International Journal of Scientific Research and Management Studies (IJSRMS)
ISSN: 2349-3771 **Volume 3 Issue 1, pg: 49-54**

VOICE CONTROL WHEEL CHAIR

Mohd Arman Khan[1], Kashish Agarwal[1], Mukesh Saini[1],
Ajay Prakash[1], Mansi Vashisht[2]
[1]UG Scholars, [2]Assistant Professor
Department of Electronics & Communication Engineering,
Moradabad Institute of Technology, Moradabad, India

ABSTRACT
Powered wheelchairs with the standard joystick interface are unable to control by many people. A voice controlled wheelchair can provide easy access for physical disabled person who cannot control their movements especially the hands. The powered wheelchair depends on the motor control and drive system which consists of ARM Processor LPC2138 and DC Motor. Once the voice recognition system recognizes the voice commands in comparison to the prestored memory, the respective coded digital signals would be sent to ARM Processor which then controls the wheelchair accordingly

KEYWORDS—*Powered wheelchair, Voice Recognition system, joystick, prestored memory*

I. INTRODUCTION

The goal of this smart wheelchair project is to enhance an ordinary powered wheelchair using sensors to perceive the wheelchair's surroundings, a speech interface to interpret commands. Intelligent wheelchair will play an important role in the future welfare society. The use of intelligent wheelchair encourages the view of the machine as a partner rather than as a tool. The population of people with disabilities has risen markedly during the past century. As the data come from the National Health Interview Survey (NHIS), two distinct trends have contributed to the increasing overall prevalence of disability: a gradual rise, due largely to demographic shifts associated with an aging population, as well as a rapid increase that is due to health impairments and accidents. Many individuals have problems to use a conventional wheelchair. A recent clinical survey indicated that 9%-10% of patients who received power wheelchair training found it extremely difficult or impossible to use it for their activities of daily living, and 40% of patients found the steering and maneuvering tasks difficult or impossible. These people, suffering from motor deficits, disorientation, amnesia, or cognitive deficits, are dependent upon others to push them, so often feel powerless and out of control. Intelligent wheelchair has the potential to provide these people with effective ways to alleviate the impact of their limitations, by compensating for their specific impairments. In particular, robotic wheelchairs may help in maneuvering a wheel chair and planning motion. Recently, research of assistant robots is also emerging field of robotic applications.

II. OVERVIEW OF THE INTELLIGENT WHEELCHAIR

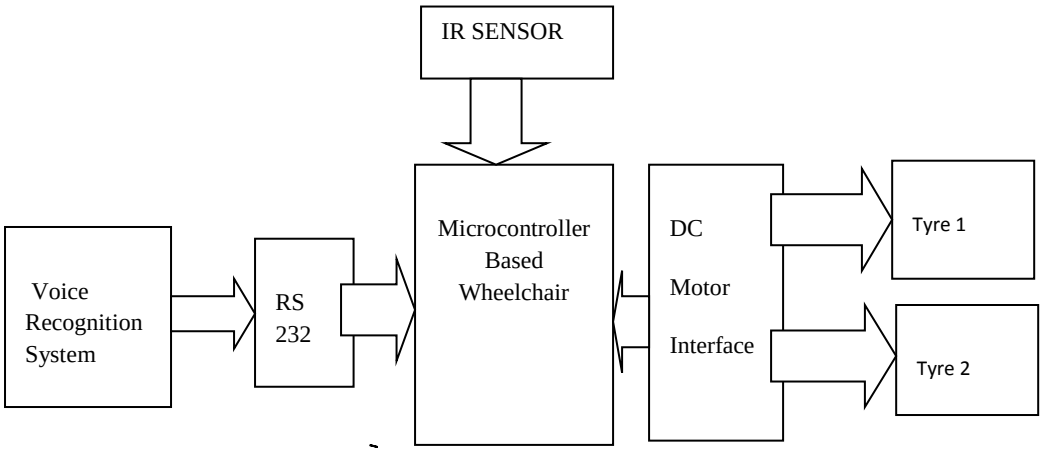


Fig1 Block Diagram of voice operated intelligent wheelchair

In our project, voice recognition system is used as user interface. The block diagram of the intelligent wheelchair with motor drive and control system is shown in figure 1. Here we are making a speech recognition based wheel chair for patients. The patients who cannot walk and have to use a wheel chair can navigate the wheel chair by their voice. Here we are using the voice recognition using pattern recognition in MATLAB s/w.

First the patient has to mount 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 have made 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, stop.

III. SPEECH RECOGNITION USING MATLAB (BASED ON PATTERN RECOGNITION)

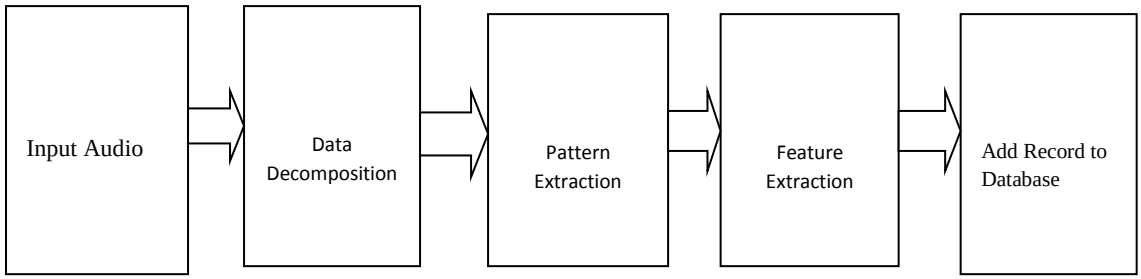


Fig2 Procedure for Speech Feature's Extraction

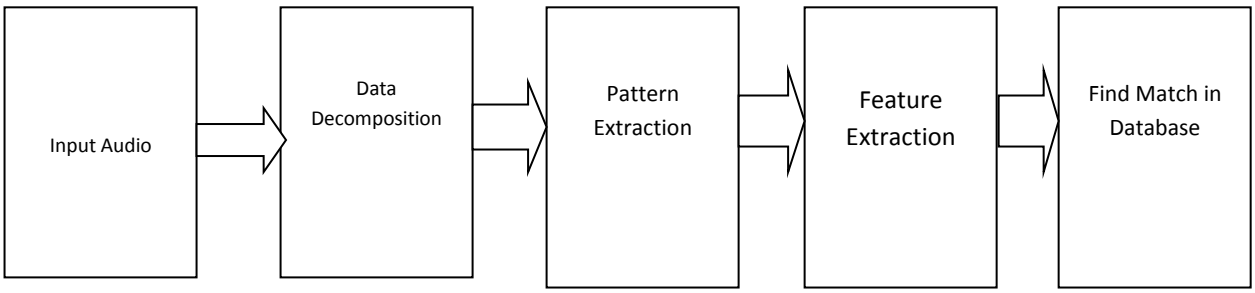


Fig3 Procedure for Speech Recognition

Pattern recognition aims to classify data (patterns) based on either a priori knowledge or on statistical information extracted from the patterns. The patterns to be classified are usually groups of measurements or observations, defining points in an appropriate multidimensional space. This in contrast to pattern matching, where the pattern is rigidly specified. A complete pattern recognition system consists of a method that gathers the observations to be classified or described; a feature extraction mechanism that computes numeric or symbolic information from the observations, and a classification or description scheme that does the actual job of classifying or describing observations, relying on the extracted features. The classification or description scheme is usually based on the availability of a set of patterns that have already been classified or described. This set of patterns is termed the training set and the resulting learning strategy is characterized as supervised learning. Learning can also be unsupervised, in the sense that the system is not given an a priori labelling of patterns, instead it establishes the classes itself based on the statistical regularities of the patterns. The classification or description scheme usually uses statistical approach. Statistical pattern recognition is based on statistical characterizations of patterns, assuming that the patterns are generated by a probabilistic system. A wide range of algorithms can be applied for pattern recognition, from very simple Bayesian classifiers to much more powerful neural networks. An intriguing problem in pattern recognition yet to be solved is the relationship between the problem to be solved (data to be classified) and the performance of various pattern recognition algorithms (classifiers).

IV. WHEELCHAIR OPERATION

When the voice is detected, the wheelchair can be controlled to move in that direction by giving commands to the wheelchair. These commands are transferred to the wheelchair using electrical signals which are used the drive the left or right motor of the wheelchair. There are basically two motors connected to the left and right wheels of the wheelchair. The electrical signals are transferred to these motors using some hardware ports, called the communication ports. Generally, the communication port is the parallel port. There are some basic predefined pins of this parallel port which accept the commands given to the wheelchair in the form of electrical signals. For the purpose of demonstration of wheelchair movement using eye motion, a wheelchair model is designed in this project, which works on batteries. This model of wheelchair is shown in Fig. 4 below

Fig4: Model of Wheelchair

Four wheels are used in the wheelchair for proper balancing. The movement of wheels is controlled by DC motors which are attached to the wheelchair. Two wheels located on left side of the wheelchair are controlled by one motor and similarly the wheels on the right side are controlled by the second motor.

The other circuitry built into the wheelchair includes the transmitter and receiver circuits and the obstacle detection circuit. It involves two IR signal emitters which emit IR signals continuously when some obstacle appears in front of the wheelchair, these IR signals are obstructed, and reflected back. These reflected signals are then detected by the IR sensor present just at the side of the emitters. As the IR signals are detected, a circuit is connected to the buzzer, and the buzzer beeps. At the same time, signal is transmitted back to the voice recognition system so as to stop the wheelchair

V. RESULTS

The working of this wheel chair is depends upon voice command given to this. In this we firstly stored the command in software database which will compare with the command given in future. The similar command is selected to take the action accordingly.

Fig 5 shows how we store the command in database. We can also read the stored command as well compare this with the new one. Fig 6 shows the analog signal of the fresh command given to wheel chair which will compare to stored voice command. Fig 7 shows the comparison waveform of fresh and stored command. The command with which fresh command is matches will selected.

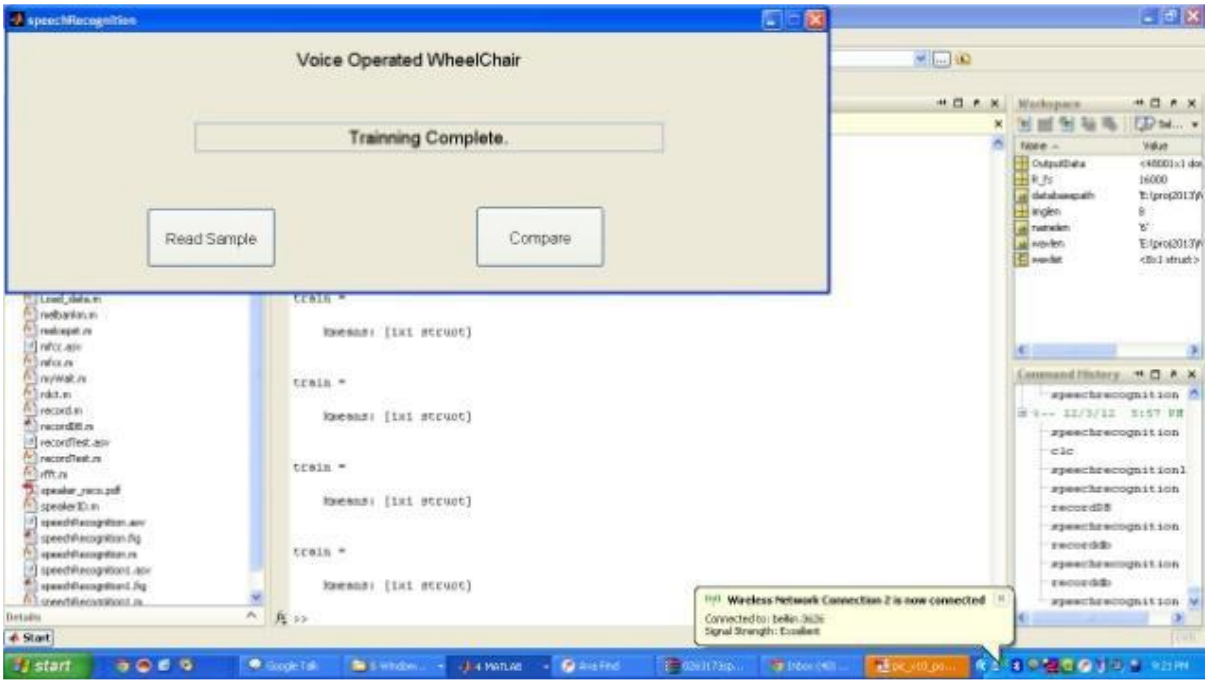


Fig 5: Storage for voice commands

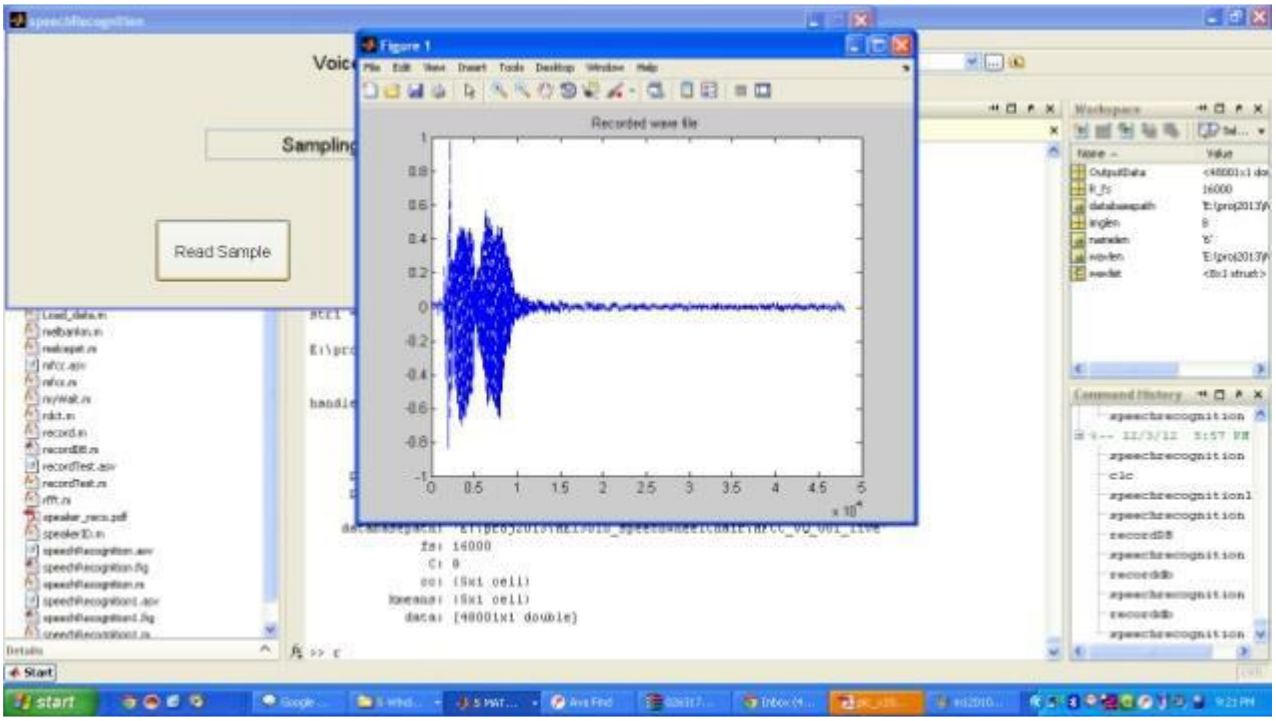
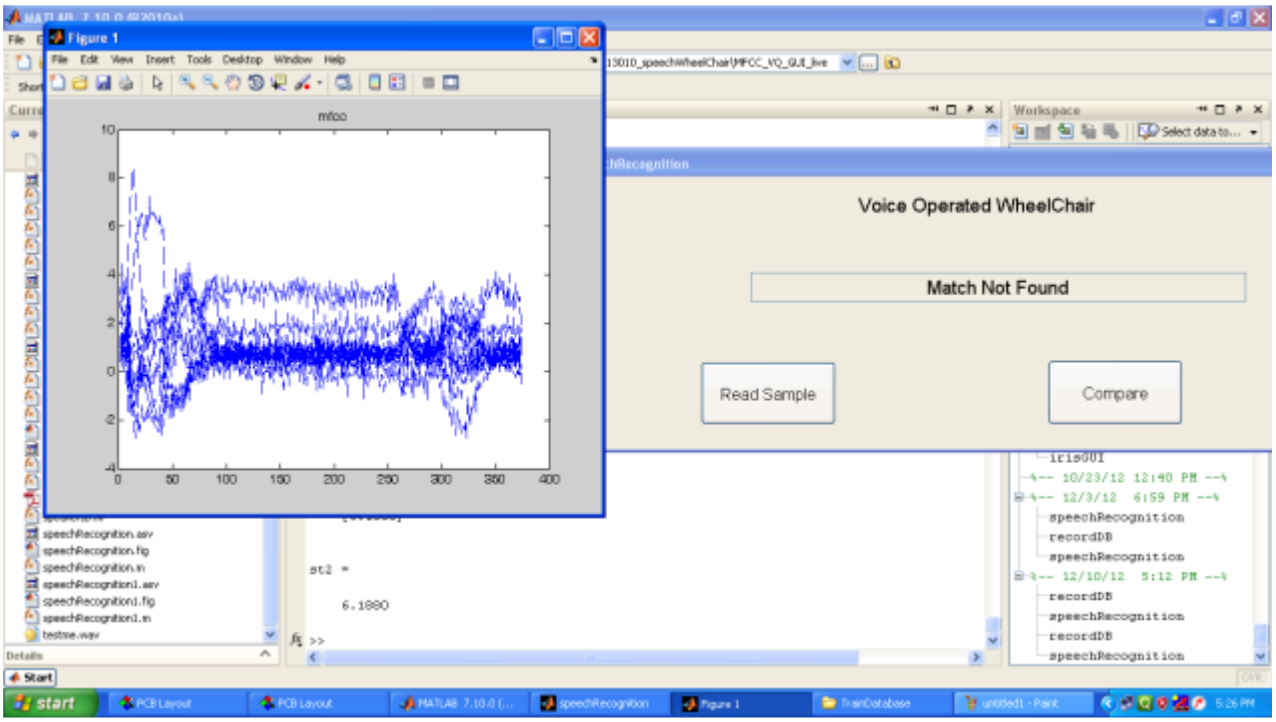


Fig 6: Accepting the fresh command



: **Fig 7**Comparing the fresh command with stored commands

VI. CONCLUSION

Android mobile is used instead of Voice recognition ICs like HM2007 the efficiency to detect voice command and control the wheel chair is significantly increased. This voice operated wheel chair will assist the handicapped persons to make them self dependent for the purpose of movement for which these people are dependent on other most of the times. A person with disabled with legs and arms can use this wheel chair efficiently if he is able to speak.

REFERENCES

[1] S.A. Chhabria and R.V. Dharaskar 'Multimodal Interface for Disabled Persons', international Journal of Computer Science and Communication-January-June 2011,
[2] R.C. Simpson, 'Smart Wheelchairs: A Literature Review', J. Rehabil. Res. Develop., 42, pp. 423-436, 2005.
[3] J.Z. Yi, Y.K. Tan, Z.R. Ang,' Microcontroller Based Voice-Activated Powered Wheelchair Control' ACM 2007 ISBN: 978-1-59593-852-7.
[4] L. Fehr, W. Edwin Langbein, and S.B. Skaar, 'Adequacy of Power Wheelchair Control Interfaces for Persons with Severe Disabilities: A Clinical Survey', J. Rehabil. Res. Develop, **37 (3)**, pp. 353-360, 2000.
[5] Yasunari Obuchi, Multiple-Microphone Robust Speech Recognition Using Decoder-Based Channel Selection, Advanced Research Laboratory, Japan, 2004
[6] Javier Hernando and Climent Nadeu, Speech Recognition In Noisy Car Enviornment Based On OsaLPC Representation And Robust Similarity Measuring Techniques, Signal Theory and comm.. Dept., Spain, 1994
[7] Shahina, B. Yenanarayana and M.R. Kesheory, Throat Microphone signal for speaker recognition
[8] "Voice and Touch Screen Based Direction and Speed Control of Wheel Chair for Physically Challenged Using Arduino" by M.Prathyusha, K. S. Roy, Mahaboob Ali Shaik, " International Journal of Engineering Trends and Technology (IJETT)" , Volume4Issue4, April 2013.
[9] "A Wheelchair Steered through Voice Commands and Assisted by a Reactive Fuzzy-Logic Controller" by Gabriel Pires and Urbano Nunes "Journal of Intelligent and Robotic Systems" 34: 301–314, 2002.
[10] "Smart Wheelchairs: A literature Survey", by Richard Simpson "Journal of Rehabilitation Research & Development", Volume 42, Number 4, Pages 423–436 July/August 2005.
[11] http://www.who.int/mediacentre/news/notes/2013/disability_and_development_20130920/en
[12] http://www.indiability.org/resources/disability-in-india
[13] www.techtriks.wordpress.com
[14] http://www.electroschematics.com/wp-content/uploads/2013/01/PIC16F877A-Datasheet.pdf
[15] http://www.atmel.in/Images/doc2466.pdf
[16] http://www.atmel.in/Images/doc2503.pdf

BIOGRAPHIES

Ajay Prakash, student of EC (Electronics and communication engineering) at M.I.T Moradabad.

Kashish Agarwal student of EC (Electronics and communication engineering) at M.I.T Moradabad.

Mohd Arman Khan, student of EC (Electronics and communication engineering) at M.I.T Moradabad.

Mukesh Saini, student of EC (Electronics and communication engineering) at M.I.T Moradabad.

Mansi Vashisht (B.tech, M.tech pursuing) Assistant professor ECE department.