LewanSoul TurboPi Robot Car

LewanSoul TurboPi Robot Car Instruction Manual

Model: TurboPi Robot Car

Introduction

The LewanSoul TurboPi Robot Car is an advanced, programmable AI vision robot designed for educational and hobbyist use. It is compatible with Raspberry Pi 5 and 4B (Raspberry Pi board not included). This manual provides essential information for assembly, operation, and maintenance of your TurboPi Robot Car.

Safety Information

- Keep small parts away from children to prevent choking hazards.
- Ensure all connections are secure before powering on the device.
- Use only the recommended power supply and batteries.
- Avoid exposing the robot to water or extreme temperatures.
- Adult supervision is recommended for users under 14 years of age.

What's in the Box

The TurboPi Robot Car kit includes the following components:

- TurboPi Robot Car chassis and structural components
- Mecanum wheels (4)
- TT motors (4)
- Anti-blocking servos (2)
- HD wide angle camera
- Glowy ultrasonic sensor
- 4-channel line follower
- Lipo batteries (2)
- Battery holder case

- Battery charger + USB cable
- USB camera cable
- 4PIN wires (20cm)
- Screwdriver and various screws
- Balls (for testing color recognition)
- Raspberry Pi 5 expansion board (if included in specific kit variant)
- Active heatsink + Thermal silicone pads (if included in specific kit variant)
- Raspberry Pi 5 boardcard reader and 32G TF card (Optional, only included in TurboPi with Raspberry Pi kit)

Note: Raspberry Pi board is NOT included in the standard kit and must be purchased separately.

Image: All components included in the TurboPi Robot Car kit, excluding the Raspberry Pi board.

Image: A comprehensive layout of all parts and tools included in the TurboPi kit.

Specifications

Feature	Detail
Product Dimensions	7.36 x 5.47 x 5.47 inches
Item Weight	2.03 pounds
Item Model Number	Without Raspberry Pi
Manufacturer Recommended Age	14 years and up
Batteries	1 Lithium Ion battery required (included)
Camera Resolution	480p
DOF of Camera Pan-Tilt	2DOF, horizontal rotation angle 180°, vertical rotation angle 130°
Power Supply	2* Lipo batteries
Working Life	Approximately 60 minutes
Hardware	Raspberry Pi and Raspberry Pi expansion board
Software	VNC software (PC) + WonderPi APP (iOS/Android)
Communication Method	Wi-Fi, Ethernet
Servo	LFD-01 anti-blocking servo
Control Method	PCI phone control

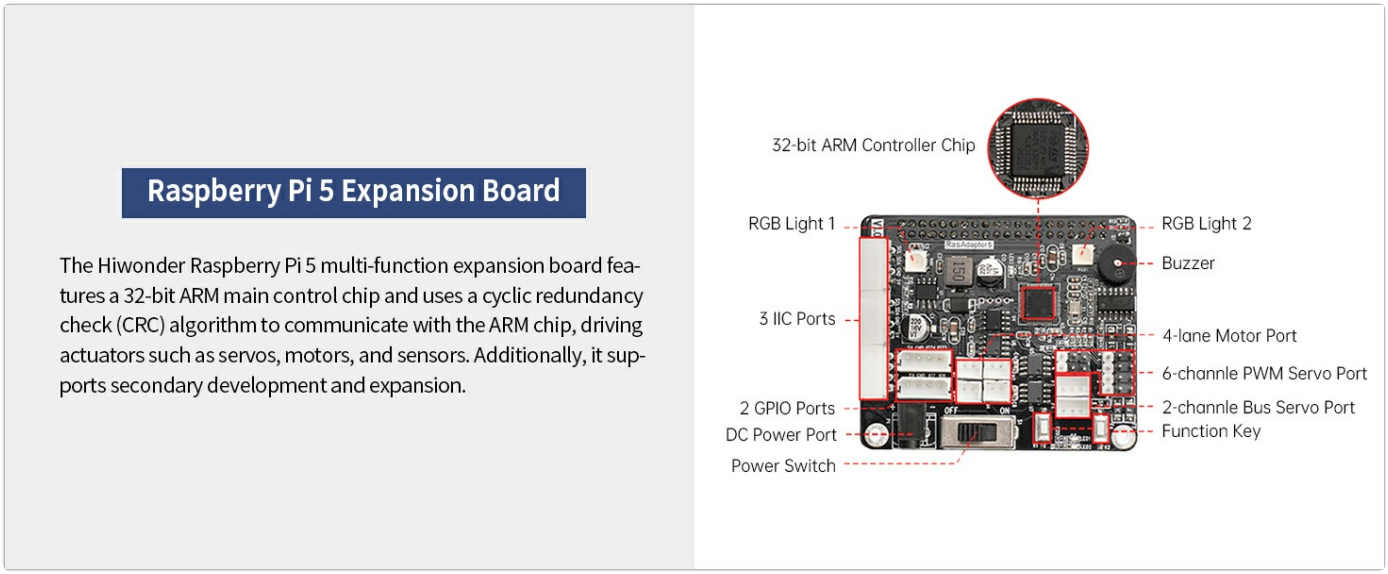

Image: Technical specifications and dimensions of the TurboPi Robot Car.

Setup and Assembly

Assembly of the TurboPi Robot Car requires careful attention to detail. Refer to the official online assembly guides and videos provided by LewanSoul for step-by-step instructions. A general overview of the process includes:

1. **Chassis Assembly:** Connect the main structural components to form the robot's base.
2. **Motor and Wheel Installation:** Attach the TT motors and Mecanum wheels to the chassis.
3. **Sensor and Camera Mounting:** Install the HD camera, ultrasonic sensor, and line follower module.
4. **Servo Installation:** Mount the pan-tilt servos for camera movement.
5. **Raspberry Pi and Expansion Board:** Securely install your Raspberry Pi (5 or 4B) onto the expansion board, ensuring proper heat dissipation with the heatsink and thermal pads.
6. **Wiring:** Connect all electronic components (motors, servos, sensors, camera, batteries) to the Raspberry Pi expansion board according to the wiring diagram.
7. **Battery Installation:** Place the Lipo batteries into the battery holder and connect them to the power input.

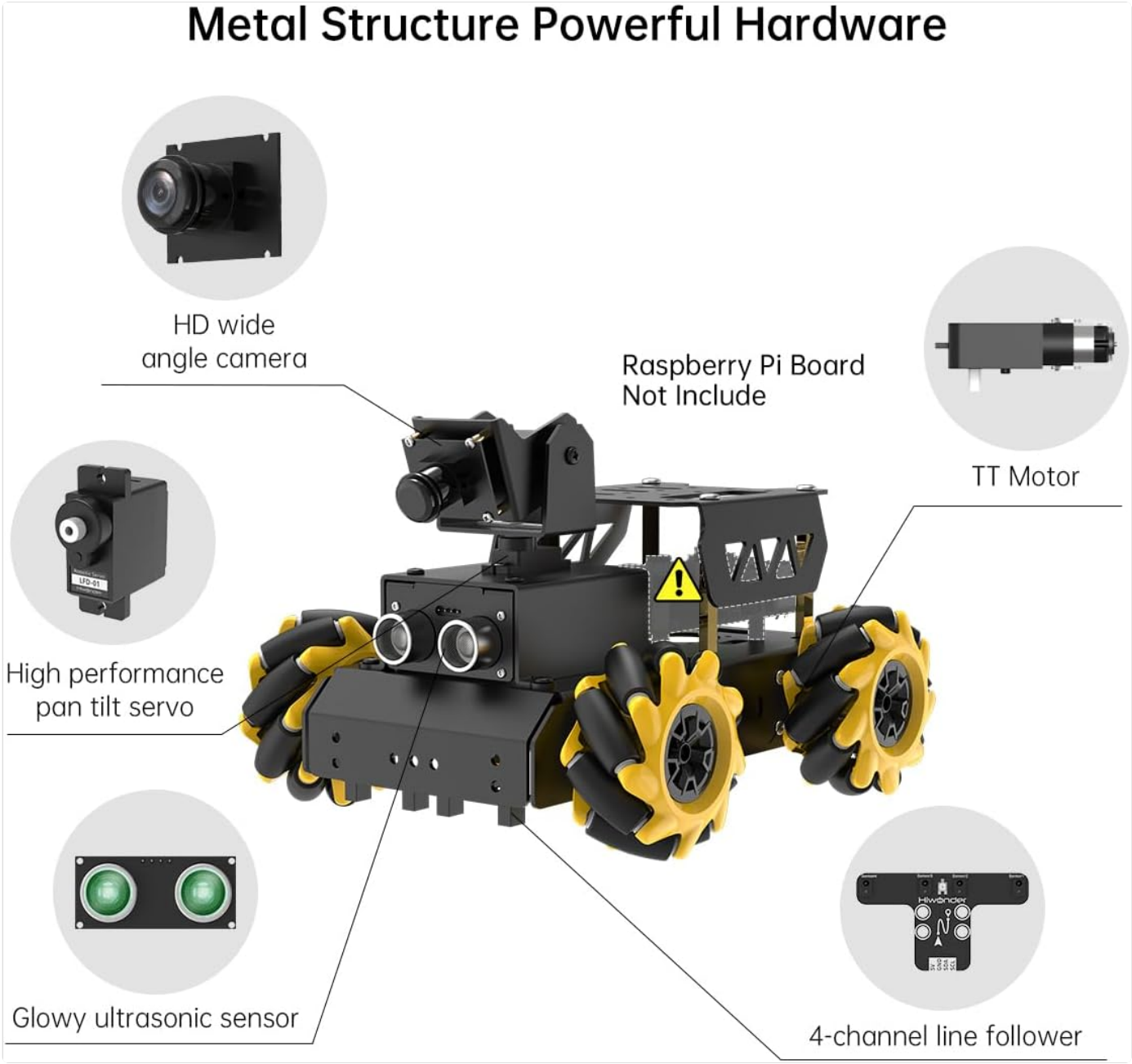

Image: Key hardware components of the TurboPi Robot Car.

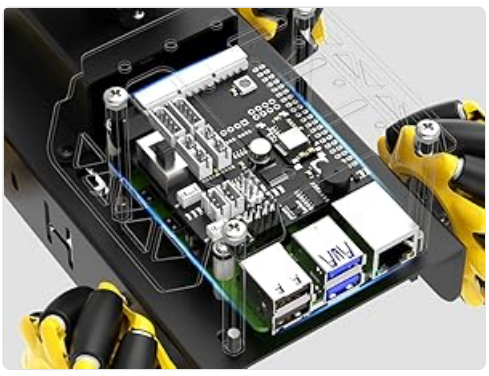

Image: Raspberry Pi 5 control system and expansion board installation diagram.

Image: Hands assembling the robot, demonstrating the physical build process.

Software Installation and Configuration

After physical assembly, you will need to install the operating system and software onto your Raspberry Pi. This typically involves:

- **Flashing the SD Card:** Download the official TurboPi image from the LewanSoul website and flash it onto a microSD card (32GB recommended).
- **Initial Boot and Setup:** Insert the SD card into your Raspberry Pi and power on the robot. Follow the on-screen instructions for initial setup.
- **Wi-Fi Configuration:** Configure the Wi-Fi settings to connect your TurboPi to your local network. Note that some initial images might have region-specific Wi-Fi settings; adjust as necessary for your location.
- **Software Updates:** Ensure all software and libraries (e.g., OpenCV) are up to date.

Operating Instructions

1. Wireless App Remote Control

The TurboPi can be controlled wirelessly using a dedicated app available for iOS and Android devices. This app provides an intuitive interface for controlling the robot's movement, camera, and various functions.

Image: The TurboPi Robot Car being controlled via a smartphone app, with a laptop displaying Python code.

Image: A user interacting with the TurboPi control application on a smartphone.

2. Omnidirectional Movement

Equipped with Mecanum wheels, the TurboPi can achieve flexible 360° omnidirectional movement. This includes moving forward, horizontally (strafing), diagonally, and rotating in place. This capability allows the robot to navigate complex

environments with ease.

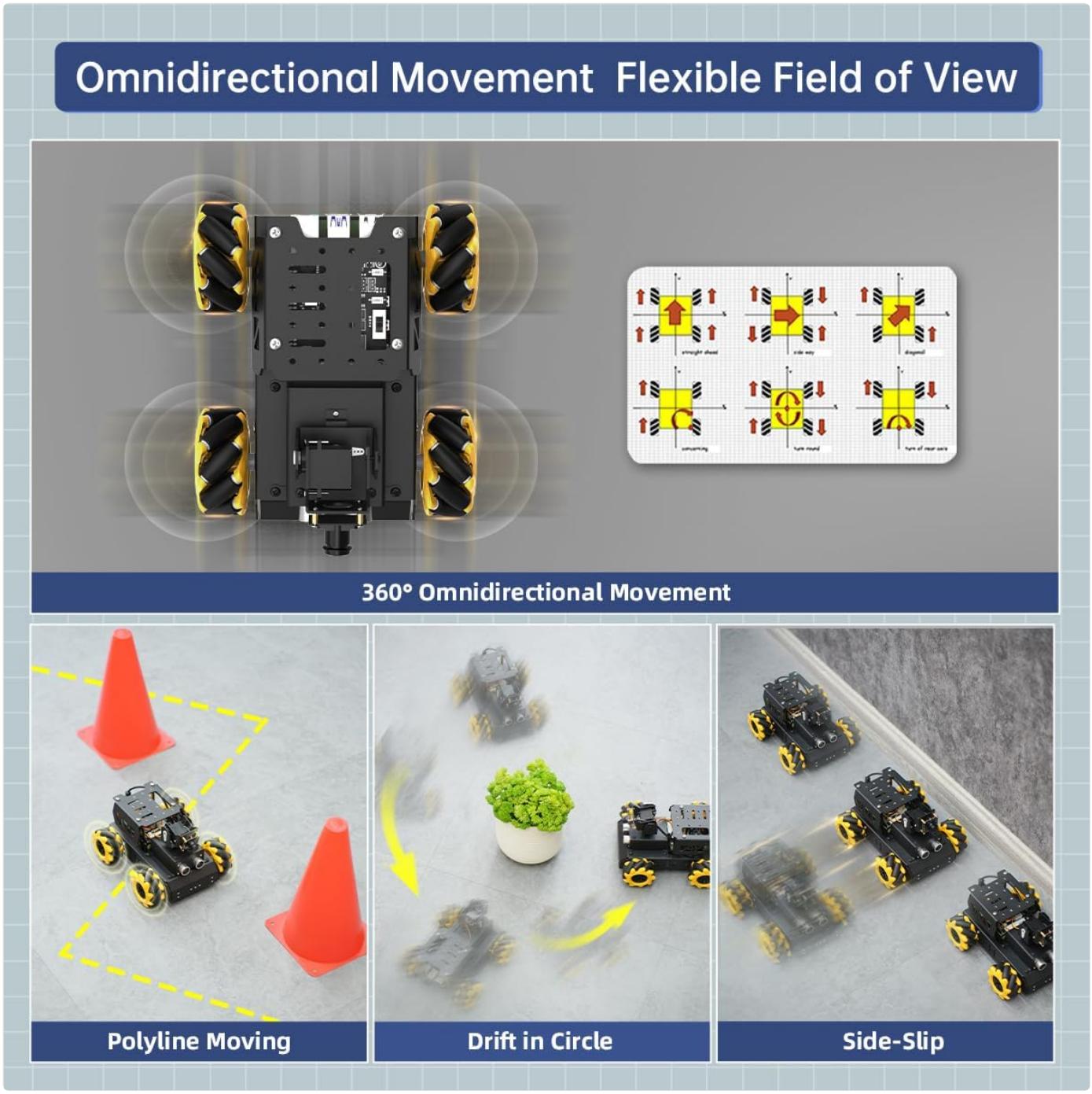

Image: Visual representation of the TurboPi's omnidirectional movement capabilities.

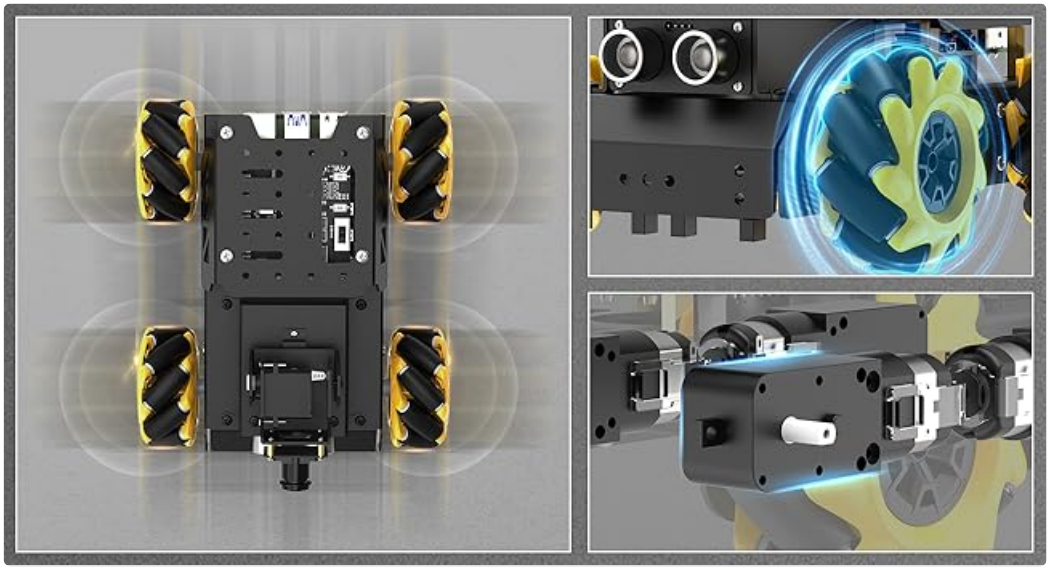

Image: Detailed view of the Mecanum wheels and motor assembly, enabling 360-degree movement.

3. AI Vision Recognition and Tracking

The TurboPi integrates an HD camera and the OpenCV library for advanced image processing. This enables various AI applications:

- **Color Sorting:** Identify and track objects based on their color.
- **Target Tracking:** Follow specific objects within its field of view. The pan-tilt camera allows for a 130° vertical and 180° horizontal range of motion.
- **Gesture Recognition:** Interpret hand gestures for interactive control.
- **Face Detection:** Recognize and track human faces.
- **QR Code Recognition:** Read QR codes to trigger specific actions.

Image: The TurboPi demonstrating object tracking with a red ball, and the corresponding app interface.

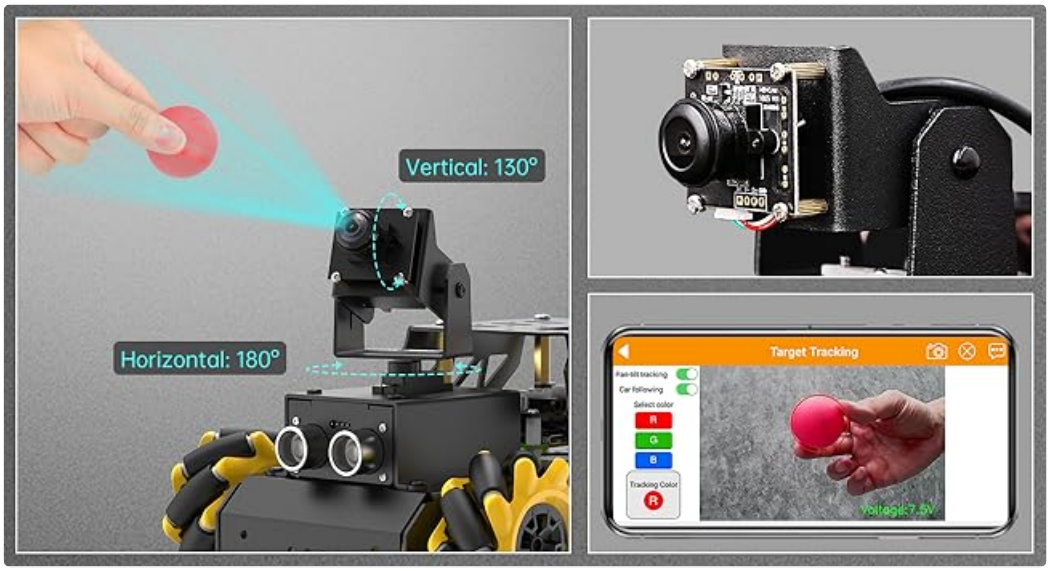

Image: Detailed view of the camera's pan-tilt mechanism and its ability to track objects.

Image: The robot tracking a green plant, demonstrating target tracking capabilities.

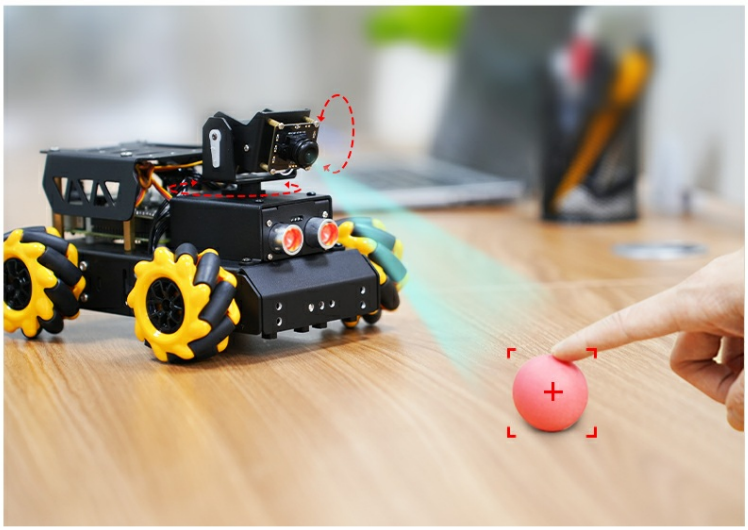

Image: Examples of gesture recognition, face detection, and QR code control.

4. Line Following and Autonomous Driving

The TurboPi can follow lines using its 4-channel infrared line follower or through AI vision with its camera. This enables autonomous navigation, including recognizing traffic lights and road signs.

Image: The TurboPi demonstrating line following and autonomous driving scenarios.

Image: The robot's autonomous driving capabilities, including traffic light and road sign recognition.

5. Obstacle Avoidance

The integrated glowy ultrasonic sensor allows the TurboPi to detect and avoid obstacles in its path without heavily utilizing the Raspberry Pi's CPU resources.

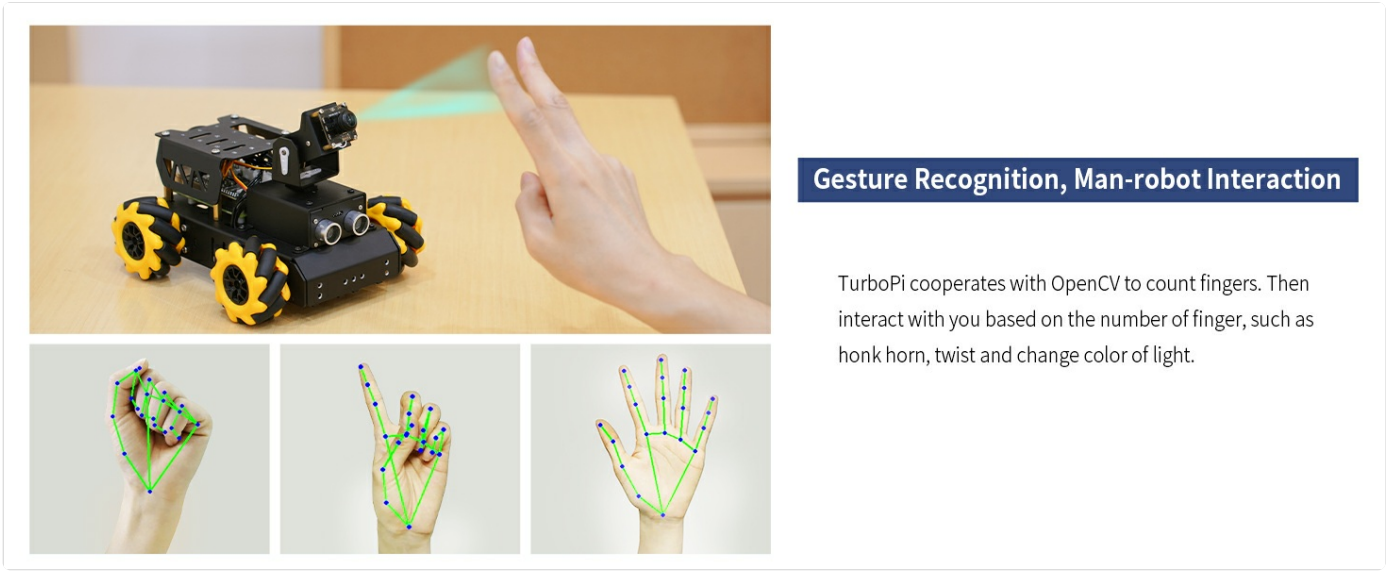

Image: The TurboPi demonstrating obstacle avoidance using its ultrasonic sensor.

6. Python Programming

The TurboPi is designed for programming in Python, leveraging the Linux environment of the Raspberry Pi. LewanSoul provides open-source Python programs and an SDK to facilitate learning and custom development.

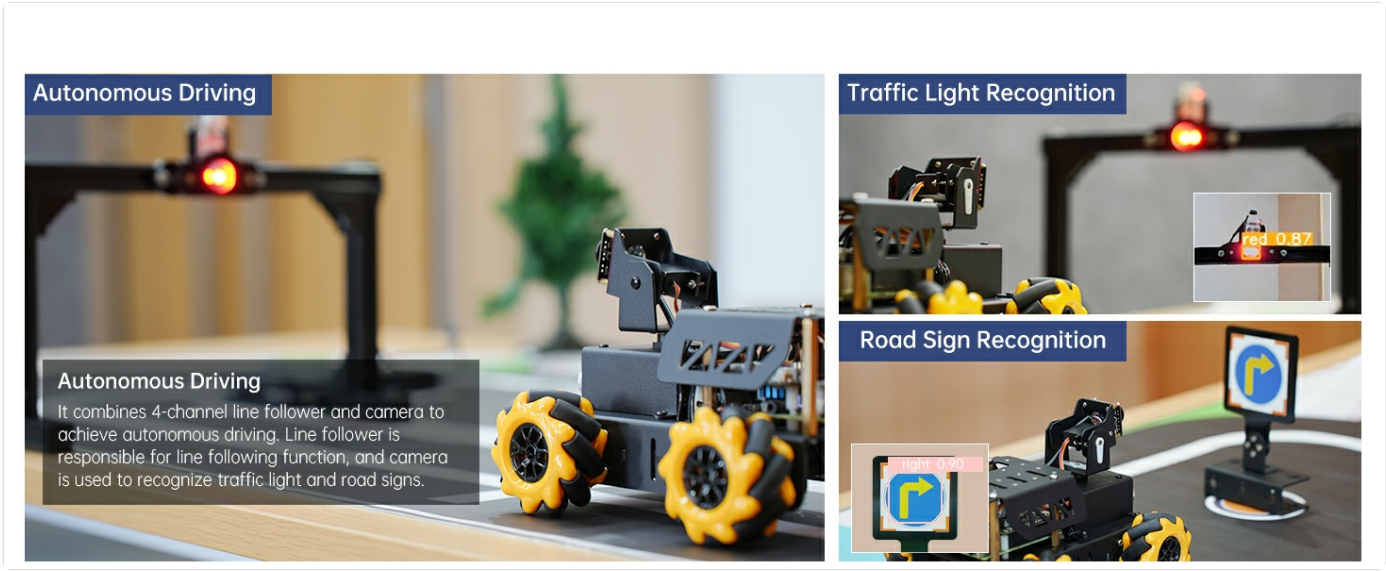

Image: A laptop showing Python code, highlighting the programming aspect of the TurboPi.

Maintenance

- **Cleaning:** Regularly clean the robot's chassis and sensors with a soft, dry cloth to remove dust and debris. Avoid using liquids directly on electronic components.
- **Battery Care:** Charge the Lipo batteries using the provided charger. Do not overcharge or completely discharge the batteries. Store them in a cool, dry place when not in use.
- **Firmware Updates:** Periodically check the LewanSoul website for firmware and software updates to ensure optimal performance and access to new features.
- **Component Inspection:** Inspect all screws and connections regularly to ensure they are tight and secure.

Troubleshooting

- **Robot Not Powering On:**

    - Check battery charge level.
    - Ensure batteries are correctly installed and connected.
    - Verify all power cables are securely connected to the Raspberry Pi expansion board.
- **Raspberry Pi Image Issues:**
    - If the provided Raspberry Pi image does not boot or function correctly, re-flash the SD card with a fresh download from the official LewanSoul website.
    - Ensure you are using the correct image for your Raspberry Pi model (e.g., Pi 5 or Pi 4B).
    - Verify the integrity of the SD card.
- **Wi-Fi Connection Problems:**
    - Check if the Wi-Fi region settings on the Raspberry Pi are compatible with your local network. Adjust if necessary.
    - Ensure the Wi-Fi credentials entered are correct.
    - Verify the Raspberry Pi's Wi-Fi module is functioning.
- **Robot Not Responding to App Control:**
    - Ensure the robot and your control device are connected to the same Wi-Fi network.
    - Verify the app is updated to the latest version.
    - Restart both the robot and the control app.
- **Vague Instructions / Assembly Difficulties:**
    - Refer to the detailed online assembly videos and documentation provided by LewanSoul. These often offer more visual guidance than printed manuals.
    - Contact LewanSoul customer support for specific clarification if needed.

Warranty and Support

For information regarding product warranty, technical support, and additional resources, please refer to the official LewanSoul website or contact their customer service directly. Details are typically provided with your purchase documentation or on the manufacturer's support pages.

Official Product Videos

The following videos provide additional information and demonstrations of the TurboPi Robot Car's capabilities:

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Video: Demonstration of the PuppyPi robot dog, a programmable and rechargeable bionic smart robotics kit with Raspberry Pi board. This video showcases general robotics capabilities, though it features a different robot model.

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Video: Robotic arm with chassis, demonstrating obstacle clearing and programming functionalities. This video highlights advanced robotic arm applications, which may be relevant for extending the TurboPi's capabilities with additional modules.