WHEELCHAIR MOVEMENT CONTROL SYSTEM

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I would like to dedicate this thesis to my family and somebody special, whose encouragement and support with a great help in completing it.

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ABSTRACT

This project is mainly to modify wheelchair that can move without the user holding the wheel. Wheelchair movement control system is a project that develops to help handicapped person or sick people who use the wheelchair. The main concept and objective for this project is to control and move the wheelchair using switch and motors. Before this, this project is done by Mr. Zamre Abd. Ghani. His project also same, it is to move the wheelchair by using motor. This project continues and upgrades work carried out to control the wheelchair movement. This project will include additional features on LCD display showing the direction of the wheelchair movement. LCD is used to display the direction such as left, right, forward and reverse. This report is focused on the circuit design and also the operation. Switch circuit will be used to determine the direction of wheelchair and connect to PIC input circuit.

ABSTRAK

Projek ini adalah bertujuan untuk megubahsuai kerusi roda yang dapat bergerak tanpa penguna perlu memegang roda berkenan. Projek ini dibangunkan adalah untuk memberi lebih kemudahan kepada golongan kurang upaya atau orang sakit yang menggunakan kerusi roda. Konsep dan objektif projek ini adalah sama iaitu mengerakan kerusi roda ini dengan menggunakan suis. Sebelum ini, projek ini telah dicipta oleh En.Zamre bin Abd. Ghani. Konsep projek beliau sama iaitu untuk menggerakkan kerusi roda dengan menggunakan motor. Projek ini diteruskan dengan kerja penambahan pada kerusi roda tersebut. Projek ini akan memasukan penggunaan LCD sebagai penunjuk arah untuk pergerakan kerusi roda tersebut. LCD digunakan untuk memaparkan arah pergerakan kerusi roda tersebut seperti kanan, kiri, ke depan dan ke belakang. Laporan ini akan lebih memfokuskan kepada mereka bentuk litar dan bagaimana projek ini dapat beroperasi dengan sepenuhnya. Switch digunakan untuk menetukan arah pergerakkan dan disambung pada input PIC.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABREVIATIONS

PSM	-	Projek Sarjana Muda
PIC	-	Peripheral Interface Circuit
LCD	-	Liquid Crystal Display
DC motor	-	Direct Current Motor
AC	-	Alternating current
2D	-	Two dimension
EOG	-	Electro-oculography
CPU	-	Central Processing Unit
RISC	-	Reduced Instruction Set Computer
RAM	-	Random Access Memory
ROM	-	Read Only Memory
I/O lines	-	Input/output lines
A/D	-	Analog to Digital Converter
D/A	-	Digital to Analog Converter
ASM	-	Assembly Language
BASIC	-	Beginner's All-purpose Symbolic Instruction Code
IC	-	Integrated Circuit
PWM	-	Pulses Width Modulation

LIST OF APPENDICES

CHAPTER I

PROJECT OVERVIEW

1.1 Introduction

Wheelchair movement control system is a system where the DC motor is used to move the wheelchair. Nowadays, handicapped people face problem to control wheelchair by themselves. Sometimes they need others people to help them. This project will provide a new way to control the wheelchair without the help of others. In this project, switch are used to control the direction of wheelchair, such as left, right, forward and reverse direction. The overall wheelchair operation uses two DC motor and motor circuits combines with Microcontroller system such as a PIC.

Besides that, this project also has information displayed on LCD to inform and help the user about the situation of the motorized wheelchair such as directions information. LCD that is used in this project is 16 pin LCD that can interface with PIC chip. PIC chip is used to operate the direction of motor and also for LCD display. Software that is used for PIC chip is C programming. Block diagram at figure 1.1 show the overall connection of wheelchair movement control system.

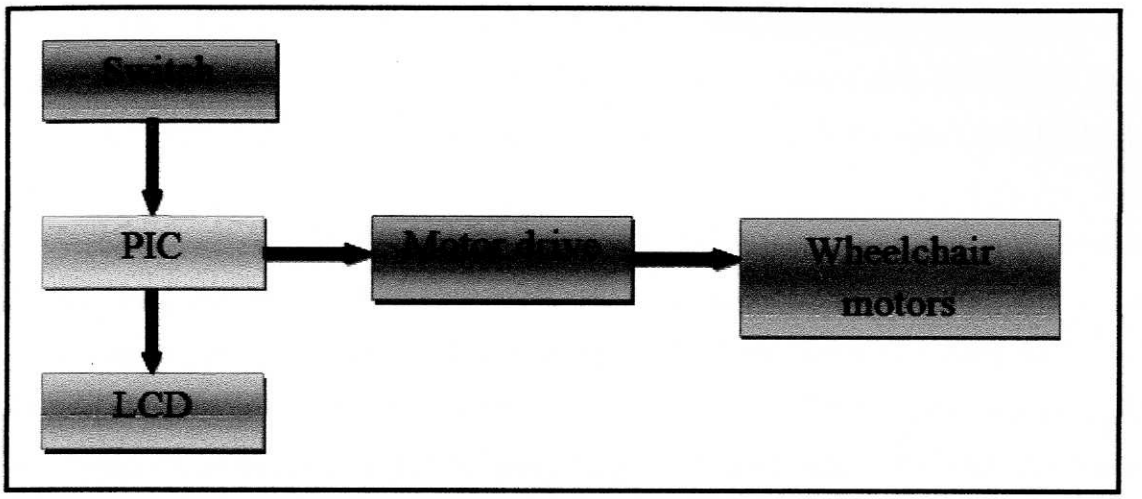

Figure 1.1 Block diagram of wheelchair movement control system.

1.2 Project Objective

In order for the project to be implemented, the following objectives must be achieved for this project:-

- to design wheelchair movement control system and control wheelchair by using switch's.
- to help handicapped people to move by using wheelchair.
- to develop new idea of product to improve the quality of the product.
- to learn and apply the technical skill to overcome problems occurred while implementing the project.

1.3 Problem Statement

No one really knows when the first wheelchair was invented, although there are plenty who are willing to hazard a guess. The interesting part is that wheelchairs weren't always invented for the right reason – especially when the Romans were concerned.

Besides that, when the first wheelchair was built it depends on people definition of a wheelchair. Certainly the advanced technology required - wheels and chairs – has been around for 6000 years, while any wooden chairs almost certainly wouldn't last that long.

Some believe it was the ancient Egyptians who were the first to use wheelchairs. These were, however, simple handcarts used to move people around, unlike the sophisticated chairs of today. The Greeks could have been the ones to invent wheelchairs, but they were more inclined to recline on wheel beds at least according to engravings on an ancient vase dating back. These were to be used by children rather than adults.

Nowadays, we can see the handicapped person having difficulties to move and sometimes they need others people to help them. So with this project, it will help them to move without any help from others. The problems to solve from this project are:

- to help handicapped people to use and control wheelchair in easy way.
- to make wheelchair is easy user for handicapper people.
- to improve the quality of the wheelchair movement control system.

1.4 Scope of work

The scope of work is to develop a wheelchair movement control system. The task is to construct a circuit especially for the motor circuit that will function as a main circuit in this project. To make the circuit function, studies are carried out on the component and the software that should be used. To obtain the result, the motor that used in this project will be operated by using switch. PIC is the microcontroller that can be programmed to set the output based on the input signal received. In this project PIC microcontroller software is used to manage the overall operation and also become the interface between the switch and LCD display. Table at 1.2 show the scope of work of this project.

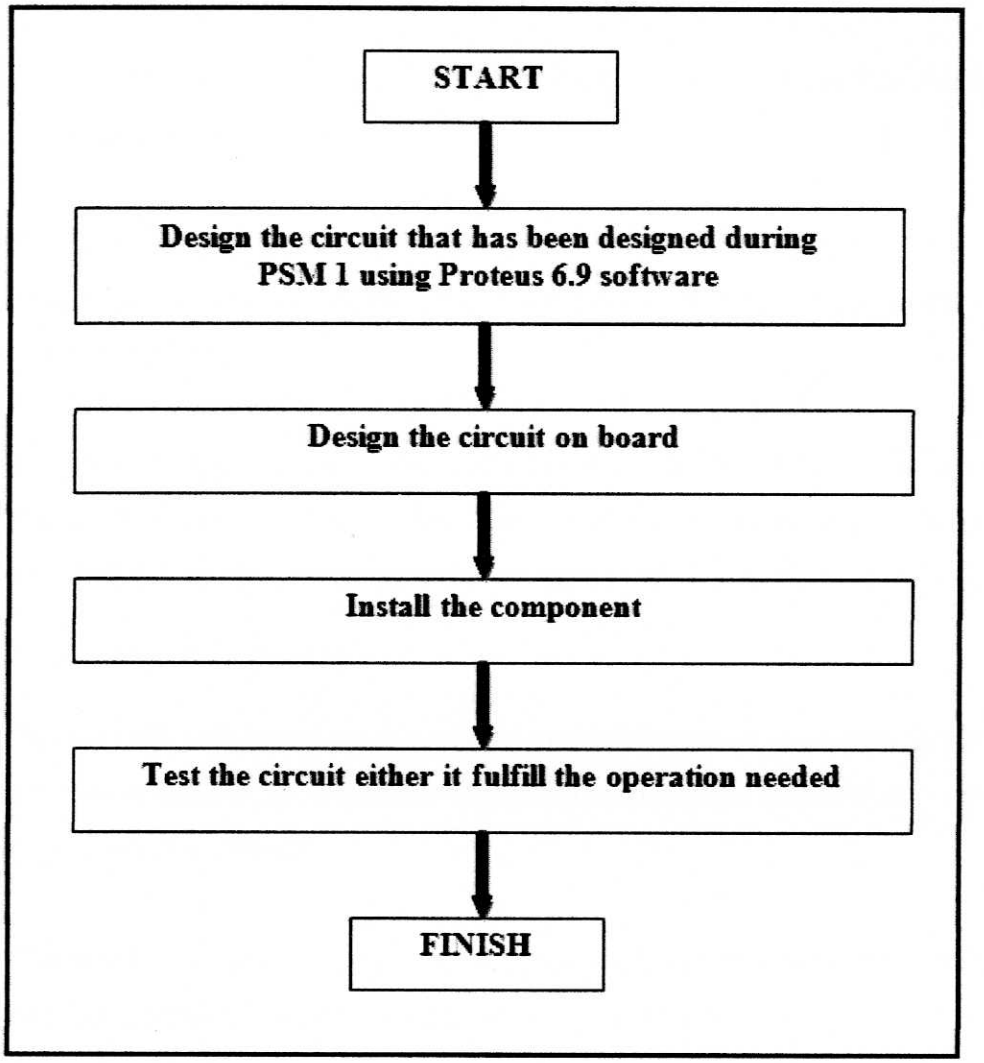

Table 1.1 Scope of work

1.5 Thesis Outline

This thesis will be divided into **five chapters** to provide the understanding and better information of the whole project.

Chapter I is introduction to the overview of this project and its objectives. This chapter also explains the scope of the project and also gives information about what is required for this project.

Chapter II describe about the background of the project and the literature review that has been researched to get the information for the completing of the project. This study focused on the circuit and also programming coding that involve in this project.

Chapter III will cover up the project methodology and a process this project implementation to achieve the objective. Besides that, hardware and software technical details are explained in this part.

Chapter IV explains the result of this project and the operation of the circuit. In this chapter the analysis of the project also had been discussed.

Chapter V explains on the future recommendation for the project for future improvement and conclusion for the project.

CHAPTER II

LITERATURE REVIEW

This chapter describe about the literature review that has been studied to get the information for this project. The information's obtained are used to complete the project. This study focuses on circuit that is used in this project. Research is carried out to understand and compare this project with other wheelchair projects. Besides that, this part discuss about the general operation of wheelchair movement control system.

2.1 Project Research

Belong to the present time, many researches for project that similar to wheelchair movement control system. Firstly, Omni-Directional Wheelchair designs by Benjamin Woods [9]. Omni-Directional Wheelchair can turn and drive in any direction, including directly sideways. Therefore, an Omni-Directional Wheelchair allows the user to navigate through a confined environment with less difficulty than would otherwise be possible with a conventional wheelchair. This project aims to improve the driving accuracy, human interface and comfort of the already existing Omni-Directional Wheelchair found in the mobile robotics laboratory at the University of Western Australia. This will be accomplished by altering the wheels, batteries, motor driver cards, joystick, control software, chassis and suspension system. Omni-directional

Wheelchair is able to drive in any direction in the 2D plane as well as rotate at the same time.

Second research that similar to wheelchair movement control system is Hybrid Wheelchair design by Elias Achkar, Ramzi Stephan and Hussein Hajo [10]. Hybrid Wheelchair means that the wheelchair will be provided by two sources of power, a battery (electric) that works in conjunction with a combustion engine (gasoline) in order to improve efficiency, power output, mileage, and range of the electric wheelchair. The aim of this project is to design a wheelchair that is able to run outdoors, and is also able to run for long hours. In addition to this major idea, they were working on several issues which include designing and building the whole body of the wheelchair from scratch, and implementing some new, unique, and intelligent control systems that make navigation easier. The wheelchair is fully controlled by a joystick placed near the left hand rest. Next to the right hand rest there is a control panel that contains all of the switches and battery charge level indicator.

Besides that, another project is an Electro-Oculographic Guidance of a Wheelchair Using Eye Movements Codification design by L. Boquete, L. M. Bergasa, E. López and M. Mazo [11]. An eye-control device based on electro-oculography (EOG) is designed to develop a system for assisted mobility. Control is made by means eye movements detected using electro-oculographic potential. Using an inverse eye model, the saccadic eye movements can be detected and know where the user is looking. This control technique can be useful in multiple applications, but in this work it is used to guide a wheelchair for helping people with severe disabilities. The system consists of a standard electric wheelchair, an on-board computer, sensors and a graphical user interface.