DEVICE SWITCHING USING PC'S PARALLEL PORT

FARAHIYAH BINTI GHAZALI

This Report Is Submitted In Partial Fulfillment Of Requirements For The Bachelor Degree Of Electronic Engineering (Industrial Electronic)

Faculty of Electronic Engineering & Computer Engineering
Universiti Teknikal Malaysia Melaka

APRIL 2007

UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek	:	**DEVICE SWITCHING USING PC'S PARALLEL PORT**
Sesi Pengajian	:	**2006/2007**

Saya .....FARAHIYAH BINTI GHAZALI.....
(HURUF BESAR)
mengaku membenarkan Laporan Projek Sarjana Muda ini disimpan di Perpustakaan dengan syarat-syarat kegunaan seperti berikut:

1. Laporan adalah hakmilik Universiti Teknikal Malaysia Melaka.
2. Perpustakaan dibenarkan membuat salinan untuk tujuan pengajian sahaja.
3. Perpustakaan dibenarkan membuat salinan laporan ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. Sila tandakan (☐) :

☐	**SULIT***	(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub di dalam AKTA RAHSIA RASMI 1972)
☐	**TERHAD***	(Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)
☑	**TIDAK TERHAD**	

Disahkan oleh:

(TANDATANGAN PENULIS)

Alamat Tetap: BATU 12, KAMPUNG RAMBAI,
TOKAI, 06660, ALOR STAR, KEDAH.

Tarikh: 30/04/07

(COP DAN TANDATANGAN PENYELIA)

SITI HUZAIMAH BT HUSIN
Pensyarah
Fakulti Kej Elektronik dan Kej Komputer (FKEKK),
Universiti Teknikal Malaysia Melaka (UTeM),
Karung Berkunci 1200,
Ayer Keroh, 75450 Melaka

Tarikh: 30 APRIL 2007

"I agree that this report is my work except for some summary and information which I already stated"

Signature : .....

Name : **FARAHIYAH BINTI GHAZALI**

Date : 30 April 2007

"I admit that to have read this report and it has follow the scope and quality in Partial Fulfillment of Requirement for the Degree of Bachelor of Electronic Engineering (Industrial Electronic)"

Signature : .....

Supervisor's Name : MADAM SITI HUZAIMAH BINTI HUSIN

Date : 30 APRIL 2009

DEDICATION

For my beloved family.....

ACKNOWLEDGEMENT

My sincerest appreciation must be extended to my supervisor, Madam Siti Huzaimah binti Husin who has sent in valuable advice, comments, corrections, and suggestions. Her consultation and assistance have enabled me to present this final year project. I also extend my thanks and appreciation to all of my friends who were directly or indirectly involved in the project.

ABSTRACT

This project proposed a system that could control different devices at home or industry by using a single PC. This project aims to control the printer power, loads & other household electrical appliances. The circuit comprises decoder, inverter, latch & relay driver sections. To control these equipments the system are using PC's parallel port. The PC parallel port is a powerful and efficient platform for implementing projects dealing with the control of real-world peripherals. The program of controlling this equipment is written in C language. The computer program through the interface circuit controls the relays, and then act as a switch to on or off the appliances. It is compiled using Turbo C compiler. Besides, the software program allows the users to know the current status of the loads.

ABSTRAK

Projek ini mencadangkan satu sistem yang boleh mengawal alatan di rumah atau industri dengan hanya menggunakan sebuah komputer peribadi. Projek pensuisan ini bermatlamat untuk mengawal pencetak, beban dan peralatan elektrik di rumah yang lain. Litar untuk projek ini terdiri daripada penyahkod, penyongsang, selak, dan bahagian pemacu geganti. Untuk mengawal kelengkapan tersebut, sistem ini menggunakan liang selari komputer peribadi. Liang selari komputer peribadi ini adalah sebuah pelantar yang berkuasa dan efektif untuk melaksanakan projek yang berkaitan dengan mengawal perkakasan dalam kehidupan sebenar. Aturcara untuk mengawal kelengkapan-kelengkapan ini ditulis dalam bahasa C. Aturcara komputer melalui litar pengantara akan mengawal geganti, dan kemudian bertindak sebagai suis untuk membuka dan menutup perkakasan. Seterusnya ia akan disusun menggunakan Penyusun Turbo C. Selain itu, aturcara perisian membolehkan pengguna untuk mengetahui status semasa perkakasan yang dikawal.

TABLE OF CONTENTS

FIGURE LIST

TABLE LIST

DIAGRAM LIST

FLOWCHART LIST

LIST OF APPENDIX

CHAPTER 1

INTRODUCTION

1.1 Introduction

The PC's parallel port is most commonly used port for interfacing home made project. The PC's parallel port adapter is specifically design to attach printer with a parallel port interface, but it can be used as a general input/output port for any device or appliances that matches its input/output capabilities. The computer program through the interface circuit controls the relays, which, in turn, switch the appliances on or off.

The parallel port has 12 outputs including 8 data lines and 4 control lines. It can be used to control up to 255 electrical appliances using only eight data lines from the parallel port. Besides, this project included the software program that allows the users to know the current status of the loads, in this case is home appliances (LED).

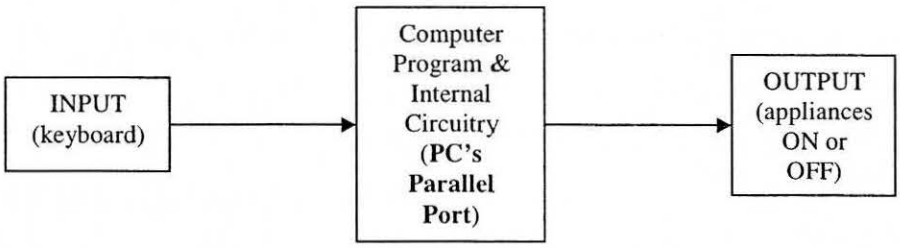

Diagram 1.1: Block Diagram of the System

The block diagram in Figure 1 depicts the main components of the switching system for electrical loads using PC. The control command to switch on/off the appliances is given through the keyboard. The software program scans the input and as per the input command, the data is available at the parallel port.

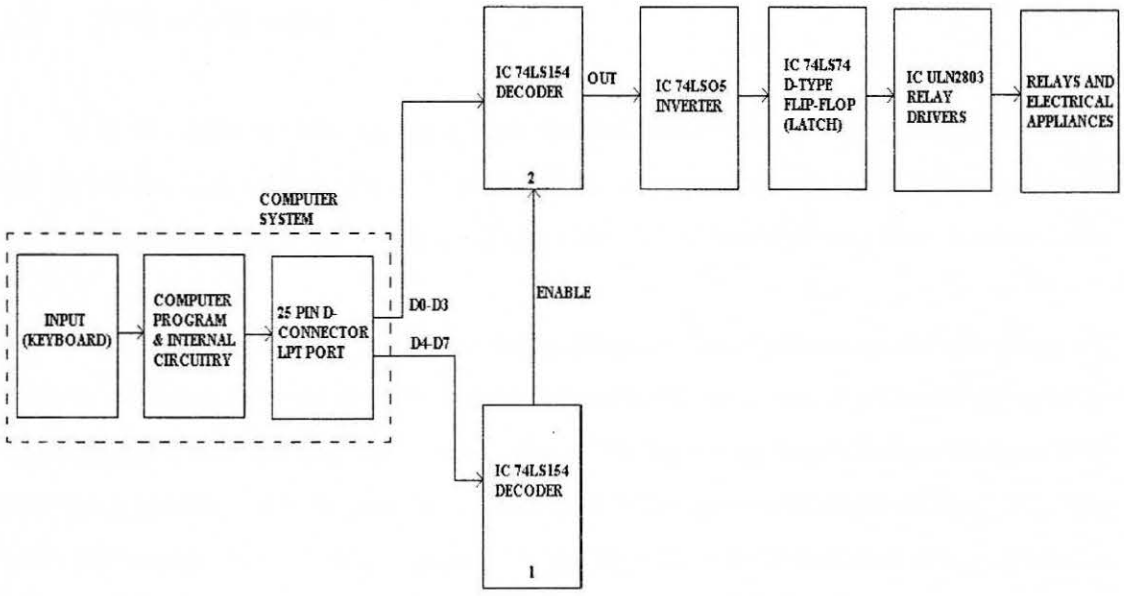

Diagram 1.2: Block diagram for main components of the switching system

Out of eight bits, first four bits (D0 through D3) are data signal bits and the remaining four bits (D4 through D7) are used as control signals. Control signals are given to decoder 1. The output of decoder 1 is given to Enable pins of decoders 2. Data signals are given to decoder 2. The outputs of decoder 2 are inverted and fed to a D-type flip-flop that is used to latch the data. The latched data output is given to relay driver ICs

ULN2803. The relay drivers drive the relays for switching the appliances. But in this project, I've only used LED to represent as electric appliances.

1.2 Project Objectives

The main objective of this project is to build a switching system that can control home appliances by only using a single PC and at the same time this system could also provide convenience and easier lifestyle. This system is not only easy to use but it also reveals people nowadays using high-technology like using in advanced country. Beside as a convenient, this control system also provides more safety environment in home.

1.3 Project Statement

In this decade, there are many new technologies which are being implemented in real world for making life easier. Some of these technologies are expensive but offered a very good service and there are some cheaper but yet still provide good service for users.

Based on all this aspect, I have come up with this good and acceptable proposed project. Although it is quite costly but is very efficient in control real world peripheral. This project is actually provides users a simple life by giving more choices to them. This switching system allowed users to control home appliances by only using a PC. The users only need to give control command through PC's keyboard and interface circuit will send the instruction to the load, which is whether to turn on or to turn off. This switching system also useful in emergency condition. It can help the user to switch on or off the appliances faster than manually.

1.4 Scope Of Work

The scope of work for this project is mainly about produce a convenience switching device controlling by only a single port and make a test in order to prove the efficiency of the project. This device must be able to control the entire load that is needed by the user. The study of how the parallel port is working and its characteristic must be done. Since this project is using C language as its software programming, the study of this language also must be done. Besides, the software programming must be easy to understand by the user in order to allow them to know the current status of the loads. This project is involved hardware and software programming, so to make sure this project work successful, the test must be done before and after combination.

1.5 Project Methodology

The first process in this project is to search and create ideas which are relevant to the project I'm working with. Then, the next process is to start the literature study on the project. These are done by referring a number of books and surf the internet which guided me to retrieve relevant and useful information on this project. The following process is to design and simulate the project circuit. After the simulation, the circuit is drawn and PCB layout is printed out. The components then are placed and soldered on the PCB. The next process is to test and troubleshoot the circuit if there any problem. Since this project also included software development, the software programming will be created and tested in the simulation. This project is a complete system when the hardware is interface with the software device.

1.6 Thesis Arrangement

Generally, this thesis comprises five chapters.

Chapter I will describe in general why this project is done.

Chapter II then will discuss related theories with this project. These theories are useful as comprehension for me to execute this project.

Chapter IV will present the result of this project. Every result will follow by briefly description to support the result.

Finally, the last chapter will clarify the conclusion for this project. This chapter also will suggest some opinion to improve this project.

CHAPTER II

LITERATURE REVIEW

2.1 Parallel Port

2.1.1 Introduction to Parallel Port

PC's parallel port can be very useful I/O channel for connecting own circuits to PC. The PC's parallel port can be used to perform some very amusing hardware interfacing experiments. Parallel port differs from serial ports primarily in that they use eight pins to carry data instead of just one. When all eight pins are transmitting in parallel, the computer can send an entire byte in the time that a serial port takes to send 1 bit. The parallel port is traditionally associated with printer connections, but in recent years, the interface has come to be used to connect external devices.

Computers typically have one parallel port, although system BIOSs support up to three. The parallel port or line printer terminal (LPT) port is a 25-pin D-type female connector available at the back of a PC. A basic PC usually comes with one or two LPT ports. Of the 25 pins, 8 are ground lines and 17 are signal lines.

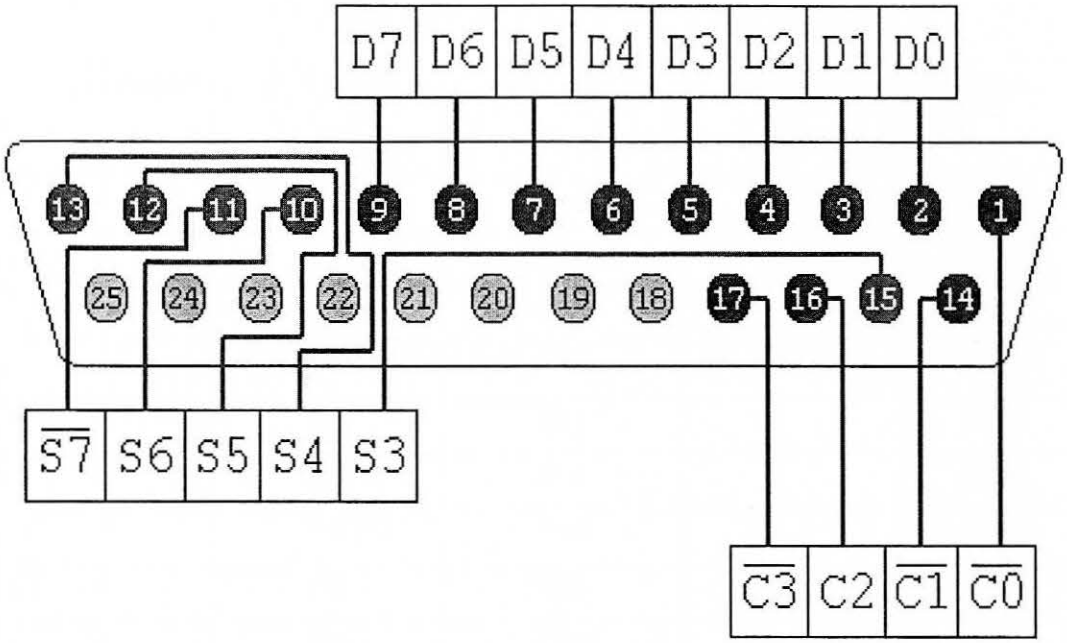

Figure 2.1: Parallel Port Pin Layout

The original parallel port, called standard parallel port (SPP), is a bundle of three ports (or registers), namely, data port, status port, and control port. The computer uses the control lines to transmit operational signals to the connected device. The status lines are indicators of the device's condition, such as when a printer runs out of paper or experience an error. The data lines carry the actual application data from the computer to the device. Pins 2 through 9 form the 8-bit data port. This port is purely a write-only port. This means it can be used only to output some data through it. Pins 1, 14, 16, and 17 form the control port, which is capable of reading/writing. Pins 10 through 13 and pin 15 together form the status port. The status port is a read-only port. The details of 25-pin parallel port are given in Table 2.1.

Table 2.1: Parallel Port Pin Details

Parallel port pin no.	Port signal Name	Direction	Hardware inverted	Register
1	NStrobe	I/O	Yes	Control
2	D0	Out		Data
3	D1	Out		Data
4	D2	Out		Data
5	D3	Out		Data
6	D4	Out		Data
7	D5	Out		Data
8	D6	Out		Data
9	D7	Out		Data
10	NACK	In		Status
11	Busy	In	Yes	Status
12	Paper Out	In		Status
13	Select	In		Status
14	Nauto-Lf	I/O	Yes	Control
15	Nerror	In		Status
16	Ninitialize	I/O		Control
17	Nselect	I/O	Yes	Control
18-25	Ground	Gnd		

The following tables show the port description applies to Standard Parallel Port (SPP).

Table 2.2: Data Port Pin's Description

Offset	Name	Read/Write	Bit No.	Properties
Base + 0	Data Port	Write	Bit 7	Data 7
			Bit 6	Data 6
			Bit 5	Data 5
			Bit 4	Data 4
			Bit 3	Data 3
			Bit 2	Data 2
			Bit 1	Data 1
			Bit 0	Data 0

This Data Register is simply used for outputting data on the Parallel Port's data lines (Pins 2-9). If the port is bi-directional, it can receive data on this address.

Table 2.3: Status Port Pin's Description

Offset	Name	Read/Write	Bit No.	Properties
Base + 1	Status Port	Read Only	Bit 7	Busy
			Bit 6	Ack
			Bit 5	Paper Out
			Bit 4	Select In
			Bit 3	Error
			Bit 2	IRQ (Not)
			Bit 1	Reserved
			Bit 0	Reserved

The Status Port (base address + 1) is a read only port. Any data written to this port will be ignored. Please note that Bit 7 (Busy) is an active low input.