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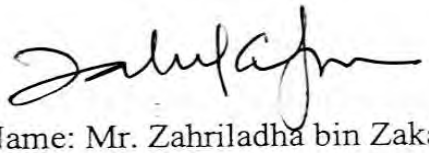
Signature: 

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DEVELOP A CELLULAR RADIO SYSTEM FOR WIRELESS SPEAKER

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This project report is submitted in part fulfillment of the requirements of the award of a degree in Bachelor of Electronic Engineering (Industrial Electronic)

FACULTY OF ELECTRONIC AND COMPUTER ENGINEERING
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APRIL 2006

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Dedicated to those remembered and beloved.....

Special for parents, brothers and sisters who's always

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ABSTRACT

The goal of this project is to design and develop a cellular radio system for a wireless speaker based on cellular radio telephone concept and microcontroller for application at offices, homes, lecturer hall, and hostel and etc. This project is acted as a "Portable Announcing System (P.A)", the user can make an announcement to his or her staff, friends, family via his or her mobile phone even user is talking far away from destination, or stranded in traffic jam. So that, the staff, friends, or family members of the user can hear the announcement as long as there is a radio coverage by a particular cellular phone system for two mobile phones. This project has a lot of benefit and suitable for someone who have limited time or someone who always busy to spent time to make important announcement which can be made in P.A room. All the detail about this project being pulls in together in this thesis with all the information which needed in separate chapter.

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ABSTRAK

Tujuan utama projek ini ialah membangunkan satu sistem radio bimbit untuk pembesar suara tanpa wayar menerusi konsep pengawalan mikro untuk diaplikasikan di pejabat, umah, bilik kuliah dan hostel. Projek ini bertindak sebagai "sistem pembuat pengumuman secara serba boleh" di mana para pengguna boleh membuat pengumuman kepada para pekerja, kawan ataupun keluarga walaupun pengguna berada di mana-mana tetapi mesti di dalam lingkungan liputan yang dikhaskan syarikat komunikasi yang terdapat di negara ini. Projek ini sesuai kepada sesiapa sahaja yang selalu sibuk dalam melakukan tugas tetapi perlu sentiasa membuat pengumuman dan dengan adanya projek ini masa dan tenaga boleh dijimatkan. Semua maklumat-maklumat penting bagi projek ini telah disiapkan dan setempatkan dalam bab-bab yang telah disediakan di dalam tesis ini.

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LIST OF ABBREVIATIONS

PIC16F84A	-	Microchip Microcontroller 16F84x Series
IC	-	Integrated Circuit
P.A	-	Portable Announcing System
NO	-	Normally Open
NC	-	Normally Close
AC	-	Alternate Current
DC	-	Direct Current
C	-	Common
MIC	-	Microphone
I/O	-	Input/Output
PC	-	Personal Computer
AN	-	Analog
C	-	Capacitor
R	-	Resistor
GND	-	Ground
ATE	-	Automatic Test Equipment
MCU	-	Microcontroller Unit
RAM	-	Random Access Memory
XT	-	Crystal Oscillator
SFR	-	Special Function Register
MCLR	-	Master Clear
EEPROM	-	Electrical Erasable Programmable Read Only Memory
CPU	-	Central Processing Unit
ALU	-	Arithmetic Logic Unit
PCB	-	Printed Circuit Board
MCB	-	Main Unit Board

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CHAPTER 1

INTRODUCTION

This chapter wills explain about project introduction, objectives, problem statement and project scope.

1.1 INTRODUCTION

What is cellular? Cellular or mobile phone is one of the fastest growing and most demanding telecommunications applications. Today, it represents a continuously increasing percentage of all new telephone subscriptions around the world. Currently there are more than 45 million cellular were that regular subscribers worldwide. It is forecasted that cellular systems using a digital technology will become the universal method of telecommunications. Other than that, technology today is moving towards the future of the wireless web. Mobiles devices such as palmtops, handheld and cellular phones are becoming all the rage. People want these devices to do everything from access their e-mail accounts, to utilize the Internet, to access personal and corporate information.

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The goal of this project is to design and developing a cellular radio system for a wireless speaker based on cellular radio telephone concept and microcontroller for application at offices, homes, lecturer hall, and hostel and etc. This project is acted as a "Portable Announcing System (P.A)", the user can make an announcement to his or her staff, friends, family via his or her mobile phone even user is talking far away from destination, or stranded in traffic jam. So that, the staff, friends, or family members of the user can hear the announcement as long as inside the radio coverage by a particular cellular phone system for two mobile phones. Figure 1.1 shows basic for this project combination between hardware and software for developing cellular radio system for wireless speaker.

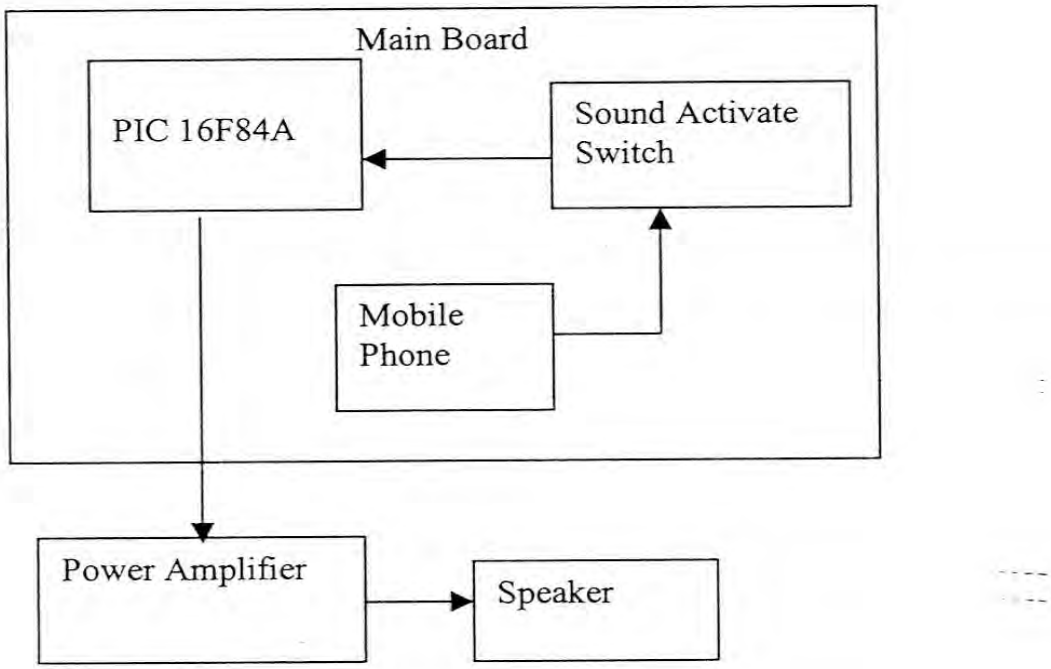

Figure 1.1: Basic Block Diagram for Project

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1.1.1 Mobile Phone

A mobile phone or cellular phone is an electronic telecommunications device. Most current mobile phones connect to a cellular network of base stations (cell sites), which is in turn interconnected to the public switched telephone network (PSTN)(the exception are satellite phones). In addition to the standard voice function of a telephone, a mobile phone can support many additional services such as SMS for text messaging, packet switching for access to the Internet, and MMS for sending and receiving photos and video, [1].

Some of the world's largest mobile phone manufacturers include Alcatel, Siemens, LG, Motorola, Nokia, Panasonic (Matsushita Electric), Philips, Samsung, Sanyo, Sharp, Sony Ericsson, and Toshiba. The entire largest mobile phone manufacturer always design a new type mobile phone and upgrade function to make their product popular and their system also friendly user, guide user using mobile phone correctly.

There are also specialist communication systems related to, but distinct from mobile phones, such as Professional Mobile Radio. Mobile phones are also distinct from cordless telephones, which generally operate only within a limited range of a specific base station. Technically, the term mobile phone includes such devices as satellite phones and pre-cellular mobile phones such as those operating via MTS, which do not have a cellular network, whereas the related term cellular phone does not. In practice, the two terms are used nearly interchangeably, with the preferred term varying by location, [1].

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1.1.2 Relay

Relay contacts on most of the industrial world are labeled with NO (Normally Open), NC (Normally Closed), and *C* (Common). These labels and the function of the relays seems to cause a great deal of confusion among people, however once the operation of these relay being understand of the meaning it is quite simple and literal, [2].

The first thing need to know is that a relay contact is a switch, nothing more, nothing less. It does not provide power; it simply opens and closes an electrical circuit, just like the light switch on a wall. When the relay is de-energized or turned off there is an electrical connection between NC and Common, hence it was normally closed. In the off state there is not a connection between NO and common, hence normally open. When the relay is being energized it's turned on the NO and *C* makes an electrical connection, and the electrical connection between NC and *C* being removed, [2].

The last issue is voltage and current ratings. A typical relay rating will be 24VDC @ 5 Amps, 110VAC @ 10 Amps, 220 VAC @ 5 Amps. This is simply telling the max amperage that the relay contacts can handle at the voltage the user used. For example a 100 Watt light bulb is going to be about 100 VAC @ 1 Amp. This is 9 Amps below the rating, so the circuit can handle turning on an off the light bulb with no problem.

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1.1.3 Power Amplifier

This is a 50 Watt stereo amplifier module design using the TDA 2009 from Philips. It is particularly suited to battery operation, providing 50 Watt per channel from only a 6VDC supply and it will operate best from 6-12 VDC and requires no heat-sink for normal use. The TDA 2009A is class AB dual Hi-Fi audio power amplifier assembled in Multiwatt package, specially designed for high quality stereo application as Hi-Fi and music centers. The benefits of this power amplifier are short circuit protected, thermal protection, low power consumption, good stability and gain is internally set to 39 dB.

1.1.4 PIC 16F84A

The PIC16F84A belongs to the mid-range family of the PICmicro® microcontroller devices. The program memory contains 1K words, which translates to 1024 instructions, since each 14-bit program memory word is the same width as each device instruction. The data memory (RAM) contains 68 bytes. Data EEPROM is 64 bytes. There are also 13 I/O pins that are user-configured on a pin-to-pin basis. Some pins are multiplexed with other device functions. These functions including external interrupt change on PORTB interrupts and timer clock input, [3].

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1.2 PROJECT OBJECTIVE

For this project there was only one main objective. This happen to achieve the objective or goal which acquirable for PSM for this year. This project is combination of hardware and software. These for this are the objective for this project is to development a system, which help anyone to make announcement in all situation (inside coverage signal) easy and fast.

1.3 PROBLEM STATEMENT

This project is acted as a "Portable Announcing System (P.A)", the user can make an announcement to his or her staff, friends, family via his or her mobile phone even user is talking far away from destination, or stranded in traffic jam. So that, the staff, friends, or family members of the user can hear the announcement as long as there is a radio coverage by a particular cellular phone system for two mobile phones.

This can save time, using the best way of evolution in cellular radio system because we can see if someone wants to make announcement they need to go to a lot of procedure before can make an announcement. Usually PA system located at the up root and it takes a lot of time to reach them or making a wasting calls just to tell them to make announcement.

Using some adjustment this system can be used effectually without any problem. With some securities system this project can be safely without any problem.

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1.4 PROJECT SCOPE

For the project scope all the important thing had being made including all the important measurement to make this project successfully without any flaw and problem.

Some research had being made to make some requirement to create a prototype for this project. For this project 50 Watt audio power amplifier had being chosen because of small input (12 VDC) which suitable for the mobile phone. All the signal and design being monitor all the time to make this amplifier work properly.

Make some research about PIC 16F84A microcontroller and learning some of it benefits and the way it operated. Some program being added to this PIC 16F84A to make it can be suitable for this project. Some adjustment being make to make PIC 16F84A circuit can match with power amplifier.

For mobile phone the Nokia had being chosen because the design of Nokia is friendly user and this mobile phone also cheap than other branded. The speaker, 8 ohm and 150 Watt being choose it suitable for this project and it can match with power amplifier. The size of speaker can be choosing depending to the Watt of power amplifier being created.

The operation of this project, signal/input entering handset (part of project) or handset receiving incoming call. The signal/input also entering PIC 16F8A which had been programming to automatic "on" the incoming call or to hang-up the handset without manually answer. PIC 16F84A will let the signal entering power amplifier. The power amplifier will increase the volume of signal to make sure the input can be heard anyone is the calculate range.

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PIC 16F84A is the main, which make this project successful, but it must being be program before using it. The entire coming signal/input being control by the PIC 16f84A microcontroller. The PIC 16f84A will make the input/signal (incoming call) being hang-up used a program automatically and makes the signal entering the power amplifier or operated the all system.

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