SMART WHEEL CHAIR WITH – HEAD CONTROLLER

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ABSTRACT—**Smart Wheel Chair is a mechanically controlled device designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels of the wheelchair. Furthermore, it also provides an opportunity for visually or physically impaired persons to move from one place to another. The smart wheelchair has gained a lot of interest in recent times. These devices are useful especially in moving them from one place to another. The machines can also be used in old-age homes where they have difficulty in their movements. The devices serve as a boon for those who have lost their mobility. Different types of smart wheelchair have been developed in the past but the new generations of wheelchairs are being developed and used which features the use of artificial intelligence and hence leaves a little to tinker about to the user who uses the wheel chair. The project also aims to build a similar wheel chair which would have a sort of intelligence and hence helps the user on his/her movement**

Keywords-; MEMS, PIC Micro Controler

I. INTRODUCTION

Smart Wheel Chair is a mechanically controlled device designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels of the wheelchair. Furthermore, it also provides an opportunity for visually or physically impaired persons to move from one place to another.

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According to a study conducted by Christopher & Dana Reeve Foundation, nearly every 1 person in 50 is suffering from paralysis due to damaging of nervous system. This figure approximates to 6 million people worldwide and has increased by 33 percent from previous estimation. Quadriplegics are persons who are not able to move their body except head [1]. The reasons for such decreased motion possibilities can be different: stroke, arthritis, high blood pressure, degenerative diseases of bones and joints and cases of paralysis and birth defects. In this project we intend to construct a cost effective design to build wheel chair for quadriplegic people who find it difficult to move independently.

Another significant requirement is that a wheelchair has to respond rapidly and operate efficiently to the commands of the user, independently of the method used for giving these commands. For human-machine interaction human motion recognition is also used. In this paper, a microcontroller system that enables standard electric wheelchair control by head motion is developed. The project describes a wheelchair for physically disabled people developed using head motion and MEMS motion sensor which is interfaced with DC motors.

The prototype of the wheelchair is built using a PIC micro-Controller, chosen for its low cost, in addition to its features of easy erasing and programming. Automation is the most often spelled term in the field of electronics [1]. The anxiety for automation brought much advancement in the existing technologies. One among the technologies, which had greater developments, is the MEMS ACCELEROMETER SENSOR. These had greater importance than any other technologies due its user- friendly nature. MEMS ACCELEROMETER SENSOR is a Micro Electro Mechanical Sensor can be used to effectively translate head movement into computer interpreted signals. For motion recognition the accelerometer data is calibrated and filtered [2].

The accelerometers can measure the magnitude and direction of gravity in addition to movement induced acceleration.

This project utilizes two DC Motors. The DC motor generates torque directly from DC power supplied to the motor by using internal commutation, stationary permanent magnets, and rotating electrical magnets, battery. The Microcontroller is programmed with the help of embedded C instructions. This Microcontroller is capable of communicating with input and output modules [3]. The

controller is interfaced with dc motors through relay driver circuit. The dc motors are fixed to the wheel chair to control the direction of the wheel chair.

II. PROPOSED MODEL

Smart Wheel Chair is a mechanically controlled device designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels of the wheelchair. It also provides an opportunity for visually or physically impaired persons to move from one place to another. smart wheelchair has gained a lot of popularity in recent times. These devices are useful especially in transportation from one place to another. The machines can also be used in old age homes where the old peoppersons have difficulty in movements devices serve as a boon for those The Wheelchair operates with head, taking motion as an input signal for the movement of wheelchair in a particular direction. An Accelerometer (Motion Sensor) is used to track these motions. This sensor is fitted to cap on head. The variations of the sensor are trapped and those signals are fed as inputs to the micro -controller. Now based on these variations the micro-controller is programmed to take decisions which in turn control the movement of wheelchair. When person tilt his head in forward direction, chair will move in forward direction.

If person tilt his head in backward direction above, chair will move in backward direction. If person tilt his head in left direction above, chair will move in left direction. If person tilt his head in right direction above, chair will move in right direction.

Truth Table representing the direction of rotation of motors is as shown below:

Position	Motor – 1	Motor –2
Forward	Clock Wise	Clock Wise
Reverse	Anti-Clock Wise	Anti- Clock Wise
Right	Clock Wise	Anti- Clock Wise
Left	Anti-Clock Wise	Clock Wise

III. BLOCK DIAGRAM:
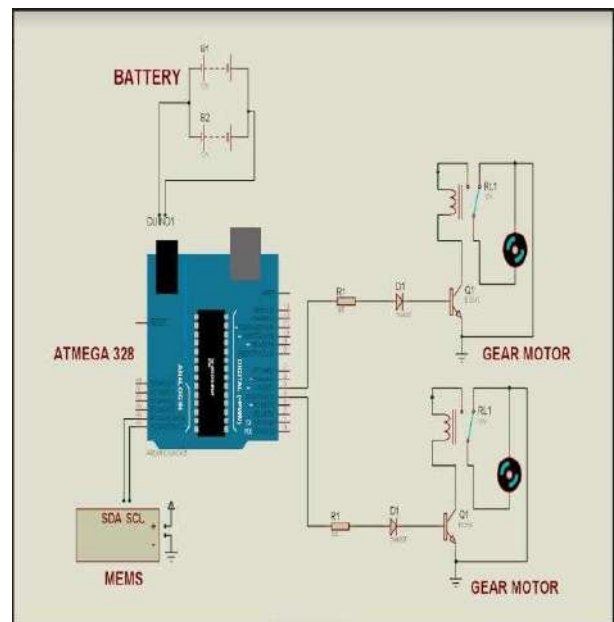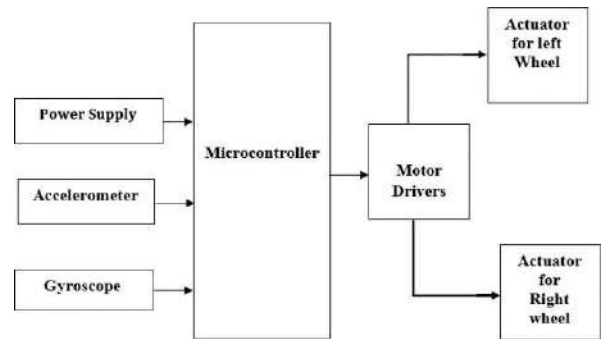
IV. HARDWARE DEVELOPMENT:

MEMS Accelerometer Sensor:
voltage regulator(IC 7805), resistor, LED (light emitting diode).
DC Motor Driver:
Relay Driver Circuit is designed to control the load. The load here is motor to drive the wheels of the wheel chair. The motor is turned „ON" and OFF" through the relay. A relay is nothing but electromagnetic switching device which consists of three pins namely common, normally closed and normally open.
DC Motor: Here the Motor used for driving the wheel-chair is

Johnson Motor. The advantage of these kind of motor is they are light in weight, consumes less power and is highly efficient to drive loads of minimum 5Kgs. These also can beeasily driven using Solar energy (Photo-Voltaic Panels).

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V. CONCLUSION & FUTURE SCOPE:

- Solar battery chargers : With the advancement in the technology , thelight weighted solar panels can be installed on the wheel chair
- Body massager : As the patient spends a lot of time on the wheel chair a massager can be useful for the relaxation of the body
- Indoor mapping : An image of the plan of the house can be stored in the controller and automated movement of the wheelchair within the mapped region can be possible
- Vital science monitoring : Vital signs and patient monitoring can be done inreal time and also patient can store and access their medical records
- Home automation: Patients home andenvironment can be automated like opening and closing of doors switching of the lights can be controlled

V.   REFERENCES

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