Wheelchair Control Using Speaker Identification.

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***Abstract*— This paper describes Wheelchair control using speaker Idendification for handicapped person. Freedom of mobility is the dream of every person especially in the case of quadriplegics and multiple indurate persons. Many of the Quadriplegics and multiple indurate persons can't operate their body below the neck.so they are dependent on others for their daily works.so they need helpers to travel or move from one place to another place therefore they don't have freedom of mobility.**

The purpose is to develop a powered Wheelchair for Quadriplegics and multiple indurate patients those who cannot operate their wheelchair through joysticks these people can able to operate wheelchair by their voice commands. This wheelchair can be easily use and driven to desired direction with minimum efforts. This powered wheelchair system consist of Microcontroller, DC motors. The voice recognition is done with the help of Matlab based PC and its output in digital form will be sent to microcontroller with the help of which they can control the wheelchair according to the users commands. The GSM based module is used in emergency needs. Another advantage added is in case of emergency a message will be sent to the persons relative mobile no. avoids the major accident or during the situation when patient cannot handle himself.

***Index Terms*—Quadriplegics, Multiple Induration, Matlab, GSM module, Microcontroller, Mobility.**

I. INTRODUCTION

The main goal of this project is to contribute effective methods for the operation of Wheelchair for Quadriplegics and multiple Indurate persons or Patients. Independent mobility is the rights of every persons especially of a physically disabled people. some of the families carries risk communicating along with the disabled person. They can't avoid their work or remove enough time for disabled persons. The multiple sclerosis persons can't operate wheelchair manually using joysticks. Peoples with disabilities meet lots of hurdles in their life. In manual wheelchair physical efforts are needed due to this efforts they will develop other disabilities in their life at certain point. Hence manually operated wheelchair are excluded or out of reach for quadriplegics patients.

So by developing voice recognition speaker idendification based multifunction wheelchair a lot of problem will be solved and it will act as backbone to all needy.

II. EXPERIMENTAL PROCEDURE

A. Literature Survey

Smart wheelchair have been subjected of research since early 1980's.The research in the field of Wheelchair control are still in progress. Smart wheelchair have been designed using different approaches. For example –wheelchair control using head movement,Wheelchair control by using finger Tracking system ,Wheelchair control using tounge movement etc.

Ericka Janet Rechy-Ramirez[3]. They have used and implement Head movement based control of an intelligent Wheelchair. It is implemented on electrical powered Wheelchair (EPG).Its two operation modes are based on head movement mode(1)- uses only one head movement to give command and mode(2) –Employees four head movement and EEG device which is use to obtained head movement information. M. Prathyusha [6].developed Voice and touch screen based Direction and speed control wheelchair using aurdino they used touch screen to navigate wheelchair manually and voice recognition for quadriplegics person's.

In that when user wants to change the direction the touch screen sensors are modelled to direct the user using direction keys on touch screen .and that values are given to the microcontroller to move accordingly. Fahad Wallam and Muhammad Asif [5].developed Dynamic finger movement Tracking and voice command based smart Wheelchair. They used finger movement to direct the Wheelchair also it is based on Voice recognition .finger movement is used to manually operation of Wheelchair.voice commands is used for Quadriplegics person's. D.K.Pratibha [7] used speech recognition based wheelchair.the wheelchair is navigated using voice commands stored in database.HM2007 is use to recognized the voice. Speech Recognition is use to provide autonomous mobility for patient there are several techniques used for speech recognition. Chandawan Ittichaichareon [8] is used speech recognition using MFCC .the MEL FREQUENCY CEPSTRAL COEFFICIENTS extracted from speech signal to spoken words.it uses training and testing phase to match the signals.Ms. S. D suryawanshi and Mr.J.S.Chithod [2] developed Voice operated Intelligent Wheelchair they use ARM7(LPC 2138) to control Wheel movement as per the voice command and IR sensor is use for obstacle avoidance also MATLAB is use for speech Recognition. Vibha Tiwari [4] have researched on speech processing and had work on speaker recognition using MFCC .It is use for feature Extraction technique.

Manuscript submitted at March 18, 2015.

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B. Proposed Work

To develop a present model of Wheelchair with multifunctioning motorized Wheelchair by using voice commands, Matrix keypad ,speaker identification for security purpose etc.some of the patients can't operate Wheelchair by their hands.so by having voice recognition facility patients can easily navigate the wheelchair by their voice commands. deaf and dumb persons are also able to handled the wheelchair using matrix keypad.For making of this multifunctional Wheelchair Microcontroller is use to provide the control signal the signals are use to drive the DC motor .GSM module is use in emergency needs so pateints can easily contact with others when they wants some help.

C. System architecture

III. SPCIFICATION OF THE SYSTEM

The ARM7 (LPC 2138)Development board is made up of using glassy poxy printed circuit board. LM 7812,7805 and LM117 is use to provide required power i.e 12V ,3.0 to 3.5V,and 5V etc. to the components on PCB. The components are used Relay Driver IC L293D to drive the 2 dc motor. 2 dc motor use to drive the Wheelchair. In our project we have use MATLAB s/w to voice recognition and speaker recognition .the voice input is given though the MIC, the Voice are match in Matlab s/w. GSM(SIM900) is used in emergency needs for calling or sending text to respective person's. SIM 900 delivers GSM/GPRS850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in small form factor and with low power consumption a LCD 16X2 is use to display information operates on 5V having 16 pins.8 pins are use as data pins. RF(CC2550) is use for wireless communication it is low cost 2.4Ghz TX/RX. The prototype of Wheelchair is made up of using woodenply.

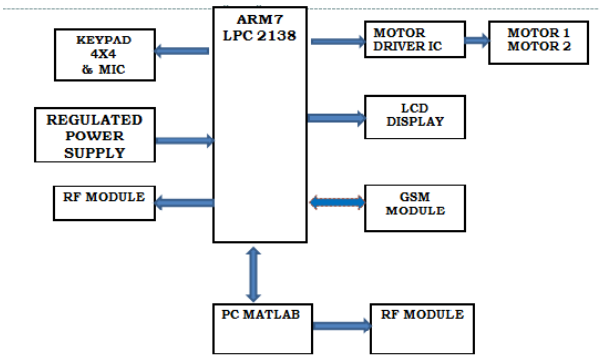

Figure 1: Block Diagram Of The System

IV. DESCRIPTION OF BLOCK DIAGRAM

KEYPAD & MIC:-

It is used for manually operation of wheelchair for deaf and dumb persons means who cannot operate wheelchair by their voice. The keypad consist of forward, reverse, left, right, emergency, reset keys. Forward, reverse, left, right is used to give the direction to the wheelchair. The emergency key is use in emergency needs to send SMS .stop key is use to stop the movement of the wheelchair. Reset key is used to reset the mode of operation.

MIC is used to give the voice input which are recognized in MATLAB software installed in PC

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GSM MODULE:-

GSM module is used to send SMS to others mobile no which are stored in database. It is used in emergency need. When the emergency key is press the SMS will send in particular mobile no through GSM module Particular no assign to the wheelchair also if quadriplegics person can send SMS by their voice by saying help.

REGULATED POWER SUPPLY:-

Device in circuitory needs dc power to operate in above system some device needs 5V to operate in power supply IC 7805 is used to provide regulated 5v dc .also the LPC 2138 need 3.3v to operate. So lm 117 is used to provide required supply to perform.

RF MODULE:-

The RF module is use for serial communication between pc and controller. RF Module provide wireless communication .the voice frames can be transmitted through RF module.

LCD DISPLAY:-

The LCD display is used for indication purpose. All the direction command can be displayed on LCD and all the messages are displayed.

PC (MATLAB):-

First the patient has to sit the wheel chair. Then the patient can give voice commands via a head phone. These commands are processes in the MATLAB s/w and according signals are then sent to the µc on board the wheel chair. We are also Here we are making a speech recognition based wheel chair for patients. The making a motorized miniature model of the wheel chair .The wheel chair is operated by 2 DC motors. The µc operates these DC motors and controls the wheel chair accordingly.

The voice commands are:

-Forward
-Reverse
-Left
-Right

DC MOTOR & MOTOR DRIVER IC:

Wheelchair is operated by 2 DC motors. The µc operates these DC motors and controls the wheel chair accordingly. The output current of the controller is inefficient to drive dc motor so motor driver IC is used to provide required current to the motor.

MICROCONTROLLER:-

All the interfacing device to the microcontroller is controlled by microcontroller .microcontroller provide control signals to all the Interfaced devices. All the voice commands and control signals through keyboard can be accessed through microcontroller LPC 2138 is used as a controller .special used for voice recognition purpose.

CIRCUIT DIAGRAM OF PROJECT:

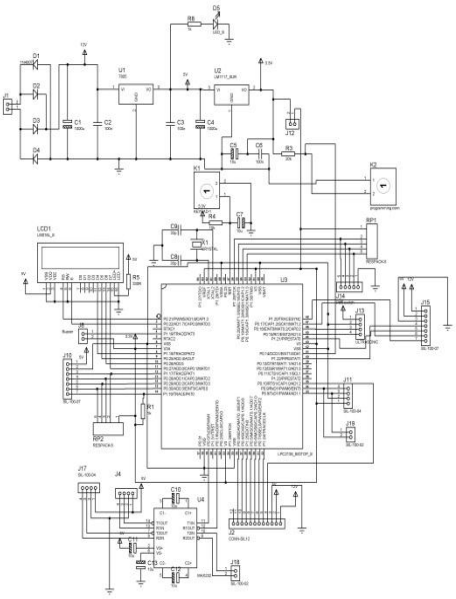

Figure 2: Circuit Diagram Of The System

V. DESCRIPTION OF CIRCUIT DIAGRAM

In above circuit diagram uses for various devices and sensor interfacing requitred in wheelchair control.it is designed as a development board .The lcd which is use to display information is connected to port0 and port1.the commands pin of lcd display is connected to port 0.22 and port 0.22 ,data pins of lcd is connected to port(0.25,0.26,0.27,1.18) the lcd use in our project is 4 bit mode. Max 232 ic is use for serial communication for RF transmitter and Receiver. Which is connected to port (0.0 as txd and 0.19 as rxd).switch K2 is used for programming mode. Using that we can program controller LPC 2138.J2 is use for connection of matrix keyboard. Buzzer is use for emergency indication.12 MHz crystal is use to arrange crystal frequency for LPC 2138.K1 is use to reset the operation of controller. also J15,J11,J19,J10 Is use to interface sensors and device that user wants to interface. The power supply is also mounted on pcb using ic 7805 and LM117.

VI. ADVANTAGES

1) Hospitality System.
2) Faster Control Action.
3) Multifunction system.
4) Accurate System.

VII. APPLICATIONS

1) Hospital's
2) Shop's(TROLLY SYSTEM).
3) Oldage homes

VIII. CONCLUSION

The designed of Wheelchair is the multifunctioning modified version of manual Wheelchair .These wheelchair does not required external assistance to navigate the Wheelchair. This project reduces the physical efforts of physically disabled people. Our project is the powerful sight for the quadriplegic, deaf and dumb for the physically handicapped persons. Such type of product or gadget plays an important role in life of disables. Their social life will tend to develop using this gadget. Such types of device will be helpful in the hospitals where the quadriplegics are surviving. This device will help them to survive and move anywhere. Also dumb people can use this product using matrix keypad to use wheelchair. GSM is used in emergency need.

IX. FUTURE SCOPE

In future studies should aim at making it more advance and automated.by using sensors. we can avoid abstacles i.e IR sensors .air suspensions system for physically disabled and avoidance in accidential damge. GPS system should be used to track the wheelchair in emergency needs. Also we can use heart beat monitoring system..

REFERENCES

[1]Aakash. A . Hongunti 1,Mayuri.Deulkar.2,Varsha .Sable.3 Prof.Dr.P.B.Mane University of Pune, University of Pune, AISSMS' Institute of Information Technology," Voice Operated Wheelchair" International Journal of Advanced Research in Computer Science and Software Engineering. Volume 4, Issue 4, April 2014.

[2]Ms. S. D. Suryawanshi, Mr. J. S. Chitode ,Ms. S. S. Pethakar Electronics Department Bharati Vidyapeeth University India." Voice Operated Intelligent Wheelchair" International Journal of Advanced Research inComputer Science and Software Engineering Volume 3, Issue 5, May 2013.

[3]Ericka Janet Rechy-Ramirez, Huosheng Hu and Klaus McDonald-Maier School of Computer Science & Electronic Engineering, University of Essex, Colchester CO4 3SQ, U.K." Head movements based control of an intelligent wheelchair in an indoor environment"IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND BIOMEMETICS DECEMBER 2012 .

[4]Vibha Tiwari Deptt. of Electronics Engg., Gyan Ganga Institute of Technology and Management, Bhopal, (MP) INDIA "MFCC and its applications in speaker recognition" International Journal on Emerging Technologies 1(1): 19-22(2010)

[5]Fahad Wallam and Muhammad Asif "Dynamic Finger Movement Tracking and Voice Commands Based Smart Wheelchair" International Journal of Computer and Electrical Engineering, Vol. 3, No. 4, August 2011

[6]M.Prathyusha#1, K. S. Roy#2, Mahaboob Ali Shaik *3 Dept. of E.C.E, K. L. University Guntur, India *Vyas Informatics Hyderabad, India "Voice and Touch Screen Based Direction and Speed Control of Wheel Chair for Physically Challenged Using Arduino" International Journal of Engineering Trends and Technology (IJETT) - Volume4Issue4- April 2013

[7]Chadawan Ittichaichareon, Siwat,Suksri and Thaweesak Yingthawornsuk. "Speech Recognition using MFCC" International conference on computer graphics,simulation and modelling (ICGSM'2012): 28-29-(2012)Pattaya (Thailand).

[8]D.K.Pratibha Deptt. of Electronics and Communication Engg., Shri Siddhartha Institute of Technology Tumkur ,Karnataka India "Speech Recognition Powered Wheelchair For Disabled" International conference on Electrical Engg.And Computer Science (ICEECS-2012) May 12th 2012,Trivendum.

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