VOICE CONTROLLED WHEELCHAIR BY USING VISUAL BASIC

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To my beloved family members, lecturers, friends and my supervisor Mr. Khairul Azha bin A.Aziz.

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Thank you to all lecturers, staffs, friends and all who has directly and indirectly involved on this project. Your helps and cooperation will never be forgotten. May Allah bless and reward them for their sincere, endeavor and contribution in the way of knowledge.

ABSTRAK

Projek ini adalah berkaitan tentang system kawalan kerusi roda bersuara dengan menggunakan Visual Basic 6.0. Sistem ini direkabentuk untuk mengawal kerusi roda dengan menggunakan suara daripada pengguna. Objektif projek ini adalah untuk memudahkan pergerakan bagi orang-orang yang kurang upaya atau cacat dan juga orang tua yang sudah tidak mampu bergerak dengan baik. Hasil rekaan ini akan membolehkan orang-orang tertentu untuk menjalani kehidupan dengan kurang bergantung kepada orang lain. Pengenalan suara menjadi satu teknologi penting yang mana boleh menyediakan suatu jalan yang baru dalam interaksi manusia dengan mesin atau alat. Masalah mereka yang tidak berkemampuan ini dapat diselesaikan dengan menggunakan teknologi pengenalan suara bagi mengerakkan kerusi roda. Ini dapat direalisasikan dengan menggunakan mikrofon sebagai perantara. Di dalam projek ini, antara muka Visual Basic direkabentuk justeru untuk menbangunkan suatu program bagi mengenalpastikan suara seterusnya mengawal pergerakan kerusi roda. Projek ini menggunakan litar mikropengawal PIC16F877A dan Motor Arus Terus untuk melakukan pergerakan bagi kerusi roda. Hasil daripada projek yang telah dijalankan ini, dapat dirumuskan rekabentuk yang telah digariskan adalah boleh digunapakai dan kesemua hasil ciptaan dan analisis akan diterangkan dalam laporan ini.

ABSTRACT

This project is related to the Voice Controlled Wheelchair System by using Visual Basic 6.0. The system is designed to control a wheelchair using the voice of consumer. The objective of this project is to facilitate the movement of people who are disabling or handicapped and elderly people who are not able to move well. The result of this design will allow certain people to live a life with less dependence on others. Speech recognition technology 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 speech recognition technology to move the wheelchair. This can be realized with used the microphone as an intermediary. In this project, Visual Basic interface is designed therefore to develop the program 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. The results and analysis of this innovation will describe in this report. The results of this project show that this project can be used for future research works and to design excellence innovation that meets market need and public interest.

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PIC	-	Peripheral Interface Controller
DC	-	Direct Current
IC	-	Integrated Circuit
UV	-	Ultra Violet
PCB	-	Printed Board Circuit
VB	-	Visual Basic
SAPI	-	Speech Application Programming Interface
PC	-	Personal Computer
Tx	-	Transmitter
Rx	-	Receiver
RTS	-	Ready To Send
CTS	-	Clear To Send
AC	-	Alternating Current
RAM	-	Random Access Memory
ROM	-	Read Only Memory

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CHAPTER 1

INTRODUCTION

While the needs of many individuals with disabilities can be satisfied with power wheelchairs, some members of the disabled community find it is difficult or impossible to operate a standard power wheelchair. This project could be part of an assistive technology. It is for more independent, productive and enjoyable living. The background, objectives, problem statement and scopes of the project will be discussed in this chapter.

1.1   Project Background

Several studies have shown that the independent mobility; which is included power wheelchair, manual wheelchair and walker access the benefit to both children and adults Independent mobility increases vocational and educational opportunities, reduces dependence on caregivers and family members, and promotes feelings of self-reliance. [1]

For young children, independent mobility serves as the foundation for much early learning. Nonambulatory children lack access to the wealth of stimuli afforded self-ambulating children. This lack of exploration and control often produces a cycle of deprivation and reduced motivation that leads to learned helplessness. [1]

For adults, independent mobility is an important aspect of self-esteem and plays a pivotal role in "aging in place." For example, if older people find it increasingly difficult to walk or wheel themselves to the commode, they may do so less often or they may drink less fluid to reduce the frequency of urination. If they become unable to walk or wheel themselves to the commode and help is not routinely available in the home when needed, a move to a more enabling environment (e.g., assisted living) maybe necessary. [1]

Mobility limitations are the leading cause of functional limitations among adults, with an estimated prevalence of 40 per 1,000 persons age 18 to 44 and 188 per 1,000 at age 85 and older. Mobility 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. [1]

In addition, impaired mobility often results in decreased opportunities to socialize, which leads to social isolation, anxiety, and depression. While the needs of many individuals with disabilities can be satisfied with traditional manual or power wheelchairs, a segment of the disabled community finds it difficult or impossible to use wheelchairs independently. [1]

This population includes, but is not limited to, individuals with low vision, visual field reduction, spasticity, tremors, or cognitive deficits. These individuals often lack independent mobility and rely on a caregiver to push them in a manual wheelchair. To accommodate this population, several researchers have used technologies originally developed for power wheelchairs have been designed of different ways, such as assuring collision-free travel, aiding the performance of specific tasks (e.g., passing through doorways), and autonomously transporting the user between locations. [1]

The idea of using voice activated technology for controlling the motion of the wheelchair is to prove that it can be a unique concept that would stand apart from the rest of the average projects. The use of this new technology in conjunction with a mechanical system in order to simplify everyday life would spark interest in an ever growing modern society. Many people with disabilities do not have the dexterity

necessary to control a joystick on an electrical wheelchair. This can be a great for the quadriplegics who is permanently unable to move any of the arms or legs. They can use their wheelchair easier only using voice commands. [1]

This project describes a wheelchair which can be controlled only by using the user's voice. This project aims to facilitate the movement of the disabled people and elderly people who cannot move properly then enable them to lead better lives without any problem. Speech recognition technology is a key technology which can provide a new way of human interaction with machines or tools for controlling a wheelchair. This project consists of two parts which is software and hardware. This program requires the computer to be equipped by using Visual Basic and this can be realized by using the microphone as an intermediary which is used as the input of human voice. In this project, Programmable Integrated Circuit (PIC) is used as a switch to control the movement of wheelchair based on the human voice as an input with installing two DC motor as the driving force.

There are five options for basic motions of a wheelchair to be applied by the user. The five conditions of the wheelchair can be described as the following:

      i.   Moving forward
     ii.   Moving backward
    iii.   Turning to the right
    iv.   Turning to the left
     v.   Stop condition

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.
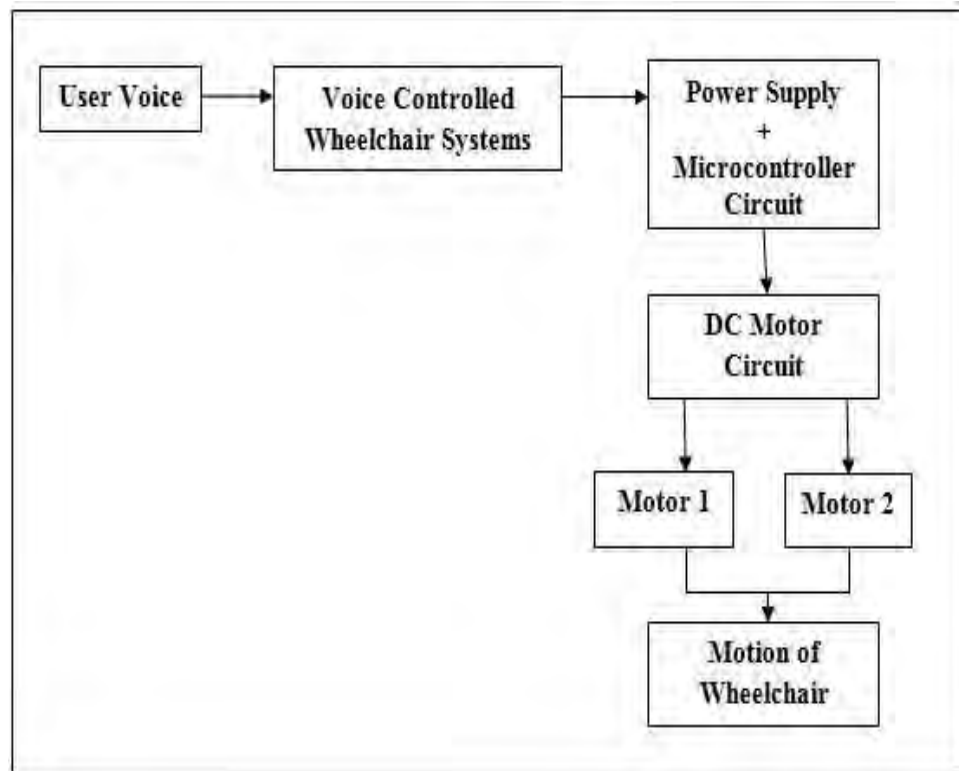
Figure 1.1: Block Diagram for overview of project

1.2   Objectives of Projects

i.   To develop a voice controlled wheelchair system by using Visual Basic for wheelchair control.

ii.   To implement the voice user as an input to control the movement of wheelchair.

iii. Provide the facilities for disabled people and elderly people who can't move properly.

1.3   Problem Statements

The power wheelchair control interfaces currently still not enough to provide truly independent mobility for substantial number of person with disabilities. Through research and design wise, the power wheelchair to control development along safe and effective use of the provision independence and self-use mobility. This project will provide disability weight innovative solutions to handle the wheel chairs to use voice interface.

1.4   Scope of project

Develop the voice recognition system by using Visual Basic. Visual Basic is use to control the movement of wheelchair. Microcontroller PIC16F877A and DC motor circuit were building for movement of wheelchair. This system works in a quiet environment so that no disorder during recognize the user voice. Furthermore, the user voice must clear in short distance on microphone to ensure the accuracy of the pronunciations of the word-related (voice) was essential in this innovation. The weight of the load for this system must be below 50 kilogram so that wheelchair only can function properly.
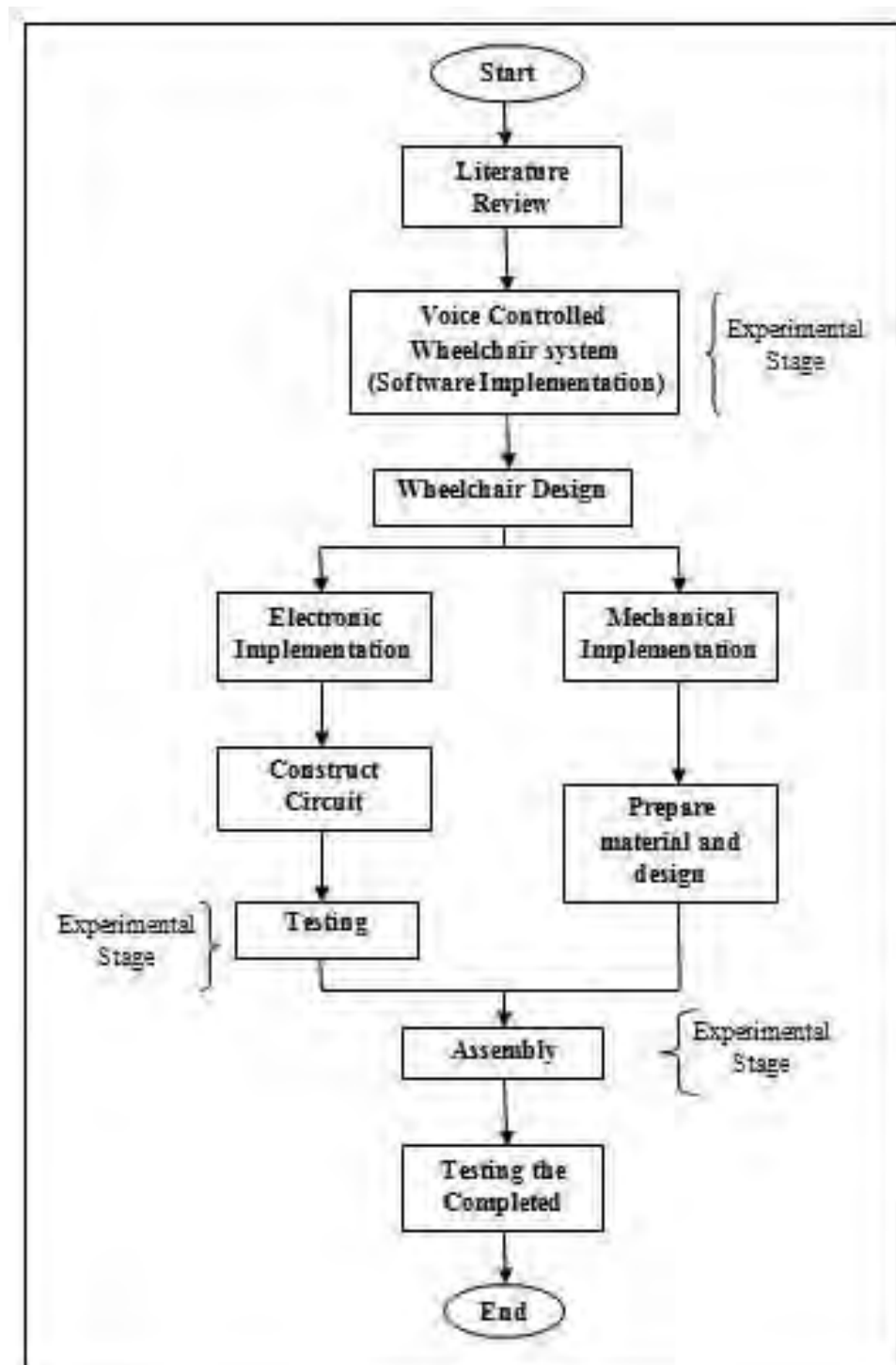
1.5   Methodology

Figure 1.2: Flowchart for overview of project

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In order to make this project successful, some studies and information has been done. The information is fetching from many sources such as books, articles, journals, and internet. All of this information is very useful as a guide in doing this project. This studies of information based on some major component and topic that related to the project that will be used in the project such as hardware and software.

2.2 Wheelchairs history

Wheelchairs have evolved very little over the past 1000 years. Most of the design changes have occurred within recent decades as shown in the following outline of wheelchair history.

Table 2.1: History of wheelchair

6th Century A.D	Earliest recording of a wheelchair; a Chinese engraving picturing a man in a chair with three wheels (Kamenetz, 1969).
16th Century A.D.	Wheelchairs were well-developed in Europe and commonly found in drawings and literature (Kamenetz, 1969).
1869	The first wheelchair patent was issued in the United States (Hotchkiss,1993).
1903	An electrically-driven wheelchair operating on a 12-volt battery and a 3/8 horsepower motor was used to give people rides. At the time it was not used for handicapped mobility but it did pave the way for future developments (Kamenetz, 1969).
World War I	The first electric wheelchairs were used for the handicapped. A battery and motor were applied to existing wheelchairs with a simple one-speed on/off switch (Kamenetz, 1969).
1940	The first patent was issued for an electric wheelchair (Hobson, 1990).
1950	Sam Duke received a patent for a releasable add-on power drive applied to manual wheelchair (the unit was actually permanently fitted to the chair with Ubolts) (Kamenetz, 1969).
1990's	The popular electric wheelchairs on the market are foldable though they require removal of at least the leg rests and batteries. The Katalavox speech-recognition control system can be used by quadriplegics to control their power wheelchair. The commands are combined to emulate the movements of a joystick. This voice controlled wheelchair was not been commercialized but it is customized for individual used.