UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DESIGN AND DEVELOPMENT OF PC BASED FOR CONTROLLING ROBOT SLIDER VIA BLUETOOTH APPLICATION

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Manufacturing Engineering (Robotic and Automation) with Honours.

by

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DECLARATION

I hereby, declared this report entitled "Design and development of PC based for controlling robot slider via Bluetooth application" is the results of my own research except as cited in references.

Signature	:	.....
Author's name	:	SUHANI SHARA BINTI ABU HANIPAH
Date	:	22 MEI 2009

APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Manufacturing Engineering (Robotic and Automation) with Honours. The members of the supervisory committee are as follow:

(Signature of Supervisor)

.....

(Official Stamp of Supervisor)

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(Signature of Principal Supervisor)

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(Official Stamp of Principal Supervisor)

(Signature of Co-Supervisor)

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ABSTRAK

Sasaran projek ini adalah untuk merekabentuk dan membina alat pengawal menggunakan komputer bagi mengawal gelongsor robot menggunakan aplikasi "Bluetooth". Objektif projek ini adalah untuk membina pengawal dan ruang hubungkait yang diprogramkan menggunakan program Visual Basic (VB). Kajian telah dibuat dengan merujuk kepada kajian yang telah dijalankan sebelum ini bagi memahami dan mendapatkan maklumat yang terperinci tentang projek ini. Gelongsor robot yang terdapat di makmal robotic FKP, Universiti Teknikal Malaysia Melaka telah dikaji bagi mendapatkan maklumat yang lebih terperinci. Dua jenis program telah digunakan untuk membina ruang hubungkait bagi gelongsor robot ini. Program VB diprogramkan untuk membina satu hubungkait bagi mengawal pergerakan motor pada gelongsor robot manakala program MikroC adalah untuk mengaitkan dengan hubungkait yang telah diprogramkan. Projek ini telah dibahagikan kepada dua bahagian iaitu peringkat 1 dan peringkat 2. Proses ujian telah dijalankan untuk memastikan sasaran dan objektif projek ini tercapai. Keputusan bagi projek ini adalah dua daripada objektif telah berjaya dicapai manakala sebahagian daripada objektif yang ketiga telah dicapai. Masalah ini adalah disebabkan oleh masalah pada litar dan juga program. Kelebihan projek ini adalah dapat membina satu alat pengawal yang mudah untuk mengawal gelongsor robot serta dapat mengurangkan penggunaan wayar. Adalah diharapkan dengan hasil projek ini membolehkan pelajar untuk mempelajari tentang teknologi "Bluetooth" untuk mengawal pergerakan robot.

ABSTRACT

The aim of this project is to design and develop a PC-based control for robot slider via Bluetooth application. The objectives include the development of PC based controller and interface using Visual Basic (VB) software. Initial studies on past researches are done to understand and obtain more information about the project. The preliminary research is done by conducting study on robot slider and related circuitry which is available in the FKP robotic lab in Universiti Teknikal Malaysia Melaka (UTeM). Two types of programming had been use to develop the interface for the robot slider. The programmings are VB and MikroC programming. VB programming is used to develop the interface to control the movement of the slider. MikroC programming is to link the interface of the VB programming that had been developed. The development of this project is divided into two stages. Testing is done to make sure that the project is successful and the aim of this project is achieved. Two objectives are successfully achieved and one objective that only partly achieved. Connection of the Bluetooth Module is acknowledged by the PC but the robot slider is not able to communicate with the interface. This is due to circuit and programming problem. The benefit of this project is to create the more users friendly in controlling the robot slider and can reduce the wire that is use. Findings of this project is hoped to be able to help students to learn about Bluetooth technology in controlling the robot movement.

DEDICATION

This report is dedicated to my supervisor, Mr. Muhamad Arfauz bin A Rahman, co-supervisor, Puan Syamimi binti Shamsuddin and lecturers for their guidance. It is not forgotten for my parents, Abu Hanipah Pandak Yahay and Suria binti Mohd Shariff, and to all my friends for their support and encouragement.

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First and foremost, *Alhamdulillah*, thank God for giving me a chance to complete my Final Year Project and this report. I would also like to thank my supervisor, En Muhammad Arfauz A. Rahman and Puan Syamimi Samsudin for the guidance that they had given to me for my thesis.

I also would like to take this chance to thank En. Muhamad Afifi who is the programmer in CAIRO because has spent a time to guide me to complete my project.

Finally, I would like to thank to my beloved family especially my father, En. Abu Hanipah Pandak Yahaya and my mother, Pn Suria Mohd Shariff for their supportive and encouragement. I also would like to thank all my friends for their help and supportive.

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CHAPTER 1
INTRODUCTION

In this chapter, the description about the project will briefly be explained. Other than that, the objective of the project also is included in this chapter. The scope and benefit of the project also been discussed.

1.1 Introduction

This project is aimed to design and develop the controller for robot slider. It is utilize the PC base interface to control the movement of the motor. The motor will be control using the Bluetooth application. Interface for controlling the robot slider will be program using the Visual Basic programming.

Bluetooth is the new technology that is now becoming commercially available. It is also called as a cable-replacement technology. For example the technology is intended to replace the cable connection between computer, peripherals and electronic devices. The cable or wire will not be used to join the devices to the machine. Other than that, load files and applications also are not necessary. Bluetooth technology enables users to swap data and synchronize files without using devices together.

Bluetooth technology have made user more mobile. The wireless link has a range of 30ft (10m). Bluetooth technology also does not need to be set up because it always on,

running in the background. The Bluetooth frequency has been set by international agreement for the use of Industrial, Scientific and Material devices (ISM) is 2.45 GHz.

The important features of the Bluetooth are it is wireless. There is no need for the cable to be attached or used with the components. In addition the set up of the devices is not needed. There also no special requirement is needed to make the technology to use. The devices will automatically find other Bluetooth devices and strike up a conversation without any user input at all.

Regarding to the benefit of the Bluetooth technology, so that the teach pendant will be improve using the Bluetooth technology. It will be improved to make sure it can be use safely and easily.

1.2 Project Aim and Objectives

The aims of this project are to design and development of PC based for controlling robot slider via Bluetooth application. The aim is to be achieved through these objectives:-

(a) To design and develop the PC based controller and interface using Visual Basic.
(b) To design and develop motor controller for robot slider that is able to receive Bluetooth signal.
(c) To establish connection between PC and robot slider and control the robot slider via Bluetooth technology.

1.3 Scope

The focus of the project is to modify and improve the teach pendant of the robot slider. PC based controller will be use to control the robot slider. It will be control manually by using the Bluetooth technology. The Bluetooth technology will be analyzed in order to understand more about its functionality and capability.

Interfacing of the controlling button will be design using visual basic programming. This is to ensure user to take the measurement more accurate.

PC based controller and the robot slider will be connected via Bluetooth technology. The controller will be program so it can control the robot slider using Bluetooth technology.

1.4 Benefit

There are several benefits of using Bluetooth technology such as:-

(a) Bluetooth technology for a safer work environment because it does not need the wire to connect each other.
(b) Bluetooth devices can penetrate walls and briefcase.
(c) Easy connection because there is no wire needed.
(d) It is wireless and can be wirelessly from some distance.
(e) Due to its high mobility, the technology is suitable and very flexible to be used.

1.5 Project Outline

GANTT CHART FOR PROJEK SARJANA MUDA (PSM 1 & 2)

PSM	TASK	WEEK													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
PSM 1	Title Selection														
	Project Review														
	Literature Review														
	Designing The Circuit														
	Develop PIC Circuit														
	Programming														
	Seminar														
	Report Writing														
	Submit Report														
PSM 2	Review PSM 1														
	Design Circuit														
	Construct Circuit														
	Testing Circuit														
	Programming PIC Microcontroller														
	Report Writing														
	Report Submission														

Planned
Actual

CHAPTER 2

LITERATURE REVIEW

In the literature review the topic that been discuss is about the wireless technology. It can be divided into two categories that are Bluetooth and infrared technology. In addition, the robot is also been discuss in this topic. The PC based also is discussing in this chapter. Then, the robot slider specification is also been discussed in this chapter.

2.1 Wireless Technology

The traditional networks require cables to transmit messages or data while the wireless technologies enable devices to communicate each other without any connection of cable or wire. Examples of devices that are wireless are the remote controls, cordless computer keyboards, mouse and stereo headsets using infrared or radio transmission. The signals that transmit by these devices are very simple and the distance between the devices to communicate is quite short.

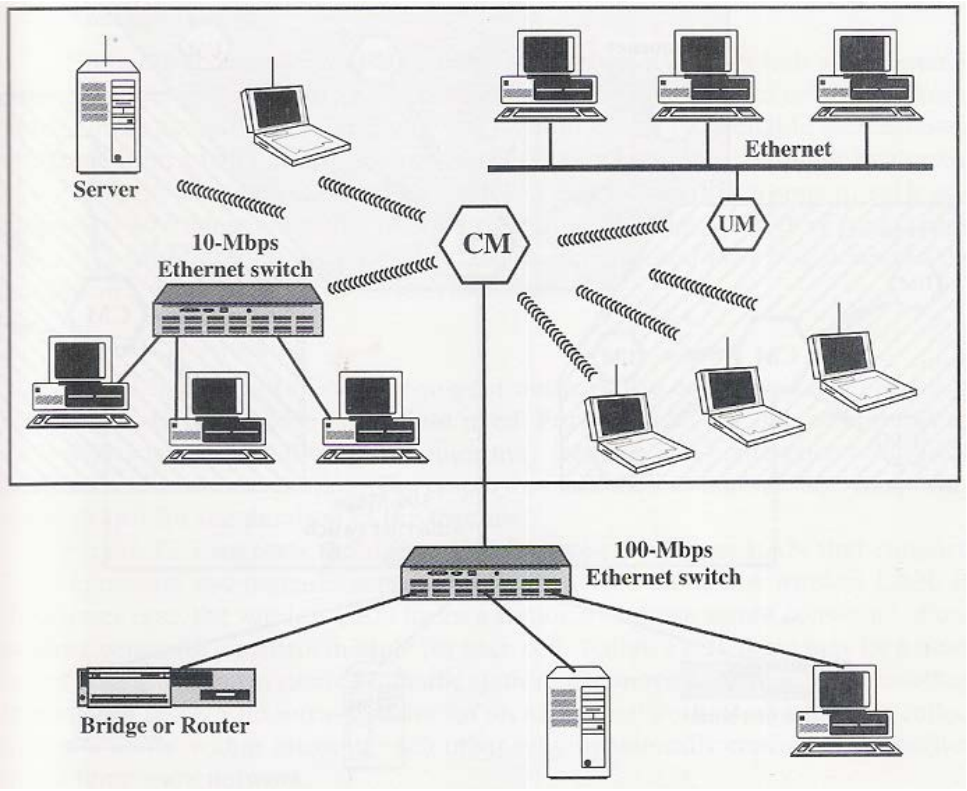

Figure 2.1: Single-Cell wireless LAN Configuration. (Stallings)

In 1980s, the primary wireless communication was developed on the Advanced Mobile Phone Service (AMPS) standard. The 1G wireless communications provide main voice service-using analogue, but no data service. The frequency of the first generation of wireless communication is 900MHz. Then the technology was advanced to 2G networks, it use a variety of standards such as Time Division Multiple Access (TDMA), Global Systems for Mobile Communications (GSM), Code Division Multiple Access (CDMA), and PDC. It provides maximum data a rate that is 14.4 kb/second and an advance in digital voice.

Next the 2.5G network utilizes General Packet Radio Service (GPRS). It improves the performance of GSM and TDMA by converting them to packet-based networks. The rate of speed for 2.5GHz network is more than 144kb/second. It was added to 2.5G Enhanced Data GSM Environment and the bandwidth is increasing to 384kb/second.

Development of wireless bandwidth increasing to 3G network. 3G rate is increase to more than 2Mbps of data transfer, coupled with ever increasing coverage. The 4G technology is being designed in making it more advances. The capability of the 4G network can be up to 20Mbps. Japanese mobile communication, DoCoMo aim to provide 100Mbps for downloads, coupled with 20Mbps for uploads on 4G.

Wireless technology had become the popular technology and been applied in the many types of devices. For example the mobile phones allow people to transmit more complex signal with the far distance. In addition each person can access internet with the mobile phone. Personal Digital Assistants (PDAs) is one of the mobile phone that has a lot of function such as an e-mail, address books and to-do lists.

In addition, there are also users that use the infrared ports for wireless communication. Infrared has a lot of shortcoming such as the range of the communication within each device is very short. Other than that the user also need to align the devices carefully while transferring data.

There are many advantage of wireless technology. It is easy to install using the wireless technology. This is because it does not require any cable or wire to communicate and connect with other devices. Other than that, regarding to the above reason, the wireless communication also save the user time to connect or communicate with other devices. Wireless technology also is more flexible because the user can move the device to communicate with other device at different location. It is not fixing at one location compare to the cable connection device. The convenient communication can be access easily using the wireless technology.

In order to meet the increasing demand for easier communication between mobile devices and wired PCs, there are many new wireless communications standards. The beginning of the using wireless network is IEEE802.11b and Bluetooth technologies. A lot of new PDAs and mobile phone use IEEE802.11b or Bluetooth for the wireless communication.

2.1.1 Bluetooth Technology

Name of Bluetooth was taken from the Harald Blatand. Blatand is Danish for Bluetooth. The development of the Bluetooth Technology was started in year 1994. It has been started use by the mobile phone-maker that is the Ericsson Mobile Communications. The Bluetooth standards had been published by an industry consortium that called as Bluetooth SIG (special interest group). Bluetooth technology is designed as a peer-to-peer network which is devices can communicate each other without any additional cable or hardware so that many devices can communicate each other such as from computers to cell phones to stereo or any other type of device.

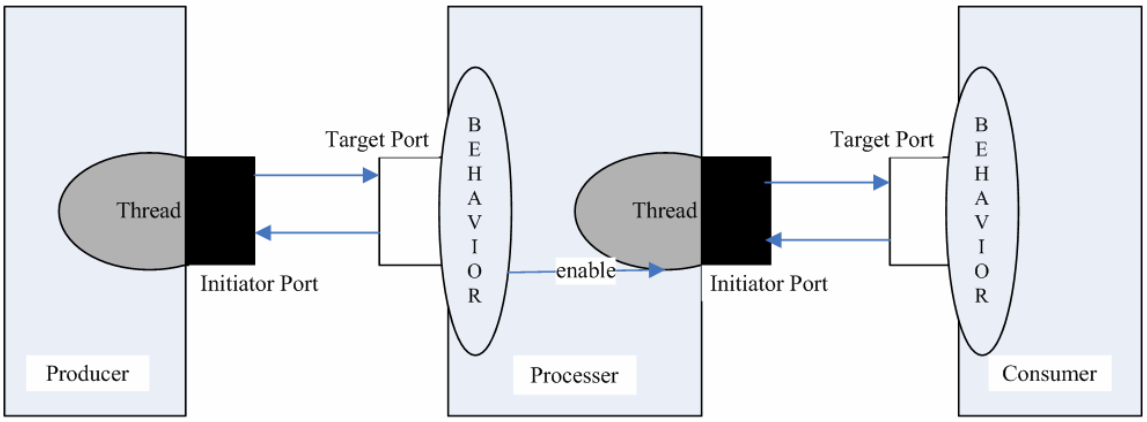

Figure 2.2: Data transfer.

According to Nada Golmie and etc (December 2003) define Bluetooth as a wireless personal area system, intended for cable replacement and short-distance adhoc connectivity. In other perspective, J.Michael Tarn and etc state that Bluetooth is an open standard for short-range transmission of digital voice and data that supports point-to-point and multipoint applications. Communications in Wireless Personal Area Network (WPAN) are normally confined to a person or object and extend up to 10m in all directions.

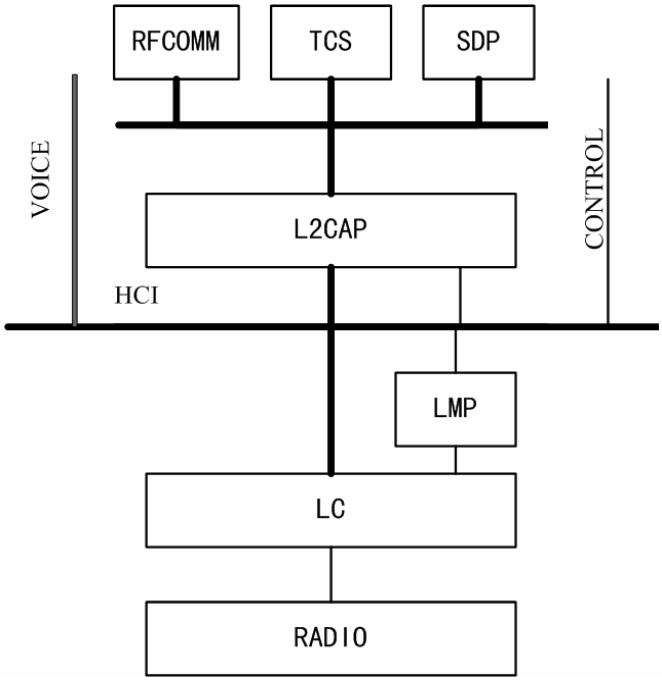

Figure 2.3: Bluetooth stack.

2.1.1.1 Feature of Bluetooth Technology

Since the Bluetooth is suitable for low-cost radio solution so it is plan to operate in the 2.4GHz by Industrial, Scientific and Medical (ISM) unlicensed.

Bluetooth technology is inexpensive use various type of electrical equipment to communicate each other. It does not need any cable to allow communication with the other device. It is also eliminate other wireless connections such as infrared and cable synchronizing. It is because the Bluetooth use radio frequency to communicate through the device.

In order for the Bluetooth to communicate with other device, there are three main agreements that they needed. The three agreements that needed are type of connection for them to communicate each other. It is whether through wires or a type of wireless signal. Then, the user need to find the type of information will be sent. It is either sent through a serial communication scheme or parallel communication scheme. Serial communication scheme is the information is sent one bit at a time while parallel