# Multilingual Voice Controlled Intelligent Wheelchair

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*Abstract*—This paper describes intelligent Multilanguage voice controlled wheelchair which operates on user's voice commands (Multilanguage). The disabled people cannot move from one place to another on their own. They continuously need someone to help them in getting the wheelchair moving. This voice controlled system makes them more independent. Powered wheelchairs with the standard joystick interface are unable to be control by many people. A voice controlled wheelchair can provide easy access for physical disabled person who cannot control their movements especially hands. Few patients such as quadriplegic, cerebral palsy and multiple sclerosis are dependent on other people to move from one place to another and due to this they don't have the freedom of mobility. This voice controlled wheelchair helps them to drive the wheelchair without anyone's help. This system can be controlled by the simple voice commands given by the user. Depending upon the direction specified in the commands, the microcontroller will drive the motors. The speech recognition is done by voice recognition module, connected with microcontroller. The wheelchair would operate on real analogous voice signal of patient or user using the wheelchair.

*Keywords*— **voice control, quadriplegic, cerebral palsy, multiple sclerosis, microcontroller, voice recognition module, GSM module, gps.**

## I. INTRODUCTION

This prototype is Multilanguage voice controlled wheel chair, which works on voice of patient. This wheelchair is designed for physically disabled persons who are dependent on wheelchair and especially those persons who cannot use their hands to move the wheels of a bwheelchair [1]. Wheel chairs are based on single voice control language [2], [3]. Controls include direction of the face [4], eye gaze [5], electromyography (EMG) signal from the neck and the arm muscles [6], EMG signal from the face muscles [7], and wireless tongue-palate contact

Pressure sensor [8], eye-control method based on electrooculography (EOG) [9], electroencephalography (EEG) [10] are proposed. We have programmed three languages in this wheelchair i.e. English, Urdu and Kashmiri. This WHEELCHAIR has also some extra feature like automatic wall detection [11], location updating, home control automation, and some emergency services. Another feature on which we are working can be added to this wheel chair i.e. we can connect this wheelchair with GSM & GPS so that the family members can easily trace the patients. Thus it will be helpful for those people who are physically disabled and will make them independent. The advancement and development of technology has always influenced several aspects of our lives since a very long time and will continue to do so in the future with more capacity and more unexpected development. In our project we have tried our best to correlate between the advancement of technology and the human requirement, for human ease. The main aim of this project is to control wheel chair through human voice and control home appliances by using patient's voice. This project is mainly designed for physically challenged people who are dependent on wheelchairs and especially those persons who cannot use their hand to drag their wheel chair because of some disability. In this system we have used voice recognition module to recognize the voice of the user for controlling the direction of the wheelchair The system has been designed and implemented in a cost effective way so that if our project is commercialized the needy users in developing countries will benefit from it. For voice recognition we have used "GEETECH HIGH SENSITIVITY VOICE RECOGNITION MODULE". We believe our project will be applicable for some useful operation and provide some advancement in technology, and most important this may provide some help to the handicap person. People with arms and hand impairment finds difficult to use a normal wheelchair as their hands are not capable of operating the normal wheelchair and cannot move it to any direction. Therefore, voice controlled wheel chair is built to overcome the problems faced by such people and enable them to operate the wheelchair. The wheelchair will be operated using the voice commands through the given input. The microcontroller will take care about all the directions the user wants. The instruction for each and every direction is

written in the form of program. The voice commands to the wheelchair will be given by the unilateral mica placed as per the user comfort. The voice recognition will be done by voice recognition module. The output from this module is then received by microcontroller. The already written programs in the microcontroller helps to convert this voice commands into considerable output and the wheelchair will move accordingly. By having a wheelchair control system people will become more independent. The wheelchair control system employs a voice recognition system for triggering and controlling all its movements. By using the system, the user is able to operate the wheelchair by simply speaking to the wheelchair's microphone. The basic movement functions includes forward and reverse direction, left and right turns and stop. The spoken words are linked to the voice recognition processor via a flexible microphone which can be bent as per the user's need. Many physically disabled patients cannot move any of the limbs below the neck. Hence manual and even joystick operated wheelchair are out of question for these patients. So the development of voice operated wheelchair will solve the query about the mobility of quadriplegic patient and make them independent of mobility

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.

## II. METHODOLOGY

The main objective is to design a system which provides solution for the physically handicapped (challenged) people those who can't move by themselves, using speech commands by interfacing the Speech Recognition kit with microcontroller and wheel chair. The Mic is provided to the person sitting on the wheel chair. Speech recognition kit registers the commands and forward them to the microcontroller. Microcontroller takes commands from speech recognition kit and passes them to the motor drivers. Motor driver receives the commands from microcontroller and moves the motors according to them. The motors are connected to the wheels of wheelchair.
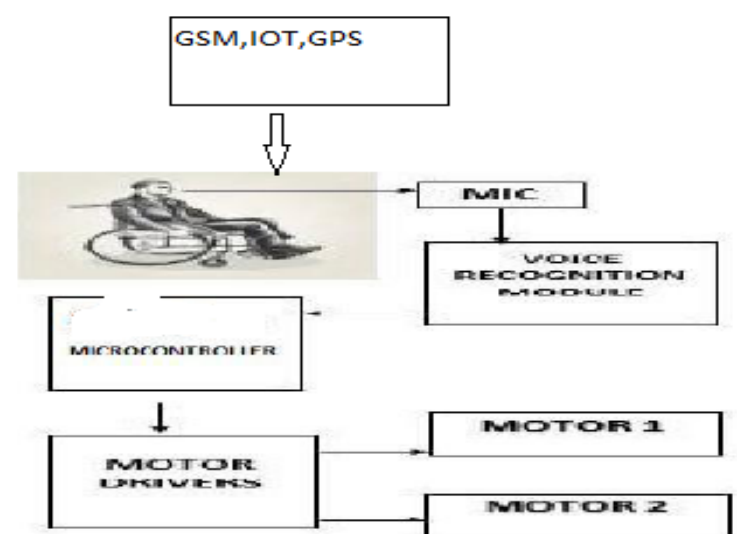
The below diagram explains the working



Figure 1

## III. ALGORITHM STEPS

The working of the project can be explained in the following steps:

A) *ENGLISH LANGUAGE ALGORITHM*

**Step 1:** Initially 5v power supply is given to the speech recognition kit, microcontroller and motor drivers.

**Step 2:** voice module is ready to receive the commands.

**Step 3:** If the given voice command is MOVE LEFT then the wheel chair moves left side.

**Step 4:** If the command is MOVE RIGHT the wheel chair moves right side.

**Step 5:** If the command is FORWARD the wheel chair moves forward.

**Step 6:** If the command is BACKWARD the wheel chair moves backward.

**Step 7:** If the command is STOP the wheelchair stops moving.

**Step 8:** If wall is detected by IR sensor then the wheel chair stops.

### B) KASHMIRI LANGUAGE ALGORITHM

**Step 1:** If the given voice command is FEAR KHAVUD then the wheel chair moves left side.

**Step 2:** If the command is DASHUN FEAR then the wheel chair moves right side.

**Step 3:** If the command is BROUNTH PAKH then the wheel chair moves forward.

**Step 4:** If the command is PAKH PATH then the wheel chair moves backward.

**Step 5:** If the command is RUK then the wheelchair stops moving.

### C) URDU LANGUAGE ALGORITHM

**Step 1:** If the given voice command is BAYAIN MUED then the wheel chair moves left side.

**Step 2:** If the command is DAYEIN MUED then the wheel chair moves right side.

**Step 3:** If the command is AAGAY CHALO then the wheel chair moves forward.

**Step 4:** If the command is PECHAY CHALO then the wheel chair moves backward.

**Step 5:** If the command is RUKO then the wheelchair stops moving.

### D) ALGORITHM FOR HOME APPLIANCES

**Step1:** if the voice command is "LIGHT ON "then the light of will turn on.

**Step2:** if the voice command is "LIGHT OFF "then the light of will turn OFF.

**Step3:** if the voice command is "DOOR OPEN" then the door will be open.

**Step4:** if the voice command is "DOOR CLOSE" then the door will be closed.

**Step5:** if the voice command is "FAN ON" then the FAN will be ON.

### E) ALGORITHM FOR EMERGENCY SERVICE

**Step1:** if the voice command is "MEDICINE "it will be transmitted through GSM/IOT to taking care person so that patient will get medicine.

**Step2:** if the voice command is "FOOD "it will be transmitted through GSM/IOT to taking care person.

**Step3:** if the voice command is any other needs it will be transmitted through GSM/IOT to taking care person.

**Step4:** The chair will be automatically located by GPS continuously and location will be transmitted to taking care person through GSM.

**Step5:** Additionally there are no. of sensors which avoid accidents **like** ultrasonic sensors, shock absorbing sensor, wall detectors sensors. By using ultrasonic sensor it can measure distance so that chair will cross the road also detect wall, edges so to avoid possible accidents.

## IV. HARDWARE DESCRIPTION

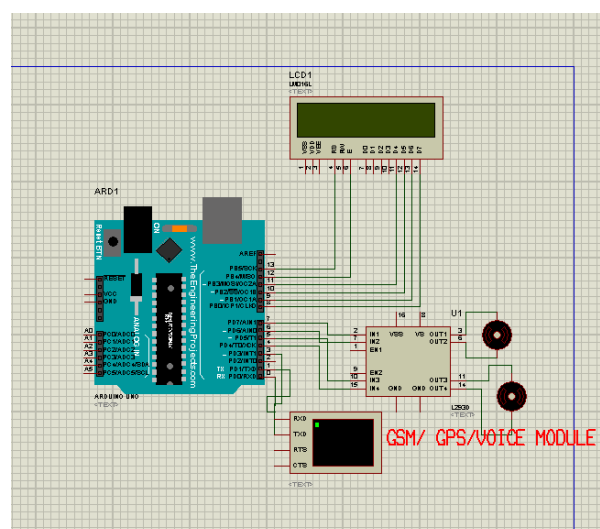Below diagram explains the all hardware description of the project



Figure 3

The basic components that we used to build this project are as:

1. ARDUINO MICROCONTROLLER.
2. GSM/GPS/IOT
3. VOICE RECOGINITION MODULE
4. MOTOR DRIVE.
5. SENSORS:
   I. ULTRASONIC SENSOR.
   II. WALL DETECTORS.
   III. SHOCK ABSORBING.
6. MOTORS.
7. HOME APPLIANCES TOOLS.
8. POWER SUPPLY.

## V. CONCLUSIONS

I. The design and implementation of a Multilanguage voice controlled wheelchair for disable people using microcontroller and voice recognition module for controlling the motion of a wheelchair is designed. The direction of the wheelchair now can be selected using the specified voice commands

II. The design not only reduce the manufacture cost compared with present market but also will give great competitive with other types of electrical wheelchair. The only thing needed to ride the wheelchair is the synthetic voice commands of the person.

III. A system that can directly enhanced the lifestyle of a physically disabled person in the community is implemented. This project has many advantages like safety, comfort, energy saving, full automation etc.

IV. The technology can also enhanced safely for users who use ordinary joystick-controlled wheelchair, by preventing collision with walls, fixed objects, furniture and other people. Thus all the drawbacks of the joystick controlled wheelchair are overcome by this "voice controlled wheelchair".

V. This project is also helpful for disabled person to control home appliances by his voice command and communicate with this project with taking care person whenever he needs especially during emergency. Thus this wheel chair is fully automatic and makes fully independent of other person for various aspects.

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