Automatic Wheelchair Control Using GSM & Microcontroller

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ABSTRACT

An automated system is developed to control the rotation of the wheel chair based on touch screen and head movement by the physically challenged person. Independent movement can be done by them with the help of an accelerometer device which is fitted on person's head and a touch screen is placed with the wheelchair which can be operated by the person . Based on the touch and head movements, the accelerometer and the relay will drive the motor fitted with the wheel chair. Here the main part is GSM which is used for controlling operation irreplaceable. The wheel chair are often driven in any of the four directions. The machine-controlled wheelchair is based on simple electronic control system and the mechanical arrangement that is controlled by a Programmable Interface Controller. This automatic wheel chair additionally helps people who have various other disabilities by simply using the accelerometer and touch screen to manage the wheel chair movement. Other than this we have implemented the subsequent applications in our wheelchair: GSM communication, Heart Rate Monitor, UV Sensor.

Keyword: - Wheel chair, ATMEGA Microcontroller, Accelerometer Device, Touch Screen, Sensor, and GSM.

I.INTRODUCTION

There are different reasons for which people need an artificial means of locomotion such as a wheelchair. The number of people, who need to move around with the help of some artificial means, because of an illness or accident, is also continuously increasing. Moreover implementing a controlling system in it enables them to move without the help of another person is very helpful. This means have to be increasingly sophisticated, taking advantage of technology evolution, in order to increase the quality of life for these people and facilitate their integration into their working world. In this way a contribution may be made for facilitating movement and to make this increasingly simple and vigorous, so that it becomes similar to that of people who do not sufferany deficiencies. However, there are still important advances that can be done in this field. Here we used Touch Screen and Accelerometer Technology .We engage the above two technologies in a wheel chair which can help physically challenged people to control the wheelchair locomotion in an easy manner[6].

II. LITERATURE REVIEW ON EXISTING TECHNOLOGIES

(a) alex Dev, Horizon C Chacko (2011) used EOG to control the wheelchair locomotion. A pair of electrodes is placed horizontally to left and right Eye. If the eye is moved from the center position towards one electrode, a potential change occurs between the electrodes. Due to the changes in the potential the wheelchair can be controlled.

(b) Sangmeshwar S. Kendre (2010) used Voice control system to control the locomotion of the wheelchair. They store the default commands in the ATMEGA IC (micro controller) by the usage this commands the wheelchair can move. Change in the words restricts the wheelchair movement.

(c) Chun Sing Louis Tsui, Pei Jia (2008) used EMG control for wheelchair locomotion. They used eyebrow muscle activity to obtain required signal. By using the signal the wheelchair movement has been controlled.

(d) S.Tameemsultana and N. Kali Saranya (2011) used head and finger movement for wheelchair locomotion. In finger movement they use flex sensor, placed on the finger. It is an analog resistor usually in the form of strip long vary resistance. Due to the bending of finger the resistance varies which controls the locomotion of the wheelchair. Bending the sensor at one point more than 90 may permanently damage the sensor which is a main drawback.

The system already existing for the physically challenged person controlled by other different technologies has some defects:

1) In Eye ball sensor they use infra red sensor tocontrol the wheelchair where continuous fall of IR radiation in the eye causes irritation to the patient (Alex Dev, Horizon C Chacko and Roshan Varghese, April, 2012, ISBN.)
2) In voice control the person must use the exact commands only to control the movement. Change in the words restricts the wheelchair movement (Manuel Mazo, 1995) .

All the electronic system and also the philosophy for functioning has been sufficiently refined to attain the subsequent performances:

- To ensure easy, comfortable driving.
- To reply to the speed requirements for a system of this kind (maximum speeds of up to three m/s).
- To be simply adaptable to any kind of commercial wheelchair chassis.
- To ease learning to handle the chair and getting most potency.
- To ensure much constant speeds, to an oversized extent independently of the characteristics of the surface over that the wheel chair is moving (greater or lesser)[6].

III. OVERVIEW ON PROJECT

In this project, we have made use of touch screen and accelerometer technology to control the locomotion of wheelchair. Both these modules are controlled by a ATMEGA IC which also controls the Heart rate monitor, UV sensor, GSM which are integrated together to enable to user for the navigation of wheelchair. Using the touch screen and accelerometer we able to control the movement of the wheelchair. The ATMEGA 16 is interfaced with motor unit which is fitted with the wheel chair after getting control signal from the ATMEGA 16 is motor moves the wheel chair correspondingly[6].

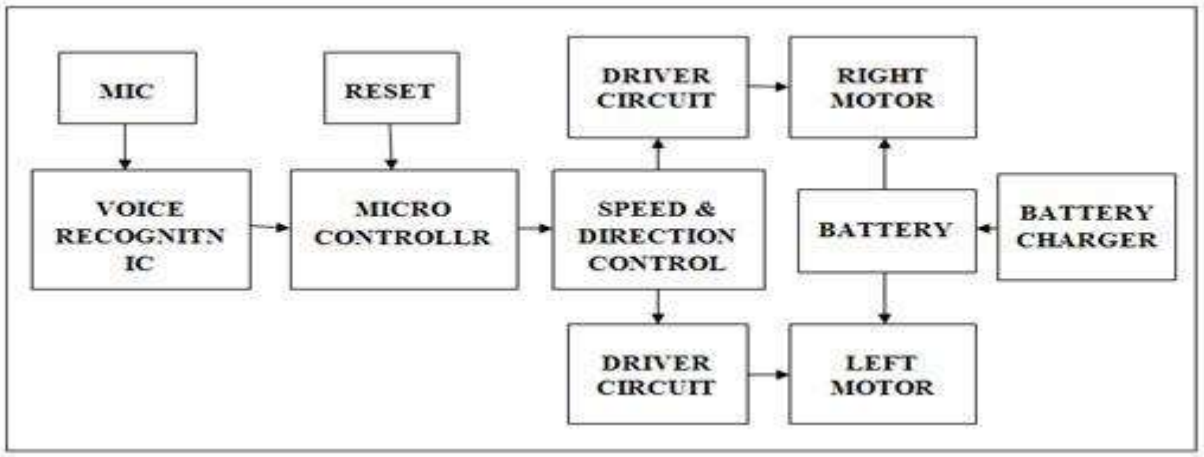

Fig 1. Generalised Reference Model

3.1 Voice Recognition Module:

B. The speech recognition system is acompletely assembled and easy to useprogrammable speech recognition circuit.Programmable, in the sense that you train the words (or vocal utterances) you want the circuit to recognize. This board allows you to experiment with many facets of speech recognition technology. It has 8 bitdata out which can be interfaced with anymicrocontroller for further development. Some of interfacing applications whichcan bemade are controlling home appliances, robotics movements, Speech Assisted technologies, Speech to text translation, and many more.

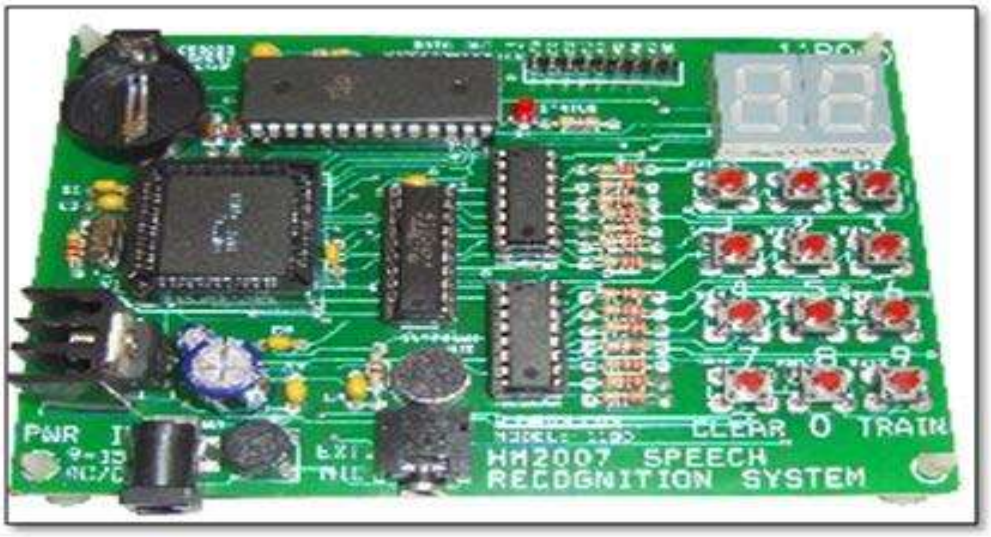

Fig 2.Voice Recognition model

3.2 Microcontroller Section

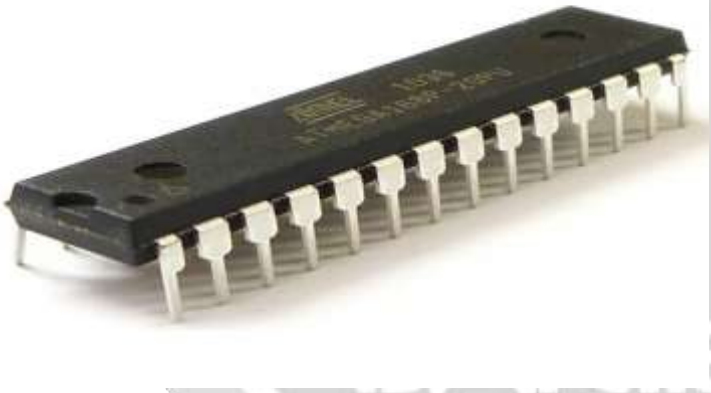

Fig 3.ATMEGA-168 Model

Features

- High performance, low power AVR 8-bit microcontroller
- Advanced RISC architecture
- 131 powerful instructions – most single clock cycle execution 8 general purpose working registers
- Fully static operation
- Up to 16MIPS throughput at 16MHz
- On-chip 2-cycle multiplier
- Non-volatile program and data memories
- 4/8/16Kbytes of in-system self-programmable flash (ATmega48/88/168)
- Endurance: 75,000 write/erase cycles
- Optional boot code section with independent lock bits
- In-system programming by on-chip boot program
- True read-while-write operation
- 256/512/512 Bytes EEPROM (ATmega48/88/168)
- Endurance: 100,000 write/erase cycles

- 512/1K/1Kbyte internal SRAM (ATmega48/88/168)
- Programming lock for software security
- Peripheral features
- Two 8-bit Timer/Counters with separate prescaler and compare mode
- One 16-bit Timer/Counter with separate prescaler, compare mode, and capture mode

IV. RESULT

Fig 4. Final Project

By Using GSM SIM 300 we are building prototype which is complete model of wheelchair control which is operated through mobile communication over frequency of 900 MHZ .ATMEGA-16 microcontroller is used for controlling operation of motor and peripheral which is drive through L293 driver IC. This is best technique over voice controlled and Tounge Drive system available for system.

V. CONCLUSION

With the development of the project it can be successfully implemented on a larger scale for the handicapped people. The low cost of the assembly makes it really a bonus for the general public. The wireless system will be a boost to the confidence and willpower of physically challenged people as it will help them to be self reliable. As a part of further development the project can be developed with addition voice recognition features through on board processing and power supply. There can also be the application of intelligent home navigation for handicapped people to go through the entire house and get help from technological interface for the navigation. The object avoiding and careful navigation principle can be improved with algorithm based image processing technology.

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BIOGRAPHIES

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Is Student of Final Year Electronics & Telecommunication Engineering of PRMCEAM Working on Wheelcahir control using GSM & Microcontroller Project project under guidance of Prof.D.V.Mankar .my area of interest in this project is microcontroller and peripheral programming.