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VOICE CONTROLLED AND JOYSTICK BASED WHEEL CHAIR FOR DIFFERENTLY ABLED PEOPLE

Haindavi Krishna*1, Srinidhi Emani*2, Rakesh Manapaka*3, Dr. S. P. V. Subba Rao*4

*1,2,3UG Students, Department Of ECE, Sreenidhi Institute Of Science And Technology, Hyderabad, India.

*4Professor, Department Of ECE, Sreenidhi Institute Of Science And Technology, Hyderabad, India.

ABSTRACT

This paper gives an automated wheelchair using voice recognition and joystick. A voice-recognized wheelchair makes it smooth for physically disabled people who can't control their hand movements. People who're suffering from ailments like paralysis, polio, or loss of hands and legs due to some accident need some artificial source with the assistance of which they could move. In order to reduce their hassle, we have developed a wheelchair which will function at the voice instructions given by the handicapped person for motion purpose. The voice instructions given by the handicapped will be first stored withinside the voice recognition module before using it so that the person other than the user can't provide a command to it. As an extra feature we are also providing a joystick when using voice recognition become problematic in noise defined places. The powered wheelchair relies upon motors for locomotion and voice recognition for command. The circuit incorporates an Arduino, Voice recognition module, and L298N motor driver. The Arduino board based on the Atmega328 microcontroller processes the data and determines which motor could be activated. Users also can extrude the route of the wheelchair through the joystick.

Keywords: Voice-Recognized, Joystick, Arduino Board, L298N Motor Driver.

I. INTRODUCTION

A wheelchair is a wheeled mobility tool wherein the consumer sits. The device is propelled either manually by pushing the wheels with the hands or via varied automatic systems. Wheelchairs are utilized by people for whom walking is troublesome or not possible due to illness, injury, or disability. People with walking incapacity usually ought to use a wheelchair. Unfortunately, day by day the quantity of disabled individuals goes on increasing because of road accidents. If an individual is handicapped, he's hooked into an alternative person for his day-to-day work like transport, food, orientation etcetera therefore a voice-operated wheelchair is developed which is able to operate mechanically on the commands from the handicapped user for movement purpose. Speech recognition is a popular topic in today's existence. The applications of Speech recognition may be determined everywhere, which makes our existence more effective. It also can lessen the cost of industrial manufacturing at an identical time. These gadgets can ease the lives of many disabled people, particularly people with extreme impairments by growing their range of mobility. The wheelchair may be managed by the use of a joystick as well as the use of voice commands. He / She simply needs to mention the route or pass the button for that route and the wheelchair moves withinside the desired route. There are 5 basic movements of a chair to be applied by the user. The 5 operations perform by the chair are described as following: 1) Moving forward 2) Moving backward 3) Turning to the right 4) Turning to the left 5) Stop condition. In hardware development, we are using a voice recognition module that correlates commands to do speech processing and gives the result to Arduino which is further programmed with respective locomotion commands.

II. METHODOLOGY

The joystick, microphone and the voice recognition module all get a 5v power and driver circuit will get 9.9V power source from the battery. The wheelchair user's verbal commands control this system. Because the technology is self-contained, the user does not need the help of another person to move the wheelchair. The user can give the wheelchair five basic commands, and the wheelchair will follow them. The user's verbal commands are recognized in the first step. Once the directions have been accepted, they are converted into equivalent instructions that drive the system. The voice recognizer, switch, joystick, Arduino and the motor are the driver main components of this system.

Voice recognition

For voice recognition, the speech recognition module is employed. The output of this recognizer is given to Arduino as an instruction, and a motor driver is used to drive the motors. In the speech-operated wheelchair, a unilateral microphone, voice recognition module, Arduino, and motors are employed. The system's input is the unilateral mic. It can accept voice commands from the user while remaining unaffected by surrounding noise. The mic will be placed where the user feels most at ease. The output was the speaker's voice, which was relayed to the speech recognizer, which connects the microphone to the Arduino. The Arduino receives the output from the voice recognition module and translates it to binary code. The system is unable to understand any language other than binary code. As a result, the produced voice command is converted into a format that can be read by machines. In this system, the Arduino UNO R3 is employed. The wheelchair is outfitted with motors that allow it to be driven anywhere. Motors are used to regulate the wheelchair's mobility. As a result, motors get input from the Arduino and move following the type of command. Four motors short circuited to left and right are connected to the motor driver in this setup. The five different commands that can be provided to the motors are forward, backward, left, right, and stop. The wheelchair's mobility is controlled by only these five commands. Any movement function is carried out by the wheelchair in response to the user's spoken instruction. The basic movement functions include forward movement, left and right turns and stopping. To recognize spoken words, the speech recognition processor must be taught with the word uttered by the user who will operate the wheelchair.

Switch

The switch is used to select the input (voice or joystick) from which the Arduino receives the qualities. A two 2 pin SPST switches are used to switch between the voice control or joystick. Joystick option also available, to used. Joystick will be switched off and the voice control will be switched on. command so that it will perform the action based on your voice. Now switch off the voice control and switch on the joystick. Only the action will be performing through Joystick. In that Option, the programming option is simply the same task that is using the If Else cases for each feature. Both the switches can be switched on and either of the features can also be used. Without switch off.

III. MODELING AND ANALYSIS

Components used are as below:

Hardware components:

1. Arduino UNO
2. Joystick
3. Two 2-pin SPST Switch
4. L298N Motor driver
5. Four 100rpm Motors
6. V3 Voice Controller
7. Three 3.3v Li ion battery

Software used:

- Arduino IDE

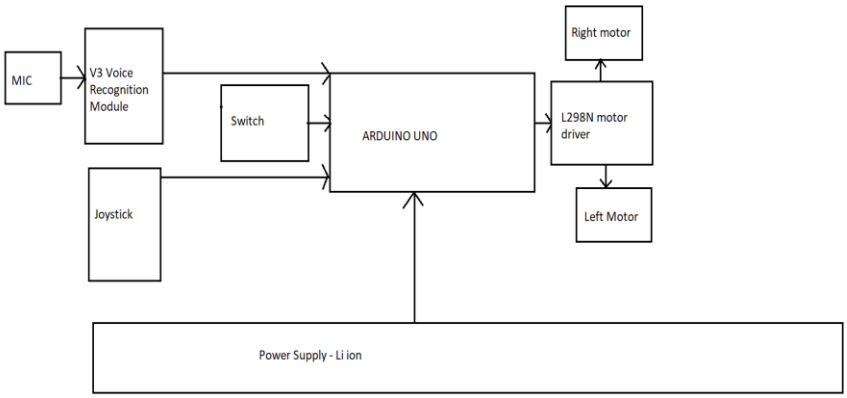

Figure 1: Block diagram of proposed system

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The suggested design includes a joystick and a V3 speech recognition module. The voice recognition module includes 12 switches, four of which control the wheelchair's journey and one of which stops it. When the wheelchair has a power supply, the user selects the mode of operation using the switch. When the speech mode is selected, the switch of the joystick is turned off. The user spells out the pre-programmed orders. The wheelchair's motors are activated when the Arduino detects this command. As a result, the wheelchair follows the path that has been chosen. When the wheelchair needs to be stopped, for example, the command "Stop" is user requirement. The voice recognition switch is turned off and the joystick switch is turned on when the subject picks the joystick as the information mode. In joystick mode, the joystick is pressed on the required quadrant to propel the wheelchair in the desired direction. Each quadrant of the joystick has a significant value for each course code in the Arduino. When the Arduino detects a certain value, it sends a signal to the motor driver via the yield port, which turns the motor on. Every mode of operation uses the same signal transmission and reception technique. The hand-off circuit is activated by a digital Pin switch. The wheelchair's DC motors, which are attached at the back, are powered by three 3.3V LI-ON Battery.

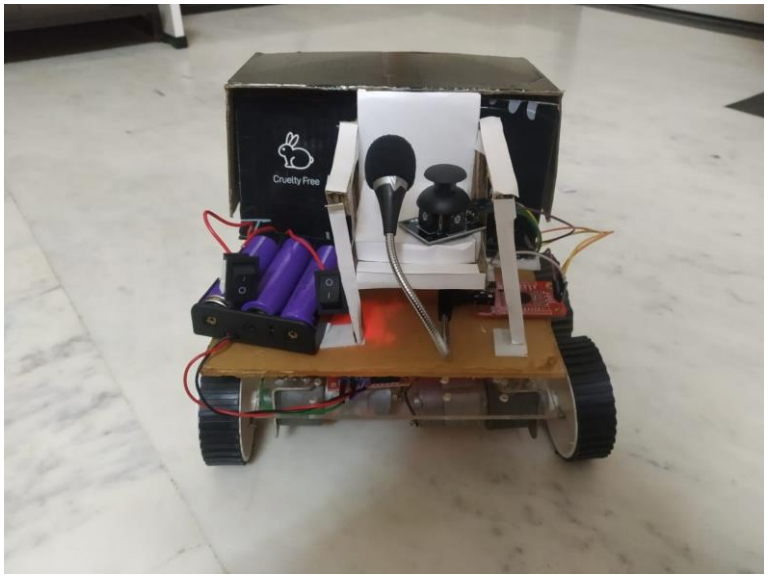

Figure 2: The image of our project

IV. RESULTS AND DISCUSSION

After the design and development of the self-automated wheelchair with its many interfacing modules, the project was tested for wheelchair movement using trained speech and also the joystick movement.

- This design is tested based on two important aspects: first, how accurate is the voice module and second, how the wheelchair moves w.r.t the commands given. Now the switch is on. The voice recognition system will first be put to the test in a quiet environment with only one user, the results are successful. It takes commands accurately.
- After that, the project was put to the test in a disturbing environment by few people nearby. When the noise was mild, the voice module had no trouble in recognizing, but when the noise is too loud, the recognizer struggled to recognise the user's voice and didn't take any commands. Sometimes it mistook the command and executed another one.
- Now the switch is low, The feature switches to joystick. We used joystick to move in all directions and it is successful with no obstacles.

V. CONCLUSION

The mechanism was successfully installed, allowing the wheelchair to move left, right, forward, backward, or remain stationary. This project aims to assist disabled people by giving alternative methods of controlling technology, such as a joystick or voice commands, which will benefit a wide range of disabilities. As a result, the wheelchair recognizes the signals from the control system and responds appropriately. We've created a smart wheelchair that uses voice and joystick control. It is simple to comprehend and process. It has two components that allow the wheelchair to move in response to human commands. If a patient is unable to move his or her

hands, voice commands can be utilized to navigate the wheelchair on their own. The joystick assists with manual control. Voice commands can be given with the use of a microphone. This technology gives the growing disabled population independent mobility as well as a variety of sophisticated features. Implementing neural network-based algorithms can boost the efficiency of the voice command control system even more.

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