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> Yahboom Jetcobot MyCobot280 7DOF Collaborative Robotic Arm Instruction Manual

## Yahboom Jetcobot

# Yahboom Jetcobot MyCobot280 7DOF Collaborative Robotic Arm Instruction Manual

Model: Jetcobot with Jetson Orin Nano Super 8GB

## 1. INTRODUCTION

The Yahboom Jetcobot is a 7-axis collaborative robotic arm designed for educational and research purposes, integrating seamlessly with the Jetson Nano/Orin Nano Super/Orin NX Super ecosystem. It offers advanced capabilities for robot algorithm development, ROS simulation, and AI vision applications. This manual provides essential information for setting up, operating, and maintaining your Jetcobot.

### Product Introduction

JetCobot is a desktop AI visual collaborative robot arm jointly released by Yahboom and Elephantrobotics for ROS educational scenarios. It is equipped with myCobot280 7 degree of freedom collaborative robot arm and high-definition camera clamping system, which integrates hand, eye and arm to achieve seamless integration of robot arm, vision and control, and can accurately identify objects such as color, face, and human posture. By calculating the position of objects through geometric relationships, the robot arm can accurately locate, grasp, track and other actions.

Equipped with Jetson series master control, by integrating ROS robot operating system and inverse kinematics algorithm, it simplifies the complex motion control of 7 Dof robot arm, and can realize robot arm coordinate control, motion planning, robot arm collision detection, gripping and sorting and other functions, providing a powerful and flexible platform for ROS education and research.

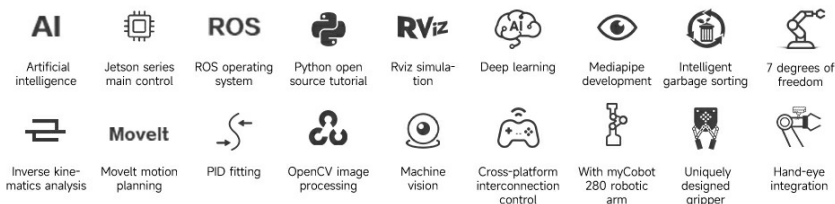


Image 1.1: Overview of the Yahboom Jetcobot Robotic Arm, highlighting its collaborative design and integration with Jetson Orin Nano.

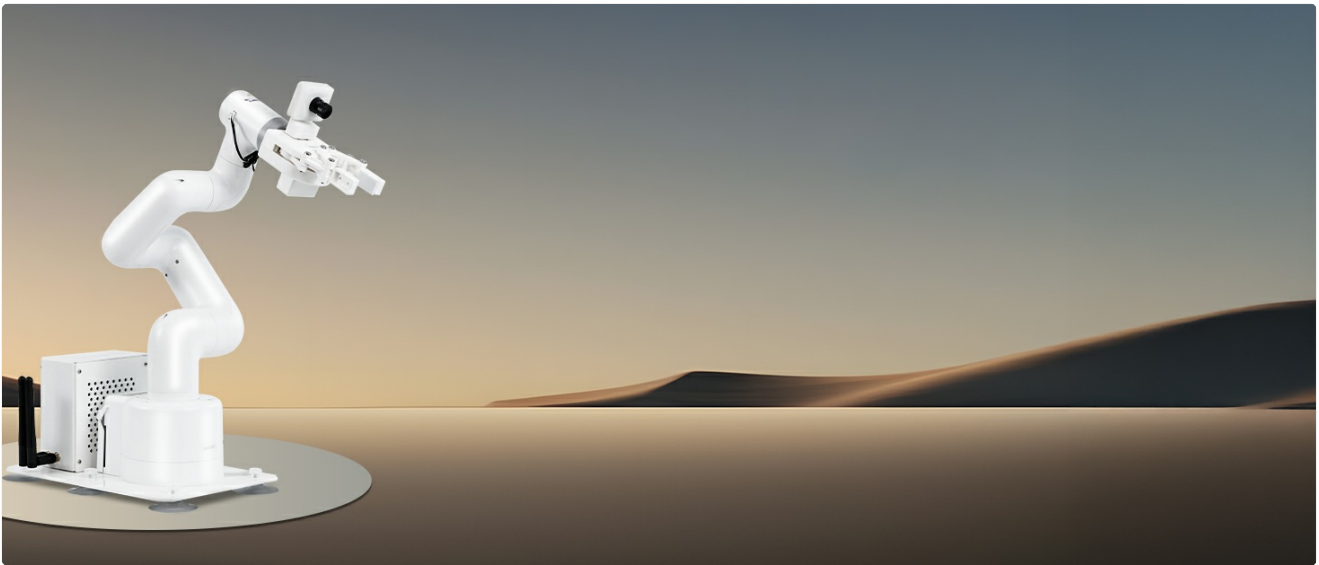


Image 1.2: Comparison chart illustrating the AI performance improvements with the SUPER upgrade for Jetson Orin Nano and NX developer kits.

## 2. SETUP

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### 2.1 Unboxing and Component Identification

Carefully unbox your Jetcobot. Verify all components are present according to the packing list. The main components include the robotic arm, development board kit, adaptive gripper, USB HD camera, and power supply.

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Video 2.1: Jetcobot product unboxing video. This video demonstrates the unboxing process and identifies the various components included in the package.

### 2.2 Product Structure and Assembly

The Jetcobot features a modular design. Refer to the diagram below for component identification and assembly guidance. Ensure all connections are secure before powering on the device.

- **Robotic Arm:** The 7-axis MyCobot280 arm provides flexible movement.
- **Adaptive Gripper:** Attach the gripper to the end effector for object manipulation.
- **USB HD Camera:** Mount the camera for AI vision capabilities.
- **ROS Main Control Board (Optional):** Integrates with Jetson Nano, Orin Nano SUPER, or Orin NX SUPER.
- **Chassis Box & Base:** Provides stability and houses the control board.
- **Suction Cups:** Secure the robotic arm base to a flat surface.



Image 2.1: Detailed diagram of the JetCobot's product structure, showing the robotic arm, gripper, camera, control board, and chassis box.

## 2.3 Power Connection

Connect the provided power adapter to the JetCobot and a suitable power outlet. Ensure you use the correct power adapter to prevent damage to the unit.

## 3. OPERATING INSTRUCTIONS

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### 3.1 Basic Movement and Control

The JetCobot is a 7-axis collaborative robot, offering high flexibility. It can be controlled via a USB game controller or through a multi-function Android app. The adaptive gripper allows for precise object handling.

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Video 3.1: JetCobot robot arm video. This video demonstrates the robotic arm's movements and control capabilities.



Image 3.1: The Jetcobot robotic arm demonstrating precise object manipulation by picking up a colored block.


## 3.2 AI Vision and Remote Control

Equipped with a USB HD camera, the Jetcobot supports AI vision for tasks such as object recognition, tracking, and grasping. Remote control is possible via a USB game controller for optimal experience, or through a multi-function Android app (note: the app may not control the gripper).

- **Recognition:** Identify wooden blocks and stickers.
- **Tracking:** Follow objects or human postures.
- **Grasping:** Perform precise pick-and-place actions.

**New Generation Jetson Orin SUPER**

In order to meet customers demand for high-performance robots, we use Jetson Orin Nano SUPER and Jetson Orin NX SUPER boards to inject more powerful performance into JetCobot. It can show excellent performance in many fields such as robotic arm control, visual applications and deep learning.



Jetson Nano B01 4GB    Jetson Orin NX SUPER 8GB/16GB    Jetson Orin Nano SUPER 4GB/8GB

**ROS2 Humble**  
Simple configuration | Better stability  
Mainstream ROS2 system versions

Jetson Orin Nano SUPER  
Jetson Orin NX SUPER  
adopt this version

**ROS1 Melodic**  
It is currently the widely used  
version of ROS in ROS1

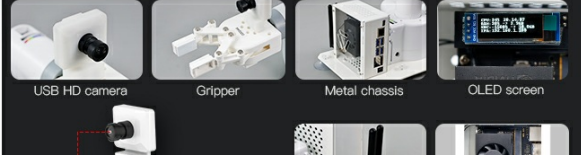
Jetson Nano B01  
adopt this version

**SUPER New Upgrade**  
AI Performance Greatly Improved

**SUPER upgrade** Computing power increased by about 70%

**AI Performance**

Jetson Orin NX SUPER 16GB	157 TOPS
Jetson Orin NX SUPER 8GB	117 TOPS
Jetson Orin Nano SUPER 8GB	67 TOPS
Jetson Orin Nano SUPER 4GB	34 TOPS
Jetson Nano B01 4GB	0.5TFLOPS



USB HD camera    Gripper    Metal chassis    OLED screen

Image 3.2: Jetcobot being controlled via a USB handle and demonstrating APP control capabilities.



**Region identification**  
Grabbing and place

**Region detection**  
Customize grabbing

**Color recognition and tracking**

**Face recognition and tracking**

**Garbage classification**

**Color block sorting**

**Label recognition and intelligent stacking**

**Color interaction**

**Color block grabbing**

Image 3.3: The Jetcobot demonstrating AI visual recognition, including color recognition and tracking of objects on a patterned mat.

## 4. PROGRAMMING & ROS SYSTEM

### 4.1 ROS Ecosystem Integration

The Jetcobot leverages the open-source Jetson Nano ecosystem and comes with a built-in ROS (Robot Operating System) environment. This provides a robust platform for robot algorithm development and simulation learning.

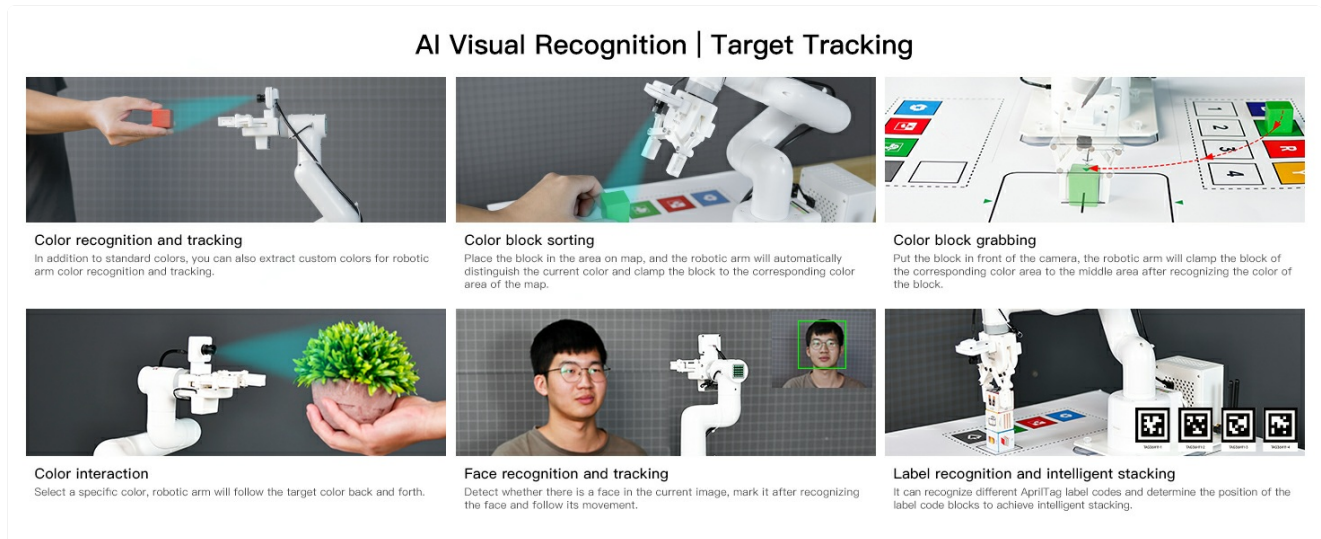


Image 4.1: Jetcobot showcasing its compatibility with ROS and OpenCV for advanced programming and visual processing.

### 4.2 Software and Development

Explore RoboFlow, the industrial robot software, and utilize Python driver libraries for easier and faster development. The system supports multiple programming languages and various software interaction methods. Jupyter Lab pages can be created online for development.

- **RoboFlow:** Industrial robot software for advanced control.
- **Python Libraries:** Simplify development with Python.
- **ROS Simulation:** Built-in environment for testing and learning.
- **Inverse Kinematics:** Built-in algorithm for precise positioning.

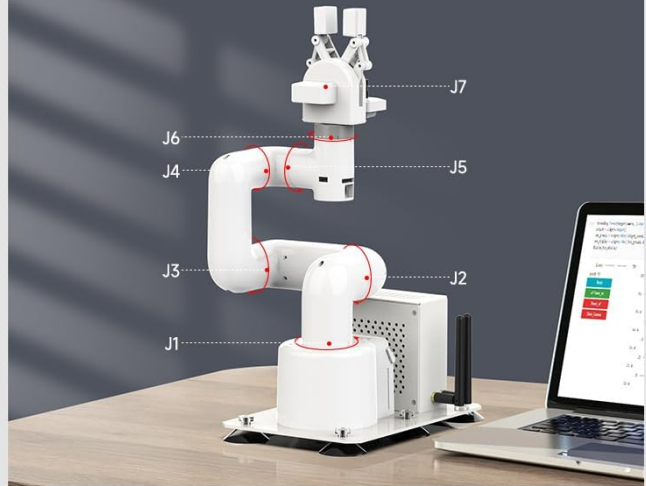
## Inverse Kinematics Algorithm

Built-in perfect inverse kinematics algorithm. You only need to input the specified coordinates to accurately drive the robotic arm to automatically reach the specified position, and it also supports setting the gripper direction.



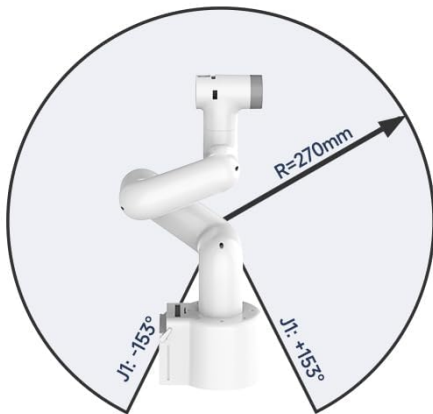
## 7-DOF Collaborative Robot

JetCobot is a 7-axis collaborative robot for user programming. It is small in size but with better performance and easy to operate.



## JetCobot Working Radius

JetCobot maximum effective arm span is 270mm (without gripper), 374.5mm (with mold gripper), Repeatability is  $\pm 0.5\text{mm}$



## ROS Robot Operating System

JetCobot is developed using ROS Robot Operating System. ROS operating system is an open source meta-operating system for robots, which provides the services that an operating system should have, including hardware abstraction, low-level device control, implementation of common functions, inter-process messaging, and package management. It also provides tools and library functions for acquiring, compiling, writing, and running code across computers. Its main goal is to provide support for code reuse for robot research and development.



Image 4.2: The Jetcobot connected to a laptop, illustrating its use in a programming and development environment.

## 5. MAINTENANCE

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

- **Cleaning:** Regularly wipe down the robotic arm and chassis with a soft, dry cloth. Avoid using harsh chemicals or abrasive materials.
- **Joint Inspection:** Periodically check the robotic arm's joints for any signs of wear or looseness.
- **Cable Management:** Ensure all cables are neatly routed and not pinched or strained.
- **Software Updates:** Keep the operating system and any installed software up to date to benefit from the latest features and security patches.
- **Environmental Conditions:** Operate the Jetcobot in a clean, dry environment within recommended temperature ranges.

## 6. TROUBLESHOOTING

If you encounter issues with your Jetcobot, consider the following common troubleshooting steps:

- **Power Issues:** Ensure the power adapter is correctly connected and the power outlet is functional. Verify that the correct power adapter is used.
- **Connectivity Problems:** Check USB and network connections. For wireless control, ensure the device is properly paired.
- **Unexpected Movement/Inaccuracy:** Recalibrate the robotic arm if movements are erratic. Ensure the base is stable and on a flat surface.
- **Software Errors:** Restart the software application or the entire system. Consult the online tutorials and documentation for specific error codes.
- **Gripper Malfunction:** Check for any obstructions in the gripper mechanism. Ensure the gripper is properly attached and receiving commands.

For more detailed troubleshooting or persistent issues, please refer to the support section.

## 7. SPECIFICATIONS

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Key technical specifications for the Yahboom Jetcobot with Jetson Orin Nano Super 8GB:

Feature	Detail
Brand Name	Yahboom
Model Name	Jetcobot
Model Number	Jetcobot
Control Board	Jetson Orin Nano Super 8GB
Degrees of Freedom (DOF)	7
Material Type	Plastic
Item Dimensions (L x W x H)	10 x 8 x 15 inches
Power Source	Battery (2 AA and 2 AAA batteries required, included)
Recommended Uses	Educational research and development, robot arm control, AI vision applications
Operating System	Ubuntu 22.04 (ROS2 Humble)
Repeat Positioning Accuracy	±0.5mm
USB HD Camera	0.3MP, 110° FOV, 480P resolution, 30fps

# SUPER New Upgrade

## AI Performance Greatly Improved

Yahboom Jetson Orin Nano and Jetson Orin NX have been upgraded to SUPER super developer kit. After the upgrade, AI performance has been greatly improved. We provide detailed tutorials and systems file to help developers quickly improve computing power.

**SUPER upgrade**

Computing power increased by about 70%



### AI performance

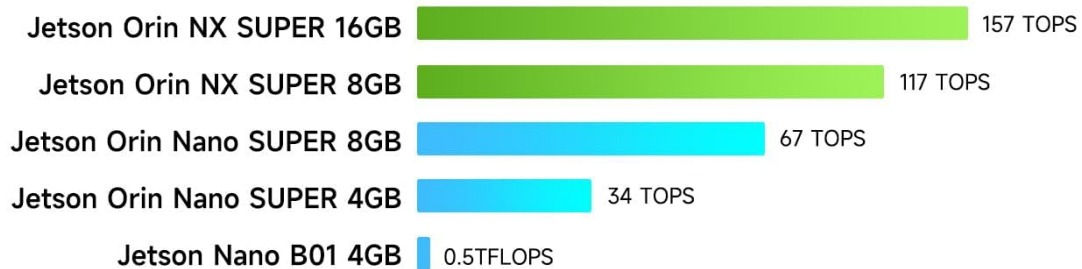


Image 7.1: Technical drawing illustrating the dimensions of the Jetcobot robotic arm.

# Comparison And Selection Suggestions Of ROS Master Control For Robotic Arms

Main control board	 Jetson Nano B01 4GB	 Jetson Orin Nano SUPER 4GB	 Jetson Orin Nano SUPER 8GB	 Jetson Orin NX SUPER 8GB	 Jetson Orin NX SUPER 16GB
Computing power	0.5TFLOPS (FP16)	34 TOPS	67 TOPS	117 TOPS	157 TOPS
CPU	4 cores 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	128 cores 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	
Memory	4GB 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	16GB eMMC + 64GB U disk	256GB SSD			
Power	5W - 10W	7W , 10W , 25W	7W , 15W , 25W	10W , 15W , 25W , 40W	
ROS system version	Ubuntu18.04 + ROS1 Melodic	Ubuntu22.04 LTS + ROS2 Humble			
ROS system operation effect	★★★★	★★★★★★			
AI deep learning	★★★★	★★★★★★			

The usage methods of multiple Jetson series control boards are basically the same, and different control boards only affect the performance of JetCobot. Yahboom provides consistent course materials, product features, functions, control software, etc.

Image 7.2: Detailed specifications for the Jetcobot's adaptive gripper and USB HD camera.

## 8. WARRANTY & SUPPORT

### 8.1 Warranty Information

The Yahboom Jetcobot comes with a 90-day warranty against manufacturer defects. This warranty covers defects in materials and workmanship under normal use.

### 8.2 Technical Support

For technical assistance, tutorials, or any questions regarding your Jetcobot, please contact Yahboom support. We provide high-quality technical support services.

- **Online Resources:** Visit [yahboom.net/download](http://yahboom.net/download) for detailed tutorials and system files.
- **Email Support:** Contact us at [amazon@yahboom.com](mailto:amazon@yahboom.com) or [support@yahboom.com](mailto:support@yahboom.com).

**Need help?**

**We are  
standing by.**

 [yahboom.net/download](https://yahboom.net/download)

 [amazon@yahboom.com](mailto:amazon@yahboom.com)

 [support@yahboom.com](mailto:support@yahboom.com)

Image 8.1: Yahboom customer support contact details for assistance.