

# SMART WHEELCHAIR CONTROLLED BY MANUAL AND VOICE CONTROL USING ARDUINO

<sup>1</sup>B.MANGAIYARKKARASI, <sup>2</sup>V.DHIVYARUBINI,  
<sup>1</sup>ASSISTANT PROFESSOR, <sup>2</sup>ASSISTANT PROFESSOR  
<sup>1</sup>DEPARTMENT OF EEE <sup>2</sup> DEPARTMENT OF EEE

<sup>1</sup>P.S.R.ENGINEERING COLLEGE, SIVAKASI, TAMILNADU, INDIA, <sup>2</sup>P.S.R.ENGINEERING COLLEGE, SIVAKASI, TAMILNADU, INDIA,

**Abstract:** The main aims at controlling a wheelchair by means of human voice or manual operate . It enables a disabled person to move around independently, using a voice recognition application or manually operate with motor. The manual operation is second option of the disabled person. The prototype of the wheelchair is build using a advanced micro-controller of arduino, chosen for its low cost, in addition to its versatility and performance in mathematical operations and communication with other electronic device. The system has been designed and implemented in a cost effective way so that if our project is commercialized the needs users in developing countries benefits from it.

Index Terms – **wheelchair, arduino UNO, voice recognition kit, push button switch, wiper motor**

## I. Introduction

This paper represents the “Voice-controlled Wheel chair” for the physically differently abled person voice command controls the movements of the wheelchair. The arduino board , bluetooth and motor in hardware model to receive command and take necessary action in movement of wheelchair. The voice command is given through a device having Bluetooth and the command is transferred and convert to string by the BT Voice Control for Arduino and is transferred to the Bluetooth Module SR-04 connected to the Arduino board for the control of the Wheelchair . if any problem occurs in the voice command the user to use the manual control to action in movement of the wheelchair software and hardware. It is realized that for input of human voice we are using Bluetooth and voice recognition kit as an intermediary. In this project, Ardiuno kit (Atmega 328) is used as controller to control the movement of wheelchair based on the human voice and manual control as an input. There are five basic movements of a wheelchair to be applied by the user. The Five operations perform by the wheelchair are described as Moving forward, Moving backward, Turning to the right, Turning to the left,. Stop

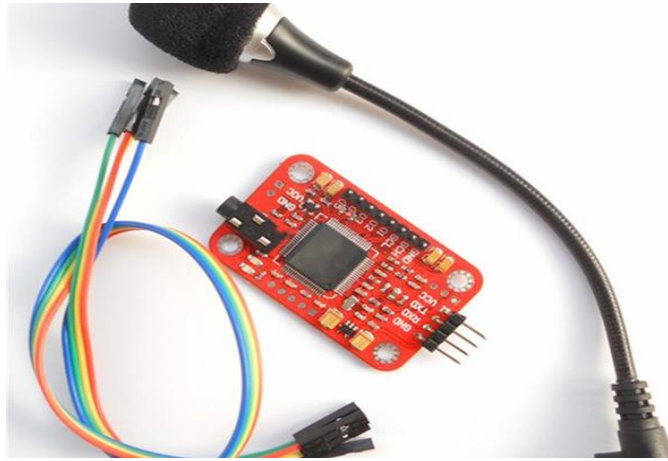
This paper aim is physically abled person move around in the world without any person help. This paper represents the “Voice-controlled and manual controlled Wheel chair” for the physically disabled person . voice command manual control controls the movements of the wheelchair.

There is several application available in the market. based the wheelchair. The handicapped , differently abled person used voice controlled wheelchair. [1] in 2016 depak kumar lodhi et al, One of the major android applications . the voice controlled Application. created for the blind and handicapped persons so that they can use their computer in an appropriate manner. Person can give commands to application and that voice commands are filtered into different frames. These frames are then encoded and given to the computer system and final output is given to the computer system and final output is given. [2]In 2014 Jayesh K. Kokate et al, one of the major android application. This is also a voice controlled application created for the handicapped people. They user can given through the command to use the android mobile. The android mobile is the send the voice command to the Bluetooth receiver. The Bluetooth receiver through the command in the microcontroller. The microcontroller is control the motor of the wheelchair.[3]In 2016 Apsana S et al, proposed a design support voice activation used the arduino controller and additionally added the joy stick to the manual control wheelchair.

Many type of the wheelchair have been developed based on the advanced electronic technology to help of the physically abled person. Main disadvantage of our reference papers , one way of the process to operate the wheelchair , if some time the electronic equipments has damaged or not properly worked the user is straggled, so our concept to additionally added the manual control to control the wheelchair help of the user

## II. Hardware Description

### A.Voice Recognition kit



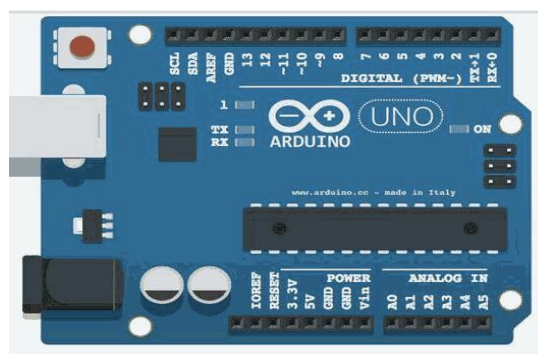
Voice acknowledgment unit show no-REES52 .voice acknowledgment is the between disciplinary sub-field of computational phonetics that creates systems and advances that empowers the acknowledgment and interpretation of spoken language into content by PCs. It is otherwise called "programmed discourse acknowledgment" (ASR), "PC discourse acknowledgment", or only "discourse to content". Presently a days discourse acknowledgment modules are utilized in voice based frameworks as opposed to utilizing entire PC frameworks to decrease multifaceted nature and size of the absolute framework. For a fruitful ASR (programmed discourse acknowledgment) framework, exactness, speed and phenomenal adaptability to deal with vast change in discourse designs are basic attributes. A Voice Recognition Module V2 is utilized in this equipment. The voice acknowledgment module can perceive the directions through mice. It gets design directions or reaction through sequential port interface.

### ***B. Bluetooth Module***



A Bluetooth module is a little remote framework. Modules are regularly little PCB's that incorporate a Bluetooth processor, just as all other equipment expected to run the gadget. A bluetooth module is normally an equipment segment that furnishes a remote item to work with the PC; or now and again, the Bluetooth might be an adornment or fringe, or a remote earphone.

### ***C. Arduino Uno***



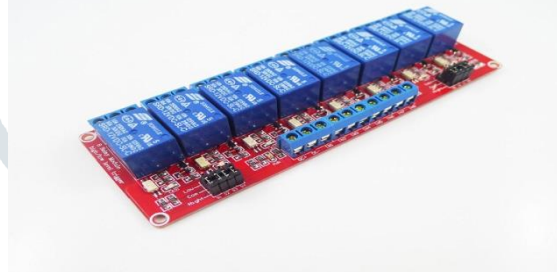
The Arduino Uno board is a microcontroller dependent on the ATmega328. It has 14 advanced information/yield sticks in which 6 can be utilized as PWM yields, a 16 MHz fired resonator, an ICSP header, a USB association, 6 simple sources of info, a power jack and a reset catch. This contains all the needed help required for microcontroller. So as to begin, they are essentially associated with a PC with a USB link or with an AC-to-DC connector or battery. Arduino Uno Board differs from every single other board and they won't utilize the FTDI USB-to-sequential driver contribute them. It is included by the Atmega16U2 (Atmega8U2 up to form R2) modified as a USB-to-sequential converter.

#### ***D. Ultrasonic sensor***



They are ordinarily utilized for a wide assortment of separation estimating applications, non-contact nearness, and vicinity. These gadgets regularly transmit a short burst of ultrasonic sound toward an objective, which mirrors the sound back to the sensor. The framework at that point estimates the ideal opportunity for the reverberation to come back to the sensor and, registers the separation to the objective utilizing the speed of sound in the medium. Ultrasonic sensors deal with a guideline like Radar or Sonar, which assess characteristics of an objective by deciphering the echoes from radios or sound waves individually. It is utilized as the hindrance identifier in the equipment in invert bearing.

#### ***E. Motor relay circuit***



An engine driver is a little momentum enhancer; the capacity of engine drivers is to take a low-flow control flag and afterward transform it into a higher-ebb and flow flag that can drive an engine. The arduino Motor Shield depends on the L298 (datasheet), which is a double full-connect driver intended to drive inductive loads, for example, transfers, solenoids, DC and venturing engines. It gives you a chance to drive two DC engines with your Arduino board, controlling the speed and bearing of every one autonomously

#### ***F. Bush button switch***



In electrical designing, a switch is an electrical part that can "make" or "break" an electrical circuit, interfering with the flow or redirecting it from one conveyor to another.[1][2] The instrument of a switch evacuates or reestablishes the leading way in a circuit when it is worked. Switch is the manual control part in the undertaking. Switch is four bolt mark consider in the four method for the heading

### ***G. Power supply***



A power supply circuit is exceptionally fundamental in any task. This power supply circuit is intended to get directed yield DC voltage. This area is comprising of a battery-powered battery. This area manages the power necessities of the wheelchair for DC engines, Microcontroller and other Section. Battery is utilized to give the power supply to L298 driver IC (12V supply) which drives the DC engines, Microcontroller and IR area works on 5V supply which is furnished with the assistance of LM7805 which is a 5V controller IC by changing over 12V into 5V.

### ***H. Motor***



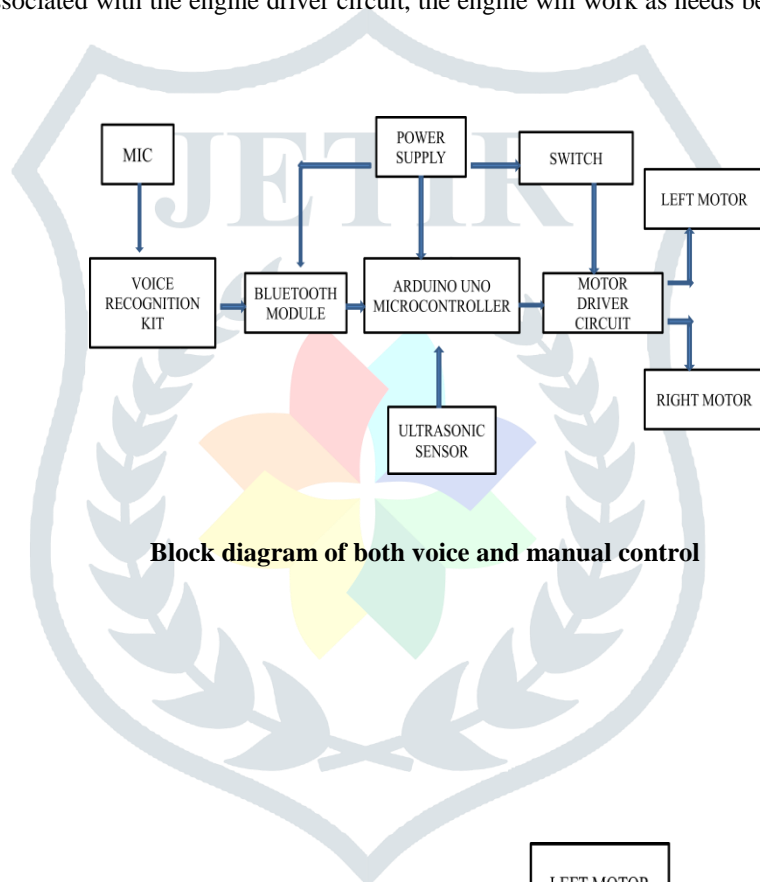
Two DC engines are utilized for the development of the wheel seat in Forward, Reverse, Left, and Right Direction. These engines are controlled from the Microcontroller. L298 is a double extension driver IC is utilized for driving the DC engines. It is a basic engine which utilizes power and an attractive field to deliver or which turns the engine. It includes 2 magnets of inverse extremity and an electric loop, which goes about as an electromagnet. The anti-agents and appealing electromagnetic powers of the magnets give the torque that causes the DC engine to turn. They are utilized them for the wheels of wheelchair.

### ***III. Proposed Method***

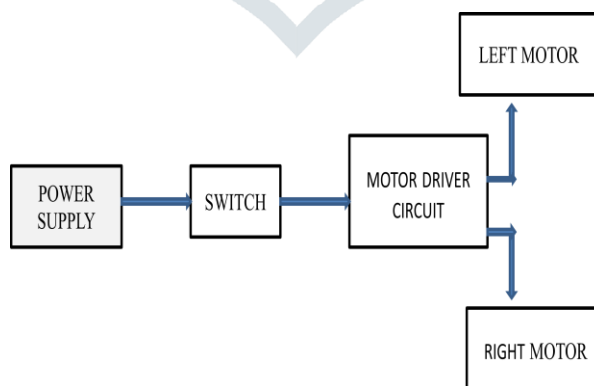
**A. System Description**

The framework has two sections, in particular; equipment and programming. The equipment parts comprises of an implanted framework that depends on Arduino Uno board, a Bluetooth Module, voice acknowledgment pack, Motor Driver circuit and two wiper engine . The Bluetooth Module gives the correspondence media between the client through the android telephone and the framework by methods for voice direction given to the voice acknowledgment unit . The client talks the ideal direction to the "BT Voice Control for Arduino voice (AMR Voice Application)" programming application introduced in the voice acknowledgment pack that is associated through Bluetooth with Bluetooth Module SR-04. The voice direction is changed over to a variety of string and the string is passed to Arduino Uno associated with it. When the Bluetooth Module gets the message, the direction sent will be separated and executed by the microcontroller joined to it and relying upon the directions nourished to the Motor Driver, the engines will work as needs be. The framework will translate the directions and control the Wheelchair likewise through android application. In the interim, the ultrasonic sensor works while the circuit is on and ensures the way has no hindrance and if any obstruction happens it advises the Arduino and stops wheelchair till further direction is acquired from the client.

The manual control parts, in particular; push catch switch, engine driver circuit and a two wiper engine. the push catch switch are four work bolt mark is accessible , up bolt wheelchair push ahead, down bolt move invert, right and left appropriately move right and left. The bolt mark yield associated with the engine driver circuit, the engine will work as needs be. This manual control is the second alternative to the client



**Block diagram of both voice and manual control**



**Block diagram of**

**manual control**

**IV. Result and**

**Discussion**

The different directions of motions possible are: forward, backward, left, right and stop. In achieving the task the controller is loaded with program using the arduino programming language and arduino development environment.

First make sure Bluetooth module is paired with the voice recognition kit. The default password for pairing is “1234” or “0000”. The computer system and final output is given.

The bluetooth module is paired with the arduino UNO SMD R3

#### A. Voice control operation

- The user says “GO”, the bluetooth module send the data from the string “\*GO\*”, to the arduino board, the controller detects “GO”, the motor attached to the wheelchair moves “FORWARD”.
- The user says “BACK”, the Bluetooth module send the data from the string “\*BACK\*”, to the arduino board, the controller detects “BACK”, the motor attached to the wheelchair moves “REVERSE”.
- The user say “RIGHT”, the Bluetooth module send the data from the string “\*RIGHT\*”,to the arduino board , the controller detects “\*RIGHT\*”, the motor attached to the wheelchair moves “RIGHT”.
- The user says “LEFT”, the bluetooth module send the data from the string “\*LEFT\*”, to the arduino board, the controller detects “LEFT”, the motor attached to the wheelchair moves “LEFT”.
- The user says “STOP”, the bluetooth module send the data from the string “\*STOP\*”, to the arduino board, the controller detects “STOP”, the motor attached to the wheelchair moves “STOP”.

#### B. Manual control operation

The different operation of the manual control using push button switch. Possible to the movements of manual control. The user press the different arrows depends on the movement of the motor

- The user presses the “↑” (up arrow). the both motor are working to move forward direction of the wheelchair
- The user presses the “→” (right arrow). the right motor off, the left motor is working to move right direction of the wheelchair
- The user presses the “↓” (down arrow). the both motor are working to move reverse direction of the wheelchair
- The user presses the “←” (left arrow). the left motor off the right motor is working to move left direction of the wheelchair

| Voice command | condition    | String command | Motor1 | motor2 |
|---------------|--------------|----------------|--------|--------|
| Forward       | Move forward | *forward#      | On     | On     |
| Reverse       | Move reverse | *reverse#      | On     | On     |
| Right         | Move right   | *right#        | Off    | On     |
| Left          | Move left    | *left#         | On     | Off    |
| Stop          | Stop         | *stop#         | Off    | Off    |

**Table 1. Voice and command operation**

| Switch arrow | Condition    | Motor 1 | Motor 2 |
|--------------|--------------|---------|---------|
| Up arrow     | Move forward | On      | On      |
| Down arrow   | Move reverse | On      | On      |
| Right arrow  | Move right   | Off     | On      |
| Left arrow   | Move left    | On      | Off     |

**Table 2. Manual control action**

## V. Conclusion

This paper elaborates the design and construction of smart wheelchair controlled by manual and voice control using arduino and bluetooth module. The work properly to the of voice and manual commands given by the user. after designing the circuit that enables physically disabled person to control the wheelchair using arduino UNO, bluetooth module and same as manual control. After complete the work handicapped person move around the world without any person help. This process only the differently abled person and older people

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