**Physical Robot Assembly Guide**

**Materials Required**

1. Chassis: 15 cm x 10 cm custom chassis (designed in Tinkercad or 3D-printed).
2. DC Motors with Encoders: 2 x 6V DC gear motors with encoders for speed feedback.
3. IR Sensors: 3 x IR sensors (e.g., Tracker Sensor Module V2.1) for line detection.
4. Caster Wheel: 1 x small passive caster wheel (2-3 cm diameter) for front stability.
5. Motor Driver: 1 x L298N Dual H-Bridge Motor Driver.
6. Battery: 1 x 7.4V 2000mAh LiPo battery (e.g., Qoltec 53041).
7. Small Breadboard: For prototyping and connecting components.

**Assembly Steps**

1. Prepare the Chassis
   * 3D-print or assemble the 15 cm x 10 cm chassis. Mount the castor wheel at the front center (7.5 cm from edge) using screws or glue for stability.
2. Install DC Motors with Encoders
   * Attach the two 6V DC motors with encoders to the rear of the chassis (2 cm from the back, 4 cm apart) using motor brackets. Connect the encoder wires to the breadboard for speed feedback.
3. Mount IR Sensors
   * Secure the three IR sensors on the chassis underside, centered along the front edge (1 cm from the front), spaced 2-3 cm apart. The middle sensor aligns with the centerline.
4. Connect L298N Motor Driver
   * Wire the DC motors to the L298N: Motor 1 to OUT1/OUT2, Motor 2 to OUT3/OUT4. Power the L298N with the battery (VCC to +, GND to -). Connect L298N control pins (IN1, IN2, IN3, IN4) to the breadboard.
5. Add Battery and Breadboard
   * Secure the 7.4V LiPo battery on top using tape. Connect it to the L298N and breadboard. Use the small breadboard to link ESP32 pins, IR sensors, and L298N control lines.
6. Test Connections
   * Verify motor and sensor wiring on the breadboard. Ensure the battery powers the system without short circuits.

**Tinkercad Access link:** [**https://drive.google.com/file/d/1xkYJ7DJXoY1nE-JQyHj5pkmbx07N8pxr/view?usp=sharing**](https://drive.google.com/file/d/1xkYJ7DJXoY1nE-JQyHj5pkmbx07N8pxr/view?usp=sharing) **Circuit simulation Link:** [**https://app.cirkitdesigner.com/project/d4ed7335-5575-48ff-84bf-b90aabfc4b4b**](https://app.cirkitdesigner.com/project/d4ed7335-5575-48ff-84bf-b90aabfc4b4b)