

Package List				For Raspberry Pi Version			
Robotic arm (Assembled) *1	Robotic arm expansion board *1			Raspberry Pi board (optional) *1	Active radiator *1		
Screw driver *1	USB handle *1			0.3MP USB camera (110°) *1	Camera USB cable *1 Camera fixed bracket *1		
12V5A charger (DC4*1.7) *1 Power adapter cable*1	micro USB data cable *1			OLED*1	64G TF card *1 Card reader *1		
Suction cup *6	Robotic arm map *1			I2C communication line (3Pin)*1	Round head screw M3*5mm ④ M3 elastic gasket ④		
Manual *1	Robotic arm packaging box *1			Copper pillar M2*10mm ⑤ Round head screw M2*6mm ⑤	M2.5*5 round head screws ⑦		
30x30mm block *4 (Red/Blue/Yellow/Green)	Black tie 3x100mm *6			Copper pillar M2.5*30mm+6 ⑧	Raspberry Pi 5 power supply expansion board package *1		
Spare parts kit③							

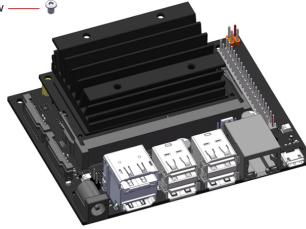
For Jetson NANO Version			
Jetson Nano board (optional) *1	U disk *1		
0.3MP USB camera (110°) *1	Camera connection cable *1		
Round head screw M3*5mm ④ M3 elastic gasket ④	Copper pillar M2*10mm ⑤ Round head screw M2*6mm ⑤		
Cooling fan *1 ⑥ Round head screw M3*12mm ⑥	Camera bracket *1 Antenna bracket *1		
Wireless network card *1	OLED *1		
40Pin gray ribbon cable *1			

Installation Steps (For Jetson NANO Version)

Step1: Remove the core board screws

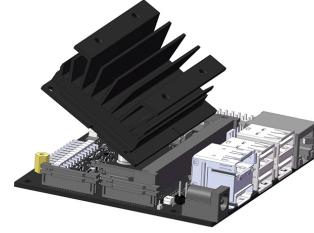
(Note: Please keep the removed screws properly)

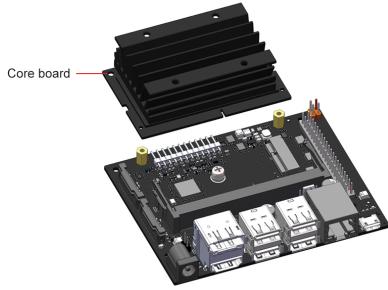
M2.5 screw



Step 2: Remove the core board

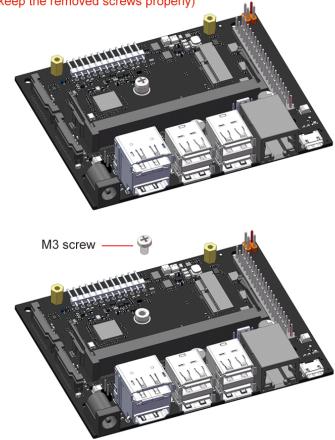
(Note: When installing the core board, be careful that the clips on both sides are easily broken, please insert the core board at an angle.)



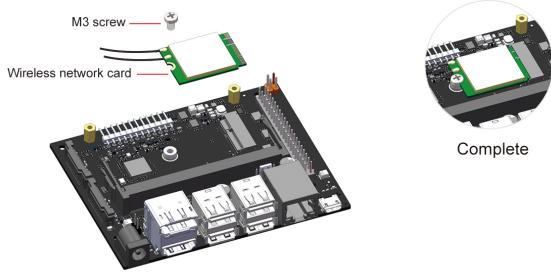


Step 3: Remove the wireless network card fixing screw

(Note: Please keep the removed screws properly)

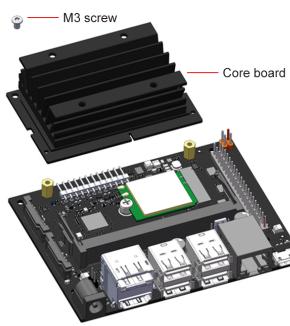


Step 4: Install wireless network card

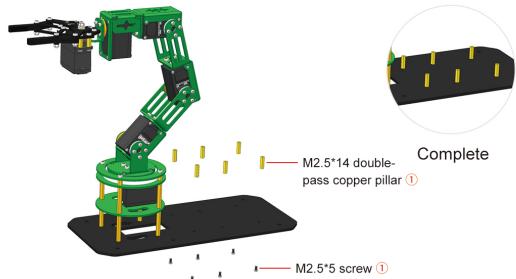


Step 5: Install core board

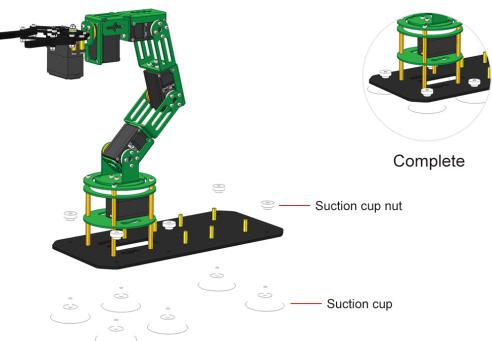
(Note: When installing the core board, be careful that the clips on both sides are easily broken, please insert the core board at an angle.)



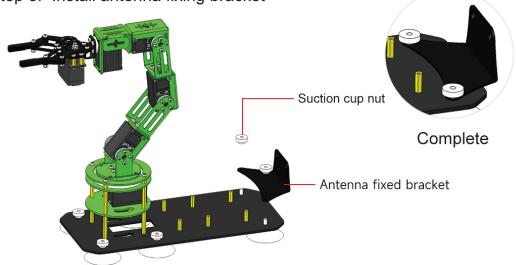
Step 6: Install expansion board copper pillars



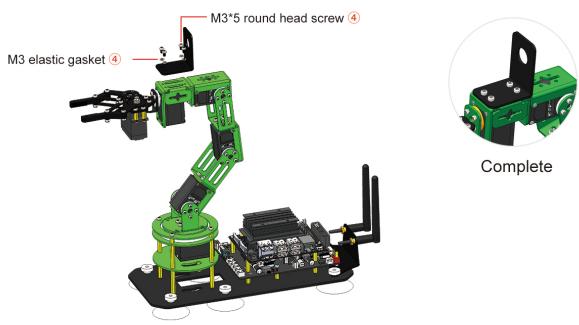
Step 7: Install suction cup



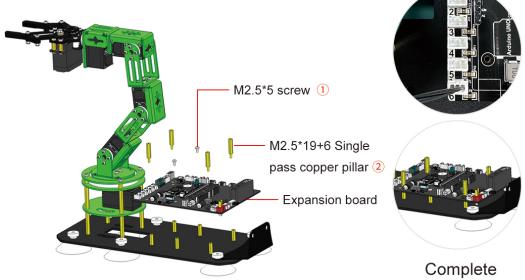
Step 8: Install antenna fixing bracket



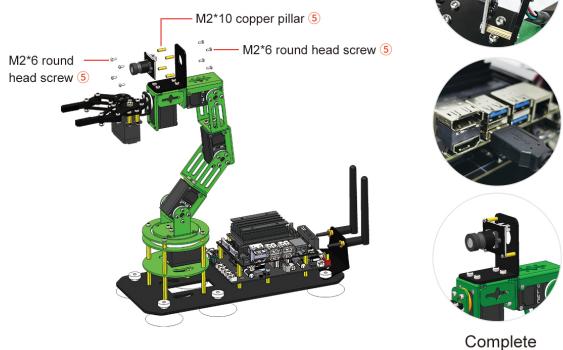
Step 12: Install the camera bracket



Step 9: Install expansion board (After installing the expansion board, the bus servo line can be inserted into the servo interface.)

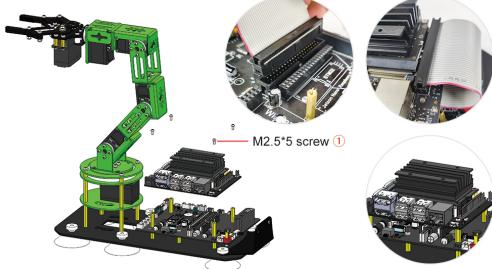


Step 13: Install the camera
(Please connect the camera to the USB cable first)

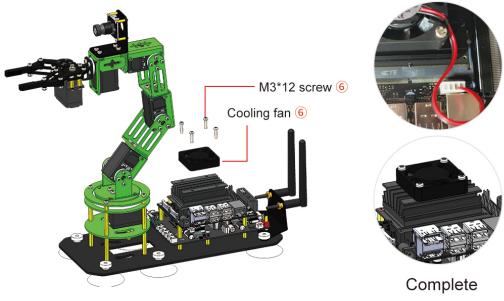


Step 10: Install Jetson Nano

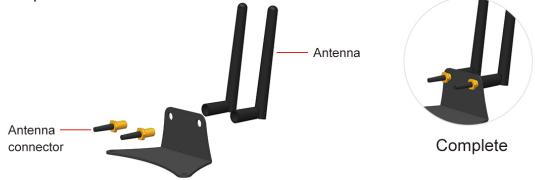
(Please install the 40Pin cable before installing Jetson nano. Please install Jetson NANO board correctly according to the diagram on the right.)



Step 14: Install cooling fan

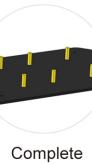
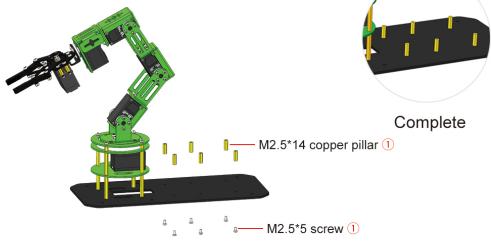


Step 11: Install the antenna



Installation Steps (For Raspberry Pi Version)

Step 1: Install expansion board copper pillar



Complete

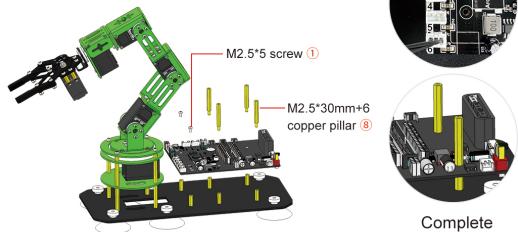
Step 2: Install suction cup



Complete

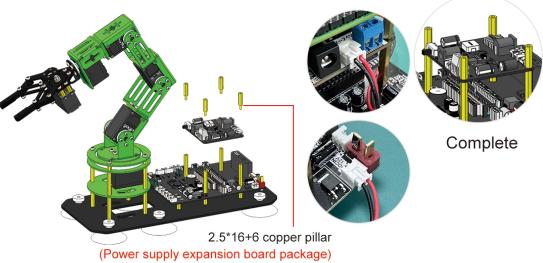
Step 3: Install expansion board

(After installing the expansion board, the bus servo line can be inserted into the servo interface.)



Complete

Step 4: Install power supply expansion board



Complete

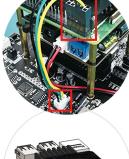
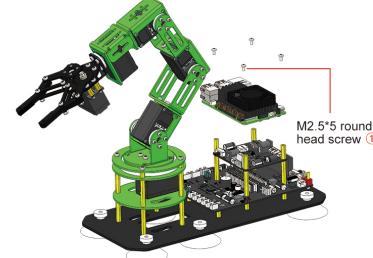
Step 5: Install the Raspberry Pi Active Cooler



Complete

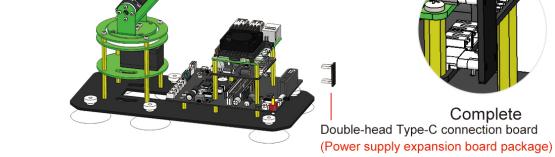
Step 6: Install Raspberry Pi board

Please refer to the picture on the right to connect the I2C communication cable (3Pin). If the wiring is wrong, the Raspberry Pi board will be damaged.



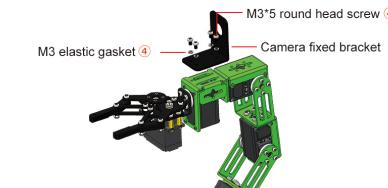
Complete

Step 7: Install dual-head Type-C adapter board



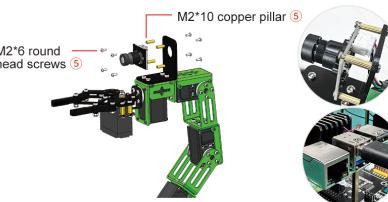
Complete
Double-head Type-C connection board
(Power supply expansion board package)

Step 8: Install camera bracket



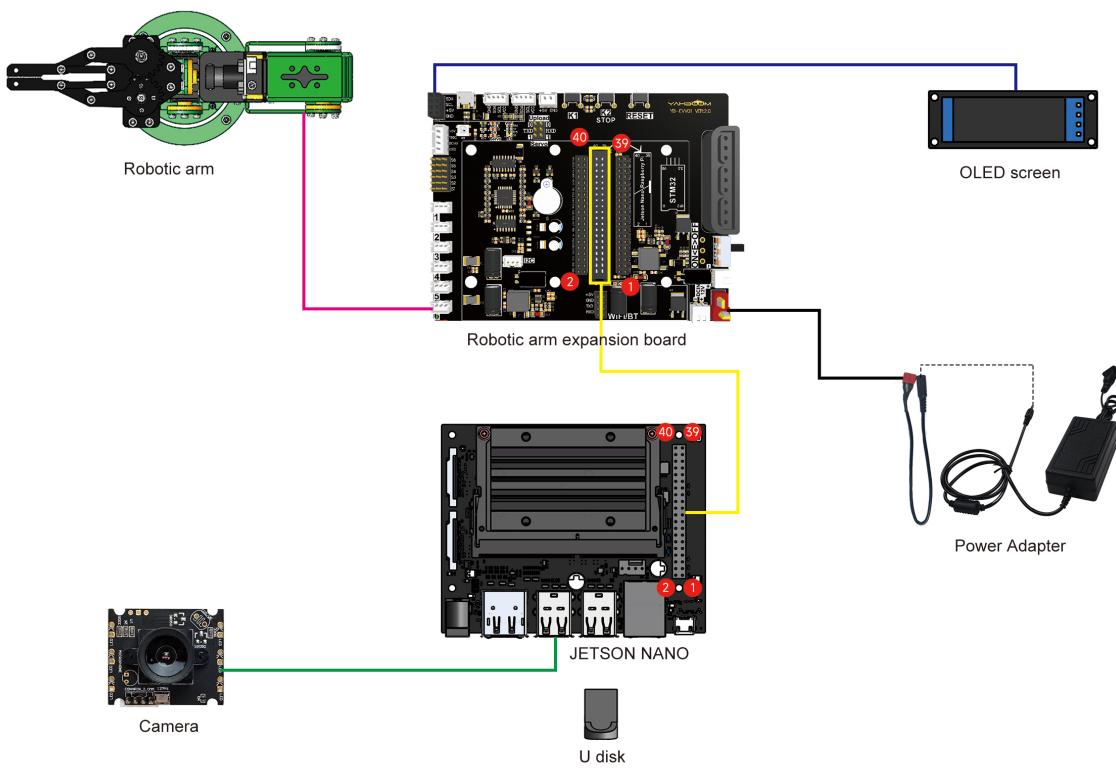
Complete

Step 9: Install camera (Please connect the camera to the USB cable first)

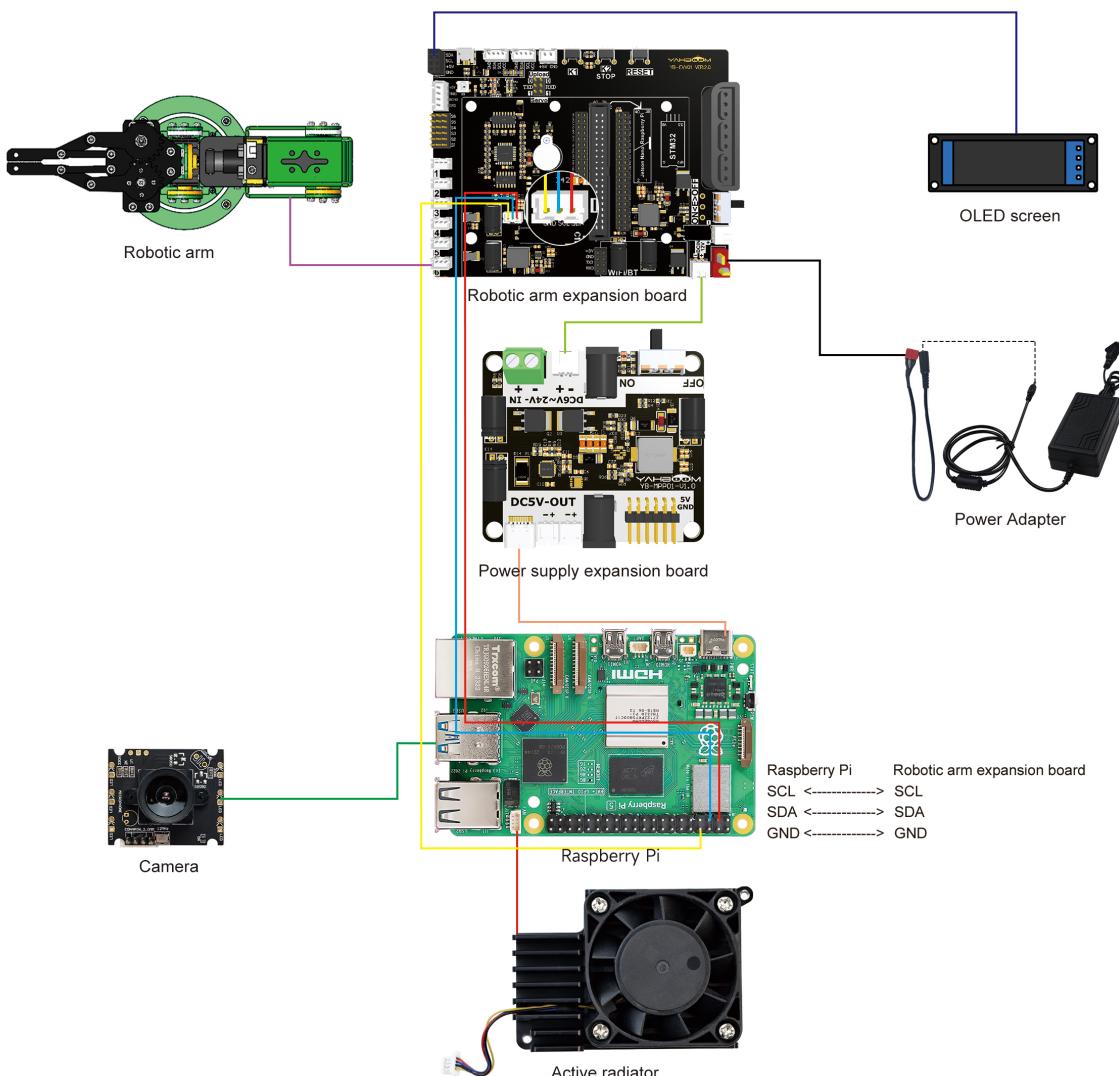


Complete

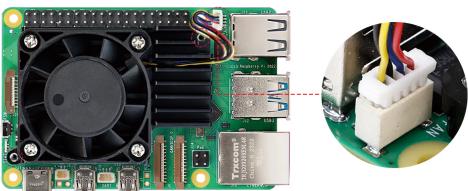
Jetson NANO Board Wiring Diagram



Raspberry Pi Board Wiring Diagram



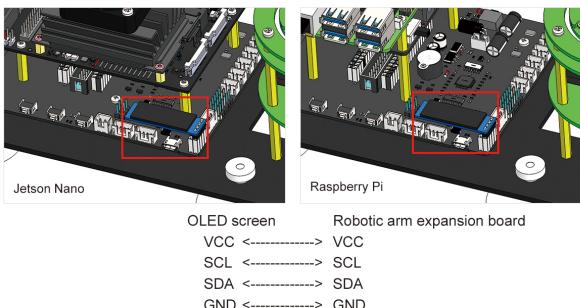
Raspberry Pi Active Radiator Wiring Diagram



Install Map



Install OLED Screen



Remove the two suction cups at the front of the robotic arm, place the map upward as shown in the figure, and fix the two suction cup screws to the front of the robotic arm base after passing through the map. After the suction cup is installed, place the robotic arm on a smooth and cleanable, and press the chassis to absorb the suction cup on the table top.

First Trial

1. Download and install APP

- ① Android users scan search "YahboomRobot" in PlayStore to download APP.
- ② iOS users search "YahboomRobot" in App Store to download APP.



2. Hardware installation

Follow the assembly video on Yahboom website and check whether all hardware connections of Dofbot are correct.

Tutorial Link:

Jetson NANO version: www.yahboom.net/study/Dofbot-Jetson_nano

Raspberry Pi version: www.yahboom.net/study/Dofbot-Pi

3. Startup state

Turn on the power switch of the expansion board, and the main control board system and APP remote control process will automatically start, which will take about 1 minute. When the buzzer sounds three times, indicating that the robotic arm has started normally.

If the buzzer still does not sound after waiting for a few minutes, you can connect to the WiFi hotspot that comes with Dofbot. Based on the IP address displayed by the OLED, remotely log in to the DOFBOT system through VNC to check the running status of the APP remote control process.

In WiFi hotspot mode, the corresponding IP address of the Raspberry Pi is 192.168.1.11

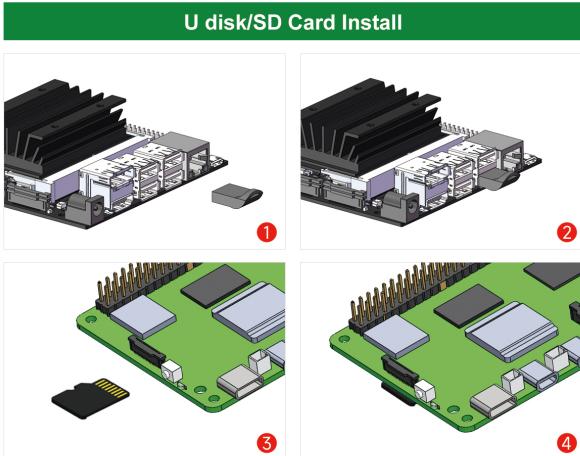
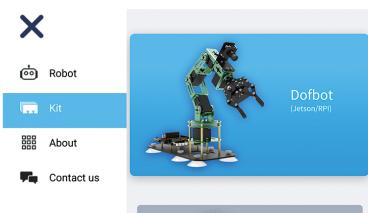


Figure 1-2 shows how to install Jetson Nano U disk.
Figure 3-4 shows how to install Raspberry Pi SD card.

4. Robotic arm connection

Before using the APP to control Dofbot, we need to ensure that Dofbot and the mobile phone are in the same LAN (the mobile phone is connected to the Dofbot hotspot or both are connected to the same WiFi).

① Choose product



② Install map

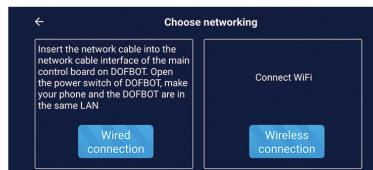


③ Connect network

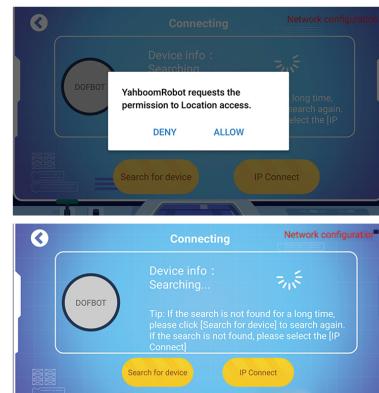
The operation of Dofbot to long press the K1 button on the expansion board to enter the network distribution mode has been cancelled.

Currently, Dofbot comes with a built-in WiFi hotspot, no need to configure the network, just choose the wired connection method!

The wired connection here does not require a network cable, we mainly connect by configuring IP!



④ IP connection



Connect according to your actual IP. The default hotspot mode is 192.168.1.11.



⑤ DOFBOT calibration

All servos must be calibrated before DOFBOT is used, otherwise it will not work properly. Press the [Middle] button to check whether DOFBOT is in the state of vertical upward, horizontal center, and the mechanical claw is closed. If it is normally, please click the [Skip], otherwise, we need to click [Calibrate] button to calibrate each servo.



After clicking [Calibrate], DOFBOT will enter the calibration state. Check whether the DOFBOT is in the state of vertical upward, horizontal center, and the mechanical claw is closed. After readjustment is completed, click [Ok]. If the circle around numbers from blue to green, it means all servos is calibrated successfully, click [Next].



⑥ Color calibration

Place the red block on the green wireframe in the video, ensure that the green wireframe can completely cover the red part, and remove your hand. When HSVvalue remained stable, click [Color Calibration]. Then, we can use the same method to calibrate green, blue, and yellow in sequence. Finally, click [Finish] to end this step.

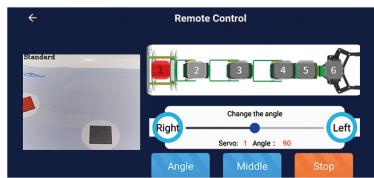


5、APP control

① Remote Control



Click the [Remote Control] icon, the following interface will appear on APP.



The camera screen is displayed on the left side of the APP. The numbers 1 to 6 on the schematic diagram of the DOFBOT represent the six servos. When we select the servo with the current ID number, the corresponding number will become red. Then, we can adjust the angle of the servo by dragging the slider or pressing left and right buttons.

[Angle]: After clicking this button, the APP will read the current servo angle, and update angle value to the upper slider.
[Middle]: DOFBOT returns to initial state.

[Stop]: Click this button, torque of the DOFBOT will be closed and stop receive control commands. We can manually control the angle of the servo. Click this button again, torque of the DOFBOT will be opened, it will returns to initial state. And it starts receive control commands.

② Action Group



Click the [Action Group] icon, the following interface will appear on APP.



[Run]: DOFBOT runs the current action group.

[Stop]: DOFBOT stops all actions.

[Customize action groups]: Make the DOFBOT learn some action groups. Click [Study mode], a prompt info will pop up, and the RGB light on the extension board will become blue breathing light. Click [Record X Action] button, the DOFBOT will record the current posture as an action group, and the RGB light breathing light on the expansion board will change to another color, which indicating that this action has been recorded. After recording multiple sets of actions, click [Completed] to exit this mode, and RGB light on the expansion board will go out.

If RGB light is red breathing light, it means that the study mode is wrong or the recorded action group is full (up to 20 actions are stored), click [Completed] button to exit.

[Fixed action group]: Click the different number buttons to view the function of the corresponding action group from the preview window. When you click [Run], DOFBOT will run the action group corresponding to the current number.

③ Gesture Interaction



Click the [Gesture Interaction] icon, the following interface will appear on APP.

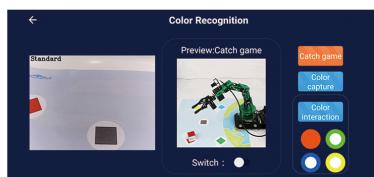


Gesture interaction includes gesture action and gesture stack.
After selecting the corresponding function, click [Switch] to open this function, we can see recognized gestures the on preview window. Click [Switch] again to closed this function.
[Gesture action]: Recognize some gestures and perform corresponding actions.
[Gesture stack]: Recognize gesture 1, 2, 3, 4, pick up yellow, red, green, and blue blocks respectively and stack them in order. When the fist is recognized, push down all blocks and the recognition data is reset.

④ Color recognition



Click the [Color recognition] icon, the following interface will appear on APP.



Color recognition includes catch game, color capture and color interaction;
After selecting the corresponding function, click [Switch] to open this function, we can see recognized gestures the on preview window. Click [Switch] again to closed this function.
[Catch game]: Place the block in the area recognized by the camera, DOFBOT will automatically recognize the currently color, and catch the block and put it in the area of the corresponding color on map.
[Color capture]: Place the block on the camera, after DOFBOT recognizes the color of the block, it catch the block from the corresponding color area to the middle area on map.
[Color interaction]: After selecting the color below, then, open the play switch and place the blocks of the corresponding color in front of the camera of DOFBOT. It will imitate the movement of the snake. The specific phenomenon can be viewed on the preview window.

⑤ Tracking game



Click the [Tracking game] icon, the following interface will appear on APP.



Color recognition includes color tracking, custom color tracking and face tracking;
After selecting the corresponding function, click [Switch] to open this function, we can see recognized gestures the on preview window. Click [Switch] again to closed this function.
[Color tracking]: Select the color on APP, open the switch, and put the block of the corresponding color in front of the camera, move the block, DOFBOT will move with the block.
[Custom color tracking]: Click this button, t will display a box on camera video, place the block in the area recognized by the camera. After accurately obtaining the color of the block, open the switch, DOFBOT will move with the block.
[Face Tracking]: If a face is detected, DOFBOT will mark it and move with the face.

⑥ Garbage Sorting



Click the [Garbage Sorting] icon, the following interface will appear on APP.



Open the switch and the system will automatically load the model. After the red prompt [Model-Loading] in the video disappears, place the block with the garbage picture in the area recognized by the camera. DOFBOT can identify the type of garbage on the current block and display result on the APP.
After the same garbage is recognized 10 times continuously, DOFBOT will sort it to the corresponding location on the map according to the garbage category.

⑧ DOFBOT Setting



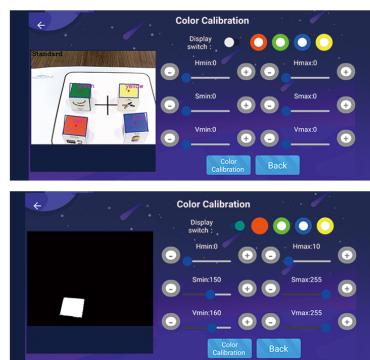
Click the [DOFBOT Setting] icon, the following interface will appear on APP.



DOFBOT setting includes servo calibration, calibration, and restore the default. [Servo Calibration]: The function is the same as that in the [Guide: Servo calibration].



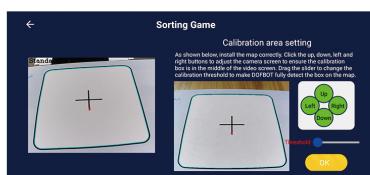
Color calibration includes basic color calibration and advanced color calibration. [Basic color calibration]: The function is the same as that in the [Guide: Color calibration].



⑦ Advanced Setting(Beta)



Click the [Advanced Setting(Beta)] icon, the following interface will appear on APP.



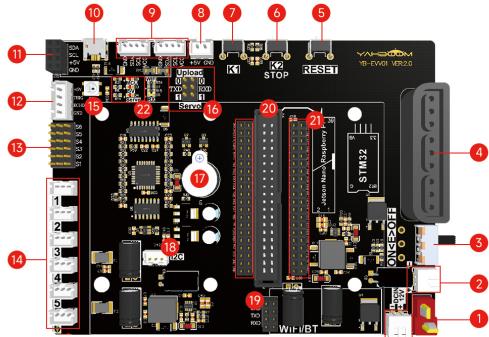
Pressing [Up, Down, Left, Right] buttons to move the DOFBOT to make the frame appears completely in the field of view. Then, slide the slider of [Threshold] to adjust the frame detection threshold until the four sides of the frame are completely detected, as shown above. Click [Ok] to enter the [Sorting Game] interface, as shown below.



[Color sorting]: Click [1], [2], [3], [4] to change the color (black is not selected). Place different color blocks in the area recognized by the camera, wait for the color to be recognized. Click [Switch] to enable this function.

[Garbage Sorting]: Click the [Garbage Sorting], wait patiently for the model to load, and then place the block with the garbage picture in the area recognized by the camera. The system will automatically recognize the currently garbage. Click [Switch] to enable this function.

Introduction to expansion board function distribution



- ① T-type power supply interface: 12V power adapter to power supply robotic arm expansion board.
- ② 12V output interface: Provides 2PCS XH2.0 interfaces that output 12V.
- ③ Power switch: Robotic arm power switch.
- ④ PS2 controller receiver base: Install PS2 controller receiver.
- ⑤ RESET key: Reset the MCU and STM32.
- ⑥ K2: Short press: the bus servo stops suddenly and turns off the torque of the bus servo; long press for about 10 seconds: closes and opens the BootLoader function of the underlying microcontroller. After the BootLoader function is opened, the RGB light shows a marquee effect.
- ⑦ K1: In default mode, press the K1 key once to reset the bus servo and raise the robotic arm vertically. Double-click the K1 key to quickly reset the servo.
- ⑧ 5V output interface.
- ⑨ I2C interface: Connect external modules.
- ⑩ microUSB interface: Writeprograms for STM32, update firmware for MCU and communicate with the main control board through the serial port.
- ⑪ I2C interface: Connect OLED screen.
- ⑫ Ultrasonic interface: Connect ultrasonic module.
- ⑬ PWM servo interface: Connect PWM servo.
- ⑭ Bus servo interface: Connect the bus servo.
- ⑮ RGB lights: RGB lights controlled by the underlying microcontroller. The main control board B can send commands to the microcontroller to make the RGB lights light up in different colors.
- ⑯ MCU serial port function selection: In the default state, use a jumper cap to connect both TXD and RXD to 1 (Servo). Only the MCU can control the bus servo. If you use a jumper cap to connect both TXD and RXD to O (Upload), you can use microUSB interface to update the firmware of MCU.
- ⑰ Buzzer: Active buzzer.
- ⑱ I2C interface: Communication interface between Raspberry Pi 5 and robotic arm expansion board.

- ⑲ Serial port interface: Connect WiFi module or Bluetooth module.
- ⑳ STM32 core board and robotic arm expansion board connection interface .
- ㉑ WiFi/BT module and robotic arm expansion board connection interface.
- ㉒ Status indicator light:
- MCU: The status indicator light of MCU. When the microcontroller is running normally, the red light flashes twice every 3 seconds.
- 5V: The 5V voltage indicator light of the expansion board. When the 5V power supply is normal, it is always on;
- Servo: The servo power supply indicator light. When the servo is powered normally, it keep on.

Specification for safe use of power adapter

1. It is strictly prohibited to connect to equipment that exceeds the load used by the product.
2. Please use the official power adapter provided by Yahboom.
3. The power adapter should be disconnected after using, and the power should be closed when the person is not present.
4. Keep away from heat, fire, any liquid. Don't use it in wet or rain. Humid environment may cause the battery to ignite or even explode.
5. When the power adapter catches fire or smoke, please use sand or dry powder fire extinguishers to extinguish the fire, and then quickly evacuate to a safe area.
6. Don't use the battery when it is leaking, damaged, heated, deformed, discolored, smelly or any other abnormal phenomenon, and contact Yahboom or other agents in time.
7. Please use the battery at 0°C~35°Cenvironment. The battery will be damaged or the discharge performance will be extremely reduced at other temperatures.
8. It is strictly forbidden to pierce, short circuit, reverse connection, welding, bumping, rolling, or throwing the power adapter.
9. Do not use the battery in a strong static and magnetic field environment, otherwise the product will be damaged.
10. It is strictly forbidden to modify or modify the hardware circuit board without permission.
11. Do not allow children to operate the power supply without adult supervision.
12. If the charger smokes or hot (the outer packaging will crack in severe cases), please quickly disconnect power supply.

Solemnly declare: Users must read specification for safe use of lithium battery carefully, especially the parameter indicators, precautions, etc., understand the use method and application range of the product. Any economic loss and safety accident caused by failure to comply with the above-mentioned lithium ion battery use specifications or operating errors shall be borne by the user.

Tutorial link

Jetson NANO version: www.yahboom.net/study/Dofbot-Jetson_nano Raspberry Pi version: www.yahboom.net/study/Dofbot-Pi

Technical Support

Email: support@yahboom.com

Shenzhen Yahboom Technology Co., Ltd.

Website: www.yahboom.net