



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Voice Controlled Wheelchair using Arduino

V. Sai Sathvik Reddy*, **M. Srinivasulu***, **G. Vinodamma***, **S. Zafar Hussain***, **M. Siva Satyanarayana****

*UG Student, Department of Electrical and Electronics Engineering, G. Pulla Reddy Engineering College (Autonomous), Kurnool, Andhra Pradesh – 518007.

**Associate Professor, Department of Electrical and Electronics Engineering, G. Pulla Reddy Engineering College (Autonomous), Kurnool, Andhra Pradesh – 518007.

ABSTRACT:

This study details the design of an embedded system-based smart voice-controlled wheelchair for those with physical disabilities. The voice activation system for physically disabled people that incorporates manual operation is the foundation of the suggested design. The wheelchair with Bluetooth receives the voice command via a mobile device. The BT Voice Control for Arduino then converts the command to a string and sends it to the Bluetooth Module HC-05, which is attached to the Arduino board and controls the wheelchair. When the user speaks "Go," for instance, the chair will go ahead; when he says "Back," it will move backward; similarly, "Left," "Right," and "Stop" will rotate the chair in left and right directions, respectively, and "Stop" will make it stop. When a command is issued, the wheelchair will move accordingly. In order to help the patient save money, time, and effort, this system was created. Additionally incorporated into the design is an ultrasonic sensor that aids in identifying any obstructions in the wheelchair's path.

Keywords: Arduino UNO, Voice Recognition, Bluetooth, Wheelchair, Bluetooth Module HC-05

1. Introduction:

In this project, a program to interface and test a fully motorised, voice-operated wheelchair will be integrated. To achieve the objectives of this project, a prototype was created rather of using a typical wheelchair. To ensure the quality of the finished product, a voice-activated wheelchair, the mechanic systems design process was adhered to in this project. The project included the following components: interface, testing, software, and hardware. It is claimed that this project uses human speech to operate a wheelchair. This project aims to make it easier for those with disabilities or impairments to move around.

1.1 Aim of the project

The goal of the proposed project is to create a voice-activated wheelchair that can precisely move and navigate in response to verbal commands. To guarantee safe operation, the system will have motor controllers, detectable obstacle sensors, and voice recognition modules. This solution is made to be affordable, easy to use, and appropriate for both indoor and outdoor settings. This wheelchair can greatly improve the mobility, self-assurance, and autonomy of people with physical disabilities by utilising voice technology, which promotes inclusive and accessible living. The goal of this project is to develop a wheelchair with features like low weight, low cost, and long range of travel.

- To make long-distance travel possible.
- Creating a prototype for a lightweight wheelchair.
- Writing a precise program that would be controlled by speech (using an Arduino) to run the project

1.2 Scope of the project

For them, the wheelchair remains the most dependable option. Because of this, wheelchairs are being manufactured with the latest advancements, which causes them to become electric wheelchairs. Insufficiently available manual wheelchairs require regular assistance from others for individuals with serious disabilities and are at a high risk of upper body injuries because of the wheelchair's mechanical limitations.

2. Methodology:

A smart smartphone is used to provide commands via voice. The Bluetooth Communication Module HC-05 is used to establish a Bluetooth connection with the Android phone. An array of strings is created from the voice command and sent to the Arduino Uno that is linked to it. After the Bluetooth Module gets the message, the microcontroller attached to it will extract and execute the command. The motors will then operate according with the commands supplied to the Motor Driver. Through an Android application, the system will decipher the commands and adjust the wheelchair accordingly. In the meantime, the ultrasonic sensor ensures that the passage is clear of barriers by monitoring obstacles within a 4-meter range while the circuit is turned on. If a problem arises, it alerts the Arduino and pauses the wheelchair until the operator gives another instruction.

2.1 Components Used

1. HARDWARE REQUIREMENTS:

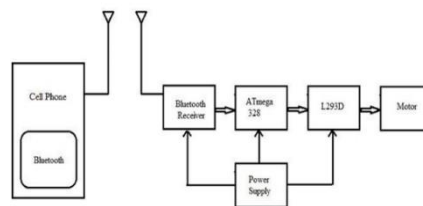
- i. Arduino Uno.
- ii. DC Gear Motors.
- iii. HC-05 Bluetooth Module.
- iv. Motor Driver L293D.
- v. Servo Motor.
- vi. 12V Battery.
- vii. Android Phone.

2. SOFTWARE REQUIREMENTS:

- i. Arduino Software (IDE).
- ii. Android Applications

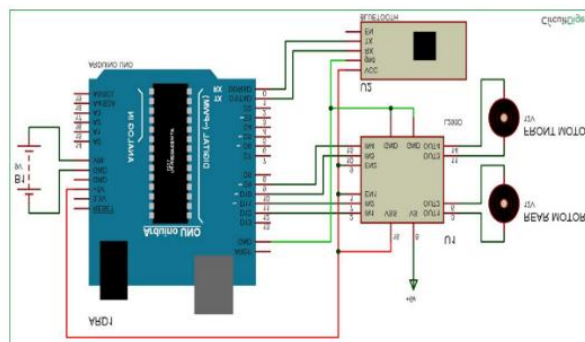
2.2 Block Diagram

This project represents the “Voice-controlled Wheelchair” for the physically disabled person where the voice command controls the movements of the wheelchair.

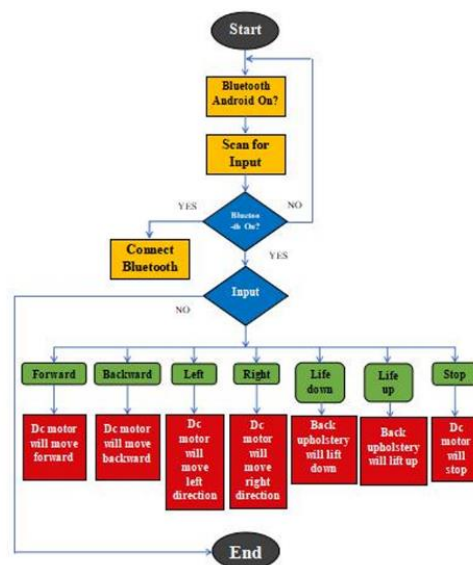


There are two elements to the system: software and hardware. An Arduino Uno board-based embedded system, a Bluetooth module, a motor driver, and a mobile device running Android make up the hardware architecture. By using voice commands to control the Android phone, the Bluetooth Module facilitates interaction between the user and the system. When an Android phone pairs via Bluetooth with the HC-05 Bluetooth Module, the user speaks the desired command to the "BT Voice Controller for Arduino voice (Arduino automation Application)" software program. An array of strings is created from the voice command and sent to the Arduino Uno that is linked to it. Once the Bluetooth Module gets the message, the microcontroller attached to it will extract and execute the command. The motors will then run in accordance with the commands delivered to the Motor Driver. Using an Android application, the system can interpret the commands and move the wheelchair accordingly..

2.3 Circuit Connection



2.4 Flow Chart



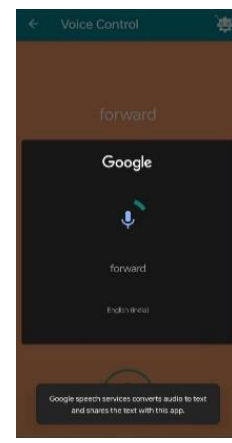
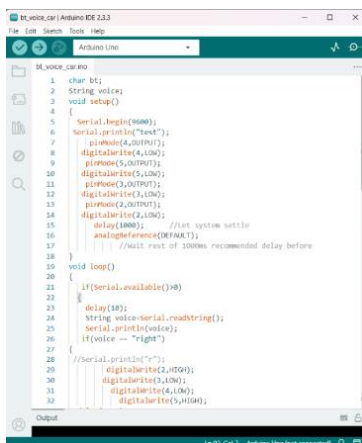
3. Implementation

Step 1: Programming the Arduino UNO board To upload the code, choose the Arduino UNO board and the COM port.

Step 2: Installing the application Install the Arduino Bluetooth Control app after downloading it.

Step 3: Interface of the application Click the settings button once this application has finished executing. After that, select "voice commands configuration" and add each command individually.

Step 4: Wheelchair control via voice commands. The Arduino Bluetooth control and the Bluetooth app are used to give voice commands. Examples include "GO," "BACK," "LEFT," "RIGHT," and "STOP." The wheelchair moves according to the provided command.



4. Advantages and Disadvantages

Advantages: 1. This can help a disabled person who is without legs become independent.

2. Less hardware will be required, thus it is easier.

3. Reduce Manpower: Because the wheelchair can be controlled by speech, there is less manual labour involved.

4. Automated operation: By using these techniques, the entire gadget may become completely automated.

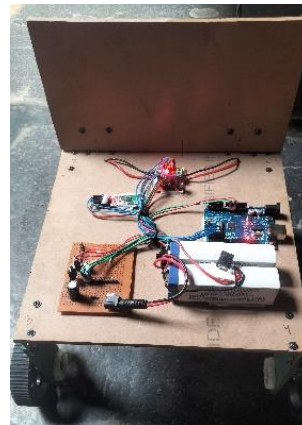
5. Bluetooth eliminates the need for wiring, which could make things more challenging for the elderly and disabled.

Disadvantages:

1. In a noisy location, it leads to complications.
2. It only acts to directs like Stop, Back, Left, and Right.

5. Result

After the power is turned on, the project will begin. The Bluetooth module with the project's mobile module need to be paired. Voice instructions are used to operate the wheelchair through smartphone apps. Voice instructions can be used to move it to the suitable location.

**6. Conclusion**

This article explains you to use a Bluetooth module to design and build a smart electronic wheelchair. The circuit performs perfectly to move in accordance with user commands. The circuit that allows those with physical disabilities to control their wheels via an Android application on their cellphones has been designed, tested, and verified. The microcontroller successfully controls the direction of control. Any command given through our mobile will be controlled by the wheelchair. This suggested system helps older and differently abled people become more independent.

Acknowledgement

We are happy to express our profound sense of gratitude and indebtedness to the Sir, Dr. Siva Satyanarayana, G. Pulla Reddy Engineering College (Autonomous) Kurnool, for his valuable and intellectual suggestions apart from the adequate guidance, constant encouragement right throughout our work, without which it would probably not possible for us to bring out this report in this form.

With a great sense of pleasure, we extend our gratitude to Dr. K. Sri Gowri, Professor and Head of the Electrical and Electronics Engineering Department, G. Pulla Reddy Engineering College (Autonomous): Kurnool, for providing necessary facilities to complete this project.

I would like to express our sincere gratitude to Dr. B. Sreenivasa Reddy, Principal, and Management of G. Pulla Reddy Engineering College (Autonomous): Kurnool, for providing the necessary facilities to complete this project.

REFERENCES :

- [1] "Wheelchair for Physically and Mentally Disabled Persons", Nirmal T M, International Journal of Electrical and Electronics Research, ISSN 2348 6988 (online), Vol. 2, Issue 2, pp: (112-118), April - June 2014
- [2] "Solar Powered Wheel Chair: Mobility for Physically Challenged", Arun Manohar Gurram, P.S.V Ramana Rao, Raghuveer Dontikurti, International Journal of Current Engineering and Technology, ISSN 2277 - 4106 Vol. 2, No.1, pp: (211-214), March 2012
- [3] "Design and Implementation of an Electric Wheel-Chair to Economics it with Respect to Bangladesh" by Humaira Salmin, Hafiz Rakibul, Pratik Kumar Kundu, B.M. Fahmid Jahur Shuvo, K.B.M. Nasiruzzaman and Rahman MD Moshior, International Journal of Multidisciplinary Sciences and Engineering, Vol. 5, No. 2, pp: (17-22), February 2014
- [4] M. Senthil Sivakumar, Jaykishan Murji, Lightness D. Jacob, Frank Nyange, M. Banupriya, "Speech controlled automatic wheelchair", Pan African International Conference on Information Science, Computing and Telecommunications, 2013
- [5] Shraddha Uddhav Khadilkar, Narendra Wagdanikar, "Android phone controlled Voice, Gesture and Touch screen operated Smart Wheelchair", IEEE, 2015.
- [6] Sachin S. Patil, Kiran N. Patil, Sanjay P. Patil: "Gesture based wheelchairs for physically disabled", it focus the hand movements and the hand gesture for controlling the wheelchairs.
- [7] Shubhangi P Patil, Seema G. Shirsikar, "Voice and Touchpad Operated Circuit for Wheel Chair".