

VOICE OPERATED AND JOYSTICK CONTROLLED ELECTRIC WHEELCHAIR

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ABSTRACT

To improve the life of disabled people by use of automatic tools, many scientists and organizations have been doing research on designing various products. A part from it the joystick control wheelchair are developed earlier. One such intelligent product is the voice controlled wheelchair. Many methods have been used to design it, each method uses a Different hardware and hence providing specific Functionalities. In this paper we examine few of the Implemented methods and then propose a new model based On the concept of artificial intelligence which uses Arduino for controlling the device, ultrasonic sensors for Robust

Obstacle detection, USB microphone for voice input. Thus, enhancing the hardware used in previous models and at the same time achieving cost efficiency.

Keywords : *Wheelchair, Battery, Wiper's Motor, Arduino Controlled Kit, Voice Controlled Kit, Relay Module, IR Sensors.*

INTRODUCTION

There is a growing need for transportation, either inside a house or office, as well as in the streets and other public spaces. This constant need is a disadvantage for anyone with some kind of disability, especially those that suffer from foot disabilities. Electric wheelchairs are part of the technological solutions to this demand. However, their cost is very high in contrast to mechanical wheelchairs. In that sense, this project aims to present a new module device that can be used for converting a mechanical wheelchair to an electrical one. The proposed device was designed for simplicity in installation, high benefit-cost ratio and easiness in control movement. Preliminary results showed the implementation of the proposal in a functional prototype.

Persons with physical disabilities or commonly known as a disability requiring special tools for doing their activities. Wheelchairs are one of the tools for the physically disabled especially the legs, to be able to move from one place to another, both on the flat and from a low to a higher place (point upward). The use of conventional wheelchair still using thrust motion with his fingers. It is less effective for persons with disabilities

in moving the wheelchair because it requires considerable power to pedal a wheelchair using hand gestures. Moreover, when the user passes through an area that has a slope, the power is needed to be doubled than usual. In India there is near about 21% people are disabilities and handcuffed so those people are from middle class so it is very hard or tough to pay a hospital bills and purchase the mechanical wheelchair so to reduce those type of drawback we design the voice control with joystick arrangement electric wheelchair.

II.METHODOLOGY

To design or construct this project we use the Arduino at mega2560, relay modules, voice recognition module. Also for detect the obstacle in front of wheelchair, we use the IR sensors. For giving a proper direction & controllism we use the motors in both sides of wheels. The battery is the main component which is heart of our system. Here we use the 12 volt, 25 amps rating of battery.

Following are the components that we have required :-

1] MODELING OF VOICE CONTROLLER :-

Model-VM 208

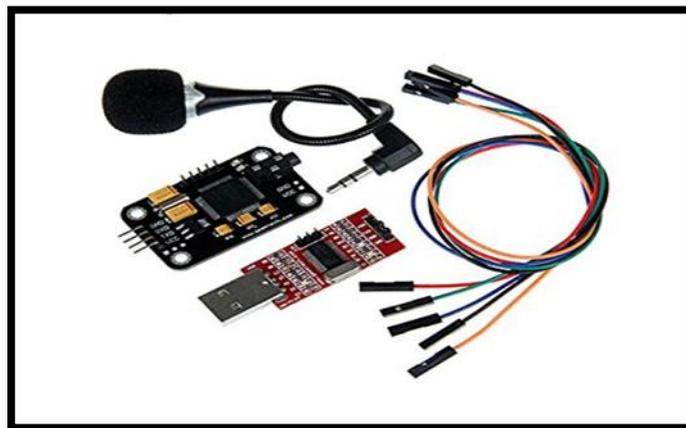


Figure1 :- Voice Module VM 208

We may call it Sound Control. Voice recognition is something that knows exactly what you were saying. We are thinking about the device that can control and capture the sound and on which it will be operate. Finally we find this module. Here is the voice recognition module VM 208 . Well in this module we can store or give a 15 words on which we are going to control our wheelchair. Also the main part is that, in this voice module the 15 words are distribute in mainly 3 different groups i.e. each group contain 5 words. So we can give at least 5 words in each group on which we give the respective instruction.

2] RELAY MODULE :-

Relay modules is basically an switching device on which the various motors, LED'S, Switching, etc can be controlled by giving triggering from Arduino, AMR etc.

Here we are using two types of relays i.e., for controlling the motors we are using relays having rating of 230 v AC or 50 v DC,30amp rating and for controlling the main relay we are using another two relay circuit which is operate on 5 volt

The relay is used for controlling this 50 v relay circuitry which is connected to Arduino and operate on 5 volts supply.

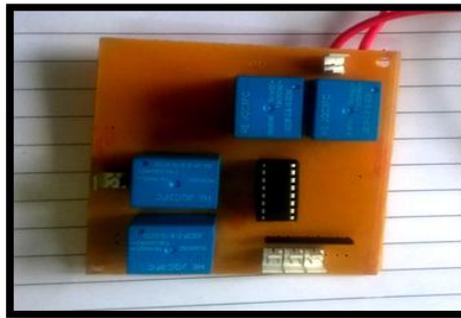


Figure 2.1 :- Relay Circuit For Operating On 5 Volt

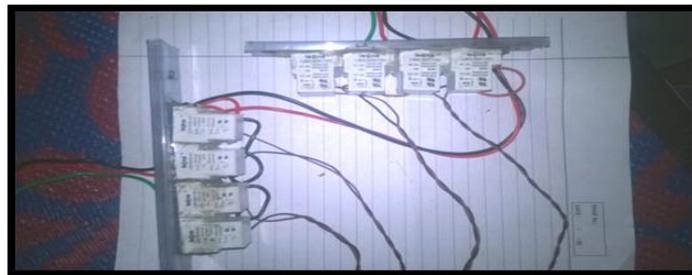


Figure 2.2 Main Relay For Controlling Motors

3] BATTERY :-



Figure 3 :- Battery

The battery is heart of the power supply for outdoor use of electric wheelchair. In the voice operated electric wheelchair, require 2 number of 12V, 22A batteries with series connected to operate the two PMDC motor. The detailed information about batteries used as follows:

As we know that in batteries there are various types in which we can pick up any one for our project but as we see, the charging and discharging rate of lead acid battery is very good as compared to other. For our information the lead acid battery is invented firstly by a French physicist Gaston Plante in 1859.

Also for continuous supply to the Arduino kit we are using 6 volt 7.8 mah battery too.

4] MOTOR :-

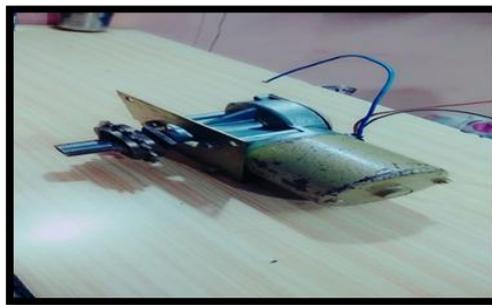


Figure4 :- Wiper Motor

Here figure shows the stepper motor. So basically stepper motor is type of DC motors. As we know that the motors are working on the basic principal. Here also the same case for DC motor. The principal is that, “when the current carrying conductor are kept in magnetic field, it experience the force.”

The DC motors are of permanent magnet types so it will operate only when the supply I given otherwise it will not run like by free hand rotation or any of kind. This type of motors are used in cars, trucks, buses, etc.

5] Model of charging kit :-

As we use the battery for motor supply, we need to charge this battery so we design the PCB as given connection diagram given below :-

In this we use a transformer of 230 v ac to 12-0-12v, also the power diodes and capacitor also used.

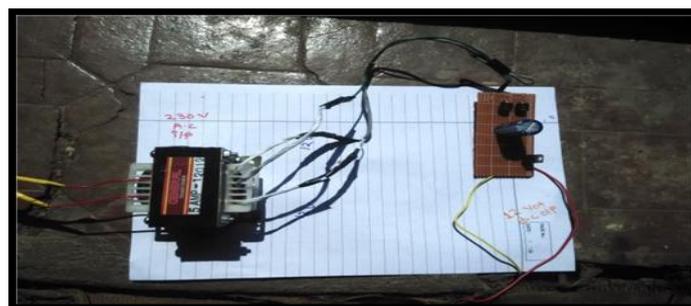


Figure 5 :- Battery Charging Kit

6] MODEL OF CHARGING INDICATION KIT :-

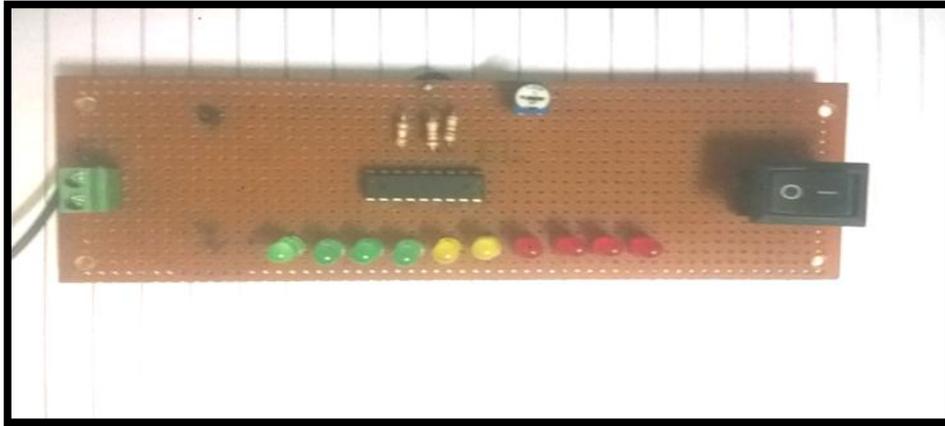


Figure 6 :- Battery Level Indication Kit

This model is design or made only for the indication of battery percentage for safety purpose or for general indication of battery life. The connection are made is given as below .

This circuit design based on the LM3914 IC. This IC is dot/bar display driver.

Principle :-

The heart o battery level indicator is LM3914IC.

The input & output for this IC is analog signal. There is no need of resister in series with LED's because itself current regulator

7] ARDUINO AT MEGA 2560

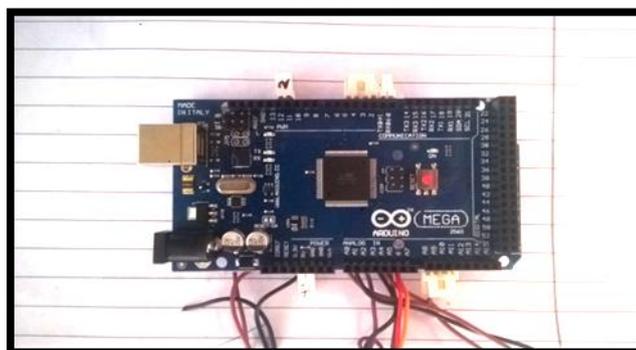


Figure 7 :- Arduino AT MEGA 2560

As we know that the Arduino is a basically controller device use for various purposes like LED'S control, motor controllism etc. Here in that Arduino at mega2560there are total 54 digital input-output pins. In which 16 are analog inputs, 15 are PWM output, 4UART.

The Arduino having 16 MHZ crystal oscillator, USB connection power jack, ICSP header, reset button. This Arduino connects to USB by AC to DC adapter or battery to get started.

Specifications :-

PROCCESOR-AT MEGA2560

Voltage -5volt

Input voltage -7to 12 volt

EEPROM – 4KB

FLASH Memory -256 KB

Clock speed -16MHZ

8] JOYSTICK KIT :-

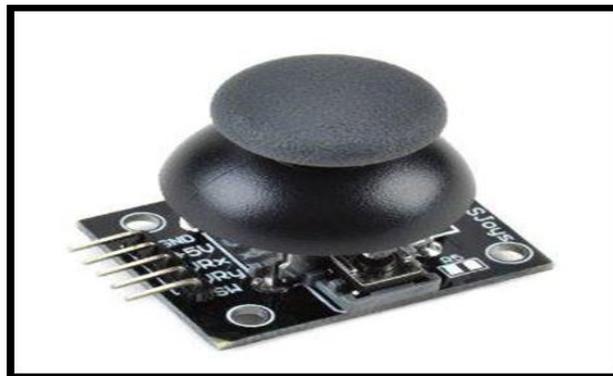


Figure 8.1 :- Joystick Module (Original)



Figure 8.2 :- Joystick Module(After Increasing Length)

As figures shows the actual view and modified view of joystick. This is the simplest joystick which we are used for controlling the motions of motors.

As we see, there 5 pins names as ground, Vcc, RXD, TXD,Switch,etc.

Specifications :-

- Compatible with Arduino interface
- The biaxial XY Joystick Module KY-023 applies ARDUINO
- Dimensions: 1.57 in x 1.02 in x 1.26 in (4.0 cm x 2.6 cm x 3.2 cm)
- Total 5 pins
- Black in colour.

Pin Configuration :-

1. GND: ground
2. +5V: 5V DC
3. VRx: voltage proportional to x position
4. VRy: voltage proportional to y position
5. SW: switch pushbutton

9] LCD DISPLAY :-

Below is the Pin out and Pin Description of 16x2 LCD Module:

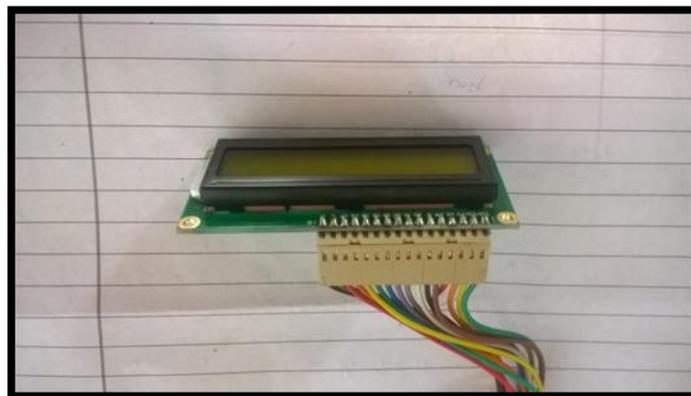


Figure 9.1 :- LCD Display

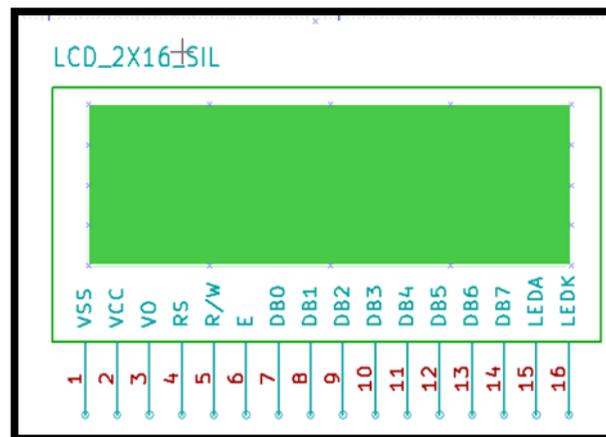


Figure9.2 :- LCD Display Pin outs

Here figure shows the 16 *2 LCD. Here are the 16 indicates the columns and 2 indicates the number of rows. As we see in market there are lots of types of LCD's are available but we require to shows large instruction to be shown. That's why we are used this 16 * 2 type of LCD.

10] IR SENSOR :-



Figure 10 :- IR Sensor

As its name indicates its function, so this a type of sensor i.e., distance sensor which is used as protective device or objective detection purpose. Its range is 1 meter and the sensors having three terminal names as ground, supply, and negative. This sensor are operates on 5volt with the connection to the Arduino directly.

If there is an any kind of object or device to be detected then IR sensor will operates and stop the wheelchair and result shows in 'Obstacle Detection'.

III.CONCLUSION

As we know that robotics and electronics is most vast field which comes with different combination of technology. But this technology also helps to us for reducing the humans efforts or time required for completing the work. In India the percentage of common man is in huge amount. So many times we are seeing that the person who are injured or paralyzes does not have that much of money by which he/she will purchase that equipment for own purpose. This project will help to reduce human efforts and stress which are felt by a paralyzed person.

The main aim of this project is that the person which are disabled from accident or some of paralyzing situation are built up and give a hope for living the life by paying less amount as compared to market values.

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