text Communicator Device	40

4.3	LCD Output Display	41
4.4	Troubleshoot the Circuit Device	41
4.5	Product of Point to Point Text Communicator	44

LIST OF ABBREVIATIONS AND ACRONYMS

CB	-	Citizen Band
CDMA	-	Code Division Multiple Access
EMS	-	Enhanced Messaging Service
FCC	-	Federal Communication Commission
FDX	-	Full Duplex
F/FDX	-	Full/Full Duplex
GSM	-	Global System for Mobile
HDX	-	Half Duplex
HLR	-	Home Location Register
Hz	-	Hertz
IMAP	-	Internet Message Access Protocol
IR	-	Infrared
KTAK	-	Kementerian Tenaga, Air dan Komunikasi
LCD	-	Liquid Crystal Display
LMDS	-	Local Multi-Point Distribution Service
MCMC	-	Malaysian Communications and Multimedia Commission
MMDS	-	Multi Channel Multi-Point Distribution Service
MMS	-	Multimedia Messaging Service
PIC	-	Peripheral Interface Controller
PTT	-	Push to Talk
RF	-	Radio Frequency
RPC	-	Remote Procedure Call
SMS	-	Short Message System
SMPP	-	Short Message Point to Point
SMSC	-	Short Message Service Centre

SMTP	-	Simple Mail Transfer Protocol
SX	-	Simplex
TDMA	-	Time Division Multiple Access

LIST OF APPENDICES

NO	TITLE	PAGE
A	SOURCE CODE	48
B	LCD 16x2 Module	60

CHAPTER I

INTRODUCTION

This chapter contains an overview of the Point to Point Text Communicator system. The chapter consists of the project introduction, project objectives, problem statement, scopes of work, methodology and the report structure.

1.1 Project Introduction

Point to Point Text Communicator is a wireless text communication system. It is used to transmit and receive the text message. It is similar concept design of walkie talkie but the different is the type of data their used to communicate. The walkie talkie uses the voice (human voice) signal to communicate but this point to point communicator uses the text as data to communicate. This low cost system operates at 100m distance. The distance of system operating is considered by the using of antenna in RF receiver and RF transmitter. The text message must be entered using the keypad and the character (text) will be displayed on the LCD.

1.2 Project Objectives

The short messaging system or SMS is one of the services provided by the phone mobile that used for transmit and receive the short message [12]. The objective of this project is to design and develop half-duplex communication PIC microcontroller:

- 1) To design a device of wireless transceiver system between two user at a short distance.
- 2) To develop a program for the microcontroller of the text communicator device.
- 3) To provide an economic and is simple text communicator device.

1.3 Problem Statement

The mobile phones are needed by all people [3] either for call or message but the message system is widely used compared to telephone cell. The message service can be used everywhere and anytime but the problem during message is at the short distance or at the same building or area also involves billing. For example students at the same faculty who are commonly using the messaging service will have credits deducted. Some advanced phone service provides the Bluetooth and infrared system for transfer the data like picture or music which is not involve the billing but that both systems are unable to transfer the text messages. Furthermore operating distance for Bluetooth is around 8 meter only and for the infrared is more less 2 centimeter. There are also problem goes to the deaf and mute person to communicate except they use the text message service. Using the walkie talkie will allow other person hear the communication. Those statement problems motivate to developing the Point to Point Text Communicator.

1.4 Scopes of Work

There must be some specification for every mobile phone. For the text communicator device, the specifications are:

- 1) The maximum text message is 64 characters.
- 2) The maximum distance between the two devices is 100m.
- 3) The device can only perform a point to point text communicator.
- 4) The text is displayed on 16x2 LCD.

1.5 Methodology

The system consists of keypad, Liquid Crystal Display (LCD), transmitter and receiver. All components are integrated by using microcontroller. A microcontroller used is PIC 16F877. A keypad functions as an input to the PIC and the output display on the LCD. Transmitter module and receiver module was used to transmit and receive the message at the frequency of 315MHz. The maximum distance for the system can operate is at 100m. The program for the microcontroller was developing by using PICC PCW.

1.6 Report Structure

Chapter I briefs the introduction of the point to point text communicator project. It also consists the project introduction, project objectives, problem statement, scopes of work and methodology of the system.

Chapter II will discuss the background study on general communication and text communication. The study focuses on perspective and method that in previous research and also the relationship between research information and the theory.

Chapter III will explain the methodology used to solve the problem of the project. It includes the explanation on the block diagram of the system, the flow chart of the program for microcontroller and the circuit design for the whole system.

Chapter IV will discuss the final result achieved at the end of the project. Some analysis and discussion on the result are also included to provide information for further research.

Chapter V will conclude the project. Some suggestions are listed as guidance for further research on the same topic.

CHAPTER II

LITERATURE REVIEW

These chapters discuss the background study on general communication and text communication in electronic system.

2.1 Basic Communication

Communications make world become small because to exchange the data or information it become more easily when the whole world are communicate to each other either by using the internet, mobile phone, email, mms, sms and many more communication medium. According to Malaysian Communication and Multimedia Commission (MCMC) and Kementerian Tenaga, Air dan Komunikasi (KTAK) [14], currently there are 21.5 million number of cellular phone subscribers in Malaysian in year 2007. That statistic has shown the high level of using the mobile phone where it will be increase to 24.4 million cellular phone subscriber in year 2010. Communications in general, messaging in particular, have always been of key important for the organization of human societies. First messaging systems can be traced back to early civilizations such as the American Indians. Amerindians have been known to communicate using smoke signals [1]. Next, the exchange of hand-written letters allowed a more reliable messaging service where message carriers were foot or horse couriers or even carrier pigeons [5]. In the new world, messaging has benefited from advances in high technology.

With the development of mobile communications network, mobile messaging has become a very popular and reliable way for communicating with almost anybody, at anytime and from almost everywhere. All message services in the telecommunication field are based on a store-and-forward paradigm where messages are kept temporarily if users are not able to immediately retrieve them. The Short Message Service (SMS) has proved to be a very popular messaging service compared with other messaging service such as Enhanced Messaging Service (EMS) or Multimedia Messaging Service (MMS) [1].

2.2 Transmission Modes

Communication system is to transfer information or data from one place to another. There are four modes of transmission for data communication circuits: simplex, half duplex, full duplex, and full/full duplex [5]. In the simplex (SX) mode, data transmission is unidirectional or one way communication. Information can be sent in only one direction.

Simplex mode also called receive-only, transmit only, or one way only lines. Commercial radio broadcasting is an example of simplex transmission, as information is propagates in only one direction, from the broadcasting station to the listeners.

For the half-duplex (HDX) mode, data transmission is possible in both directions but not at the same time. Half-duplex communications lines are also called two-way alternate or either-way lines [5]. Citizens band (CB) radio is an example of half-duplex transmission because to send a message, the push-to-talk (PTT) switch must be depressed, which turns on the transmitter and shuts off the receiver. To receive a message, the PTT switch must be off, which shuts off the transmitter and turns on the receiver.

For the full-duplex (FDX) mode, transmission are possible in both directions simultaneously, but they must be between the same two stations. Full-duplex lines are also called two way simultaneous, duplex, or both way lines [5]. A local telephone call is an example of full-duplex transmission.

The full/full duplex (F/FDX) mode, transmission is possible in both directions at the same time but not between the same stations [5]. Full/full duplex is possible only on multipoint circuits. The U.S postal system is an example of full/full duplex transmission because a person can send a letter to one address and receive a letter from another address at the same time.

2.3 Relationship between Mobile & Wireless

A mobile device is anything that can be used on the move, ranging from laptops to mobile phones. As long as location is not fixed, it is considered mobile. Areas that are not included in definition of mobile include remote offices, home offices, or home appliances. While these are definitely remote, they are not considered mobile [4].

Wireless refers to the transmission of voice and data over radio waves or radio frequency (RF) [5]. Wireless technologies represent a rapidly emerging area of growth and importance for providing ubiquitous access to the network for all of the campus community. Students, faculty and staff increasingly want un-tethered network access from general-purpose classrooms, meeting rooms, auditoriums, and even the hallways of campus buildings. There is interest in creating mobile computing labs utilizing laptop computers equipped with wireless Ethernet cards. Recently, industry has made significant progress in resolving some constraints to the widespread adoption of wireless technologies. Some of the constraints have included disparate standards, low bandwidth, and high infrastructure and service cost [8]. Wireless technologies can both support the institution mission and provide cost-effective solutions.