Voice Recognition and Touch Screen Control Based Wheel Chair for Paraplegic Persons

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Abstract- *In the world there are many problems occur like accident, age and health problems for that there are many sensing techniques and devices are existed already. To help people with overcoming such defects, the intelligent wheelchair system which we will have implementing such system uses dual control for navigation in familiar environments. In this system there are two modes of input control to the wheelchair that are Voice recognition and Touch Screen . Touch screen sensor is modeled for moving in different direction by pressing finger on touch pad for control appliances. With the help of Voice command technique people can also move intelligent chair in different direction using voice controller.*

Keywords- ARM Microcontroller, Touch-Screen, Wheelchairs, Bluetooth , BT VOICE App.

I. INTRODUCTION

Due to accident, age and health problems peoples have physical illness & Inability and unable to walk with limitation in performing tasks. So, wheelchairs are used for physically disable & paralyzed persons. Today's technology is fast shifting towards automation which minimizes the need for human interaction for serving to the people. Literature survey of smart wheelchairs concludes that, 40% of patients have difficulties in steering wheelchair & movement in daily life environments. There is a wide scope to develop smart wheelchair to assist these physically challenged peoples. This paper elaborates a new idea to develop an intelligent wheelchair using smart phone with ability to control the movement of wheel chair using voice or touch-screen. .

These scenarios include situations in which the persons can't open door easily for that requires precise control. For overcome this drawback we going to use touch-screen & voice recognition. By using smart wheelchair person can open & close the door. The response and distance covered by wheelchair can be further improved by using RF module. Therefore the smart wheel Chair is developed to overcome the above problems allowing the end-user to just perform safe movements and accomplish some daily life important tasks. with such defects, the developed intelligent wheelchair system uses dual control for navigation in familiar environments.

Designing a simple and efficient advanced wheelchair system for to assist people The two modes of input control to the wheelchair are voice recognition and touch screen. When one want to change the direction, then voice recognition system is used and another want to on/off the electrical appliances ,touch-screen mode is used, the touch screen sensor is modeled by pressing finger against the various quadrants on the touch screen, which has different values programmed for different direction. This can also be controlled through simple voice commands using voice controller. By storing a single letter in voice recognition kit for each direction control, the recognition time is reduced drastically and thus quick reach to destination is obtained.

Objective of design a wheel chair is design a simple and efficient advanced wheelchair system for Isolated words to satisfy the motion control of electric motorized wheelchair for handicapped persons is the interest of this project. The project carried out would make an impressing task in hospital etc.

From previous literature surveys observed, the accuracy of the touch screen was found to be 50%. In this proposed system achievement of wheelchair movement in all direction is obtained with an accuracy of 94.6%. Voice recognition apps has accuracy of 80.8% which is 30% higher than the voice recognition model. This device helps the disabled to have automatic moment of wheel chair for advancement to their destination through predefined paths in the indoor & outdoor system.

II. LITERATURE SURVEY

A wide range of supportive devices and modern equipment has been developed to help improve quality of human life. Around many researches done in the field of wheel chair by using voice recognition. Due to signal processing algorithms and availability of powerful computers, computer based speech processing system nowadays have reached complex structure with high accuracy & grate performance. The challenge of system is to maintain standard

performance while using limited computation and memory resources. In 1933 Harry Jennings and his disabled friend Herbert Everest, both mechanical engineers, invented the first lightweight, steel and collapsible wheelchair. Everest had previously broken his back in a mining accident. Everest and Jennings saw the business potential of the invention and went on to become the first developed wheel chair for handicap people.

Recent technological advances are slowly improving wheelchair and power chair technology. In In 2010 addition of geared, all-mechanical wheels for manual wheelchairs is a new development incorporating a hypocycloidal reduction gear into the wheel design. The 2-gear wheels can be added to a manual wheelchair. The geared wheels provide a user with additional assistance by providing leverage through gearing (like a bicycle, not a motor). The two-gear wheels offer two speed ratios- 1:1 (no help, no extra torque) and 2:1, providing 100% more hill climbing force. The low gear incorporates an automatic "hill hold" function which holds the wheelchair in place on a hill between pushes, but will allow the user to override the hill hold to roll the wheels backwards if needed.

In 2011, Andrew Slorance who is British inventor developed Carbon Black the first wheelchair to be made almost entirely out of carbon fiber. Recently, EPFL's CNBI project has succeeded in making wheelchairs that can be controlled by brain impulses and control wheelchair by using brain impulses. Experiments have also been made with unusual variant wheels, like the omniwheel or the mecanum wheel.

In 2013, M. Prathysha invented voice recognition & touch-screen based wheel-chaiR.In this system the voice recognition is done by HM2007 Voice recognition IC.For touch-screen is analog in nature to digitized these Signals by using six channel ADC of ATMEAGA8 microcontroller on reciving to control circuit.In this two brushless motors are used for control the two wheels of the chair independently[4].

In 2015 Krishna Pal Tiwari devolped voice controlled autonomous wheelchairs ,in this system voice recognition is used as user interface. Here they are creating a speech recognition based wheel chair for handicapped patients and The patients who cannot walk and have to use a wheel chair can steer the wheel chair by their voice. In this project there is one input device i.e. mic which takes input from the user in the form of speech, speech recognition system recognize the input word spoken from mic. On receiving the Signal from mic microcontroller directs the motors through the control circuit. In this, two DC high torque stepper motors are used for controlling the two wheels of the chair independently and they work correctly [5].

In 2016 Mohammed Ismail, Syed Fouzan Ishaqui invent Head Gesture based control of wheelchair for a paralysed persons for indoor environment movement. In this system they utilized the acceleration data to recognize the hand gestures and then transfer the gesture information which indicates certain motion commands into the wheelchair's smooth motions. It's a trial method to realize the natural interaction for the older and handicapped with the wheelchair through the hand gestures[6].

It is reviewed that although some current wheelchair systems have embedded computers, they have very little computer control and require precise, low-level control inputs from the user.in our project we developed a smart wheelchair with intelligent controllers that let people with physical disabilities overcome these difficulties .A user dependent voice recognition system had been integrated in the wheelchair. In this way they had obtained a wheelchair which can be driven using both touch-screen and voice command.

III. SYSTEM DEVELOPMENT

The purpose of this project is to describe an intelligent motorized wheel chair for handicapped person using voice and touch screen technology. It enables a disabled person to move around independently using a touch screen and a voice recognition application which is interfaced with motors through microcontroller. When we want to change the direction, the voice command is modeled to direct the user to required destination using direction keys on the screen and that values are given to microcontroller. Depending on the direction selected by the voice command, microcontroller controls the wheel chair directions.

A needy-user recognition voice system and ultrasonic and infrared sensor systems has been included in this wheelchair. In this way we have acquired a wheelchair which can be driven autonomously or with using voice commands and with the possibility of avoiding obstacles and downstairs or hole detection. Paper describe the wheelchair system with user friendly touch screen interface. The ability to choose between manual operating mode and predefined operating mode uniquely presents capacity of the wheelchair to operate in multiple environments.

The speech recognition system is easy to use programmable speech recognition circuit that is the system to be trained the words (or vocal utterances) the user wants the circuit to recognize.

IV. PROPOSED HARDWARE

In this project there will be a 3 whell wheel chair. The rear wheels are fitted with 2 12V DC Motors. A 12V 1.3Ah battery is used to supply power to the circuit. A castor wheel is fitted in the front side . A bluetooth module and touchscreen modules are fitted on the main board. An android app is used to send voice commands to microcontroller using Bluetooth of mobile . A touchscreen is used to control electrical appliances remotely.

BLOCK DIAGRAM

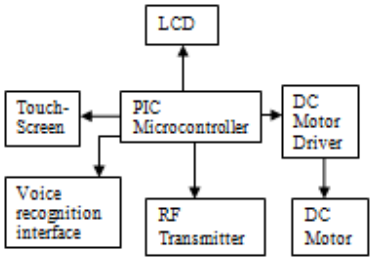


Fig. Block dig. For Voice-recognition & touch-screen based wheel-chair.

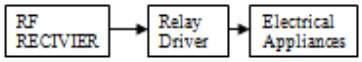


Fig.2. Block dig. For RF RECIVIER

In this system there are two input devices, speech recognition system and touch screen. The system consist of PIC Microcontroller as we need the port for LCD, Touch screen, Bluetooth & DC motor. In this project we are going to use a pic microcontroller ic 16f877A since it has 32 IO pins 8 10 bit ADC channels , one serial port , two timers . It also has I2C and SPI Interface . Also it has only 35 instruction set . As compared with other microcontroller with same specifications it's cost is lowest.

4.2. LCD

LCD Display is for showing the command which is receive from microcontroller

4.3. TOUCH-SCREEN

Here paralyzed person has to select the motion of the wheelchair or he has to select the appliance control touch-screen used for this purpose a picture of up/down/left/right/stop image is placed below touch-screen.

4.4. RF MODULES

Microcontroller sends a 4 bit code to encoder IC HT12E. It generates a 12bit data and sends it to the RF transmitter TX433. The transmitted data is received by a RF receiver RX433 and decoded by decoder IC HT12D , the output of the decoder IC is given to relay board .

4.5. RELAYS

When a command is received the relay is switched on/off. Hence he can control the electrical appliances. In order to select a specific input device we are using a switch that is when the switch=1 voice recognition system is considered and when Switch =0 touch screen is considered. The output of the touch screen is analog in nature, to digitize these signals we are using in-built six channels ADC of PIC16S877A Microcontroller. In this, two DC brushless motors are used for controlling the two wheels of the chair independently.

BT VOICE CONTROL APP

BT VOICE CONTROL is Android app used for voice recognition .voice recognition uses android mobile internal voice recognition to pass voice command to your device/robot.The app work by recognizing your voice command ,it will then display the word that you have spoken then sending data string to the device via Bluetooth.

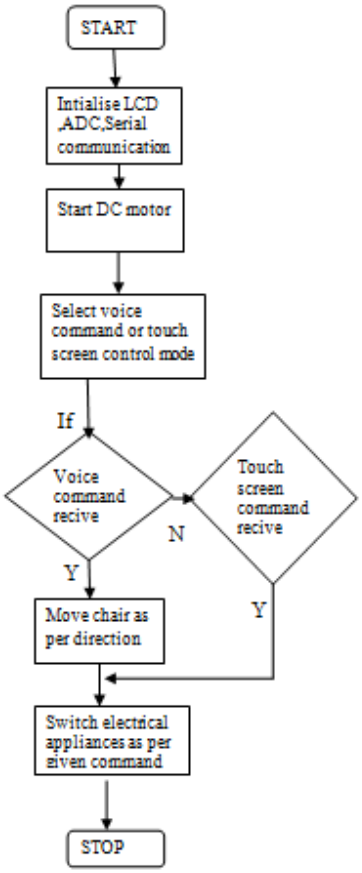
V. WORKFLOW

In this system there are two input devices, speech recognition system using android app and touch screen with serial interface is used . In order to select a specific input device we are using a switch that is when the switch=1 voice recognition system is considered and when switch=0 touch screen is considered. The output of the touch screen is analog in nature, PIC microcontroller receives serial data . On receiving data the PIC microcontroller directs the motors through the control circuit. In this, two 45 RPM DC motors are used for controlling the the two wheels of the chair independently.

A. ALGORITHM

1.Initialize LCD ADC and serial communication
2. Read voice command from android app using blue tooth module.
3. If touch screen mode is selected then switch required electrical appliances on/off.
4. If Voice command received move the wheelchair as per the code received from Voice recognition module.

B. FLOWCHART



VI. CONCLUSION

Recent advancements in the technology are making lives easier for everybody. This system used for the self-dependency of physically challenged, handicapped, paralyzed people. It reduces the manual effort for a attaining parlayed persons. The command for controlling the motion of a wheelchair by specified voice commands. Further that, the development of this project is done with less cost and affordable any common man.we are mainly focusing on touch screen and voice recognition based system interface, more advancements can be done through more research. The efficiency of the voice command control system can be further improved by implementing neural network based algorithms.We can attach various sensor to paralyzed person and we can send this data over internet so that we can monitor his health status remotely.

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REFERANCES

[1] Saranghi P. Parikh; Valdir Grassi Jr.; R. Vijay Kumar Jun Okamoto Jr., “Integrating Human Inputs with Autonomous Behaviors on an Intelligent Wheelchair Platform”, IEEE Trans., April 2007, Volume 22, Issue 2, page 33.

[2] Journal by Takashi Gomi and Ann Griffith, applied AI Systems, Inc.“Developing Intelligent Wheelchairs for the Handicapped”.

[3] Saranghi P. Parikh; Valdir Grassi Jr.; R. Vijay Kumar Jun Okamoto Jr.,“Integrating Human Inputs with Autonomous Behaviors on an Intelligent Wheelchair Platform”, IEEE. Trans., April 2007, Volume 22, Issue 2.

[4] Journal by M. Prathysha and K.S.Roy, applied AI Systems, Inc. “voice recognition and touchscreen based Wheelchairs”. April 2013.

[5] Krishna Pal Tiwari and Kranti Kumar Dewangar “Voice controlled autonomous wheelchairs”IJSR April 2015.

[6] Journal by Mohammed Ismail, Syed Fouzan Ishaqui “Head Gesture based control of wheelchair for a paralysed persons for indoor environment movement” April 2016.

[7] GundaGautam, GundaSumanth,″ Eye Movement Based Electronic Wheel Chair For Physically Challenged Persons, ″ International Journal Of Scientific & Technology Research Volume 3, Issue 2, February 2014.

[8] KoheiArai, RonnyMardiyanto,″ Eyes Based Electric Wheel Chair Control system” International Journal of Advanced Computer Science and Applications.

[9] inyukov D.A, Ran Li, Otero N.W, Runzi Gao, Padir T., "Augmenting a voice and facial expression control of a robotic wheelchair with assistive navigation", IEEE International Conference on Systems, Man and Cybernetics, 2014, P. 1088-1094, California, USA.