Voice Controlled Wheelchair

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Voice Controlled Wheelchair

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ABSTRACT

This paper presents an automatic wheel chair using voice recognition. A voice controlled wheelchair makes it easy for physically disabled person who cannot control their movements of hands. The powered wheel chair depends on motors for locomotion and voice recognition for command. The circuit comprises of an Arduino, HM2007 Voice recognition module and Motors. The voice recognition module recognizes the command by the user and provides the corresponding coded data stored in the memory to Arduino Microcontroller. Arduino Microcontroller controls the locomotion accordingly. The wheelchair also has provision for joystick for physically disabled people who can move their hands.

Keywords
Voice recognition, wheelchair, HM2007 module, DC motor,Microcontroller Arduino

INTRODUCTION

Speech recognition is a popular topic in today's life. The applications of Speech recognition can be found everywhere, which make our life more effective. For example the applications in the mobile phone, instead of typing the name of the person who people want to call, people can just directly speak the name of the person to the mobile phone, and the mobile phone will automatically call that person. If people want send some text messages to someone, people can also speak messages to the mobile phone instead of typing. Speech recognition is a technology that people can control the system with their speech. Instead of typing on the keyboard or operating the buttons for the system, using speech to control system is more convenient. It can also reduce the cost of the industry production at the same time.

Robotic wheelchairs have enhanced the manual wheelchairs by introducing locomotion controls.These devices can ease the lives of many disabled people, particularly those with severe impairments by increasing their range of mobility[1].These robotic enhancement will provide benefit people who cannot use hands and legs. In this project we have developed a voice controlled wheelchair which aim to counter the above problems. The wheelchair can be controlled using joystick as well as using voice commands. He/She just needs to say the direction or move the button for that direction and the wheelchair moves in the desired direction. In hardware development, we are using HM2007 voice recognition module which correlates commands to do speech processing and give the result to Arduino which is further programmed with respective locomotion commands[2].
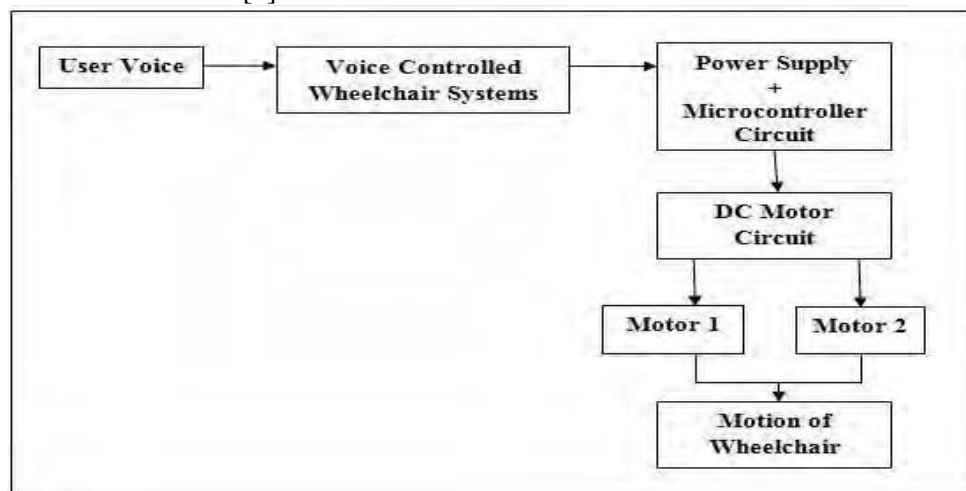

Fig 1: Block daigram

1. METHODS AND MATERIALS

There are twokey components involvedin making of the voice controlled wheel chair : hardware design and Control. A substantial amount of work needs to be done in each of these areas in order to develop a real wheel chair. The sections below describes the challenges involved in these areas.

1.1 Hardware Design

A good hardware design can increase the performance of the robot, and often can make each of the other fundamental issues easier to deal with.Motored wheels have been used to traverseplain terrain. The motors of high power supply have beenused for the movement.

The Motors are connected to Relays and L293D IC which in turn is connected to Arduino.L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive in either direction.It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction.
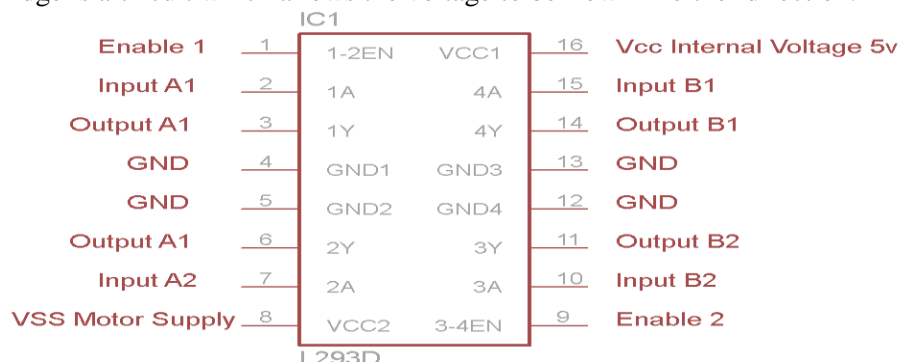

Fig 2: L293D IC pin diagram

The voice recognition module is connected to RX pin of the Arduino to receive coded data stream from the module specifying the corresponding command for direction. The locomotion is controlled using L293D and Relay which control the motors.

1.2 Control

There are three primary components of the control problem for a voice controlled wheel chair: 1) Recording commands 2)Recognition of commands 3) Locomotion control

1.2.1 Recording commands

Before using it, we have to record voice instructions. Each voice instruction has the maximum length of 1300ms, which ensures that most words can be recorded. Once you start recording, you can't stop the recording process until you finish all the 5 voice instructions recording of one group. Also, once you start recording, the previous content of that group will be erased. In recording stage, this module doesn't reply to any other serial commands.The commands are recorded using serial communication with the PC using Access Port with baud rate 9600 and Data bit 8.

The command Send: 0xaa11 is sent to access port and then command is recorded. The group 1 comprising of 5 commands is recorded.
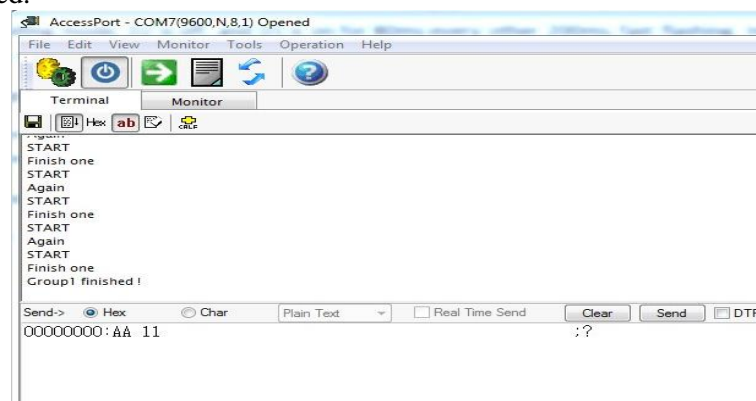

Fig3: Recording Commands

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1.2.2 Recognition of commands

Send command 0xAA21 to import group 1.
Send command 0xAA22 to import group 2.
Send command 0xAA23 to import group 3.

This command can recognize 5 voice instruction of a group at the same time. It could have 15 voice instructions in 3 groups. Each time you need to import the group before it could recognize instructions in that group. In recognition stage, this module could receive other serial commands. It will not exit the recognition stage until you send 0xAA00, or delete that group, or begin recording instructions.

1.2.3 Locomotion control

The results of the commands are imported from the voice recognition module in the Arduino and accordingly the motion is calibrated. For example , the command Right is calibrated to rightward movement of the wheel chair.

2. IMPLEMENTATION

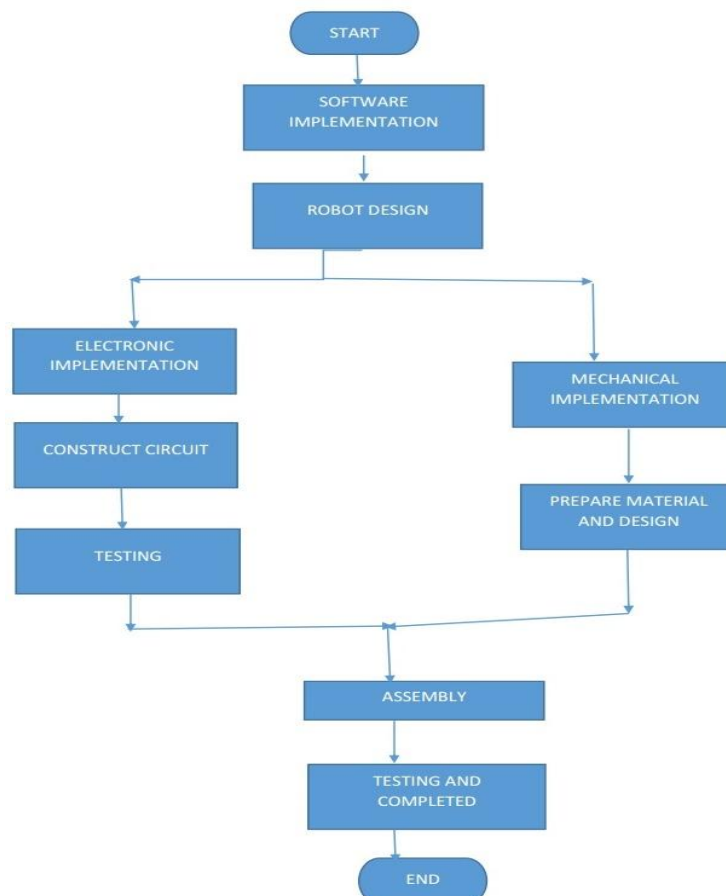The process of designingwas led forward by its implementation process.

Fig 4: Planning Implementation Flow Chart
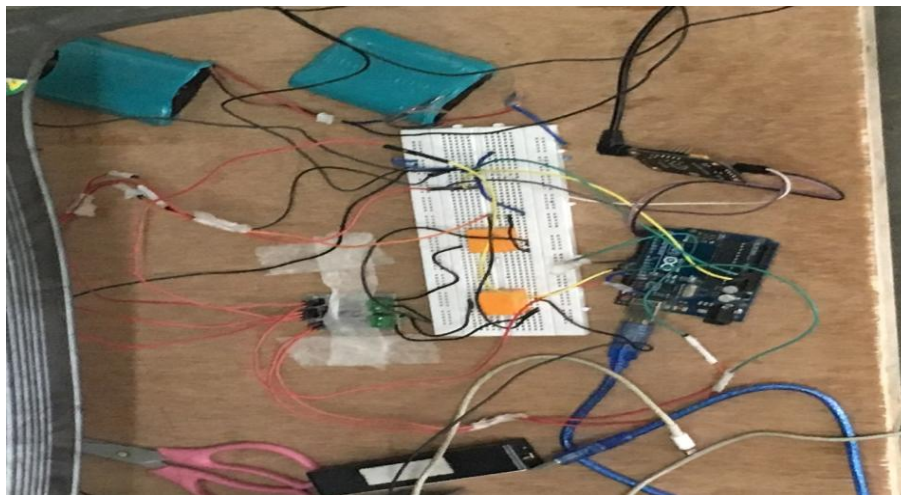
Fig 5: Implementation view

Fig 6: Circuit view

3.FUTURE EHANCEMENTS

i)   The weight of the load for this system must be below 50 kilogram so that wheelchair only can function properly, weight lifting capacity to be increased.

ii)   Obstacle avoidance sensors can be interfaced.

iii)   Home appliance control circuit can interfaced along with wheel chair control.

4. CONCLUSION

This paper described the successful implementation of a motorized wheelchair controlled by a joystick or through voice recognition.The voice recognition system worked for most of the commands (over 95%). Only when a word was not properly vocalized, the system did not recognize it.Overall, users reported satisfaction with the system.

The project provides the following learning's:

1. Speech recognition module operation.
2. DC motors working and need for motor driver.
3. Interfacing Speech recognition module to Microcontroller
4. Relay working principle.

5.ACKNOWLEDGEMENT

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