Yahboom Rider Pi

Yahboom Rider-Pi CM5 Self-Balancing Robot Instruction Manual

Model: Rider Pi | Brand: Yahboom

1. Introduction

The Yahboom Rider-Pi is an advanced two-wheeled self-balancing robot designed for Python programming and AI vision recognition. Equipped with a Raspberry Pi Compute Module 5 (CM5), it offers comprehensive performance upgrades and supports various intelligent interactions. This manual provides essential information for setting up, operating, and maintaining your Rider-Pi robot.

Figure 1: Yahboom Rider-Pi CM5 Self-Balancing Robot and its packaging.

2. What's in the Box

Carefully unpack your Rider-Pi robot and ensure all components are present. The package includes:

- Rider-Pi wheel-legged robot (Assembled)
- TF card

- Type-C data cable
- Type-C USB hub
- Micro to HDMI data cable

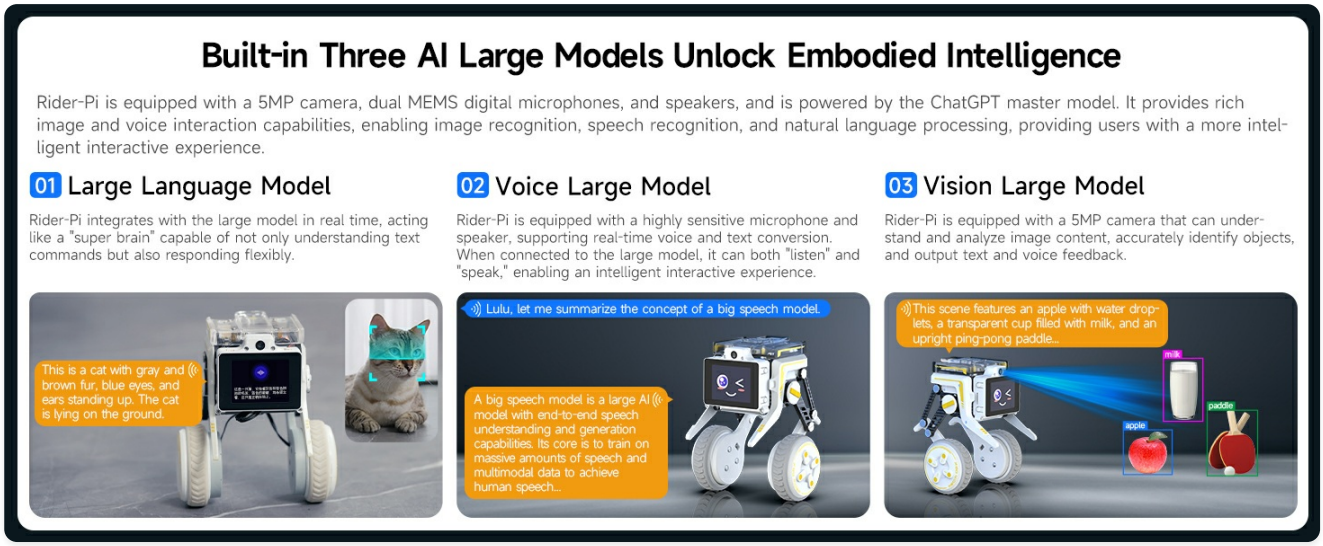

Figure 2: Included components of the Rider-Pi package.

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Video 1: Unboxing the Rider-Pi robot, showing all included accessories and the pre-assembled robot.

3. Product Overview & Features

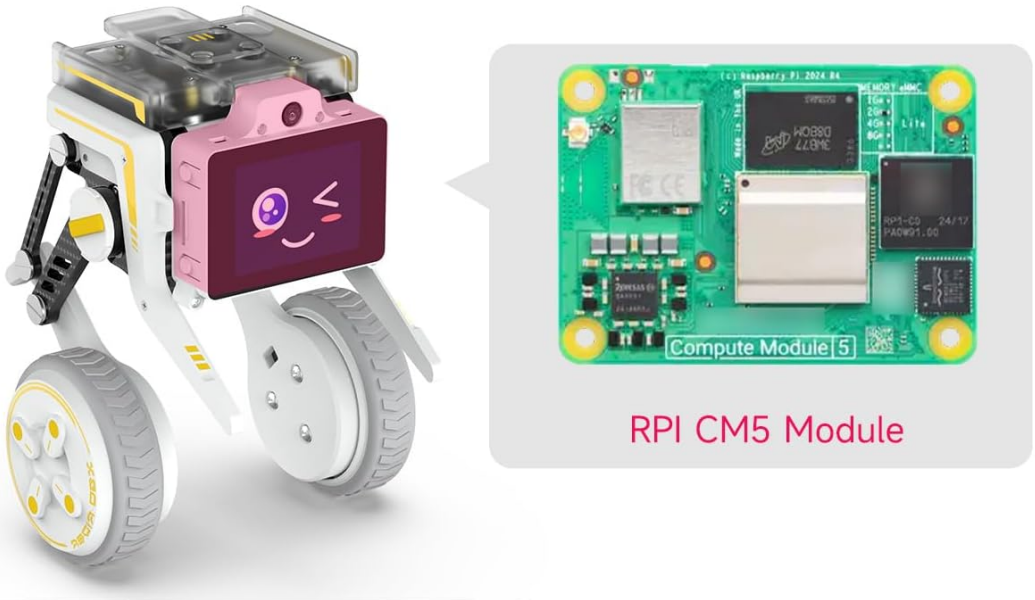
The Rider-Pi robot is a versatile platform for AI and robotics education, featuring a unique two-wheeled legged structure that combines the mobility of wheeled robots with the obstacle-crossing ability of legged robots.

Key Features:

- **Raspberry Pi CM5 Module:** Built-in AI module supporting Python programming.
- **AI Visual Recognition:** Supports gesture control, human body movement imitation, face/color object tracking, and recognition.
- **Voice Interaction:** Dual MEMS digital microphones and speakers, equipped with OpenRouter for image recognition, voice recognition, and natural language processing.
- **Self-Balancing:** Built-in IMU sensor for real-time posture adjustment and stable omnidirectional movement across various terrains.
- **Durable Construction:** Made of ABS material for toughness and impact resistance, with a carbon fiber bracket for sturdiness and lightweight design. The back cover is aviation aluminum for abrasion resistance.
- **Dynamic Expressions:** 2.0-inch IPS display with 35 dynamic expressions and support for custom expressions.
- **Cross-Platform Control:** Dual APP support (WiFi with image transmission and Bluetooth) for iOS and Android devices.

Newly Upgraded RPI CM5 Module

Rider-Pi is equipped with the RPI CM5 module, offering comprehensive performance upgrades. It features a 2.0-inch IPS color display and four programmable buttons, an integrated 5MP HD camera, a digital microphone, and a speaker, along with AI vision and voice control, making it ideal for intelligent interaction.



Model	RPI CM4	RPI CM5
CPU	BCM2711 Soc	BCM2712 Soc
	4-core 64-bit Arm Cortex-A72	4-core 64-bit Arm Cortex-A76
	1.5GHz	2.4GHz
GPU	VideoCore VI	VideoCore VI
Memory	2GB	2GB
Summary	Rider-Pi supports both RPI CM4 and CM5 main control module. Overall functions are essentially the same; the difference in controller only impacts performance. The CM5 offers significant improvements in hardware performance and speed compared to the CM4, making it better suited for complex tasks and high-performance scenarios.	

Figure 3: Overview of the upgraded Raspberry Pi CM5 module integrated into the Rider-Pi.

Product Structure

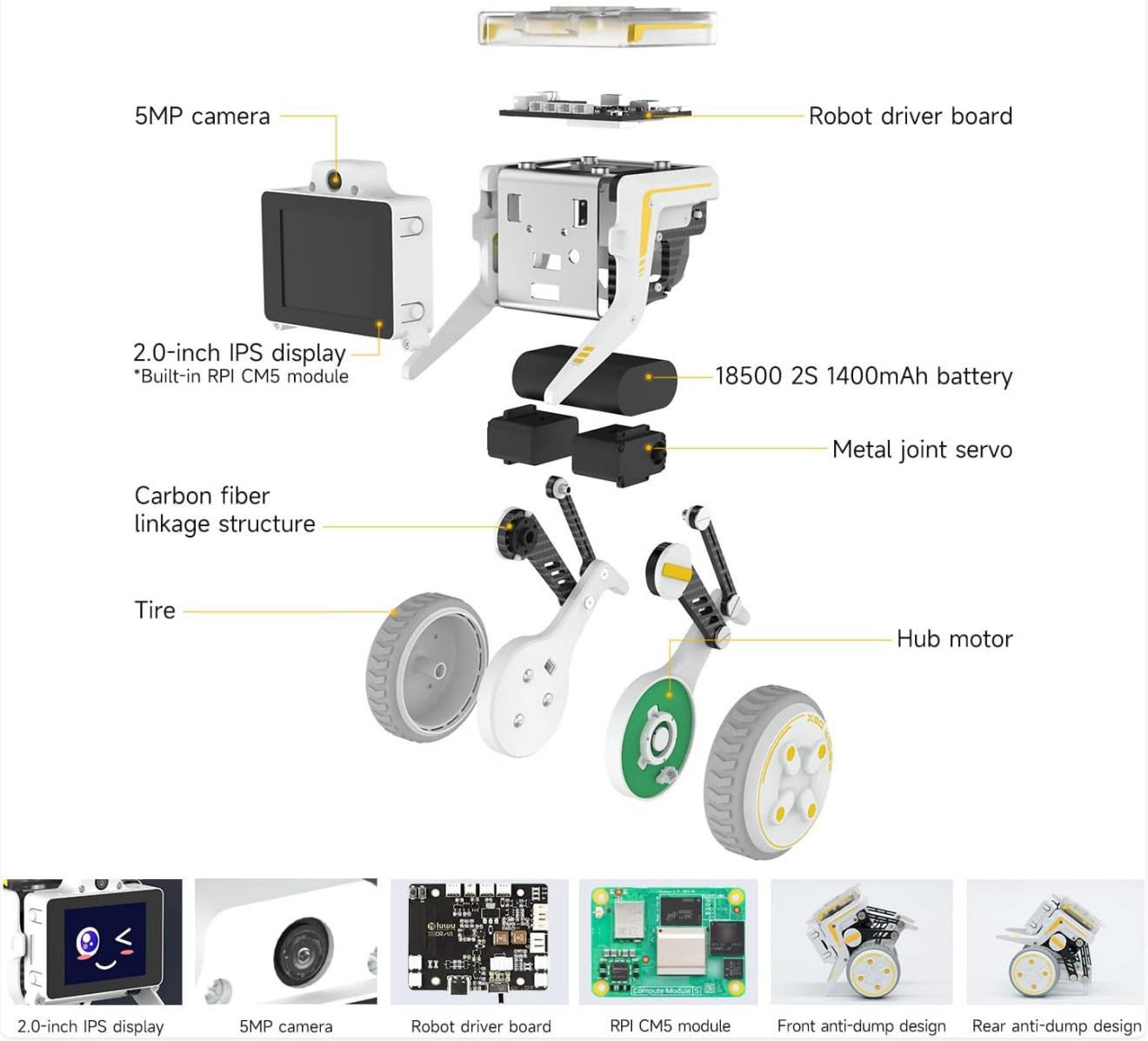


Figure 4: Detailed product structure and components of the Rider-Pi robot.

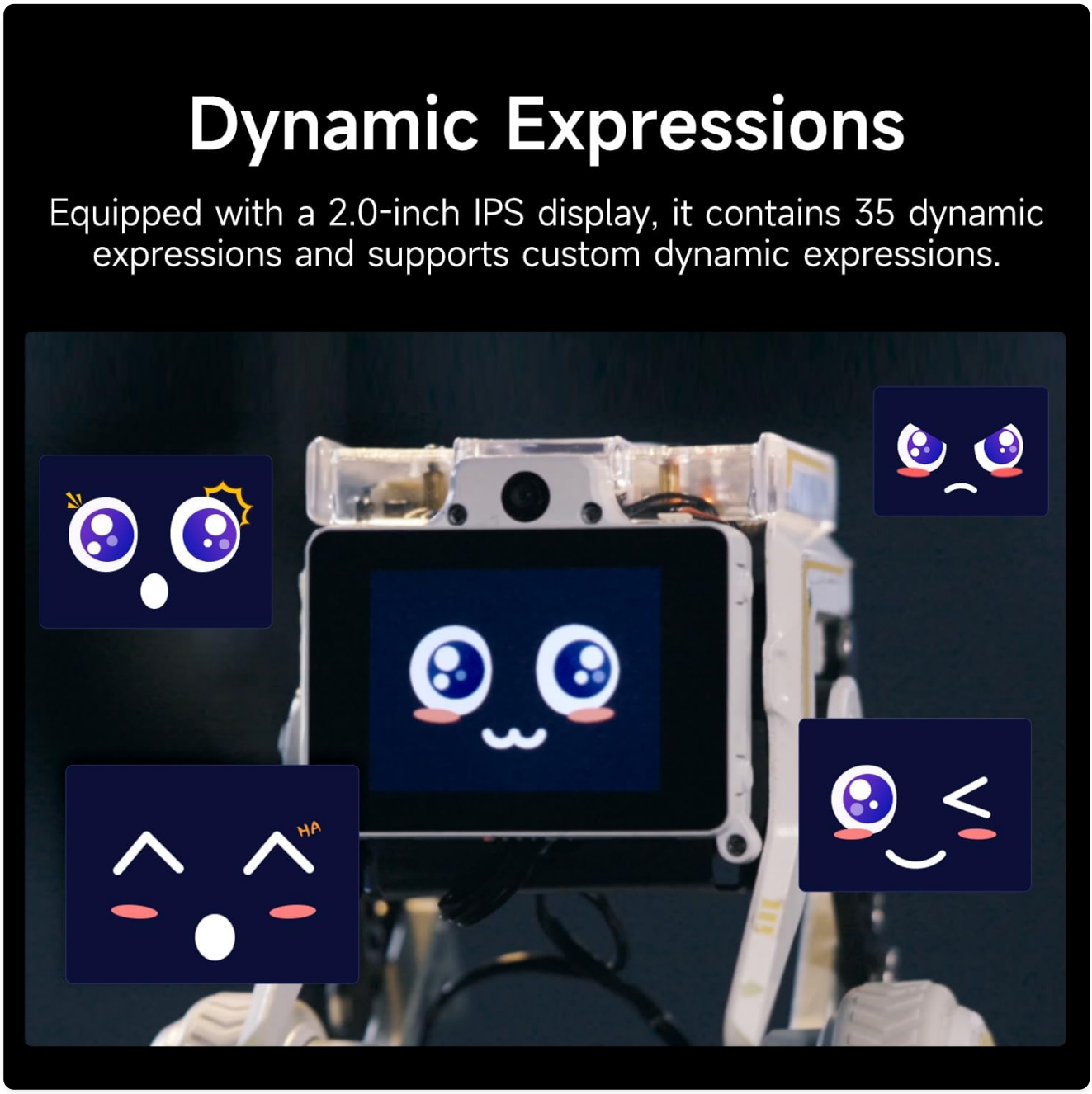


Figure 5: The robot's 2.0-inch IPS display showing dynamic expressions.

4. Setup

The Rider-Pi robot comes pre-assembled. Follow these steps to power it on and begin operation:

1. **Power On:** Locate the power switch on the robot and turn it on.
2. **Initial Boot:** The robot's screen will display the 'Luwu Dynamics' logo.
3. **Select Mode:** On the screen, you can choose between 'Remote Control Mode (RC)' or 'Try Demos'. Use the robot's physical buttons to navigate and select.
4. **Explore Demos:** If you select 'Try Demos', you will enter an interface with various sample programs (31 in total) including ChatGPT, Q&A, Speech, and AI visual interaction functions.

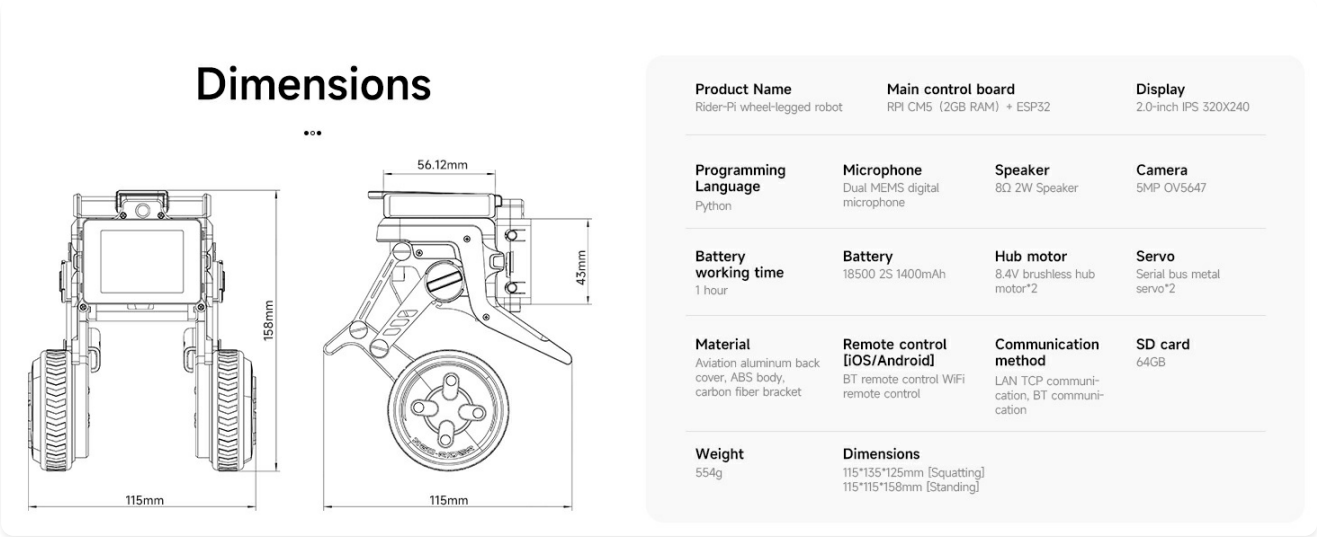


Figure 6: Robot screen displaying mode selection after power-on.

5. Operation

The Rider-Pi can be controlled through its pre-installed GUI programs or via a smartphone application.

5.1. Basic Functions

The robot supports several basic functions directly from its interface:

- Audio recording and playback
- Video recording and playback
- RGB light control
- Posture angle acquisition
- Reading battery status
- Motion control

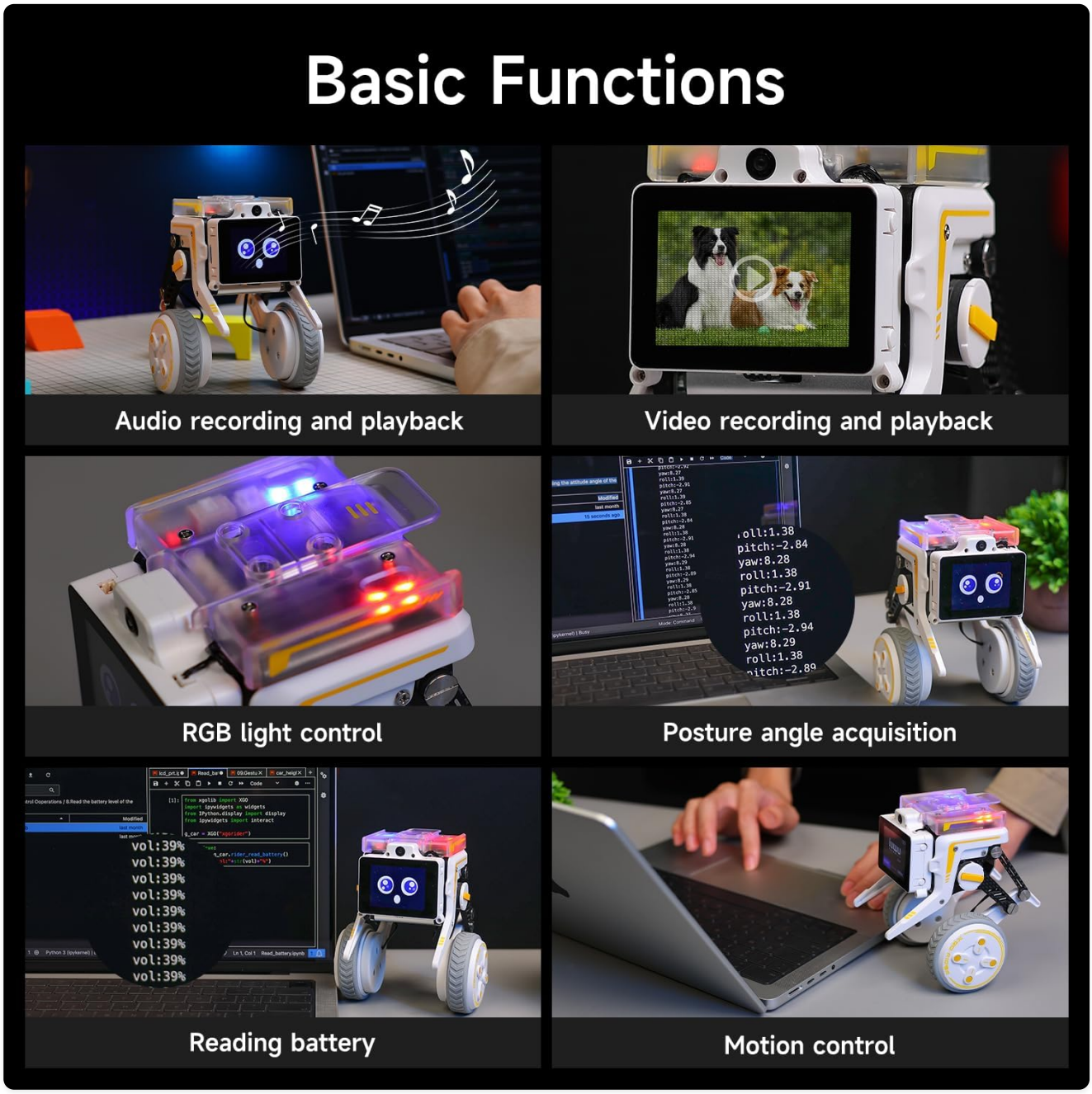


Figure 7: Visual representation of the Rider-Pi's basic functions.

5.2. App Control

The Rider-Pi supports both WiFi and Bluetooth APP control for iOS and Android devices. This allows users to control the robot's movements and execute various action groups.

- **WiFi Remote Control:** Offers FPV (First-Person View) control with image transmission.
- **Bluetooth Remote Control:** Provides direct control over robot actions.

Figure 8: Cross-platform remote control options via smartphone apps.

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Video 2: Demonstrates the Rider-Pi robot's two-wheeled legged movement and self-balancing capabilities.

5.3. Movement and Stability

The unique linkage wheel-legged structure allows the Rider-Pi to achieve stable and omnidirectional movement, easily coping with various terrain obstacles.

- **Self-Balancing:** The robot can immediately return to a balanced status if picked up and placed back on the ground.
- **Omnidirectional Movement:** Capable of moving forward, backward, rotating, and adjusting altitude.
- **Obstacle Crossing:** Designed to navigate slopes and steps with stability.

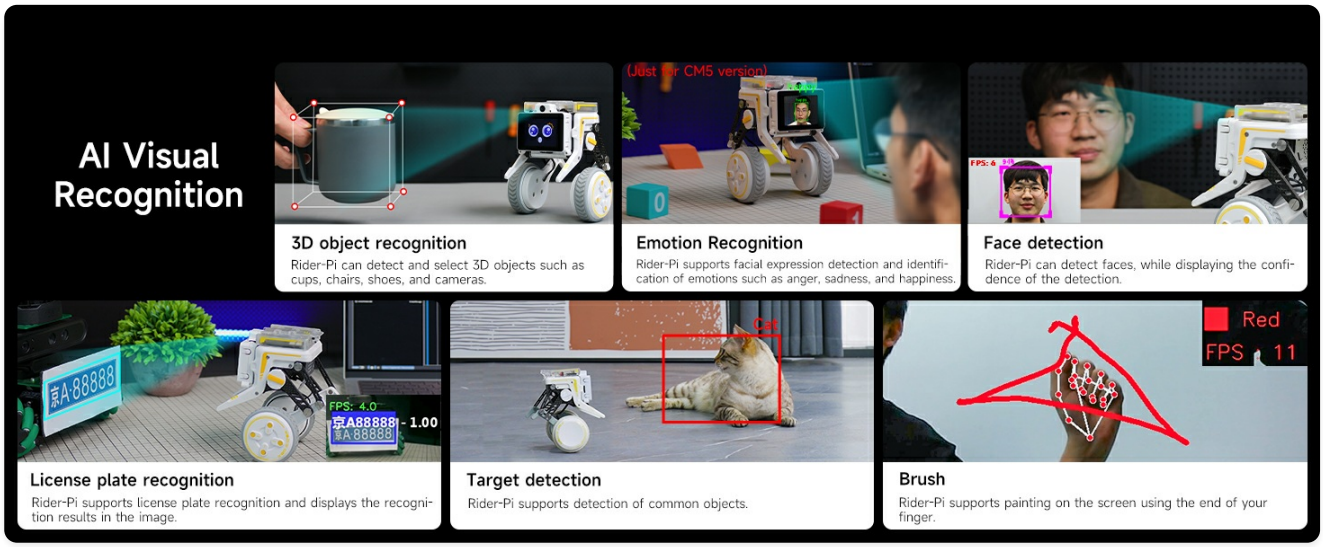

Figure 9: The Rider-Pi robot demonstrating stable movement on an incline.

6. AI Visual Interaction & Programming

The Rider-Pi leverages its CM5 module, 5MP camera, and dual MEMS microphones to provide rich AI capabilities.

6.1. Multimodal AI Applications

The robot integrates Large Language Models, Voice Large Models, and Vision Large Models to understand environmental information and interact intelligently.

- **Voice Q&A:** Ask questions and receive spoken answers.
- **Voice Control:** Command the robot using voice (e.g., "Lulu, forward," "Lulu, lift rotate").
- **Scene Understanding:** Describe objects and scenarios within its field of view.
- **Embodied Intelligence:** Perform actions based on visual recognition (e.g., move forward if a red ball is seen).

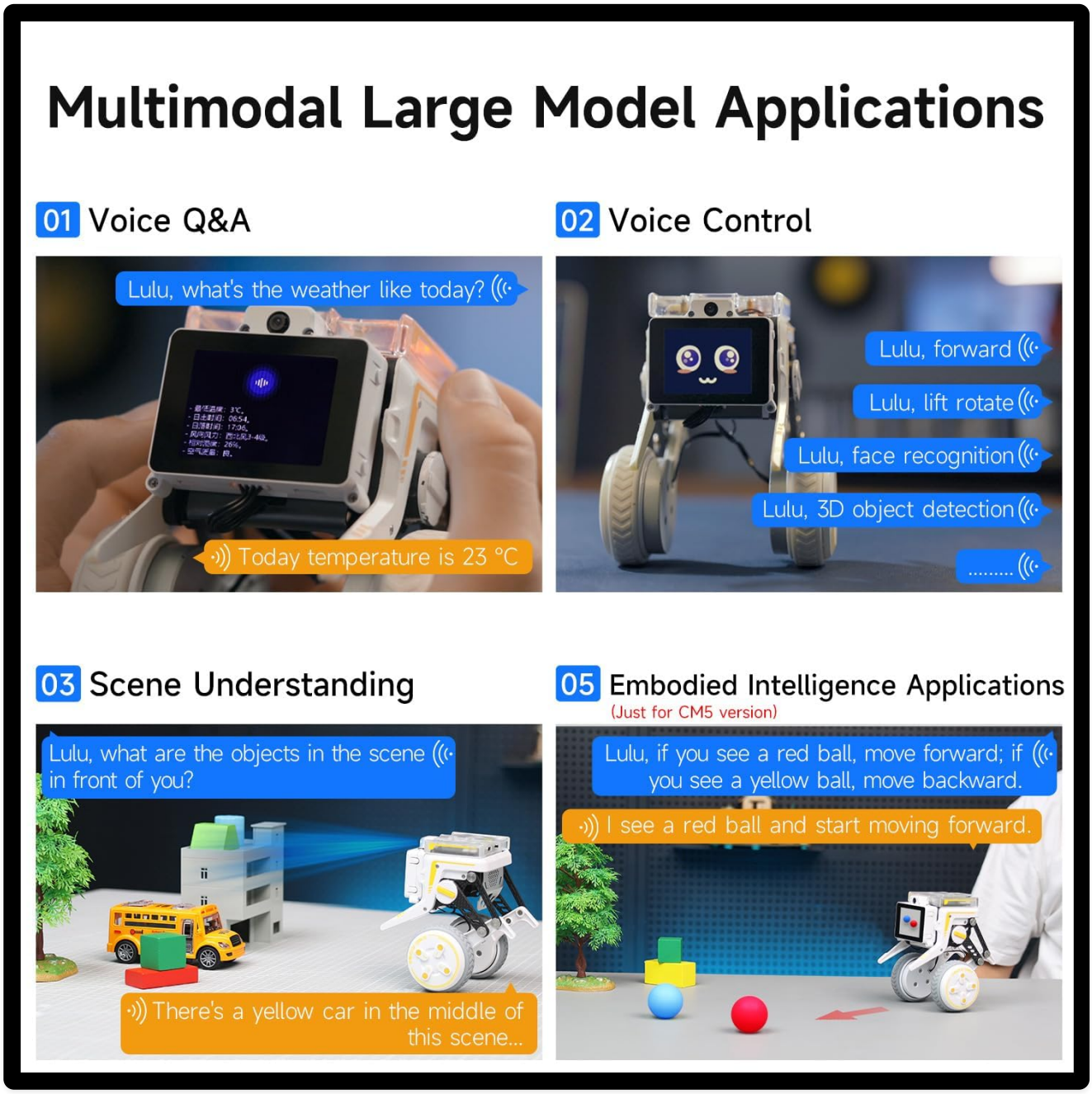

Figure 10: Examples of multimodal AI applications.

6.2. AI Visual Recognition Functions

The 5MP camera enables a wide range of visual recognition tasks:

- Palm control
- Human skeleton recognition
- Face tracking and detection
- Color tracking/following
- QR code motion control
- Face mask detection
- Gesture following and control
- 3D object recognition
- License plate recognition

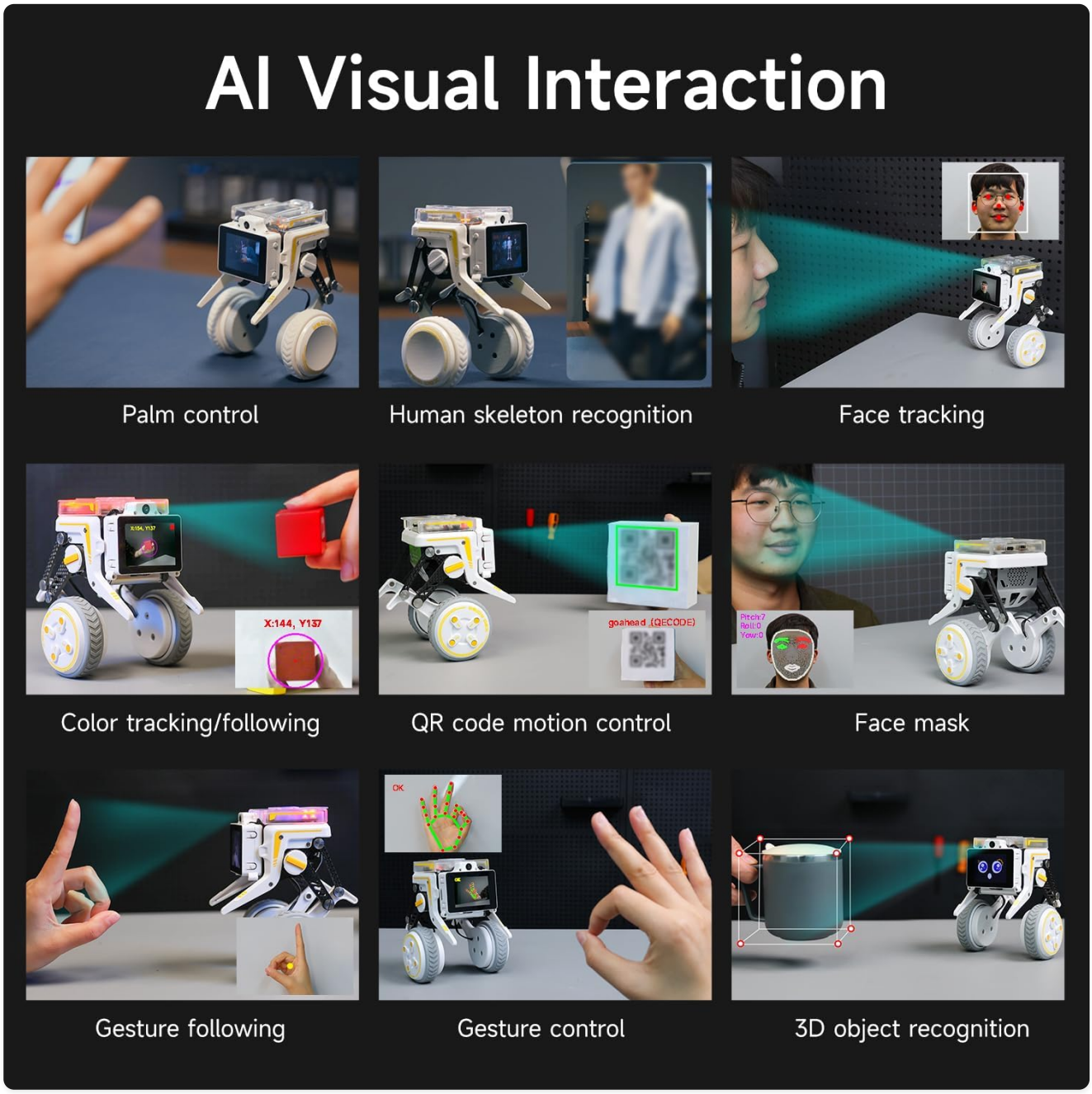

Figure 11: Various AI visual interaction functions of the Rider-Pi.

6.3. Python Programming

The Rider-Pi supports Python programming and comes with pre-installed GUI programs offering over 30 functions. Sample codes, motion control protocols, and Python interfaces are provided to facilitate development for both beginners and experienced DIY developers.

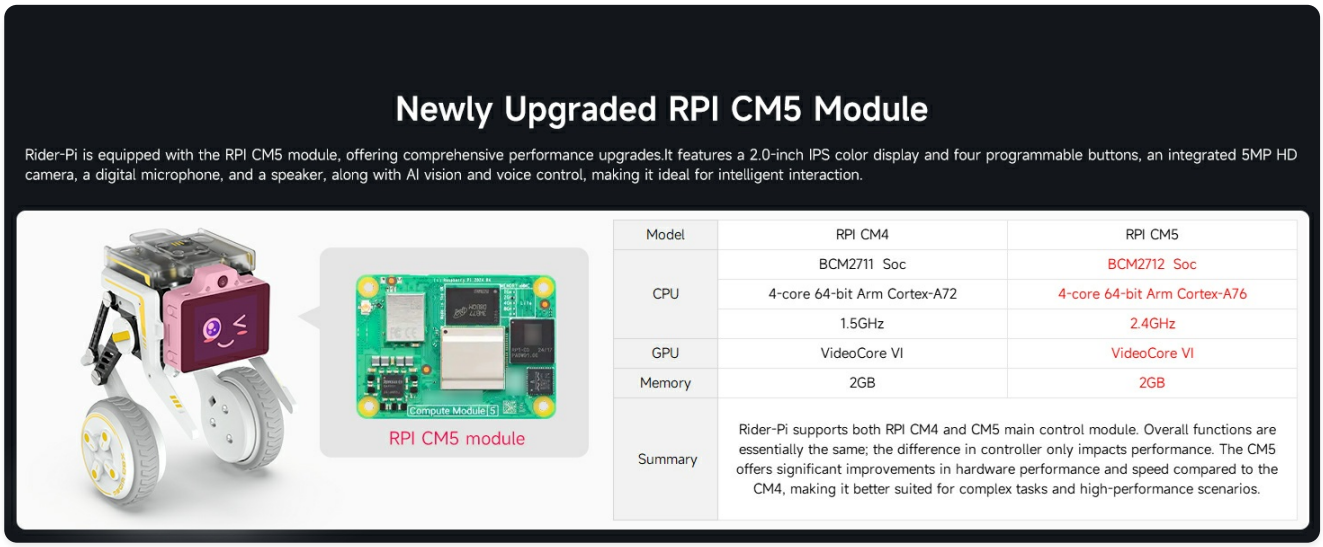

Figure 12: The Rider-Pi robot being programmed via a laptop.

7. Specifications

Feature	Detail
Product Name	Rider-Pi wheel-legged robot
Main Control Board	RPi CM5 (2GB RAM) + ESP32
Display	2.0-inch IPS, 320x240
Programming Language	Python
Microphone	Dual MEMS digital microphone
Speaker	8Ω 2W Speaker
Camera	5MP OV5647
Battery	18500 2S 1400mAh battery
Battery Working Time	1 hour
Hub Motor	8.4V brushless hub motor * 2
Servo	Serial bus metal servo * 2
Material	Aviation aluminum back cover, ABS body, carbon fiber bracket
Remote Control	BT remote control, WiFi remote control [iOS/Android]
Communication Method	LAN TCP communication, BT communication
SD Card	64GB
Weight	560g
Dimensions (Squatting)	115*115*125mm

Feature	Detail
Dimensions (Standing)	115*115*158mm

Figure 13: Technical specifications and dimensions of the Rider-Pi robot.

8. Maintenance

To ensure the longevity and optimal performance of your Rider-Pi robot, follow these maintenance guidelines:

- **Cleaning:** Use a soft, dry cloth to clean the robot's exterior. Avoid using harsh chemicals or abrasive materials.
- **Battery Care:** Charge the battery fully before first use. For long-term storage, charge the battery to about 50-60% and store in a cool, dry place. Avoid overcharging or completely draining the battery.
- **Software Updates:** Regularly check the official Yahboom website or community forums for firmware and software updates to ensure your robot has the latest features and bug fixes.
- **Storage:** Store the robot in a safe, dry environment away from direct sunlight, extreme temperatures, and moisture.

9. Troubleshooting

If you encounter issues with your Rider-Pi robot, refer to the following common troubleshooting steps:

- **Robot Not Powering On:** Ensure the battery is fully charged and correctly installed. Check the power switch is in the 'ON' position.
- **Unstable Movement/Balancing Issues:** Verify that the robot is on a flat, stable surface. If the issue persists, check for any physical obstructions in the wheels or linkage.
- **App Connection Problems:** Ensure Bluetooth or WiFi is enabled on your smartphone and the robot. Restart both the robot and the app. Make sure the app is up to date.
- **AI Feature Malfunction:** Check your network connection if using features that require internet access. Ensure the camera lens is clean and unobstructed. Restart the specific AI program or the robot.
- **Programming Errors:** Double-check your Python code for syntax errors. Refer to the official tutorials and sample codes for guidance.

For more detailed troubleshooting or persistent issues, please contact Yahboom technical support.

10. Warranty and Support

The Yahboom Rider-Pi robot comes with a**90-day warranty against manufacturer defects**. Please retain your proof of purchase for warranty claims.

Additional Resources:

For comprehensive tutorials, sample codes, and further support, please visit the official Yahboom study page:

Yahboom Rider-Pi Tutorial Link

This resource includes detailed information on:

- Quick Start Guide
- Basic Control Course
- AI Visual Recognition Course
- AI Large Model Applications
- Video Practical Tutorials

Figure 14: Screenshot of the Yahboom Rider-Pi tutorial website.

If you encounter problems during use, please contact Yahboom customer service or technical support directly for assistance.