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Wheelchair Using Automatic Gesture Control

Aparna Ramteke, Ashwini Maski, Vaibhavi Mutkure, Swapnil Yende, Prof. P. A. Shewane
Electrical Department, RTMNU/DBACER, Nagpur, Maharashtra, India

ABSTRACT

This project developed a wheelchair control which is useful to the physically disabled person with his hand movement or his hand gesture recognition using acceleration technology. Tremendous leaps have been made in the field of wheelchair technology. However, even these significant advances haven't been able to help quadriplegics navigate wheelchair unassisted. It is wheelchair which can be controlled by simple hand gesture. It employs a sensor which control the wheelchair hand gesture made by the user and interrupt the motion intended by user and moves accordingly. In acceleration we have acceleration sensor. When we change the direction, the sensor register values are given to microcontroller. Depending on the direction of the acceleration, microcontroller controls the wheelchair like LEFT, RIGHT, FRONT and BACK. The aim of the paper is to implement wheelchair direction control with hand gesture reorganization.

Keywords: Micro-Electromechanical Systems (MEMS), Wheelchair.

I. INTRODUCTION

The aim of this project is to use wheelchair automatically for moving forward, backward, Left & Right. The overall framework of this project is to restore automatic to severely Disabled people by helping them use independently a power wheelchair.
A wheelchair is an electric wheelchair fitted with acceleration sensors, obstacle sensor and computer to help less able drivers achieve some independent mobility. By just tilting acceleration sensor wheelchair can be moved in four directions. The obstacle sensor can help the rider control the by and avoiding objects until he or she is able to handle the job.

The amount of work that the rider chooses to do and how much control is taken by the chair is decided by the rider and his or her care. Obstacle in the way can also determined by wheelchair and wheelchair will stop automatically. The wheelchair can also integrate with HAND movements and computers; the pilot can use the same control to drives the wheelchair and operate another assistive device, so handicap person who cannot make use of his hands can drive chair by HAND movement.

Taking advantages of technological evolution, in order to increase the quality of life for handicap people and facilitate their integration into the working world. In order to guide a wheelchair various situation can be distinguished. If the user is capable of controlling his HANDs, the ideal solution is the use of a sensor.

Our project handicap wheelchair basically works on the principle of acceleration sensors whose output is analog varies according to acceleration applied to it, by applying simple formula we calculate the amount of tilt & output of tilt will decide to move in which direction.

II. WORKING

Our project handicap wheelchair basically works on the principle of acceleration, one acceleration sensor,

provides to axes, acceleration sensor whose output is analog, varies according to acceleration applied to it, by applying simple formula we calculate the amount of tilt and output of tilt will decide to move in which direction Sensor gives X axis and y axis output independently which is hand to ADC and then microcontroller and depending on pulse width it decide to move or not. On chair obstacle sensors will be installed. Total 4 sensors will be installed for detection of wall/obstacle in the forward, backward, left and right direction.

Movement of hand, the motor moves in any of the 4 direction's (i.e. forward, backward, left, right) when person tilt his hand in forward direction above 20 degree angle chair will move in forward direction. If person tilt his hand in. Backward direction above 20 degree angle chair will move in backward direction. If person tilt his hand in left direction above 20 degree angle chair will move in left direction.

If person tilt his hand in right direction above 20 degree angle chair will move in right direction. If person tilt his hand at 45 degree forward priority will be given to forward direction.

Depending on the width of pulse width modulation, microcontroller will generate a count value. So, depending on the value of the count it will give the proper signal to the motor to move in corresponding direction.

WORKING OF WHEELS

1. We obtained four combination from acceleration sensor which we used to drive a motor in four direction.
2. From acceleration sensor we found analogue output which got converted into digital at the output of 12 bit ADC which is followed by microcontroller.
3. The program burned into Ic is running successfully to accept input from all ports and provide various combination at output port.

Table 1

Direction	Motor1	Motor2
Forward	Forward	Forward
Backward	Backward	Backward
Left	Backward	Forward
Right	Forward	Backward

III. CIRCUIT DIAGRAM

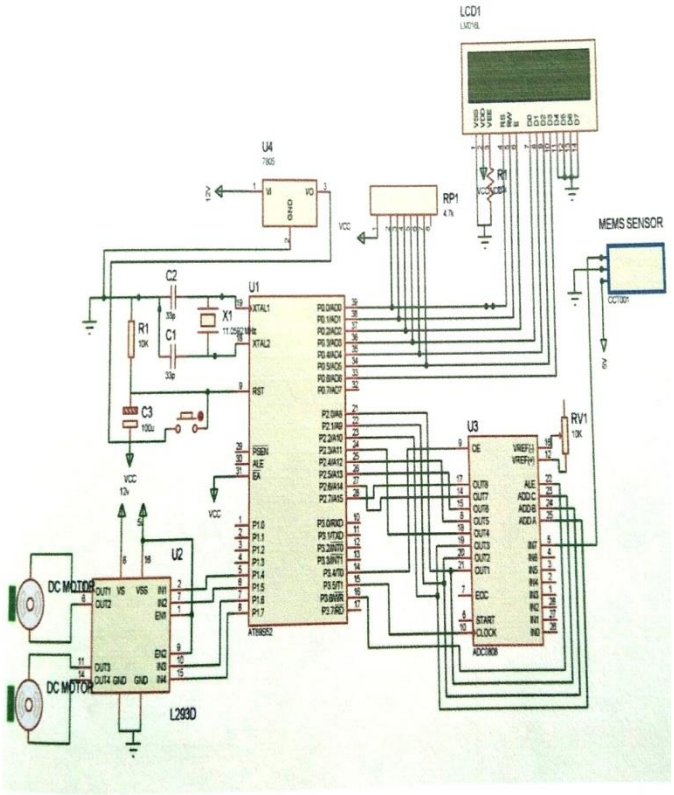

Figure 1

CIRCUIT DIAGRAM OF RF MODULE

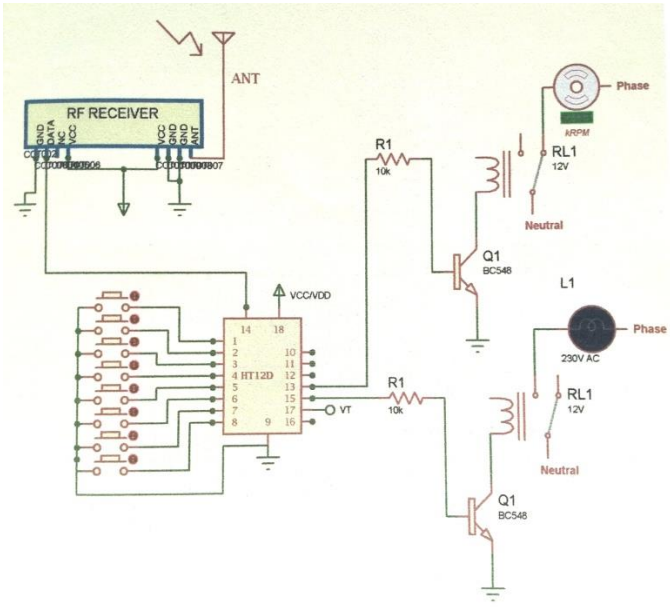

Figure 2

IV. BLOCK DIAGRAM

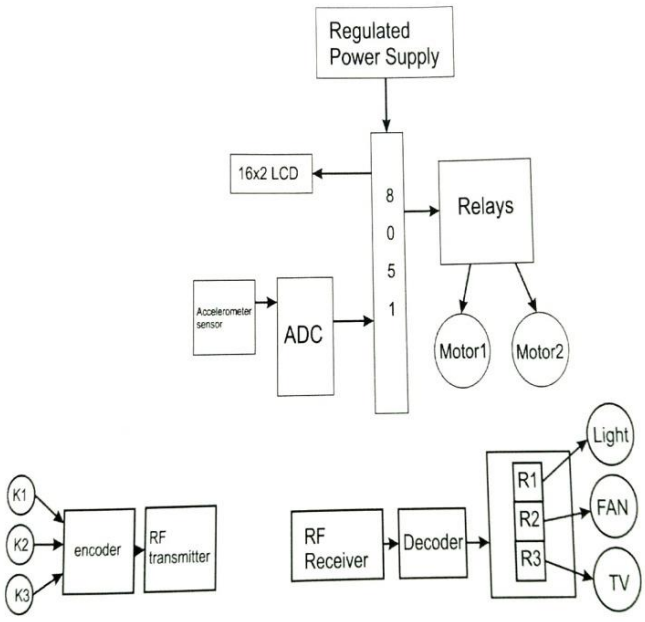

Figure 3

V. ACCELEROMETER

An Accelerometer Is a device that measures proper acceleration. Measure by an accelerometer is not necessarily the coordinate acceleration(Rate of change of velocity). Accelerometer multiple application in industry and science. Accelerometers are used in tablet, computers and digital cameras so that images on screen are always displayed upright.

Single and multi access model of accelerometer are available to detect magnitude and direction of the proper acceleration(G-Force), as a vector quantity, and can be used to sense orientation(because direction of weight changes), coordinate acceleration(so long as it produce G-Force or a change in force), vibration, shock and falling in a resistive medium(a case were the proper acceleration changes since it starts at zero, then increases). Micro machined accelerometer are increasingly present in portable electronics devices and video game controllers, to detect the position of device or provide for game input.

Pairs of accelerometers extended over a region of space can be used to detect differences(gradients) in the proper acceleration of frames of references associated with those points. These devices are called gravity gradiometers, as they measures gradients in the gravitational field. Such pairs of accelerometers in theory may also be able to detect gravitational waves.

VI. DC MOTOR

A variety of electric motors provide power to robots making them move with various programmed motion. The direct current(DC) motor is one of the first machine devised to convert electric power into mechanical power. Permanent magnet(PM) direct current converts electrical energy into mechanical energy through the interaction of two magnetic fields. One field is produced by a permanent magnet assembly. The other field is produced by an electric current flowing in the motor windings. These two fields result in a torque which tends to rotate the rotor. As the rotor turns, the current in the windings is commutated to produce a continuous torque output permanent magnet(PM) motors are probably the most

commonly used DC motors, but there are also some other type of DC motors(types which used coils to make the permanent magnetic field also). DC motors operate from direct current power source moment of the magnetic field is achieved by switching current between coils within the motor. This action is called "Commutation".

VII. MICROCONTROLLER

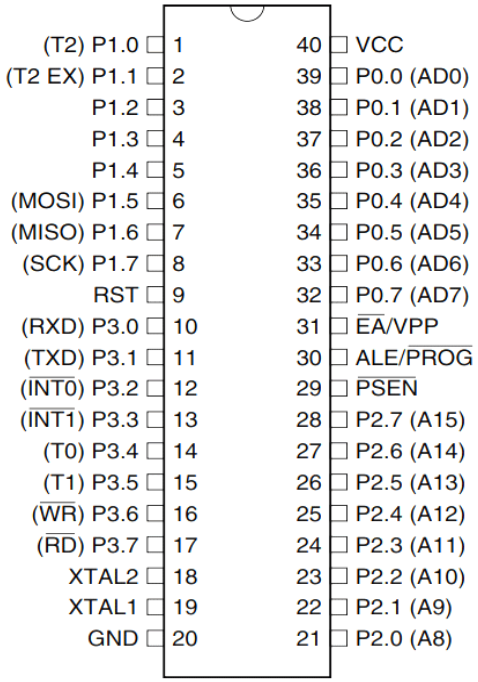

Figure 4

The microcontroller is the heart of this project. The microcontroller is the 40 pin IC which can be programmed. The microcontroller which we are using in this project is AT 89S52.

The AT89S52 is designed with static logic for operation down to zero frequency and support to software selectable power saving modes. The Idle mode stop the CPU while allowing the RAM, timer/counter, port and interrupt system to continue functioning. The power-down mode save the save the RAM contents but freezes the oscillator disabling all other chip function until the next hardware reset.

VIII. APPLICATION

- Hospitals
- Health care centers
- Old age home
- Communication
- Automatic gaming toys
- Control of mechanical systems
- Sport

IX. ADVANTAGES

- Increase mobility, for disable people who can not use their arms to power a manual wheel chair.
- Increase maneuverability, power wheelchair use caster that swivel a full 180 degree to provide more maneuverability, especially in small areas, according to the electric wheelchair centre.
- Increase physical support, a power wheelchair can have the option to allow for ore physical support.
- Increase disabled people ability to live independently to enjoy the same choice, control and freedom as any other citizen at home, at work and as member of the community.
- Improving the life chances of disabled people.

X. CONCLUSION

This paper will provide the solution to the controlling mechanism of automatic wheelchair by propagating the signal using by hand gesture of the physically challenged people. The different gestures will considered as the signal and it will control the wheelchair as per the signal request send by the transceiver. The MEMS sensor is used to propagate the signal properly to the transceivers as per the response of the user.

XI. REFERENCES

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