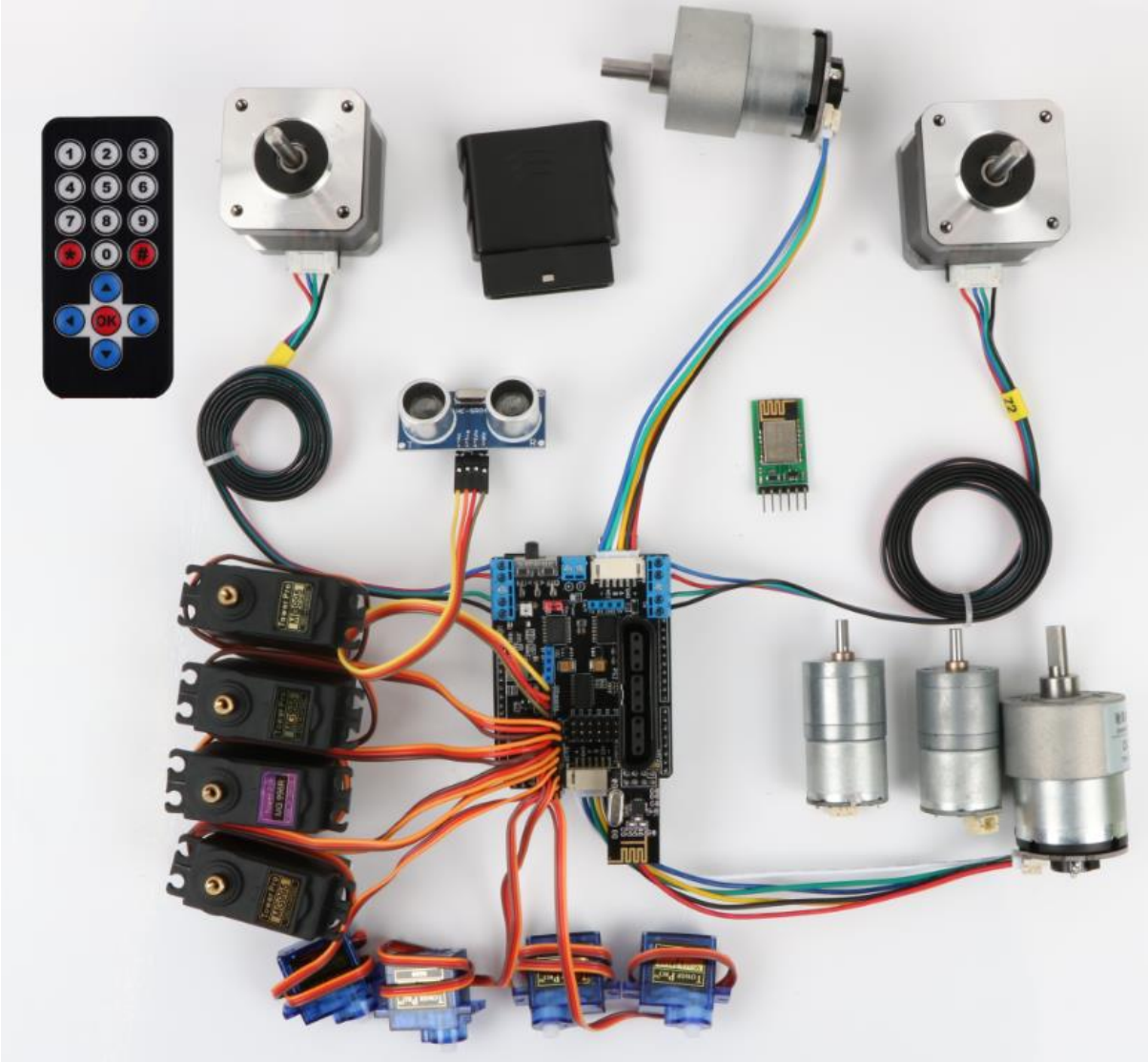
MBlock5 graphical programming of MotorDriverBoard4.0_ v.2.0



Revision

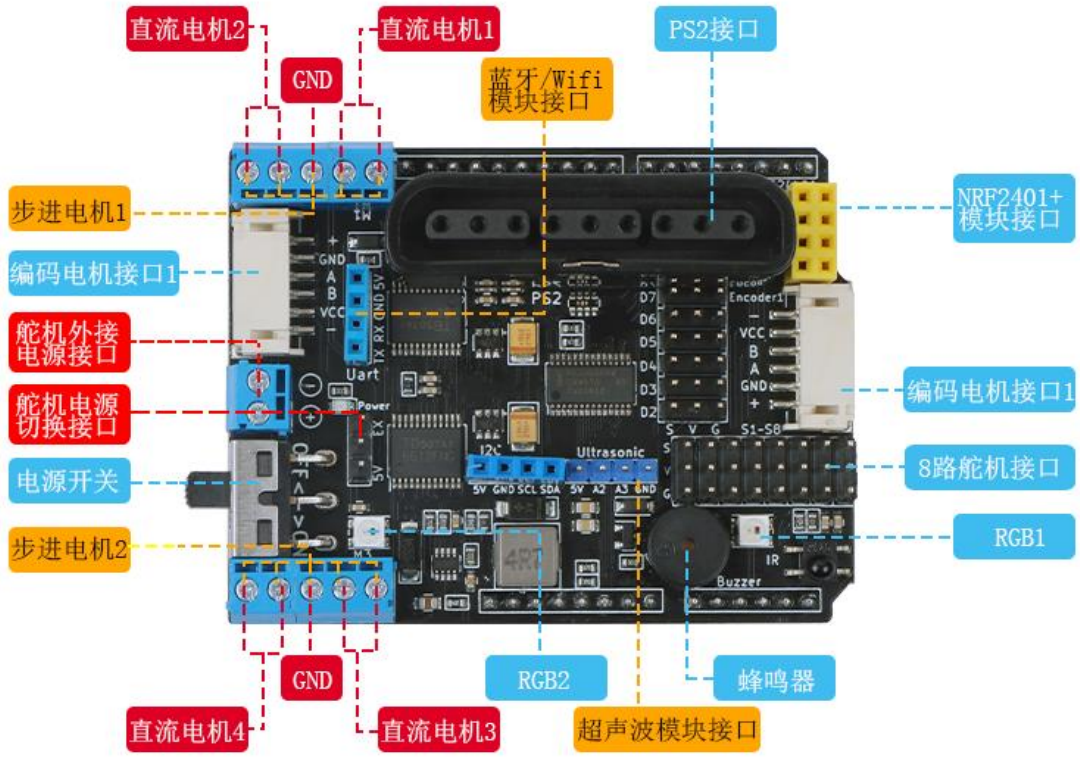
date	version number	description	Author
2019-10-12	**V.1.0**	**Create document**	**Twisted**
2019-11-1	**V.2.0**	**Modify the sample program screenshot**	**Twisted**

Chapter 1 Understanding MotorDriverBoard and mBlock5 graphical programming

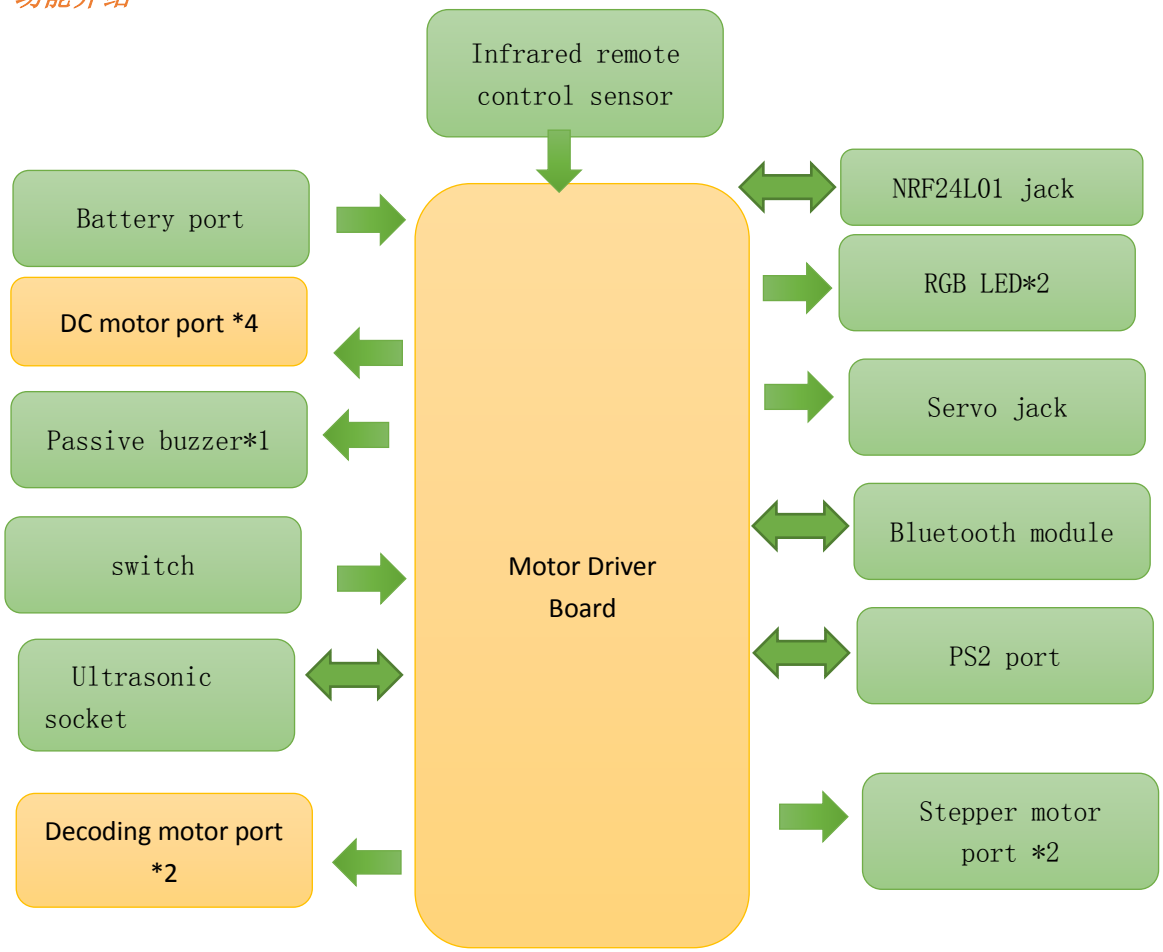
1.1 Introduction to MotorDriverBoard Expansion Board

1.1.1 Overview

PS2X&Motor Driver Board driver can drive 4 DC motors, 2 encoding motors, 2 stepping motors, 6 servos (two can be connected to external power supply), and the drive current can reach 2A. The driver board is specially designed for the arduino uno R3 motherboard, which can be directly plugged into the Arduino Uno. The motherboard integrates a passive buzzer, 2 RGB LED lights, and an infrared receiver. Sensor interfaces such as PS2 socket, Uart interface, I2C interface, and ultrasonic obstacle avoidance module socket are also reserved, which is very convenient for external connection of various sensor modules.



1.1.2 功能介绍

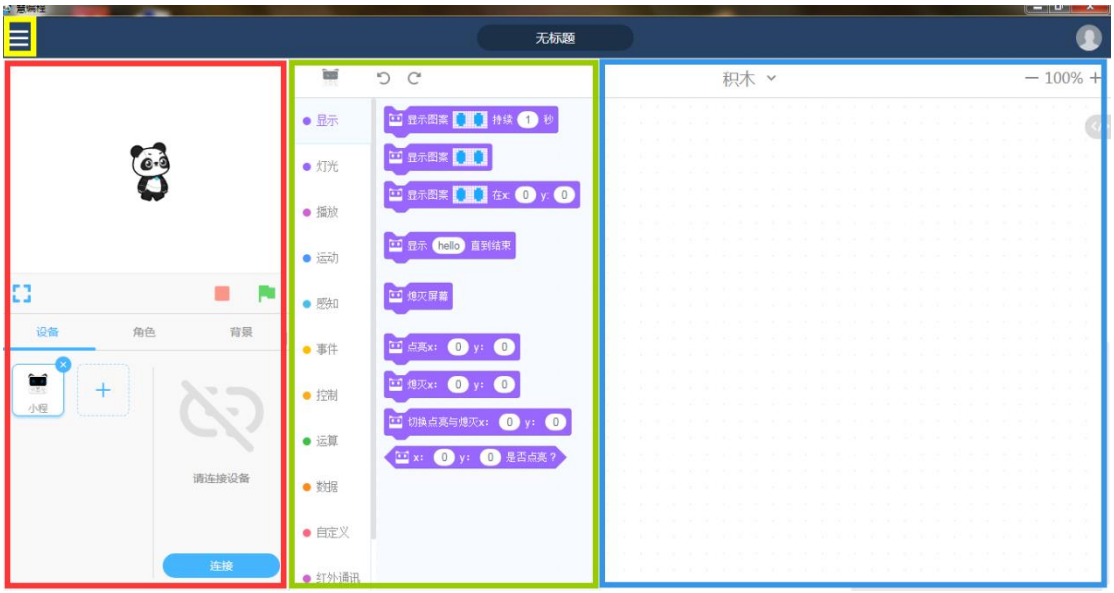


1.1 Introduction to graphical programming software mBlock5

1.2.1 Overview

mBlock5 is a building block programming and code programming software for the STEAM education field. It is developed based on Scratch3.0 and integrates Python code input, expanding a large number of hardware interfaces. It not only allows users to create interesting stories, games, animations, etc. in the software, but also programs Makeblock system, micro:bit and other hardware, and integrates cutting-edge technologies such as AI and IoT, making it easier to control various hardware works. To make hardware works smarter and full of fun.

1.2.2 Interface navigation



- **The red frame area is the stage area, the green frame area is the building block area, the blue frame area is the script area, and the yellow frame area is the menu bar.**
- Stage area: In addition to presenting works, functions such as device connection, character setting, and background setting are all performed in this area.
- Building block area: Provide the building blocks required for programming. You can search for the required building blocks by category and color.
- Script area: the area where the program is written. You can drag and drop blocks to this area to write the program.
- Menu bar: Switch between Chinese and English interface, open and save files, sample programs, help and other functions can be found here.

1.2.3 Basic operations

-Register and login account

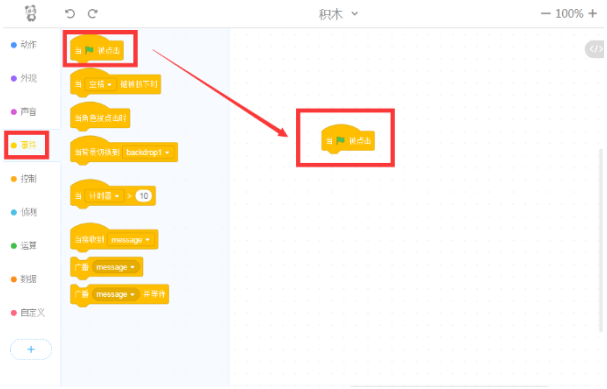
After completing the registration and login account, you can use cloud data and other functions, of course, you can also use the software without logging in.If you do not need to log in, please ignore the following process.

1）Click the logo in the upper right corner of the page and select "Register". Enter the mailbox, the verification code received in the mailbox and set a password in order, you can complete the registration

2）After the registration is completed, return to the main page, click the logo in the upper right corner of the page, enter your email and password, and log in.

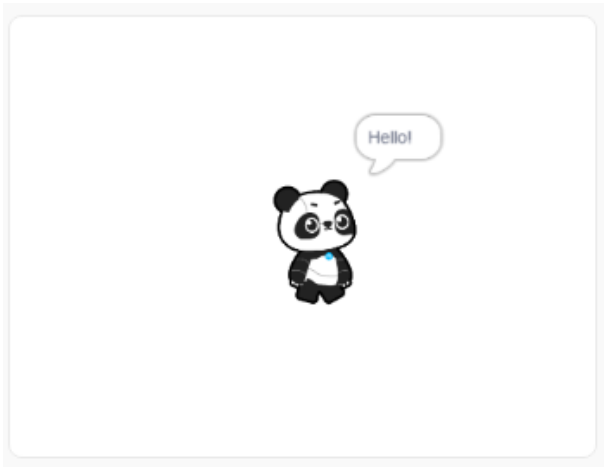
1.2.4 Building block programming mode

With mBlock5, you will find that programming is as simple as building blocks.
1）Select the required building block from the building block area, click with the left mouse button and keep dragging until it reaches the script area, release the mouse to drop the building block.



2）Blocks of different colors and shapes can be spliced together

3）Click on the building block, it can directly display the effect in the stage area.

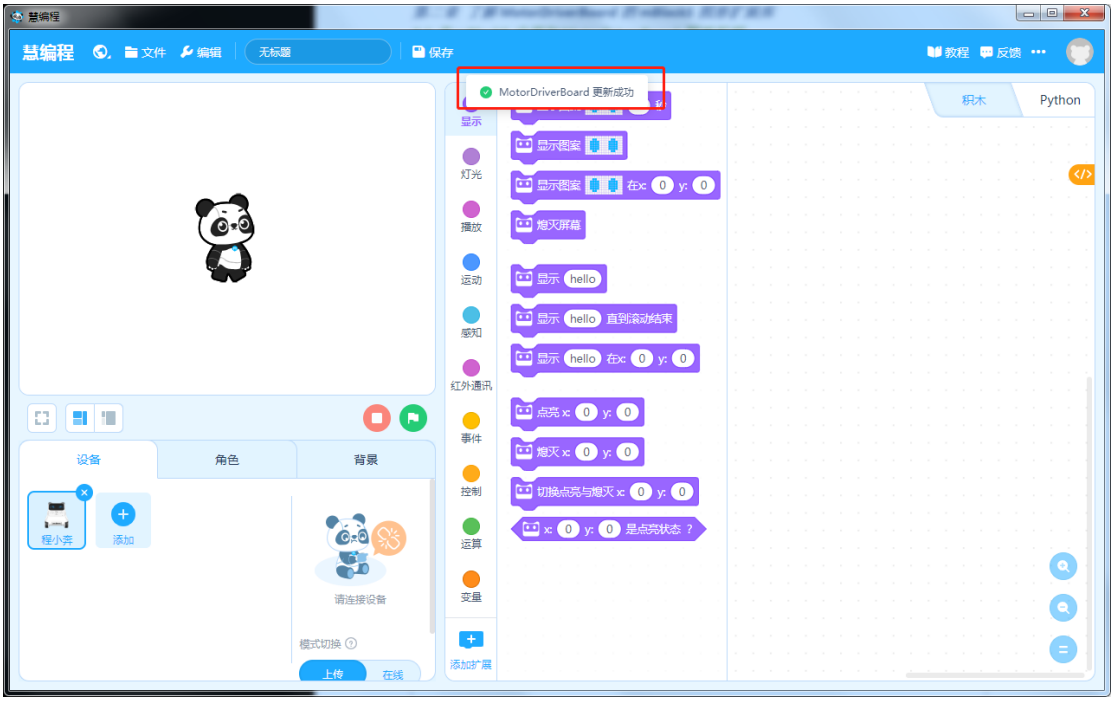


Chapter 1Understanding MotorDriverBoard's mBlock5 graphics extension library

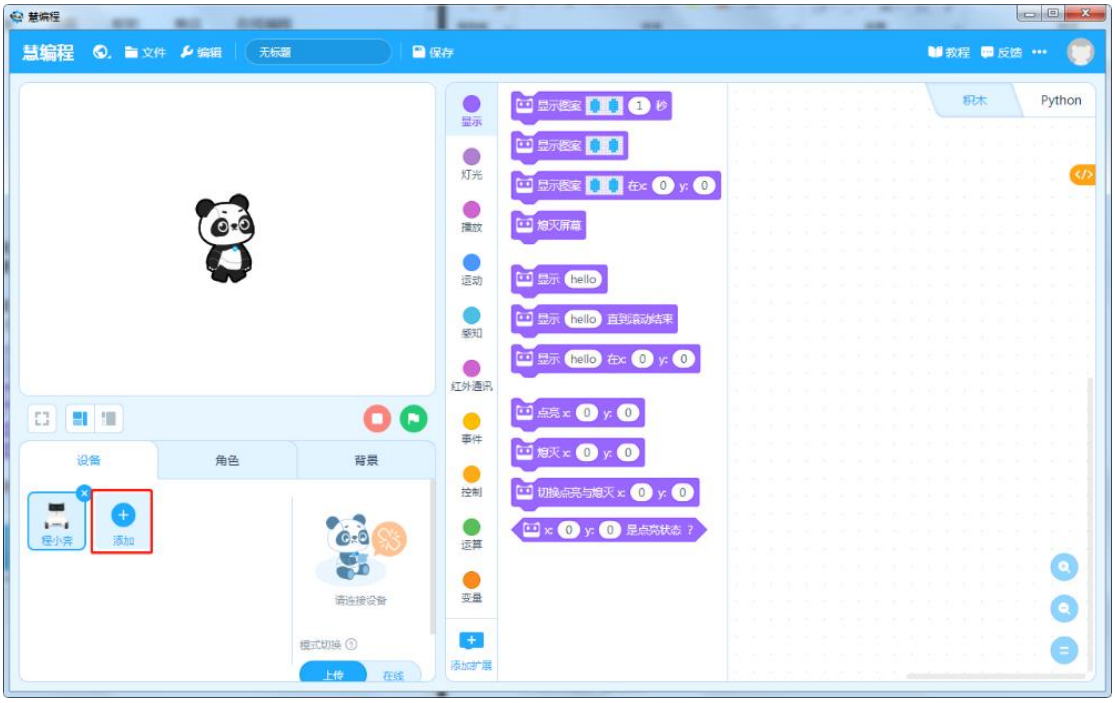
2.1 Add MotorDriverBoard graphics extension to mBlock5

Before programming MotorDriverBoard with mBlock5, you need to add the MotorDriverBoard extension. The steps are as follows：

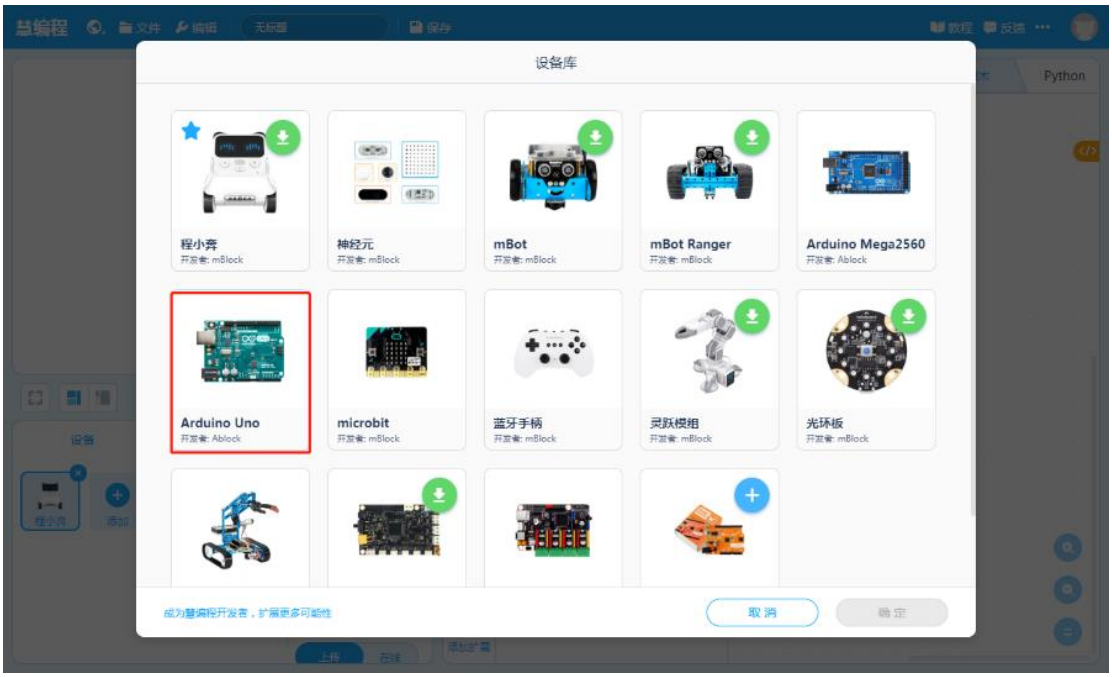
1. Open the mBlock5 software, and then put the MotorDriverBoard extension file ext_motordriverboard.mext drag directly into the mBlock5 interface, and then restart the software.



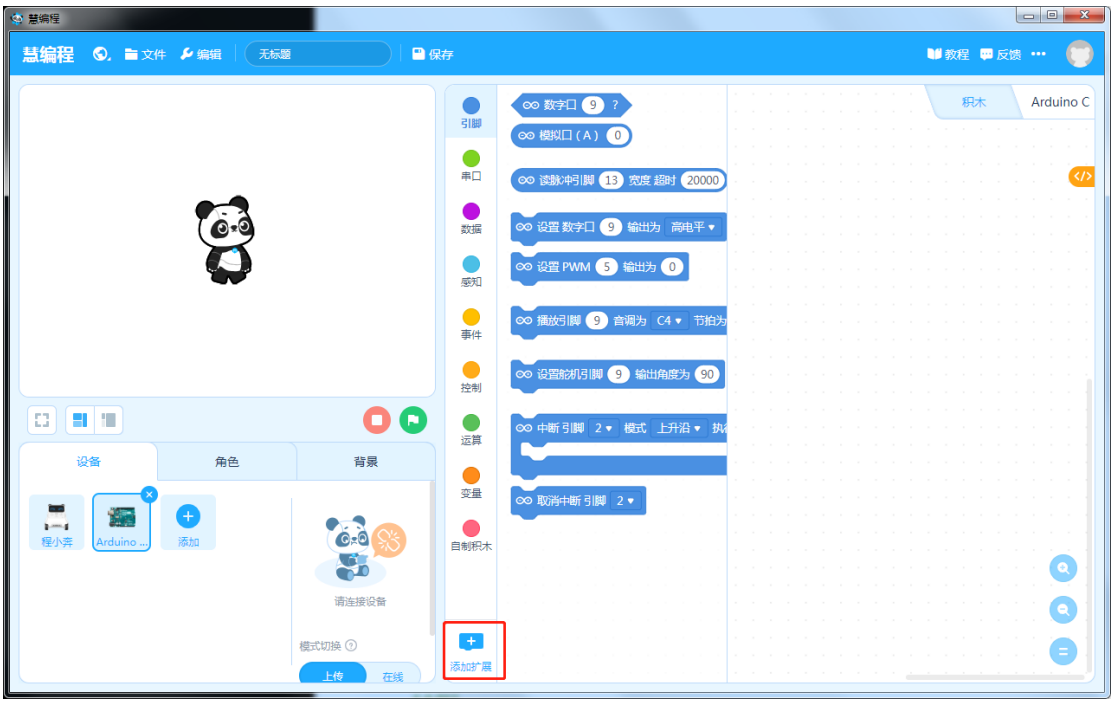
2. Under "Role", click "Add"

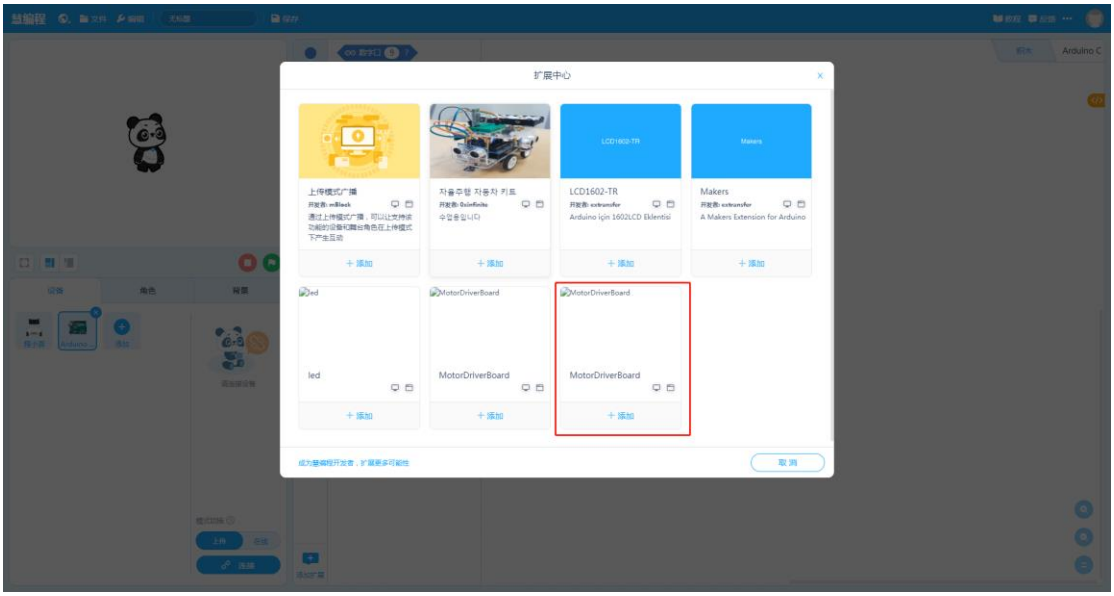


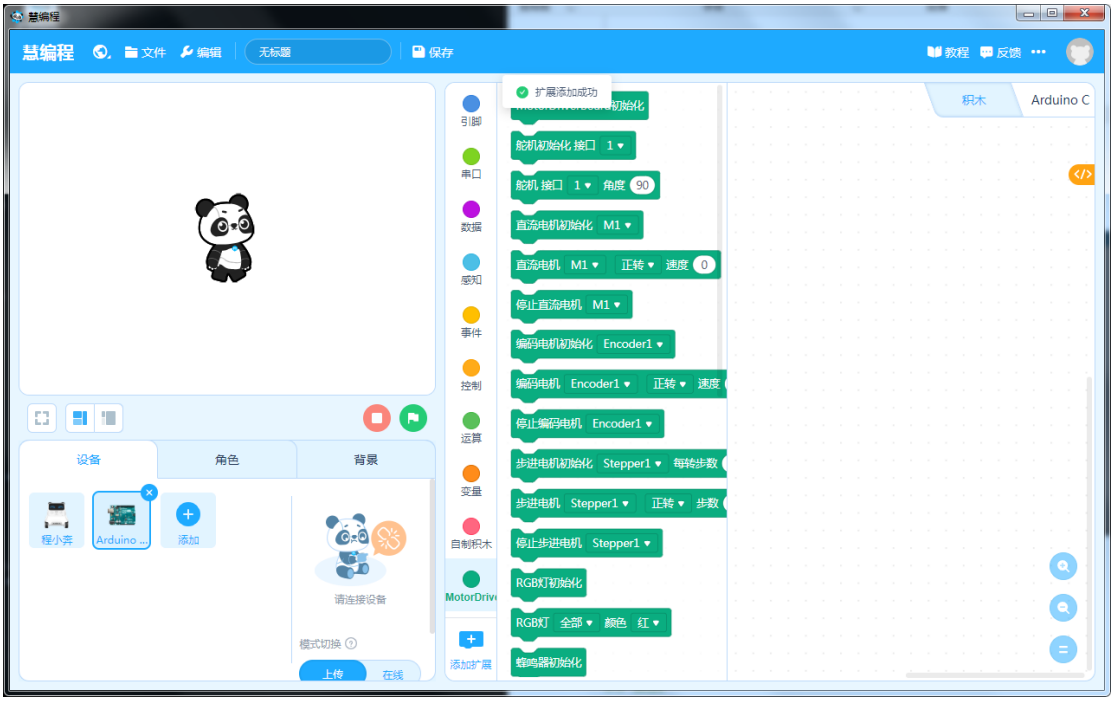
3. Select Arduino uno device



4. Click "Add Extension" under the building block category, select MotorDriverBoard, and the addition is successful







2.2 MotorDriverBoard graphic block introduction

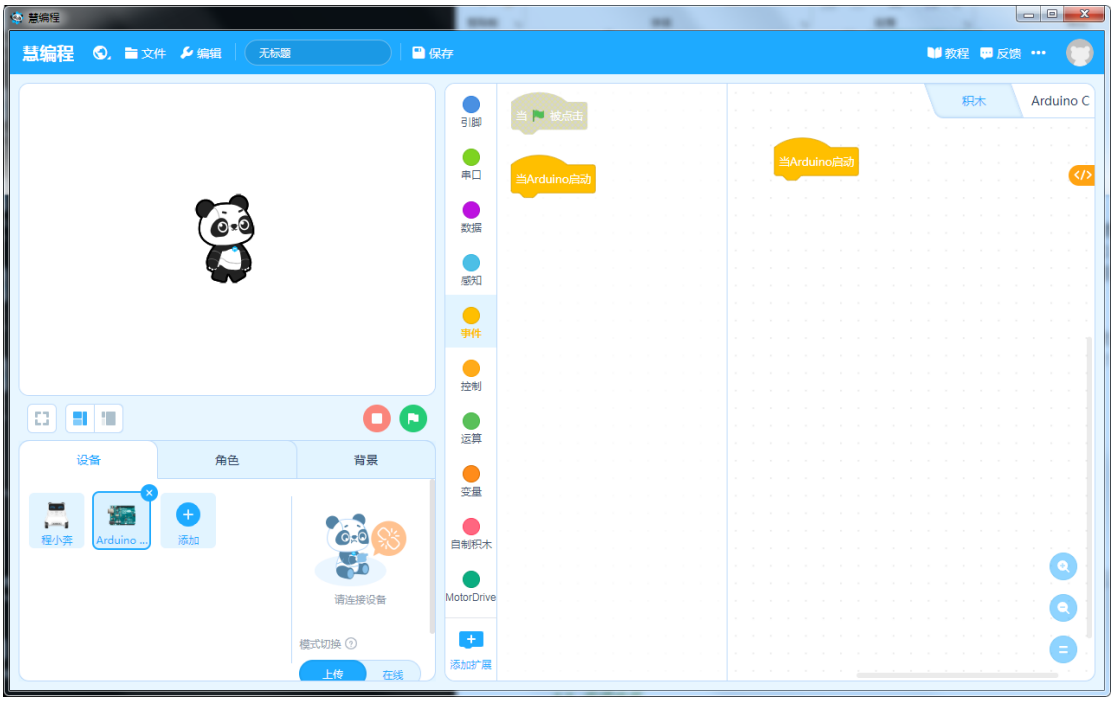
The graphics block of MotorDriverBoard contains all the module functions including initialization and execution functions. We also need to use some of mBlock5's own graphics blocks when programming. Commonly used pins, serial ports, data, time, control, operation, variable graphics Piece. We only need to build the graphics block through the logic of the program to program the MotorDriverBoard.

2.3 MotorDriverBoard graphical programming first experience

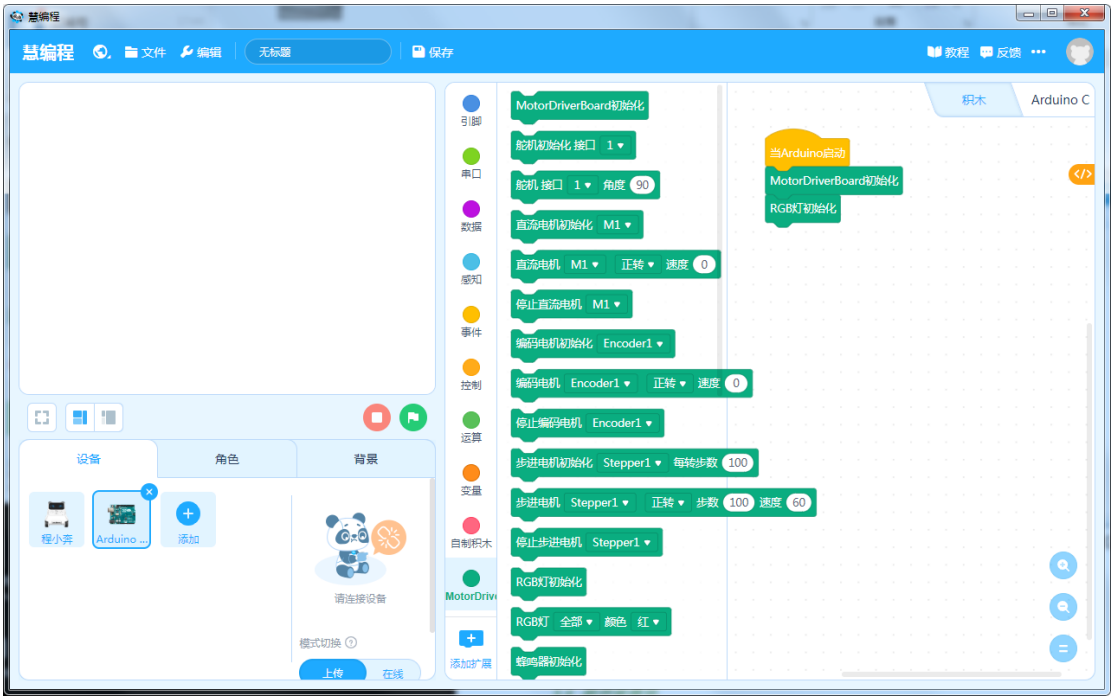
2.3.1 Programming

After understanding the graphics blocks of MotorDriverBoard and mBlock5, you can start programming. We first compile a simple RGB RGB program for MotorDriverBoard and upload it to it to see the effect!

1. Click on "Event" and drag out "When Arduino starts";

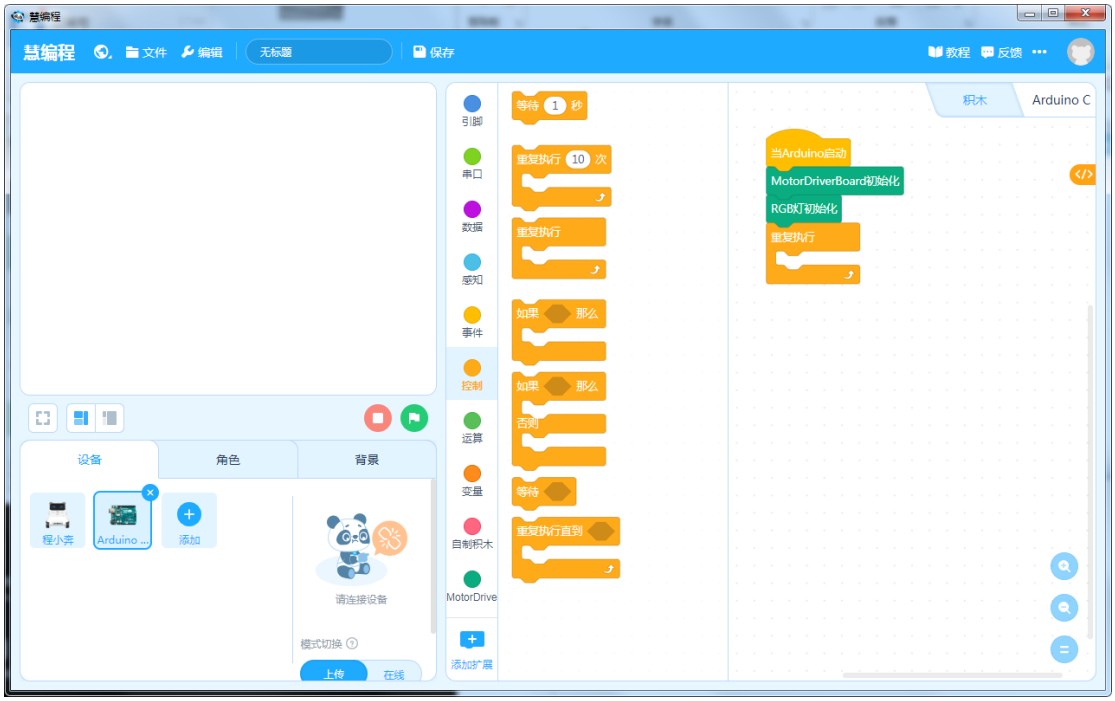


2. Click "MotorDriverBoard", drag and drop the "MotorDriverBoard Initialization and RGB Initialization" graphic block and place it under "When Arduino starts";

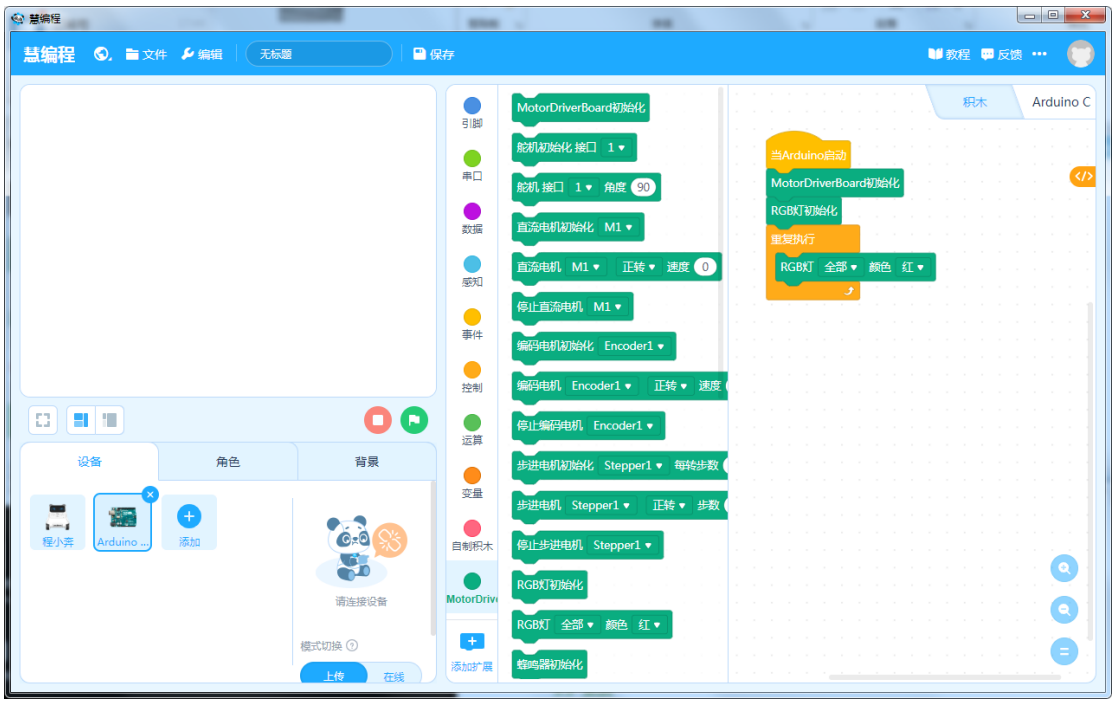


3. Click "Control", drag and drop the "Repeat" graphic block and place it

under the current graphic block；



4. Click "MotorDriverBoard", drag and drop the "RGB light (all) color (red)" graphic block and place it in the gap of the "repetitive execution" graphic block；



2.3.2 上传

We have compiled the RGB light program, now we need to upload the program to the motherboard of the MotorDriverBoard (Arduino Uno), the steps are as follows：

1. Connect the motherboard and computer with usb；
2. Click "Connect" on the mBlock5 software interface, click "Show all

connectable devices" to select the port, and click "Connect". If the device cannot be connected, you need to enter the mBlock5 installation directory, double-click mblock5/drivers/Driver_for_Windows.exe to manually install the serial port ch340 driver, restart the computer after installation；

3. Click "Upload to device" and the upload is complete.

2.3.3 Program effect

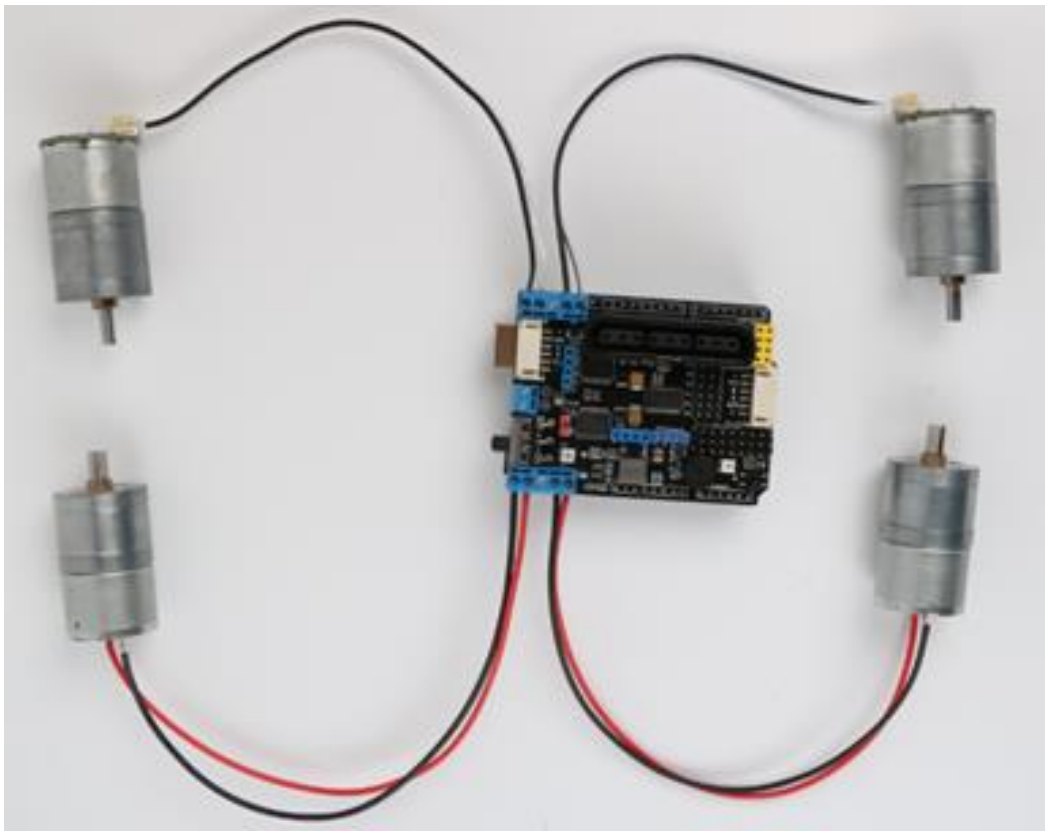
After the upload is complete, turn on the power of MotorDriverBoard, you can see that the two RGB lights are always on

Chapter 1 Experience mBlock5 graphical programming of MotorDriverBoard

3.1 DC

3.1.1 Drive DC motor

The reason why a car can move is because an engine provides power to the car. The expansion board also has a DC motor module to make it move, so what is a motor? In our science textbook, there is an introduction to electromagnetic induction. The motor is turned by electromagnetic induction. It has an iron core wound with copper wire inside and a rotor outside. When the iron core is energized, there is electromagnetic induction to let the rotor Move, this is the motor. MotorDriverBoard has four DC motor interfaces, we can use the DC motor to control the building blocks to make the DC motor rotate.



3.1.2 mBlock5 sample program


当Arduino启动
MotorDriverBoard初始化
直流电机初始化 M1
直流电机初始化 M2
直流电机初始化 M3
直流电机初始化 M4
重复执行
直流电机 M1 正转 速度 200
直流电机 M2 正转 速度 200
直流电机 M3 正转 速度 200
直流电机 M4 正转 速度 200
等待 4 秒
直流电机 M1 反转 速度 200
直流电机 M2 反转 速度 200
直流电机 M3 反转 速度 200
直流电机 M4 反转 速度 200
等待 4 秒
停止直流电机 M1
停止直流电机 M2
停止直流电机 M3
停止直流电机 M4
等待 4 秒

3.2 Coded motor

3.2.1 Drive coding motor

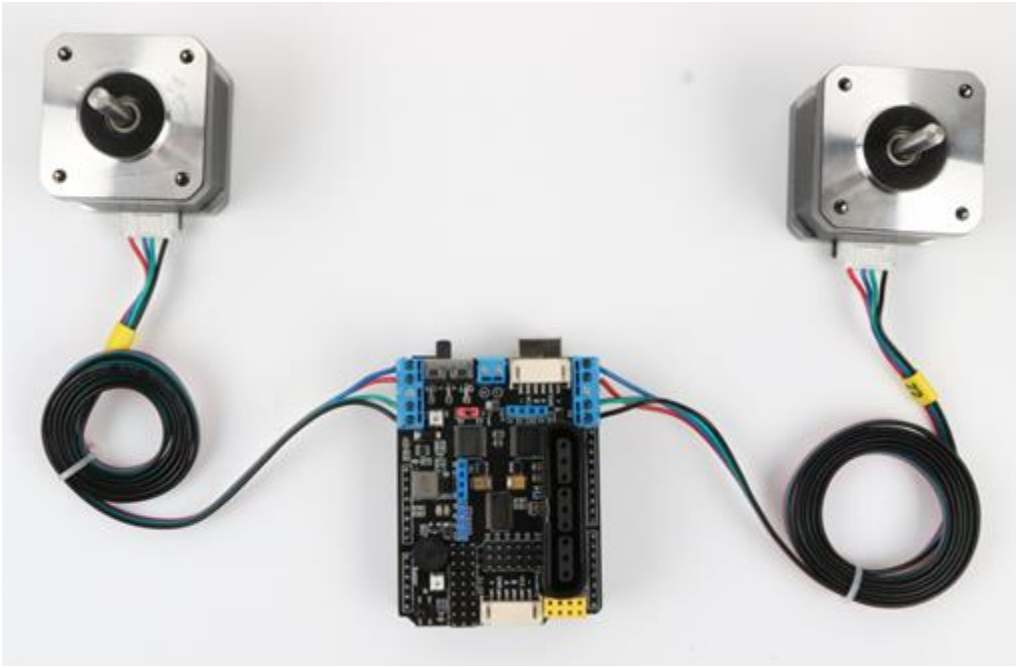
The encoder is a rotary sensor that converts angular displacement or angular velocity into a series of electrical digital pulses. We can measure the final displacement or velocity information through the encoder. MotorDriverBoard has two interfaces for encoding motors. The working voltage of the encoding motor is 5~ Between 12V.

3.2.2 mBlock5 sample program

3.3 Stepper motor

3.3.1 Drive stepper motor

Stepper motors are open-loop control motors that convert electrical pulse signals into angular or linear displacements. They are the main actuators in modern digital program control systems and are widely used. In the case of non-overload, the speed of the motor and the position of the stop only depend on the frequency and pulse number of the pulse signal. MotorDriverBoard has two stepper motor interfaces, and the working voltage is between 5~12V.



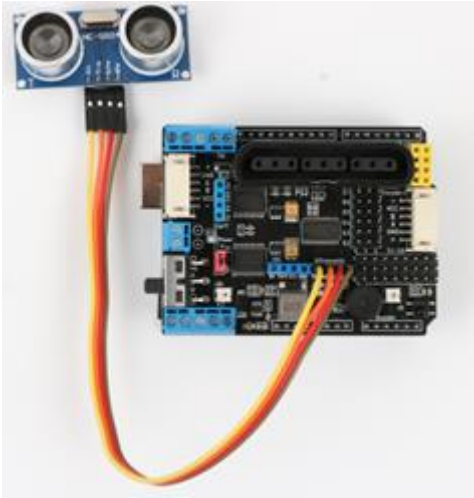
3.3.2 mBlock5 sample program

3.4 Ultrasonic module

3.4.1 Drive ultrasonic module

Ultrasonic sensors are devices that detect distance by emitting ultrasonic waves. Ultrasonic waves are inaudible sound waves that have the property of returning when they touch an object. The ultrasonic sensor has two "eyes", one of which emits ultrasonic waves, and the other "eye" receives the ultrasonic waves from the obstacles. When one eye transmits ultrasonic waves, it starts timing and waits for the other When the eye receives the returned ultrasonic wave, it stops timing. Mathematically we have learned the distance = speed × time, then the distance measured by the ultrasonic wave = the speed of the ultrasonic wave × (timed time ÷ 2); in this way, the distance can be calculated. The four-wire ultrasonic module interface is left on the

MotorDriverBoard driver board. The four pins are the power pin (vcc), the ultrasonic signal transmitting pin (A1), the ultrasonic signal receiving pin (A1), the ground wire (GND), four Each pin is connected to the corresponding pin of the ultrasonic module.



3.4.2 mBlock5 sample program


当Arduino启动
MotorDriverBoard初始化
超声波初始化
RGB灯初始化
重复执行
将 distance 设为 读取超声波距离
如果 distance < 5 与 distance > 0 那么
RGB灯 全部 颜色 红
如果 distance < 10 与 distance > 2 那么
RGB灯 全部 颜色 绿
如果 distance < 15 与 distance > 10 那么
RGB灯 全部 颜色 蓝
如果 distance < 20 与 distance > 15 那么
RGB灯 全部 颜色 黄
如果 distance < 25 与 distance > 20 那么
RGB灯 全部 颜色 紫
如果 distance < 30 与 distance > 25 那么
RGB灯 全部 颜色 白
如果 distance > 30 那么
RGB灯 全部 颜色 熄灭

3.5 Steering gear

3.5.1 Drive servo

The steering gear is mainly composed of the following parts, the steering wheel, the reduction gear set, the position feedback potentiometer, the DC motor, the control circuit, etc., the bumblebee we saw in the movie, and the joints of the expansion board of Optimus Prime, all need The steering gear is controlled, especially when the expansion board is walking, it emits a mechanical sound that clicks and clicks, which is caused by the rotation of the servo on the expansion board. At this stage, the most commonly used is the SG90 servo。

3.5.2 mBlock5 sample program

3.6 buzzer

3.6.1 Drive buzzer

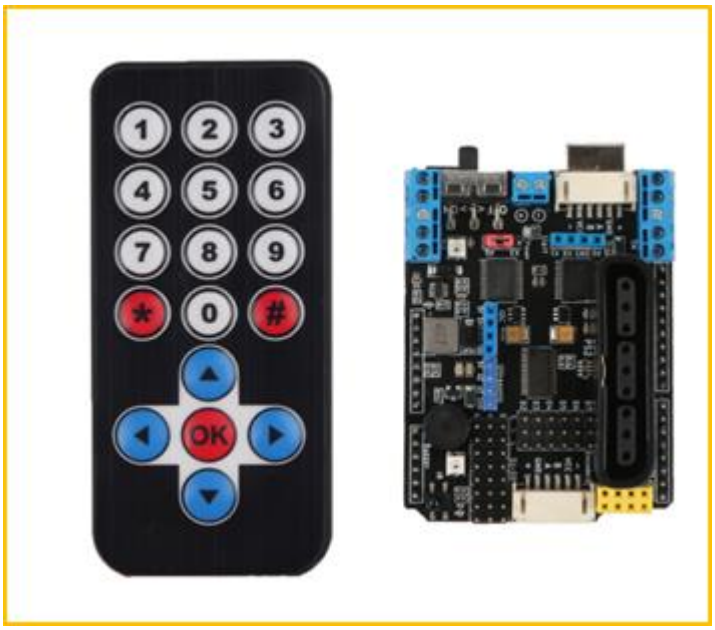
There is a passive buzzer on the MotorDriverBoard driver board, which can be used to control the buzzer to play prompt sounds or play music by writing programs

3.6.2 mBlock5 sample program

3.7 Infrared remote control

3.7.1 Drive infrared remote control

There is an infrared remote control receiving probe on the MotorDriverBoard driver board. When you use it, you only need to plug the expansion board into the Arduino. When an infrared coded signal is transmitted, after the infrared connector processes it, the output is a square wave signal after detection and shaping, and it is directly provided to the SCM, perform the corresponding operation to achieve the purpose of controlling the motor



3.7.2 mBlock5 sample program

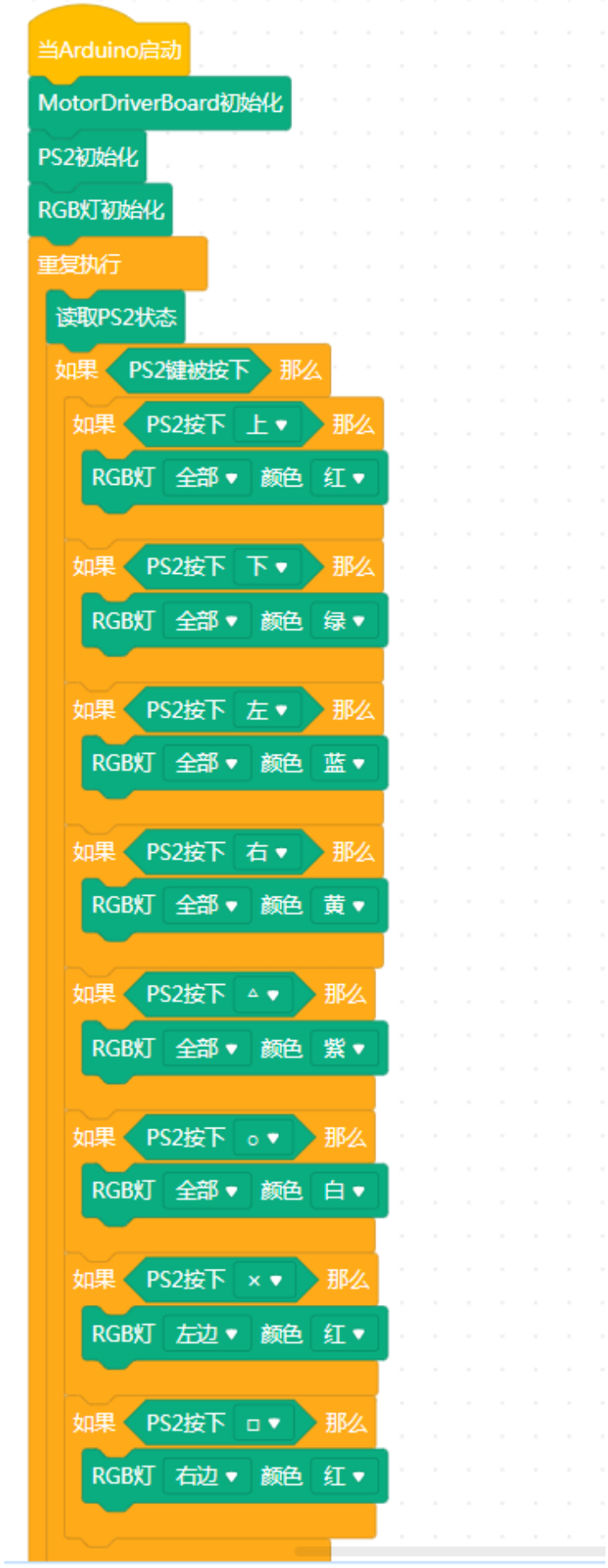
3.8 PS2

3.8.1 Drive PS2

There is a PS2 port on the MotorDriverBoard driver board, and the PS2 infrared

receiver can be directly plugged into the PS2 port. The PS2 handle consists of a handle and a receiver. The handle requires two 1.5V power supplies on the 7th. The receiver's power supply and arduino are used The same power supply, the power supply range is 3~5V, can not be reversed, overvoltage, overvoltage and reverse connection will cause the receiver to burn out. There is a power switch on the handle, ON ON/OFF OFF, turn the handle switch to ON, the light on the handle will flash continuously when the receiver is not searched, and within a certain time, the receiver has not been searched Device, the handle will enter standby mode, the light on the handle will go out, at this time, press the "START" button to wake up the handle

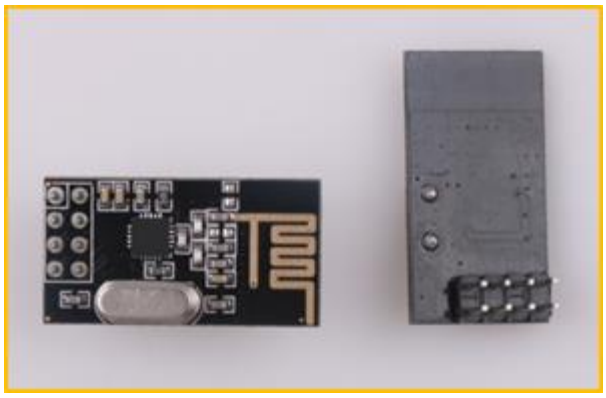
3.8.2 mBlock5 sample program

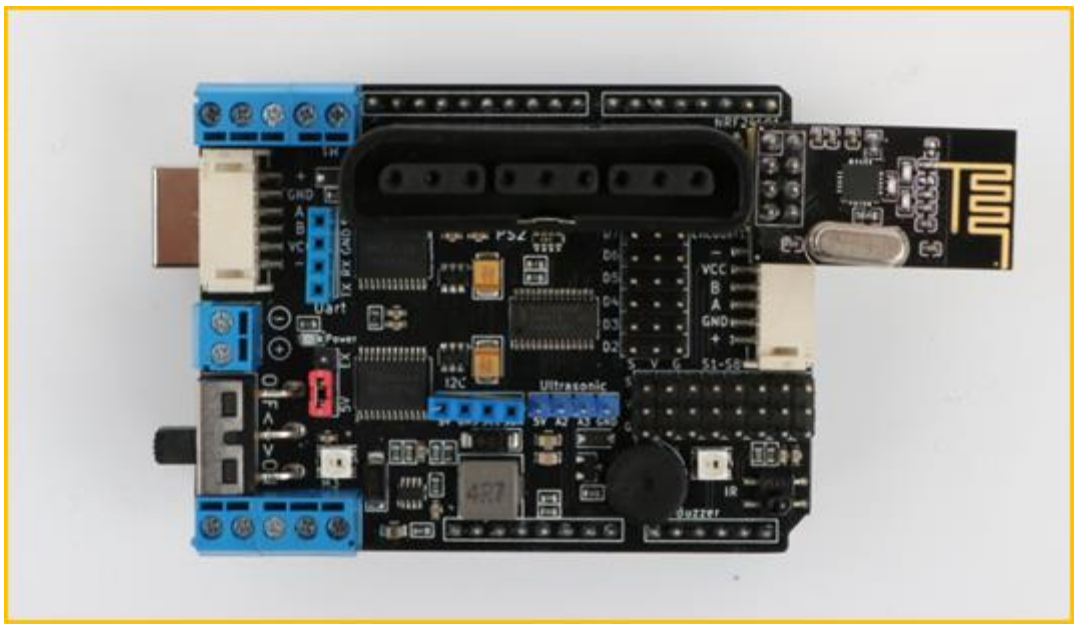

当Arduino启动
MotorDriverBoard初始化
PS2初始化
RGB灯初始化
重复执行
读取PS2状态
如果 PS2键被按下 那么
如果 PS2按下 上 那么
RGB灯 全部 颜色 红
如果 PS2按下 下 那么
RGB灯 全部 颜色 绿
如果 PS2按下 左 那么
RGB灯 全部 颜色 蓝
如果 PS2按下 右 那么
RGB灯 全部 颜色 黄
如果 PS2按下 △ 那么
RGB灯 全部 颜色 紫
如果 PS2按下 ○ 那么
RGB灯 全部 颜色 白
如果 PS2按下 × 那么
RGB灯 左边 颜色 红
如果 PS2按下 □ 那么
RGB灯 右边 颜色 红

3.9 Nrf24L01

3.9.1 Drive Nrf24L01

The nRF24L01+ module is a 2.4G wireless communication module developed by Nordic based on the nRF24L01 chip. Using FSK modulation, Nordic's own Enhanced Short Burst protocol is integrated inside. Can achieve point-to-point or 1 to 6 wireless communication. The wireless communication speed can be up to 2M (bps). NRF24L01 has four working modes: transceiver mode, configuration mode, idle mode, and shutdown mode. There is an Nrf24L01 interface on the MotorDriverBoard driver board.





3.9.2 mBlock5 sample program

Sender

Receiver