

# A Review On Hand Gesture And Joystick Control Handicapped Wheel Chair With Solar Charge

Yogesh P Sushir<sup>1</sup>, Aniket V Tayade<sup>2</sup>, Pandurang G Chaudhari<sup>3</sup>, Arvind K Sonawane<sup>4</sup>

<sup>1</sup> Assistant Professor, Department of Electrical Engineering, Padm Dr. Vbkcoe Malkapur Maharashtra India

<sup>2,3,4</sup> Bachelore Of Enginering Students, Department of Electrical Engineering, Padm Dr. Vbkcoe Malkapur Maharashtra India

## ABSTRACT

*In today's world, physically handicapped person & elder peoples are depending on others peoples. But today's world becomes fast, everyone is very busy & there are few peoples to take care of these peoples properly. We find the automated wheelchairs for an easy transportation for these physical disable persons. The proposed work is to fabricate a solar powered hand gesture and joystick based wheelchair using Gesture Control System and joystick. Wheelchairs are used by which person who cannot walk due to physiological, injury or any disability. This project 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 MEMS technology or just slight movement of joystick. The use of powered wheel chair with high navigational intelligence is one of the great steps towards the integration of severely physically disabled people. Driving wheel chair in domestic environments is a difficult task for people with arm or hands impairments. The wheel chair is developed to overcome the above problem described above allowing the end users to just perform safe movements and accomplish some daily life important tasks.*

**Keyword:** - Joystick, ATmega328, DC Motor, Accelerometer Sensor, L293dIC, DC Motor

## 1. INTRODUCTION

The aim of the project is hand gesture and joystick control handicapped wheel chair with solar charge. In this project we add new innovative technology like combination of two controlling method's to controlled the wheel chair by using the gesture. the micro-electromechanical system accelerometer sensor are in used. It is very highly sensitive sensor which detect the tilt. The tilt identify to change the direction of the wheel chair by using accelerometer depending on the tilt. The gesture is the most frequently spelled term in the electronics field. In electronic technologies has more development to occurring micro electro-mechanical system. Accelerometer sensor is more important because those technologies is very easily operating and effective for proper operation purpose. The combination of joystick and micro electro-mechanical system accelerometer sensor based devised is easily to reach for common man. The smart wheel chair is totally electric and solar powered chair. It's designed for indoor as well as outdoor work. it has used for those people who are not used the manual chair due to arm, hand, shoulder any other disabling condition and do not have leg's to drive manually the chair with their foot. The smart wheel chair has various power function such as tilt, legs elevation etc.,. The wheel chair uses two electric motors to move the wheels. They use the power by 12 volt DC supply for Rechargeable batteries with solar panel. Similarly the main advantages of this project it has charge electric supply also available.

## 2. HARDWARE DESCRIPTION

To design and fabricate the joystick and hand gesture controlled wheel chair various types of material are used, first of all wheel chair to fabricated by mechanically and to install the mechanical equipments. Like wheel, caster wheel, axels, motor gear etc. Then the second part of electrical and electronics component proper connection and installation for wheel chair after the completion two section the wheel chair are turned in face of "Hand Gestures and Joystick Control Handicapped Wheel Chair with Solar Charge".

### 2.1 Mechanical Components

- |                                 |                              |                                      |
|---------------------------------|------------------------------|--------------------------------------|
| 1. Wheelchair                   | 4. Microcontroller ATMEGA328 | 7. DC Gear motor                     |
| 2. Joystick,                    | 5. L298N motor driver module | 8. Solar panel 25 watt               |
| 3. ADXL335 accelerometer sensor | 6. Transformer 12 volt 2 amp | 9. 12 volt 12 amp chargeable battery |

### 3. BLOCK DIAGRAM

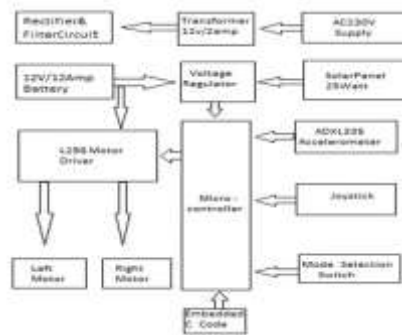


Fig -1: Block diagram of system connection

#### 3.1 Joystick



Fig 2: Joystick

Lots of robotic projects need a joystick. This module offers an affordable solution to that. The Joystick module is similar to analog joysticks found in gamepads. It is made by mounting two potentiometers at a 90 degrees angle. The potentiometers are connected to a short stick centered by springs. This module produces an output of around 2.5V from X and Y when it is in resting position. Moving the joystick will cause the output to vary from 0v to 5V depending on its direction. If you connect this module to a microcontroller, you can expect to read a value of around 512 in its resting position (expect small variations due to tiny imprecision of the springs and mechanism) When you move the joystick you should see the values change from 0 to 1023 depending on its position.

#### 3.2 Atmega328

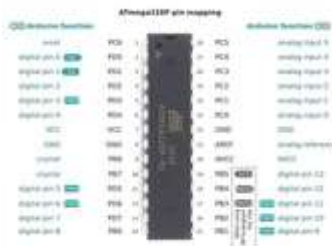


Fig 3: AT mega 328

ATmega328 IC has 28 pins. Out of which, 20 of the pins function as input ports. Its work as an input to the 14 pins are digital and 6 pins function is given PWM output and it has an analog input output used the 6 pins. The two pins are used to crystal oscillator and it provide the clock pulse for the ATmega328 Chip. Obviously the pins has got power to '2' of the pin is VCC and GND provide the supply for operation.

#### 3.3 DC Gear Motor



Fig 4: DC Motor

The motors are used for the movement of the robotic vehicle, which are of DC gear motors operated at 12V DC power supply. 4 motors have been used to rotate the two wheels clockwise or anticlockwise. This provides motion to the robot. Motors are arranged in a fashion called H-Bridge. H-Bridge is an electronic circuit which enables a voltage to be applied across a load in either direction. It allows a circuit full control over a standard electric DC motor. That is, with an H-bridge, a microcontroller, logic chip, or remote control can electronically command the

motor to go forward, reverse, left, right and stop. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM. The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor.

### 3.4 L298 motor driver



Fig 3: L298 motor driver

The L298 is an integrated monolithic circuit in a 15-lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

### 3.5. 12 Volt 12 Amp Chargeable Battery



Fig 3: chargeable battery

A rechargeable battery, storage battery, or secondary cell, is a type of electrical battery which can be charged, discharged in to a load, and recharged many times, as opposed to a disposable or primary battery, which is supplied fully charged and discarded after use. It is composed of one or more electrochemical cells.

### 3.6 ADXL335 accelerometer sensor

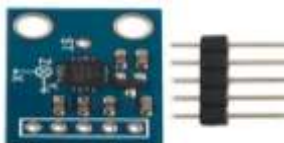


Fig 4: ADXL335 Accelerometer sensor

The ADXL335 is a small, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. ADXL335 IC from Analog Devices is the brain of this module. The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of  $\pm 3$  g.

## 4. OPERATION

The main system is powered by 12V/12Amp Rechargeable battery, which charges by 25 watt solar panel or by using 12 volt step down transformer. Then the power from battery given to the whole system. The 12 volt given to motor driver module. The ATmega 328 microcontroller is brain of whole system which controls all operations for that we have programmed as per our requirements. The microcontroller, ADXL335 & Joystick needs 5 Volt regulated power supply, so for that reason we have used a 7805 positive voltage regulator which gives output as constant 5 Volt. Joystick and ADXL335 are interfaced to analog pin of microcontroller. The toggle switch for selection mode as joystick or gesture is connected to digital pins of microcontroller. We have programmed to ATmega328 microcontroller as to controlled wheel chair on selected mode like joystick or gesture. We can control

wheel chair as forward, reverse, left and right direction. We have used higher torque 12 volt DC gear motors. Gear motors are controlled by L298N motor driver module and module is getting signal from microcontroller to run motor either clockwise or anticlockwise depends on joystick and gesture output to the microcontroller. Free wheels are connected to motors shaft and both wheels. The program which is uploaded to microcontroller is given in appendix A at last page. The code is written in Embedded C language and uploaded by using Arduino Board and code is written in software Arduino IDE.





## 6. CONCLUSION

The smart wheel chair have designed for the physically abnormal people who can not walk without any support so they can easily Handle this chair by using two controller like joystick and hand gesture. The main benefits of two controller is the operator easily operate the chair giving the command left, right, forward and backward direction. If they can't move their hand the gesture are mount at the neck of people or any part of body which they can move easily. For operation and very less cost of Wheel chair to be fabricated we are eliminated the battery backup issue by using solar panel for charging purpose. The wheel chair is useful for indoor and outdoor operation very effectively.

## 7. REFERENCES

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## BIOGRAPHIES

	Prof. Yogesh P. Sushir Assistant Professor, Department Of Electrical Engineering, VBKCOE Malkapur, Maharashtra, India
	Mr. Aniket V Tayade B.E Student, Department Of Electrical Engineering, VBKCOE Malkapur, Maharashtra, India
	Mr. Pandurang G Chaudhari B.E Student, Department Of Electrical Engineering, VBKCOE Malkapur, Maharashtra, India
	Mr. Arvind K Sonawane B.E Student, Department Of Electrical Engineering, VBKCOE Malkapur, Maharashtra, India