



Voice-Controlled Smart Wheelchair

An intelligent Arduino-based wheelchair prototype that can be controlled via voice commands (Bluetooth) or operate autonomously as a line follower. Designed to enhance mobility and independence for people with disabilities.

Table of Contents

- [Features](#)
- [Hardware Requirements](#)
- [Wiring Diagram](#)
- [Installation & Setup](#)
- [Usage](#)
- [Code Structure](#)
- [How It Works](#)
- [Troubleshooting](#)
- [Contributing](#)
- [License](#)
- [Acknowledgments](#)

Features

- **Dual Control Modes**
 -  **Voice Command Control** via Android app (Bluetooth)
 -  **Autonomous Line Following** using IR sensors
- **Bluetooth 4.0 Connectivity** (HC-05/HC-06 module)
- **Adjustable Motor Speed** (PWM control)
- **Emergency Stop** functionality

- **Directional Control:** Forward, Backward, Left, Right

Hardware Requirements

Component	Quantity
Arduino UNO	1
L298N Motor Driver	1
HC-05/HC-06 Bluetooth Module	1
IR Line Sensors	2
DC Motors (12V)	2
Wheelchair Chassis	1
12V Battery	1
Jumper Wires	20+

Wiring Diagram

Arduino Pin	Connection	Description
2 (RX)	Bluetooth TX	SoftwareSerial RX
3 (TX)	Bluetooth RX	SoftwareSerial TX
5 (enB)	L298N enB	Motor B Enable (PWM)
6 (in4)	L298N in4	Motor B Input 4
7 (in3)	L298N in3	Motor B Input 3
8 (in2)	L298N in2	Motor A Input 2
9 (in1)	L298N in1	Motor A Input 1
10 (enA)	L298N enA	Motor A Enable (PWM)
A0	Right IR Sensor	Line following sensor
A1	Left IR Sensor	Line following sensor

Note: Connect the L298N outputs to the DC motors and ensure the battery is properly connected to power both the Arduino and the motors.

Installation & Setup

1. Clone the Repository

```
https://github.com/varunthej-8630/Voice-Controlled-Smart-Wheelchair-.git
```

2. Arduino IDE Setup

- Open the `.ino` file in Arduino IDE.
- No external libraries are required (uses built-in `SoftwareSerial`).
- Select **Arduino UNO** as your board and the correct COM port.

3. Upload the Code

- Connect your Arduino UNO to your computer.
- Click **Upload** in the Arduino IDE.

4. Hardware Assembly

- Assemble the wheelchair chassis.
- Mount the motors, IR sensors, and connect the L298N motor driver as per the wiring diagram.
- Connect the Bluetooth module and battery.

Usage

Bluetooth Pairing

1. Power on the wheelchair.
2. Pair your smartphone with the HC-05/HC-06 Bluetooth module (default password: 1234 or 0000).
3. Use a Bluetooth terminal app or a custom Android controller app to send commands.

Control Commands

Command	Action
1	Move Forward
2	Move Backward
3	Turn Left
4	Turn Right
5	Stop
6	Voice: Turn Left (400ms)
7	Voice: Turn Right (400ms)
8	Enable Line Follower
9	Manual Mode
21-255	Set Speed (PWM value)

Tip: Use the Android app to send these commands, or type them directly in a Bluetooth terminal.

Code Structure

- **SoftwareSerial** is used for Bluetooth communication.
- **PWM Pins (enA, enB):** Control motor speed.
- **IR Sensors (A0, A1):** Used for line following.
- **Mode Switching:** Switch between manual (Bluetooth) and automatic (line following) modes.
- **Functions:** `forword()`, `backword()`, `turnLeft()`, `turnRight()`, `Stop()` control the wheelchair's movement.

How It Works

1. **Manual Mode:**
 - Default mode. Use the app or terminal to send movement commands.

- Voice commands can also be sent as numbers (6 and 7 for left/right turns).

2. **Line Follower Mode:**

- Send command 8 to enable.
- The wheelchair follows a black line using two IR sensors.

3. **Switching Modes:**

- Send 9 to return to manual mode.
- Send 8 to activate line follower mode.

4. **Speed Control:**

- Send a value between 21 and 255 to adjust speed (default is 130).

Troubleshooting

• **Bluetooth Not Connecting:**

- Check wiring and power to HC-05/HC-06.
- Ensure correct pairing code.

• **Motors Not Moving:**

- Check L298N connections and battery voltage.
- Ensure correct pin mapping in code.

• **Line Follower Not Working:**

- Test IR sensors separately.
- Adjust sensor placement for better line detection.

Contributing

Contributions are welcome!

- Fork the repository

- Create a new branch for your feature or bugfix
- Submit a pull request

License

This project is licensed under the MIT License.

See the [LICENSE](#) file for details.

Acknowledgments

- Arduino Community & Documentation
- L298N Motor Driver Library
- HC-05 Bluetooth Module Guides
- Inspiration from open-source smart mobility projects

Made with ❤ by [varunthej.p]