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# Smart Gesture Controlled Robot

## Introduction

The gesture-controlled robot project was initiated with the goal of designing and developing a robot that can be controlled using hand gestures. The project aims to demonstrate the feasibility of using gesture recognition technology for robotic applications, with potential applications in both consumer and industrial settings.

WEEK 1: Collection of components along with the theoretical study for project.

WEEK 2: Software part completion including simulations on tinkercad.

WEEK 3: Complete hardware connections.

WEEK 4: Continuous testing + debugging

## Hardware Development

### Robot Structure:

- Chassis and wheels form the base of the robot.  
- Four single-axis gear reducer motors attached to the wheels.  
- An NRF24L01 transceiver module acts as a receiver.  
- An Arduino Uno reads the received signals and sends corresponding instructions to the motor driver.  
- An L298N Dual H-Bridge motor driver controls the motors attached to the wheels.

### Gesture Control System (Fitted on a Glove):

- An MPU6050 accelerometer detects the orientation of the hand.  
- An Arduino processes the accelerometer's signals and communicates via a Bluetooth module.  
- An NRF24L01 transceiver module serves as a transmitter.

### Additional Components:

- Breadboard  
- HC-05 Bluetooth Master Module  
- Switch  
- Male-to-Male Jumper Wires  
- Hard Jumper Wires  
- Battery Clip  
- 9V Battery  
- Nuts and Bolts  
- On/Off Switch  
- Battery Holder (2 Cell)  
- Two Battery Cells

## Software Development

- A program is developed to capture and process real-time acceleration data from the hand to recognize hand gestures and serve as the transmitter unit.  
- Another program interprets the accelerometer readings and maps them to the robot’s movement in a specific direction.  
- The car can be controlled remotely via a Bluetooth module, enabling users to control movement using various hand gestures.

## Testing and Safety Considerations

- Test the robot by moving the glove in different directions and observing the corresponding movement.  
- Take precautions while handling lithium-ion batteries, as improper usage can be hazardous.  
- If any issues arise, check the wiring and refer to the schematic for troubleshooting.  
- Optimize the setup for better stability and communication.

## Conclusion

The smart gesture-controlled robot is an innovative project that integrates electronics, programming, and mechanics. By following the detailed steps, one can successfully build a functional model. As gesture control technology advances, similar projects can serve as the foundation for further development in automation and robotics.