Wheelchair Handling for the Disable through Voice

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Abstract - The main objective of this project is recommended to control a wheel chair by using voice of person. The objective of this project is provide facility for the movement of people who are disable or handicapped and elderly people who are not able to move well. The goal of this system will allow certain people to live a life with less dependence on others for their movement as a daily need. Speech recognition technology is a key technology which will provide a new way of human interaction with machine or tools. Therefore the problems that they face can be solved by using speech recognition technology for the movement of wheel chair. This can be realized and optimized with use the smart phone device as an intermediary or interface. In this project interfaces has been designed therefore to develop a program for recognize speech also controls the movement of chair and an application which can handle or manage the graphical commands. This project uses PIC Microcontroller circuit, Bluetooth module and DC motors to create the movement of wheel chair and Ultrasonic Sensors to detect the hurdles in between wheelchair and the way of direction.

*Key Words***:** PIC microcontroller, Bluetooth module, DC motors, Android App.

1. INTRODUCTION

In this project we are using Android Application and Voice Recognition System. But many of individuals with disabilities who need wheelchairs are satisfied with it, few members of the disabled community find it is difficult or impossible for operating a standard power wheelchair. This project is included in assistive technology. For handicapped and depended disable it is more independent, productive and enjoyable living.

To perform functions a handicapped person with locomotive disabilities needs a wheelchair that requires him or her to move around. He/She can do so manually by pushing the wheelchair with his/her hands. However many of us have weak upper limbs or find the manual mode of operating too tiring. Therefore it is desirable to provide them with a motorized wheelchair which is controlled by moving a voice commands. Since motorized wheelchair is important that it be able to avoid obstacles automatically in real time, it can move at a fair speed. Cost of this motorized wheelchair is affordable for many handicapped people as possible, as well as for organizations that support it. With these requirements in mind we propose an automated wheelchair with real-time Herald avoidance capability. The power wheelchair control interfaces currently still not enough to provide mobility for substantial number of person with disabilities. Through research and

design wise, the 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. This project describes a wheelchair which can be controlled only by using the android application and user's voice also. The main aim of this project is to facilitate the movement of the disabled people and elderly people who cannot move properly so with this we can enable them to lead better lives without any problem. Speech recognition is a key technology which can provide human interaction with machines for controlling a wheelchair. This project includes two parts which is software and hardware. It is realized that for input of human voice we are using Android phone as an intermediary. In this project, PIC microcontroller is used as controller to control the movement of wheelchair based on the human voice as an input. There are five basic movements of a wheelchair to be applied by the user. The Five operations perform by the wheelchair are described as following:

1) Moving forward
2) Moving backward
3) Turning to the right
4) Turning to the left
5) Stop condition

1.2. LITERATURE REVIEW

Several studies have concluded that the independent mobility or movement which is included powered wheel chair, manual wheelchair and walker access the benefit to all the disabled human beings .Independent mobility increases vocational and educational opportunities, reduces dependence on other members, and promotes feelings of self-reliance and independent ability.

[1]Independent mobility plays a vital role in building the foundation for much early learning for young people. The lack of exploration and control often results into a cycle of deprivation and lack of motivation that leads to learned helplessness. For aged people, independent movement is an important aspect of self-esteem and plays a vital role in "aging in place." Mobility difficulties led to the problem of activities of daily living (ADL) and instrumental ADL disabilities because of the need to move to accomplish many of these activities.

[2]The impaired mobility often results in reduced opportunities to have socialized policies, which leads to social isolation, and many mental problems. While the needs of many individuals with disabilities can be satisfied with traditional manual or self-automated wheelchairs, a segment of the disabled community finds it difficult or impossible to use wheelchairs independently.

[5] The disabled population includes people with low vision, visual field reduction, spasticity, tremors, or cognitive deficits. These individuals dependent on other people for mobility to push them in a manually handled 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.

[7]The Idea of using voice based technology for controlling the motion of the wheels of wheelchair is to prove that this project stands one step ahead of other average projects.

[8]The use of this new technology in conjunction with a mechanical system in order to simplify everyday life would spark interest in the developing modern society. Many people with disabilities do not have the dexterity necessary to control a joystick on an electrical wheelchair.

2. PROPOSED SYSTEM

Fig -1: Block Diagram

Block diagram shown above main components of this project. Entire system requires 5V and 12V power supply. Here we using 12V battery supply and LM7805 regulator for make 5V supply. PIC 16f690 microcontroller is brain of our project. Bluetooth Module HC-05 gets voice command from mobile Android App and these commands to controller. Controller processing them and ON DC motors according to given movement. Here ultrasonic sensor also use for obstacle detection in front of wheelchair. If obstacle detect buzzer will blow and stop wheelchair. Here 2 DC motors require for left and right side. To operate DC motors we using here relay driver circuit.

2.1 PIC16f690 microcontroller:

The PIC16F range of microcontrollers from Microchip are 8-bit MCUs that incorporate Microchip's PIC® architecture into a variety of pin and package options, from space efficient 14-pin devices to feature-rich 64-pin devices. Devices with Baseline, Mid-Range or Enhanced Mid-Range architecture are available with numerous different peripheral combinations, giving designers flexibility and choice for their applications.

The PIC16F631/677/685/687/689/690 family of microcontrollers is based upon Microchip's Mid-range core with an 8 level deep hardware stack and 35 instructions. These MCUs provide up to 5 MIPS, up to 7 Kbytes program memory, up to 256 bytes RAM and Data EEPROM of up to 256 bytes. On board is a configurable oscillator factory calibrated to ±1% accuracy.
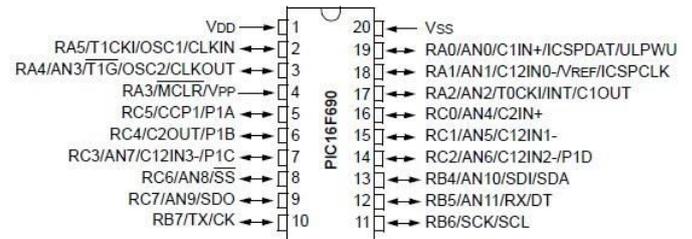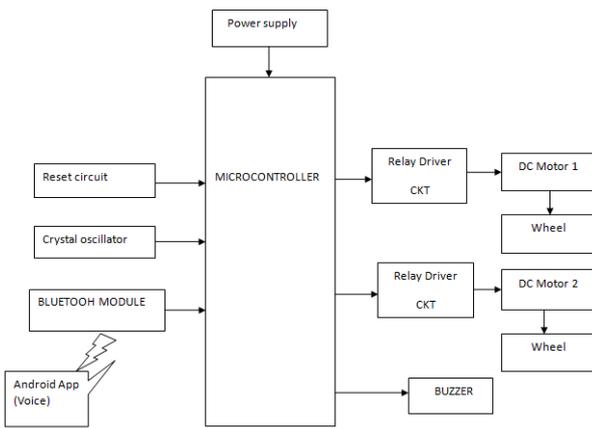

Fig -2: PIC16f690 Microcontroller

2.2 Bluetooth Module:

- HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth. It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications.

- It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions.

- It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air.

- It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).

Fig -3: Bluetooth Module

2.3. Relay Driver Circuit:

A relay driver circuit is a circuit which can drive, or operate, a relay so that it can function appropriately in a circuit. The driven relay can then operate as a switch in the circuit which can open or close, according to the needs of the circuit and its operation. Since DC and AC voltages operate differently, to build relay drivers for them requires slightly different setup. We will also go over a generic relay driver which can operate from either AC or DC voltage and operate both AC and DC relays. Now that we're using a transistor to drive the relay, we can use considerably less power to get the relay driven. Because a transistor is an amplifier, we just have to make sure that the base lead gets enough current to cause a larger current to flow from the emitter of the transistor to the collector. Once the base receives sufficient power, the transistor will conduct from emitter to collector and power the relay.
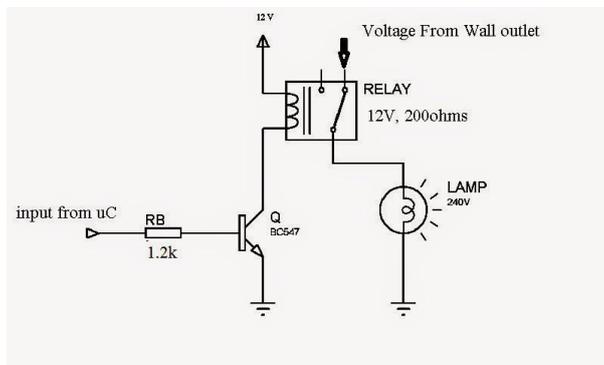

Fig -4: Relay Driver Circuit

2.4. DC Motor:

A DC motor is an electrical machine which converts electrical energy into mechanical energy. The basic working principle of the DC motor is that whenever a current carrying conductor places in the magnetic field, it experiences a mechanical force.

Fleming's Left Hand Rule:

If we stretch the first finger, second finger and thumb of our left hand to be perpendicular to each other, and first finger represents the direction of the magnetic field, the second finger represents the direction of the current, then the thumb represents the direction of the force experienced by the current carrying conductor.
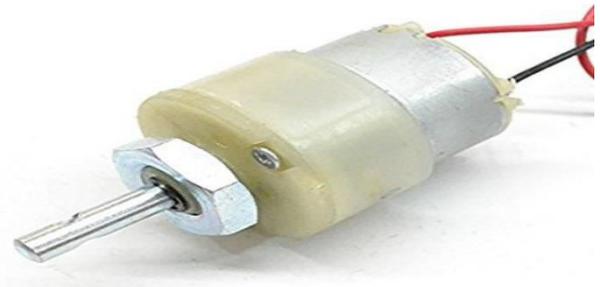

Fig -5: DC Motor

3. CONCLUSIONS

The project was tested for the movement of the wheel chair using voice command after the design and development of the self-automated wheel chair with its various interfacing units. The project fulfills the following objective:

➢ To implement and use the voice based system so that users voice as an input to control the mobility of wheelchair.
➢ Easy to drive with negligible efforts
➢ Helps to implement movement for disabled people and aged people who can't move properly.
➢ Less Complexity and Hardware to mount.
➢ Reduces manpower and dependency on other human drive.
➢ Wheelchair is compact and economical.
➢ Low power consuming and easy to operate the wheelchair.

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