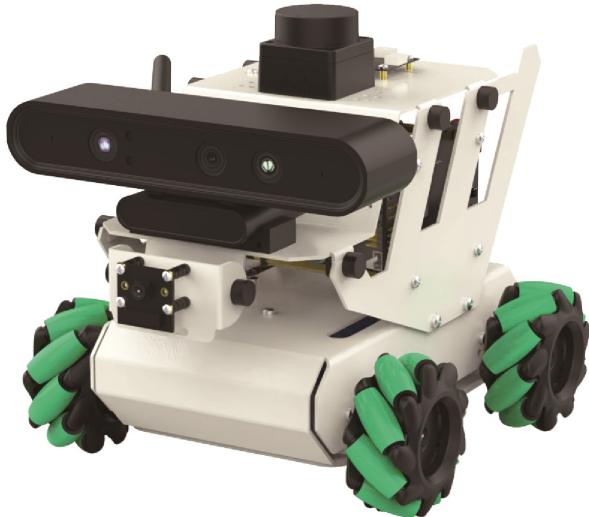


Manual



RDK ROBOT

说明书/Manual



①使用前请仔细阅读本说明书
①Please read this manual carefully before use



Android/iOS 手机用户请扫描二维码下载遥控软件。
iOS 用户也可在 App store 苹果应用商城搜索并下载
[MakerControl]

②本公司保留说明书解释权
②Our company reserves the right of interpretation for this manual

③产品外观请以实物为准
③Product appearance, please prevail in kind



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④Please keep the manual properly after reading

Android users scan the QR code by browser
to download APP.
iOS users scan the QR code by browser or
camera to download APP. Or search
"MakerControl" in App Store to download APP.

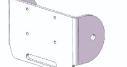
官网在线学习: <https://www.yahboom.com/study/RDK-X3-Robot>
官网在线学习: <https://www.yahboom.com/study/RDK-X5-Robot>

提取码: wsxs
提取码: ntrc

Tutorial link: <https://www.yahboom.net/study/RDK-X3-Robot>
Tutorial link: <https://www.yahboom.net/study/RDK-X5-Robot>

在产品使用过程中，如对以下说明有疑问的，请根据说明书首页的网址查阅最新的网页资料或者联系我们技术支持。
! Any questions about the instructions on manual, please enter the tutorial link on the homepage, check the latest information on our website or contact our technical support.

Packing List

	Car chassis		Car top plate
	Car side plate*2		Camera fixed bracket
	Battery fixed plate		65mm Mecanum wheel *4
	RGB Cooling HAT		ROS expansion board
	USB HUB board		Motor*4
	OLED +Acrylic protective board+Wire		USB wireless handle + AAA battery
	Antenna		Motor connect line *4
	Charger		Instruction manual
	MS200 Lidar + Adapter board		Lidar accessory package
	USB3.0 male to USB3.0 male		Micro USB data cable (right-bend)

	XH2.54 flat cable		Battery
	Parts package		Screwdriver *2
	TF card		Card reader
	RDK X5 MIPI camera (For RDK X5 version)		RDK X3 MIPI camera (For RDK X3 version)

Astra Pro depth camera (Optional)

	Astra Pro depth camera		Camera fixed bracket
	Screw pack		

RDK X3 Board (Optional)

	RDK X3 board		Serial port module
	Connect line		

RDK X5 Board (Optional)

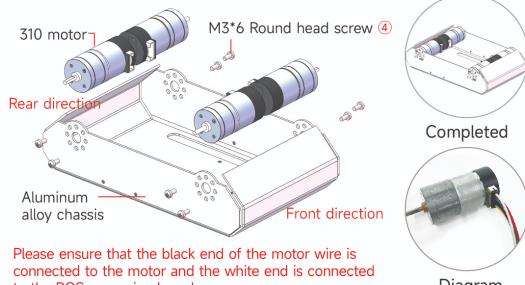


RDK X5 board

Install Steps

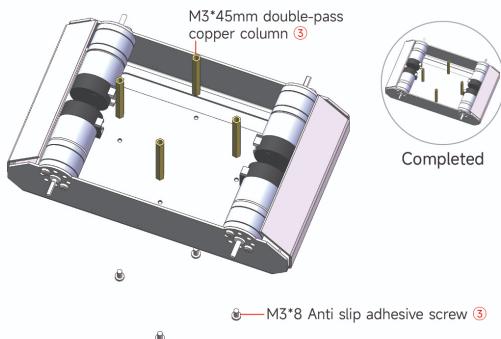
1. Install 310 motor

Note: After the installation of this step is completed, check and connect the motor wires properly.

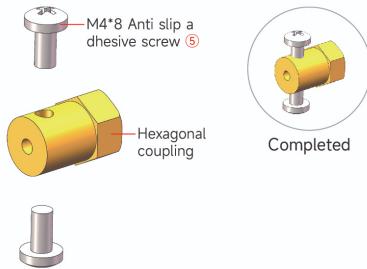


Please ensure that the black end of the motor wire is connected to the motor and the white end is connected to the ROS expansion board.

2. Install power supply copper column

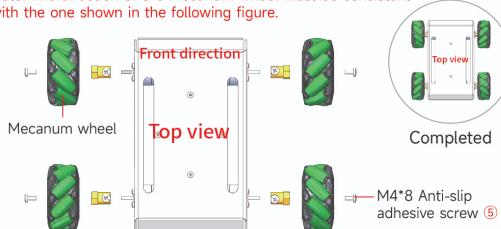


3. Install motor coupling



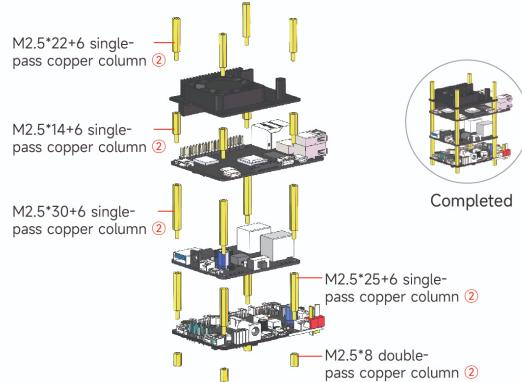
4. Install Mecanum wheel

Note: The direction of the Mecanum wheel must be consistent with the one shown in the following figure.

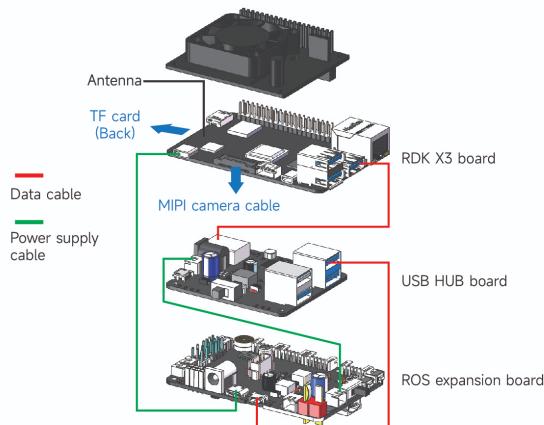


5. Install expansion board (Just for RDK X3 version)

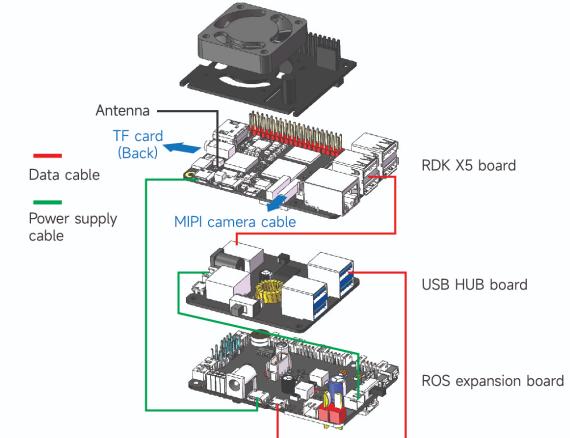
Note: Please ensure that the direction of each PCBA board must be consistent with that shown in the figure below. Connect the data cable, power supply cable, TF card, insert the expansion board and RDK X3 board.



RDK X3 version wiring diagram

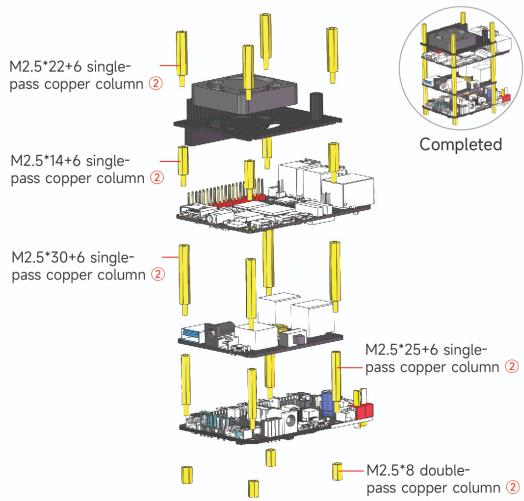


RDK X5 version wiring diagram

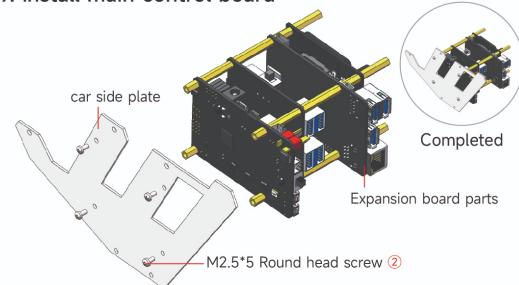


6. Install expansion board (Just for RDK X5 version)

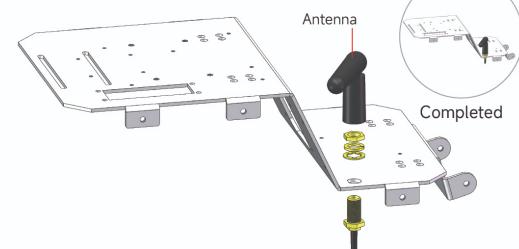
Note: Please ensure that the direction of each PCBA board must be consistent with that shown in the figure below. Connect the data cable, power supply cable, TF card, insert the expansion board and RDK X5 board.



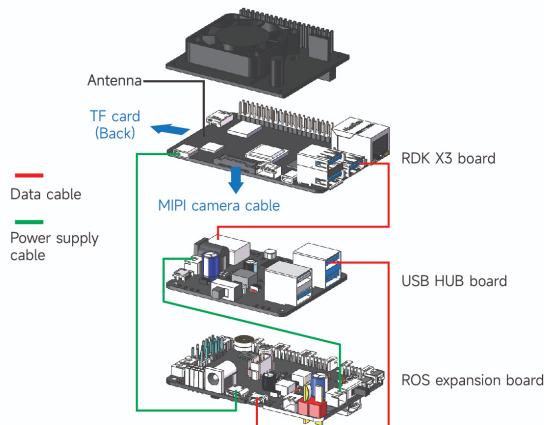
7. Install main control board



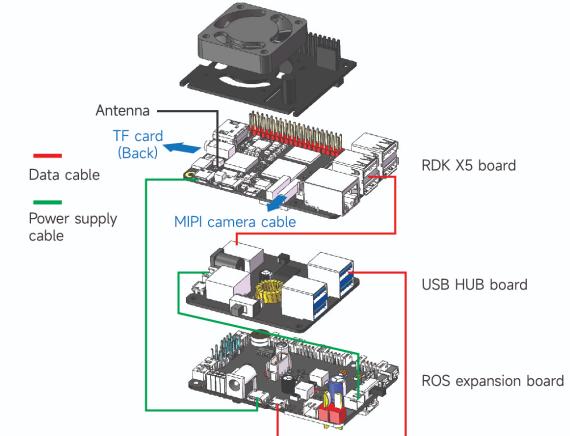
8. Install car top plate and antenna



RDK X3 version wiring diagram

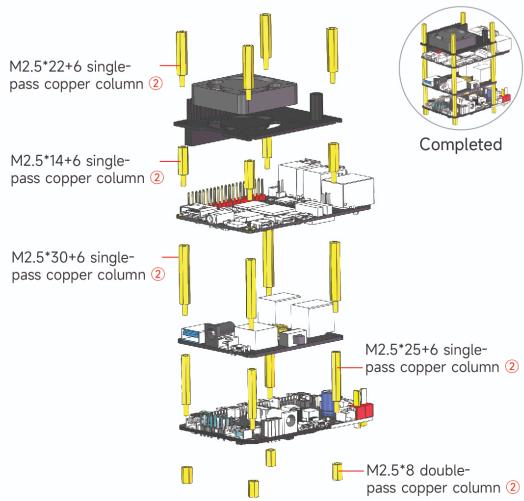


RDK X5 version wiring diagram

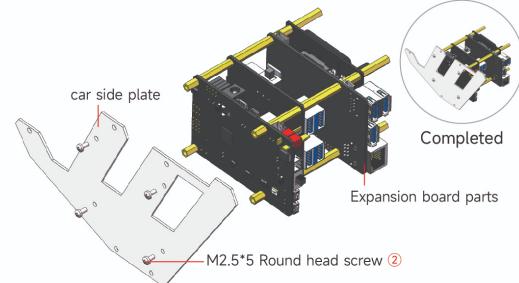


6. Install expansion board (Just for RDK X5 version)

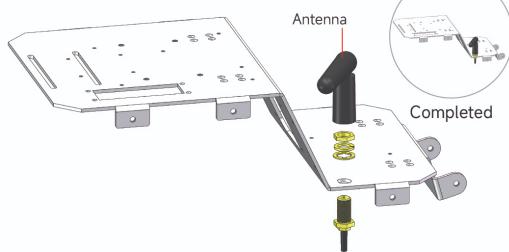
Note: Please ensure that the direction of each PCBA board must be consistent with that shown in the figure below. Connect the data cable, power supply cable, TF card, insert the expansion board and RDK X5 board.



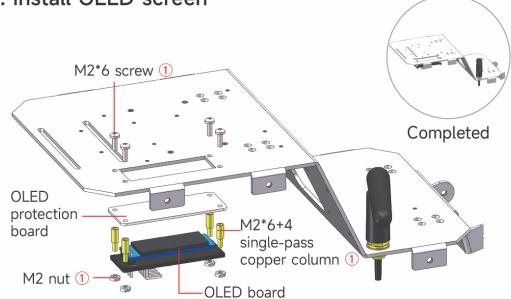
7. Install main control board



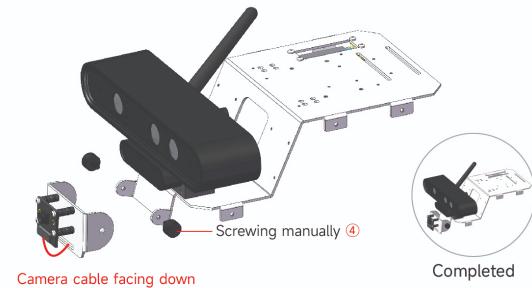
8. Install car top plate and antenna



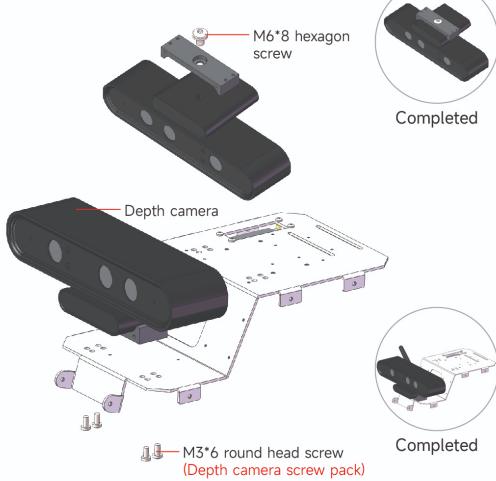
9. Install OLED screen



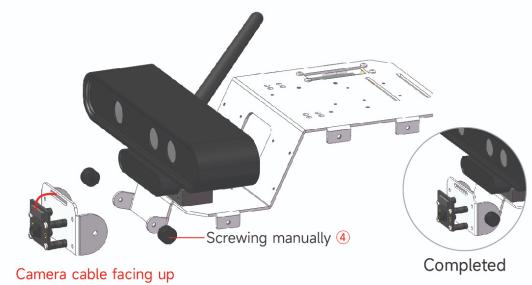
12. Install RDX X3 camera part (Just for RDK X3 version)



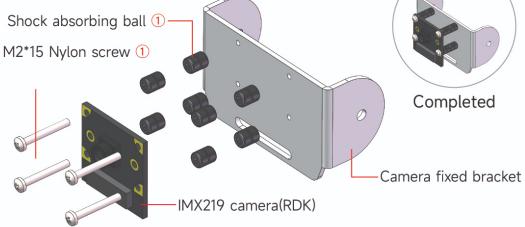
10. Install Depth camera(Optional)



13. Install RDX X5 camera part (Just for RDK X5 version)

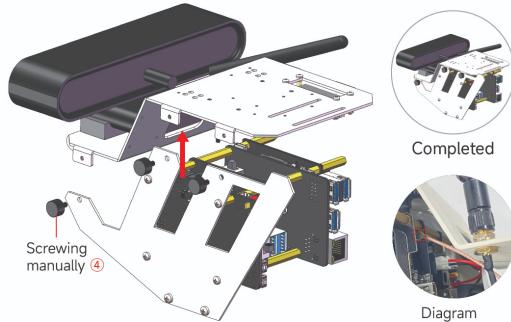


11. Install camera parts



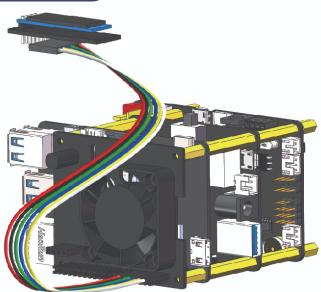
14. Install top plate

Note: Connect the antenna, OLED, depth camera and expansion board/main board before installation.

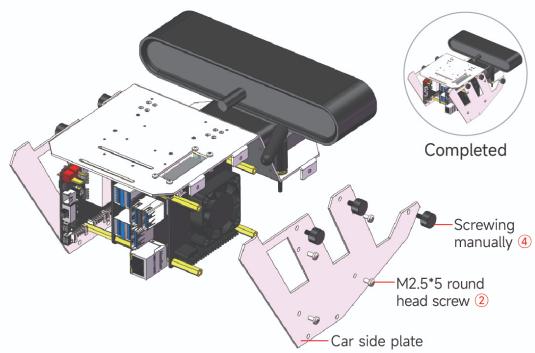


The depth camera cable passes through the hole in the middle of the top plate, and connects to any USB port of RDK-X3/X5 or USB HUB board

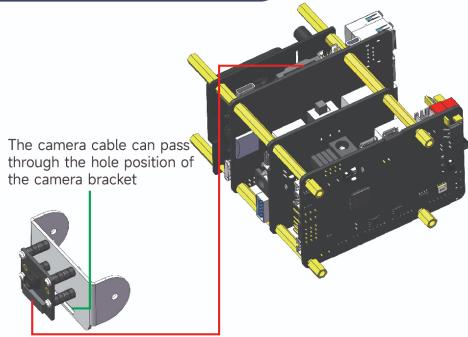
OLED wiring diagram



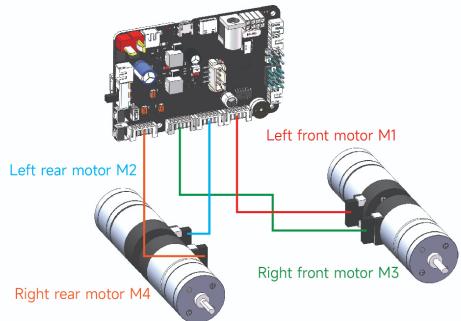
15. Install right side plate



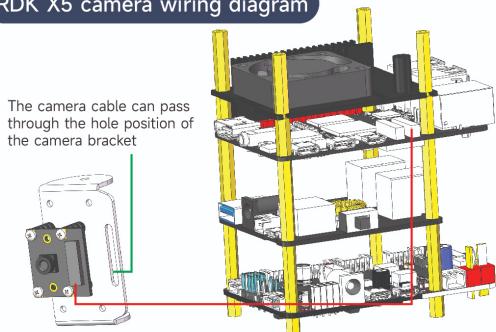
RDK X3 camera wiring diagram



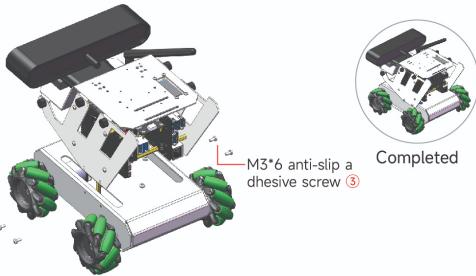
310 motor wiring diagram



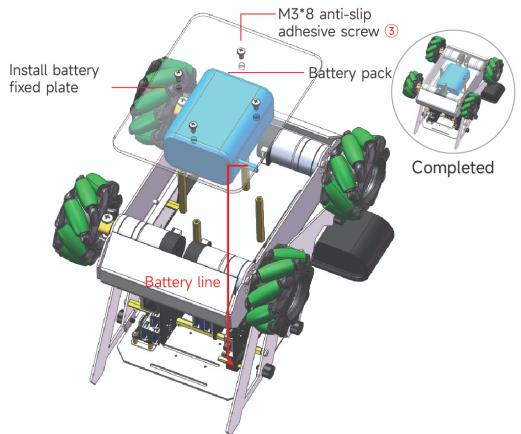
RDK X5 camera wiring diagram



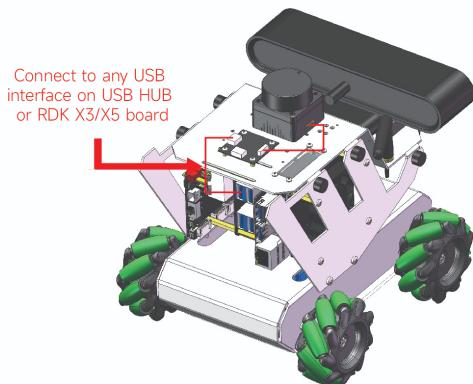
16. Install car body



17. Install battery

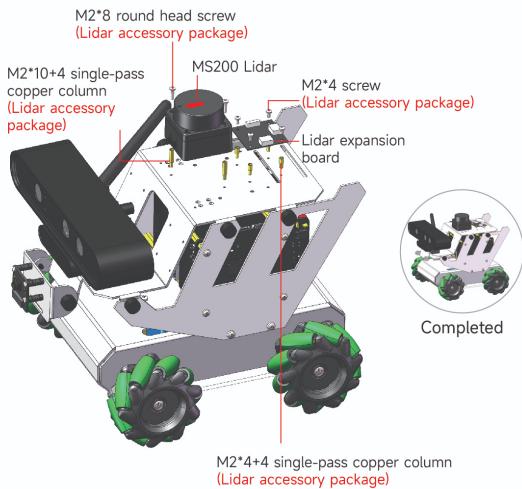


Lidar wiring diagram

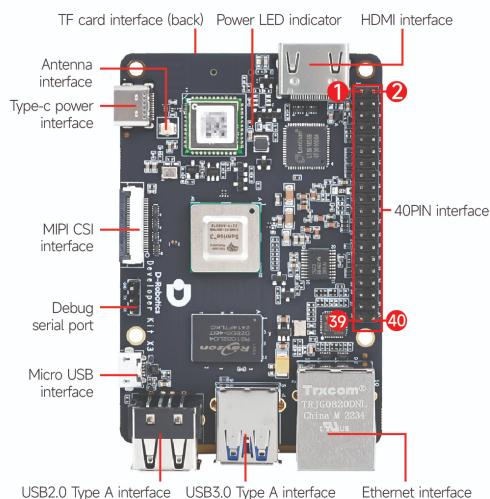


18. Install lidar

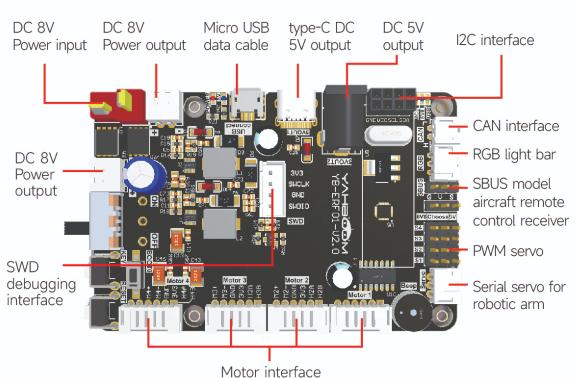
Note: Ensure the lidar is installed correctly with the top arrow pointing straight ahead.



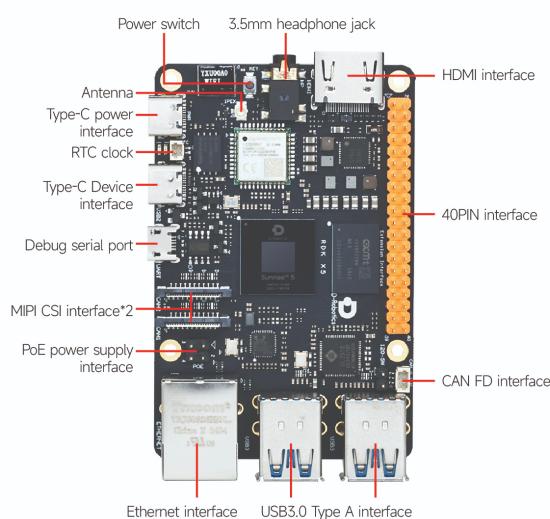
RDK X3 Board Interface Description



Expansion board interface description

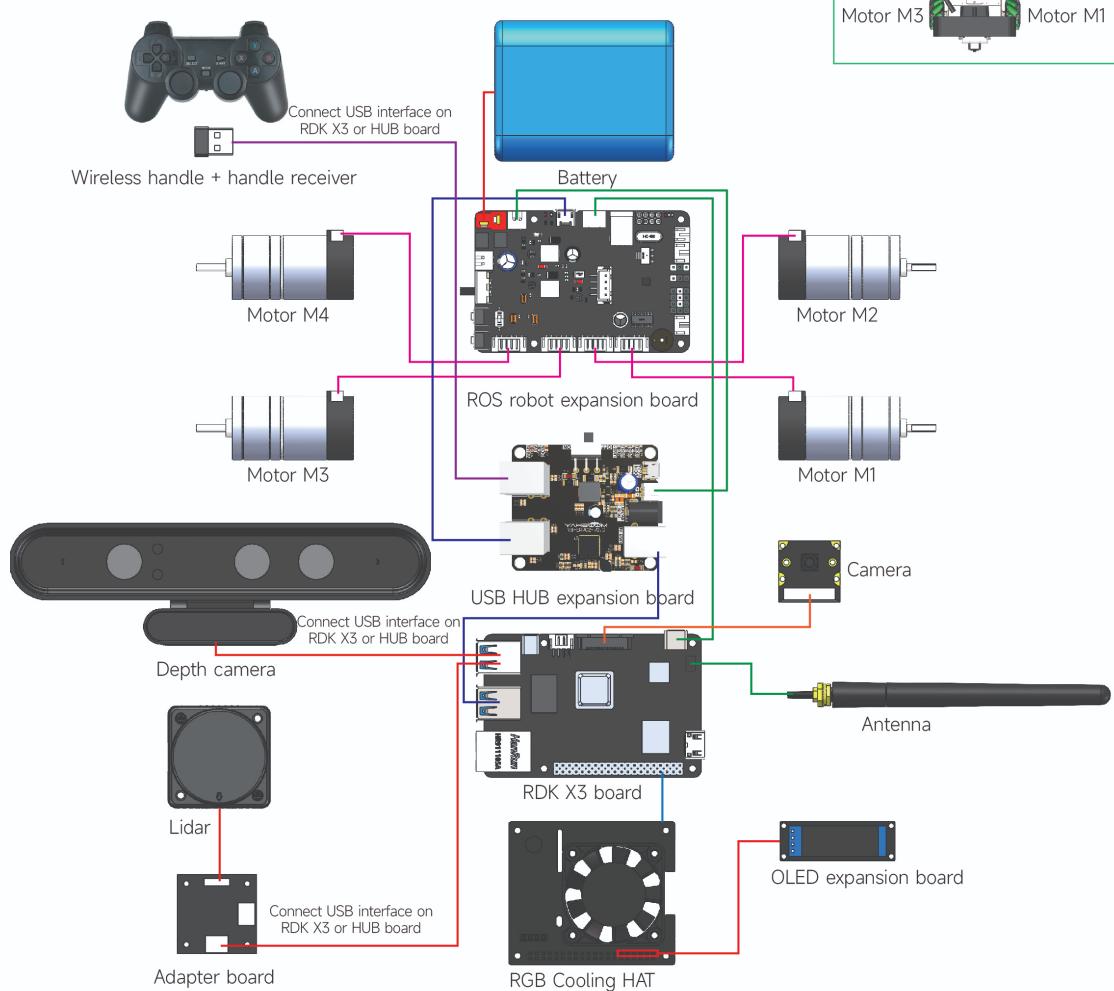


RDK X5 Board Interface Description

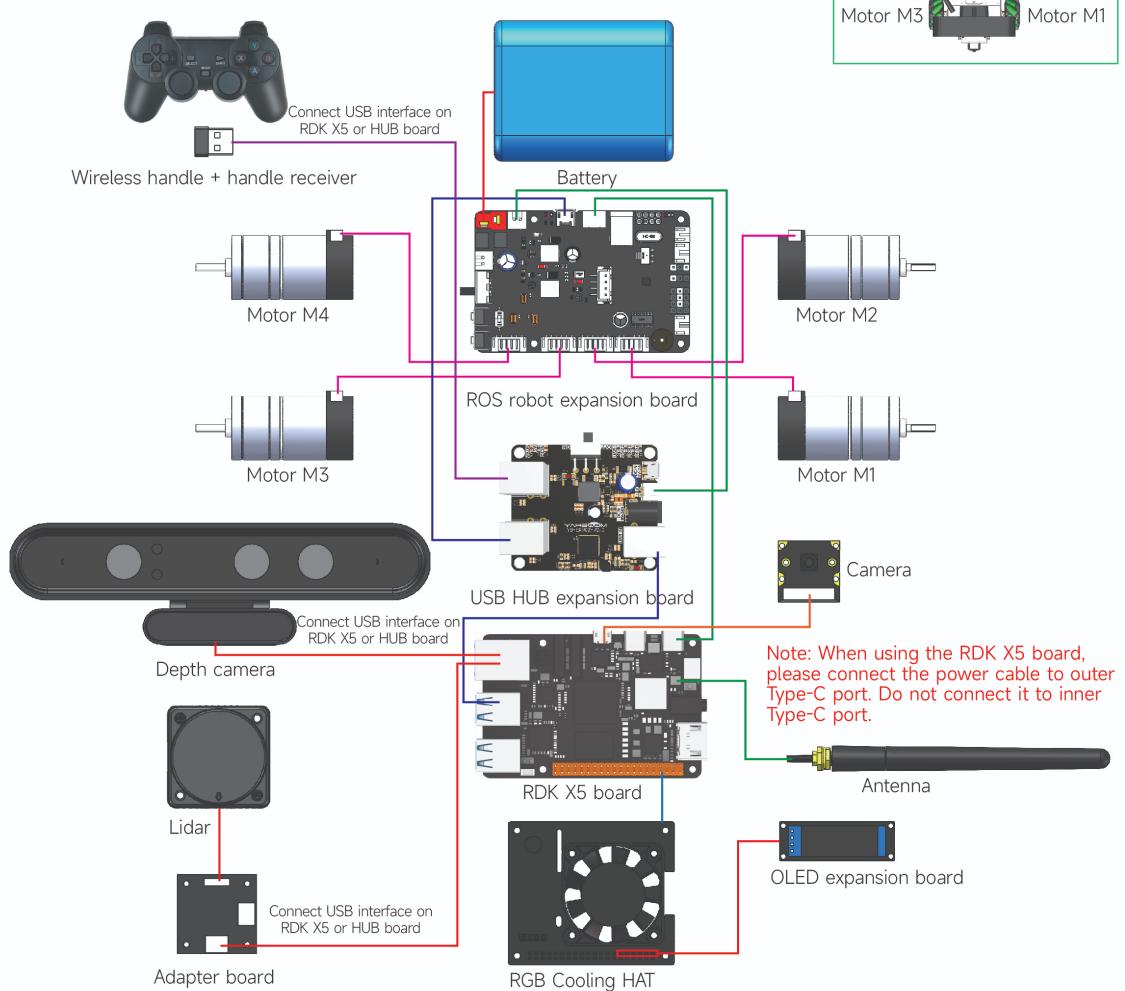


RDK Pins Comparison Table									
Function description	X3 pin number	BCM code	CVM function name	Physical pin BOARD code	CVM function name	BCM code	X3 pin number	Function description	
3.3V power signal			VDD_3V3	1 2	VDD_5V			5V power signal	
I2C0 data signal	9	2	I2C0_SDA	3 4	VDD_5V			5V power signal	
I2C0 clock signal	8	3	I2C0_SCL	5 6	GND			Ground signal	
I2S0 MCLK clock signal	101	4	I2S0_MCLK	7 8	UART_TXD	14	111	UART3 send signal	
Ground signal			GND	9 10	UART_RXD	15	112	UART3 receive signal	
GPIO6 signal	6	17	GPIO6	11 12	I2S0_BCLK	18	102	I2S0 BCLK clock signal	
GPIO5 signal	5	27	GPIO5	13 14	GND			Ground signal	
GPIO30 signal	30	22	GPIO30	15 16	GPIO27	23	27	GPIO27 signal	
3.3V power signal			VDD_3V3	17 18	GPIO7	24	7	GPIO7 signal	
SPI2 MOSI signal	12	10	SPI2_MOSI	19 20	GND			Ground signal	
SPI2 MISO signal	13	9	SPI2_MISO	21 22	GPIO29	25	29	GPIO29 signal	
SPI2CLK signal	14	11	SPI2_SCLK	23 24	SPI2_CSN	8	15	SPI2 CS signal	
Ground signal			GND	25 26	GPIO28	7	28	GPIO28 signal	
I2S1 BCLK clock signal	106	0	I2S1_BCLK	27 28	I2S1_LRCK	1	107	I2S1 LRCK clock signal	
GPIO119 signal	119	5	GPIO119	29 30	GND			Ground signal	
GPIO118 signal	118	6	GPIO118	31 32	PWM4	12	25	PWM4 signal	
PWM0 signal	4	13	PWM0	33 34	GND			Ground signal	
I2S0 LRCK signal	103	19	I2S0_LRCK	35 36	GPIO3	16	3	GPIO3 signal	
GPIO105 signal	105	26	GPIO105	37 38	I2S0_SDIO	20	104	I2S0_SDIO signal	
Ground signal			GND	39 40	I2S1_SDIO	21	108	I2S1_SDIO signal	

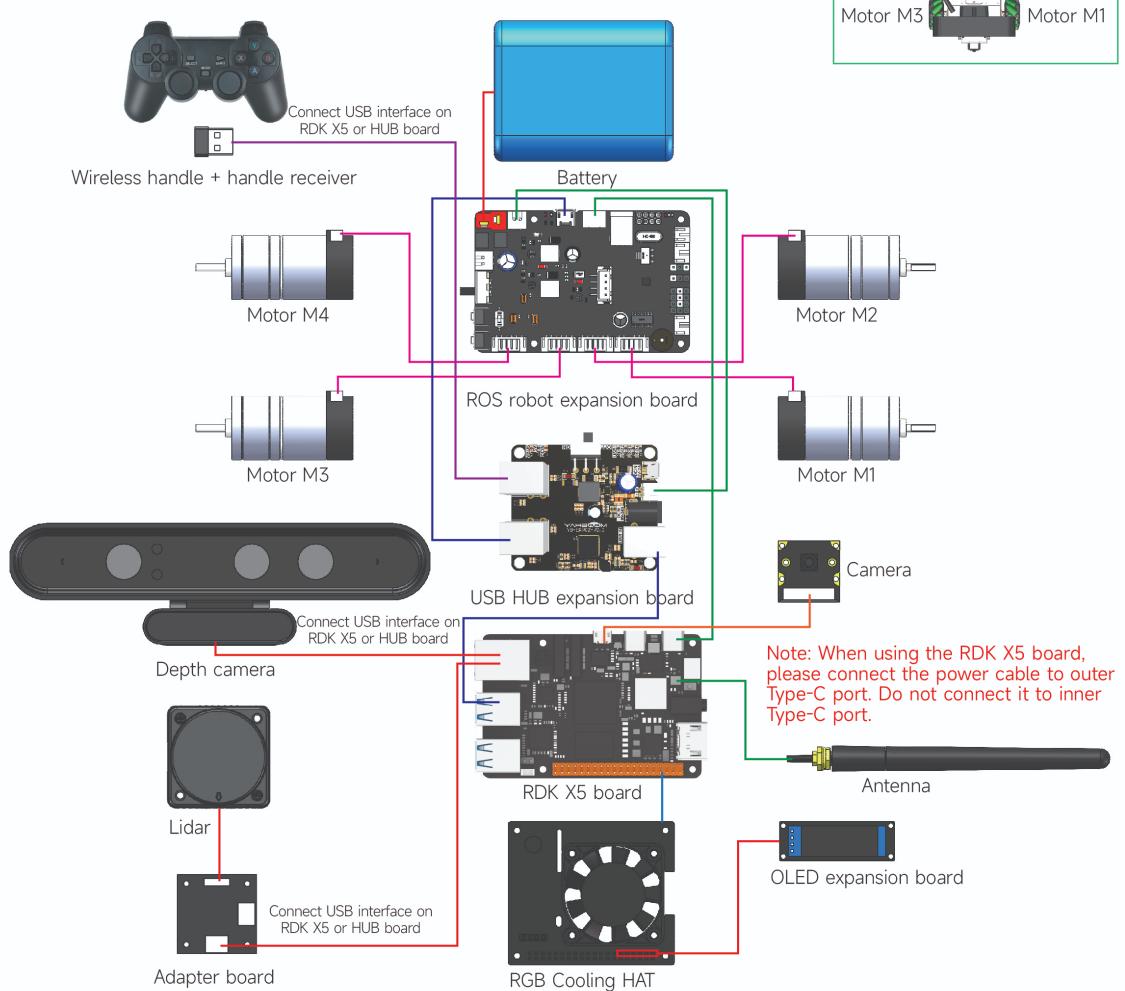
RDK X3 ROBOT Wiring Diagram



RDK X5 ROBOT Wiring Diagram



RDK X5 ROBOT Wiring Diagram



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- iOS users scan the QR code by browser or camera to download APP. Or search "MakerControl" in App Store to download APP.



(APP download QR code)

Start Up RDK ROBOT

The TF card provided in the robot kit has been written into the image system, you can directly install the TF card into the TF card slot of the RDK board.

Turn on the power switch of the robot and wait for 1 minute. You can hear the buzzer beeping three times, indicating that the system starts normally. At this time, you can see the information displayed on the OLED.

System user name: root Password: yahboom

Connect RDK Robot

The RDK Robot car has its own WIFI signal [RDK-X3-Robot] / [RDK-X5-Robot]. You can directly connect your mobile phones to the WIFI signal of the RDK Robot to form a local area network, and the hotspot password is 12345678. Or connect the RDK Robot and the mobile phone to the same router to form a local area network.

1. Select the device

Note: RDK-ROBOT and Rosmaster X3 use the same

APP, so select Rosmaster X3 when selecting a robot. Open the [MakerControl] APP, you need to select the [Rosmaster X3] device.



2. Fill in the IP address displayed by the OLED on the robot, as shown below. Port and Video use default parameters. Click [Connect], after the connection is successful, it will automatically jump to the main control interface.



APP function introduction

The main interface of RDK Robot APP is divided into three parts.

1. Remote control



Click the [Remote control] icon, you can see the following interface.



Part 1. Left area: The scroll bar can adjust the straight-line speed and turn speed of the robot. The button can control the robot to move forward, back, move left, move right and stop.

Part 2. Right area: Camera display screen, you can see the front screen of RDK Robot . The screen supports zoom in/out. The frame rate of the current camera will displayed on left corner.

Part 3. Bottom right area: users can choose three control methods: gravity sensing control, button control, joystick control.

The last button is pressed to control the buzzer to whistle, release to turn off the buzzer.

Part 4. Self-stabilizing mode: When the self-stable mode is turned on, the car will brake to stop immediately after receiving the stop command.

When the self-stable mode is turned off, the car will stop after coasting for a while after receiving the stop command.

Part 5. Bottom right area: Two buttons control the robot to rotate left and right.

Part 6. Full screen display: All icons can be hidden to enter the full screen display of the camera image.

2. Mecanum wheel



Click the [Mecanum wheel] icon, you can see the following interface.



The four scroll bars represent the four wheels of the robot, and when it is in the middle, the wheels stop. When you swipe it to the left, the wheel reverses. When you swipe it to the right, the wheel forward.

After moving the scroll bar, select [update speed], the wheel of the robot will turn.

Open the [drag the update switch], when we move the scroll bar, the wheel of the robot will rotate in real time and change the speed. Click [all clean], the robot stop.

Tip: Before testing this function, we can keep the wheels of the robot away from the ground or desktop to prevent the robot from breaking. Bottom left and bottom right buttons be used to control the robot movements directly.

Middle dial (from top to bottom):

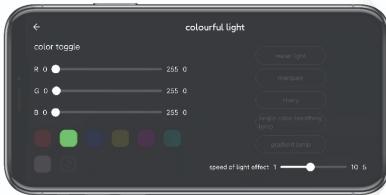
1. X: Speed in X-axis direction; 2. Y: Speed in Y-axis direction; 3. Z: Speed in Z-axis direction.

3. Colorful light

This function currently does not support RDK Robot



Click the [Colorful light] icon, you can see the following interface.



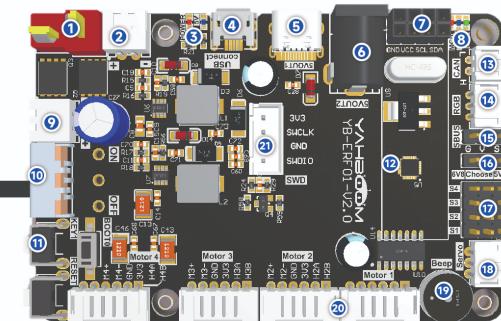
The colorful light are divided into three parts.

Part 1. Upper left area: When we directly drag the [R] [G] [B] scroll bar, we can see that the RGB light bar at the rear of the robot will be changed in real time.

Part 2. Lower left area: This function can make the RGB light bar display red, green, blue, yellow, purple, cyan, white and off. Users can also adjust the color of the breathing light.

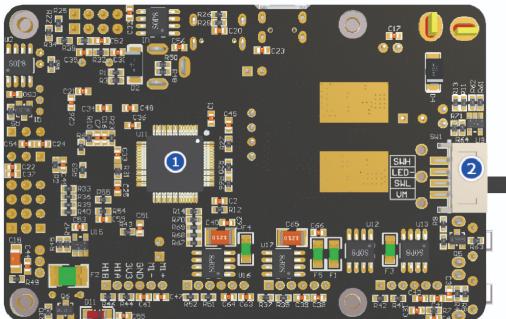
Part 3. Right area: After pressing a button, the RGB lights will show the corresponding special effects, click the button again to exit the special effect. The scroll bar below can change the speed of the lighting effects, the default is 5, the fastest is 1, and the slowest is 10.

Expansion board functional layout



- ① T-type DC 8V power input interface: Connect to the DC 8V power supply or 8V battery.
- ② DC 8V power output: Provide DC 8V power to an external device.
- ③ Power indicator: Indicates whether the power supply is normal.
- ④ Micro USB data interface: Connect to main control board.
- ⑤ Type-C interface: Provide DC 5V to an external device, only power supply can't communicate.
- ⑥ DC 5V output interface: Can supply power to main control board
- ⑦ I2C interface: Can connect external I2C devices, such as OLED screen.
- ⑧ Indicator: Data indicator and 6.8V voltage indicator.
- ⑨ DC 8V power output: Provide DC 8V power to the outside.
- ⑩ DC 8V power switch: Power switch.
- ⑪ Button:
 - Button KEY1: User function button, which can realize custom functions through programming.
 - Button RESET: Reset button of the onboard microcontroller.
 - Button BOOT0: BOOT0 button of the on-board MCU is used for the MCU to enter the flashing mode.
- ⑫ 9-axis attitude sensor: Check the current attitude of the expansion board.
- ⑬ CAN interface: Connect CAN devices.
- ⑭ RGB light bar interface: Connect to RGB colorful light bar.
- ⑮ SBUS interface: Connect to the model aircraft remote control receiver.

- ⑯ PWM servo voltage switch: Change the position of the jumper cap to select 6.8V or 5V to supply power to the PWM servo.
- ⑰ PWM servo interface: It can be connected to 6.8V or 5V voltage PWM servo, and the corresponding voltage should be selected in ⑯ according to the servo voltage.
- ⑱ Serial Servo Interface: Connect to the serial servo of robotic arm.
- ⑲ Buzzer: Whistle.
- ⑳ 4-channel motor port: Connect four motors. Please refer to the corresponding tutorials according to different robots.
- ㉑ SWD debugging interface: Connect to the SW interface on ST-Link or J-Link, used to debug MCU or download MCU firmware.



- ① On-board MCU: Control the peripherals on the expansion board, such as buzzer, motor drive, etc.
- ② Metal key switch PH2.0 interface: It can be connected to an external metal switch and connected in parallel with the onboard power switch. Only need to turn on one of the switches to turn on the power.

FAQ

Q1: Why is the connection too slow after executing the SSH remote login command to the system?

A: When logging in, the `~/.bashrc` file will be executed, but loading will be slightly slower due to multiple ROS workspace setup.bash files being written to this file.

Q2: Why is there a error issue when driving a depth camera or lidar?

A: If there are no issues with the hardware connection, please exit the program and re-insert the device USB cable.

Q3. How does RDK-X3/X5 board communicate with the expansion board?

A: RDK-X3/X5 sends serial port data and transmits it to the expansion board through USB port. The expansion board integrates a MCU to receive and parse serial port data. Then, processes specific commands to be executed.

Q4: About power supply methods?

A: Robot car kit is equipped with a battery pack. Insert the battery pack into the T-shaped interface of the DC 8V power supply on the expansion board. Turn on the main power switch, and the expansion board integrates a voltage conversion chip to provide DC 5V power, which is transmitted to RDK-X3/X5 board through the Type-C 5V power cable.

Q5: What functions on the expansion board are managed by a MCU?

A: The MCU management part on the expansion board includes: active buzzer, attitude sensor, motor, key KEY1, RESET key, SBUS interface, CAN interface, etc.

Q6. How does the expansion board update the MCU firmware? Why update MCU firmware?

A: The MCU integrated in the expansion board has already programmed the firmware when it leaves the factory. If it is not necessary, please do not need to update the firmware. If you need to update the firmware, please refer to Yahboom tutorials.

Lithium-ion battery safety specification

1. It is strictly forbidden to connect to equipment that exceeds the load used by the product.

2. Please use the official battery, power adapter and battery box provided by Yahboom.

3.When the battery voltage is less than 6.5V, the expansion board buzzer will sound an alarm and the MCU indicator will flash quickly. At this time, you need to turn off the power and then charge the battery.

4.When charging the battery, please turn off the powers witch on the expansion board.Do not use the battery while charging to prevent the charger or the battery from exploding.

5.When charging, the indicator light of the charger is red,indicator light on the charger will become green, when battery is fully charged. When charging the battery, some-one should take care of it. After charging, unplug the charger as soon as possible to avoid overcharging of the battery.

6.After using, turn off the power switch on the expansion board. When not in use for a long time, please keep the voltage of the lithium battery pack about 7V, use a screwdriver to remove the battery box, take out the lithium battery pack and put it in the battery safe area. Do not mix with metal objects, and the insulating film wrapped on the outside cannot be torn off.

7.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.

8.When the lithium battery pack or battery charger catches fire or smoke,please use sand or dry powder fire extinguisher to extinguish the fire, and then quickly evacuate to a safe area.

9.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.10.Please use the battery at 0° C~35° C environment. The battery will be damaged or the discharge performance will be extremely reduced at other temperatures.

11.Intentional puncture, short circuit,reverse connection,unauthorized welding,impact, crushing, and throwing of batteries

are strictly prohibited.

12.Do not use the battery in a strong static and magnetic field environment,otherwise the battery may leak fluid,catch fire or even explode.

13.It is strictly forbidden to modify the hardware circuit board without permission.

14.Do not allow children to replace batteries without adult supervision.Keep batteries out of the reach of children.

15.If the charger or battery pack smokes or hot (the outer packaging will crack in severe cases) or the battery leaks,please disconnect the power strip or the main gate, then quickly pull out the charger,remove the battery and put it in an open area.

Solemnly declare: Users must read this manual 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

www.yahboom.net/study/RDK-X3-Robot

www.yahboom.net/study/RDK-X5-Robot

Technical Support

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