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### Yahboom X3 Plus without Orin NX

# Yahboom Rosmaster X3 Plus ROS Programming AI Robot Kit User Manual

Model: X3 Plus without Orin NX | Brand: Yahboom

## 1. INTRODUCTION

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The Yahboom Rosmaster X3 Plus is an advanced educational robot kit designed for adults interested in ROS (Robot Operating System) programming and artificial intelligence. This kit provides a comprehensive platform for building experimental projects, offering a rich set of hardware components and software capabilities for learning and development.

This manual provides essential information for the setup, operation, and maintenance of your Rosmaster X3 Plus robot kit. Please read it thoroughly before beginning assembly or operation.



Figure 1.1: The Yahboom Rosmaster X3 Plus robot kit, featuring a robotic arm, depth camera, and Mecanum wheels.

## 2. PRODUCT OVERVIEW AND KEY FEATURES

The Rosmaster X3 Plus boasts a flagship configuration designed for advanced robotics projects. It integrates various high-performance components to enable complex AI and robotics applications.

## 2.1 Core Components

- **ORBEC Astra Pro Depth Camera:** For advanced perception and 3D mapping.
- **High-definition Touch Adjustable 7-inch Screen:** For user interaction and display.
- **6-DOF Robotic Arm with Camera:** Enables manipulation tasks and visual AI applications.
- **YDLIDAR 4ROS TOF Ranging Lidar:** Provides 360-degree environmental scanning for navigation and mapping.
- **80mm Large-size Mecanum Wheels:** Allows for omnidirectional movement.
- **520 Hall Coding Geared Motor:** Ensures precise and powerful movement.
- **9600MAH Lithium Battery Pack:** Provides extended operating time.
- **Epoxy Color Road Alloy Body Structure:** Durable and robust chassis.

## 2.2 Functional Capabilities

The Rosmaster X3 Plus supports a wide array of functions and gameplay scenarios:

- **Navigation and Mapping:** Supports algorithms such as ORBSLAM2, Rtab-Map 3D, RRT exploration, gmapping, hector, karto, and cartographer.
- **Voice Control:** Enables voice-controlled robot driving and robotic arm operations like grabbing.
- **Obstacle Avoidance and Following:** Conventional methods for dynamic environments.
- **Object Recognition and Detection:** Includes bone detection and other visual recognition tasks.
- **Programming and Simulation:** Based on the ROS operating system, supporting Python programming for robot arm MoveIt simulation, STM32 underlying development, MaeiaPipe development, and Cartesian path planning.
- **Cross-platform Control:** Dual APP control, real-life first-person controller, Jupyter Lab programming control, and ROS system control.

# ROS Main Features

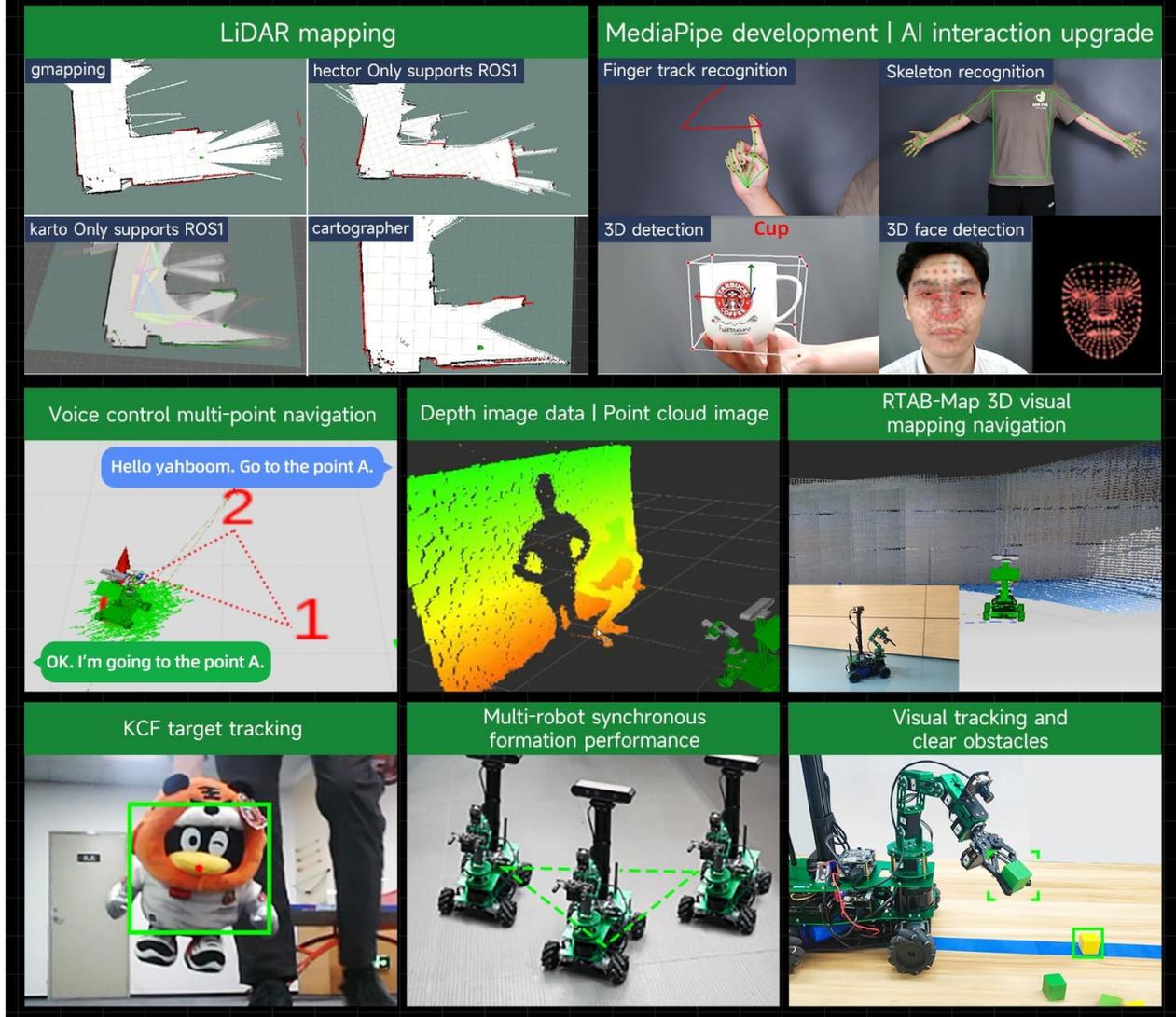


Figure 2.1: Overview of ROS main features including LiDAR mapping, MediaPipe development for AI interaction, voice control navigation, depth image data, RTAB-Map 3D visual mapping, KCF target tracking, multi-robot synchronous formation, and visual tracking with obstacle avoidance.

# Functions List

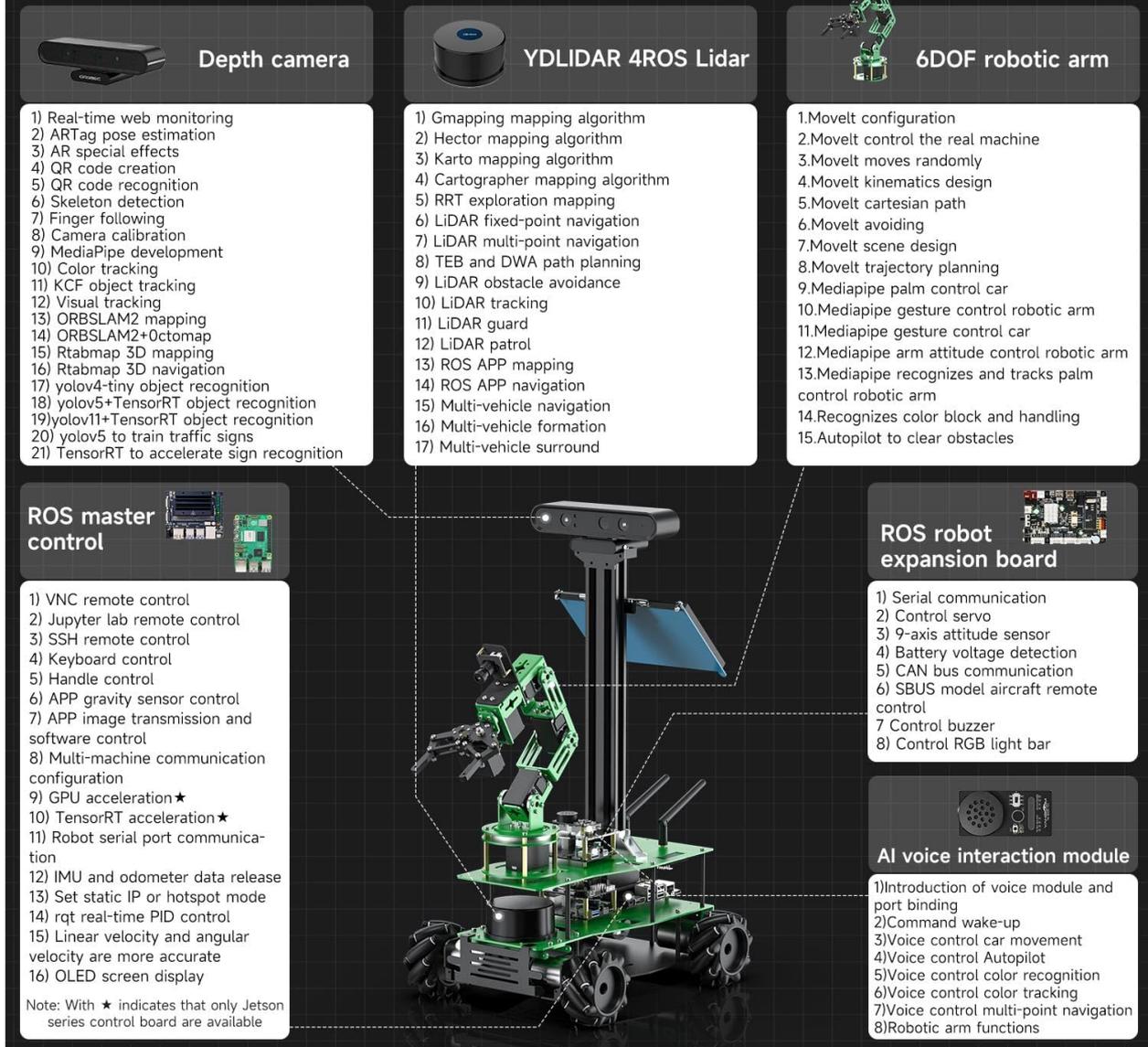


Figure 2.2: A detailed list of functions categorized by Depth Camera, YDLIDAR 4ROS Lidar, 6DOF Robotic Arm, ROS Master Control, ROS Robot Expansion Board, and AI Voice Interaction Module.

## 3. SETUP AND ASSEMBLY

The main body of the Rosmaster X3 Plus robot car is pre-assembled. Users are required to complete the installation of specific components and wiring according to the provided construction order to begin programming and operating the robot.

### 3.1 Unpacking and Inventory

Upon receiving your Rosmaster X3 Plus kit, carefully unpack all components and verify them against the shipping list. The contents may vary slightly depending on the specific product version (e.g., with or without Orin NX Super).

# Shipping list



Different versions have slightly different shipping lists.  
Most of the structural components of X3 PLUS are assembled before shipped. Users only need to install the main control board and complete the wiring between modules.

### Chassis

- Pendulum suspension motor chassis
- 520 geared motor 205RPM \*4
- Frame main control fixing plate \*1
- Anti-collision beam \*1
- Pendulum suspension bracket \*1
- Light bar fixed \*1
- Lidar fixing plate \*1
- Screwdriver \*1
- Parts package \*4
- Mecanum wheel \*4

### Hardware control

- ROS car expansion board \*1
- USB HUB expansion board \*1
- OLED screen board \*1
- USB camera \*1
- LED light bar \*1
- Several cables \*N
- Data line \*N
- 7-inch screen and fixing bracket \*1
- 9600mah 12.6V power battery and charger \*1
- Gamepad and handle phone holder \*1
- Network card antenna (Just for Jetson series) \*1
- RGB Cooling HAT (Just for Raspberry Pi) \*1

### ROS accessories

- Astra Pro Plus depth camera and fixing bracket
- YDLIDAR 4ROS lidar
- AI voice interaction module
- Some wires

High quality aluminum box

### ROS controller

#### Raspberry Pi 5 Version:

- Raspberry Pi 5 16GB 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.

Figure 3.1: An example of the shipping list, showing various components such as the robot chassis, 7-inch LCD display, lidar, robotic arm, and different ROS controller options.

## 3.2 Component Identification

Familiarize yourself with the various parts of the robot using the product structure diagram.



Figure 3.2: Exploded view illustrating the main components of the Rosmaster X3 Plus, including the depth camera, robotic

arm, AI voice interaction module, YDLIDAR 4ROS Lidar, ROS master control, ROS robot expansion board, USB3.0 HUB expansion board, 9600mAh lithium battery pack, 520 encoder motor, Mecanum wheels, and 7-inch display screen.

### 3.3 Main Control Board Installation

The kit is available in several versions, differing primarily in the main control board (e.g., Raspberry Pi 5, Jetson Nano, Jetson Orin Nano Super, Orin NX Super). Install your chosen main control board and complete the necessary wiring between modules. Refer to the specific assembly guide provided with your kit for detailed instructions.



Figure 3.3: The Rosmaster X3 Plus is compatible with Jetson Nano, Jetson Orin SUPER series, Raspberry Pi 5, and PC, allowing for flexible main control board choices.

## 4. OPERATING THE ROSMASTER X3 PLUS

The Rosmaster X3 Plus offers diverse control methods and extensive programming capabilities. It is designed for users with some programming experience, as it presents challenging but rewarding projects.

### 4.1 Control Methods

The robot supports multiple ways of interaction and control:

- **Remote Control APP:** Available for iOS and Android devices, providing interfaces for remote control, user guidance, Mecanum wheel calibration, and colorful light control.
- **Mapping and Navigation APP:** Supports Android devices for real-time mapping and navigation control.
- **FPV Handle Control:** Utilizes a physical gamepad for first-person view control.
- **Computer Keyboard Control:** Direct control via a connected computer keyboard.
- **Jupyter Lab Programming Control:** For interactive coding and experimentation.
- **ROS System Control:** Direct control and interaction through the ROS framework.



Figure 4.1: Various cross-platform control methods for the Rosmaster X3 Plus, including mobile apps, FPV handle, keyboard, Jupyter Lab, and ROS system control.

# Cross-platform interconnection control

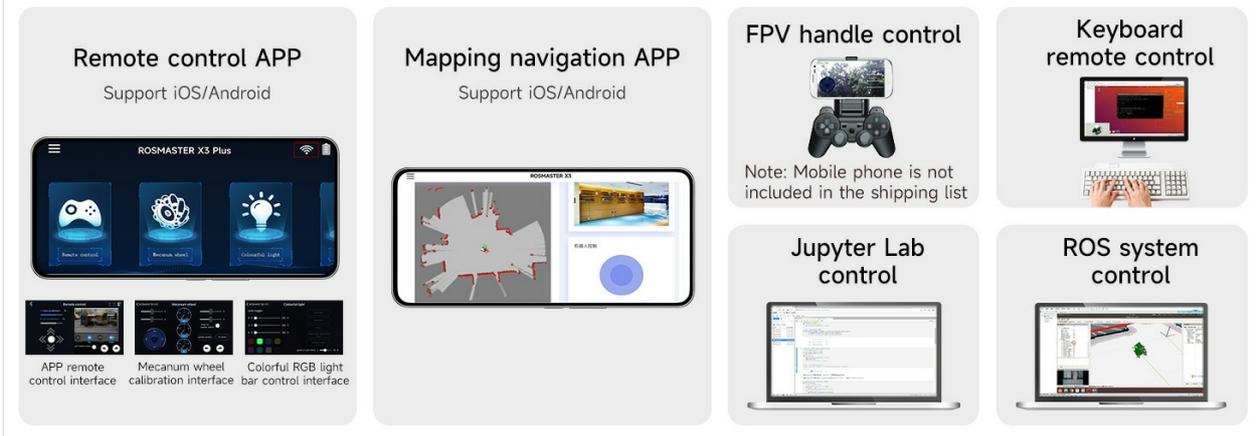


Figure 4.2: Detailed view of the different control interfaces, including remote control APP, mapping navigation APP, FPV handle control, keyboard remote control, Jupyter Lab control, and ROS system control.

## 4.2 Programming and Development

The Rosmaster X3 Plus is an excellent platform for learning and applying ROS, Python, and AI concepts. Yahboom provides extensive open-source resources and 124 video courses (with dual subtitles) to guide users from basic to advanced topics.

- **ROS Operating System:** The foundation for all robot operations and programming.
- **Python Programming:** Used for implementing various algorithms and control logic.
- **Robot Arm MoveIt Simulation:** Learn to simulate and control the 6-DOF robotic arm.
- **Mapping and Navigation:** Implement and test various SLAM and navigation algorithms.
- **STM32 Underlying Development:** Understand and program the robot's low-level hardware.
- **MaiePipe Development:** Explore advanced AI vision applications.
- **Cartesian Path Planning:** Develop precise movement paths for the robotic arm.
- **OpenCV:** Utilize computer vision libraries for object recognition, tracking, and more.

### What can you learn from ROSMASTER X3 Plus?

ROS operating system

RTAB 3D mapping navigation

PCL 3D point cloud

SLAM mapping navigation

Machine vision applications

MoveIt Simulation

Voice interactive control

Octomap

Python programming

Open Source CV

ORB\_SLAM2

Manipulator kinematics algorithm

STM32 development

MediaPipe development

YOLO model training

TensorRT acceleration

Pytorch

Cartesian path planning

Rosmaster X3 ROS Robot Product Parameters						
Main control board	Raspberry Pi 5 16GB	Jetson NANO 4GB SUB	Jetson Orin Nano SUPER 4GB	Jetson Orin Nano SUPER 8GB	Jetson Orin NX SUPER 8GB	Jetson Orin NX SUPER 16GB
Microprocessor	Broadcom BCM2712 64-bit 2.4 GHz 4 core CortexA76+ Video Core VII @ 800 MHz	64-bit quad-core ARM A57 @ 1.43GHz + 128 core Maxwell @ 921MHz z GPU	512-core Ampere architecture GPU with 6 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 6-core Arm® Cortex-A78AE v8.2 64 bit CPU2MB L2 + 4MB L3
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
Operating system	Raspberry Pi OS + Docker + ROS Melodic	Ubuntu18.04 LTS + ROS Melodic	Ubuntu 22.04 LTS + ROS2 Humble			
Programming language	Python					
Input	Astra Pro Plus depth camera, YDLIDAR 4ROS lidar, PS2 wireless handle, 9-axis attitude sensor, motor speed with encoder, USB camera					
Output	RGB colorful tail lights, buzzer, 520 motor interface*4, 6DOF robotic arm, PWM servo interface*4, OLED display					
Motor scheme	520 metal motor with encoder*4					
Power scheme	12.6V 6000mah 2C lithium battery pack					
Working time	3 Hour	3.5 Hour	3 hours	3 hours	2.5 hours	2.5 hours
Power interface	T-type discharge interface, DC4.0*1.7 charging interface					
Remote control method	Mobile APP, PC computer, PS2 wireless handle					
Communication method	WiFi network (LAN/WP)					
Safety protection	Short circuit protection, over current protection					
Material	Anodized aluminum alloy					
Weight(assembly)	About 4.35kg					

Figure 4.3: An overview of learning opportunities with the Rosmaster X3 Plus, including ROS, RTAB 3D mapping, SLAM, MoveIt simulation, Python, OpenCV, and various AI algorithms.

### What Can YOU Learn?

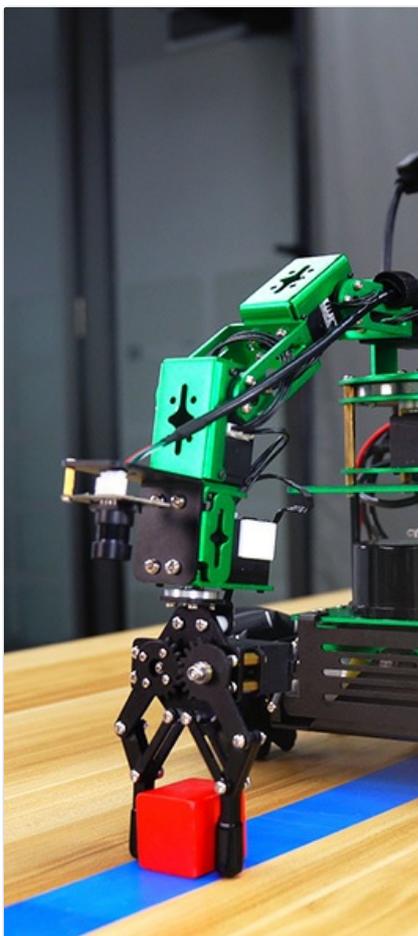
<b>Linux operating system</b> <ul style="list-style-type: none"> <li>1. Virtual machine installation and use</li> <li>2. Linux basics</li> <li>3. Remote control</li> <li>4. Multi-machine communication...</li> <li>5. Static IP and hotspot mode</li> <li>6. Bind the device ID</li> <li>7. Web page real-time monitoring</li> <li>8. Expansion tutorial</li> <li>9. Write system images</li> </ul>	<b>ROS basic course</b> <ul style="list-style-type: none"> <li>1. ROS introduction</li> <li>2. ROS installation</li> <li>3. ROS common command tools</li> <li>4. ROS workspace</li> <li>5. ROS function package</li> <li>6. ROS node</li> <li>7. ROS topic publisher</li> <li>8. ROS topic subscribers</li> <li>9. ROS service client</li> <li>10. ROS service server</li> <li>11. ROS action client</li> <li>12. ROS action server</li> <li>13. ROS custom message reception</li> <li>14. ROS-launch file</li> <li>15. ROS-TF transformation</li> <li>16. ROS parameter service</li> <li>17. ROS-nviz use</li> <li>18. ROS-rqt tool usage</li> <li>19. Topic message recording and ...</li> <li>20. urdf model introduction</li> <li>21. gazebo introduction</li> <li>22. ROS distributed communication</li> </ul>	<b>Robot control course</b> <ul style="list-style-type: none"> <li>1. PID algorithm theory</li> <li>2. Robot PID debugging</li> <li>3. Robot information release</li> <li>4. Robot keyboard control</li> <li>5. Robot handle control</li> <li>6. Robot state estimation</li> <li>7. Robot calibration</li> <li>8. Robot URDF model</li> </ul>	<b>Lidar course</b> <ul style="list-style-type: none"> <li>1. Lidar basics/Exclusive for EAI series...</li> <li>2. Lidar avoiding</li> <li>3. Lidar guard</li> <li>4. Lidar follow</li> <li>5. Patrol game</li> <li>6. gmapping mapping algorithm</li> <li>7. Hector mapping algorithm</li> <li>8. karto mapping algorithm</li> <li>9. cartographer mapping algorithm</li> <li>10. mt_exploration mapping algorithm</li> <li>11. AMCL</li> <li>12. Navigation and avoiding</li> <li>13. APp mapping and navigation-new</li> <li>13.APp mapping and navigation-old</li> </ul>	<b>Deep Learning course(SUPER)</b> <ul style="list-style-type: none"> <li>1. Handwritten digits KNN recognition</li> <li>2. Basic use of TensorFlow</li> <li>3. Basic use of pytorch</li> <li>4. YOLOv11 model conversion</li> <li>5. YOLOv11 dataset annotation</li> <li>6. YOLOv11 model conversion + TensorRT acceleration</li> <li>7. YOLOv11 object recognition</li> </ul>	<b>Robotic arm control course</b> <ul style="list-style-type: none"> <li>1. MoveIt configuration</li> <li>2. MoveIt control the real machine</li> <li>3. MoveIt moves randomly</li> <li>4. MoveIt kinematics design</li> <li>5. MoveIt cartesian path</li> <li>6. MoveIt avoiding</li> <li>7. MoveIt scene design</li> <li>8. MoveIt trajectory planning</li> <li>9. Mediapipe palm control car</li> <li>10. Mediapipe gesture control robotic...</li> <li>11. Mediapipe gesture control car</li> <li>12. Mediapipe arm attitude control...</li> <li>13. Mediapipe recognizes and tracks...</li> <li>14. Recognizes color block and handling</li> <li>15. Autopilot to clear obstacles</li> </ul>
<b>OpenCV courses</b> <ul style="list-style-type: none"> <li>1. Getting started with Open Source CV</li> <li>2. Open Source CV geometric transformation</li> <li>3. Open Source CV image processing and ...</li> <li>4. Open Source CV image beautification</li> <li>5. Opencv application</li> <li>6. AR vision</li> <li>7. AR QR code</li> <li>8. ROS+Opencv foundation</li> <li>9. ROS+Opencv application</li> <li>10. Data transformation and point cloud</li> <li>11. MediaPipe development</li> </ul>	<b>OpenCV courses</b> <ul style="list-style-type: none"> <li>1. ROS action client</li> <li>12. ROS action server</li> <li>13. ROS custom message reception</li> <li>14. ROS-launch file</li> <li>15. ROS-TF transformation</li> <li>16. ROS parameter service</li> <li>17. ROS-nviz use</li> <li>18. ROS-rqt tool usage</li> <li>19. Topic message recording and ...</li> <li>20. urdf model introduction</li> <li>21. gazebo introduction</li> <li>22. ROS distributed communication</li> </ul>	<b>OpenCV courses</b> <ul style="list-style-type: none"> <li>01. How to use the Astra camera</li> <li>02. Astra camera calibration</li> <li>03. Astra Color Tracking</li> <li>04. Astra Object Tracking</li> <li>05. Visual tracking autopilot</li> <li>06. Pure visual 2D mapping and...</li> <li>07. RTAB-Map 3D mapping ....</li> <li>08. ORB SLAM2 basics</li> <li>09. ORB SLAM2 Octomap source</li> </ul>	<b>Multi-robot control course</b> <ul style="list-style-type: none"> <li>1. Multi-machine handle control</li> <li>2. Multi-machine navigation</li> <li>3. Multi-machine formation</li> <li>4. Multi-machine surround</li> </ul>	<b>Deep learning courses</b> <ul style="list-style-type: none"> <li>1. KNN recognizes handwritten digits</li> <li>2. Basic use of TensorFlow</li> <li>3. Basic use of PyTorch (jetson)</li> <li>4. yolov5 model training (jetson)</li> <li>5. yolov5+tensorrt acceleration (jetson)</li> <li>6. yolov4-tiny</li> </ul>	<b>Model training Autopilot</b> <ul style="list-style-type: none"> <li>0. Notes (must read!)</li> <li>1. yolov5 to train traffic signs</li> <li>2. TensorRt acceleration identification...</li> <li>3. Road sign indication function...</li> <li>4. Collect data</li> <li>5. Training model</li> <li>6. Model transformation and application</li> <li>7. AI Autopilot</li> <li>Annex</li> </ul>

Figure 4.4: A comprehensive list of courses covering Linux, ROS basics, robot control, LiDAR, deep learning, robotic arm control, OpenCV, LLM development, voice control, and model training.

## 5. DETAILED COMPONENT INFORMATION

### 5.1 Robotic Arm

The 6-DOF robotic arm is equipped with a camera for visual tasks and offers precise control for manipulation. It features a 5 DOF + gripper servo scheme with anodized aluminum material.



Servo scheme	15KG*5+6KG*1 serial bus intelligent servo	Repeatability	±0.5mm
Robot arm material	Anodized aluminum	Control method	UART serial command
Degree of freedom	5 DOF + gripper	Communication baud rate	115200
robotic arm payload	200g (straighten for clamping)	Servo storage	Servo settings are automatically saved after power off
Robotic arm load	500g (clamping weight)	Readback function	Support readback of servo position, status and other information
Wingspan	350mm	Servo protection	Locked rotor for 3 seconds to enter protection status
Effective crawl range	Radius less than or equal to 30cm	Parameter feedback	Position, abnormal feedback
USB camera parameters (mounted on the robotic arm)			
pixel	300,000 pixels	Field of view	110°
Resolution	480p (640*480)	Frame rate	30fps
Connection method	USB2.0	Focus method	Manually focus adjustment

Figure 5.1: Specifications for the robotic arm, including servo scheme, material, degrees of freedom, payload, wingspan, control method, communication baud rate, servo storage, protection, feedback, and USB camera parameters.

### 5.2 7-inch HD Touch Screen

The integrated 7-inch HD touch screen provides a clear interface for interaction and can be adjusted for optimal viewing angles.



Figure 5.2: The 7-inch screen supports vertical position adjustment and a pitch angle adjustment of 180 degrees.

### 5.3 ORBBEC Astra Pro Depth Camera

This depth camera is crucial for 3D perception, mapping, and AI applications, offering various resolutions and framerates.



Figure 5.3: Technical specifications for the ORBBEC Astra Pro depth camera, including 3D technology, accuracy, resolution, framerate, deep processing chip, field of view, supported operating systems, size, power consumption, operating temperature, microphone, and safety class.

## 5.4 YDLIDAR 4ROS Lidar

The YDLIDAR 4ROS provides Time-of-Flight (TOF) ranging for accurate 360-degree environmental scanning, essential for navigation and mapping.

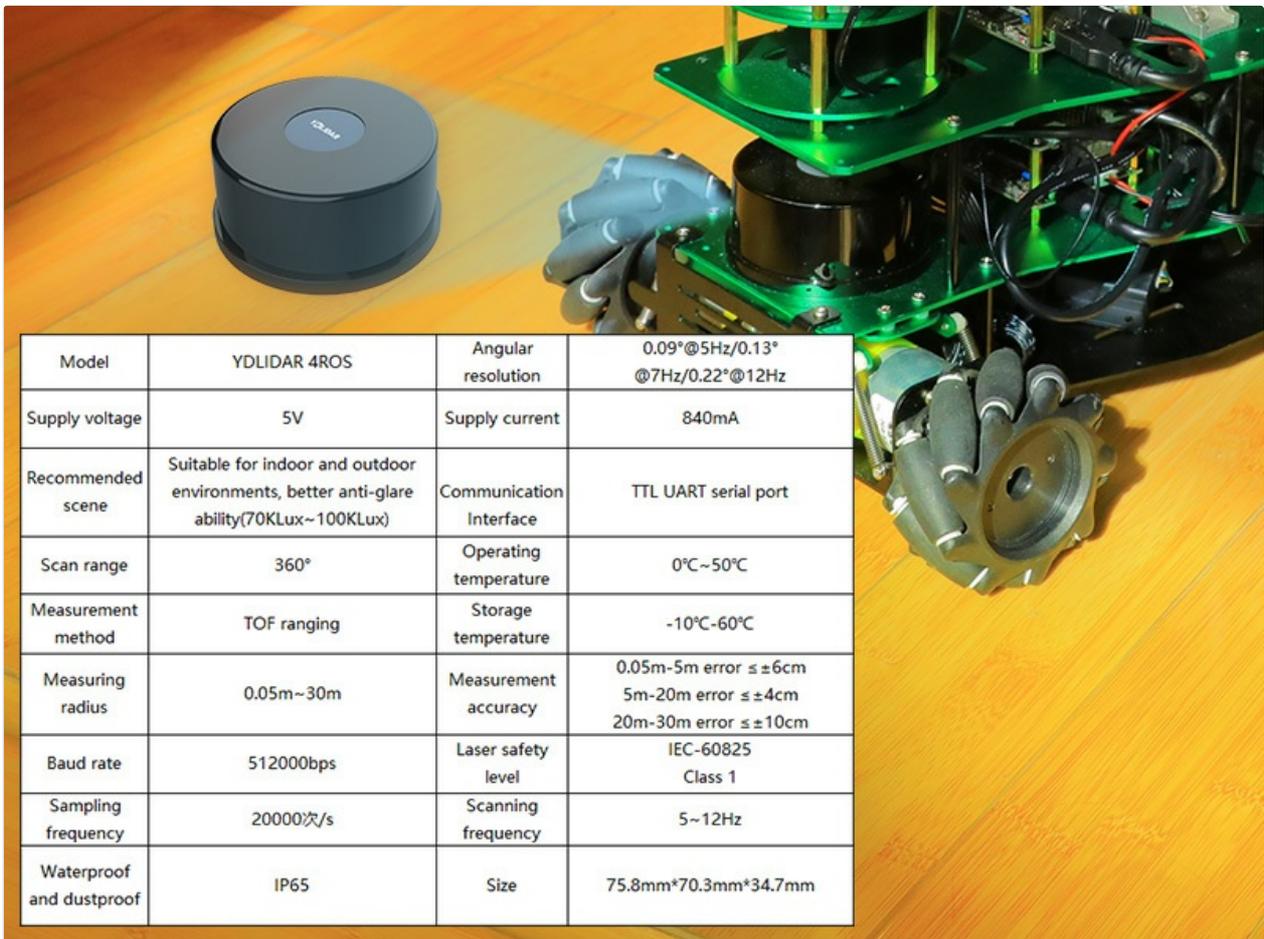


Figure 5.4: Technical specifications for the YDLIDAR 4ROS Lidar, including model, supply voltage, recommended scene, scan range, measurement method, measuring radius, baud rate, sampling frequency, waterproof/dustproof rating, angular resolution, supply current, communication interface, operating temperature, storage temperature, measurement accuracy, laser safety level, scanning frequency, and size.

## 5.5 AI Voice Interaction Module

This module enables voice command recognition for interactive control of the robot.

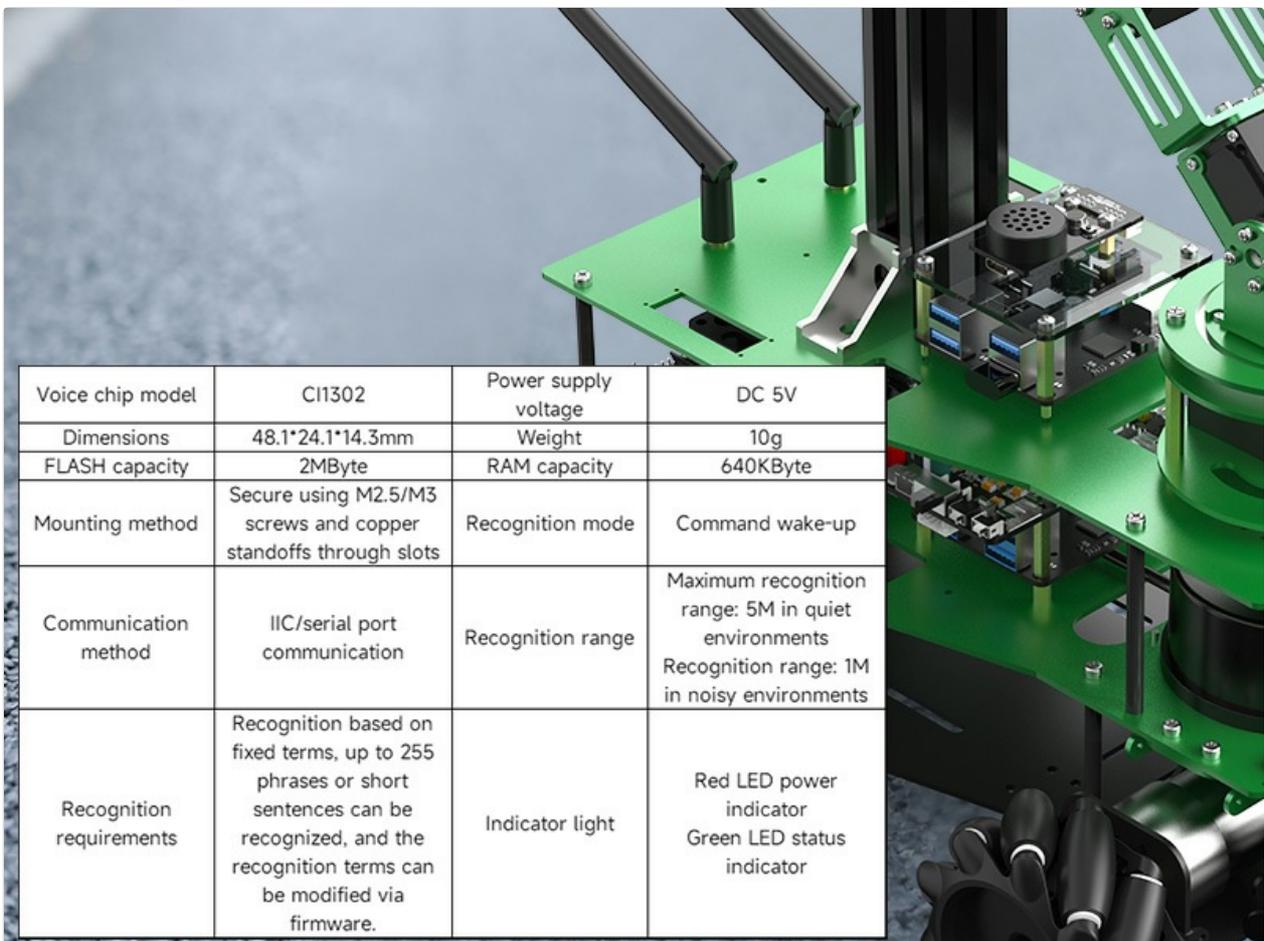


Figure 5.5: Technical specifications for the AI Voice Interaction Module, including voice chip model, dimensions, FLASH capacity, mounting method, communication method, recognition requirements, power supply voltage, weight, RAM capacity, recognition mode, recognition range, and indicator lights.

## 5.6 520 Hall Gear Motor with Encoder

The robot utilizes high-precision magnetic encoder motors for accurate and reliable movement.

### 520 hall gear motor with encoder

The 520 motor comes with a high-precision magnetic encoder, with excellent performance, surpassing the stepper motor. And it is equipped with a AB-phase incremental hall encoder, which has the characteristics of high precision and strong anti-interference ability.



Rated voltage	12V	Rated power	≤4W
Motor type	Permanent magnet brush	Stall current	3A
Stall torque	4.8kgf.cm	Rated current	0.3A
Rated torque	3.3kgf.cm	Reduction ratio	1:30
Speed before deceleration	11000rpm	Speed after deceleration	330±10rpm
Output shaft	Diameter 6mm D-type eccentric shaft	Encoder type	Hall encoder
Line count	11-line	Voltage	3.3-5V
Interface Type	PH2.0		

Figure 5.6: Specifications for the 520 Hall gear motor with encoder, detailing rated voltage, motor type, stall torque, rated torque, speed before deceleration, output shaft, line count, interface, rated power, stall current, rated current, reduction ratio, speed after deceleration, encoder type, and voltage.

## 5.7 9600mAh Large Capacity Lithium Battery Pack

A robust battery pack ensures stable power supply and extended operation times for the robot.

### 9600mah large capacity lithium battery pack

ROSMaster X3 PLUS car is equipped with a large-capacity lithium battery pack, longer working time, providing a steady power for robot car.

Capacity	9600mAh	Rated current	6A
Size	64*43*75mm	Maximum discharge current	10A
Weight	About 450g	Plug	T-type discharge port + 4017 charge port
Charger	12.6V 2A	Protection	Over-current, over-charge, over-discharge, short-circuit, power-off protection



Figure 5.7: Specifications for the 9600mAh lithium battery pack, including capacity, size, weight, charger, rated current, maximum discharge current, plug type, and protection features.

## 5.8 ROS Robot Expansion Board

This board is designed to control and drive the robot chassis, supporting various chassis types and meeting power supply requirements for different ROS master control boards.



Figure 5.8: Details of the ROS robot expansion board, including onboard MCU, communication baud rate, data interface, USB to serial port chip, data output method, command control, IMU chip, motor drive model, encoder motor, SBUS remote control, CAN communication, other peripheral interfaces, firmware update method, operating voltage, standby current, voltage output, protection circuit, working temperature, product size, and product weight.

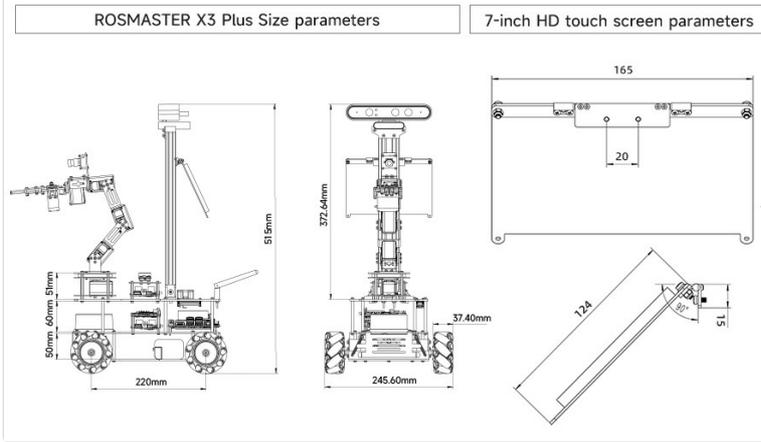
## 6. SPECIFICATIONS

The following table summarizes the key specifications of the Rosmaster X3 Plus robot kit.

Specification	Value
Product Dimensions	10 x 5 x 8 inches
Item Weight	10 pounds
ASIN	B0CL4RXFFT
Item Model Number	X3 Plus without Orin NX
Manufacturer Recommended Age	20 years and up
Batteries	1 12V battery required (included)
Manufacturer	Yahboom

## Product parameters

Unit: mm



## Products real shot



Figure 6.1: Detailed product parameters including size, 7-inch HD touch screen parameters, and a real shot of the product with its aviation aluminum packing box.

## 6.1 Main Controller Comparison

The Rosmaster X3 Plus offers various main control board options, each with different computing power and specifications.

## Support Orin **SUPER**/Raspberry Pi 5

### AI performance



## ROSMASTE **X3 PLUS** ROS main controller comparison

ROS master						
Computing power	Raspberry Pi 5 16GB 2.5 times of Raspberry Pi 4B and close to Jetson Nano B01	Jetson NANO 4GB 0.5TFLOPS (FP16)	Jetson Orin Nano <b>SUPER</b> 4GB 34 TOPS	Jetson Orin Nano <b>SUPER</b> 8GB 67 TOPS	Jetson Orin NX <b>SUPER</b> 8GB 117 TOPS	Jetson Orin NX <b>SUPER</b> 16GB 157 TOPS
CPU	Cortex-A76	Quad-Core Arm Cortex-A57 MPCore processor	6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3		6-core Arm® Cortex A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3	8-core Arm® Cortex A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3
GPU	VideoCore VII	128-core Maxwell™ GPU	512-core Ampere architecture GPU with 16 Tensor Cores	1024-core Ampere architecture GPU with 32 Tensor Cores	1024-core Ampere architecture GPU with 32 Tensor Cores	
RAM	16GB	4 GB 64-bit LPDDR4 25.6GB/s	4GB 64-bit LPDDR5 51 GB/s	8GB 128-bit LPDDR5 102 GB/s	8GB 128-bit LPDDR5 102 GB/s	16GB 128-bit LPDDR5 102 GB/s
Storage	64GB TF card for free	64GB U disk for free	256GB SSD for free			
Power	10W	5W   10W	7W, 10W, 25W	7W, 15W, 25W	10W, 15W, 25W, 40W	
Provide ROS system	Raspberry Pi OS + Docker + ROS	Ubuntu18.04 LTS + ROS Melodic	<b>Ubuntu 22.04 LTS + ROS2 Humble</b>			

Figure 6.2: A comparison table detailing the specifications of different main controllers compatible with the Rosmaster X3 Plus, including Raspberry Pi 5, Jetson Nano, Jetson Orin Nano Super (4GB/8GB), and Jetson Orin NX Super (8GB/16GB).

## 7. MAINTENANCE

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To ensure the longevity and optimal performance of your Rosmaster X3 Plus, follow these general maintenance guidelines:

- **Cleaning:** Regularly clean the robot's surfaces with a soft, dry cloth. Avoid using harsh chemicals or abrasive materials.
- **Battery Care:** Store the lithium battery pack in a cool, dry place. Do not overcharge or completely discharge the battery. Follow all safety instructions provided with the battery.
- **Component Inspection:** Periodically check all connections, screws, and moving parts (e.g., robotic arm joints, Mecanum wheels) for looseness or damage. Tighten as necessary.
- **Software Updates:** Keep the operating system and all relevant software packages updated to ensure compatibility and access to the latest features and bug fixes.
- **Environmental Conditions:** Operate and store the robot in a clean, dry environment, away from extreme temperatures, dust, and moisture.

## 8. TROUBLESHOOTING

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This section provides general troubleshooting tips for common issues. For more specific problems, refer to the official Yahboom documentation or community forums.

### 8.1 Power Issues

- **Robot does not power on:** Ensure the battery is fully charged and properly connected. Check all power cables and switches.
- **Short operating time:** The battery may not be fully charged, or its capacity might be degraded. Consider replacing the battery if it's old or damaged.

### 8.2 Connectivity Problems

- **Cannot connect via APP/PC:** Verify Wi-Fi or network connections. Ensure the robot's software is running and configured correctly for network communication. Check firewall settings on your PC.
- **Robotic arm/Lidar not responding:** Check physical connections to the main control board. Ensure relevant ROS nodes or control programs are running without errors.

### 8.3 Movement and Sensor Issues

- **Robot moves erratically:** Calibrate Mecanum wheels if necessary. Check motor connections and encoder feedback.
- **Mapping/Navigation errors:** Ensure the Lidar is clean and unobstructed. Verify that mapping algorithms are correctly initialized and receiving data.
- **Depth camera not working:** Check USB connections. Ensure the camera driver and ROS nodes are correctly installed and running.

## 9. WARRANTY AND SUPPORT

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For information regarding product warranty, technical support, and service, please refer to the official

Yahboom website or contact their customer service directly. Details are typically provided with your purchase documentation or on the manufacturer's product page.

**Manufacturer:** Yahboom

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## Related Documents - X3 Plus without Orin NX

	<p><a href="#">Yahboom Transbot Robot User Manual and Installation Guide</a></p> <p>Comprehensive guide to assembling, installing, and operating the Yahboom Transbot robot. Includes packing lists, step-by-step instructions, wiring diagrams, software setup, and detailed explanations of app control features.</p>
	<p><a href="#">Yahboom Arduino Batmobile: Graphical Programming Tutorials</a></p> <p>Learn to program the Yahboom Arduino Batmobile robot car with graphical tutorials. This guide covers LED control, buzzer sounds, sensors, motor control, line following, obstacle avoidance, and more.</p>
	<p><a href="#">Yahboom Pico Robot Car: Features, Functions, and Programming Guide</a></p> <p>Explore the Yahboom Pico Robot Car, powered by Raspberry Pi Pico and MicroPython. Discover its extensive features including APP control, various sensors for line tracking, obstacle avoidance, voice control, and more. This guide details its hardware, software, and course content.</p>
	<p><a href="#">Yahboom WOM Sensor Kit for BBC micro:bit - User Manual and Building Models</a></p> <p>Comprehensive guide to the Yahboom WOM Sensor Kit for BBC micro:bit, covering packing list, module introductions, building models, tutorials, and safety instructions. Learn how to use various sensors and build different models.</p>



[Yahboom Raspblock AI Smart Robot Car for Raspberry Pi 4B | Omnidirectional AI Platform](#)

Explore the Yahboom Raspblock, an AI omnidirectional mobile smart car based on the Raspberry Pi 4B. Features include advanced AI functions, 360° Mecanum wheel movement, FPV capabilities, and Python programming via Jupyter Lab.



[Pickerbot Mini User Manual - Roboworks](#)

Comprehensive user manual for the Pickerbot Mini, a pick-and-place robot based on ROS, designed for robotic researchers, educators, students, and developers. Covers product specifications, ROS controllers, sensing systems, hardware components, power management, tele-operation, MIROS visual programming, ROS 2 quick start, and pre-installed packages.