User manual (quick start)

Assembly & wiring

1. Mount motors to chassis, attach wheels and caster. Secure L298N near motors.
2. Wire motors to L298N OUT terminals. Tighten screws.
3. Connect battery pack to switch and to L298N motor terminal. Add 220 µF cap across motor supply.
4. Set up buck converter input to battery (after switch) and ground; adjust to 12 V; wire 5 V out to ESP32 VIN and optionally L298N logic 5V. Share common ground.
5. Connect the Arduino Nano BLE 33 Sense pins as specified above: motor IN, EN, ultrasonic sensors TRIG/ECHO pins in the ESP32. Connect LEDs via 220 Ω resistors to ESP32 pins.
6. Connect Serial2 RX/TX to remote UART to both microcontrollers. Ensure TX->RX and RX->TX cross.
7. Program ESP32 and Arduino Nano BLE 33 Sense using USB cable with the provided code.

Power up

- Flip power rocker ON. `LED_POWER` should show power. If Bluetooth credentials were entered, the app will require Bluetooth connectivity to the device.

Connect & control

- Pair your phone with the device, this will be used in the app as well just before use. Use buttons to command robot.

Safe operation

- Begin with no-load motors and low speed (`SPEED 120`) when calibrating.
- Test ultrasonic sensing and obstacle avoidance by slowly approaching obstacles.
- Never allow people to be very close to moving parts; this is an assistive demonstrator, not certified medical equipment.