UNIVERSITI TEKNIKAL MALAYSIA MELAKA

VOICE CONTROLLED WHEELCHAIR BY USING VISUAL BASIC

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Industrial Electronics) (Hons.)

by

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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **VOICE CONTROLLED WHEELCHAIR BY USING VISUAL BASIC**

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) (Hons.). The member of the supervisory is as follow:

……

(Project Supervisor)

ABSTRAK

Kerusi roda berkuasa dengan kawalan kayu ria, kawalan skrin tidak dapat dikawal oleh kebanyakan orang. Jadi kerusi roda yang dikawal oleh suara boleh menyediakan akses mudah untuk orang kurang upaya fizikal yang tidak dapat mengawal pergerakan badan mereka terutama tangan. Projek ini boleh membantu untuk meningkatkan kemudahan mobiliti untuk mereka yang kurang upaya, kecederaan yang teruk dan juga golongan orang tua oleh itu reka bentuk ini boleh membantu mereka ini untuk menaik taraf kehidupan mereka untuk hidup lebih selesa. Pengecaman suara merupakan teknologi terbaru yang memberi alternatif kepada orang ramai untuk berinteraksi dengan mesin atau peranti elektronik. Untuk menyelesaikan masalah ini ialah dengan melaksanakan kawalan suara maka dengan menggunakan mikrofon untuk mengawal kerusi roda. Sistem pengecaman suara akan menggunakan perisian Visual Basic 6.0. Sistem ini adalah reka bentuk untuk mengawal kerusi roda menggunakan input suara dari pengguna untuk melaksanakan pergerakkan kerusi roda, dengan itu ia dapat memberi kawalan kepada pengguna ke atas kerusi roda tanpa memerlukan sebarang bantuan daripada orang lain. Oleh itu Visual Basic digunakan untuk mengiktiraf suara seterusnya mengawal pergerakkan kerusi roda. Projek ini menggunakan mikropengawal PIC16F877A litar dan motor arus terus untuk mewujudkan pergerakan kerusi roda.

ABSTRACT

The powered wheelchairs with the standard joystick and screen control are unable to control by many people. So a voice controlled wheelchair can provide easy access for physical disabled person who cannot control their movement especially using hands. This project can help to increase the ease of mobility for disable, injured and older people as a result this design can help the people to upgrade their life to live more independently. Voice recognition is a prominent technology which gives an alternative to people to interact with machines electronic devices. Implementing voice control interfacing over a microphone for the wheelchair can resolve this problem. The voice recognition system will be using Visual Basic 6.0 software. The system is designed to control a wheelchair using the voice inputs from the user to performing the programmed motion, thereby giving a control to the user over the wheelchair without need any help from other people. Therefore Visual Basic interface is for recognizes a voice in turn controls the movement of wheelchairs. This project uses PIC16F877A microcontroller circuit and Direct Current Motor to create the movement of wheelchair.

DEDICATION

To my beloved mother and father

ACKNOWLEDGEMENT

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

ADA	-	Americans with Disabilities Act
ADL	-	Activity if Daily Living
PDSS	-	Physical Disability Stress Scale
WWII	-	World War 2
DC	-	Direct Current
SDK	-	Software Development Kit
SAPI	-	Speech Application Programming Interface
VB	-	Visual Basic
GUI	-	Graphic User Interface
OLE	-	Object Linking and Embedding
API	-	Application Programming Interface
DTE	-	Data Terminal Equipment
DCE	-	Data Communication Equipment
PIC	-	Peripheral Interface Controller
RAM	-	Random Access Memory
ROM	-	Read Only Memory
UART	-	Universal Asynchronous Receiver/Transmitter
USART	-	Universal Synchronous Asynchronous Receiver/Transmitter
RF	-	Radio Frequency
DC	-	Direct Current

CHAPTER 1

INTRODUCTION

Nowadays, more and more day people are suffering from losing the abilities to move their hand and body. Wheelchair is a very important necessity for handicap. Many organizations intend to design and create a more convenient high technology wheelchair for the handicap. Most available wheelchair in the market is self-control wheelchair. So it is not practical for person who lost the hands or legs or lost the abilities to use their hand and lack of stamina such as older people. For those people they still have their voice so they can use voice to control wheelchair without moving their body.

1.1 Introduction of Project

The focus of this project is to design and develop a voice controlled wheelchair for handicap, disability and older people. Today, more and more people are suffering from losing their hand and losing their hand and losing capabilities to control their hand or body. Wheelchair is a very important necessity for the handicap. Many organizations intend to design and create a more convenient wheelchair for the handicap such as joystick controller.

But this chair come with high price and most available wheelchair in the market are self-control wheelchair. So it is not practical for person who lost their hands or lost abilities to use their hand or body or lack of stamina such as older people, but for those people they still have their voice so they can use their voice to controlled wheelchair without moving their body.

1.2 Project Background

Electric wheelchair has given a lot of benefit of today technology make the life of handicap and disabled people more quality and comfortable especially for people or individual which have a problem of broken a leg or hand, paralyzed or elderly people but by using power wheelchair it can be assistance or help them to improve their capability to move independently. With a voice control wheelchair, it can help people to move to any areas more easily and smoothly.

According Furlong M, Connor JP. (2007) to several studies have shown that the independent transportability, which is included power wheelchair, manual wheelchair and walker it all give the benefit to both children and adults. Independent transportability increases career or employment opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-dependence.

According Linda Carter, J.D, Beth Loy (2013) from Americans with Disabilities Act or known as ADA has make a studies about wheelchair users in the United States, there are an estimated 1.4 million wheelchair users in the United States (Kraus, 1996). People use the wheelchairs for a many of reasons, the most common reason are being paralysis from spinal cord injuries. Current estimates indicate there are between 183,000 and 230,000 persons alive today in the United States with spinal cord injuries. The mean age of injury is 38 (Spinal Cord Injury Information Network, 2008).

There are much type of wheelchairs on the market, including manual, motorized, stand-up, elevating, reclining, sports, beach, and stair-climbing. Most people who use wheelchair have some of limitation, but rarely have in all of them. Beside that this limitation is depend on individual who use wheelchair need the accommodations but may be few of the will need some of accommodations.

For a handicapped person, to be independent is a important condition of self-confidence. For a case, usually handicap and older people has a problem with difficult to walk or pull a wheel for themselves, so literally they might be do take easily about their hygiene for example drink less mineral water to reduce a routine of urination.

According to Furling M, Connor JP (2007) Mobility limitations are the leading cause of functional limitations among adults with an estimated prevalence of 40 per 1000 persons age 18 to 44 and 188 per 1000 at age 85 and older. Transportability difficulties are also strong predictors of activities of daily living (ADL) and instrumental ADL disabilities because of the need to move to accomplish many of these activities. In addition, because of the limitation of the movement, it can affect a result to an individual to join a social activity which can lead them into social isolation, anxiety and depression

According to Furling M, Connor JP (2007) from the National Center for Biotechnology Information is U.S studies state that from the 119 wheelchairs users with acquired physical disability are participates state a result there is 4 main factors of disability related stress, access accounted for 33.7% of the variance, physical for 8.4% of the variance, social for 7.9% of the variance and burden of care for 7.2% of the variance

From the ZocDoc (2014), there are some disability people asking a question that he felt so small and meaningless and helpless. Disable people will find that it there is some element of post-traumatic stress disorder that accompanies any traumatic event. Nowadays wheelchair has become popular among the elderly and disabled people because the power wheelchair that they are easy and helpful which can be controlled by the user in the chair by using their hands or other body parts useful. The function is very important for some who need to be more independent and confident.

In fact, there is many varieties of power wheelchair is available in the market which there is thousands of companies for wheelchair, online sites, shop and mall. But most of the wheelchair must be control using hand, leg or any other body parts. Seeing that people regularly communicates each other by voices, it is very beneficial if voice is used to command robots.

Wheelchair is a very important vehicle for the handicapped or older people to help them move around in spite of that for the people who has serious body injury or paralysis or older people, the wheelchair with joystick are not productive device as a

control device. Lately the development in speech technology has becoming a focus attention of researchers to establish a more great design, simple, reduce cost to support and help the disabled community

This project describes a wheelchair which the user can control the wheelchair only by using the voice command. This project will give contribute a great benefit to disable people and elderly people to control a movement of a wheelchair.

The aims of this project is to help a movement of the disabled people who cannot move properly or need help to move to have a more better and quality life and help them build self-esteem. Speech recognition technology will give a great benefit to human to interact with a machines or tools for controlling a wheelchair.

This project are divided to two part which software and hardware. For the software, the program that will used required the computer that equipped with Visual Basic and for the interaction between computer and user the project using the microphone as an intermediary which is used as the input of human voice.

Furthermore this project also used a Programmable Integrated Circuit (PIC) which is operate as a switch to control the movement of wheelchair based on the human voice as an input with installing two DC motors as the driving force.

The power wheelchair equipped with five options for basic motion for user to control the wheelchair. The five condition of the wheelchair can be described as the following.

(a) Moving forward.
(b) Moving backward.
(c) Turning to the right.
(d) Turning to the left.
(e) Stop moving.

This project describes the design and development of the motion control using voice recognition for a wheelchair application. Figure 1.1 shows the block diagram for overall of the project.

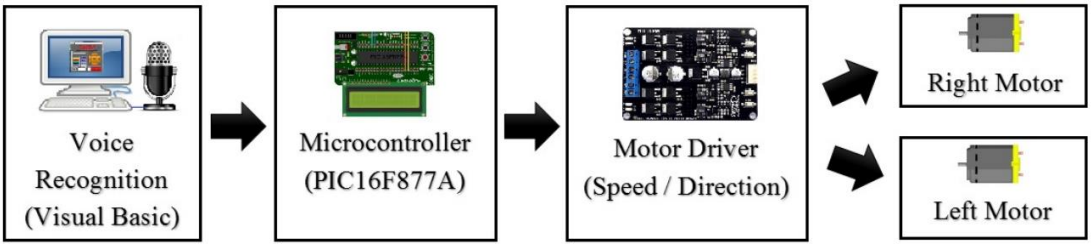

Figure 1.1: Block Diagram for project

1.3 Project Objective

(a) To develop a wheelchair system that can be control by using voice.
(b) To develop a voice recognition system by using Visual Basic.
(c) To increase disabled people ability to live independently.

1.4 Problem Statement

People with disabilities meet barriers of all types. However the technology can be a help to reduce of these barriers by creating the powered wheelchairs. Because some wheelchairs may not fit enough for disable or older people to use their hands to operate a joystick or move the wheel. So to overcome this problem, by using this technology it can help to create and design this wheelchair to minimize disable people difficulties.

The result of this design will allow certain people to live a life independently. Speech Recognition technology including voice recognition is a key which may provide a new way of human interaction with machines or tools. Thus the problem that

they are faced can be solved by using Voice Recognition Technology to move the wheelchair. This can be realized with used the microphone as an intermediary.

Furthermore a handicapped people with locomotive disabilities needs a wheelchair that can perform a function that require a person to move around and most regular and low cost wheelchair need to be push by using hands. However there are individual that have weak upper body or do not have strength to operate it manually.

So that it is desirable to provide them with the automatic motorized wheelchair that can be control by moving joystick, but it is too mainstream and limit to person who still have body capabilities to move hands. But for handicapped people how do not have capabilities on upper body and elder people who find the manual mode is too tiring, the voice control can be the answer of this problem.

With a lower cost and price that a current market and affordable for as many handicapped people this wheelchair will have a potential to the market and future as new technology that can help a people who need this type of service.

1.5 Scope of Project

This project is focus on handicap people who lose their hand or lose abilities to move their body. For those people still have their voice can use this system to control movement of the wheelchair. In this project, the software of Visual Basic 6 and SDK 5.1 will be used as an application to receive the voice input from user which is a user can instruct the wheelchair by using a microphone to give a command to control the movement of the wheelchair to any desire direction which is forward, backward, left and right. The dc motor will be used to move the wheelchair and PIC16F877A will be as a controller of the motor driver MDD10A.

1.6 Methodology

Methodology is the process used to collect information and data for the making purpose of making decision. The methodology may include understand the problem, research of information and data, design, decision and test and analysis. Figure 1.2 below shows the flowchart of methodology of this project.

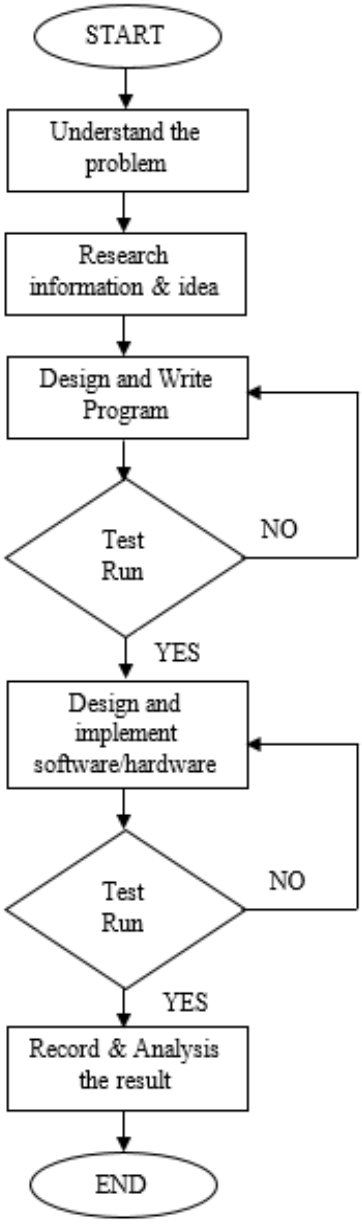

Figure 1.2: Flowchart of project

CHAPTER 2

LITERATURE REVIEW

This chapter includes the background study regarding voice recognition concept from journal and related previous projects and thesis. It also discusses on the component that have been research to use in this project.

2.1 Introduction

To start build this project, some research and collecting information had been done. The information is collected from many sources such as books, journals, forum and website. All this collected information were recorded and been discuss with lecturer, students and public to collect and choose the best information and idea. All information is very important and useful as a guide to build this project. All research and studies is related to the topic such as type of component used, hardware and software that used for this project.

2.2 Wheelchair History

It has been said that “necessity is the mother of all invention”, at some point in human history something has been created to help disabled people to move from one point to another point with some relaxation. From Erin Florence (2012) thus the invention of the wheelchair sprung forth. Table 2.1 show the chronology of the