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Voice Controlled Wheel Chair

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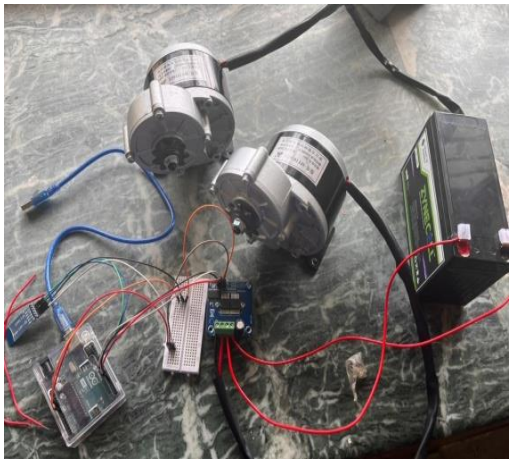
Abstract :The paper illustrates the design and implementation of a basic speech reconnaissance wheelchair for alm civilian users. We layered a Bluetooth-capable Arduino Uno heart to create a system built around safety and security. We did this by taking the spoken intent and translating it into mechanical work to mitigate needing as much manual control over things, as well .We discuss the build process – the areasoning behind our obstacle-avoidance algorithms and what physically feasible hands-free mobility looks like.

Keywords: Assistive Robotics, Voice UI, Bluetooth, Arduino Integration.

I. INTRODUCTION

For people with severe physical disabilities, the whole universe revolves around the restrictions that have been imposed on their movement. We have had power wheelchairs in the past but most of them involved fine motor movements which might prove to be challenging to some of the patients. Our project aims to develop a means for the patient to interact with his or her environment. Because of mobile phones and the versatility of Arduino Uno, our wheelchair is a listening wheelchair.



II. CONTEXT AND BACKGROUND

The ability to walk unaided is a fundamental aspect of human dignity. Repeatedly, independent mobility is associated with better self-esteem and mental health outcomes, especially among the elderly and those in early physical therapy. But there remains a gap for those users who are unable to use traditional joysticks because of tremors or muscle weakness . The current research is heading toward hands-free navigation. Some autonomous systems are very high-end but they are often too expensive. What we're doing is a middle ground: An inexpensive voice-driven interface that provides the safety of automated obstacle detection without the high cost of full-scale robotics..

III. LITREATURE SURVEY

To understand the effectiveness of our project we had to first understand the types of the existing wheelchair, their advantages, and their shortcomings. Some of the types of wheelchairs are: [1] Manual wheel Chair: Had to be manually operated. [2] Electric Wheel Chair: Controlled by a lever but not automatic.[3]Beach Wheel Chair: Good grip on sand but manual. [4]Airplane Wheel Chair: Additional strapping but manual.[5]Ergonomic Wheel Chair: Extremely comfortable but manual.[6]Pediatric Wheel Chair: Kid-size Wheelchair Semi-Automatic. [7]Reclining Wheel Chair: Can be tilted to a limited angle, [7]Wheel Chair Stretches: Can be opened to a stretcher. We even did our research

by reading a few of the papers and here are what we understood and used through those. We went through a paper that specified about the development of wheelchair that can be controlled by voice, eye or using joystick according to the severity of disability of handicap person.

It also features a warning system that analyses the patient real situation such as heart rate, temperature, etc and notifies the doctor regarding the same. It even has integrated robotic hand which helps the

IV. METHODOLOGY

The proposed system works by integrating a smartphone application, an Arduino Uno microcontroller, an ultrasonic sensor, and a DC motor driver (L298N). The smartphone application is used to send commands or control signals to the Arduino Uno microcontroller. The Arduino Uno acts as the main processing unit of the system.

patient for taking medicines and food. This study paper concentrates on the queries of the handicapped individual and tries to benefits but

After receiving the command from the smartphone application, the Arduino Uno processes the input and communicates with the ultrasonic sensor. The ultrasonic sensor detects obstacles or measures the distance between the system and nearby objects by transmitting ultrasonic waves and receiving the reflected signals.

Based on the distance measured by the ultrasonic sensor, the Arduino Uno sends appropriate control signals to the L298N motor driver module. The motor driver then controls the operation and movement of the DC motor according to the programmed conditions. If an obstacle is detected within a specified range, the motor can stop, slow down, or change direction to ensure safe operation.

This methodology enables wireless control and intelligent obstacle detection, making the system efficient and suitable for automation and smart monitoring applications

still restricts from the circumstance that it has larger battery charging time and less capacity to climb up the slope.

V. SUMMARY TABLE OF ALL THE JOURNAL

Sl.No	Title of thye paper/Author	Technologies used	Key finding	Gap
1	Design, manufacture, and Test a ROS Operated Smart Obstacle Avoidance Wheelchair	JOYSTICK/VOICE COMMANDS AND ULTRASONIC SENSORS	The motion command to the motors is complemented with the information from the ultrasonic sensors	it can't operate with both the joystick and the voice commands at the same time
2	Empowering the Disabled and Elderly: A Voice Control Unit for Assistive Technology	Node MCU,Arduino uno, ESP8266 Wi-Fi Module, Linear Actuator,Relay,DC motor	The proposed system depends on a direct command from the user, which can be accessed remotely via the Wi-Fi network.	The suggested system will be activated and controlled according to the user command that has been previously trained using the Voice Recognition Module,

3	Smart wheelchairs	Sensors,motor,soft ware applications.	To avoid obstacles, smart wheelchairs need sensors to perceive their surroundings. By far, the sensor most frequently used by smart wheelchairs	inexpensive sensor is developed that can detect obsta cles and drop-offs over a wide range of operating condi tions and surface materials, liability concerns will limit smart wheelchairs to indoor environments
4	A Wheelchair Control System Using Human Machine Interaction	Brain-computer interface (BCI), control, EEG signals, facial expressions, head movements, multi modal, single modal, wheelchair.	EPOC was used to collect facial expressions, head movements, and EEG signals. The signals were sent to the PC wirelessly.	the EEG signals are weak and may be affected by different sources such as physiological sources, which are generated from the body parts having an electric dipole such as heart, eyes, muscle,
5	Accelerometer Based Hand Gesture Controlled Wheelchai	Accelerometer, I2C, Hand gesture recognition, Wheelchair control, Wireless.	allows the users to use human gestures of movement like hands and synchronize them with the movement of the wheelchair so that they can use it with comfort and ease on all kinds of terrains	If wheelchair is to be moved in right direction then movement of hand should be in right direction giving the digital binary output

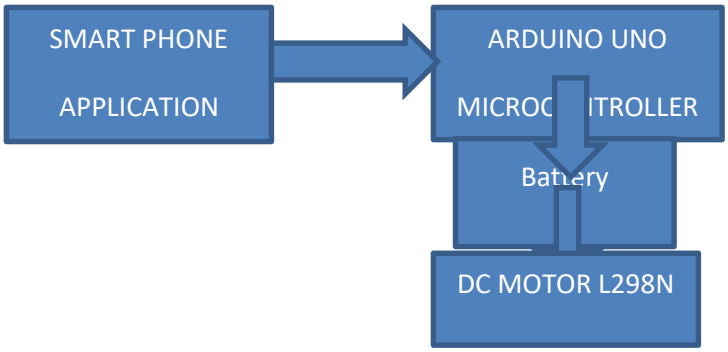


Fig:1 Block diagram of voice controlled wheelchair

VI. WORKING PRINCIPLE

The system works on the principle of voice recognition and wireless communication. The user gives commands such as “forward,” “backward,” “left,” “right,” and “stop” through a smartphone application. The application converts speech into text commands and sends them to the HC-05 Bluetooth module.

The Bluetooth module transfers the command to the Arduino UNO microcontroller. The Arduino processes the received data and controls the motor driver accordingly. The motor driver activates the DC motors to move the wheelchair in the desired direction

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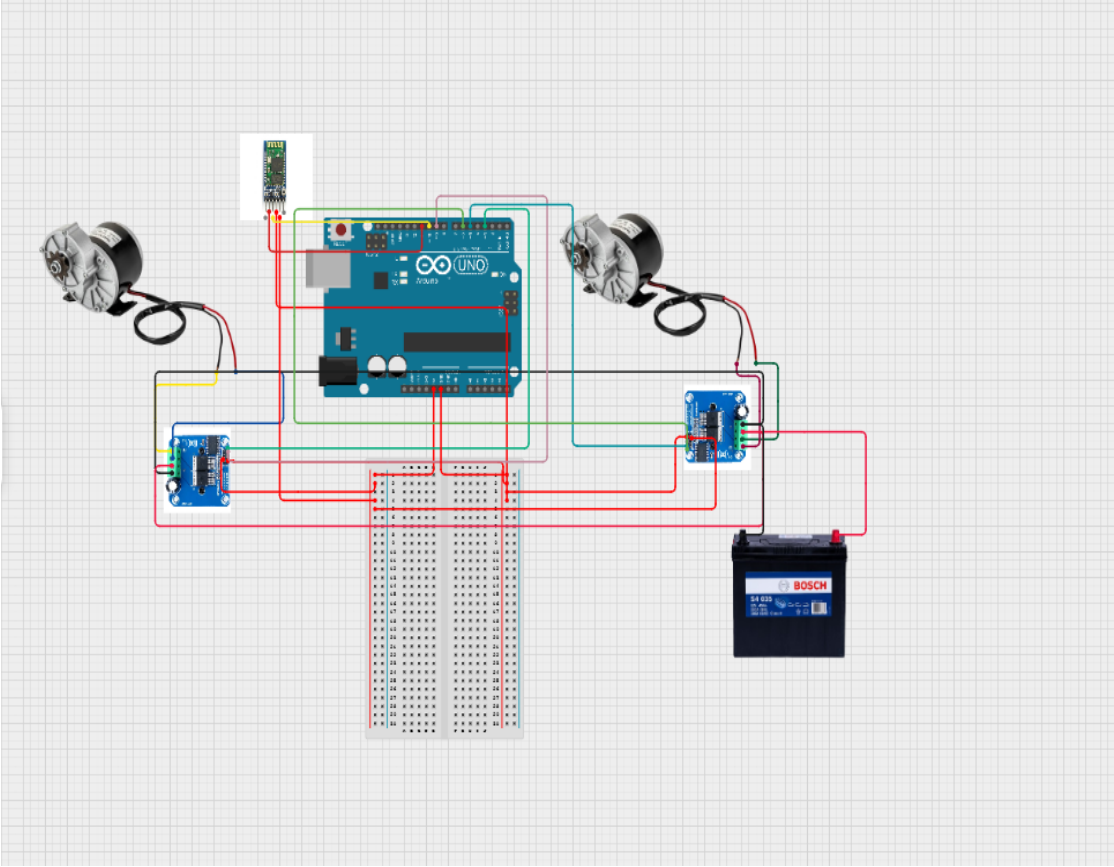
VII. EXPERIMENTAL PROCEDURE

1. All electronic components were connected according to the circuit design.
2. The Arduino UNO was programmed using Arduino IDE.
3. The HC-05 Bluetooth module was paired with the smartphone.
4. A voice control application was installed on the mobile device.
5. Different voice commands were spoken and tested repeatedly.
6. The movement of the wheelchair was observed and recorded.
7. Response time and accuracy of commands were analyzed.



A.The Processing Core

We selected Arduino Uno due to its reliability and open source flexibility. It acts as the central nervous system, receiving 'instruction packets' over bluetooth and deciding how to fire the motors.

FIG:1 arduino board

B. Design and Application of Wireless Logic

In this ecosystem, the smartphone is the primary sensor. Our app uses the phone's built-in microphone and voice-recognition APIs to capture speech and filter it into five core commands: Forward, Backward, Left, Right and Stop. These are sent directly to the Bluetooth receiver on the wheelchair.

C. Safety Interlocks

To avoid accidents we developed a "Safety First" logic. The Arduino pings the ultrasonic sensors before any motion command is given. If an object like wall or person is detected within 30cm, the system cancels the voice command and stops immediately.

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VIII. TECHNICAL SPECIFICATIONS

Bluetooth connectivity – Robocraze HC-05 Bluetooth module with 9600 Baud rate, 2.1 Mbps Data Rate, Operates on 2.4 GHz band for low latency communicationbetween user's chair.

Fig:bluetooth module

.**BTS 7960 H MOTOR Drive System**: A robust motor driver that takes care of the physical weight of the chair and user by regulating the voltage supplied to the DC motors.

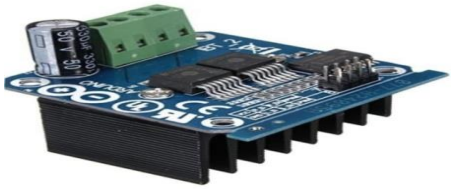

FIG:3 motor driver board

ELECTRIC MOTOR: xcluma Metal My1016Z2 250W .The motor is the mechanical heart of the system .It provides the leg for the movement of wheel**.**

FIG:4 motor

Rechargable Lithium Battery: Provide 11.1v nomial voltage and 1 2Ah capacity with BMS for various application. The PDB uses a regulator to "step down" that power, essentially turning that fire-hose pressure into a gentle, steady stream that the computer parts can handle safely.

FIG:5 battrey

IX. DATA AND OBSERVATIONS

In our testing phase we learned a few key things. The delay between a voice command and physical motion was minimal, under 200ms, which testers found natural. Second, the obstacle detection was important in "blind spots" that the user could miss a low-lying object. The mobile app interface was purposefully sparse so that users could operate it without looking. The voice-feedback loop alone told them which direction they were going and if they were safe.

X. CONCLUSION

The purpose of the smart wheelchair is to make technology an invisible assistant. We have moved the control scheme from the hands to the voice, opening up a new degree of freedom for those who have been left on the sidelines by traditional designs. This prototype demonstrates that we can create tools that don't simply move people but empower them with a modest budget and thoughtful engineering.

REFRENCE

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