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› LewanSoul MentorPi A1 ROS2 Robot Car User Manual - Raspberry Pi 5 AI Vision & SLAM Mapping

LewanSoul MentorPi A1 Standard

LewanSoul MentorPi A1 ROS2 Robot Car User Manual

Model: MentorPi A1 Standard

1. SETUP

The MentorPi A1 ROS2 Robot Car is designed for advanced AI robot development. Proper assembly and initial setup are crucial for optimal performance.

1.1 Component Assembly

The robot car requires assembly of its various components, including the Raspberry Pi 5, RRC Lite controller, TOF Lidar, and 3D depth camera. Ensure all connections are secure.

Upgrades in the 2025 Edition

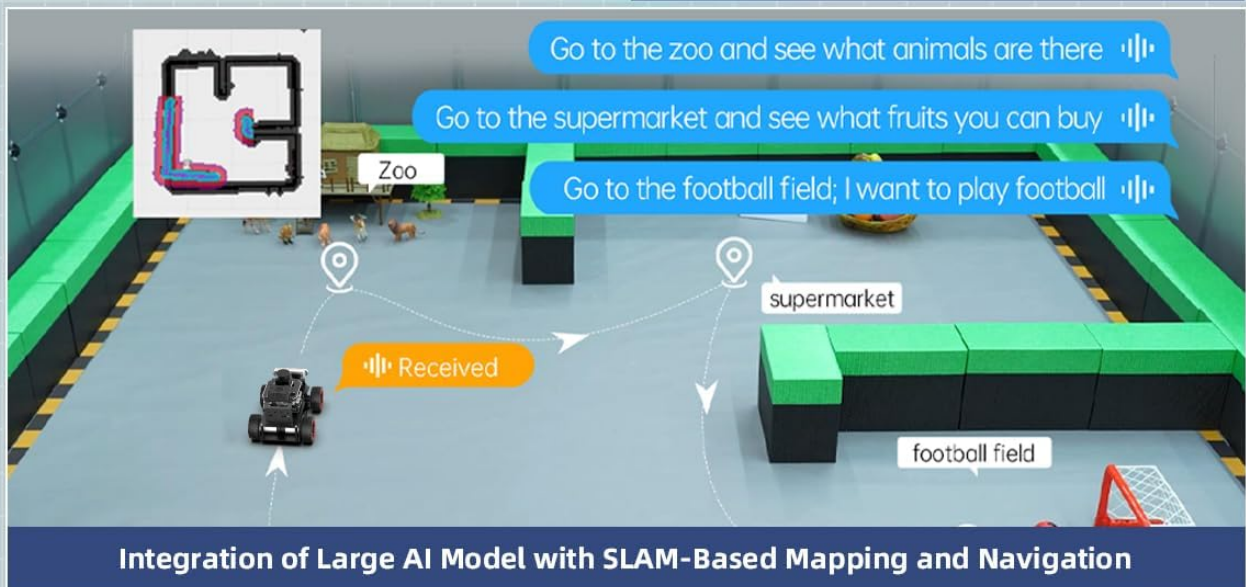
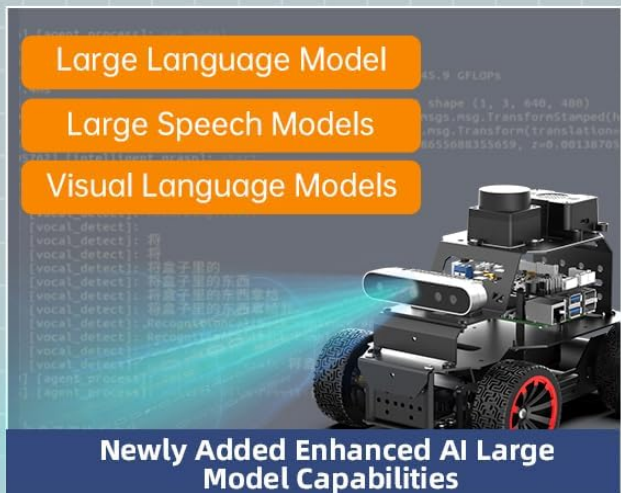


Image: All components of the MentorPi A1 Robot Car laid out on a grid mat, including the chassis, Raspberry Pi 5, RRC Lite controller, Lidar, and 3D depth camera.

MentorPi A1 Starter Packing List

Image: Detailed interface diagram of the MentorPi A1 AI Robot Car, showing connections for the RRC Lite Controller, Raspberry Pi 5, and various sensors.

1.2 Power Supply and Initial Boot

Ensure the battery is fully charged before initial use. Connect the battery to the RRC Lite controller. The system will boot up, and indicators will confirm power status.

2. OPERATING INSTRUCTIONS

The MentorPi A1 offers multiple control methods and advanced AI functionalities. Familiarize yourself with each to maximize your robot's potential.

2.1 Control Methods

The robot car can be controlled via PC, a dedicated mobile application, or a wireless handle.

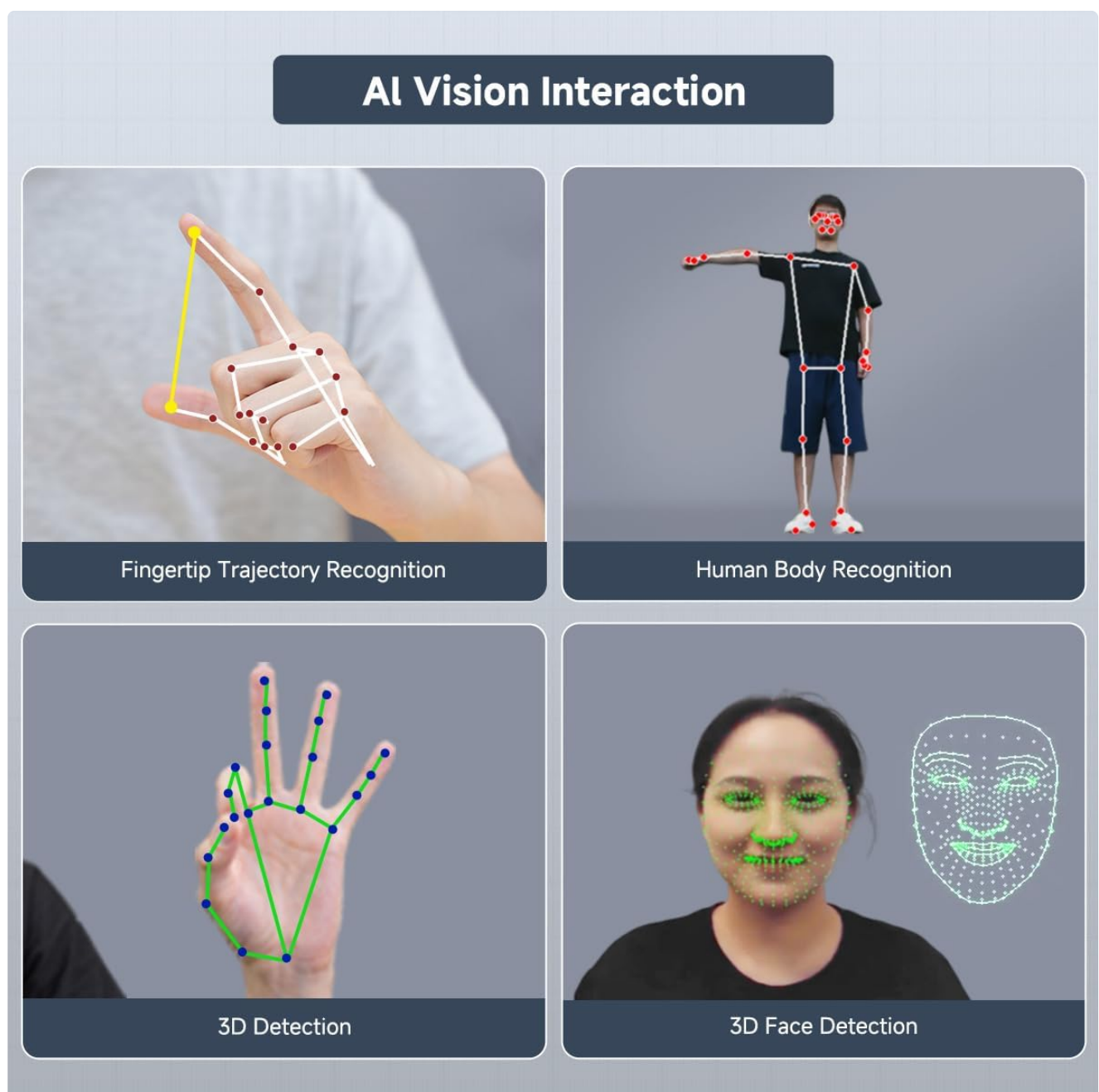


Image: Three panels showing different control methods for the MentorPi A1 Robot Car: PC control with a laptop, APP control via a smartphone, and wireless handle control with a gamepad.

2.2 SLAM Mapping and Navigation

Utilize the TOF Lidar and 3D depth camera for simultaneous localization and mapping (SLAM) to create detailed maps of environments and enable autonomous navigation.

Video: Demonstrates the ROS2 Robot Car for Raspberry Pi 5 performing AI Vision and Lidar SLAM Mapping Navigation. The robot maps its environment and navigates autonomously.



Image: Illustrates the Lidar Mapping and Navigation features, showing the robot creating a 2D map, performing fixed-point and multi-robot navigation, and dynamic obstacle avoidance.

2.3 AI Vision and Voice Interaction

The robot supports large AI models, including ChatGPT, for advanced vision and voice interaction. This enables capabilities like object recognition, voice control, and semantic understanding.

Video: Showcases MentorPi's advanced AI robotics with Lidar, SLAM, and Depth Vision, demonstrating intelligent navigation, scene understanding, voice control, and vision tracking.

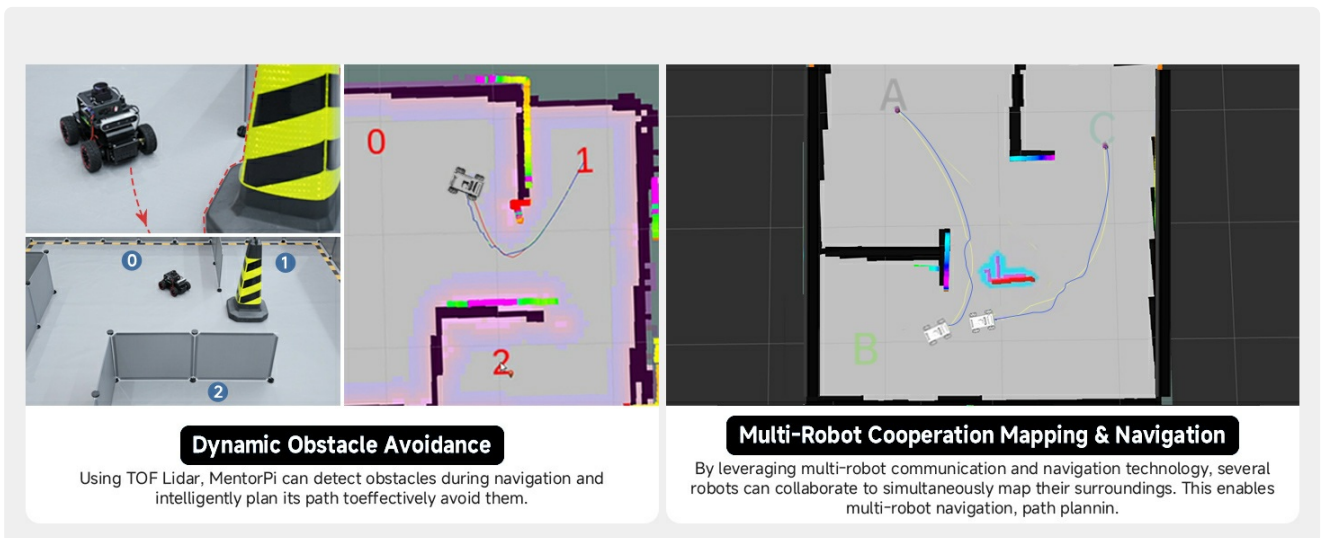
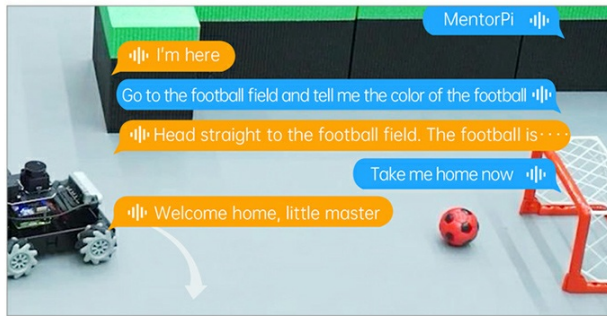


Image: Displays the MentorPi A1's AI capabilities, including Large Language Model for text generation and Q&A, Large Speech Model for voice interaction, and Vision Language Model for object recognition.

2.4 Autonomous Driving

Leverage deep learning models like YOLOv11 for road sign and traffic light recognition, lane keeping, and autonomous parking.

Video: Demonstrates the ROS2, SLAM, AI vision, and programming smart robot car, showcasing autonomous driving and traffic light recognition.



Semantic Understanding

MentorPi leverages a large language model to accurately interpret and analyze user voice commands, enabling a deeper understanding of natural language intent.



Environmental Perception

Powered by a vision language model, MentorPi can interpret objects in its surroundings and understand the spatial layout of the environment.

Image: Shows the MentorPi A1's deep learning capabilities for autonomous driving, including road sign detection, lane keeping, autonomous parking, and turning decision making.

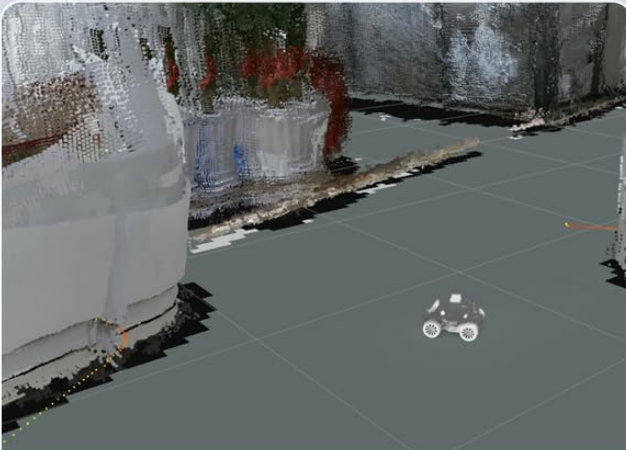
3. FEATURES AND CAPABILITIES

The MentorPi A1 is equipped with high-performance hardware and advanced software features for comprehensive AI and robotics development.

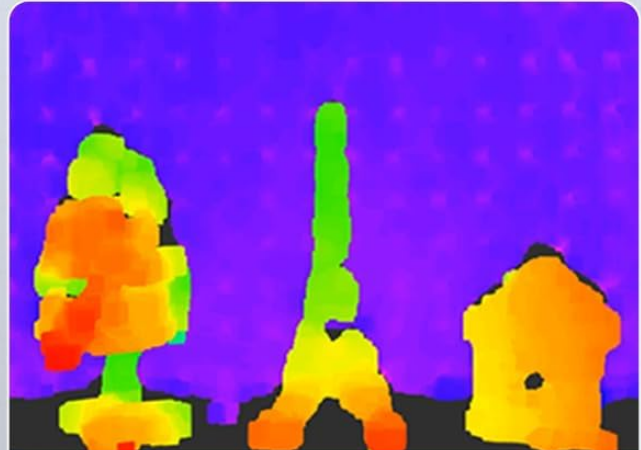
3.1 Hardware Overview

The robot car features an Ackermann steering structure, closed-loop encoder motors, TOF Lidar, 3D depth camera, and high-torque servos.

3D Depth Camera Exclusive Function



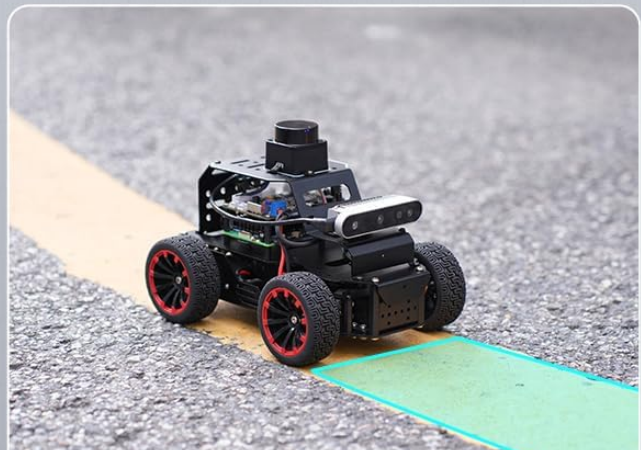
RTAB-VSLAM 3D Mapping and Navigation



Depth Map Data, Point Cloud



YOLO Object Recognition



Vision Line Following

Image: A close-up view of the MentorPi A1 Robot Car highlighting its Ackermann steering structure and robust chassis.

Function List

1. Line following
2. Lidar obstacle avoidance
3. Lidar following
4. Lidar guarding
5. Lidar fixed-point navigation
6. Lidar multi-point navigation
7. TEB and DWA path planning
8. SLAM_toolbox mapping



Lidar

1. Supports Raspberry Pi 5 power supply protocol
2. Control smart bus servos
3. Control encoder motors
4. Control RGB lighting
5. Monitor battery voltage and alert for low voltage
6. Control buttons



RRC Lite Controller

7. PID closed-loop control
8. Control PWM servos
9. Robot serial communication
10. Publish IMU data
11. Control buzzer
12. Control LED



Depth Camera

1. Real-time web monitoring
2. RGB data visualization
3. Point cloud data visualization
4. QR code creation
5. QR code recognition
6. Color recognition
7. Color tracking
8. Autonomous line following
9. MediaPipe development
10. Gesture control
11. Target tracking
12. Fingertip trajectory recognition

13. Hand following
14. Body motion control
15. Human pose detection
16. Rtabmap 3D mapping
17. Rtabmap 3D navigation
18. Yolov5 target detection
19. Autonomous driving



8. URDF model visualization
9. IMU, linear velocity and angular velocity calibration
10. Mecanum chassis speed control
11. Ackermann chassis speed control
12. YOLOV5 model training
13. AP and STA mode setting



ROS Control System

1. VNC remote control
2. SSH remote control
3. Keyboard control
4. Wireless handle control
5. APP wireless image transmission and control
6. YOLOV5 target detection
7. Autonomous driving

Image: Four panels showcasing the powerful hardware of MentorPi A1: 3D Depth Camera, Raspberry Pi 5 Controller, STL-19P TOF Lidar, and High Performance Encoder Motor.

3.2 Software and Programming

Powered by Raspberry Pi 5 and compatible with ROS2, the robot is programmable in Python. It supports Docker container technology for swift deployment and offers open-source code for self-study.

Provide ROS2 System Image

ROS2, the upgraded version of ROS1, retains all its functions while supporting more operating systems and compilation environments. It offers real-time control, enhanced modular development, and testing, delivering more powerful features and broader applications than ROS1.

01 ROS1 VS ROS2

Version	 ROS2	 ROS1
Programming language	C++/Python3	C++/Python2
Operating system	Linux/Windows/MacOS/RTOS	Linux
Communication architecture	DDS (distributed architecture)	TCPROS/UDPROS
Compilation system	CMake/Ament	CMake

02 Adopt Docker Container Technology

Docker is the mainstream container technology. Docker is an open-source application container engine that allows developers to package their applications into containers. These containers can then be migrated to the Docker application on other machines, enabling swift deployment.

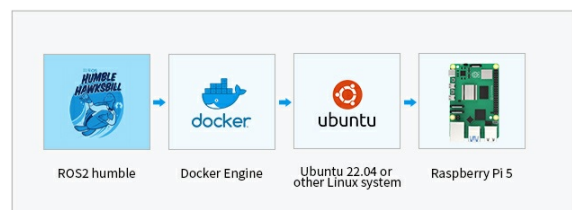


Image: Explains the ROS2 system image and the adoption of Docker container technology for the MentorPi A1, detailing ROS1 vs ROS2 differences and the Docker deployment process.

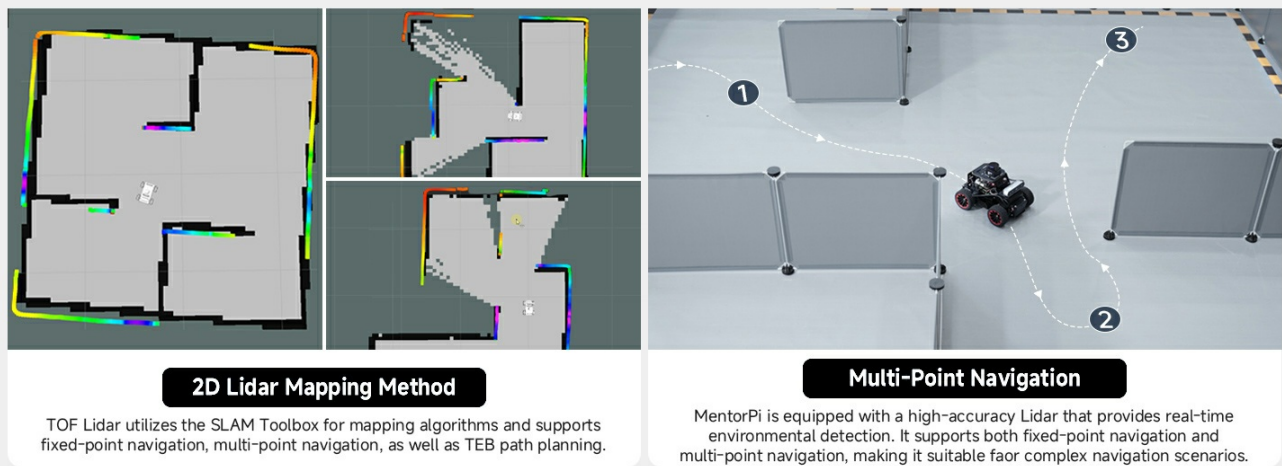


Image: A person typing code on a computer with the MentorPi A1 robot car on the desk, illustrating the open-source Python programming aspect of the robot.

4. SPECIFICATIONS

Attribute	Value
Brand Name	LewanSoul
Model Name	LW-MentorPi-D-A154
Model Number	LW-MentorPi-D-A154
Edition	Standard, RPi5 4GB
Included Components	MentorPi A1 Robot Car
Item Type Name	Smart Robot Car
Manufacturer	Hiwonder
Is Assembly Required	Yes
Color	Black
Material Type	Aluminum
Item Weight	16 ounces
Item Dimensions	6.7 x 5.8 x 8.4 inches
Are Batteries Required	Yes
Number of Batteries	1 Lithium Polymer batteries required. (included)
Educational Objective	Programming Skills
Operation Mode	Automatic

MentorPi A1 Advanced Packing List

 A1 (Ackermann) Chassis (Assembled, Battery included)	 Bracket set	 Raspberry Pi 5 (Optional)	 64GB SD card (Optional)	 Cooling fan	 Raspberry Pi power supply cable	 RRC Lite controller+ RRC data cable
 Battery cable	 Lidar+4PIN wire	 Lidar data cable	 8.4V 2A charger (DC5.5 *2.5 male connector)	 3D Depth camera	 Depth data cable	 Wireless controller
 Controller receiver	 EVA ball(40mm)	 Card reader	 3PIN wire(100mm)	 WonderEcho Pro AI voice interaction box + Type C cable	 Accessory bag	 User manual

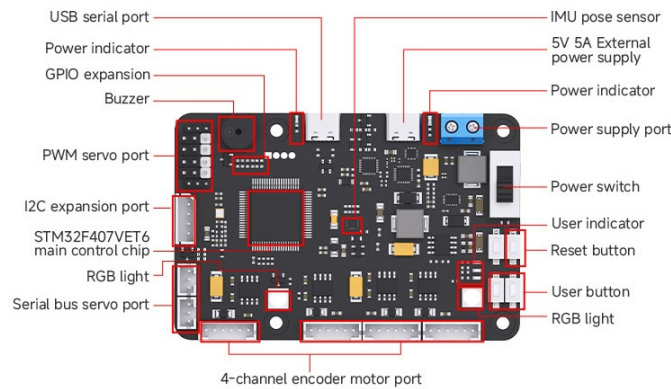
Image: Detailed technical specifications and dimensions of the MentorPi A1 Robot Car, including size, weight, chassis type, motor, encoder, and control methods.

5. WHAT'S IN THE BOX

The MentorPi A1 Robot Car package includes:

- MentorPi A1 Robot Car

③ RRC Lite Controller



Parameters			
Main control chip	STM32F407VET6(100PIN)	Motor drive chip	SA8870C (Overcurrent protection)
IMU sensor	3-axis acceleration and 3-axis gravity acceleration	Encoder motor port	4-Channel (Independent drive)
Serial servo port	2-Channel (6-12V)	PWM servo port	4-Channel (5-8.4V)
Responsive component	Buzzer×1; LED light×3; RGB light×2	Power supply	6-14V wide voltage input
		External power supply port	5V 5A
Download port	Serial port one-click download	Circuit protection	Overheat, short circuit and overcurrent protection
Board layer	Industrial-grade dual layers	Size	85×56×17mm
Mounting pitch	57.5×48.5mm	Weight	32kg

Image: A visual representation of the MentorPi A1 Packing List for the Depth Camera Version, showing all included components such as chassis, Raspberry Pi 5, 3D depth camera, Lidar, and various cables and tools.

6. TROUBLESHOOTING

If you encounter any issues, please refer to the official LewanSoul support resources or online documentation for detailed troubleshooting guides. Common issues may include connectivity problems, sensor calibration, or software configuration errors.

7. WARRANTY AND SUPPORT

For warranty information and technical support, please visit the [LewanSoul Store on Amazon](#) or contact their customer service directly. LewanSoul is committed to providing high-quality products and support.

ASK A QUESTION ABOUT THIS MANUAL

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

Name

Anonymous

Email

you@example.com

After a successful submission, we securely hash the supplied account or form email before sending it to Microsoft Advertising for conversion attribution. [Privacy details](#).

Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question