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Yahboom Transbot-SE

Yahboom Transbot-SE Tank Chassis Robot: AI Camera ROS Starter Kit Instruction Manual

Model: Transbot-SE (YB-A089)

Brand: Yahboom

1. INTRODUCTION

The Yahboom Transbot-SE Tank Chassis Robot is an advanced educational and development kit designed for artificial intelligence projects. It is built upon the Robot Operating System (ROS) and supports programming in Python and C++. This kit facilitates various AI vision recognition and visual control operations, making it suitable for both beginners and advanced users in ROS and AI vision development, particularly for projects involving Jetson Nano and Raspberry Pi.



Figure 1.1: The Yahboom Transbot-SE Tank Chassis Robot.

2. SAFETY INFORMATION

- **Adult Supervision:** This product contains small parts and functional sharp components. Adult supervision is required, especially when children are present.
- **Battery Handling:** Ensure correct polarity when installing batteries. Do not reverse the poles. Do not attempt to recharge non-rechargeable batteries.
- **Electrical Safety:** Avoid contact with water or moisture. Do not place the robot on conductive surfaces. Handle circuit boards and connectors with care to prevent mechanical or electrical damage.
- **Operating Environment:** Use the robot in normal ambient room temperatures.
- **Component Integrity:** Regularly inspect all components for damage. Do not operate if any parts are broken or malfunctioning.

3. WHAT'S IN THE Box

The Transbot-SE kit includes various components necessary for assembly and operation. Please verify all items are present upon unboxing.

- Transbot-SE robot chassis components
- 3-degree-of-freedom (3DOF) robotic arm
- 2-degree-of-freedom (2DOF) camera gimbal
- 4400mAh rechargeable battery pack (12V)

- 520 reduction encoder motors (x2)
- Expansion board
- Screwdriver and various screws/fasteners
- Cables and wiring
- Instruction manual
- Development board (Jetson Nano or Raspberry Pi) depends on the version purchased.
- Remote controller is not included.

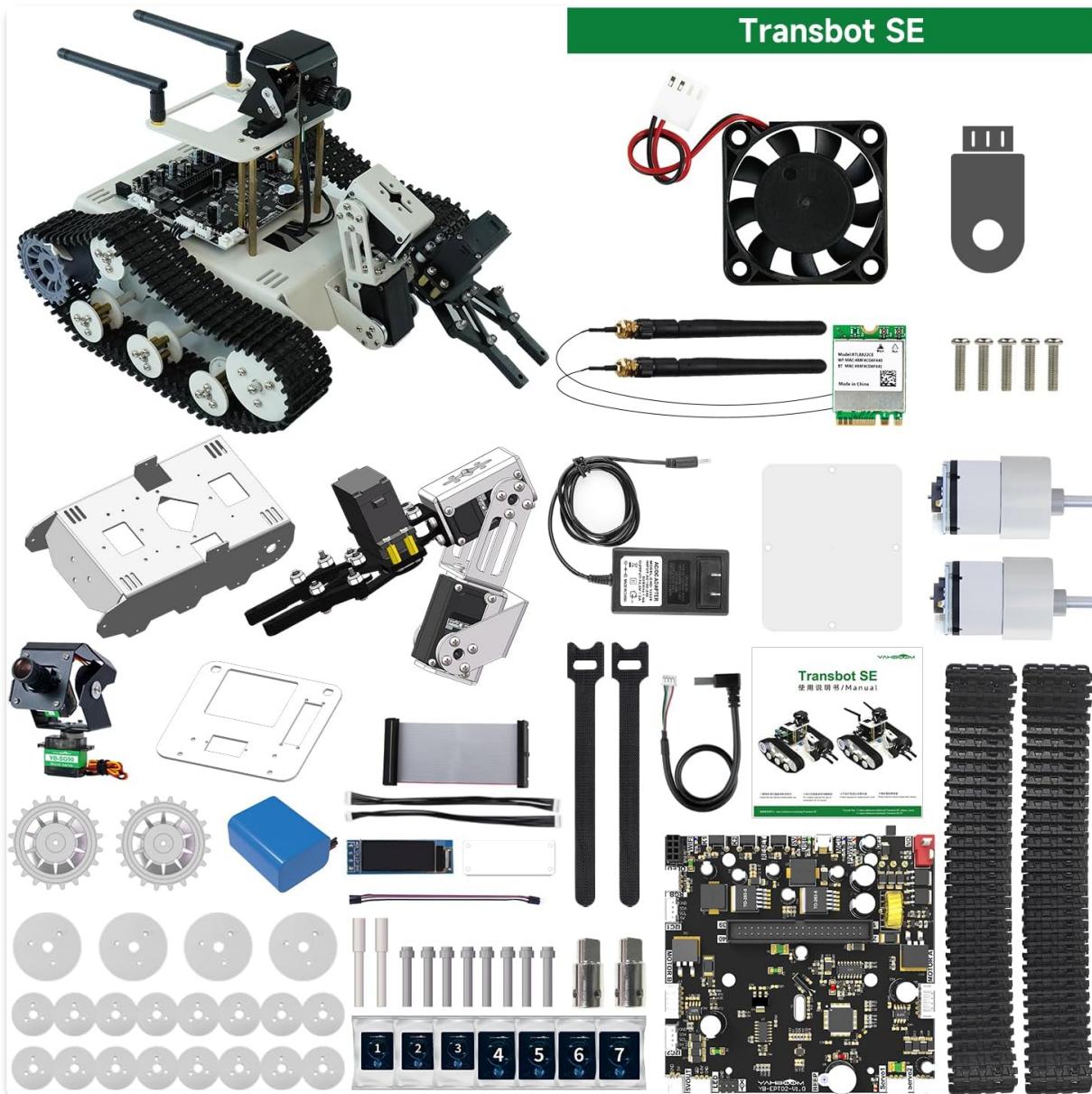


Figure 3.1: Comprehensive view of all components included in the Transbot-SE kit.

Metal digital servo parameters (camera gimbal)			
Operating Voltage	4.8V-6.0V DC	No-load current	80mA (4.8V)
no-load speed	0.14sec/60° (4.8V)	Stall Torque	1.3kgf.cm (4.8V)
Stall current	650mA (4.8V)	Pulse Width Range	500~2500us corresponding to 0~180°
Angular accuracy	180°±1	dead zone width	3us
Rocker type	40T/φ4.85mm	Servo cable length	245mm+5mm
gear material	Plastic teeth	Output shaft material	Plastic shaft
shell material	ABS	control method	PWM pulse width control
life span	1,000,000 Cycles(Min)	weight	10±0.5g



Figure 3.2: Components typically not included, such as the main development board (Jetson Nano or Raspberry Pi).

4. ASSEMBLY INSTRUCTIONS

The Transbot-SE is a DIY product requiring assembly. Detailed video instructions are available from Yahboom to guide you through the process. Ensure all components are correctly installed before powering on the device.

4.1. Chassis and Robotic Arm Assembly

The kit features a high-quality aluminum alloy off-road chassis. Follow the provided video instructions for assembling the tank tracks, chassis, 3DOF robotic arm, and 2DOF camera gimbal.



Figure 4.1: The Transbot-SE robot with its packaging, illustrating the assembled state.

Functions

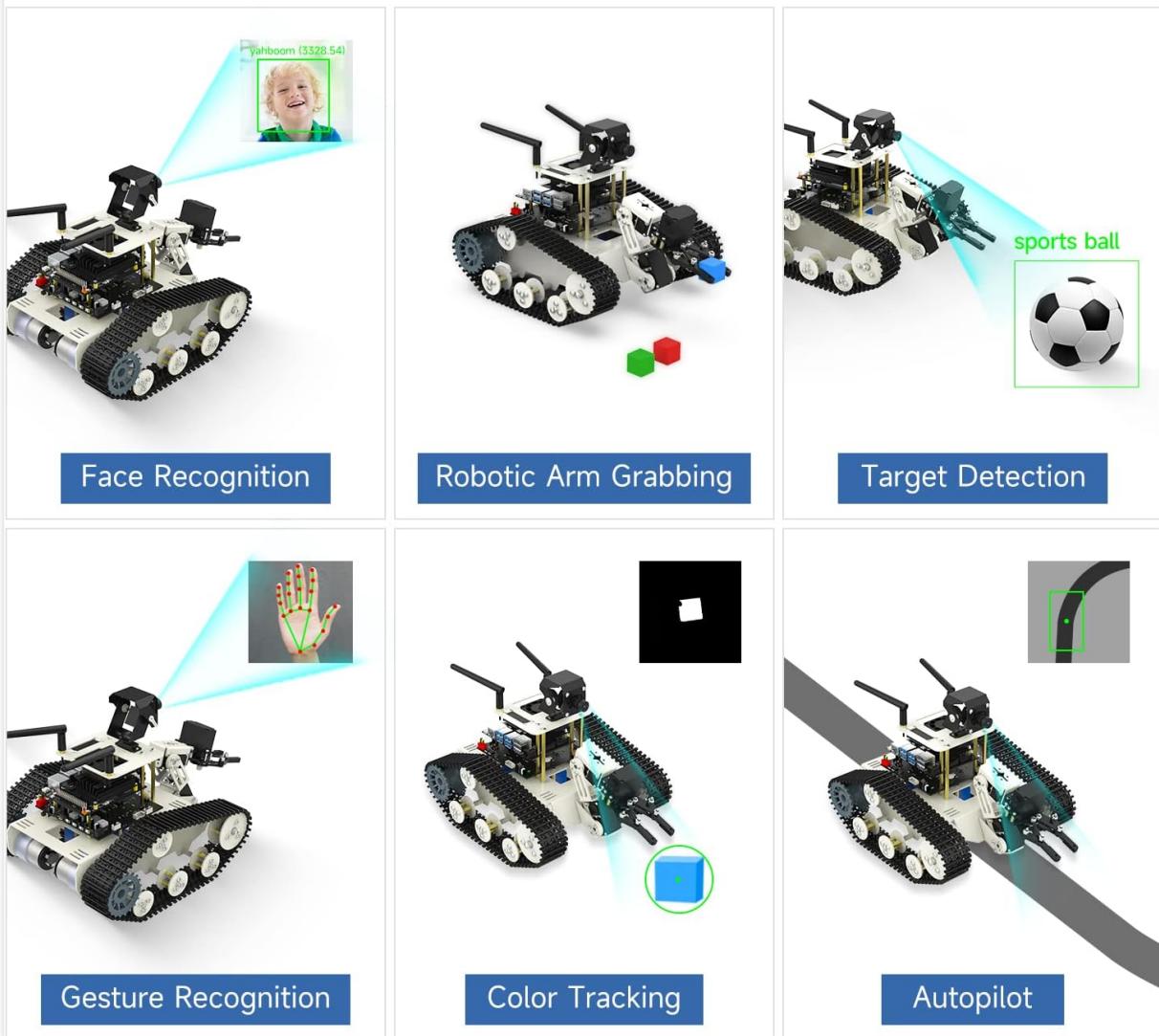


Figure 4.2: Key structural features of the Transbot-SE, including the track system, camera PTZ, motors, robotic arm, and battery.

4.2. Battery Installation

The robot is powered by a 12V 4400mAh rechargeable battery pack. Ensure correct polarity when inserting the batteries into the battery module. Do not reverse the poles. The battery module is typically located within the chassis.

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Video 4.1: Battery installation for a similar UGV robot. This video demonstrates the process of installing batteries and securing the chassis plate.

5. SETUP AND SOFTWARE INSTALLATION

The Transbot-SE is compatible with NVIDIA Jetson Nano and Raspberry Pi development boards. The specific setup process will depend on your chosen development board.

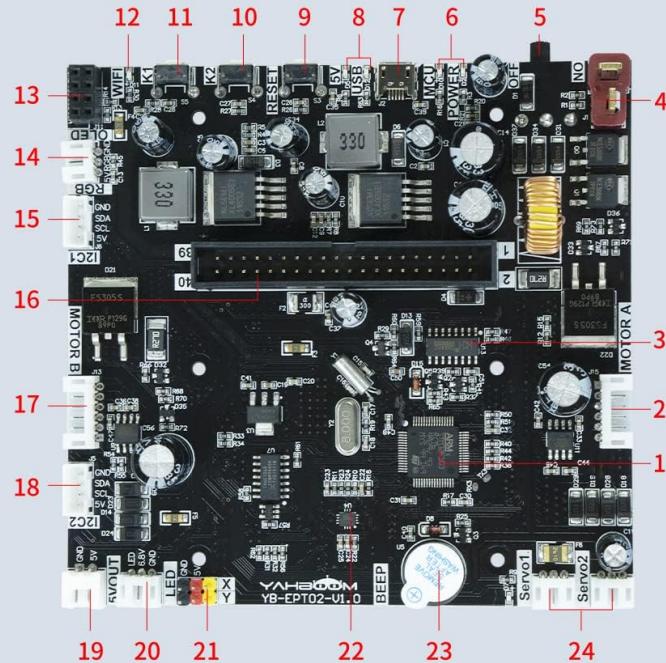


Figure 5.1: Compatibility of Transbot-SE with Jetson Nano, Raspberry Pi, and PC for development.

5.1. Expansion Board Connection

The versatile expansion board allows for deep development and connects to the main development board. Ensure all connections are secure.

Expansion board function distribution



1. Onboard MCU	2. Motor interface A	3. Serial communication chip	4. DC 12V power supply
5. Main power switch	6. MCU indicator light	7. Micro USB interface	8.5V LED
9. RESET button	10. Button K2	11. Button K1	12. WiFi indicator light
13. OLED interface	14. Custom extension interface	15. I2C interface 1	16. Cable female seat
17. Motor interface B	18. I2C interface 2	19. DC 5V power output	20. Custom extension interface
21. PWM servo interface	22. Six-axis attitude sensor	23. Active buzzer	24. Robotic arm interface

Figure 5.2: Detailed layout and function distribution of the expansion board.

5.2. Software Environment

The robot is developed based on the ROS system and can be programmed using Python and C++. Comprehensive documentation and technical support are provided by Yahboom for setting up the development environment.

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Video 5.1: AI Visual Recognition ROS Starter Robot Kit overview. This video demonstrates the robot's capabilities and programming environment.

6. OPERATING INSTRUCTIONS

The Transbot-SE offers multiple methods for control and interaction, allowing for flexible operation in various scenarios.

6.1. Remote Control Options

The robot can be controlled via:

- **Yahboom App:** Provides an intuitive interface for control.

- **Gamepad:** Offers superior handling for precise movements.
- **Jupyter Web Interface:** Allows programming and control through a web browser.



Figure 6.1: Various control methods for the Transbot-SE, including mobile app, gamepad, and web-based programming.

6.2. AI Vision and Robotic Arm Functions

The integrated AI camera and robotic arm enable a wide range of intelligent functions:

- **AI Vision Recognition:** Includes OpenCV image processing, human feature recognition, QR/AR code recognition, and visual tracking of faces and objects.
- **MediaPipe Machine Learning:** Enables gesture-controlled manipulation.
- **Robotic Arm Control:** The intelligent servo robotic arm supports Movelt simulation and Cartesian path planning for precise object interaction.
- **Autonomous Navigation:** Features like color tracking and autopilot allow the robot to navigate and interact with its environment intelligently.

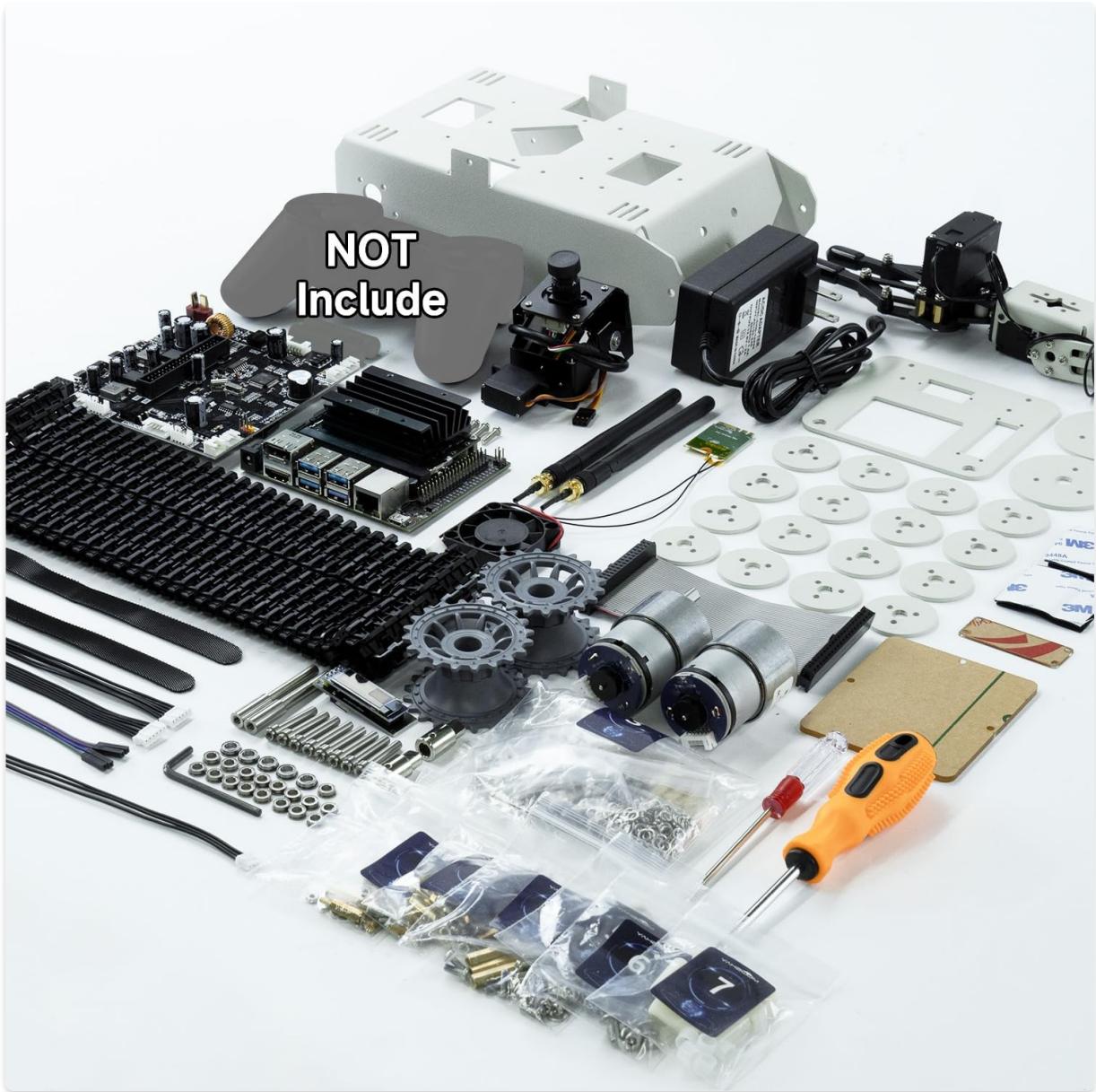


Figure 6.2: Overview of the AI vision and robotic arm functions.



Figure 6.3: Advanced AI visual functions and programming capabilities.

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Video 6.1: Raspberry Pi G1 Tank Robot Car Kit Feature Preview. This video showcases various features and movements of a Yahboom tank robot.

7. MAINTENANCE

To ensure the longevity and optimal performance of your Transbot-SE robot, regular maintenance is recommended:

- **Cleaning:** Keep the chassis and tracks free from dust and debris. Use a soft, dry cloth for cleaning.
- **Battery Care:** Fully charge the battery before extended storage. Avoid overcharging or completely draining the battery.
- **Component Inspection:** Periodically check all screws, connections, and moving parts (robotic arm, camera gimbal) for looseness or damage. Tighten any loose screws.
- **Software Updates:** Regularly check for and install software updates for the ROS system and any associated libraries to ensure optimal performance and access to new features.

8. TROUBLESHOOTING

If you encounter issues with your Transbot-SE, refer to the following common troubleshooting steps:

- **Robot Not Powering On:** Ensure the battery is fully charged and correctly installed. Check the main power switch.
- **Movement Issues:** Verify all motor connections are secure. Check the tracks for any obstructions or damage. Ensure the control method (App, gamepad, Jupyter) is correctly configured and connected.
- **AI Vision Malfunctions:** Confirm the camera is properly connected. Check software logs for errors related to OpenCV, MediaPipe, or ROS vision nodes. Ensure adequate lighting in the operating environment.
- **Robotic Arm/Gimbal Problems:** Inspect servo connections and ensure no physical obstructions. Check for any error messages in the control software.
- **Connectivity Problems:** Verify Wi-Fi or Bluetooth connections. Ensure the robot and control device are within range.

For further assistance, please contact Yahboom technical support.

9. SPECIFICATIONS

Below are the technical specifications for the Yahboom Transbot-SE Tank Chassis Robot:

Feature	Detail
Product Dimensions	2.1 x 2 x 1.5 inches
Item Weight	5.7 pounds
Item Model Number	YB-A089
Manufacturer Recommended Age	18 years and up
Batteries	2 x 12V 4400mAh (included)
Main Control Board Compatibility	Raspberry Pi 5, Jetson Nano SUB (depending on version)
Programming Language	Python / C++
Body Material	Anodized powder coated aluminum alloy
Robotic Arm	3DOF (degrees of freedom)
Camera PTZ	2DOF (degrees of freedom)



Figure 9.1: Detailed size and product parameters for Transbot-SE.



Figure 9.2: Specifications and dimensions of the 3DOF robotic arm.



Figure 9.3: Specifications for the 2DOF camera PTZ and its associated components.



Figure 9.4: Specifications for the 520 encoder motors and the Lithium battery pack.

10. WARRANTY AND SUPPORT

Yahboom provides comprehensive documentation and technical support for the Transbot-SE DIY product. For any questions or assistance, please contact the seller or technical support team promptly.

- **Warranty:** Please refer to your purchase documentation for specific warranty terms and conditions.
- **Technical Support:** Contact Yahboom directly for technical inquiries, troubleshooting, and guidance on advanced projects.

