WIRELESS COMPUTER PRESENTER

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SUPERVISOR APPROVAL

'I admit that I have read this literature work through my observation which has fulfilled the scope and quality in order to be qualified for the conferment of Bachelor Degree in Electronic Engineering (Computer).'

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Supervisor's name : En. Nor Zaidi Bin Haron

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DEDICATION

I dedicate this to my beloved
parents; my whole family; and to all
my friends who have stood by me throughout
these 4 years; all of lecturers of Faculty of
Electronics Engineering and Computer Engineering
for all effort and knowledge given to me

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ABSTRACT

Technology advancement has brought our life into the digital world. Digital control is incorporate in almost device. The wireless computer presenter is a part of control devices which is used to control Power Point Presentation. The project undertaken was to design and implement a Wireless Computer Presenter. This project is divided into two main subsystems, hardware and software. For hardware parts, consists of Peripheral Interface Controller (PIC) and Bluetooth Module transceiver. While, for software parts consist C programming language. This thesis describes the process that was used to take a conceptual design and turn it into working reality. This device will have operation such as Slide Forward and Slide Back, Maximize and Minimize, Start and End the slide show with few additional operations. It basically assimilates from the remote control and Bluetooth technology. PIC is used in the main circuit where it is will programmed to control the operation of the presenter. The Bluetooth module is used for communication between the computer and the presenter. Apart from its advantage of transmitting data in distance, it is widely available in nowadays Personal Computer (PC) and laptop. The person who gives talk could walk around without any hindrance and change the slide whenever he or she wants.

ABSTRAK

Kemajuan teknologi membawa hidup kita ke arah dunia digital. Kawalan digital digabungkan pada semua peralatan. Penyampai Komputer Tanpa Wayar adalah sebahagian daripada peralatan kawalan yang digunakan untuk mengawal Persembahan Power Point. Projek yang diambil ini adalah untuk mereka dan melaksanakan sebuah Penyampai Komputer Tanpa Wayar Projek ini dibahagikan kepada dua subsistem, perkakasan dan aturcara. Bagi bahagian perkakas terdiri daripada Kawalan Antara Muka Periferal (PIC) dan penghantar-terima Modul Bluetooth. Manakala, bahagian aturcara terdiri daripada bahasa aturcara C. Setiap subsistem mengandungi metodologi yang melibatkan penyelidikan, pelaksanaan dan pengujian. Tesis ini menghuraikan tentang proses yang digunakan untuk menyampaikan konsep rekacipta dan menukarkan kepada dunia nyata. Perkakasan ini mempunyai operasi seperti slaid hadapan dan slaid belakang, memaksimum dan meminimum, mula dan menamatkan persembahan slaid dengan beberapa operasi tambahan. Secara asasnya, ia diasimilasikan daripada teknologi kawalan jauh dan modul Bluetooth. PIC digunakan sebagai litar utama dimana ia diprogram untuk mengawal operasi Penyampai. Modul Bluetooth digunakan untuk komunikasi antara komputer dan penyampai. Sebahagian daripada kelebihannya ia dapat menghantar data yang jauh, ianya juga sudah tersedia pada komputer peribadi dan laptop. Seseorang yang memberi ucapan boleh berjalan di sekeliling tanpa gangguan dan menukarkan slaid di mana saja dia mahukan.

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CHAPTER I

INTRODUCTION

Today in the high technology world remote control technologies are widely utilized to facilitate the human. These not only happen in industrial sector but also happen in our day life. Electronic devices that can be controlled from some distance are one of the applications of this technology.

Ten years ago, many electric and electronic devices such as television, CD player and radio have been remotely controlled. However, in today life, remote control also used for the presentation. For example, people who give a talk in presentation session need to walk around without any hindrance and change the slide away from PC or laptop.

1.1 PROJECT OVERVIEW

The proposed project is to design a Wireless Computer Presenter for Power Point Presentation. This Wireless Presenter will have operation such as Slide Forward and Slide Back, Maximize and Minimize, Start and End the slide show with few additional operations. The presenter circuits are designed based on Microchip's Peripheral Interface Controller (PIC) microcontroller. Bluetooth communication is used in this project. Apart from its advantage of transmitting data in distance, it is widely available in nowadays PC or laptop. The presenter will also be equipped with infrared laser pointer to point the slide.

1.2 OBJECTIVES

The objective of the project is to design a Wireless Computer Presenter for Microsoft Power Point Presentation. This device used Microchip's Peripheral Interface Controller (PIC) microcontroller as the "brain" of the circuit and Bluetooth module as transceiver. The Bluetooth transmitting capability is also studied.

1.3 SCOPE OF THE PROJECT

This final year project is basically the application on computer engineering. This project is divided into two part; C programming for PIC development and fabrication of piece of an electronics circuit. The entire operation of the presenter is controlled by Microchip PIC microcontroller. For software part, PIC compatible language is written and compiled using SourceBoost IDE version 6.40. Simulation of the entire circuit is done using Proteus Version 6 Professional. For hardware section, transceiver circuit is fabricated which comprises of PIC microcontroller, Bluetooth module and other lump

components. The circuit is fabricated on Printed Circuit Board (PCB). Proteus ARES Professional is used to draw circuit on PCB. Etching and soldering processes will also be exercised. Testing on complete design will be carried out to ensure the functionality of the presenter.

1.4 PROBLEM STATEMENT

It is a problem when delivering a Power Point presentation when the presenter needs to stand next to the computer. Alternatively, there is might be another person controlling the computer while presenter is talking. This project is to alleviate the problem by designing a wireless remote that allows user to wirelessly control their presentation from a distance. A Microchip's Peripheral Interface Controller (PIC) microcontroller will be used to control the operation of this remote.

PIC is chosen as Microcontroller as it. It cheep and widely available in market. Meanwhile, Bluetooth is the latest technology in communication. It is capable to transmit data further compare to infrared. Nowadays, many personal laptops already equipped with this module thus make this project possible to be utilized.

At the end, this project is aimed to ease presentation session. The person who gives talk could walk around without any hindrance and change the slide whenever he or she wants.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents the theory and the concept that related with this project to yield the project using right method. The reason of this discussion is to clarify the perspective and method that have been used, so that this project can be studied and build according to the theory. This chapter is also as the reference to the available theory in resolving resolve the problem of the project.

2.2 INTRODUCTION OF MICROCONTROLLER

Microcontrollers can be found in any products these days. For example modern washing machine in our house that consists of timer, button and LED contains a microcontroller. All modern cars also contain microcontroller. To understand how microcontroller works, we need to understand digital electronics. However, with the existing of microcontroller like PIC16F877A from Microchip, we can make electronic circuits work by writing programming code and download into microcontroller. C

programming is one method to program the microcontroller to respond to what we wish, everything become so simple.

A microcontroller is a small computer and it can only perform simple task [1]. Microcontroller consists of:

- Processor that executes programs. Processor execute program digitally. All instruction given to the processor should be in digital form.
- Program Memory to store the program that has been compiled successfully by the compiler.
- RAM (random-access memory) to store "variables."
- Input Output (I/O) Port to connect to sensor, keypad, LED, Relay and so on.
- Timer to count the time to execute some processes.

2.2.1 Microcontroller Specification

The microcontroller is very brilliant and useful. This microcontroller is very easy to program and the price is also very cheap. Its cost is less than RM40. The good thing is that single unit can be purchased at that RM40 price. Unlike some other Integrated Circuit that must be bought at a minimum order quantity such as 1000 units or 2000 units or else you won't be able to purchase it.

PIC16F877A microcontroller can be programmed and erased about 10 000 times [11]. If we are doing programming and downloading our code into the microcontroller 20 times a day, which means we can do that for 500 days which is more than a year.

The erasing time is almost unnoticeable because once new program are loaded into the PIC, the old program will automatically be erased immediately. PIC16F877A already made with 368 bytes of Random Access Memory (RAM) inside it. The temporary variable storage that written in the program will be stored inside the RAM. It is not necessary to buy any external RAM because 256 bytes of EEPROM are available

also inside this microcontroller. This is very useful to store information such as PIN Number, Serial Number and so on. Using EEPROM is very important because data stored inside EEPROM will be retained when power supply is turn off. RAM does not store data permanently. Data inside RAM is not retained when power supply is turned off.

The size of program code that can be stored is about 8k words inside PIC16F877A Read Only Memory (ROM) is one word size is 14 bits. By using the free version of the CCS C compiler only 2k words of program can be written and compiled. Nevertheless, more than 2k to write of C program we have to purchase the original CCS C compiler and it cost less than 700 dollar [11].

The crystal oscillator speed that can be connected to the PIC microcontroller is in the range of DC to 20Mhz. Normally 20Mhz oscillator will be used when using the CCS C Compiler. The 20 MHz crystal oscillator should be connected with about 22pF capacitor. There are 5 input/output ports on PIC microcontroller namely port A, port B, port C, port D and port E. Each port has different function. Most of them can be used as I/O port.

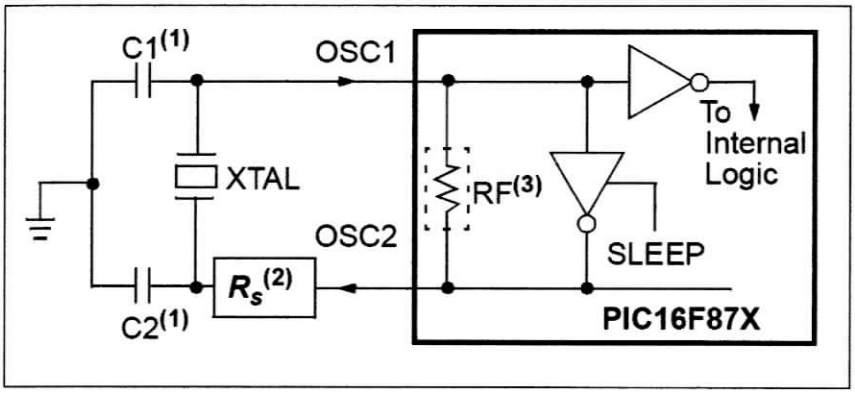

Figure 2.1 : The Oscillator Circuit

2.3 MICROCONTROLLER PIC16F877A

Table 2.1 : PIC16F877A Microcontroller Specification

RAM	368
EEPROM	256 bytes
Flash Program Memory	8k words
Operating Frequency	DC to 20MHz
I/O port	Port A,B,C,D,E

PIC16F877A is a small piece of semiconductor integrated circuits (IC). The package type of these integrated circuits is DIP package. DIP stand for Dual Inline Package for semiconductor IC. This package is very easy to be soldered onto the stripboard. However using a DIP socket is much easier due to that this chip can be plugged and removed from the development board. Additional components that is needed to make this IC work are just a 5V power supply adapter, a 20MHz crystal oscillator and 2 units of 22pF capacitors.

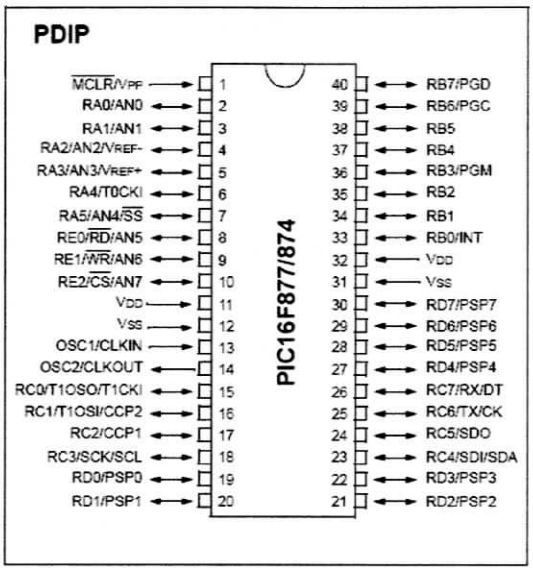

Figure 2.2 : PIC16F877A [7]

The Microcontroller PIC16F877 have 40 pins of input and output (IO) where it can be separated into 4 ports which are Port A, Port B, Port C and Port D. Port A have 6 pins; RA0, RA1, RA3, RA4, RA5 and RA6. Port B have 8 pins; RB0, RB1, RB2, RB3, RB4, RB5, RB6 and RB7. Port C have 8 pins; RC0, RC1, RC2, RC3, RC4, RC5, RC6 and RC7. Port D have 8 pins; RD0, RD1, RD2, RD3, RD4, RD5, RD6 and RD7.

2.3.1 Pins Description

Table 2.2 : Table of Pins Description [7]

Pin name	***Description***
OSC1/CLKIN	Oscillator crystal input/external clock source input.
OSC2/CLKOUT	Oscillator crystal output. Connects to crystal or resonator in crystal oscillator mode. In RC mode, the OSC2 pin outputs CLKOUT which has 1/4 the frequency of OSC1, and denotes the instruction cycle rate.
$\overline{MCLR}$/VPP	Master Clear (Reset) input or programming voltage input. This

	pin is an active low RESET to the device.
RA0/AN0	**PORTA is a bi-directional I/O port.** RA0 can also be analog input0.
RA1/AN1	RA1 can also be analog input1.
RA2/AN2/VREF-	RA2 can also be analog input2 or negative analog reference voltage.
RA3/AN3/VREF+	RA3 can also be analog input3 or positive analog reference voltage.
RA4/T0CKI	RA4 can also be the clock input to the Timer0 module. Output is open drain type.
RA5/$\overline{SS}$/AN4	RA5 can also be analog input4 or the slave select for the synchronous serial port.
RB0/INT	**PORTB is a bi-directional I/O port. PORTB can be software programmed for internal weak pull-up on all inputs.** RB0 can also be the external interrupt pin.
RB1	-
RB2	-
RB3/PGM	RB3 can also be the low voltage programming input.
RB4	Interrupt-on-change pin.
RB5	Interrupt-on-change pin.
RB6/PGC	Interrupt-on-change pin or In-Circuit Debugger pin. Serial programming clock.
RB7/PGD	Interrupt-on-change pin or In-Circuit Debugger pin. Serial programming data.
	PORTC is a bi-directional I/O port.
RC0/T1OSO/T1CKI	RC0 can also be the Timer1 oscillator output or Timer1 clock input.
RC1/T1OSI/CCP2	RC1 can also be the Timer1 oscillator input or Capture2 input/Compare2 output/PWM2 output.

RC2/CCP1	RC2 can also be the Capture1 input/Compare1 output/ PWM1 output.
RC3/SCK/SCL	RC3 can also be the synchronous serial clock input/output for both SPI and I2C modes.
RC4/SDI/SDA	RC4 can also be the SPI Data In (SPI mode) or data I/O (I2C mode).
RC5/SDO	RC5 can also be the SPI Data Out (SPI mode).
RC6/TX/CK	RC6 can also be the USART Asynchronous Transmit or Synchronous Clock.
RC7/RX/DT	RC7 can also be the USART Asynchronous Receive or Synchronous Data
RD0/PSP0 ***RD1/PSP1*** ***RD2/PSP2*** ***RD3/PSP3*** ***RD4/PSP4*** ***RD5/PSP5*** ***RD6/PSP6*** ***RD7/PSP7***	**PORTD is a bi-directional I/O port or parallel slave port when interfacing to a microprocessor bus.**
VSS	Ground reference for logic and I/O pins.
VDD	Positive supply for logic and I/O pins.

2.4 BLUETOOTH

2.4.1 Descriptive Overview

Bluetooth radios operate in the unlicensed ISM band at 2.4 GHz. A frequency hop transceiver is applied to combat interference and fading. A shaped, binary FM modulation is applied to minimize transceiver complexity. A Time-Division Duplex scheme is used for full-duplex transmission. The RF specifications are fairly relaxed, allowing for low cost, low power implementations at the expense of range (< 10m) and throughput (max 1Mb/s)[10].

The Bluetooth baseband protocol is a combination of circuit and packet switching. Slots can be reserved for synchronous packets. Each packet is transmitted in a different hop frequency. A packet nominally covers a single slot, but can be extended to cover up to five slots [10].

Bluetooth can support an asynchronous data channel, up to three simultaneous synchronous voice channels, or a channel that simultaneously supports asynchronous data and synchronous voice. Each voice channel supports 64 kb/s synchronous (voice) link. The asynchronous channel can support an asymmetric link of maximally 721 kb/s in either direction while permitting 57.6 kb/s in the return direction, or a 432.6 kb/s symmetric link [8].

In the Bluetooth network all units are peer units with identical hardware and software interfaces except a unique 48-bit address. At the start of a connection, the initializing unit is temporarily assigned as a master. This assignment is valid only during this connection. It is the master that initiates the connection and controls the traffic up to a maximum of seven units, defined as slaves in each piconet [8].