YAHBOOM

MicroROS-Pi5 Robot Car

说明书/Manual

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

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

④阅后请妥善保留
④Please keep the manual properly after reading

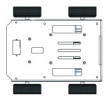
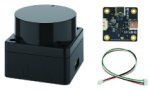
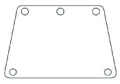
Android/iOS 手机用户请扫描二维码下载遥控软件。
iOS 用户也可在 App store 苹果应用商城搜索并下载建图导航 APP【 ROS Robot】

Android users search "ROS Robot" in Play Store to download APP.
iOS users search "ROS Robot" in App Store to download APP.

官网在线学习: https://www.yahboom.com/study/MicroROS-Pi5　提取码：sfah　Tutorial link: https://www.yahboom.com/study/MicroROS-Pi5

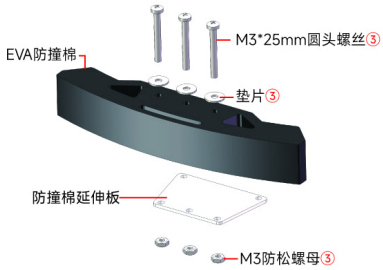
在产品使用过程中，如对以下说明有疑问的，请根据说明书首页的网址查阅最新的网页资料或者联系我们技术支持。
！ Any questions about the instructions on manual, please enter the tutorial link on the homepage, check the latest information on our website or contact our technical support.

物品清单

	底盘 (已安装电机、 线材)		二自由度 摄像头云台
	树莓派5 (可选)		冷酷派 主动式散热器
	EVA防撞棉		前盖
	后盖		MS200激光 雷达+转接板
	扩展板		7.4V电源
	防撞棉延伸板		电池亚克力板
	天线		配件包
	电源充电器		USB无线手柄 +7号电池
	说明书+ 三包凭证		螺丝刀
	TF卡+ 读卡器		线材

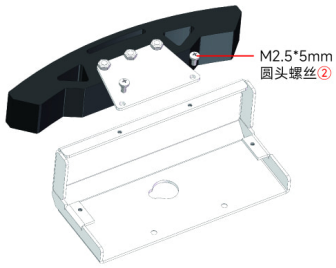
安装步骤

1. EVA防撞棉组装



安装完成

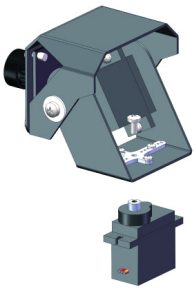
2. EVA防撞棉与前盖连接



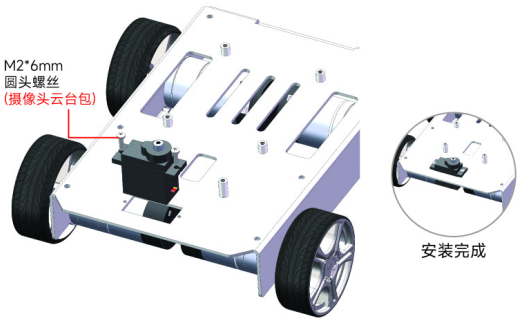
安装完成

3. 二自由度摄像头云台安装

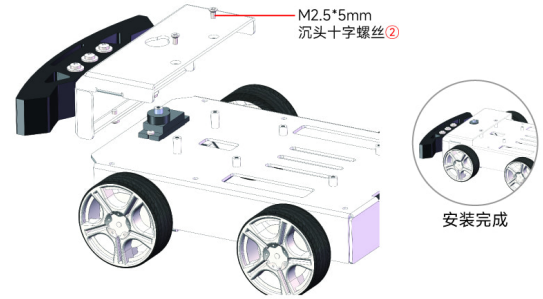
3.1 精巧摄像头拆卸（注意：拆卸舵机时请勿扭动舵机）

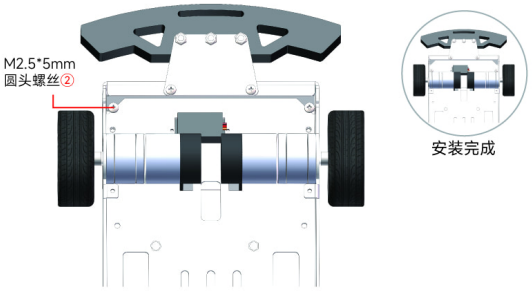


3.2 精巧摄像头舵机安装

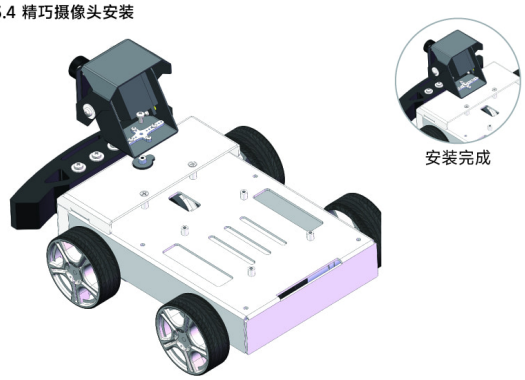


3.3 MicroROS前盖安装

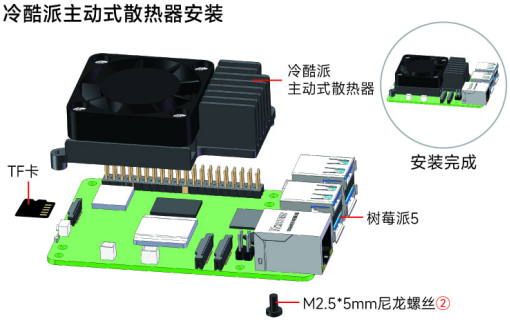


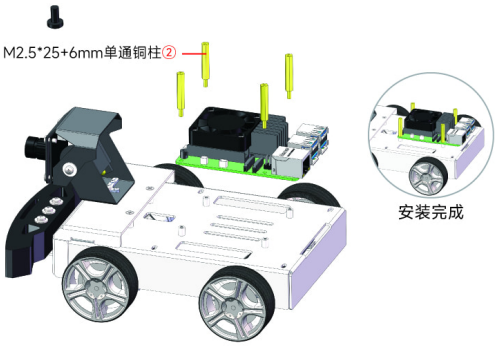


3.4 精巧摄像头安装



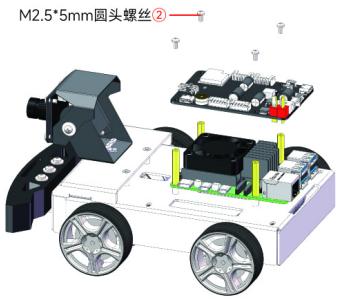
4. 冷酷派主动式散热器安装

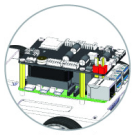




5. MicroROS扩展板安装

（安装完成后，将Type-C转Type-C线材接好，详情请见接线图）

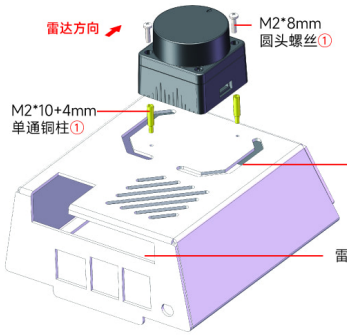


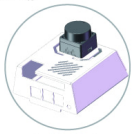


安装完成

扩展板安装完成后
请将天线接于此处

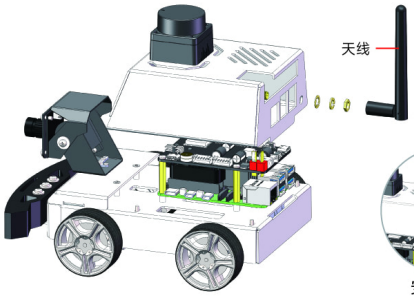
6. 激光雷达安装(雷达线材从进线口穿入，从出线口穿出)





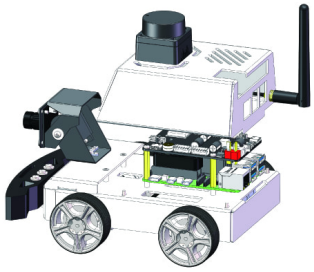
安装完成

7. 天线安装

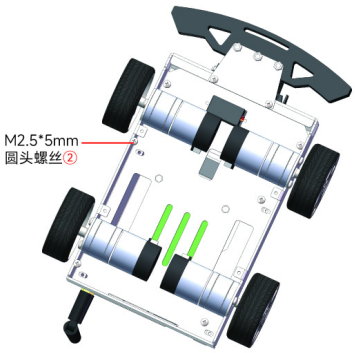


安装完成

8. 顶盖安装

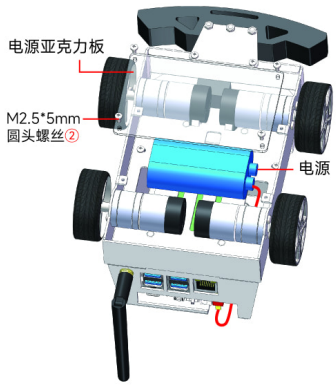


安装完成



安装完成

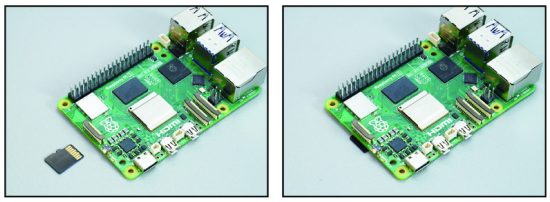
9. 电源安装



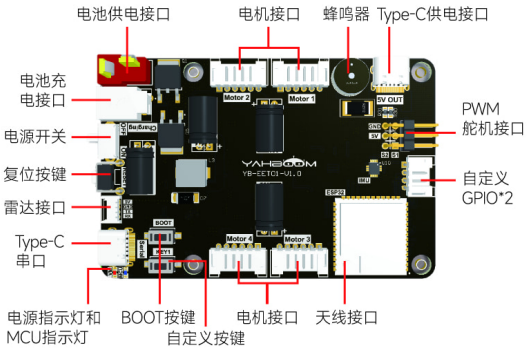
安装完成

电源线穿过底盘和上盖过线孔
后，接入电池供电接口。

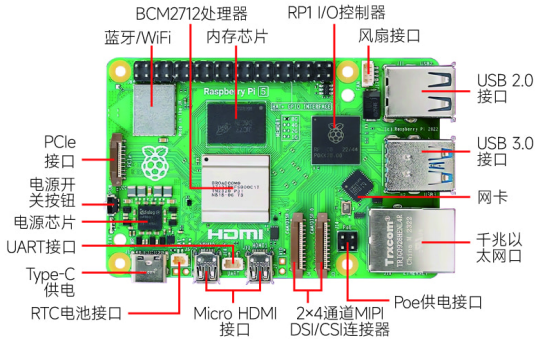
SD卡安装



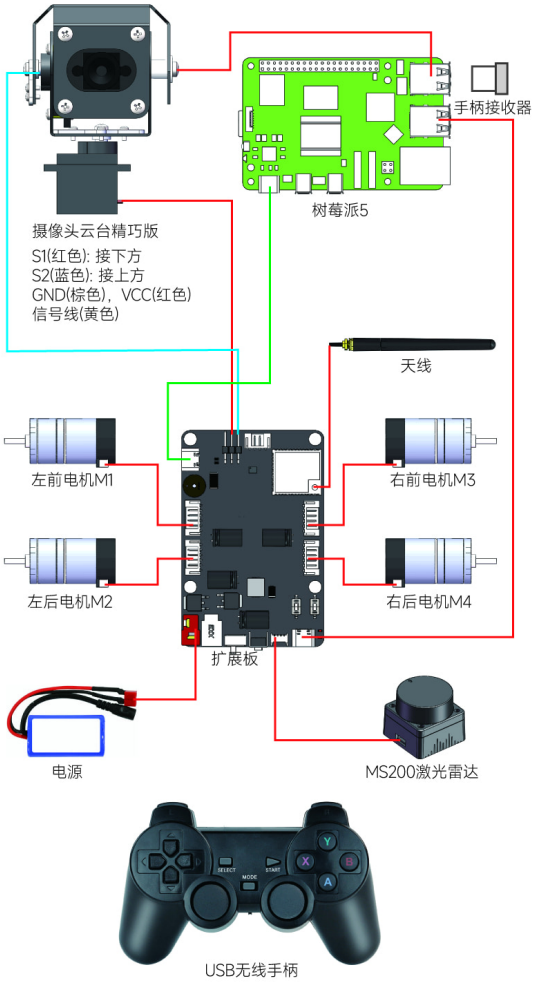
扩展板接口说明



树莓派5接口说明



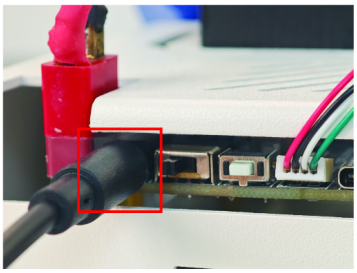
接线示意图



充电说明

将产品自带的充电器插入排插，此时充电器指示灯亮绿色。

关闭机器人的总电源开关。在机器人扩展板找到充电接口，将充电器的充电接头插入扩展板的充电接口。



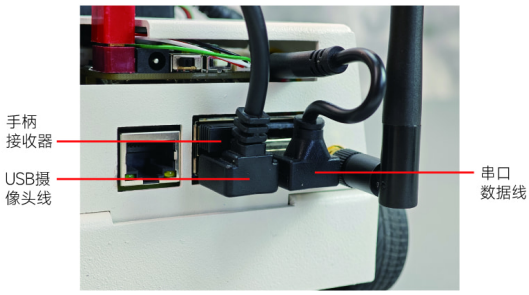
充电器正在给机器人充电时，充电器指示灯亮红色。

等待电池充满后指示灯变为亮绿色。拔下充电器接头和充电器，并将充电器放置在安全区域。

快速上手使用

一、接线

将串口数据线，USB摄像头线、手柄接收器分别接到树莓派上，如下图：



二、启动

接好线之后，插上电源，打开 microROS 控制板的开关，等待 30 秒左右。打开手柄按 start 能听到嘀嘀嘀声就可以使用手柄进行控制了，要是控制没反应，按一下手柄的 R1 按键即可控制。

按键	属性
左摇杆上	小车前进
左摇杆下	小车后退
右摇杆右	小车右转
右摇杆左	小车左转
X	舵机往左
B	舵机往右
A	舵机往下
Y	舵机往上

树莓派系统信息：

系统账户：**pi**　　系统密码：**yahboom**

热点名称：**Micro_ros**　　热点密码：**12345678**

常见问题分析

1. 机器人为何要配置参数?
答：由于每个用户的 WiFi 环境和 IP 地址不同，所以需要根据实际情况配置参数。

2. 关于 microROS 控制板小车类型，树莓派版本与虚拟机 / 电脑版本有什么不同?
答：树莓派版本与虚拟机 / 电脑版本使用的是相同的出厂固件，通过配置参数来区分版本，树莓派版本使用串口通讯方式，虚拟机 / 电脑使用 WiFi-UDP 通讯方式。

3. 配置成树莓派版本后，无法读写配置参数怎么办?
答：请按一下机器人的复位键，在开机后 5 秒内为配置状态（MCU 指示灯每 300 毫秒闪一次），此时运行配置文件即可正常读写配置。

4.microROS 控制板有两个 type-C 口，有什么区别?
答：标记 Serial 的 type-C 接口主要用来通讯、配置、烧录固件等，标记 5V OUT 的 type-C 接口是用来给树莓派 5 供电的。

5. 机器人蜂鸣器持续‘滴滴滴’响是怎么回事?
答：机器人在电池电量低的情况下会发出‘滴滴滴’响声（每间隔 100 毫秒响一次），此时无法控制机器人，请保存代码关机，然后给机器人充电。

6. 机器人 MCU 状态指示灯代表的意义?
答：底板单片机开机进入配置状态，大约 5 秒后，自动进入连接代理状态，连接代理成功后，开始初始化 ROS 相关话题，如果 microROS 错误则自动结束结束 microROS 任务，如果 microROS 初始化完成则进入正常状态。

LED 灯指示功能	LED 灯现象
配置状态	LED 灯闪烁（每间隔 300 毫秒闪烁一次）
连接代理状态	LED 灯慢闪（每间隔 1 秒闪烁一次）
microROS 错误	LED 灯快闪（每间隔 50 毫秒闪烁一次）
正常状态	LED 灯双闪（每 3 秒快闪 2 次）
低电压状态	LED 灯快闪（每间隔 100 毫秒闪烁一次）

7. 同个局域网内有多台机器人怎么避免干扰?
答：可以通过设置不同的 ROS_DOMAIN_ID 来避免干扰。ROS_DOMAIN_ID 的设置范围：0~101。请修改 config_robot.py 文件里的 set_ros_domain_id(20) 参数，并将配置写入 microROS 控制板。然后在虚拟机 / 电脑用户目录下 .bashrc 文件增加一行 "export ROS_DOMAIN_ID=20"，保存并重启终端。

8. 建图导航的时候出现无法获取实时的 TF 变换?
答：重新按下复位键，重新连接代理。

锂电池组和充电器使用规范

1. 严禁接入超过产品使用负载的设备。

2. 严禁使用非亚博官方提供的电池或充电器。

3. 电池电量不足时，扩展板蜂鸣器发出报警声，此时需要关闭电源，然后给电池充电。

4. 电池充电时请关闭扩展板上的总电源开关，请勿对电池边充电边使用，防止出现充电器或电池爆炸。

5. 充电时充电器指示灯亮红色，表示正在充电，充电器指示灯亮绿色，表示电池已充满。电池充电时应有人看护，充电完毕后应尽快拔下充电器，避免电池过冲。

6. 使用完毕后应关闭电源总开关，长时间不使用设备时，保持电池电压在 7.0V-7.8V 之间，拆下底部电池仓，把电池接线拔下来，取出锂电池组并放到电池安全区域，不要与金属物体混放，包在外面的绝缘膜不可以撕掉。

7. 远离热源、火源、任何液体，切勿在潮湿或雨中使用。潮湿环境可能导致产品短路损坏。

8. 锂电池组或电池充电器冒烟、发烫（严重时外包装会裂开），应迅速断开排插电源或者断开总闸，然后迅速拔出充电器，并取出电池放置空旷地带。

9. 当锂电池组或电池充电器起火、冒烟，请使用沙或者干粉灭火器灭火，然后迅速撤离至安全区域。

10. 若锂电池组或电池充电器出现破损、漏液、严重发热、变形、变色、有异味或其他任何异常现象时不得使用，并及时联系亚博或者其他代理商处理。

11. 请在温度 0°C至 45°C环境下使用，其他温度下锂电池组或电池充电器稳定性可能会出现下降。

12. 严禁故意刺破、短路、反接、私自焊接、撞击、碾压、抛掷电池组或电池充电器。

13. 禁止在强静电和强磁场环境中使用产品，否则会导致产品损坏。

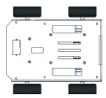
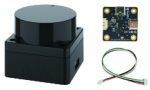
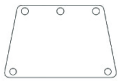
14. 严禁私自改装或修改硬件电路板。

15. 无成人监护时，请不要让儿童使用锂电池组或电池充电器，存放电池时应放在儿童不能拿到的地方。

郑重声明：请客户仔细阅读本规格书，特别是参数指标、注意事项等，了解产品的使用方法及应用范围。若出现产品使用方法错误、电路连接不对或采用的输入电源、负载功能参数与产品规格书所标性能参数不符合等现象均属使用不当，由于使用不当造成产品、负载及周边连接的损坏，本公司均不承担相关责任。

使用人群 18 岁以上；
产品名称 / 型号：MicroROS-Pi5 Robot Car
技术支持邮箱：support@yahboom.com
制造商：深圳市亚博智能科技有限公司

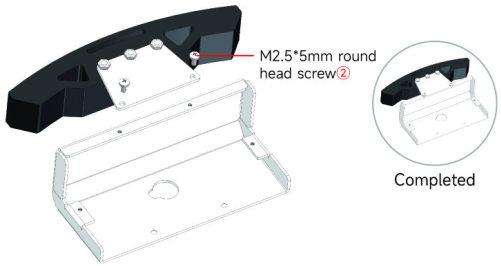
Packing List

	Chassis (motor and wires assembled)		2DOF PTZ
	Raspberry Pi 5 (Optional)		Cool cooler Pi 50
	EVA anti-collision cotton		Front cover
	Rear cover		MS200 Lidar +adapter board
	Expansion board		7.4V power supply
	Anti collision cotton extension board		Battery acrylic board
	Antenna		Accessories kits
	Charger		USB wireless handle + AAA battery
	Manual		Screwdriver
	TF card + Card reader		Cables

Assembly Steps

1. Install EVA anti-collision cotton

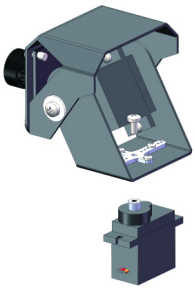
2. Connect EVA anti-collision cotton to front cover



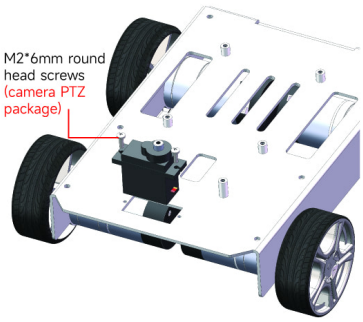
3. Install 2DOF PTZ

3.1 Disassemble servo

(Note: do not twist the servo when disassembling the servo)

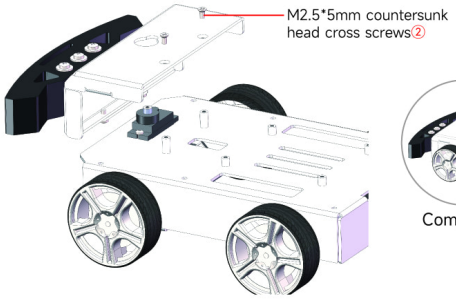


3.2 Install servo

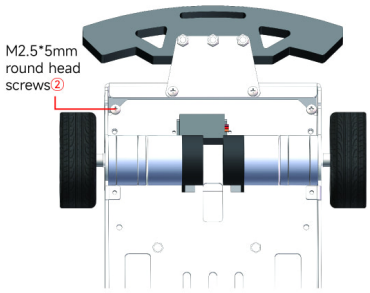


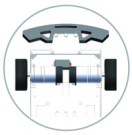

Completed

3.3 Install MicroROS front cover

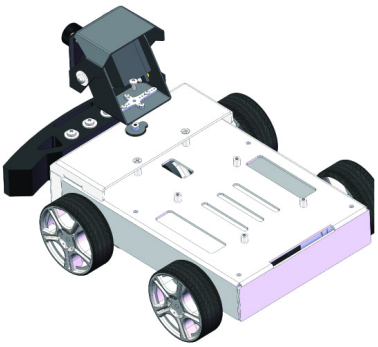



Completed



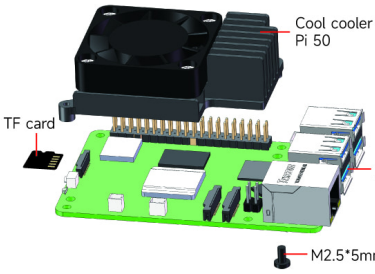

Completed

3.4 Install camera




Completed

4. Install Cool cooler Pi 50

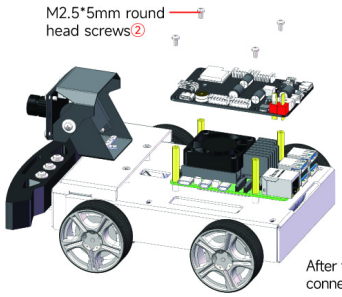


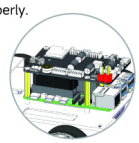

Completed


Completed

5. Install MicroROS expansion board

(After installation, connect the Type-C to Type-C cable properly. Please refer to the wiring diagram for details.)

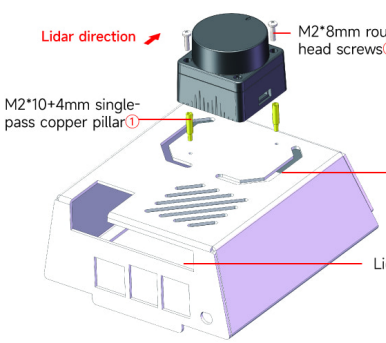


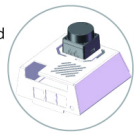


Completed

After the expansion board is installed, connect the antenna here

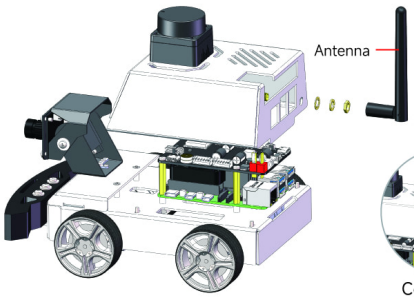
6. Install Lidar(Lidar wire passes through the cable inlet and out from the cable outlet)





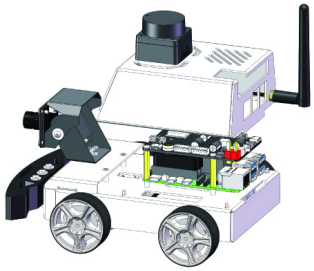
Completed

7. Install Antenna

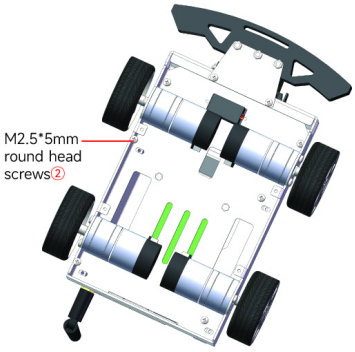


Completed

8. Install top cove

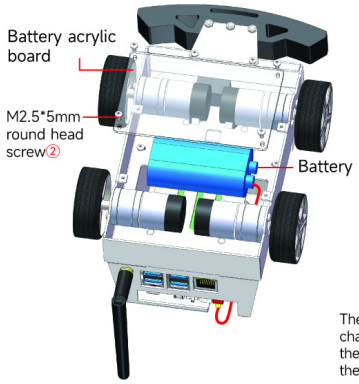


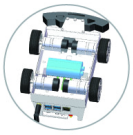
Completed



Completed

9. Install battery

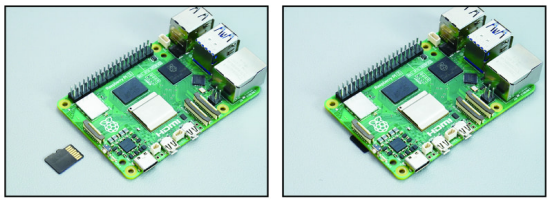




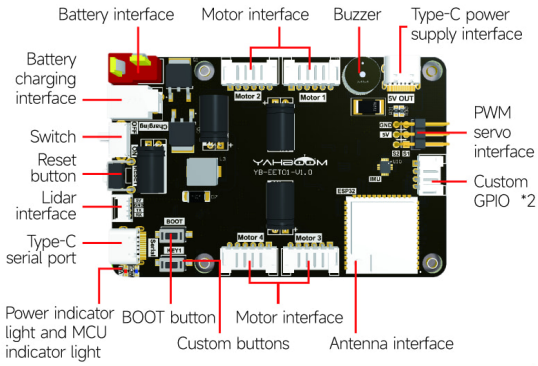
Completed

The battery line passes through chassis and the wiring holes on the upper cover, connected to the battery interface on expansion board.

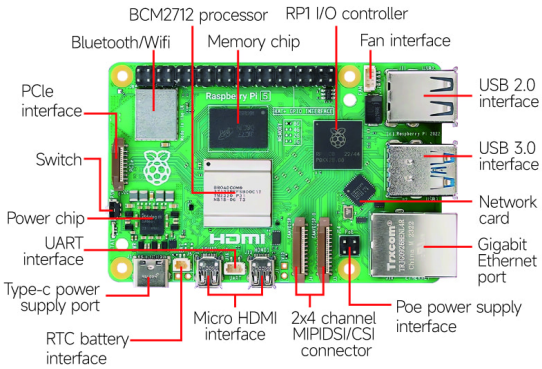
Install TF card



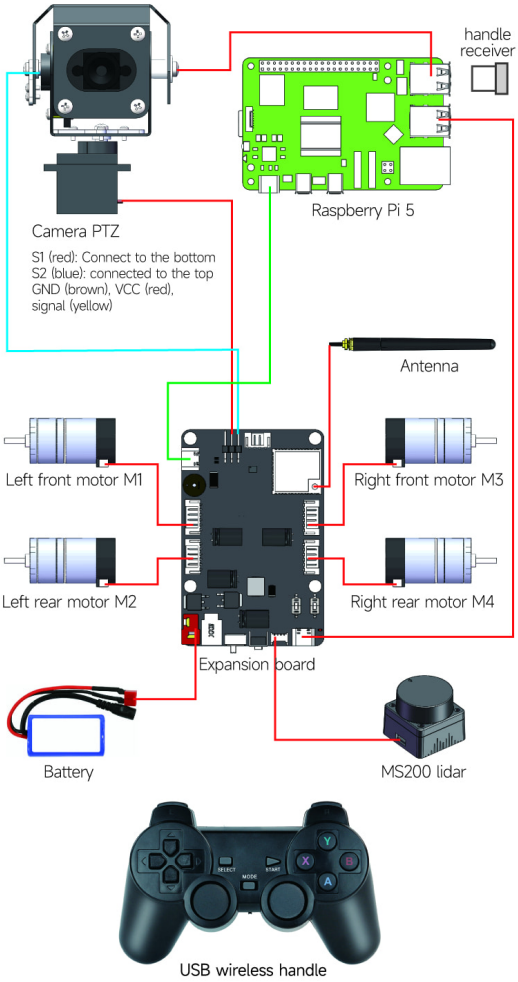
Expansion Board Interface Description



Raspberry Pi 5 Function Distribution



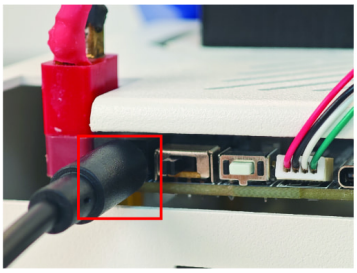
Expansion Board Wiring Diagram



About Charging

Plug the charger provided by Yahboom into the power output interface at home, and the charger indicator light is green.

Turn off the robot power switch. Insert the charging connector of the charger into the charging port of the expansion board.



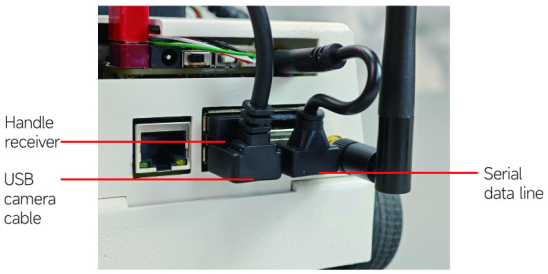
When charging, the charger indicator light is red.

When the charger indicator light become green, which means it is fully charged. Unplug the charger and place it in a safe area.

First Trial

1. About wiring

Connect the serial port data cable, USB camera cable, and handle receiver to the Raspberry Pi respectively, as shown below.



2. Start up

1) After the wiring is completed, turn on the switch on the microROS control board to start the car and wait for about 30 seconds.

2) Turn on the power switch of the handle, press the【start】button, and you can use the handle to control when you hear a beep.

If you cannot control the car normally, press the R1 button on the handle to solve the problem.

Button	Function
Left rocker push up	Car forward
Left rocker push down	Car back
Right rocker push right	Car turn right
Right rocker push left	Car turn left
X	Servo turn left
B	Servo turn right
A	Servo turn down
Y	Servo turn up

Raspberry Pi system information:
System user name: **pi** System password: **yahboom**
WiFi hotspot name: **Micro_ros**
WiFi hotspot password: **12345678**

FAQ

1. Why do we need to modify the configuration file?
A: Due to the different WiFi environments and IP addresses of each user, parameters need to be configured according to the actual situation.

2. What is the difference between the Raspberry Pi version and the virtual machine version regarding the type of microROS control board car?
A: The Raspberry Pi version uses the same factory firmware as the virtual machine version.
We differentiate versions by configuring different parameters.
Raspberry Pi version uses serial communication method.
Virtual machines version use WiFi UDP communication.

3. What should I do if the robot cannot read and write configuration parameters after configuring to Raspberry Pi version?
A: Please press the reset button of the robot and it will enter the configuration state within 5 seconds of startup (MCU indicator light flashes every 300ms).
At this time, running the configuration file will enable normal reading and writing of the configuration.

4. The microROS control board has two Type-C ports. What is the difference between them?
A: The Type-C interface marked with Serial is mainly used for communication, configuration, write firmware, etc,
The type-C interface marked with 5V OUT is used to power supply to Raspberry Pi 5.

5.Why does the buzzer on the expansion board continue to sound?
A: When the battery level is insufficient, buzzer will continue to whistle (every 100ms), and we cannot control the robot at this time. Save the code and shut down, and charging the battery.

6. What is the significance of the robot MCU status indicator light?
A: After the car starts, the MCU enters the configuration state, and after about 5 seconds, it automatically enters the network connection state.
After successfully connecting to the proxy, start initializing ROS related topics.
If there is an error in microROS, the microROS task will automatically end. If microROS initialization is completed, it will enter a normal state.

Function	LED light Phenomenon
Configuration status	LED flashing (flashing every 300ms)
Network connection status	LED light flashing slowly (flashing every 1s)
MicroROS error	LED light flashing quickly (flashing every 50ms)
Normal state	LED dual flashing (fast flashing twice every 3s)
Low voltage state	LED light flashing quickly (every 100ms)

7. How can multiple robots within the same LAN avoid interference?
A: You can set different ROS_ DOMAIN_ ID to avoid interference.
ROS_ DOMAIN_ The setting range of ID is from 0 to 101.
Please modify the config_ Set in the robot.py file_ ROS_ Domain_ ID (20) parameter and write the configuration file to the microROS control board.
Then, add a line in the. bashrc file in the virtual machine/computer user directory with "export ROS-DOMAIN-ID=20", save and restart the terminal.

8. What should I do if I am unable to obtain the TF transformation at the current time when creating a map navigation?
A: Press the reset button on expansion board, and try again.

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 provided by Yahboom.

3.When the battery level too low,, the buzzer will sound the alarm. At this time, we need turn off power switchand charge the battery.

4.Please turn off the power switch before charging. For safety reasons, the robot cannot be used during charging.

5.When charging, the indicator light of the charger is red, when the indicator light become green, indicating that the battery is fully charged. When charging the battery, some one should take care of it. After charging, unplug the charger in time to avoid over-charging.

6.After use, the power switch should be turned off. When the device is not used for a long time, we should be kept battery voltage is between 7.0V-7.8V. Remove the bottom battery box and unplug the battery cable, take out the lithium battery pack and place it in a battery safe area.
Do not mix with metal objects, and the insulating film wrapped outside cannot be torn off.

7.Keep away from heat, fire, any liquid. Don't use it in wet or rain. Damp environment may cause the battery to ignite or even explode.

8.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.

9.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.

10.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.

11.Please use the battery at 0°C~45°C environment. The battery will be damaged or the discharge performance will be extremely reduced at other temperatures.

12.Deliberate piercing, short circuit, reverse connection, unauthorized welding, impact, extrusion and throwing of batteries are strictly prohibited.

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

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

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

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

http://www.yahboom.net/study/MicroROS-Pi5

Technical Support

E-mail: support@yahboom.com
Website: www.yahboom.net