# "A hand gesture based wheelchair for physically handicapped person with emergency alert system"

**Prof. Chitte p.p.[1] , Miss: Khemnar S.B. [2],Miss: Kanawade A.A.[3] ,  Miss:Wakale S.B.[4]**

*Assistant Dept , of  Electronics engg   PREC , Loni ,india[1]*
*Student Dept ,  of  Electronics  engg   PREC ,Loni, india[2]*
*Student Dept  , of  Electronics  engg PREC ,Loni ,india[3]*
*Student Dept , of Electronics  engg  PREC ,Loni,india[4]*

-------------------------------------------------------------------***--------------------------------------------------------------------

**Abstract -**  *The system consist of development of a wheel chair control. It is useful for physically disabled person with his hand movement with the help of  hand gesture recognition. The system is classified into gesture unit and wheelchair unit. This wheelchair can be control by simple hand gestures. It consist a Accelerometer sensor which is control the wheelchair hand gesture made by the users and clarify the motion consist by user and moves accordingly. When we changed the ways, the sensor registers values are changed & that values are given to lpc2138 controller. Depending on the direction of the Acceleration, ARM7 controller controls the wheelchair ways like LEFT, RIGHT, FORWARD, & BACKWARD. The purpose of this system is to implement wheelchair direction control with hand gesture reorganization.*

***Key Words*:  Gesture, Wheelchair, ARM7, XBee-S1,DC motor ,Flex sensor, Accelerometer sensor.**

## 1. INTRODUCTION

People with physical disabilities every time find it complicated  to navigate through their house without the assistance of someone.  But to navigate through one's own home without contribute of any one all time can be demoralizing for the person as well. It can be handled wirelessly with hand gesture methods [9]

 Gesture control wheelchair is divided into two  parts:

1. Transmitter: the Hand gesture

2. Receiver: the wheel chair

The hand gesture reorganization needs both hands

 Person will be capable to control the chair in limited space, because this project uses the IR sensors which are also helpful in avoiding object. In addition, the SMS will be sent to the family members in the case of emergency by pressing a single switch. In such case ,the chair will move forward, backward, left, right and will alert the family members whose number are pre-saved in distress call module[8] .

The gesture unit consists of LPC2138, Three flex sensors and  One accelerometer sensor mounted on gloves and XBee-S1.  The wheelchair unit consists of LPC2138, L293DNE driver IC, two DC motors and XBee-S1[1].

## 2. LITERATURE SURVEY

 The system comprises of two major units. The first unit is a simple user's of two hand gesture unit. The second unit is the wheelchair unit. The first gesture unit consists of ARM7 controller which monitors the motions of fingers and transmits the corresponding control signal to the wheelchair unit. The wheelchair unit also consists of ARM7 controller for controlling the movement of wheelchair. The second gesture unit consist of ARM7 controller the controller can detect the audio announcement.[2]

 U. Rajkanna  and M.Mathankumar introduced "Hand Gesture Based Mobile Robot Control Using PIC Microcontroller  In this work, gesture of the user controls the movement of the mobile robot. The developed system is classified into gesture unit and mobile robot unit[1].

 Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS presented by Prof. Vishal V. Pande, Nikita S.Ubale Darshana P. Masurkar, Nikita R. Ingole, Pragati P. Mane This paper is to develop a wheel chair control which is useful to the physically disabled person with his hand movement or his hand gesture recognition using Acceleration technology  The aim of this paper is to implement wheel chair direction control with hand gesture reorganization. [2].

 Hand Gesture Recognition Using Accelerometer Sensor for Traffic Light Control System presented by Shirke Swapnali and P.G.Chilveri In this paper, hand gesture recognition is implemented for traffic light control system (TLC).Thresholding Algorithm is used for recognition purpose[6].

 Sign to Letter Translator System using a Hand Glove presented by Hanine El Hayek and Jessica Nacouzi and Abdallah  Kassem, Mustapha Hamad and Sami El-Murr  A sign to letter translator system using a hand glove is

proposed in this paper. The glove can be used by any deaf and/or mute person to communicate with people that do not understand sign language [5].

Wheel Chair Motion Control Based On Hand Gesture Recognition presented by Gowthaman.A1, Ranjith kumar.R1, Varunarajan.MV1, Ganesh Babu.P2   In this paper, the accelerations of a hand in motion in three perpendicular directions are detected by a MEMS accelerometer and transmitted to a PC via Bluetooth wireless protocol[4].

Accelerometer Based Direction Controlled Wheelchair Using Gesture Technology presented by Manisha Devi1, B.Anil Kumar2. This paper presents a model for Gesture controlled user interface (GCUI), and identifies trends in technology, application and usability. We present an integrated approach to real time detection, gesture based data glove technique which controls the wheelchair using hand movements [3].

Accelerometer Based Gesture Controlled wheel chair with GPS, GSM navigation presented by Nakul k Patel1, Saurabh b Patel1, Mansuri mo. Ammar 1 Keeping in mind, the problems faced by handicapped people and their co-ordination with their wheel chair, we are introducing a futuristic and reliable system named "Accelerometer Based Gesture Controlled wheel chair with GPS, GSM navigation" which can interface gesture with micro controller [7].

Hand Gesture Recognition using Microcontroller & Flex Sensor presented by Prapat Parab1, Sanika Kinalekar2, Rohit Chavan3, Deep Sharan4, Shubhadha Deshpande5. This paper presents how to lower the communication barrier between the mute communities with the general public. It is based on the need of developing an electronic device that can translate sign language into commands in order to make the communication. A Wireless data gloves is used which is normal cloth driving gloves fitted with flex sensors along the length of each finger and the thumb [8].

Speech and flex sensor controlled wheelchair for physically disabled people presented by 1 Shruti Warad,2 Vijayalaxmi Hiremath, 3Preeti Dhandargi, 4 Vishwanath Bharath, 5P.B.Bhagavati. This paper describes an intelligent motorized wheelchair for physically handicap person using dependent user speech controlled and flexes sensor technology. In this project, to drive the wheelchair we are using speech commands "forward, backward, maximum, medium, minimum and stop". The direction of the wheelchair is controlled by flex sensor application [9].

Hand movements based control of an intelligent wheelchair Using Accelerometer, obstacle avoidance Using Ultrasonic and IR sensors presented by D.Anjaneyulu*, Mr. B.V.N.R. Siva Kumar. In this project we used Accelerometer, ultrasonic and infrared sensor systems has been integrated in this wheelchair. The MEMS sensor is used for senses the angle of the hand, i.e. according to the tilt of hand it gives voltages to microcontroller [10].

Wheelchair for Physically Disabled People with Voice, Ultrasonic and Infrared Sensor Control presented by Manuel

Mazo, Francisco J. Rodriguez, Josi. This paper describes a wheelchair for physically disabled people developed within the Project. A dependent-user recognition voice system and ultrasonic and infrared sensor systems has been integrated in this wheelchair [11].

Wheel-Chair Control Using Accelerometer Based Gesture Technology presented by Sandeep, Supriya. This work presents a novel approach to gesture recognition system using accelerometer MEMS sensor in addition with ultrasonic obstacle detection. This methods based on joystick and camera based vision where camera is always tracking the movement of different body parts like face, eye etc [12].

Indian Sign Languages using Flex Sensor Glove presented by Solanki Krunal Mr.  In this paper, I made Indian Sign Language's alphabets using one hand. For making this, Flex sensor glove is used. Using this alphabet, I made word forming for example, "BOY", "HELLO". For making this, each sign of alphabets, the output shown in LCD [13].

Stem Hand Gesture Recognition and Voice Conversion System for Differentially Able Dumb People presented by Shoaib Ahmed .V . This project aims to lower this barrier in communication. It is based on the need of developing an electronic device that can translate sign language into speech in order to make the communication take place between the mute communities with the general public possible [14].

Hand Gesture Recognition for Dumb People using Indian Sign Language presented by Prakash B Gaikwad, Dr. V. K. Bairagi This system will help him to express their thoughts as a more convenient way. Sign language as a kind of gestures which helps the dumb people to make communication like as normal people. In this research, flex sensor and accelerometer sensors based hand glove is designed to recognize the Indian sign language [15].

Accelerometer Based Hand Gesture Controlled Wheelchair presented by Diksha Goyal and Dr. S.P.S saini. In this system, presents a gesture based wheelchair which controls the wheelchair using hand movements. The system is divided into two main units: MEMS Sensor and wheelchair control. The MEMS sensor, which is connected to hand, is an 3-axis accelerometer with digital output (I2C) that provides hand gesture detection, converts it into the 6- bit digital values and gives it to the PIC controller.[16]

Intelligent gesture controlled wireless wheelchair for the physically handicapped presented by 1Shreedeep Gangopadhyay, 2Somsubhra Mukherjee & 3Soumya Chatterjee In this paper we discuss the development of a novel architecture of an intelligent wheelchair working on wireless hand gesture control and not by the usual method of keypad for the physically handicapped people [17].

Finger Gesture and Pattern Recognition Based Device Security System presented by Shivam Khare. In this system, a hand gesture recognition based system to recognize real time gestures in natural environment and compare patterns

with image database for matching of image pairs to trigger unlocking of mobile devices[18].

Hand Gesture Recognition Using Convexity Hull Defects to Control an Industrial Robot presented by Srinivas Ganapathyraju, Ph.D .This paper presents a method for hand gesture recognition to control a 6 axis industrial robot. The image is acquired by means of a web cam system, and undergoes several processing stages before a meaningful recognition can be achieved [19].

Utrasonic and infrared sensor systems has been integrated in this wheelchair presented by Manuel Mazo , Francisco J.Rodriguez Josi~L.L,~Zaro, How hand gestures are recognized using a data glove presented by Mario Ganzeboom This paper presents research on the topic of glove based gesture recognition. Human Computer Interaction keeps moving toward interfaces which are more natural and intuitive to use, in comparison to traditional keyboard and mouse[20].
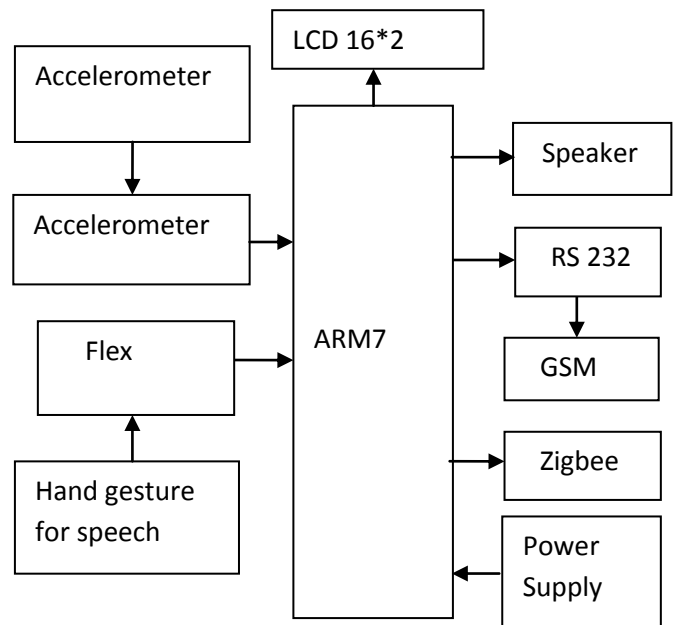


**Fig1:Block diagrm of gesture model 1**

## 3. PROBLEM  DEFINATION

In earlier systems wheelchair is use  for handicap person and this wheelchair had limited range. Due to this we were unable to handle the wheelchair from long distance. Wheelchair capable of both manual and autonomous operation .Manual operation relies on a joystick. Replacing joystick with hand gesture we have improve range of system. Generally for controlling hand gesture on the board, always there is need of human being. With the help of accelerometer sensor system to identify the movement of wheelchair and flex sensor system detect the audio announcement.

## 4. SYSTEM  DESCRIPTION

The system comprises of two main parts: Transmitter part and receiver part. It consist of various block the main block of this project is arm-7 (lpc2138) this block is heart of this system though which controlling and monitoring of system is carried out. Various different blocks are connected to ARM-7 which is as follows:- GSM, power supply , Accelerometer and flex sensor IR sensor, LCD  display In transmitter part we are two hands gesture is recognized by the sensor, digital output is transmitted to the controller and then transmitted to receiver side by the zigbee transmitter. Fig. 1shows the block diagram of the transmitter unit. The same data is received at receiver side by the zigbee   receiver. DC Motors (L293d) which are interfaced to the controller by the motor driver controls the direction of the wheelchair. Fig. 2 shows the block diagram of the receiver unit. In glove technique sensors are placed in gloves or in different parts of arm to detect the gesture. In this work, three  flex sensors are used to detect the audio announcement which is placed on the top side of the gloves.
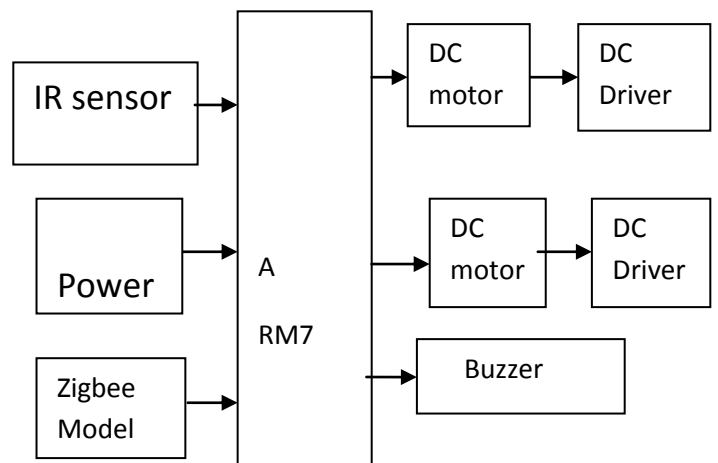


**Fig 2:Block diagram of wheelchair model 2**

Each sensor is interfaced in ADC module of the ARM 7 (LPC2138) controller and one accelerometer sensor has specific values which are read as analog inputs by the ARM7(LPC2138). The data obtained from the accelerometer for the various orientations of the hand gave us the readings to decide the threshold value for each x, y and z coordinate reading: The accelerometer which convert the hand position into 3-Dimensional Output. The values obtained from the accelerometer are analog values which should be further converted into digital values so they can be used by the ARM7 controller The accelerometer sensor senses the accelerating force and thus gives a particular voltage for the x, y and z coordinate orientation. which is placed on the top side of the gloves. GSM is used for SMS alert at the time to

emergencey to the relative. By sending SMS to there relative at the time of emergency to help the person .when the IR signals can travel between transmitter & receiver then detect the present object .
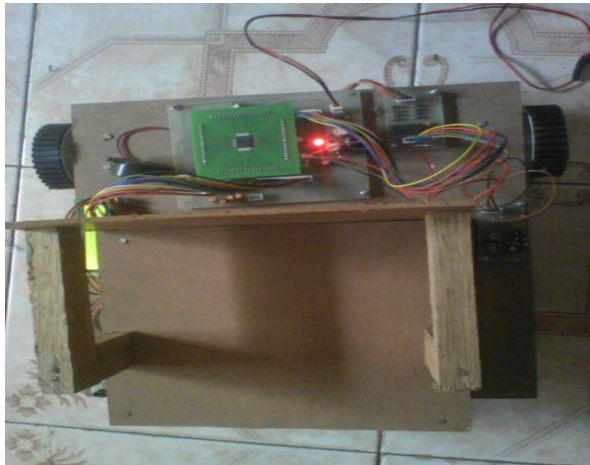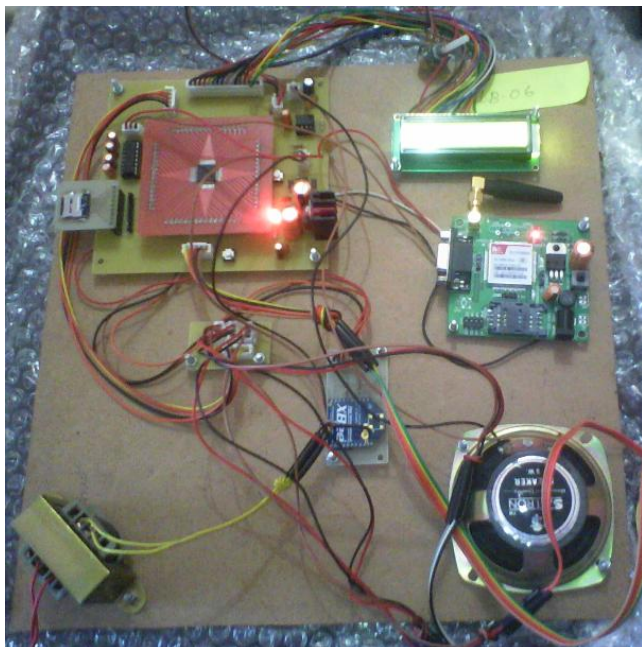
## 5.RESULT



**Fig3 : Wheelchair model 1**



**Fig4: Gesture model**

## 6. ACKNOWLENGMENT

Great thanks to God finally I finish my project on A hand gesture based wheelchair for physically handicapped person with emergency alert system . Special thanks to my friends

that share their idea and advice in completing my project. Their support and encouragement in my project have helped me in various aspects. Without their help, this project would very difficult to complete and it will take a long time to finish.

Finally, thank to my dear friend that support me in various field such as fund, idea and moral in completing the project.

I hope that this project able to be a step for an gesture based wheelchair for handicapped person in the future because nowadays a larger scale for handicapped people designed for difference purpose.

## 7. CONCLUSION

In proposed work, we can successfully developed and implemented gesture based wheelchair control in real time application like handicapped person. The system will provide better performance in above mentioned real time application.

## 8. FUTURE SCOPE

1. In future the proposed system will be designed to identify more number of gestures and command.

2. Range of communication will also be increased to 100m With the powerful wireless devices.

3. It is used in battery source.

## 9.REFERENCES

1. " Hand Gesture Based Mobile Robot Control Using PIC microcontroller" U. Rajkanna Assistant Professor, Dept. of EIE Dr. Mahalingam College of Engineering and Technology, Pollachi, India .

2. "Hand Gesture Based Wheelchair Movement Control for Disabled Person Using MEMS." Prof. Vishal V. Pande, Nikita S.Ubale, Darshana P. Masurkar, Nikita R. Ingole, Pragati P. Mane"

3. " Accelerometer Based Direction Controlled Wheelchair Using Gesture Technology".Manisha Devi1, B.Anil Kumar2 M.Tech Scholar,Lingaya"University,Faridabad,India1, Assistant Professor, Lingaya"s Gvks Institute of Mgt and Technology,Faridabad,India2

4. "Wheel Chair Motion Control Based On Hand Gesture Recognition"Gowthaman.A1,Ranjith kumar.R1, Varunarajan .MV1 ,Ganesh Babu .P 2 U.G. Student, Department of Biomedical Engineering , Adhiyamaan College of Engineering, Hosur, India1

5. "Sign to Letter tem using a Hand Glove" Hanine El Hayek and Jessica Nacouzi Department of Electrical, Computer and Communication

Engineering   Notre   Dame   University-Louaize, P.O.Box: 72 Zouk Mosbeh, Zouk Mikayel, Lebanon

6. "Hand Gesture Recognition Using  Accelerometer Sensor for Traffic Light Control System". Shirke Swapnali Student of ENTC  Dept. SKNCOE,PUNE Pune,  India

7. "Accelerometer Based Gesture Controlled wheel chair with GPS, GSM navigation" Nakul k Patel1, Saurabh b Patel1, Mansuri mo. Ammar 1 Student, Dept. of ECE, Government Engineering College, Bharuch, Gujarat, India.

8. "Intelligent gesture controlled wireless wheelchair for the physically handicapped" 1Shreedeep Gangopadhyay, 2Somsubhra Mukherjee & 3Soumya Chatterjee Department of Electronics & Communication, Techno India Salt Lake, Kolkata, India

9. "Hand Gesture Recognition using Microcontroller & Flex Sensor" . Prapat Parab1, Sanika Kinalekar2, Rohit Chavan3, Deep Sharan4, Shubhadha Deshpande5 public. PVPP College of Engineering, Sion

10. ".Speech and flex sensor controlled wheelchair for physically disabled people 1 Shruti Warad, 2 Vijayalaxmi Hiremath, 3 Preeti Dhandargi, 4 Vishwanath Bharath, 5P.B.Bhagavati.

11. "Hand movements based control of an intelligent wheelchair Using Accelerometer", obstacle avoidance Using Ultrasonic and IR sensors 1D.Anjaneyulu*, 2 Mr. B.V.N.R. Siva Kumar

12. "Wheelchair for Physically Disabled People with Voice, Ultrasonic and infrared sensor control" Manuel Mazo, Francisco J.  Rodriguez, Josi.

13. "Wheel-Chair Control Using Accelerometer Based Gesture Technology ".1Sandeep, 2Supriya.

14. "Indian Sign Languages using Flex Sensor Glove" Solanki Krunal M.

15. "Hand Gesture Recognition for Dumb People using India Sign Language" Prakash B Gaikwad, Dr. V. K. Bairagi

16. "Accelerometer Based Hand Gesture Controlled Wheelchair". Diksha Goyal and Dr. S.P.S

17. "Intellgent gesture controllrd wireless wheelchair for the physically handicapped ".

18. "Finger Gesture and Pattern Recognition Based Device Security System" Shivam Khare.

19. "Hand Gesture Recognition Using Convexity Hull Defects to Control an Industrial Robot." Srinivas Ganapathyraju, Ph.D

20. "How hand gestures are recognized using a data glove" Mario Ganzeboom

21.  www.googlescholars.com

22. www.electronicsforu.com

23.  www.wikipedia.com