

**DEVELOPMENT OF PC BASED HOME
APPLIANCES CONTROLLER VIA
BLUETOOTH TECHNOLOGY**

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**Bachelor of Electrical Engineering
(Industrial Power)**

Dedicated with deepest love to:

My beloved family for their support, guidance and love.

My dearest friends for being there whenever I needed them.

“I hereby declare that I have read through this report entitle “*Development of PC Based Home Appliances Controller via Bluetooth Technology*” and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)”

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Date : 10TH MAY 2010

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BLUETOOTH TECHNOLOGY**

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**A report submitted in partial fulfillment of the requirements for the Degree of
Electrical Engineering (Industrial Power)**

**Faculty of Electrical Engineering
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MAY 2009

I declare that this report entitle “*Development of PC Based Home Appliances Controller via Bluetooth Technology*” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

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Date : 10TH MAY 2010

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ABSTRACT

The development of this project is separated into two parts; the first part would be the development in the laptop or computer which is be the controller for this project. The second part of the development would be the Bluetooth server unit that receive the the function that is clicked by the user. The second part of development has three subsets which would be the Bluetooth component, PIC 16F877A microcontroller unit and finally the relay circuit. Windows application was used as the background Operating system to develop the Graphical User Interface for the system. The GUI application for the Bluetooth system is developed using Microsoft's Visual Basic Express Edition. The computer would receive input from the user through the GUI which is then processed the input data and transfer it to the display unit using Bluetooth connection The receiver (a Bluetooth server) that connected to the appliances will receive the input data that was sent by the computer and then transferred it to the microcontroller. The input that the microcontroller receives would be characters that are coded in the ASCII code. Those ASCII codes need to be the same characters that are coded in the programmed into microcontroller. So that the microcontroller would produce the output according to the user's wish.

ABSTRAK

Pembangunan projek ini terbahagi kepada dua bahagian iaitu; bahagian yang pertama adalah pembangunan pada sistem komputer riba atau komputer yang bertindak sebagai pengawal untuk projek ini. Pada bahagian yang kedua pula adalah pembangunan unit pelayan Bluetooth yang menerima kata fungsi apabila pengguna menekan butang fungsi. Pada bahagian dua pula terbahagi kepada tiga pecahan iaitu komponen Bluetooth, unit pengawalanmikro PIC16F877A dan litar relay. Aplikasi Windows digunakan sebagai sistem operasi untuk membangunkan Paparan Interaksi Pengguna ataupun lebih dikenali sebagai GUI dimana aplikasi GUI untuk pelayan Bluetooth ini adalah dibangunkan menggunakan Microsoft Visual Basic Express Edition. Komputer akan menerima data masukkan daripada GUI yang akan memproses data tersebut dan akan menghantar data tersebut kepada unit Bluetooth komputer tersebut. Penerima (pelayan Bluetooth) yang bersambung dengan pengawalanmikro akan memproses data yang diterima. Data masukkan yang diterima oleh pengawalanmikro adalah dalam bentuk kod ASCII. Kod-kod ASCII yang diterima oleh pengawalanmikro mestilah sama dengan kod yang telah diprogramkan ke dalam pengawalanmikro tersebut supaya pengguna memperolehi hasil yang dikehendaki.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	ACKNOWLEDGEMENT	i
	ABSTRACT	ii
	TABLE OF CONTENT	iv
	LIST OF TABLE	vi
	LIST OF FIGURE	vii
	LIST OF APPENDICES	ix
1	INTRODUCTION	1
	1.1 Overview	1
	1.2 Problem Statement	2
	1.3 Objective	2
	1.4 Project Scope	3
2	LITERATURE REVIEW	5
	2.1 Related Project	5
	2.2 System Overview	5
	2.3 Software Flow Chart	6
	2.4 USB Dongle Setup	7
	2.5 Interface Using HyperTerminal	8
	2.6 Summary For Related Project	9
	2.7 Proposed System Operation	10
3	METHODOLOGY	11
	3.1 Methodology Flowchart	11
	3.2 Tools Used	13
	3.2.1 Controller Selection	13

3.2.2	Software Selection	16
3.2.2.1	Visual Basic Express Edition	16
3.2.2.1.1	Visual Basic Features	16
3.2.3	CCS PCWHD v4.084	19
3.2.3.1	Transfer the program to PIC microcontroller	20
3.2.4	Bluetooth	21
3.2.4.1	Bluetooth Application	21
3.2.4.2	What is Bluetooth?	22
3.2.4.3	Bluetooth Technology and Transceiver	23
3.3	Circuit Schematic Diagram	25
4	RESULT AND ANALYSIS	27
4.0	Graphical User Interface, GUI	27
4.1	Hardware	29
4.2	Analysis of the project	30
4.2.1	Analysis on Apartment house	30
4.2.1.1	Analysis Condition 1	31
4.2.1.2	Analysis Condition 2	31
4.2.1.3	Analysis on Condition 3	32
4.2.1.4	Analysis on Condition 4	33
4.2.2	Analysis on two storey house	34
4.3	Analysis Conclusion	36
5	DISCUSSION AND CONCLUSION	37
5.0	Circuit Operation	37
5.1	Discussion	41
5.2	Conclusion	44
5.3	Recommendation	44
	REFERENCE	46
	APPENDICES	48

LIST OF TABLE

TABLE	TITLE	PAGE
3.0	Bluetooth Frequency Band	22
3.1	The Bluetooth Class Specification	24
4.0	The result for Condition 1	31
4.1	The result for Condition 2 (door opened)	31
4.2	The result for Condition 2 (door closed)	32
4.3	The result for Condition 3	32
4.4	The result for Condition 4	33
4.5	The Simplified Table For Analysis In Apartment House	33
4.6	Result For Analysis in Terrace House	35

LIST OF FIGURE

FIGURE	TITLE	PAGE
1.1	Scope of Project	4
2.1	The System Illustration	6
2.2	The System Circuit Schematics	7
2.3	Bluesoleil Main Window Searching For Device	8
2.4	Bluesoleil Main Window Searching For Device	8
2.5	Hyperterminal Setup	9
2.6	System Illustration for Hardware Development	10
3.1	Methodology Flowchart	12
3.2	PIC16F877A pin diagrams	14
3.3	PIC 16F877A Block diagram	15
3.4	Visual Basic Program	16
3.5	Visual Basic Launch in Windows	17
3.6	The PCW Integrated Drive Electronics (IDE)	19
3.7	PIC bootloader device	20
3.8	IC programmer graphical user interface (GUI)	21
3.9	Host to host communication through Bluetooth Transceivers	24
3.10	Circuit Schematic diagram	25
3.11	PIC16F877A Properties Windows	26
4.0	The complete GUI in visual basic	28
4.1	Complete hardware	29
4.2	Apartment House Floor plan	30
4.3	Ground floor floorplan	34
4.4	First Floor Floorplan	35
5.0	Virtual Terminal Properties	38
5.1	Circuit Simulation	38
5.2	Data '1' sent	39

5.3	Data '3' sent	39
5.4	Data '0' sent	40
5.5	Searching for bluetooth device	41
5.6	Pairing the bluetooth device with computer	42
5.7	Established Connection Between GUI and Bluetooth Device	42
5.8	Indicator shows the device is connected	43

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	CCS PCW CODING FOR PIC16F877A MICROCONROLLER	46
B	CODING FOR VISUAL BASIC	48

CHAPTER 1

INTRODUCTION

This chapter will discuss on overview of the Development of PC based home appliances controller via Bluetooth technology. This chapter also will explain the basic understanding on the project scope and the objective of the project.

1.1 Overview

Nowadays, wireless technology has grown so fast even without us realized it. Everything in this world is changing the typical cable application with wireless devices. We can see that the typical cable application that has been change for example parallel and serial communication, remote sensing, industrial control and home automation. So, with the Bluetooth Wireless Technology we could manipulate and apply this technology in our life so that makes our life at home or working space even much better, safer and easier.

1.2 Problem Statement

In this modern era, the need of controlling home appliances by automatically by computer is very highly demand. This is due to save time and energy in case of in the middle of working with the computer to operate the manually switch “on” and “off” meaning that user do not need to leave in the middle of working just only to switch on or switch off the home appliances for example light or fans.

Besides that, cable will be replace with wireless will save the cost of wiring the house reduce the chances of short circuit to be happen. This is also will lead us to the future modern house where all the appliances are controlled wirelessly.

Thus, with this project that developed it will provide the convenience way for human to control all the home appliances for example the lights and fans is the most common home appliances that are used in our daily life.

1.3 Objective

There are 4 main objectives of this project is shown as below:

- To make house appliances controlled easier.
- To implement the new Bluetooth technology application in control system.
- To integrate between software and hardware.
- To analyse and make comparison of proposed system Bluetooth connection in conventional houses.

1.4 Project Scope

The K-chart in Figure 1.1 below shows the scope of the project. From the K-chart it can be clear to understand the scope of the project that is include hardware development, software and microcontroller used.

There are three stages in the project scope. The first stage is automatic home appliances is selected instead of manual way to control the home appliances. The home appliances that are controlled are indoor type for examples lights and fans using computer instead of handphones. The second stage is the controller stage is hardware, software and PIC16F877A. On the hardware part the wireless technology are selected to control the hardware. The while the software part is the visual basic that is used to create the graphical user interface and convert it to exe files and installed to the computer that used in controlling the circuit operation. The third stage is the system that is used to communicate between input source and output desired of the project. The communication between the hardware and software must be configured first in order to send the data wirelessly using Bluetooth module. These three stages must be archived in order to complete the development of computer based home appliances controller via Bluetooth.

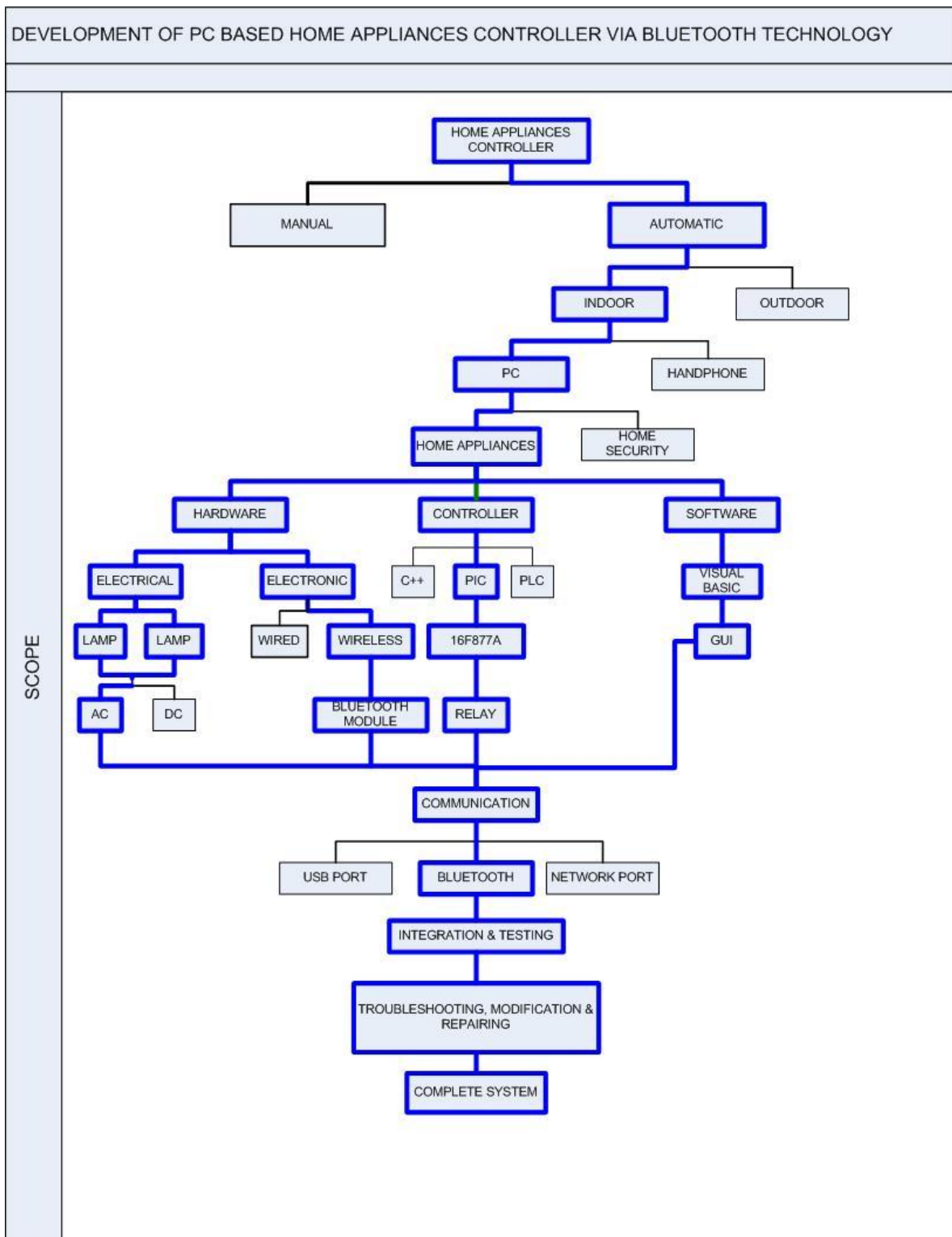


Figure 1.1: Scope of Project

CHAPTER 2

LITERATURE REVIEW

This chapter will be discuss on literature review including a detailed survey of the background to the project, an overview of the subject, discussion of any essential theories and a review of any important publications.

2.1 Remote Control Seven segment using USB

This project is an open source microcontroller “Do It Yourself Kit” from cytron website [2]. This PIC microcontroller based project perfectly designed for armature user to start develops the Bluetooth wireless control and learn the basic function of the Bluetooth wireless control via microcontroller PIC. By this project, the user can clearly understand on how to interface the microcontroller PIC16F877A with the KC Wire-free Bluetooth Starter Kit. The 7-segment LED display is used to show the number that typed in the text of HyperTerminal in computer.

2.2 System Overview

Figure 2.1 shows the illustration on how the data (text) is transfer from computer via Bluetooth to the PIC16F877A that connected to the Bluetooth Module and show the data that received on the 7-segments. The Computer is using a Bluetooth dongle (a device that enable computer to pair or communicate with other Bluetooth devices wirelessly) to connect and sending data to the Bluetooth Module. The pins TX and RX of the Bluetooth Module is connected to the PIC16F877A pin RC7 and RC8 that are enable the UART (Universal Asynchronous Receiver Transmitter)

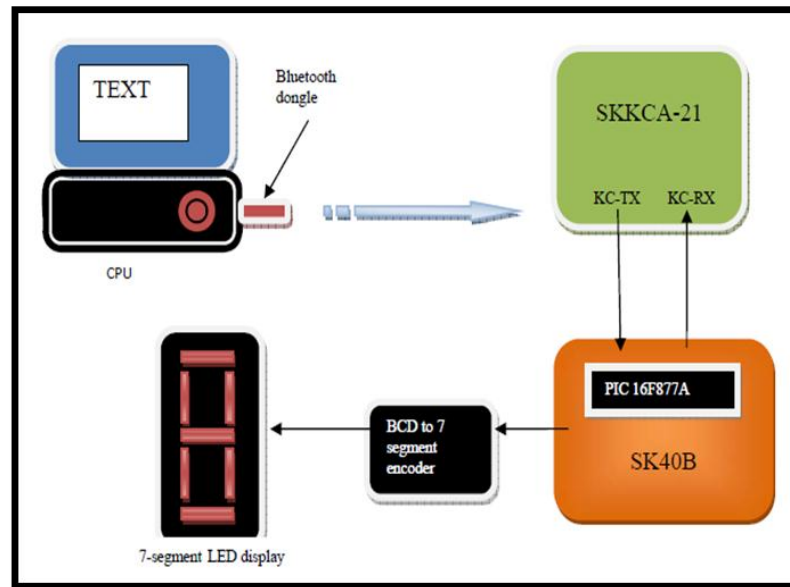
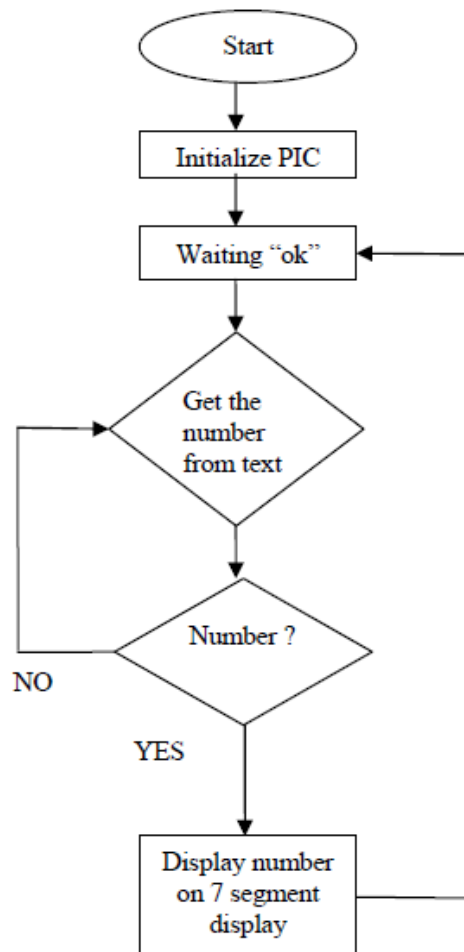


Figure 2.1: The System Illustration

2.3 Software Flow Chart



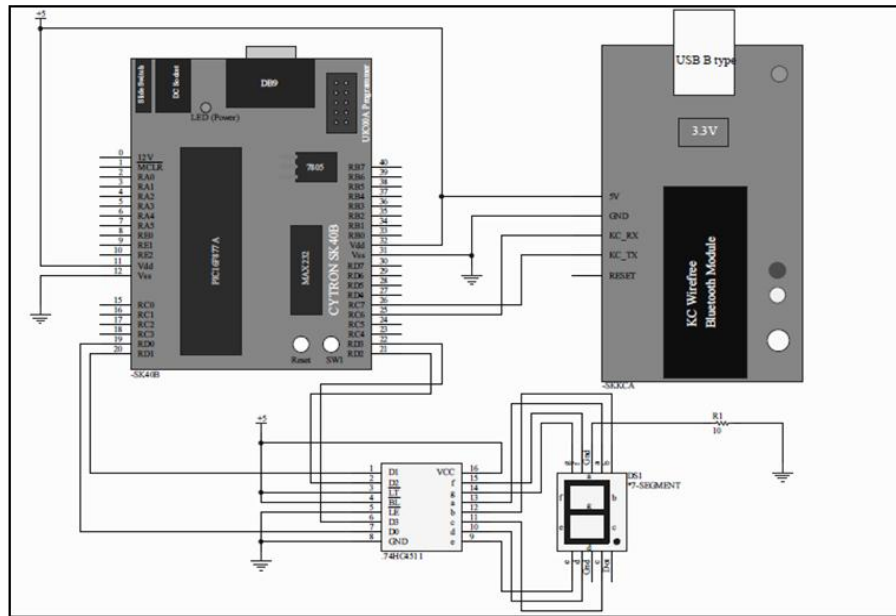


Figure 2.2: The System Circuit Schematics

2.4 USB Dongle Setup

Before the USB dongle can be used, a communication link has to be established between the Bluetooth Module and Bluetooth Dongle using IVT BlueSoleil. Following are the steps of installing and establishing a link between the two:

- Install the software IVT BlueSoleil using CD included with the USB dongle
- Once the software has been successfully installed, plug in the USB dongle and run the software
- Switch on the power for the circuit with the SKKCA-21
- On the screen, you should be able to see a window as in figure 4.5. Click the Orange ball in the center of the window or press F5
- Once the Bluetooth module is detected, it will appear in the window. Figure 2.3 shows the program searching for devices and Figure 4.7 shows the discovery finished.
- Right click on the symbol to select Connect then Bluetooth serial port service.

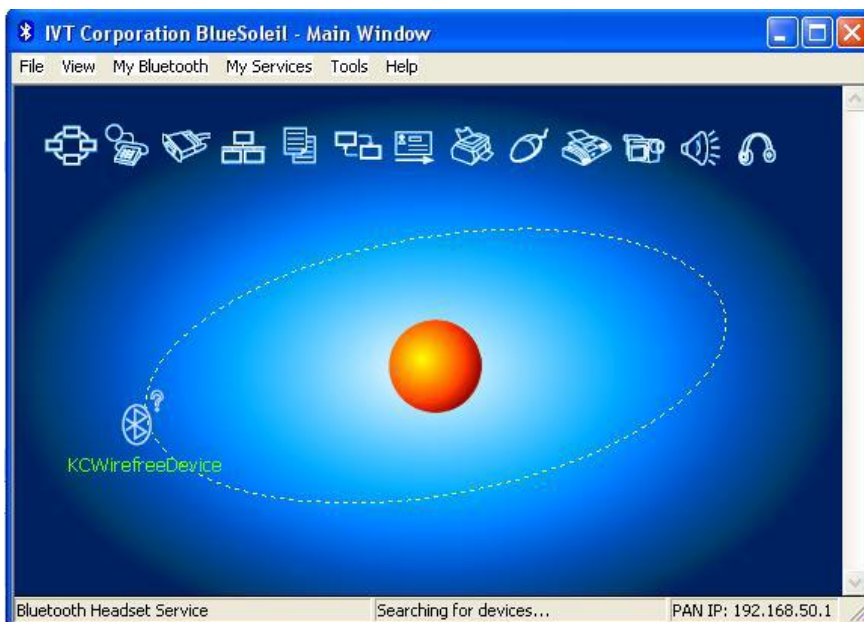


Figure 2.3: Bluesoleil Main Window Searching For Device

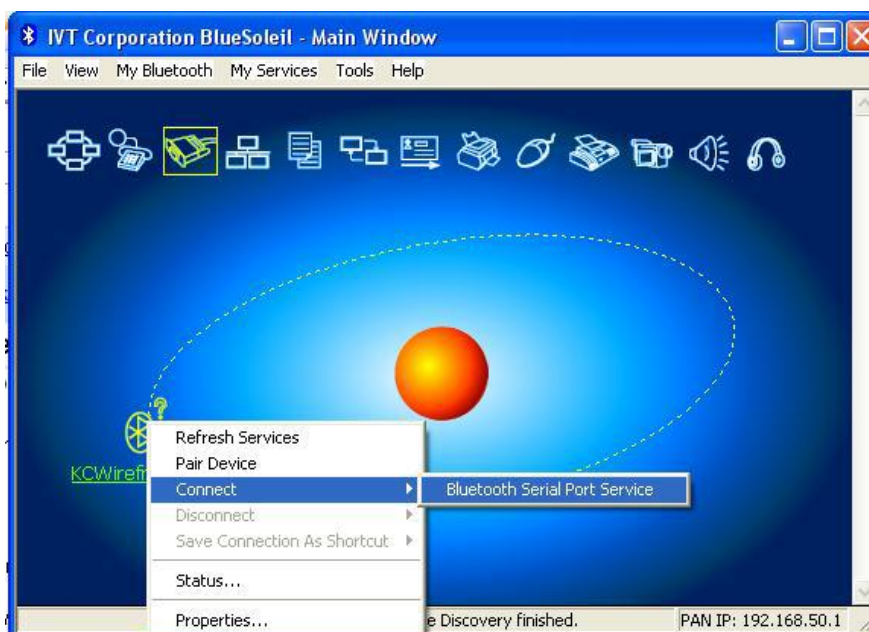


Figure 2.4: Bluesoleil Main Window Searching For Device

2.5 Interface Using HyperTerminal

The project will be communicating with the Bluetooth module through HyperTerminal that was also used for bootloader [2]. As shown in Figure 2.5 To setup the Hyperterminal by selecting the Serial Port that was designated by BlueSoleil software.



Figure 2.5: Hyperterminal Setup

2.6 Summary for Related Project

From the study and review that have been made from this system. It show that this project is used window's HyperTerminal as the interface between the computer along with the Bluetooth module and PIC16F877A. It shows that the system is not user friendly because it doesn't have GUI (Graphical User Interface) that is harder for user to operate certain operation to PIC16F877A.

Besides that, it can conclude that the previous project only involve basic control system there is only control a 7-segment instead of home appliances that using larger voltage and more complex circuit design and a lot of programming that associated with the project.

2.7 Proposed System Operation

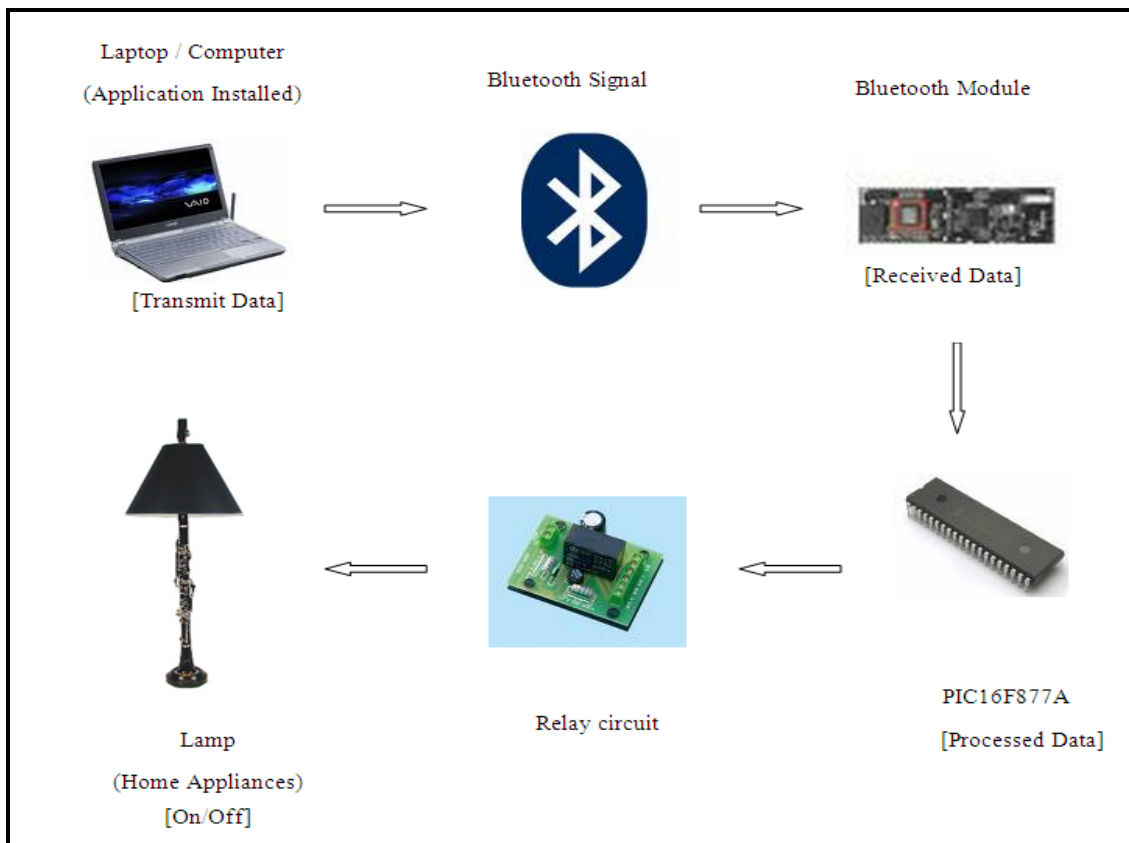


Figure 2.6: System Illustration for Hardware Development

Figure 2.3 shows the proposed system for the project. First, the Computer needs to be installed with the program (interface that build using Visual Basic) and paired (connected and established link with certain protocol) with the Bluetooth server. Then, user will send command using Visual Basic interface via Bluetooth signal to the Bluetooth Server by clicking the button “on” and “off” on the interface. The Bluetooth Server that connected to the microcontroller processed the data received from the Bluetooth Module and control the relay to on or off the home appliance for example lamp. User can change the desired output at any time as long as the computer is still connected with the Bluetooth server this can be make sure by knowing the range of Bluetooth can be capture by the computer’s Bluetooth dongle.