



# Design and Analysis of Voice Control Wheel Chair

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## Abstract:

The main objective of “VOICE CONTROLLED WHEEL CHAIR SYSTEM” project is recommended to control a wheel chair by using speech recognition module. The system is designed to control a wheel chair using the voice of person. 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 arduino kit Microcontroller circuit 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.

**Keywords:** Android Application, Wheel chair, physically Challenged, Ultra sonic Sensor, Voice Command, HC-05 Bluetooth Module, DC Motors, Arduino.

## CHAPTER 1

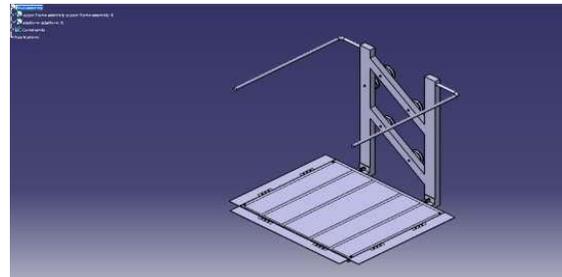
### 1.0 INTRODUCTION

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 require 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.



### 1.1. Controller

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, Ardiuno kit (Atmega 328) is used as controller to control the movement of wheelchair based on the human voice as an input.



## 1.2. Basic Movement:

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

## 1.3. Related work

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 in dependability. 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. 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. 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. 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. 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.

## CHAPTER 2

### 2.1. LITERATURE SURVEY

Author Kristi Kosasih et al. Has developed the intelligent fire fighting tank robot. Acrylic, plastic, aluminium and iron are used to make the robot. The tank robot is consisting of components like two servo motors, thermal array sensor, two DC motors, flame detector, ultrasonic sensor, IR and photo transistors, sound activation circuit and micro switch sensor. The goal of paper is search the prescribed area find the fire and extinguish it. The robot is activated by using DTMF transmitter and receiver. Author Sahils. Shah et al. Have developed the fire fighting robot. The fire fighting robot is integrated with embedded system.

Prototype system is designed to detect and extinguish fire. It aims to reduce air pollution caused due to fire. The robot is designed to detect fire in small floor plan. The task of extinguishing fire is divided into smaller tasks. Each task is carried out in most appropriate way. The robot navigates in every room step by step, finds the fire in a room, approaches fire from fixed distance and then extinguishes fire.

## CHAPTER 3

### 3.1 PROPOSED SYSTEM

Our project is designed to develop android application for remote operation of fire fighter robot. The fire extinguishing system is activated once the sensors detect the fire. Two sensors are used to detect the fire i.e. smoke sensor(light intensity) and another is temperature sensors. When these two sensors are simultaneously activated, the fire is detected. The fire extinguisher is mounted on the robotic vehicle which is then controlled over the wireless communication. At the transmitting end android application device is used. Commands like moving forward, left and right are sent to robot by using android device. At the receiving end, three motors are interface to the microcontroller. Out of these, two motors are used for the movement of robot and one is used to position the arm of the robot. Remote operation is achieved by any smart phone with android operating system. The android application device acts as a remote control. Receiver has a wireless device fed to the microcontroller. Actuator is located on the top of the extinguisher. Actuators are used to activate the sensors. All of the process occurs autonomously without any human intervention.

### 3.2 Voice Command

The left command will make right wheel moves forward and left wheel moves backward. The right command makes left wheel moves forward and right wheel rotate backward. In this system, by assigning the word command stop the rotation of both motors will stop. The wheelchair system will go back to the stand by condition or end the whole system by turning off the power supply of the speech recognition board.

### 3.3 Voice Command Conditions

**FORWARD** - Moving Straight to the Forward

**REVERSE** - Moving Straight in the Backward

**LEFT** -Turning to Left

**RIGHT** - Turning to Right

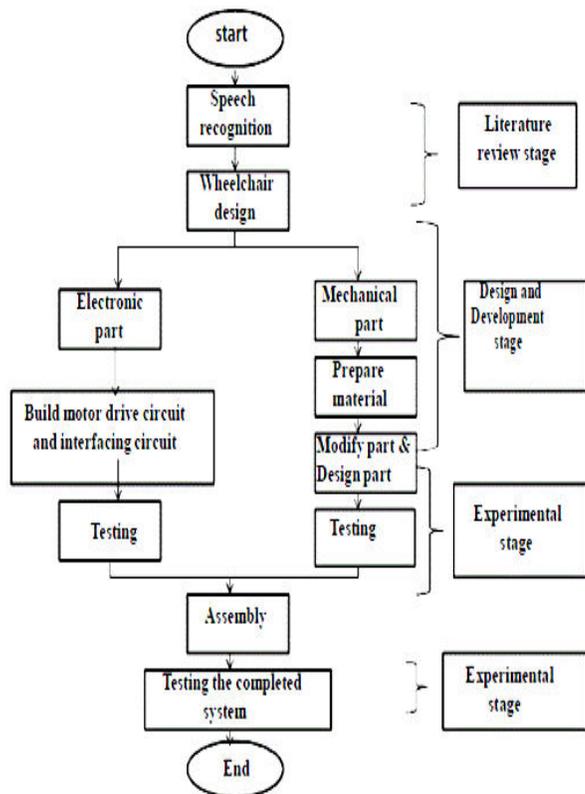
**STOP** - No Motion /Wheelchair Stops

**ON** - Giving the Supply to the Wheelchair

**OFF** - Switching Off the Supply

### 3.3 APPARATUS AND BLOCK DIAGRAM





### 3.4 Objectives of Project:

To develop a voice controlled wheelchair system by using C++ and java for wheelchair control.

- To design and develop an android app through which we can operate a movement of wheel chair Using android device. Mohammad IlyasMalik *et al*, International Journal of Computer Science and Mobile Computing To implement and use the voice based system so that users voice as an input to control the mobility of wheelchair.

- Helps to implement movement for disabled people and aged people who can't move properly.
- Easy to drive with negligible efforts.
- Less Complexity and Hardware to mount.
- Can be mounted on the existing wheelchair. • Wireless control helps to monitor the wheelchair.
- Reduces manpower and dependency on other human drive.
- Wheelchair is compact and economical.
- Provides easy movement for physically challenged people.
- Low power consuming and easy to operate the wheelchair

### 3.5 Voice Command

The left command will make right wheel moves forward and left wheel moves backward. The right command makes left wheel moves forward and right wheel rotate backward. In this system, by assigning the word command stop the rotation of both motors will stop. The wheelchair system will go back to the stand by condition or end the whole system by turning off the power supply of the speech recognition board.

### 3.6 Voice Command Conditions

FORWARD - Moving Straight to the Forward

REVERSE - Moving Straight in the Backward

LEFT -Turning to Left

RIGHT - Turning to Right

STOP - No Motion /Wheelchair Stops

ON - Giving the Supply to the Wheelchair

OFF - Switching Off the Supply

### 3.7 Future Scope of Project

- Voice recognition module is used to develop the voice recognition system. Voice recognition issues a Command to control the movement of wheelchair. For movement of wheelchair Microcontroller Atmega328 and DC motor circuit were built. For not to occur disorder during recognize the user voice, this system works in a quiet environment. Furthermore, the pronunciations accuracy must be ensured and the word-related (voice) the users voice must clear in short distance on microphone was essential in this innovation.

- Using gear box we can produce high speed moving wheelchair.
- PWM modulation can also increase speed.
- Solar Panel can also be used to charge the battery for power supply to the components required to drive the wheelchair.
- The wheelchair can also include the gesture feature to operate the wheelchair.
- Wheelchair only can function properly when the weight of the load for this system must be below 50 kilogram. Obstacle avoidance sensors are used.

### 3.8 Advantages

- To detect the exact direction of the fire source
- Reduce human effort
- Reliable and economical
- Not sensitive to weather condition
- User friendly
- Adaptable

### 3.9 Disadvantages

- No monitoring system for the vehicle
- No automatic control for the robotic movement

## CHAPTER 4

### 4.1 CONCLUSION

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

- On the basis of two important aspects, firstly, on the accuracy of the voice system and secondly, wheelchair velocity by means of control commands this design is experimented. This would be implemented for disabled people. Firstly the voice recognition system will be tested in a quiet room with only one single user. Every word was correctly recognized.

- For a next time we will test it with a different user on whom the system was not trained .For example words like "right" were recognized as "write" in this way about 5% errors occurred in this case.

- This was because the recognizer heard a different pronunciation. However, after the user had to speak the word a number of times the system had enough examples and properly determined what pronunciation the user speak of the word.

- After this system was tested in a noisy room by turning on some music in that room. There was no problem in correctly recognizing the words when the music was light but the

recognizer found it difficult to recognize the user's voice when we turned the volume high and often took commands from what it heard in the song.

## CHAPTER 5

### 5.1 REFERENCES

- [1]. W. Budiharto, *Membuat Robot Cerdas*, Jakarta: Gramedia, 2006.
- [2]. Ratnesh Malik, "Fire Fighting Robot : An Approach" , *Indian Streams Research Journal* Vol.2,Issue.II/March; 12pp.1-4
- [3]. Kristi Kosasih, E. Merry Sartika, M. Jimmy Hasugian, dan Muliady, "The Intelligent Fire Fighting Tank Robot" , *Electrical Engineering Journal*, Vol. 1, No. 1, October 2010
- [4]. H.P.Singh, Akanshu Mahajan, N. Sukavanam, Veena Budhraj, "Control Of An Autonomous Industrial Fire Fighting Mobile Robot", *DU Journal of Undergraduate Research and Innovation*
- [5]. Swati A. Deshmukh, Karishma A. Matte and Rashmi A. Pandhare, "Wireless Fire Fighting Robot", *International Journal For Research In Emerging Science and Technology*
- [6]. Lakshay Arora, Prof. Amol Joglekar, "Cell Phone Controlled Robot with Fire Detection Sensors", (*IJCSIT*) *International Journal of Computer Science and Information Technologies*, Vol. 6 (3), 2015, 2954-2958
- [7]. Arpit Sharma, Reetesh Verma, Saurabh Gupta and Sukhdeep Kaur Bhatia, "Android Phone Controlled Robot Using Bluetooth", *International Journal of Electronic and Electrical Engineering*. ISSN 0974-2174, Volume 7, Number 5 (2014), pp. 443-448
- [8]. Saravanan P, "Design and Development of Integrated Semi - Autonomous Fire Fighting Mobile Robot", *International Journal of Engineering Science and Innovative Technology (IJESIT)* Volume 4, Issue 2, March 2015
- [9]. Poonam Sonsale, Rutika Gawas, Siddhi Pise, Anuj Kaldate , "Intelligent Fire Extinguisher System", *IOSR Journal of Computer Engineering (IOSR-JCE)* e-ISSN: 2278-0661, p-ISSN: 2278-8727 Volume 16, Issue 1, Ver. VIII (Feb. 2014), PP 59-61 [www.iosrjournals.org](http://www.iosrjournals.org)
- [10]. Phyo Wai Aung, Wut Yi Win, "Remote Controlled Fire Fighting Robot", *International Journal of Scientific Engineering and Technology Research* Volume.03, IssueNo.24, September-2014