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Ultrasonic Sensor-Based Voice-Activated Smart Wheelchair

Mr. M Arvind [1], Mr. A. Charlesmahimainathan [2]

[1] UG scholar, Department of Computer Technology, Sri Krishna Adithya College of Arts and Science
[2] Assistant professor, Department of Computer Technology, Sri Krishna Adithya College of Arts and Science

ABSTRACT :

The voice-controlled wheel chair system's primary goal is to suggest ways **to control a wheelchair using a speech recognition module**.

The system can be used to operate a wheelchair by voice command.

The goal of this project is to facilitate the movement of older individuals who are unable to move with ease as well as disabled or handicapped people.

This system's objective is to **lessen certain people's reliance on other people for daily needs** like movement.

The use of speech recognition technology will open up new possibilities for how people interact with tools and machines. Therefore, by utilizing speech recognition technology for the movement, the issues that they confront can be resolved.

I'm hoping that this **project will be incredibly beneficial**

To society , especially those who require this kind of technology

INTRODUCTION

We are utilizing an Android application and a voice recognition system in this project. However, many disabled people who require wheelchairs are happy with it. But, few people with disabilities find it hard or impossible to operate a regular motorized wheelchair.

Assistive technology includes this initiative. It is more independent, fruitful, and joyful for dependent and disabled people to live this way.

A wheelchair is necessary for a disabled person with locomotor impairments to do tasks that involve movement.

physically propelling the wheelchair, can be done by Most of the physically challenged people But some of them are physically unable to use manual controls or find them to be too taxing. Because of this, it would be ideal to give them a motorized wheelchair that they can operate by speaking directions. what **any language conveys**. This technology (wheelchair) can therefore be used by **people who do not speak English.** It can move at a reasonable speed because it's crucial for a motorized wheelchair to be able to automatically avoid obstacles in real time. For as many disabled people as possible, the **price of this motorized wheelchair is affordable**.

This concept outlines a wheelchair that can only be **operated via an Android application** and the user's voice. This project's primary goal is to aid with the movement of elderly persons and those with disabilities who have trouble moving around.

enabling individuals to live better lives without difficulty A vital tool that can help is speech recognition wheelchair control through human-machine interaction. This project consists of two components:

It has been realized that our Android phone acts as a middleman for human voice input. Within this project,

 Based on the input of a human voice, a wheelchair's movement is controlled by an Ardiuno kit.

SOFTWARE SPECIFICATION:

- Arduino Integrated Development Environment,
- Arduino bluetooth controller
- Google voice assistant.

HARDWARE SPECIFICATION:

- Arduino UNO,
- Motor Shield,
- Ultrasonic Sensor,
- bluetooth module (HC-05),
- Servo.

The Arduino Uno is an open-source microcontroller board created by Arduino.cc and first made available in 2010. It is based on the Microchip ATmega328P microcontroller. The board has sets of analogue and digital input/output pins that can connect to different expansion boards and other devices. It contains 6 analogue inputs, a 16 MHz ceramic resonator, 14 digital input/output pins (six of which can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button.
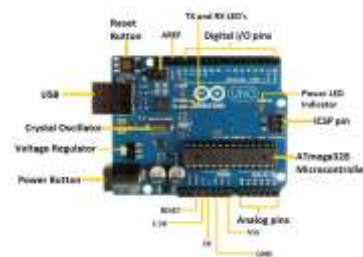

The Arduino Motor Shield

is based on the L298 datasheet, a twin full-bridge driver made to drive inductive loads including relays, solenoids, DC motors, and stepping motors. You may use your Arduino board to operate two DC motors, individually regulating each one's speed and direction. Additionally, you can assess each motor's current absorption.

In order for **Ultrasonic sensors** to function, a sound wave above the range of human hearing must be sent out. The sensor's transducer serves as a microphone for receiving and transmitting ultrasonic sound. Like many others, our ultrasonic sensors use a single transducer to transmit a pulse and receive the echo. By monitoring the amount of time that passes between delivering and receiving an ultrasonic pulse, the sensor can calculate the distance to a target.This module's basic operating concept is straightforward. It uses a 40kHz ultrasonic pulse that passes through the air and bounces back to the sensor if it encounters an obstruction or object. The distance can be determined using the travel time and sound speed.

The **Bluetooth module** is a technology that sets a standard for data transmission between devices and serves as an interface for wireless Bluetooth Low energy connections between any two devices. Typically, a short-range wireless connection is used to transmit files between tiny devices like mobile phones. It operates in the 2.45GHz range. Data may be sent at a rate of up to 1Mbps over a distance of ten meters. The HC-05 module may be used with a power source of 4-6V.
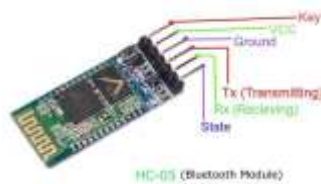
- **Enable** - This pin is used to configure the Data Mode or the AT command mode (set high).

- **VCC** - This is connected to a +5V power source.

- **Ground** - Associated with the electrical system's ground.

- **Tx (Transmitter)** - This pin transfers the received data serially.

- **Rx (Receiver)** - Used for transmitting serial data via Bluetooth.

- **State** - Used to determine whether Bluetooth is functioning properly.

Servomotor :

The rotary actuator or linear actuator known as a **servomotor** (or servo motor) enables precise control of angular or linear position, velocity, and acceleration. It comprises an appropriate motor connected to a position feedback sensor. It also needs a rather complex controller, frequently a special module created just for use with servomotors.
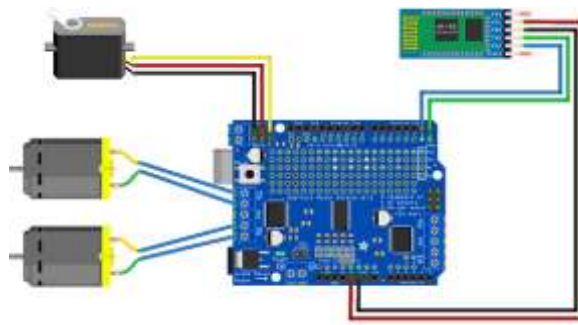

Although the word "servomotor" is frequently used to describe a motor appropriate for use in a closed-loop control system, servo motors are not a particular sort of motor.

Applications for servo motors include robotics, CNC equipment, and automated manufacturing.

Other hardware requirements

- DC MOTOR

- 12V BATTERY

- CONNECTING WIRES

- WHEELS

Circuit Diagram

System Research

EXISTING SYSTEM :

The majority of wheelchairs in use today are physically propelled models, making them difficult for most physically challenged people to operate without assistance from (or intervention from) others. There are wheelchairs with joystick controls for physically disabled people who are unable to operate a standard wheelchair on their own and always require assistance. But other persons with physical disabilities who couldn't use their arms to steer the wheelchair are still in pain. Even wheelchairs with joystick controls are not offered at reasonable prices. A very small number of wheelchairs are available with audio controls, although they are very expensive. Even they are not responsive to spoken commands in any other language other than English.

Additionally, the current smart wheelchair is significantly heavier than the standard wheelchair. It cannot be folded, so a special truck is required to transport it wherever the user goes. It also consumes more electricity and requires frequent recharging.

Drawbacks:

- Most wheelchairs now in use are not very clever.

- The other smart wheelchairs might be too expensive.

- They were also unable to support voice commands.

- They may be prohibitively expensive.

- Compared to manual wheelchairs, they are considerably heavier.

- They are challenging to move; you might need a special truck.

- Power utilization must be taken into consideration.

- They need ongoing upkeep.

- Learning how to use controls might be challenging

Proposed System:

This voice controlled system makes them more independent. Powered wheelchairs with the **standard joystick interface are unable to be controlled by many people.** A voice controlled wheelchair can provide easy access for **physical disabled persons who cannot control their movements, especially hands**. Particularly in this project, we increase the smart wheelchair's intelligence so that it may be **accessed using our own native languages**, such as (முன்னே செல் ,வலது,இடது, பின்னே செல், நில்). Any language's comments are possible. In order for someone who does not speak English can also utilize this smart device.This technology was added to a foldable wheelchair, making it more **portable and practical because it can be folded up like a regular wheelchair**.For someone who is physically challenged, this endeavor can be quite beneficial. We can also alter a few things in the **coding to make it even smarter for blind folks**. It can move automatically and use an ultrasonic sensor to **automatically detect impediments.**

This wheelchair's battery lasts for a very long time. Only a smaller amount of electricity is needed**.** By pulling the cable to the switch box, it can be recharged**. We don't want to often replenish the battery because the wheelchair's sensors, motors, and other components utilize very little electricity.**

Conclusion :

Our society will greatly benefit from the effort, especially those who need this kind of technology. The lives of those with physical disabilities would unquestionably change as a result of this. This benefits them greatly. individuals can move their wheelchair simply by talking (commanding), making them feel liberated, autonomous, and happier. It is not necessary for everyone to remark in English; they are free to do so in their own tongue. The wheelchair for blind people can move on its own with a few coding adjustments, and by employing an ultrasonic sensor to detect obstructions, it can lead people in the right direction.

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