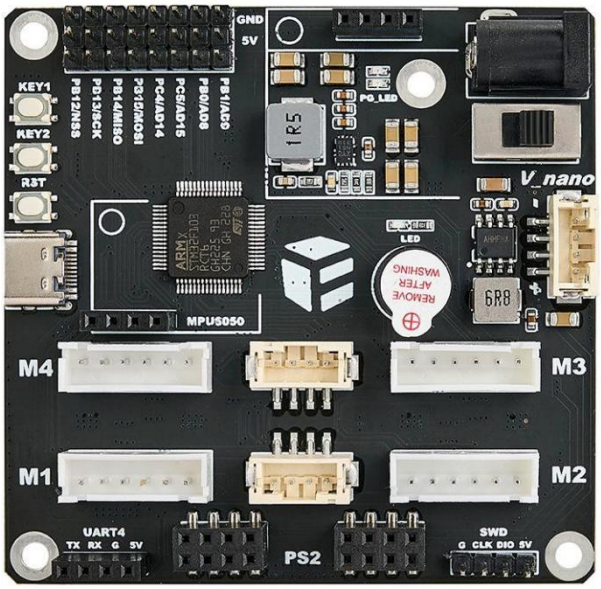
You fang smart Product User Manual

Main control board



Ackermann chassis + robotic arm

V4 chassis + robotic arm

V1 chassis + robotic arm

Learning Wizard

Thank you for using Neoway Robot. The purpose of the instructions is to assist users to quickly build and experience the car gameplay, and the document provides the product

The software development platform construction instructions, hardware wiring instructions, smart car routine code details and related precautions hope to help users get started quickly, please read this manual carefully and patiently before use, so that you can better use the product.

The following are some precautions for using this product:

Special instructions

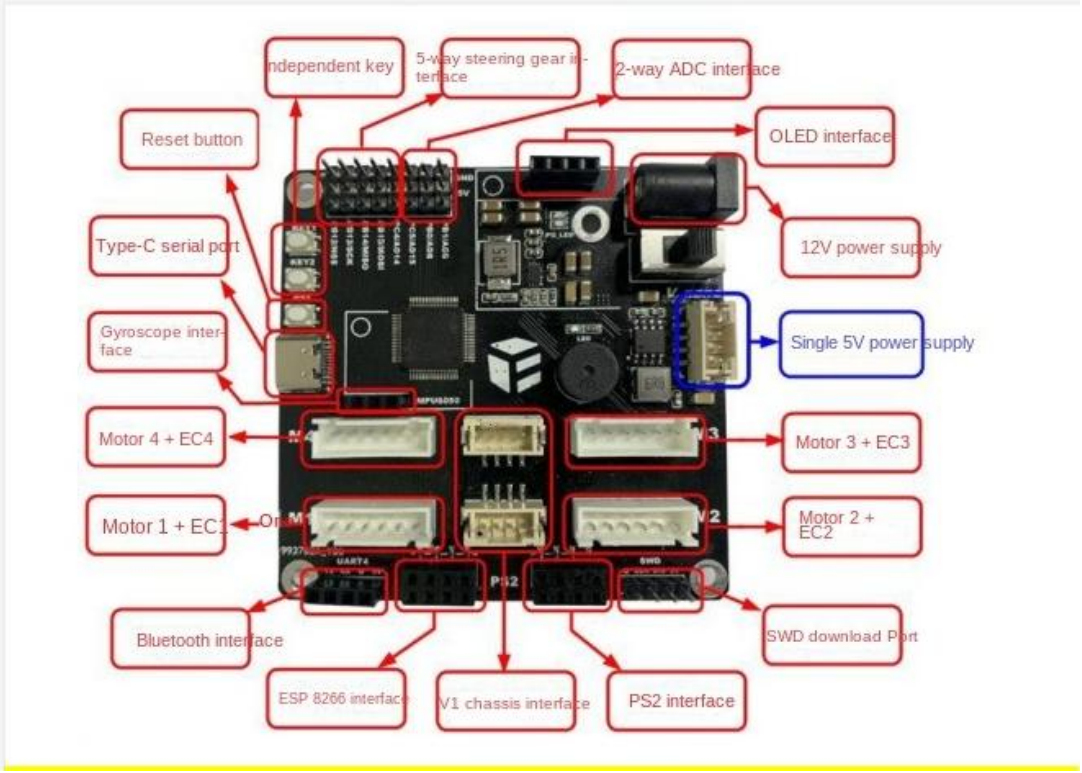
1. When downloading programs for the main control board, it is recommended to use batteries to power the main control board. When the MPU is only powered by 5V (such as 5V for USB and STLINK), the power supply of the MPU will heat up (the heating degree is hot). This phenomenon is normal.

2. The V_nano power connector on the main control board is a separate power supply, reserved for the power supply of AI systems such as Raspberry Pi and Jetson nano.

一、Introduction to Main controlboard

1.1Hardware introduction

The main control board is a multi-functional intelligent main control board, which can be equipped with square robot V1 McWheel open loop chassis, V4 McWheel closed loop chassis, Ackerman chassis and robot arm, etc., to help users learn three shape algorithms from simple to complex, users can gradually improve the skills and challenges of intelligent car control, from junior players to advanced players. The main control board is equipped with a variety of peripherals to provide richer functions and scalability for intelligent vehicles. At the moment, The supporting peripherals include 4 motor drivers, 4 AB phase encoder data interfaces, 2 5V regulated power supplies, 1 Type-C serial port interface, 1 ESP8266 interface, 1 Bluetooth interface, PS2 remote control controller interface, 5 rudder PWM interface, and 1 I2C Type 0.96 inch OLED interface, 1 MPU6050 gyroscope interface, 1 buzzer, etc. As shown in the following picture:



Note: The blue box in the figure above is a single 5V power supply (not in the same 5V line as the chip and other circuits), which is reserved for powering AI systems such as the upper Raspberry PI and Jetson nano. This interface can be ignored by users who do not use it.

二、Hardware assembly wiring

2.1 Wiring requirements

The main control board is suitable for three intelligent vehicle chassis. Users can find the corresponding chassis in Section 2.2 of this chapter to complete the cable connection.

The main control board has been burned with the corresponding chassis program, and the user can directly load the car experience after getting it. Before connecting the cable to the battery power supply, check whether the vehicle wiring is wrong, and then supply power to the main control board to reduce the risk of burning the board.

2.2 Chassis wiring

The main control board is suitable for a total of three smart car chassis, details can be seen in the following table: (Users can click the chassis name in the first column of the table below to automatically jump to the wiring section of the corresponding chassis)

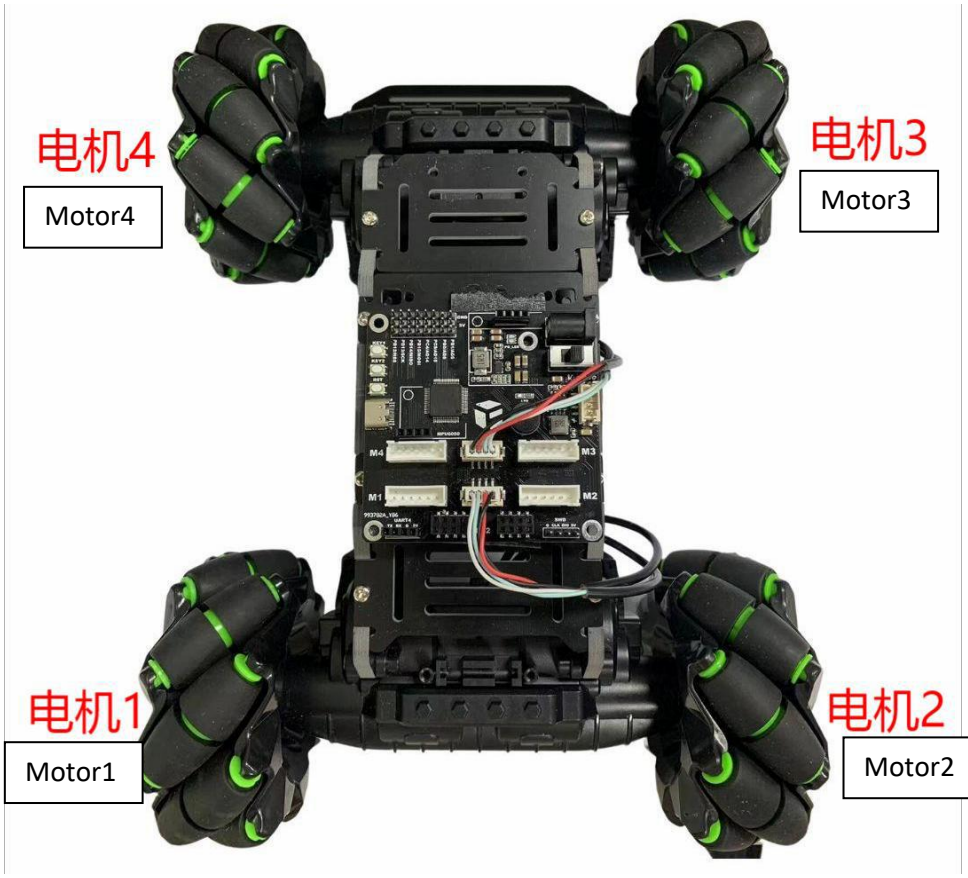
name	Graphical representation
V1 chassis wiring	

V4 Chassis wiring	

Ackerman chassis wiring	

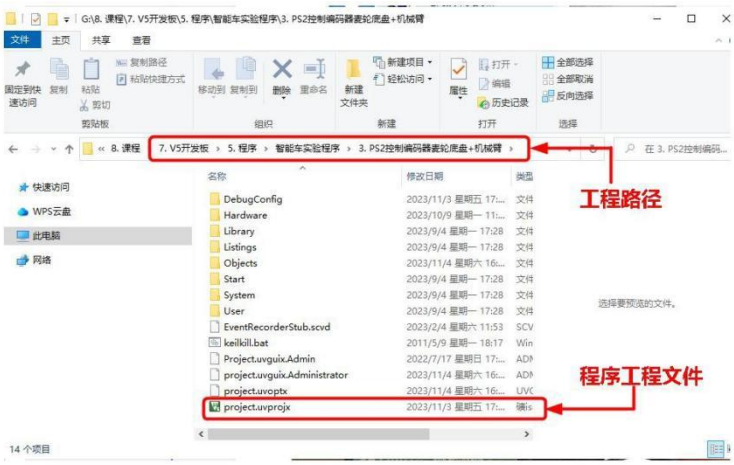
2.2.1 Connecting Cables to the V1 chassis

The chassis routine is in the official information package of Youfang [PS2 Control V1 Chassis + Robotic Arm]. The path is shown in the following figure:



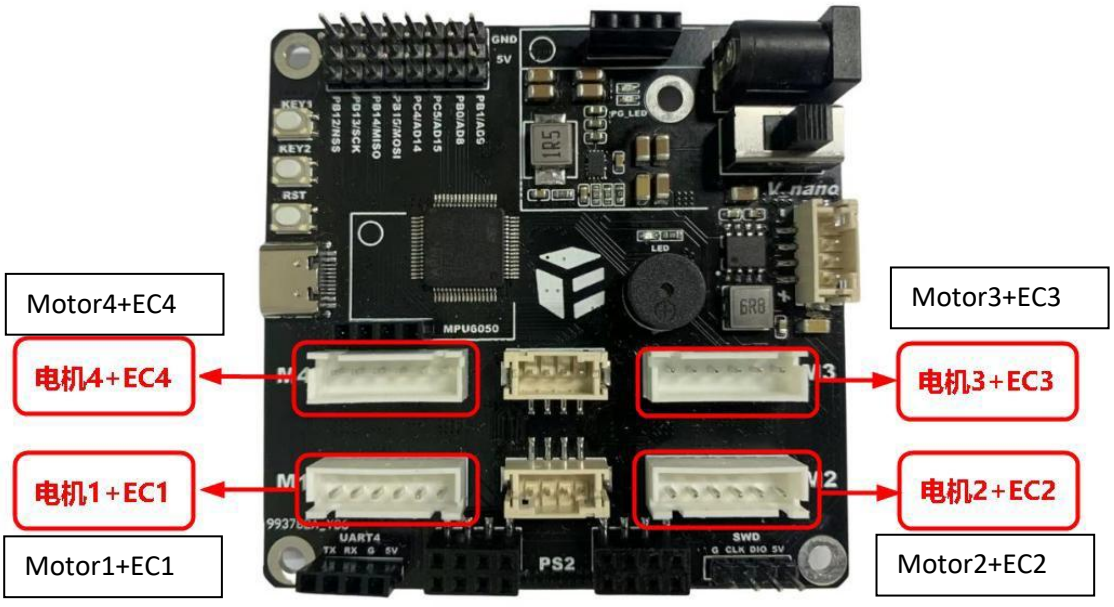
2.2.1 V4 Chassis wiring

The chassis program is in the official information package [PS2 control coder McWheel Chassis + Robot arm]. The path is as follows:

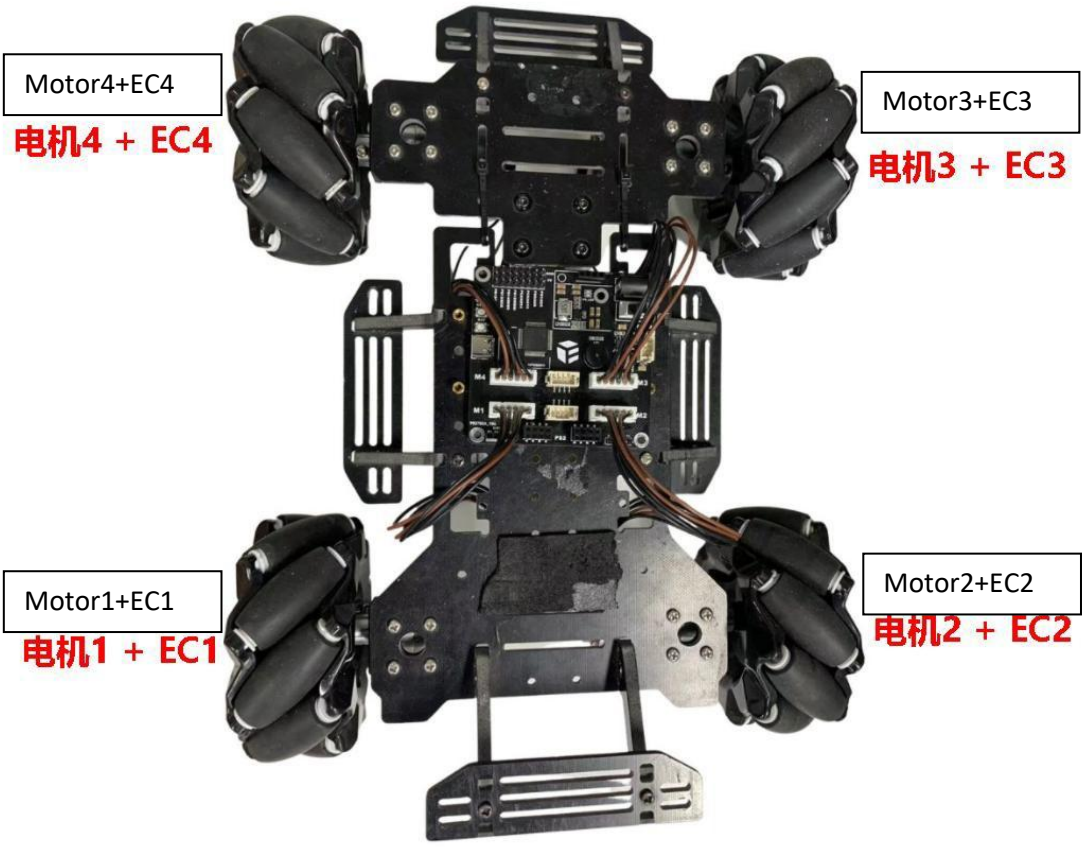


Double-click the program project file to open the project, and follow the steps in the "III Program Download" chapter of this document Download the sequence to the main control board。

The V4 chassis (high precision suspension chassis) is paired with four encoder motors, and all ECs below refer to encoders. "Motor +EC" means an encoder motor. The corresponding encoder motor interface on the main control board is shown as follows：

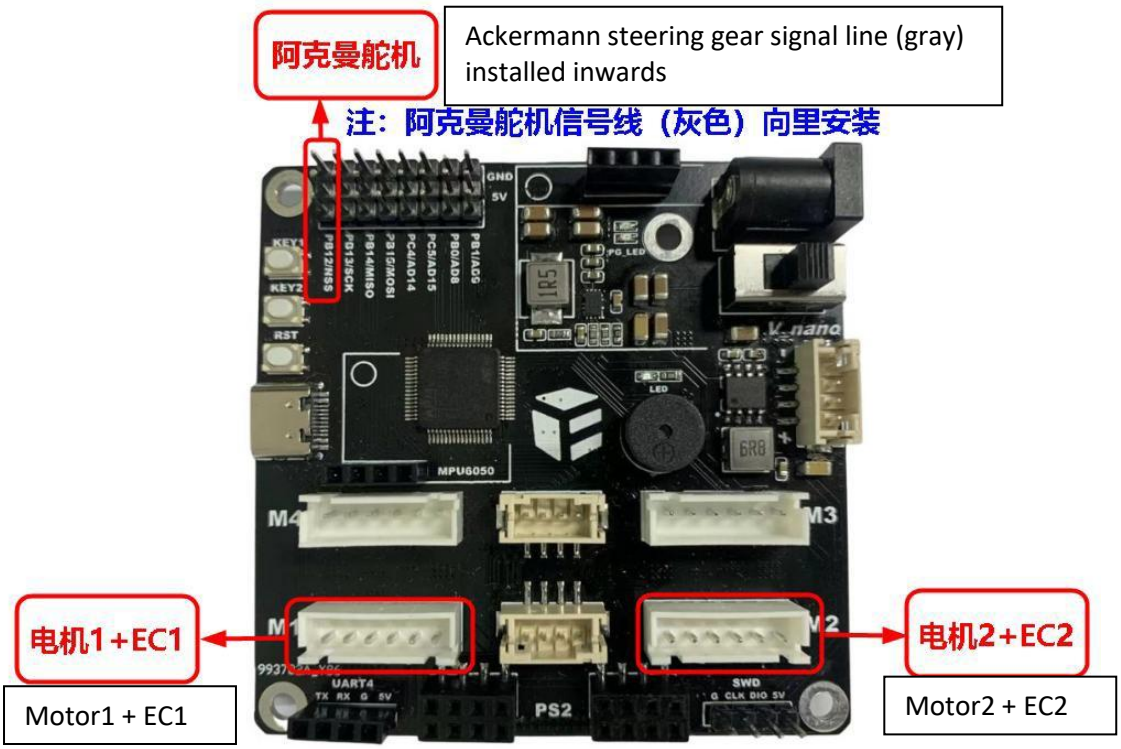


The connection between the V4 chassis (high-precision suspension chassis) and the main control board is shown in the following figure:



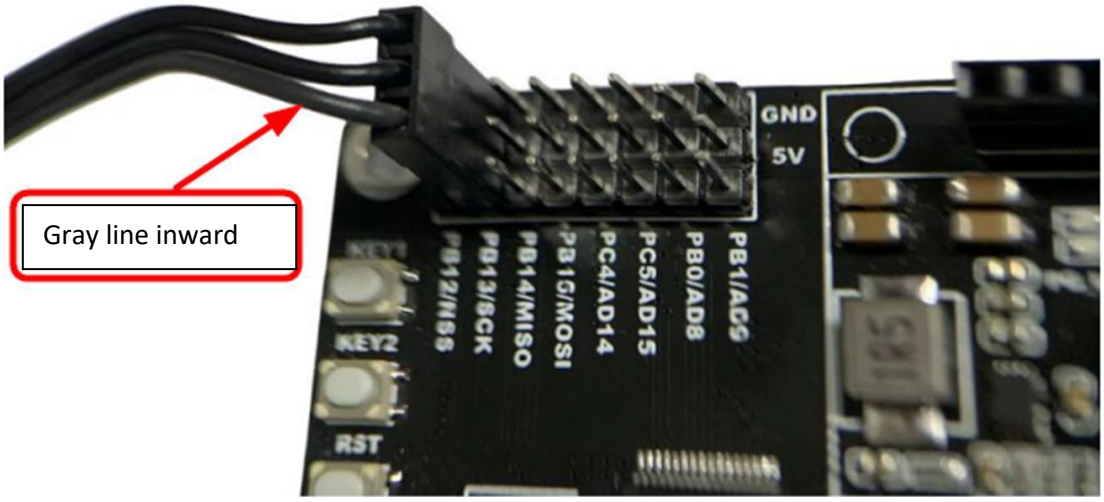
2.2.3 Ackerman chassis wiring

The chassis corresponds to the case program of [PS2 Control Ackermann Chassis + robot arm] of the official information package of the party. Download the program to the main control board according to the steps in chapter "III. Program Download" of this document.
The motor interfaces corresponding to the Ackermann steering gear and encoder on the main control board are shown as follows: (All EC in the figure below refers to the encoder. "Motor +EC" means an encoder motor)



The connection between the Ackerman chassis and the main control board is shown in the following figure:

Note: The gray line in the steering gear cable is the signal line, and the black line is the power cable. When connecting to the main control board, the gray line should be inward. As shown in the picture below:



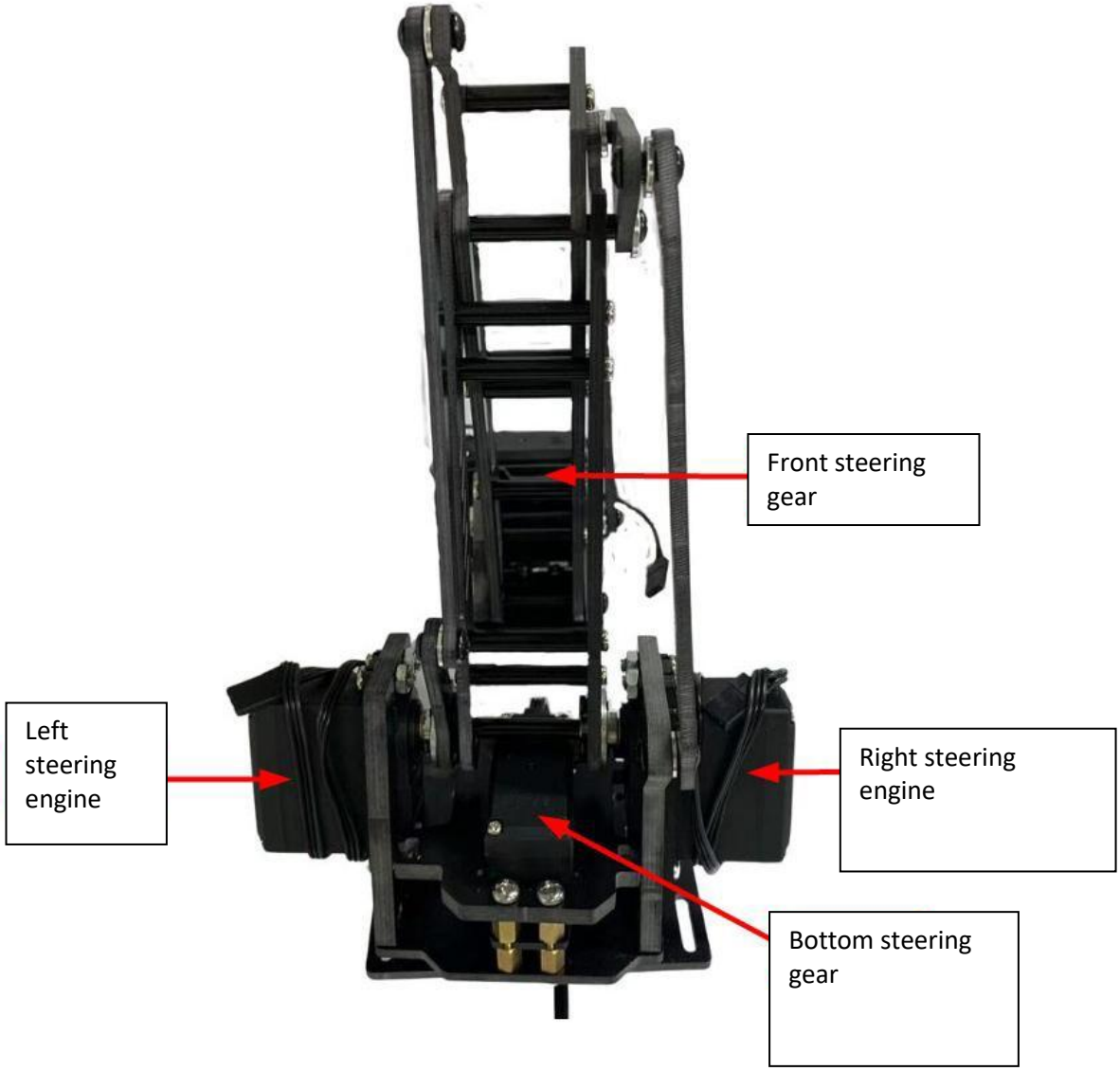
2.3 PS2 Remote control installation

The PS2 remote control handle consists of a receiver, a PS2 adapter board and a remote control handle. Insert the receiver into the adapter board and install the two modules at the corresponding interfaces on the main control board, as shown in the following figure:

2.4 4 Shaft mechanical arm wiring instructions:

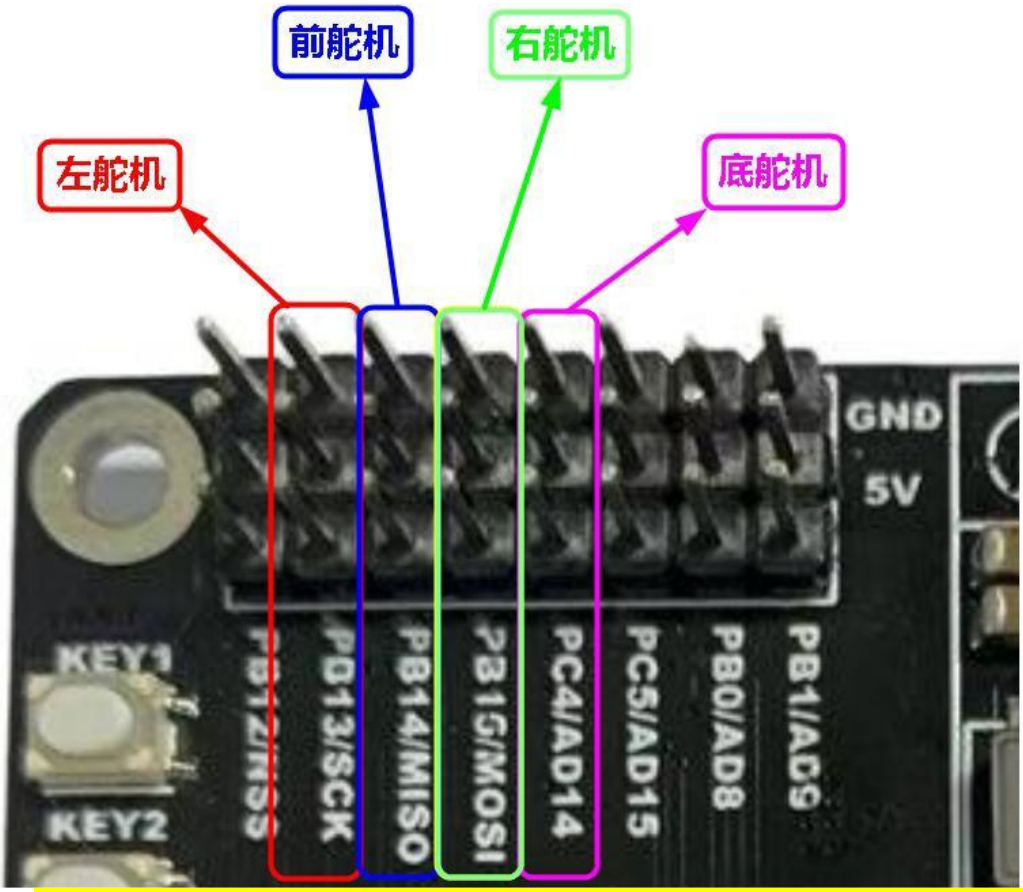
Note: The extension cable is required for the front steering gear connection. Please connect the extension cable to the front steering gear at the end.

The 4-axis mechanical arm is composed of 4 steering engines, as shown in the figure below

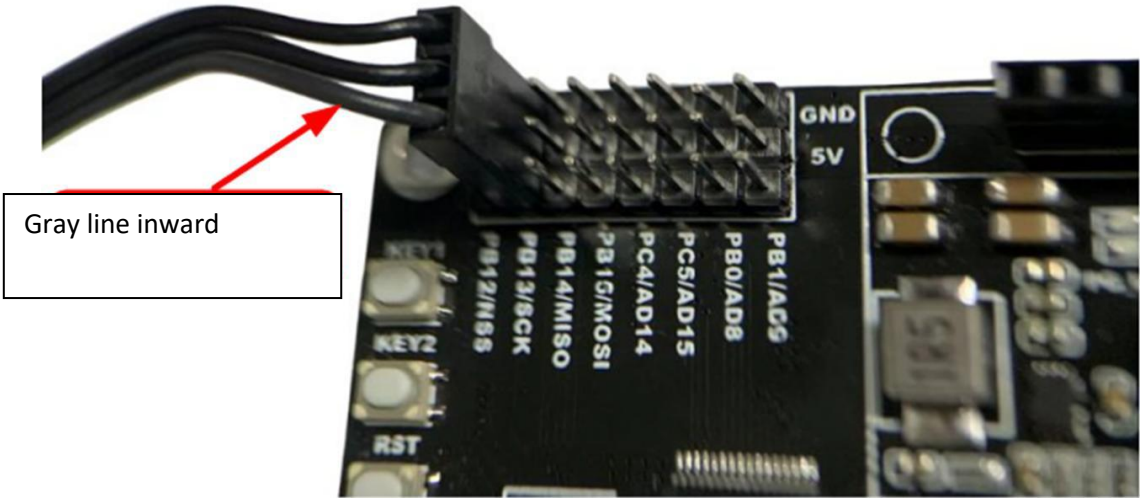


Left steering engine:

Four interfaces are connected to the steering gear from left to right
PB13-> Left steering gear
PB14-> Front steering gear
PB15-> Right steering gear
PC4-> Bottom steering gear

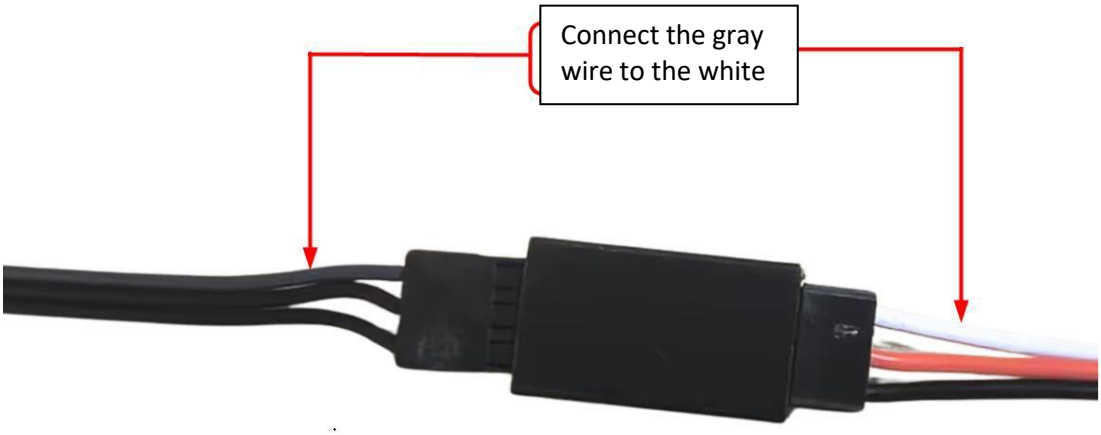


Note: The gray line in the steering gear cable is the signal line, and the black line is the power cable. When connecting to the main control board, the gray line should be inward. As shown in the picture below:

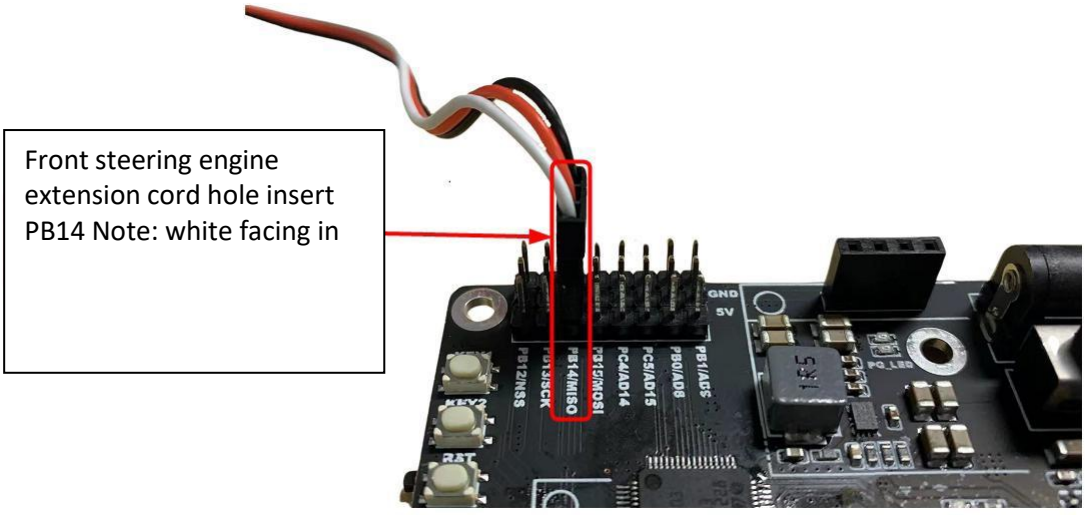


Due to the large range of motion of the front steering gear, it is necessary to use an extension wire with one end needle and one end hole head when connecting the front steering gear with the development board. The extension wire is shown as follows:

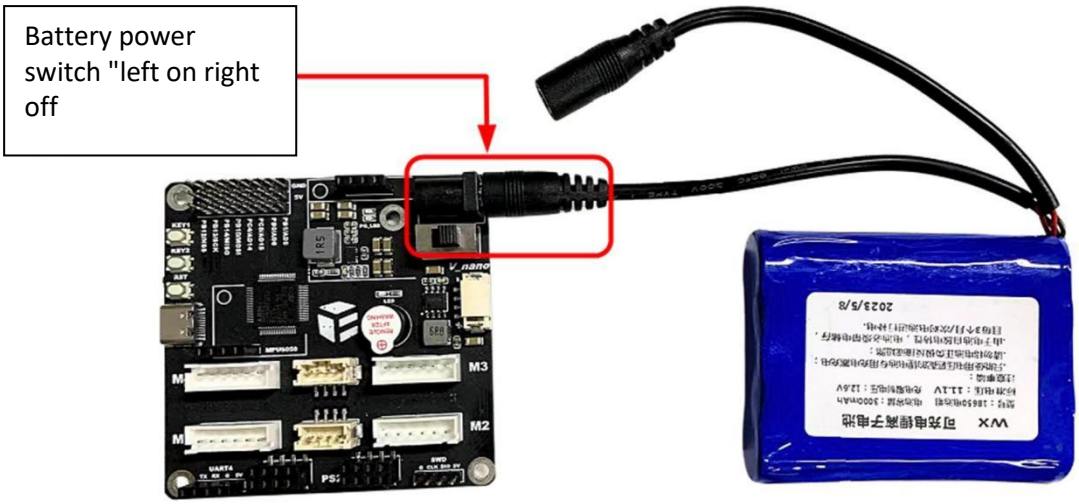
Use the needle to connect the steering wire of the front steering gear. Note: Please connect the "white line" to the grey line of the steering gear when connecting. As shown in the picture below:



The hole head is connected to the development board with the white line facing inward, as shown in the figure below



2.5 The battery is connected to the main control board



三、PS2 remote control car description

3.1 PS2 Control knowledge

The ps2 handle is composed of three parts: the handle, the receiver and the switching board. The handle is mainly responsible for sending key information. The receiver is installed with the switching board and then connected to the single chip microcomputer to receive the information sent by the handle and pass it to the single chip microcomputer.

The transmission mode of the remote control handle is divided into green mode and red mode. Users can switch the MODE by themselves through the [mode] button on the remote control, as shown in the figure below:

In the green mode (light off), the handle will send the status of all keys (whether they are pressed) information to the MCU, and the remote control handle will send the status information of the joystick to the single chip machine when the remote control lever is pushed to the end, so it can be roughly understood that the key is effective in the green mode.

In the red light mode (light on), the controller will send all the data information of the joystick to the MCU, but will not send the status information of the key, so the joystick is valid in this state, and all the keys are invalid.

Therefore, the user needs to judge the transmission mode of the current handle, and then decide whether to use the key or the joystick to control the carriage chassis and the robot arm.

Special note: Depending on the batch or the manufacturer, the appearance of the handle and receiver will vary. There are currently two categories. The first, as shown in the figure above, has two lights on the handle: power light and mode indicator; the second, only the power light without mode indicator on the handle. But the pin definition of the receiver is the same, the decoding method is the same, and the use is the same. As shown in the picture below:

。When the remote control indicator light and the indicator light on the receiver are long, it means that the remote control and the development are successfully connected.
The remote control is divided into two modes: red light and green light. The user can judge by pressing the [UP button]. If the car moves forward by pressing the button, the current remote control is in green mode, and if there is no response, it is in red mode.

3.2 PS2 Remote control key description

：The button description is shown in the following figure

In the green mode, the button mode is button mode. At this time, the button on the remote control is effective, and the rocker push to the end is equivalent to the button in the corresponding direction. If Ly is pushed forward to the end, it is equivalent to pressing the UP button, and the car forward action is performed.

In RED light mode, the rocker is in rocker mode. In this case, the rocker on the remote control is valid, and the UP, LEFT, RIGHT, DOWN, GREEN, PINK, BLUE, and RED buttons are invalid

3.3 PS2 Remote control controls the chassis of the car

小车控制方式：

key	Carriage motion
Rocker L Push forward /UP	Dolly forward
Rocker L Push back /DOWN	Dolly forward
Rocker L Push LEFT /LEFT	Car shift to left

Rocker L Push RIGHT /RIGHT	The car shifts to the right
Rocker R push left /PINK	Left turn in place
Rocker R push right /RED	The car turns right in place

3.4 PS2 Remote control buttons control the robot arm

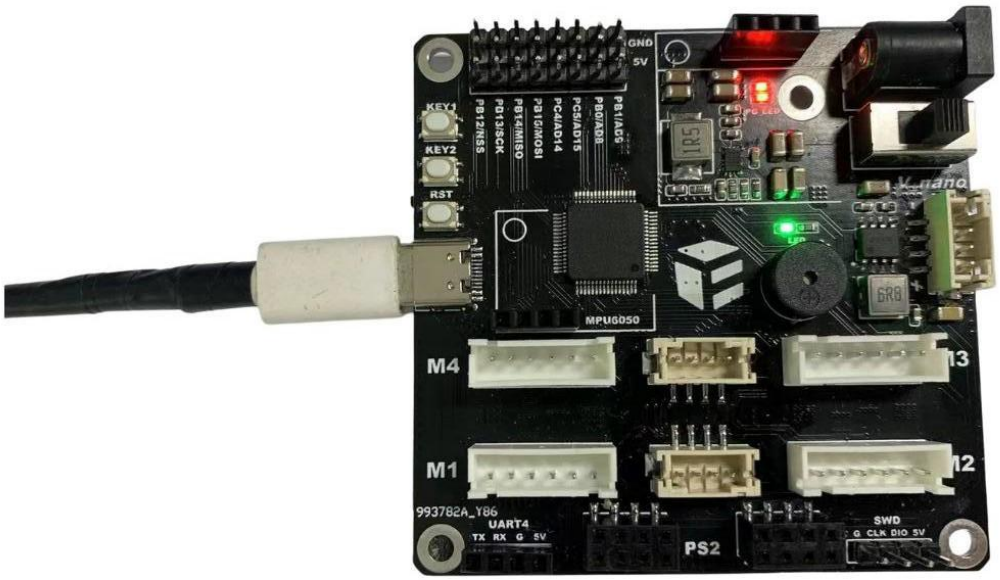
Note: The manipulator control must hold down L1 and then press other keys to perform corresponding operations. If L1 is pressed while the rocker L is pushed forward, the mechanical arm is extended forward

Robotic arm control mode:

button	The movement status of the robotic arm
L1 + L1 + Rocker L Push forward /UP	The robotic arm reaches forward
L1 + L1 + Rocker L Push back /DOWN	The robot arm retracted
L1 + L1 + Rocker L Push LEFT /LEFT	Left turn of robot arm
L1 + L1 + Rocker L Push RIGHT /RIGHT	Robotic arm turn right
L1 + L1 + Rocker R push forward /GREEN	Lower head of robot arm
L1 + L1 + Rocker R Back /RED	Manipulator head up
L1 + L1 + Rocker R Push left /PINK	Robotic arm claws tighten
L1 + L1 + Rocker R Push right /RED	Robotic arm claws tighten

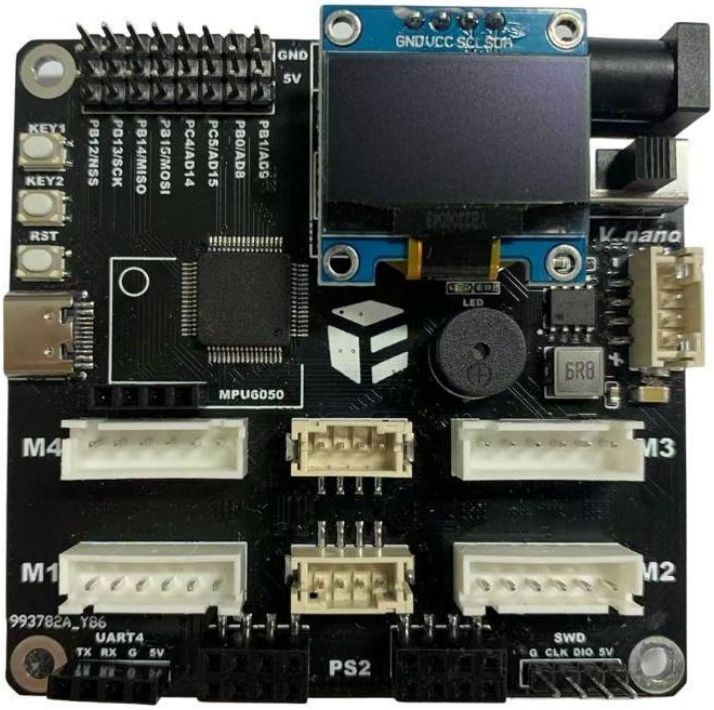
6.2 Type-C（USB）

The wiring method of this peripheral corresponds to the 3 case programs in the [2. Serial port] folder in the [5. Program] of Yifang's official information package. The wiring diagram is as follows:



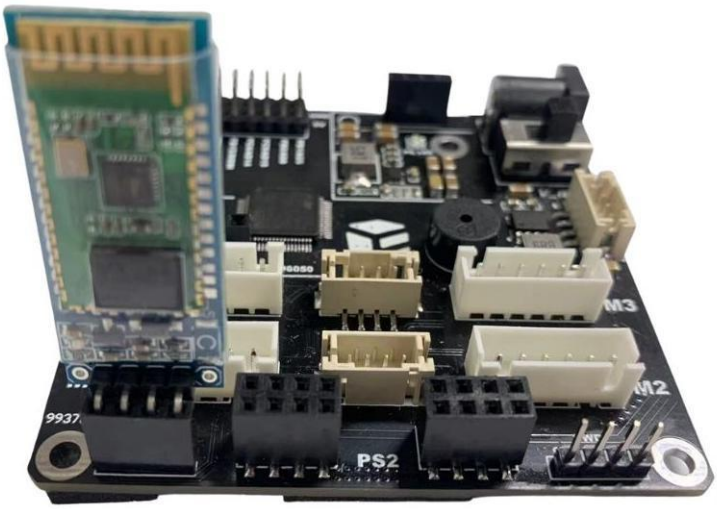
6.3 0.96 inch OLED small LCD

The wiring method of this peripheral corresponds to two case programs in the [3.OLED display] file folder in the [5. Program] of Yifang's official information package. The wiring diagram is as follows:



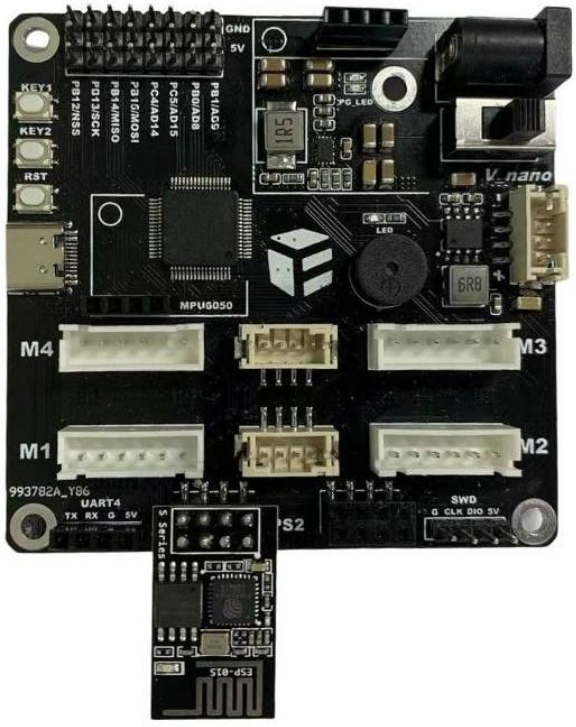
6.4 Bluetooth module

：The wiring method of this peripheral corresponds to the case program of [5. Bluetooth module control of Wheatwheel car (without encoder)] in the official information package of Yifang. Note: The serial port used here is USART4 of STM32F103, which is not the same serial port used in related experiments with [2. Serial port] of USB, so the program cannot be shared. The wiring diagram is shown below:



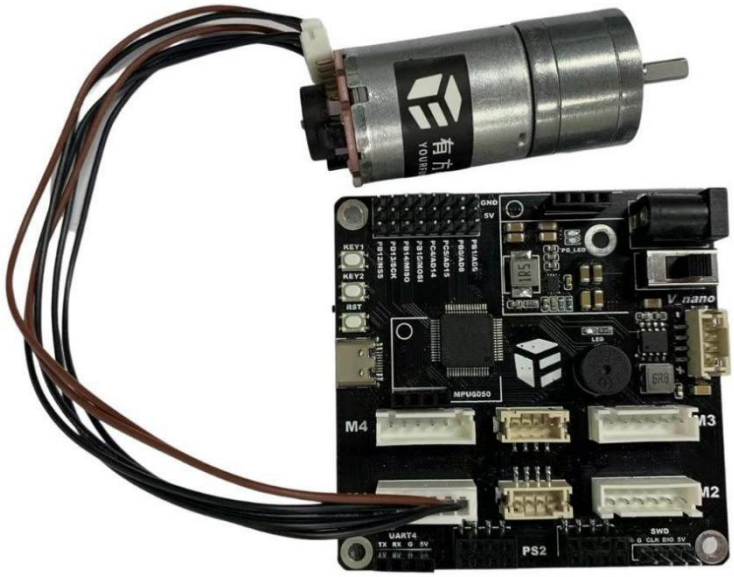
6.5 ESP8266WIFI module

：The wiring method of this peripheral corresponds to the case procedure of [6. ESP8266WIFI module control Wheatwheel Trolley (without encoder)] in [5. Program] of the official information package of Yifang. The wiring diagram is shown below



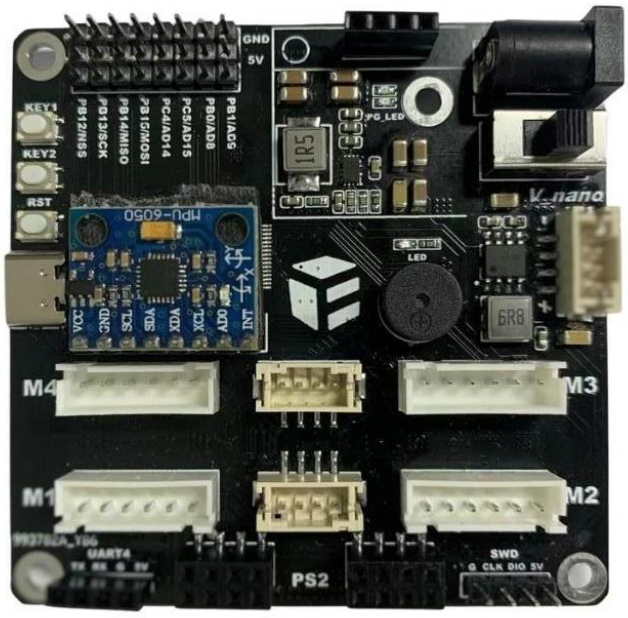
6.6 Encoder dc motor

The wiring method of this peripheral corresponds to the case procedure of [7. PID Control DC generator] in [5. Procedure] of your Party's official information package. The wiring diagram is as follows:



6.7 MPU6050gyroscope

The wiring method of this peripheral corresponds to the case procedure of [10. MPU6050 Gyroscope experiment] in [5. Procedure] of your official information package. The wiring diagram is as follows:



: Note: There are a total of 8 pins on the gyroscope module, but only VCC, GND, SCL and SDA are actually used. Therefore, the gyroscope interface on the main control board has 4 pins, and the remaining 4 pins of the gyroscope are suspended during installation, as shown in the following figure: