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Designing an interactive telephone based remote control
and alarm system / Siti Shakhiroh Mohamad Ismail.

**DESIGNING AN INTERACTIVE TELEPHONE
BASED REMOTE CONTROL AND ALARM SYSTEM**

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MAY 2007

“I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power).”

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**DESIGNING AN INTERACTIVE TELEPHONE BASED REMOTE CONTROL
AND ALARM SYSTEM**

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**This Report Is Submitted In Partial Fulfillment of Requirements For The Degree of
Bachelor In Electrical Engineering (Industry Power)**

**Faculty of Electrical Engineering
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March 2007

"I hereby declared that this report is a result of my own work except for the excerpts that have been cited clearly in the references."

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To my beloved mother, father, brother, sister, mazrul, family
And all my buddies...

ACKNOWLEDGEMENT

Alhamdulillah, praise to be Allah S.W.T for the guidance and blessing bestowed upon me, for without it I would not have been able to come this far.

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ABSTRACT

In the era of information technology, human tend to develop a better and more convenient lifestyle. Most of the controlling mechanisms of the daily appliances are at our finger tips. The telephone system is a communication system that provides private two-way voice and data communication between virtually any locations, separated by a few yards to thousand of miles. This project innovate the controlling of electrical home appliances by allowing long distance remote control via telephone line. Besides, the system could contact the users and notify them if any emergency has occurs, using auto-dialer system. This project combines the advantages of the telephone system with a microcontroller unit that act as the main data processing unit to produce a better and more reliable remote control and alarm system. It uses the telephone's Dual Tone Multi Frequency (DTMF) chip feature to allow users to control the electrical appliances at their house from any location. Moreover, it is hoped that this project could enhance the capability of the existing remote control and home alarm system and help the users to lead a more comfortable and easy life.

ABSTRAK

Dalam era teknologi maklumat masa kini, manusia lebih cenderung untuk membentuk cara hidup yang lebih mudah dan teratur. Kebanyakan peralatan yang digunakan dalam kehidupan seharian dikawal menggunakan hujung jari. Sistem telefon merupakan sistem komunikasi yang menyediakan perhubungan dan pertukaran data secara dua-hala sesama manusia yang berada di dua lokasi berbeza, samada dipisahkan oleh jarak beberapa meter mahupun beribu batu. Projek ini menginovasi sistem kawalan peralatan elektrik di rumah dengan membenarkan sistem kawalan jarak jauh menerusi talian telefon. Selain dari itu, projek ini boleh menghubungi pengguna melalui telefon sekiranya sesuatu kecemasan berlaku di rumah mereka. Projek ini menggabungkan kelebihan sistem telefon dan unit mikropengawal yang bertindak sebagai unit pemproses data utama bagi menghasilkan satu sistem kawalan jauh dan penggera yang lebih baik. Ia menggunakan kelebihan 'Dual Tone Multi frequency' (DTMF) bagi membolehkan pengguna mengawal peralatan elektrik di rumah dari mana-mana lokasi sekalipun. Lebih dari itu, adalah diharapkan supaya projek ini dapat meningkatkan keupayaan sistem kawalan jauh dan keselamatan rumah yang sedia ada bagi membolehkan pengguna menjalani kehidupan yang lebih mudah dan selesa.

CONTENTS

CHAPTER	TITLE	PAGE
	PROJECT TITLE	i
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	CONTENTS	vii
	LIST OF TABLES	xi
	LIST OF FIGURES	xii
	LIST OF APPENDICES	xv
1	PROJECT OVERVIEW	
	1.1 Introduction	1
	1.2 Objective	2
	1.3 Scope of Project	2
	1.4 Thesis Outline	3
2	LITERATURE REVIEW	
	2.1 Introduction to telephone system	4
	2.2 Signaling	
	2.1.1 Ringing signals	7
	2.1.2 Dialing	7
	2.3 Introduction to Alarm system	8

2.4	Conventional to Alarm System	9
2.5	Project's Methodology	11
3	DESIGN BACKGROUND	
3.1	Introduction	12
3.2	Microcontroller Module	
3.2.1	The PIC Microcontroller History	13
3.2.2	PIC Micro concept	14
3.2.3	The PIC 16F873 General Description	14
3.3	Telephone Module	
3.3.1	Dual Tone Multi Frequency (DTMF)	18
3.3.2	DTMF Receiver	19
3.3.3	Ring Detector	20
3.3.4	On/off-Hook Telephone	21
3.3.5	RF Transmitter and RF Receiver	21
4	PROJECT DESIGN	
4.1	Introduction	23
4.2	PIC16F873 Circuitry and Schematic	25
4.3	The Telephone Circuit	
4.3.1	Ring Detector Circuit	27
4.3.2	Off-Hook Circuit	28
4.3.3	DTMF Receiver Circuit	29
4.3.4	RF Transmitter Circuit	32
4.3.5	RF Receiver Circuit	33
4.4	The Output Circuit	
4.4.1	Appliance Circuit	34
4.4.2	Alarm Circuit	36
4.4.3	Program Circuit	37
4.5	Developing On the Printed Circuit Board (PCB)	38

4.5.1	The main Telephone and Microcontroller Circuit Board	39
4.5.2	The Transmitter Board	40
4.5.3	The Receiver Circuit Board	41
5	SOFTWARE DEVELOPMENT	
5.1	Introduction	42
5.2	Programming Tools	42
5.2.1	MPLAB IDE	43
5.2.2	ICPROG	45
5.3	Development of the Project's Program	48
5.3.1	Call In Program	50
5.3.2	Call Out Program	50
5.4	Software Setup	53
5.4.1	Initialize the Microcontroller	53
5.4.2	Ring Detector	55
5.4.3	Receives the Password	56
5.4.4	ON/OFF Electrical Appliances	58
5.4.5	Alarm	60
6	RESULT	
6.1	Project Outcome	62
6.1.1	The Main Microcontroller and Telephone Circuit Board	62
6.1.2	The Transmitter Circuit Board	66
6.1.3	The Receiver Circuit Board	67
6.2	Activating Electrical Appliances	69
6.3	Alerting Users When Alarm is triggered	69
6.4	Advantages of This Project	
6.4.1	User's Friendly	72

6.4.2	Longer Delay Times	73
6.4.3	Stages of Dialing the Users (Call-out Process)	74
7	CONCLUSION AND RECOMMENDATIONS	
7.1	Conclusion	75
7.2	Future Recommendations	76
	BIBLIOGRAPHY	77
	APPENDICES A-E	79 - 83

LIST OF TABLE

NO	TITLE	PAGE
3.1	Microcontroller Features	17
3.2	Devices Features for PIC16F873	17
3.3	DTMF Frequency Tone Pair	19
3.4	RT4 Pin Description	22

LIST OF FIGURES

NO	TITLE	PAGE
2.1	A Simple Telephone System	5
2.2	A Basic Telephone System	6
2.3	A Closed-Circuit Magnetic Sensor	10
2.4	Project's Block Diagram	11
3.1	PIC16F873	15
3.2	PIC16F873 Microcontroller Pin Layouts	15
3.3	PIC16F873 Block Diagram	16
3.4	CM8880 Chip and Pin Out Description	20
3.5	RT4 Mechanical Dimensions	22
4.1	Electronic Single Line Block Diagram	24
4.2	Connection of the LM7805 Regulator	25
4.3	Picture of Power Circuit	25
4.4	The Oscillator Circuit	26
4.5	Picture of Oscillator Circuit	26
4.6	The Microcontroller Pin Assignments	26
4.7	The Ring Detector Circuit	28
4.8	Picture of Ring Detector Circuit	29
4.9	The DTMF Receiver Circuit	29
4.10	Picture of DTMF Receiver	30
4.11	Functional Block Diagram of CM8880	31
4.12	The Transmitter Circuit	32
4.13	Picture of Transmitter Circuit	32
4.14	The Receiver Circuit (4 ways)	33

4.15	Picture of Receiver Circuit	33
4.16	The Appliances 1 Circuit	34
4.17	Picture of Appliances 1 Circuit	34
4.18	The Appliances 2 Circuit	35
4.19	Picture of Appliances 2 Circuit	35
4.20	The Alarm Circuit	36
4.21	Picture of Alarm Circuit	36
4.22	The Program Circuit	37
4.23	Picture of Program Circuit and Alarm	37
4.24	Design Explorer Desktop interface	38
4.25	The Main Telephone and Microcontroller PCB Schematic	39
4.26	The Main Telephone and Microcontroller Multi-Layer Composite Schematic	39
4.27	The Transmitter PCB Schematic	40
4.28	The Transmitter Multi-Layer Composite Schematic	40
4.29	The Receiver PCB Schematic	41
4.30	The Receiver Multi-Layer Composite Schematic	41
5.1	MPLab IDE Desktop Interface	44
5.2	Select Device Toolbox	44
5.3	Source code when loaded into MPLab	45
5.4	ICPROG Desktop Interface	46
5.5	PIC Microcontroller Programmer	46
5.6	Dialog Box for Hardware Setting	47
5.7	The Main Program Flow Chart	49
5.8	The Call-In Program Flow Chart	51
5.9	The Call-Out Program Flow Chart	52
6.1	The Main Microcontroller and Telephone Circuit on PCB	63
6.2	The Main Microcontroller Overall Circuit	64
6.3	The Main Microcontroller and Telephone Circuit	65
6.4	The Transmitter Circuit on PCB	66
6.5	The Transmitter Circuit	66

6.6	The Receiver Circuit on PCB	67
6.7	Overall of Receiver Circuit	68
6.8	Call-In Process Flow Chart	70
6.9	Call-Out Process Flow Chart	71
6.10	Overall Project Circuit on PCB	74
6.11	Picture of Project	74

LIST OF APPENDICES

NO	TOPIC	PAGE
A	PROJECT SCHEMATIC	79
B	PROJECT SOURCE CODE	80
C	DATA SHEET – CM8880	81
D	DATA SHEET - UL2001, 2002, 2003, 2004	82
E	DATA SHEET – PIC 16F873	83

CHAPTER I

PROJECT OVERVIEW

1.1 Introduction

Telephone based remote control and alarm system is an added feature to innovate the controlling of electrical appliances by allowing long distance remote control via telephone line, which means that we can turn on/off electrical appliances from any location as long as there is a telephone connection. It uses the telephone's Dual Tone Multi Frequency (DTMF) feature to allow users to control the electrical appliances at their house from any location.

This project will also enhance the performance of home security. Conventional home alarm system only alert those who are within hearing range of siren. With auto-dialer attached to the alarm system circuitry, the user will be alerted immediately via telephone. Thus, it is hoped that this project could enhance the capability of the existing remote control and home alarm system and help the users to lead a more comfortable and easy life.

1.2 Objectives

The main objective for this project is to build and develop a system that would enable the user to activate electrical home appliances remotely via telephone using Peripheral Interface Controller (PIC).

Another objective is to develop a home safety monitoring and alarm system which alerts the owner in cases of emergency, using auto-dialer system. Therefore, the owner need not be near the house to know if something is wrong because the information will be received through the phone.

1.3 Scope of Work

The scope of this project is divided into three main categories. The first one is construction of the system's main processing unit using PIC16F873 microcontroller. These types of microcontroller are currently new to UTeM students. So, a wide knowledge about the operations, functions and programming of the microcontroller is essential. The PIC microcontroller is chosen because it is easy to buy, inexpensive low cost development tools and also powerful.

Next, development of the telephone circuits that act as an interface between user and the system. The telephone is categorized as an analog system while the microcontroller is a digital system. Thus, a combination of a few suitable circuits is needed so that the analog signal from the telephone can be changed to its digital form. This is essential because the microcontroller can only recognize and process digital signals. This also includes sensor implementation which implement a ring detect sensor in this project.

Finally, software design to enable the system to operate according to the objectives of this project. There are two source code compilers that can be use for PIC microcontroller. The program can be written whether using assembly or C language.

1.4 Thesis Outline

This thesis is divided into seven chapters. The first chapter is the project overview, followed by Chapter II for literature reviews. Chapter III covers about the design background. Chapter IV will describe about the project design. Chapter V is about the software development while Chapter VI shows the result of this project. The last chapter provides the conclusions of the project and future recommendations.

CHAPTER II

LITERATURE REVIEWS

2.1 Introduction to Telephone System

A telephone system is a communication system that provides two-way voice and data communication between virtually any locations separated by a few yards to thousands of miles. A sophisticated network of switching circuitry allows a caller to dial and be connected to a desired party at the far end.

Although most of us take it completely for granted, the telephone that we have in our house is one of the most amazing devices ever created. If we want to talk to someone far away, all that we have to do is pick up the phone and dial a few digits. Then, we are instantly connected to that person, and we can have a two-way conversation. Fortunately, the telephone network extends worldwide, so we can reach nearly anyone on the planet. And if we compare that to the state of the world just 100 years ago, when it might have taken several weeks to get a one-way written message to someone, we'll realize just how amazing the telephone is. We should be thankful to Alexander Graham Bell, the inventor of the telephone system that we use nowadays.

Surprisingly, a telephone is one of the simplest devices we have in our house. The design is so simple and in fact, the telephone connection to our house has not changed in nearly a century. The very simplest working telephone would look like this inside:

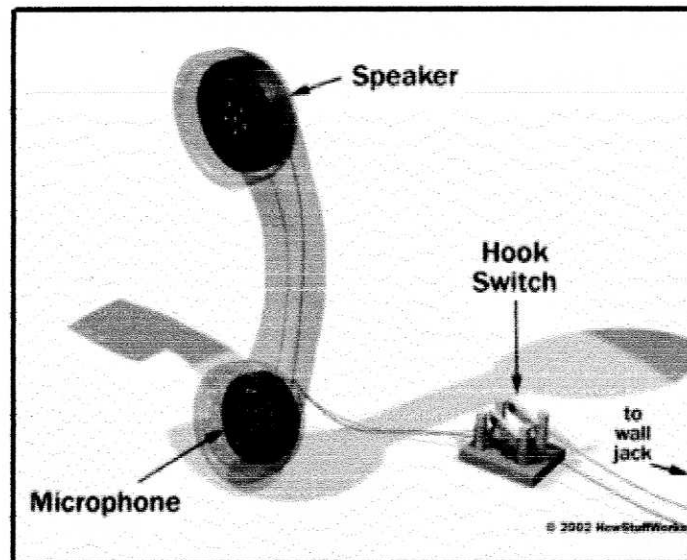


Figure 2.1: A Simple Telephone System [5]

From Figure 2.1 shown above, a simple and very basic telephone system only contains three parts and they are all very simple:

- **Switch** : To connect and disconnect the phone from the network.
This switch is generally called the hook switch. It connects when we lift up the phone stalk/stem.
- **Speaker** : This is generally a little 50-cent size, 8 ohm speaker of some sort.
- **Microphone** : In the past, telephone microphones have been as simple as carbon granules compressed between two thin metal plates. Sound wave from our voices compress and decompress the granules, changing the resistance of the granules and modulating the current flowing through the microphone. [5]

For learning experience and exposure to the telephone system, we can make this simple basic telephone. The dialing system is by rapidly tapping the hook switch (all modern telephone switches still recognize "pulse dialing"). If we pick the phone up and

rapidly tap the switch hook for four times, the phone company's switch will understand that we have dialed a "4." For a more "real" telephone system that we use nowadays, it will look more like the figure below:

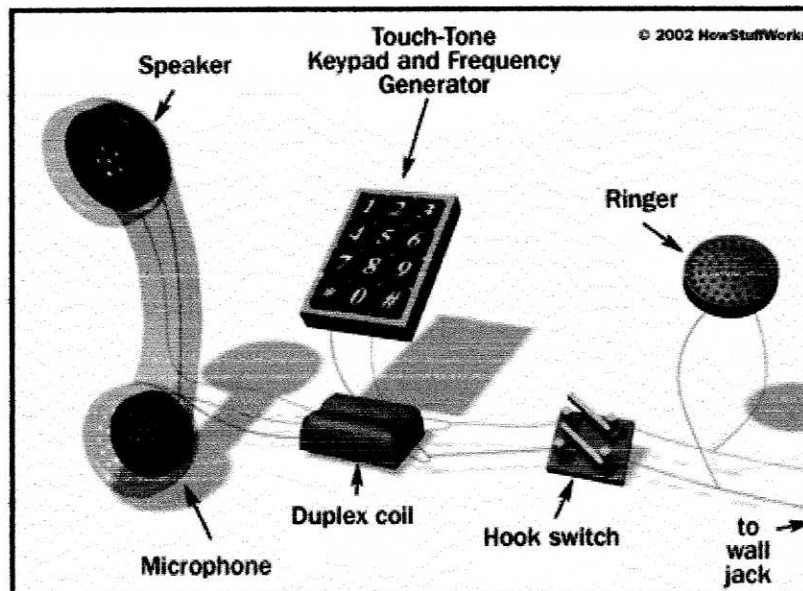


Figure 2.2: A Basic Telephone System [5]

The main differences between Figure 2.2 and Figure 2.1 are that it has three additional telephone instruments which are:

- **Duplex Coil** : To block the users own voice from reaching their ear.
- **Ringer** : The function is to block any DC current when a telephone line is connected. Only AC ring signal will go through and make the telephone rings.
- **Touch-Tone Keypad and Frequency Generator**
: Touch-tone is fast compared to pulse dialing. It is used to send signals around the world via telephone line. [5]