
Assembly Guide for Gesture-Controlled Robot

Introduction

This guide will walk you through the process of assembling the robot chassis and the glove. By following the steps outlined below, you will be able to create your own gesture-controlled robot powered by the ESP32 microcontroller and the MPU6050 sensor.

Required Tools and Components

Tools:

- Soldering iron and solder (if required)
- Screwdriver
- Hot glue gun or double-sided tape
- Wire cutters and strippers
- Needle-nose pliers

Components:

- ESP32 (x2)
 - MPU6050 sensor
 - L298N Motor Driver
 - DC Motors (x2)
 - Robot Chassis
 - Wheels (x2)
 - Jumper Wires
 - Battery pack
 - Micro-USB cable
 - Resistors and capacitors (optional)
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Section 1: Assembling the Glove with the MPU6050 Sensor

1. Prepare the Glove:

- Choose a glove that is comfortable and has enough space to hold the MPU6050 sensor.
- If the glove is too tight, consider using a larger size or modifying it slightly to hold the sensor securely.

2. Mount the MPU6050 Sensor:

- Attach the MPU6050 sensor to the back of the glove using double-sided tape or a small pouch.
- Ensure the sensor's axes are aligned with the hand's movement for optimal gesture detection.
- Use a small piece of velcro or tape to hold the sensor securely in place.

3. Connect the Wires:

- Use jumper wires to connect the MPU6050 to the ESP32. Follow the wiring diagram provided in the resources section.
- Solder the wires (if necessary) to ensure a secure connection between the ESP32 and the MPU6050 sensor.
- Ensure the connections are stable and the wires are properly insulated to avoid any short circuits.

4. Test the Sensor:

- Before assembling the rest of the glove, connect the ESP32 and test the MPU6050 sensor using the provided code to make sure it's working as expected.
- Use the serial monitor to check the raw sensor data and verify the readings.

Section 2: Assembling the Robot Chassis

1. Prepare the Robot Chassis:

- Start by assembling the robot chassis. Many kits come with pre-drilled holes to make this process easier.
- Attach the two DC motors to the motor mounts on the chassis using screws or adhesive.
- Place the wheels onto the DC motors' shafts and secure them tightly.

2. Mount the Motor Driver (L298N):

- Attach the L298N motor driver to the chassis using screws or double-sided tape.
- Ensure the motor driver is securely fastened to prevent it from moving during operation.
- Connect the motor driver to the DC motors using jumper wires or soldered connections. Refer to the wiring diagram for details.

3. Install the ESP32:

- Secure the ESP32 to the chassis in a convenient location. You can use screws or double-sided tape.

- Ensure the ESP32 has enough space for proper airflow and access to its pins for connecting other components.

Section 3: Wiring and Connections

1. Connect Motors to L298N:

- Wire the DC motors to the motor outputs on the L298N motor driver.
- Follow the wiring diagram to connect the motor driver's input pins to the ESP32 for controlling motor movement.

2. Wire the Power Supply:

- Connect the battery pack to the motor driver and the ESP32 to provide power to the robot and glove.
- Be sure to connect the ground pin of the battery to both the ESP32 and the motor driver to complete the circuit.

3. Wire the ESP32 to the Glove:

- Use jumper wires to connect the ESP32 (on the robot) to the glove's ESP32. This is how the robot will receive commands sent by the glove's motion sensor.

Section 4: Testing and Calibration

1. Test the Motor Functionality:

- Power on the robot and check if the motors respond to the commands sent from the glove.
- Test each direction (forward, backward, left, right) to ensure that the robot responds correctly.

2. Calibrate the Sensor:

- If needed, calibrate the MPU6050 sensor to improve gesture accuracy.
- Adjust the sensitivity in the code to ensure the robot accurately responds to hand movements.

Section 5: Finalizing the Project

1. Secure All Components:

- Use hot glue, screws, or zip ties to secure all components in place. Ensure that the ESP32, motor driver, and battery pack are all securely mounted.
- Double-check that all connections are stable and properly insulated.

2. Mount the Glove and Test:

- Wear the glove and test the entire system. Perform gestures (left, right, forward, backward) and ensure that the robot moves as expected.
- If there are any issues, troubleshoot the sensor or wiring based on the provided troubleshooting guide.

Conclusion

Congratulations! You have successfully built your own gesture-controlled robot using the ESP32 and MPU6050 sensor. You can further enhance this project by adding more advanced features like obstacle avoidance, improved gesture recognition, or even integrating a camera for vision-based control.
