YAHBOOM

# MicroROS 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

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.

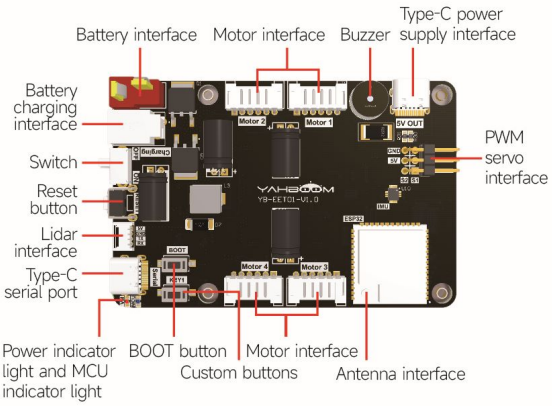
官网在线学习: https://www.yahboom.com/study/MicroROS-ESP32 提取码：ypom Tutorial link: https://www.yahboom.net/study/MicroROS-ESP32

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

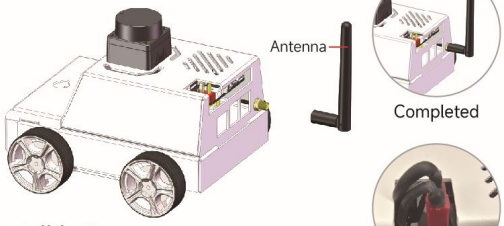
| | | | |
|---|---|---|---|
|  | Chassis (Assembled) |  | Antenna |
|  | 7.4V power supply |  | Battery acrylic board |
|  | Accessories kits |  | Manual |
|  | Charger |  | Screwdriver |

## Expansion Board Interface Description

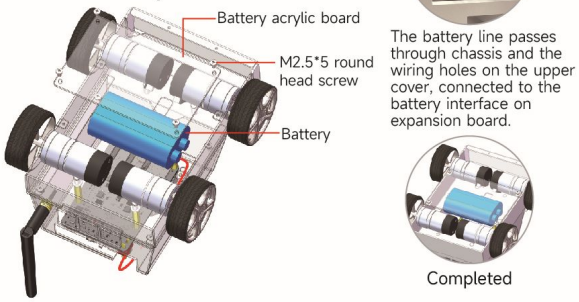



## Assembly Steps

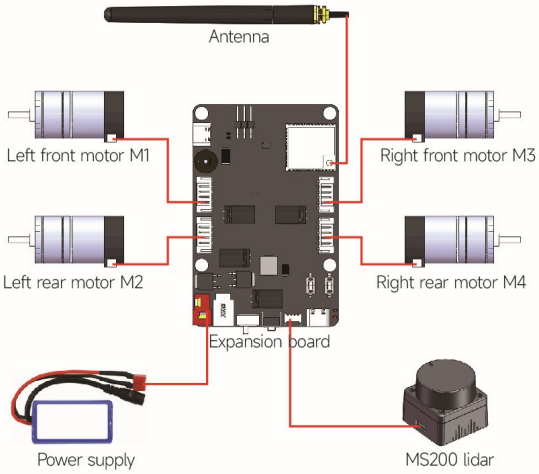
1. Install Antenna




2. Install battery



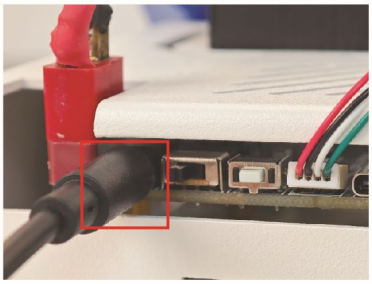

## Expansion Board Wiring Diagram



## 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). Preparation

Before starting the Micro ROS car, you need to install a virtual machine on your computer.
Please enter this website:
http://www.yahboom.net/study/MicroROS-ESP32
And carefully view the course **【Preparation】--【How to install and use VM】**
According to the tutorial, install a virtual machine on your computer.

### (2). Modify configuration file

Note: The Micro ROS control board has been written with the corresponding firmware(microROS_Robot_Vx.x.x.bin) before leaving the factory.
If you have written the firmware of other routines, please rewrite microROS_Robot_Vx.x.x.bin. Then, turn on the power switch of the robot to start it.

1. Copy the **config_robot.py** file included in the tutorials Yahboom provided to the virtual machine(PC).
2. If the virtual machine(PC) has an external USB serial device, please temporarily remove the USB external serial device from the virtual machine(PC).
Then, use a type-C data cable to connect the virtual machine (PC) to the serial port on the microROS control board.
At this point, a pop-up window will appear in the system. Please choose to connect to the virtual machine.
3. Enter the **config_robot.py** file. At the end of the file, modify following contents.
According to your own WiFi network name and password: update the parameters of **set_wifi_config** function
For example: My WIFI name:ssid123; Password: passwd123
According to the address of your virtual machine(PC): update the parameters of **set_udp_config** function.
Set the car type to **CAR_TYPE_COMPUTER**.
As shown below. After modification is completed, save and exit.

```
robot.set_wifi_config("ssid123", "passwd123")
robot.set_udp_config([192, 168, 2, 116], 8090)
robot.set_car_type(robot.CAR_TYPE_COMPUTER)
# robot.set_car_type(robot.CAR_TYPE_RPI5)
robot.set_ros_domain_id(20)
robot.set_ros_serial_baudrate(921600)
robot.set_ros_namespace("")
robot.set_pwm_servo_offset(1, 0)
robot.set_pwm_servo_offset(2, 0)
robot.set_motor_pid_parm(1, 0.2, 0.2)
robot.set_imu_yaw_pid_parm(1, 0, 0.2)
```

4. First, press the reset button of the microROS control board briefly to enter the configuration state (MCU indicator light flashes every 300ms).
Then, input the following command to configure the robot.
**python3 config_robot.py**
Check if the data returned by the system is consistent with the one you set, which means the setting is successful.

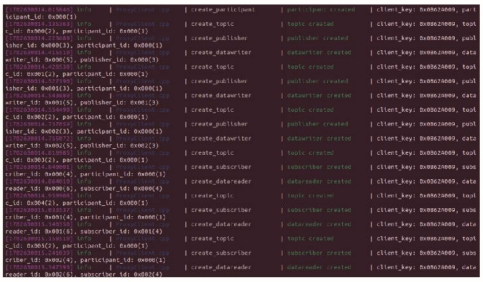
```
ssid: ssid123
passwd: passwd123
ip_addr: 192.168.2.116
ip_port: 8090
car_type: CAR_TYPE_COMPUTER
domain_id: 20
ros_serial_baudrate: 921600
ros_namespace:
servo_offset: 0, 0
motor pid parm: 1.00, 0.20, 0.20
imu yaw pid parm: 1.00, 0.00, 0.20
Please reboot the device to take effect, if you change some device config.
```

5. Press the reset button of the robot to reload the configuration. Then, you can remove the data cable between the robot car and PC.

## (3). Start keyboard control car

1. Input following command in virtual machine terminal
**sh ~/start_ agent_ computer.sh**

2. Turn on the car power switch, the car will automatically connect.



Successfully connected as shown in the above figure.

3. Input following command in virtual machine terminal
**ros2 run yahboomcar_ctrl yahboom_keyboard**
You need to click on the terminal interface running the program with the mouse so that the terminal is active, allowing the system to capture the keyboard input.

Then, according to the table below, use the keyboard to control the car.

| Keys | Attribute |
|---|---|
| I | Car forward |
| < | Car back |
| U | Car rotates to the left front |
| O | Car rotates to the right front |
| M | Car rotates to the left back |
| > | Car rotates to the right back |
| J | Car left rotation |
| L | Car right rotation |

# 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<br>(flashing every 300ms) |
| Network connection status | LED light flashing slowly<br>(flashing every 1s) |
| MicroROS error | LED light flashing quickly<br>(flashing every 50ms) |
| Normal state | LED dual flashing<br>(fast flashing twice every 3s) |
| Low voltage state | LED light flashing quickly<br>(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-ESP32

### Technical Support

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