

Manuals+

[Q & A](#) | [Deep Search](#) | [Upload](#)

[manuals.plus](#) /

› [Yahboom](#) /

› [Yahboom ROS2 Robot Lidar Mapping Navigation Mecanum Wheel Robotic Kit Instruction Manual](#)

Yahboom Advanced Ver-without Nano

Yahboom ROS2 Robot Lidar Mapping Navigation Mecanum Wheel Robotic Kit Instruction Manual

Model: Advanced Ver-without Nano

1. PRODUCT OVERVIEW

The Yahboom ROS2 Robot is an advanced educational robotic kit designed for learning and exploring robotics, Python programming, and AI concepts. It features Lidar mapping and navigation capabilities, Mecanum wheels for omnidirectional movement, and supports various control boards including Jetson series and Raspberry Pi 5. This kit is suitable for both beginners and professional developers interested in robotics and artificial intelligence.



Figure 1: The Yahboom ROS2 Robot Kit, showcasing its main components including the Lidar sensor, depth camera, and Mecanum wheels.



Figure 2: Overview of the ROSMASTER-X3 educational robot, highlighting its key features such as Lidar navigation, 3D mapping, voice control, and omnidirectional movement.

2. SETUP AND ASSEMBLY


The Yahboom ROS2 Robot kit requires assembly. Detailed video tutorials and a comprehensive manual are provided to guide users through each step of the building process. Ensure all components listed in the shipping list are present before beginning assembly.

2.1 Unpacking and Component Check

Carefully unpack all items from the box. Refer to the provided shipping list to verify that all parts are included. The kit typically includes:

- Robot Chassis components (Green aluminum alloy material)
- Mecanum Wheels (4 units)
- ROS Robot Expansion Board
- USB3.0 HUB Expansion Board
- Lidar Module (Optional, depending on version)
- Depth Camera (Optional, depending on version)
- Voice Interaction Module (Optional, depending on version)
- 7-inch LCD Screen (Optional, depending on version)
- Power Battery Pack (12V, 6000mAh)
- Controller (e.g., PS2 game handle)
- Cables and Fasteners
- CD with software and documentation

Shipping list



The pictures are for reference, the configuration of each package is slightly different

All accessories are brand new and original, Raspberry Pi/JETSON board, lidar, depth camera, etc.

Chassis	Hardware control	ROS accessories
<ul style="list-style-type: none"> Pendulum hanger*1 Motor chassis*1 520 gear motor330RPM*4 Frame main control fixing plate*1 Anti-collision beam*1 Pendulum suspension bracket*1 Light bar fixed*1 Radar fixing plate*1 Screwdriver*1 Parts package*4 Mecanum wheel*4 	<ul style="list-style-type: none"> ROS car expansion board*1 USB HUB expansion board*1 OLED screen board*1 LED light bar*1 6000MAH 12.6V power battery and battery charger*1 Game handle and handle phone holder*1 7-inch screen and fixing bracket (optional)*1 Several cables Data cable*1 	<ul style="list-style-type: none"> Astra Pro Plus depth camera and accessories package (optional) SLAM A1 lidar and accessories package (optional) SLAM S2L lidar and accessories package (optional) Voice interaction module and speaker (optional) Several wires

ROS controller																
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Raspberry Pi 5 Version:</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Raspberry Pi 5 8GB board (optional)</td> </tr> <tr> <td style="padding: 2px;">64GB TF card (with robot system)</td> </tr> <tr> <td style="padding: 2px;">Raspberry Pi board accessories package</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Jetson Nano Version:</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">JETSON NANO 4GB SUB board (optional)</td> </tr> <tr> <td style="padding: 2px;">64GB system U disk (with robot system)</td> </tr> <tr> <td style="padding: 2px;">Jetson Nano accessory package</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Jetson Orin Nano SUPER Version:</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Orin Nano 4GB/8GB board (optional)</td> </tr> <tr> <td style="padding: 2px;">256GB SSD (with robot system)</td> </tr> <tr> <td style="padding: 2px;">Orin Nano accessory package</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; padding: 2px;">Jetson Orin NX SUPER Version:</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Orin NX 8GB/16GB board (optional)</td> </tr> <tr> <td style="padding: 2px;">256GB SSD (with robot system)</td> </tr> <tr> <td style="padding: 2px;">Orin NX accessory package</td> </tr> </tbody> </table>	Raspberry Pi 5 Version:	Raspberry Pi 5 8GB board (optional)	64GB TF card (with robot system)	Raspberry Pi board accessories package	Jetson Nano Version:	JETSON NANO 4GB SUB board (optional)	64GB system U disk (with robot system)	Jetson Nano accessory package	Jetson Orin Nano SUPER Version:	Orin Nano 4GB/8GB board (optional)	256GB SSD (with robot system)	Orin Nano accessory package	Jetson Orin NX SUPER Version:	Orin NX 8GB/16GB board (optional)	256GB SSD (with robot system)	Orin NX accessory package
Raspberry Pi 5 Version:																
Raspberry Pi 5 8GB board (optional)																
64GB TF card (with robot system)																
Raspberry Pi board accessories package																
Jetson Nano Version:																
JETSON NANO 4GB SUB board (optional)																
64GB system U disk (with robot system)																
Jetson Nano accessory package																
Jetson Orin Nano SUPER Version:																
Orin Nano 4GB/8GB board (optional)																
256GB SSD (with robot system)																
Orin Nano accessory package																
Jetson Orin NX SUPER Version:																
Orin NX 8GB/16GB board (optional)																
256GB SSD (with robot system)																
Orin NX accessory package																

Only the control board is optional, related accessories are standard by default. For example, if you purchase the Jetson Nano version robot without Jetson Nano board, it also comes with a 64GB system U disk and accessories package.

***To upgrade the previous Pi4 version to the Pi5 version, you need to prepare:**

1. ROS expansion board version 3.0	4. Pi5 active cooler
2. USB HUB version 2.0	5. Mirror
3. Double elbow type-C to type-C data cable (available in Yahboom courses, customers need to burn it in by themselves)	

***If you have purchased the Pi5 version now, but want to use the Pi4 master controller, you need to prepare:**

1. Temperature control manager (for the customer can solve the heat dissipation problem of the Pi4 motherboard by himself)
2. Other hardware is compatible
3. Pi4 image (available in Yahboom courses, customers need to burn it in by themselves)

***Conversion between Raspberry Pi version and Nano version is not supported**

Figure 3: An example of the shipping list, detailing the components included in the Yahboom ROS2 Robot kit. Note that configurations may vary slightly by package.

2.2 Assembly Instructions

Follow the step-by-step instructions provided in the included CD or online tutorials. Assembly typically involves:

1. Assembling the chassis and attaching the Mecanum wheels.
2. Mounting the main control board and expansion boards.
3. Connecting the Lidar, depth camera, and other modules.
4. Wiring the power supply and motors.
5. Installing the operating system and necessary software from the CD.

It is highly recommended to watch the official assembly videos for visual guidance. These videos provide detailed instructions for every step of building and programming.

Product Structure

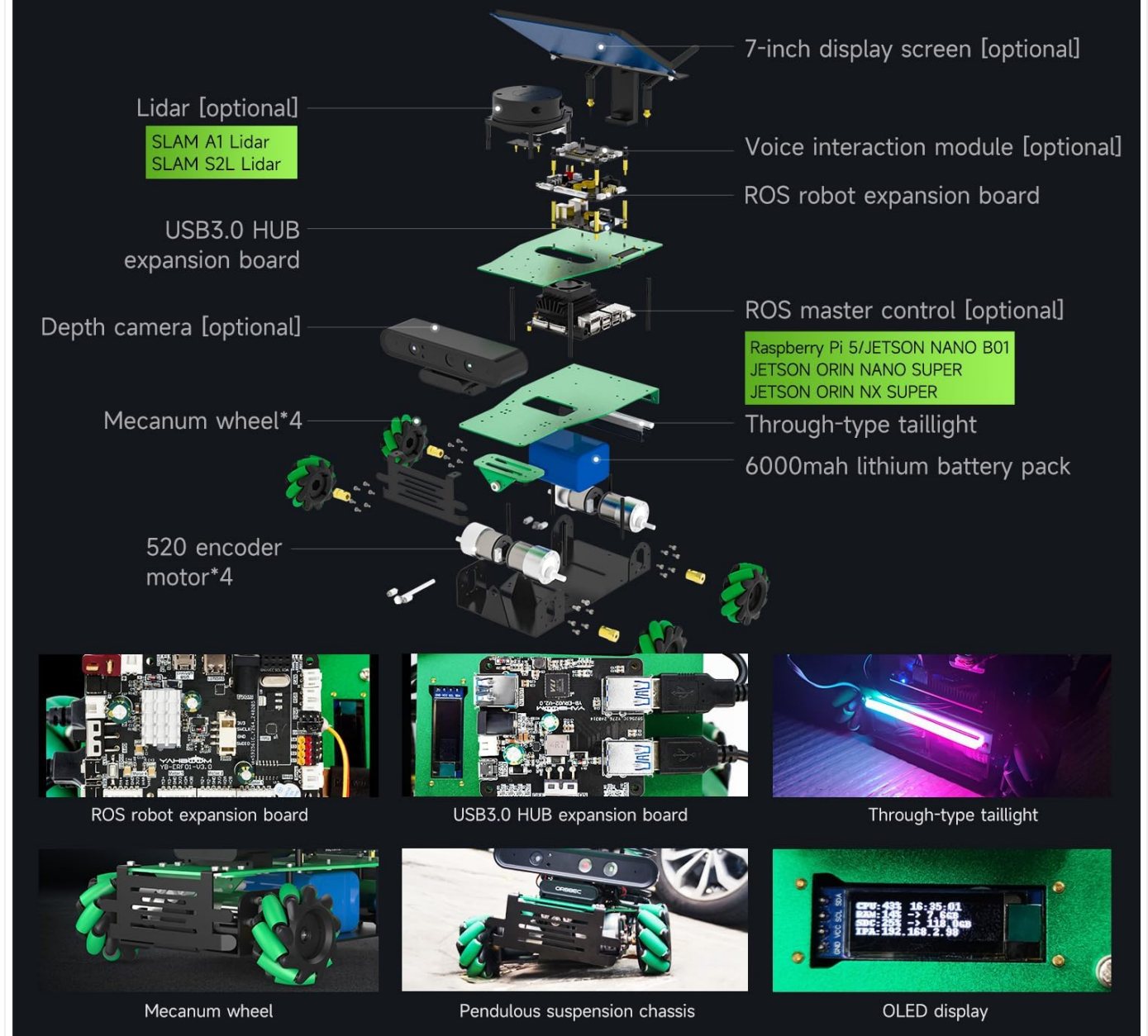


Figure 4: Exploded view of the ROSMASTER X3, illustrating the various components and their assembly points, including optional modules like the Lidar and 7-inch display screen.

3. OPERATING INSTRUCTIONS

The Yahboom ROS2 Robot offers a wide range of operating modes and functionalities, leveraging its advanced hardware and ROS2 operating system.

3.1 Movement and Navigation

Thanks to its Mecanum wheels and pendulum suspension chassis, the robot can achieve 360-degree omnidirectional movement, both indoors and outdoors. It supports advanced navigation features:

- **Lidar Mapping and Navigation:** Utilizes SLAM high-precision Lidar for simultaneous positioning and mapping of its environment.
- **Route Planning:** Users can define specific routes, and the robot will autonomously navigate to the destination, even with multiple waypoints.

- **Obstacle Avoidance:** The Lidar sensor enables the robot to detect and autonomously avoid obstacles in its path.
- **Multi-robot Navigation:** For users with multiple ROSMASTER robots, advanced formation performance and coordinated navigation can be achieved.

Your browser does not support the video tag.

Video 1: A comprehensive demonstration of the ROSMASTER X3's capabilities, including its movement, navigation, AI features, and various control methods.

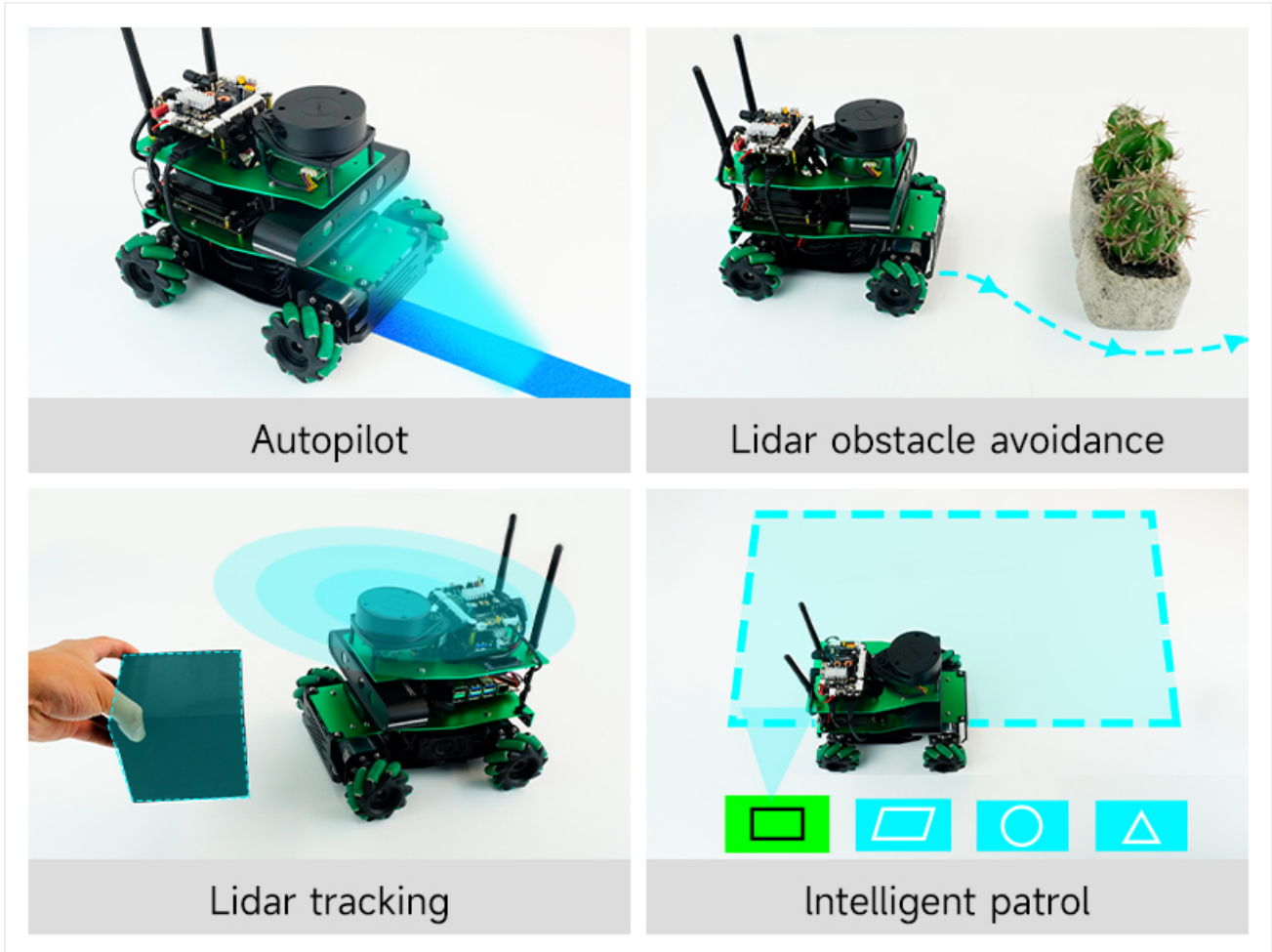


Figure 5: Visual representation of the robot's advanced navigation features, including autopilot, Lidar obstacle avoidance, Lidar tracking, and intelligent patrol.

3.2 AI and Visual Recognition

The robot integrates AI deep learning and augmented reality technologies, allowing for sophisticated visual processing:

- **Object Recognition:** Based on AI algorithms like YOLOv5, the robot can recognize various objects in its environment.
- **3D Environment Scanning:** The depth camera enables the robot to scan its surroundings in 3D, obtaining depth point cloud images for real-scene navigation.
- **Color Tracking:** The robot can track colors in real-time, allowing for applications like following a colored line or object.
- **QR Code Recognition:** It can identify QR code labels and obtain their pose coordinates for dynamic tracking.
- **AR Augmentation:** Users can present virtual graphics on checkerboard paper, demonstrating augmented reality capabilities.
- **Hand and Face Detection:** Utilizing MediaPipe development framework, the robot can perform hand detection, attitude detection, and face detection.

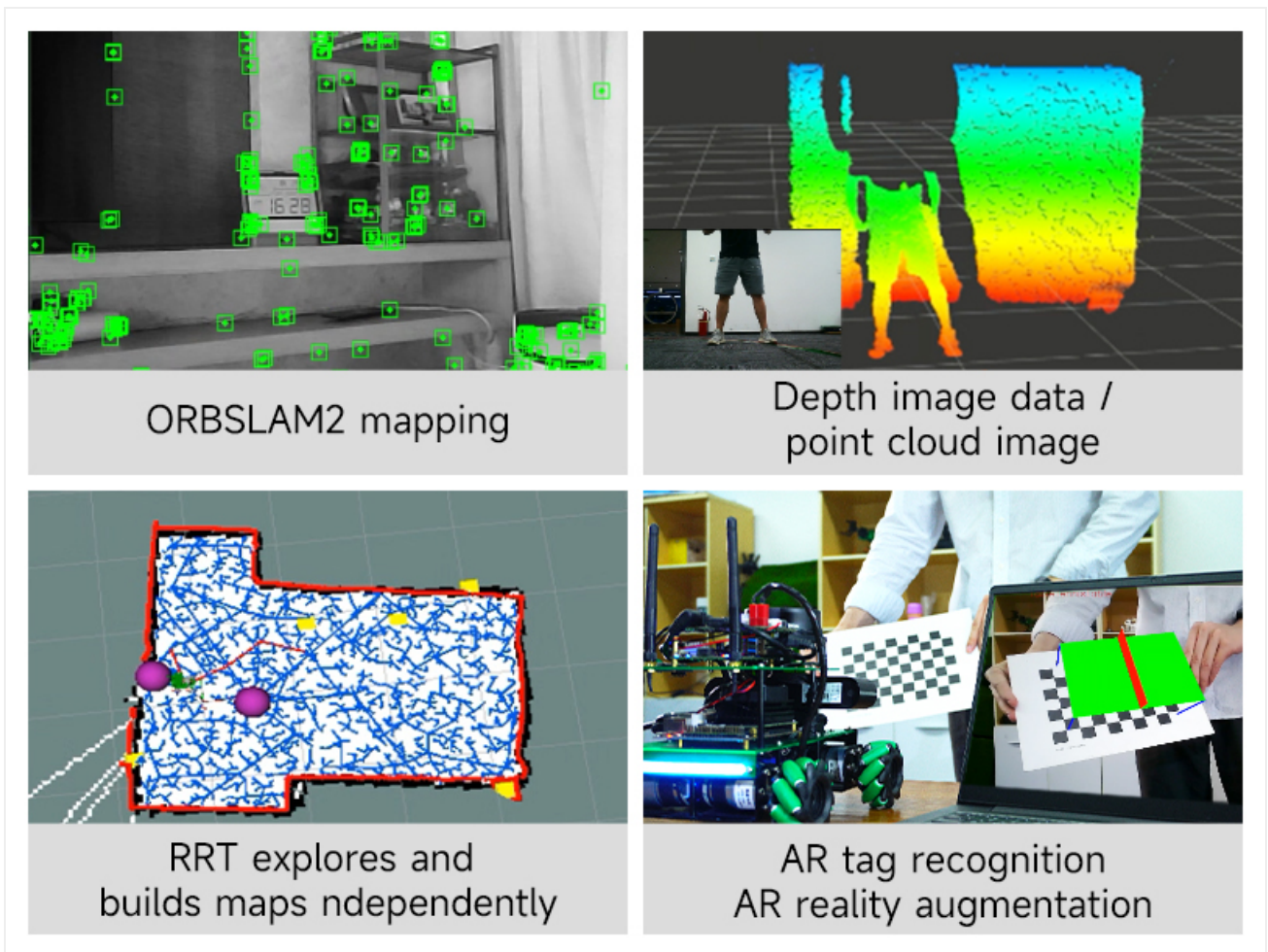
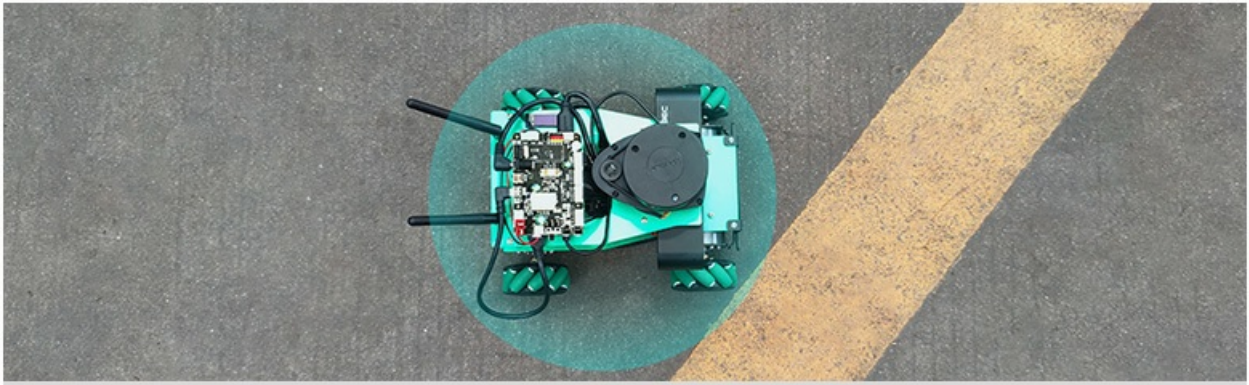


Figure 6: Examples of the robot's AI capabilities, including ORBSLAM2 mapping, depth image data processing, RRT exploration for map building, and AR tag recognition.

3.3 Control Methods

The ROSMASTER X3 can be controlled through multiple interfaces:

- **Mobile APP Remote Control:** Dedicated mobile applications allow users to control the robot's motion, view real-time video, and perform mapping and navigation tasks.
- **Voice Interaction:** An optional voice interaction module enables the robot to recognize and respond to voice commands.
- **PS2 Game Handle:** For a more tactile control experience, the robot can be operated using a PS2 game handle, often combined with a mobile phone for FPV (First-Person View).
- **Python Programming:** Users can expand and customize the robot's functions by writing Python code, with complete source code and manuals provided.



Mecanum wheel omnidirectional movement



Mobile APP remote control



FPV handle remote control

Figure 7: Demonstrates the various control methods for the robot, including omnidirectional movement via Mecanum wheels, mobile APP remote control, and FPV control using a game handle.

Robotic voice interaction control

(Just for Advanced version, Superior version, Ultimate version)

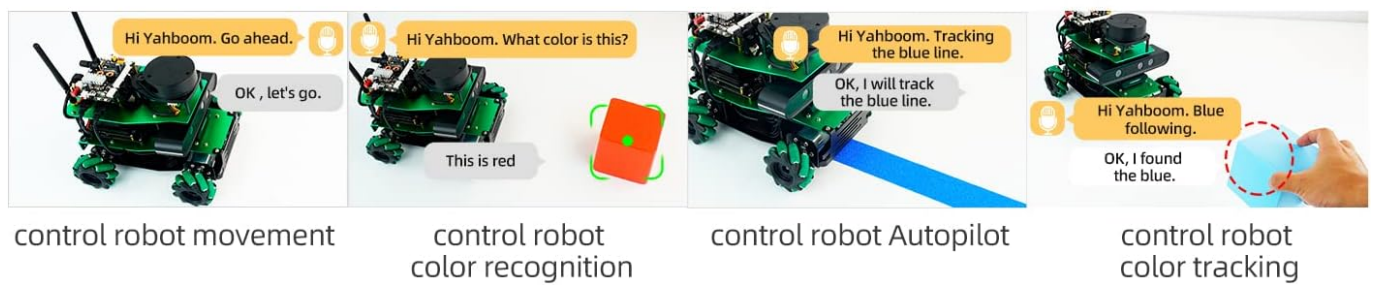
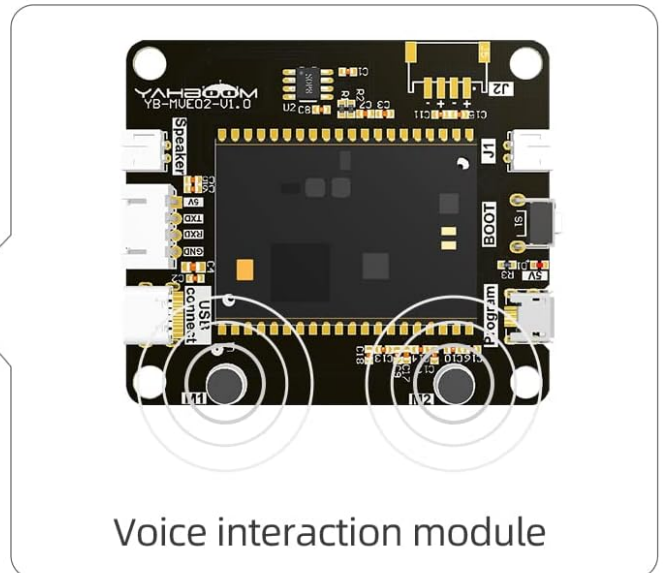
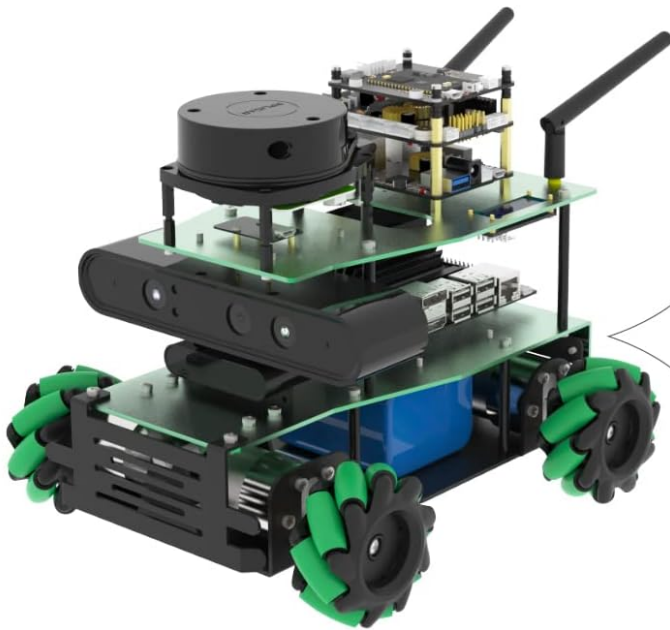


Figure 8: Illustrates the voice interaction capabilities of the robot, showing how it can respond to commands for movement, color recognition, and autopilot functions.

4. MAINTENANCE

Regular maintenance ensures the longevity and optimal performance of your Yahboom ROS2 Robot.

- **Cleaning:** Periodically clean the robot's chassis, wheels, and sensors to prevent dust and debris buildup, which can affect performance. Use a soft, dry cloth.
- **Battery Care:** Ensure the 12V lithium battery is charged according to manufacturer guidelines. Avoid overcharging or deep discharging to prolong battery life.
- **Software Updates:** Regularly check for and install software updates for the robot's operating system and applications to ensure access to the latest features and bug fixes.
- **Component Inspection:** Inspect all connections, wires, and mechanical parts for any signs of wear or damage. Tighten any loose screws.

5. TROUBLESHOOTING

If you encounter issues with your Yahboom ROS2 Robot, consider the following common troubleshooting steps:

- **Robot Not Responding:**

- Check battery level and ensure it is fully charged.
- Verify all power connections are secure.
- Restart the robot and the control application/software.

- **Navigation/Mapping Issues:**

- Ensure Lidar and depth camera sensors are clean and unobstructed.
- Verify software configurations for mapping and navigation are correct.
- Perform a software recalibration if necessary.

- **Connectivity Problems (APP/Remote Control):**

- Ensure the robot and control device are on the same Wi-Fi network.
- Check network stability and signal strength.
- Update the mobile APP to the latest version.

- **Software/Programming Errors:**

- Review your Python code for syntax errors or logical flaws.
- Consult the provided video tutorials and documentation for programming guidance.
- Ensure all necessary libraries and dependencies are installed.


For persistent issues, refer to the detailed troubleshooting guides available on the provided CD or contact Yahboom technical support.

6. SPECIFICATIONS


Feature	Specification
Model	ROSMaster X3 (Advanced Ver-without Nano)
Brand	Yahboom
Control Board Support	Raspberry Pi 4B, Jetson Nano, Jetson Orin Nano, Jetson Orin NX (depending on version)
Movement Type	Omnidirectional (Mecanum Wheels)
Navigation	Lidar SLAM Mapping & Navigation, Depth Camera 3D Real-Scene Navigation
AI Features	Object Recognition (YOLOv5), Color Tracking, QR Code Recognition, Hand/Face Detection, AR Augmentation
Programming Language	Python (ROS/ROS2 based)
Battery	1 x 12V 6000mAh Lithium Battery (included)
Chassis Material	Green Aluminum Alloy

Feature	Specification
Included Accessories	CD (with software), various cables, screwdriver, etc.

Different Version Descriptions



RPLIDAR S2L (Optional)



RPLIDAR A1 (Optional)



Astra Pro Plus Depth camera (Optional)





7-inch LCD screen (optional)



Voice interaction module (optional)

ROS controller (optional)

Raspberry Pi 5
 JETSON Nano 4GB SUB
 Jetson Orin Nano SUPER
 Jetson Orin NX SUPER

	Lidar		Astra Pro Plus Depth camera	Voice interaction module	7-inch LCD screen
	A1	S2L			
Standard Ver	●		●		
Advanced Ver	●		●	●	
Superior Ver	●		●	●	●
Ultimate ver		●	●	●	●




A1M8 lidar adopts the measurement method of triangular ranging, the measurement radius is 0.15m~12m, **sampling frequency is 8K**. Combined with the ROS robot system, indoor mapping and navigation functions can be easily realized.




S2L lidar adopts TOF ranging method, supports indoor and **outdoor** mapping and navigation, measurement radius supports 0.05m~18m, **sampling frequency is 32K**, scanning frequency is 8HZ~15HZ, and supports 1M communication rate.



The **depth camera** platform supports left and right rotation and up and down manual adjustment, which can not only realize all the AI visual functions, but also realize advanced functions such as image data processing and 3D mapping navigation.



Unique **voice interaction module** allows ROSMASTER to recognize voice and broadcast, and users can control the car through voice.



Any configuration can be equipped with a this **touch screen**.The LCD screen is a convenient configuration, which is convenient for users to debug ROS robots.

Figure 9: A table detailing the features included with different versions of the ROSMASTER X3, such as Lidar, Depth Camera, Voice Interaction Module, and 7-inch LCD screen.

Rosmaster X3 ROS Robot Product Parameters							Astra Pro Plus depth camera product parameters			
Main control board	Raspberry Pi 5 8GB	Jetson NANO 4GB SUB	Jetson Orin Nano SUPER 4GB	Jetson Orin Nano SUPER 8GB	Jetson Orin NX SUPER 8GB	Jetson Orin NX SUPER 16GB	3D technology	ORBEBECR monocular structured light	Range	0.6-8m
Microprocessor	Broadcom BCM2712 64-bit 2.4 GHz 4 core CortexA76+VideoCore VII @ 800 MHz	64-bit quad-core ARM A57 @ 1.43GHz + 128 core Maxwell @ 921MHz GPU	512-core Ampere architecture GPU with 16 Tensor Cores 6-core Arm® Cortex®-A78AE v8.2 64 bit CPU1.5MB L2 + 4MB L3	1024-core Ampere architecture GPU with 32 Tensor Cores 6-core Arm® Cortex®-A78AE v8.2 64 bit CPU1.5MB L2 + 4MB L3	1024-core Ampere GPU with 32 Tensor Cores 6-core Arm® Cortex A78AE v8.2 64 bit CPU1.5MB L2 + 4MB L3	1024-core Ampere GPU with 32 Tensor Cores 8-core Arm® Cortex A78AE v8.2 64 bit CPU2MB L2 + 4MB L3	Precision	1m: ±3mm	Field of View (FOV)	H 58.4° ×V 45.8°
AI computing power	2.5 times of Raspberry Pi 4B and close to Jetson Nano B01	0.5TFLOPS (FP16)	34 TOPS	67 TOPS	117 TOPS	157 TOPS	Resolution@ Frame rate (depth)	640 ×480@30fps 320×240@30fps 160× 120@30fps	Resolution@ Frame rate (RGB)	1920*1080@30fps 1280*720@30fps 640*480@30fps
Operating system	ROS1 Melodic ROS2 Foxy	Ubuntu 22.04 LTS + ROS2 Humble					Advanced processing chip	MX600	Close protection	Support
Programming language	Python						RGB Field of View	H66.73° V40.19° @1920*1080 H66.99° V40.37° @1280*720 H60.60° V46.81° @640*480	UVC(RGB)	Support
Input	Astra Pro Plus depth camera, SLAM lidar, PS2 wireless handle, 9-axis attitude sensor, motor with encoder						Support operating system	Android / Linux / Windows	Data transmission interface	USB2.0
Output	RGB colorful taillight, buzzer, 520 motor interface*4 Bus servo interface, PWM servo interface*4, OLED display screen						Size (mm)	164.85* 48.25* 40	microphone	Two-channel stereo
Motor scheme	520 metal motor with encoder*4						Power consumption	<2.5W	Safety	Class I laser
Power scheme	12.6V 6000mah 2C lithium battery pack						Operating temperature	10°C-40°C		
Working time	1.5 hours	1.5 hours	1 hours	1 hours	1 hours	1 hours	Power battery pack			
Power interface	T-type power supply interface, DC4.0*1.7 charging interface						Capacity	6000mAh	Rated discharge current	8.8A (2C)
Remote control method	Mobile APP, PC computer, PS2 wireless handle						Size	68*55*37mm	Maximum discharge current	10A
Communication method	WIFI network (LAN/AP)						Weight	300g	Plug	T-plug discharge +4017 female
Safety protection	Short circuit protection, over-current protection						Charger	12.6V 800mA	Protect	Over-current, over-charge, over-discharge, short circuit protection
Material	Anodized aluminum alloy									
Weight(assembly)	3200g-4600g (Different configuration, the weight will different)									

Figure 10: Detailed product parameters for the ROSMASTER X3, including main control board specifications, camera parameters, and battery pack details.

7. WARRANTY AND SUPPORT

Yahboom is committed to providing comprehensive support for its products. While specific warranty details are not provided in this manual, general technical support is available to assist users with any questions or issues encountered during use, assembly, or programming.

For technical assistance, please refer to the contact information provided on the product packaging or the official Yahboom website. The manufacturer also provides extensive video tutorials with English subtitles to aid in learning and troubleshooting.