iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 9 **Issue:** VI **Month of publication:** June 2021

**DOI:** https://doi.org/10.22214/ijraset.2021.35277

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 9 Issue VI Jun 2021- Available at www.ijraset.com*

# MEMS Operated Automatic Wheelchair

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***Abstract:*** ***The limitations with ancient wheel chairs chiefly embrace exibility, weight and restricted functions. several developments are created within the field of wheel chair technology; however, these couldn't aid the quadriplegics to navigate severally. Automatic wheel chair victimization MEMS technology enabled the top and neck quality of quadriplegics in a very price effective manner. The position of user's head is born-again into speed and direction by the system. MEMS detector and PIC controller square measure the most components of the system. The amendment in direction of head is detected by the MEMS detector and corresponding signal is given to microcontroller. The microcontroller controls the wheel chair directions with the assistance of DC motors.***

***Keywords: DC Motor, MEMS detector, Quadriplegics.***

## I. INTRODUCTION

The number of individuals on the road the globe with the assistance of artificial means that because of health problem or accident is increasing at AN direful rate. Their quality of life needs to be increased by exploitation subtle and price effective locomotive devices. Today's technology has shifted to automation minimizing the requirement of human intervention. These machine-controlled systems have fewer manual operations with high responsibility and accuracy. Intelligent wheel chairs square measure greatly useful for severely impaired those who have difficulties in driving commonplace supercharged wheel chairs. Persons with high degree of impairment like quadriplegics don't seem to be able to drive electrical wheel chairs. Medical devices designed to assist such person's square measure greatly sophisticated and expensive . So, a microcontroller based mostly system that permits wheel chair movement by head motion is introduced. The system describes a wheel chair for physically disabled folks that use head motion and MEMS sensing element interfaced with DC motor. MEMS sensing element could be a small electronic mechanical sensing element that effectively translated head movements into laptop taken signals. The measuring instrument information is graduated for motion recognition.

## II. EVALUATION

### *A. Existing System*

The existing systems embrace hand gesture based mostly, measuring system and voice-controlled systems etc. The hand gesture based mostly system used the transfer of hand gesture info commands to maneuverer the wheel chair. The measuring system and voice-controlled system used voice recognition kit and MEMS motion sensing element to drive the wheel chair.

The problems with prevailing system are

*1)* Unable to adapt to external conditions.
*2)* Less identification accuracy.
*3)* Classification techniques utilized are advanced.
*4)* Time intense and expensive.

## III.IMPLEMENTATION

### *A. Proposed System*

This system operated with taking head movement as signal to manage the motion of wheel chair in any direction. A MEMS sensing element or measuring system is employed to trace the movements. A cap is placed on the pinnacle and therefore the sensing element is connected thereto. The variations created by the sensing element in step with head movement square measure cornered and fed as input to the microcontroller.

*The following are the merits of the proposed system*

*1)* If the pinnacle tilts in forward direction, the wheel chair moves in forward direction.
*2)* If the pinnacle tilts in backward direction, the wheel chair moves in backward direction.
*3)* If the pinnacle tilts left, the wheel chair moves left.
*4)* If the pinnacle tilts right, the wheel chair moves right.

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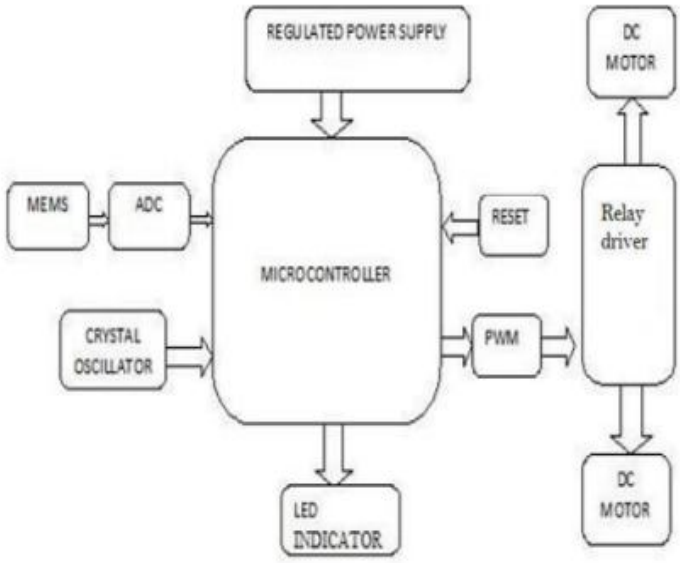
## IV. WORKING




MEMS detector The ADXL335 could be a tiny, thin, low power, complete 3-axis measuring system with signal conditioned voltage outputs. The product measures acceleration with a minimum complete vary of ±3 g. It will live the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration ensuing from motion, shock, or vibration. The user selects the information measure of the measuring system exploitation the one hundred ten, CY, and CZ capacitors at the Xout, Yout, and Zout pins. Bandwidths will be elect to suit the application, with a spread of zero.5 cycle per second to 1600 cycle per second for the X and Y axes, and a spread of zero.5 cycle per second to five0 cycle per second for the Z axis. The ADXL335 is accessible in a tiny low, low profile, four millimetre × four millimetres × one.45 mm, 16-lead, plastic lead frame chip scale package. small Electro Mechanical Systems (MEMS) is the combination of mechanical components, sensors, actuators, and physical science on a standard Si substrate through small fabrication technology. associate measuring system is associate mechanical device, device that measures acceleration forces. MEMS measuring system is one chip with tiny size and low value. as a result of their tiny size and weight, accelerometers area unit hooked up to the finger tips and back of the hand. In this model we have a tendency to area unit usingMMA760FC measuring system, that is 3axis measuring system and provides digital output (I2C).

Proteus is software package that accepts solely hex files. Once the computer code is regenerate into hex code, that hex code has got to be drop into the microcontroller and this can be done by the Proteus. Proteus could be a computer programmer that itself contains a microcontroller in it aside from the one that is to be programmed. This microcontroller incorporates a program in it written in such how that it accepts the hex file from the pic compiler and dumps this hex file into the microcontroller that is to be programmed. because the Proteus computer programmer needs power offer to be operated, this power offer is given from the facility offer circuit designed and connected to the microcontroller in proteus. The program that is to be drop in to the microcontroller is altered in proteus and is compiled and dead to examine any errors and therefore when the winning compilation of the program the program is drop in to the microcontroller employing a tipper.

The on top of system represents, any amendment in the direction of MEMS detector in X- and coordinate axis directions then this MEMS detector has piezo resistive material at the middle of the chip, that is suspended by four beams doped with piezo resistive material. once the detector is subjected to acceleration in any direction, the movement of the mass causes the four beams to deform then changes the resistance of the piezo material. This allows the detector to find the acceleration motion. MEMS detector contain Tilt register. once the changes in the direction, the tilt register values area unit modified and that values area unit given to ADC, that converts analogy to digital values this values area unit given to microcontroller. relying on the direction of the MEMS, microcontroller controls the wheel chair directions like LEFT, RIGHT, FRONT, and BACK by implementing the on top of circuit.

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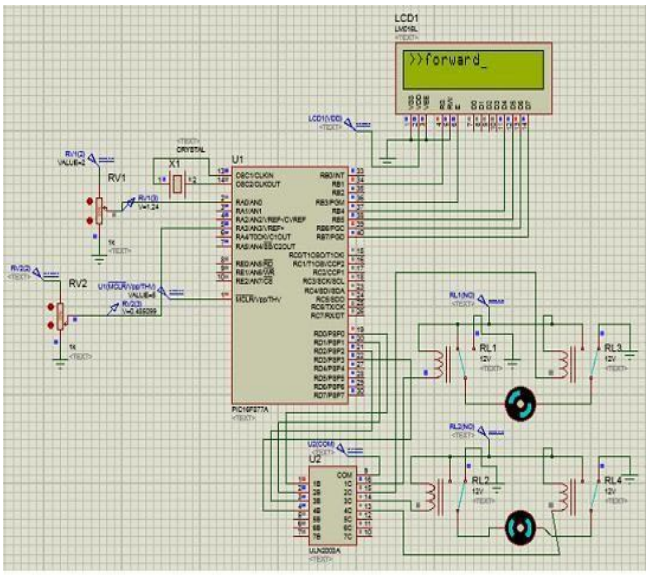
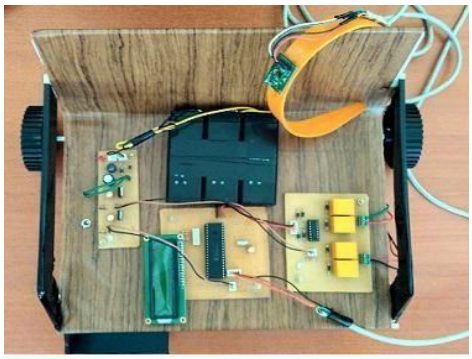



## V. RESULT

The proposed system is intended to create a cost-effective wheel chair to help quadriplegic people who find it difficult to move independently. The system uses head movement to control the wheel chair. The tilt angles produced are sensed and corresponding voltages are generated by the MEMS sensor. These voltages are fed into microcontroller.



| Direction | Axis | Voltages |
|---|---|---|
| Forward | X | Less than 1.5V |
| Backward | X | Greater than 1.7V |
| Left | Y | Less than 1.5V |
| Right | Y | Greater than 1.7V |

## VI. CONCLUSION

The head motion-controlled wheel chair system is enforced as associate example of company of human and machine. freelance movement is achieved with the assistance of the system. Errors showing once the user makes free head motions may be reduced to a precise extent mistreatment associate modify switch. it's designed to be characterised by low worth and better responsibleness. This paper is enforced victimization varied elements, the project is simply an early kind if we tend to build this project as industrial project, then undoubtedly helpful to all the disabled individuals, United Nations agency area unit unable to maneuverer and unable to drive traditional wheel chair their own. With their hand movements they will move wheel chair right, left, front, and back directions with 3-axis accelerometer (MEMS SENSOR) that may be a sensitive detector and capable of police investigation the lean. the longer-term scope of the project is extended victimization wireless technology, and intelligent hand gesture wheel chair.

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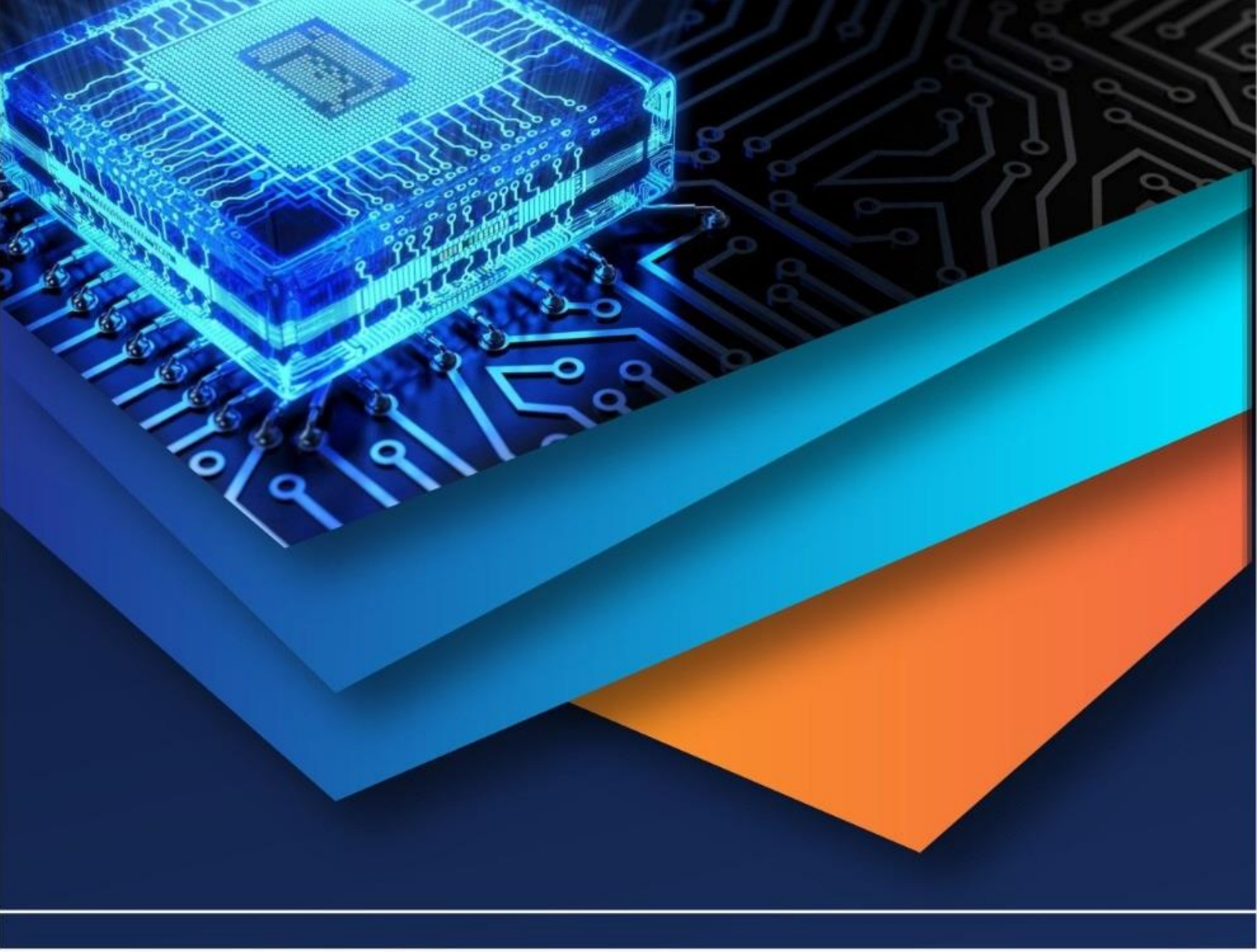

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