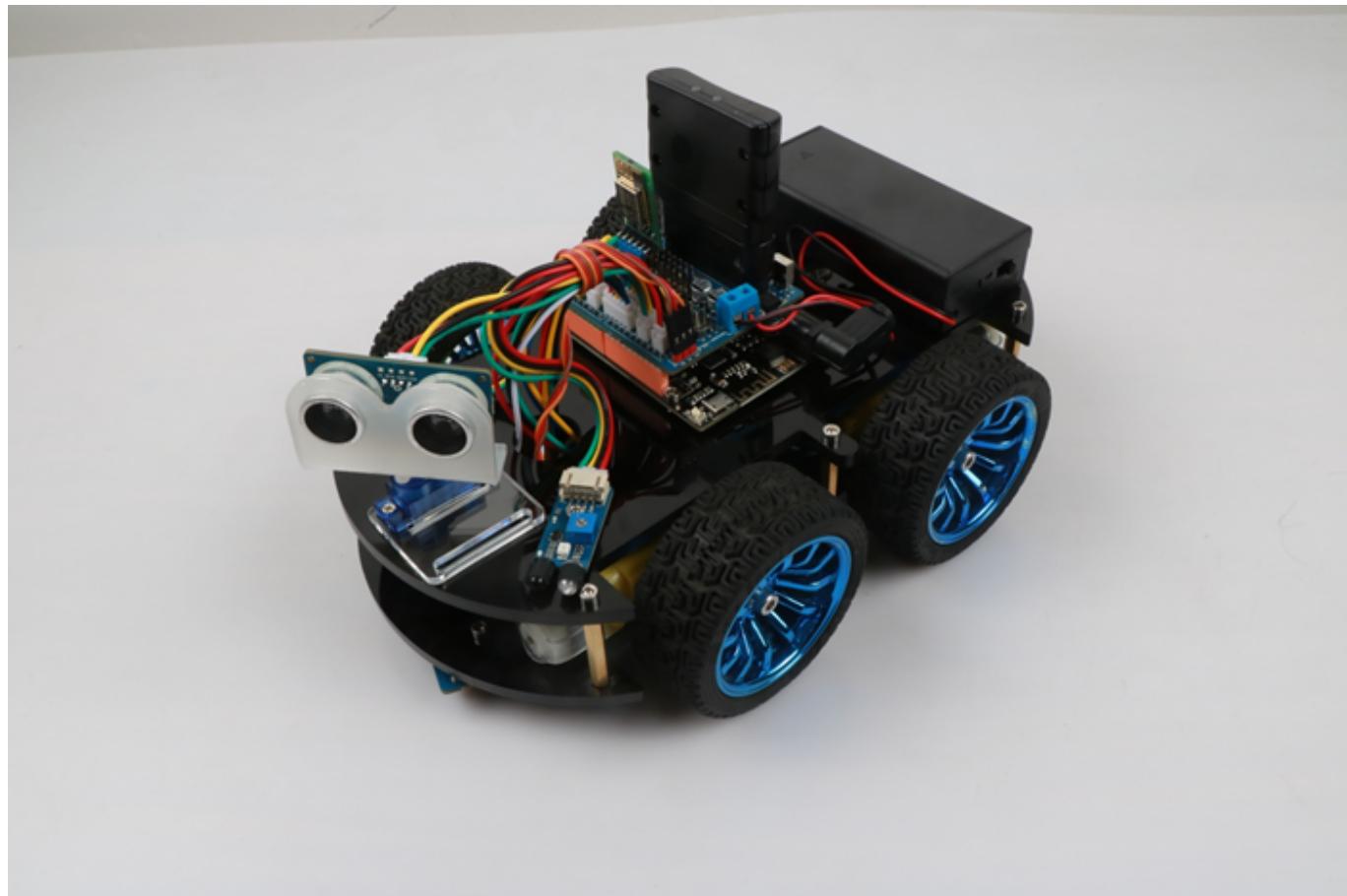


Using MagicBlock to upload program in hummerbot

Meet hummerbot

About hummerbot



Hummerbot is a multifunctional and programmable Arduino intelligent car

Function of hummerbot

1.Ultrasonic obstacle avoidance function

2.Ultrasonic + infrared obstacle avoidance function

3.Automatic tracking function

4.Infrared remote control function

5.Bluetooth remote control function

6.PS2 remote control function

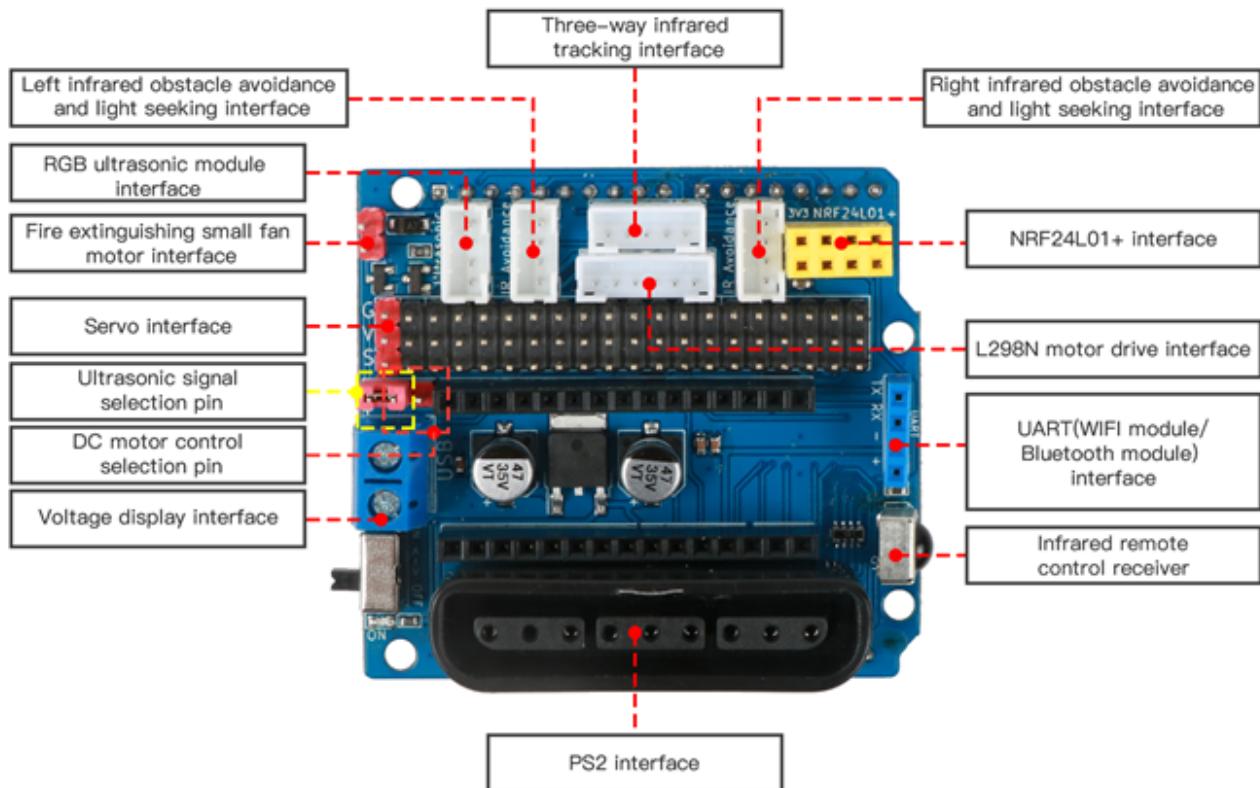
7.Bluetooth remote mode switching function

8.Light tracing function

9.RGB

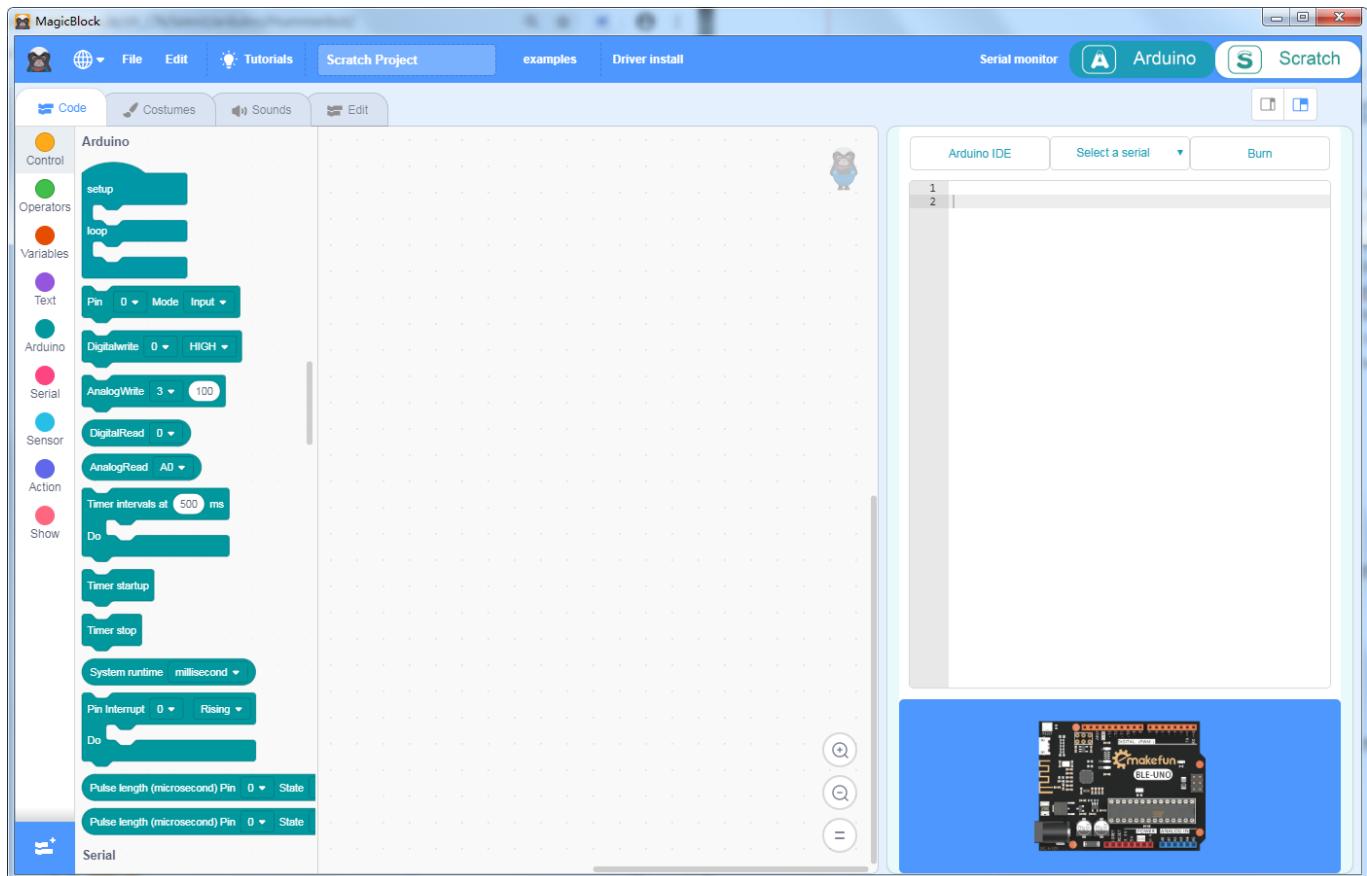
Introduction to the main control board and expansion board of hummerbot





Arduino mode of MagicBlock [go to the MagicBlock tutorial](#)

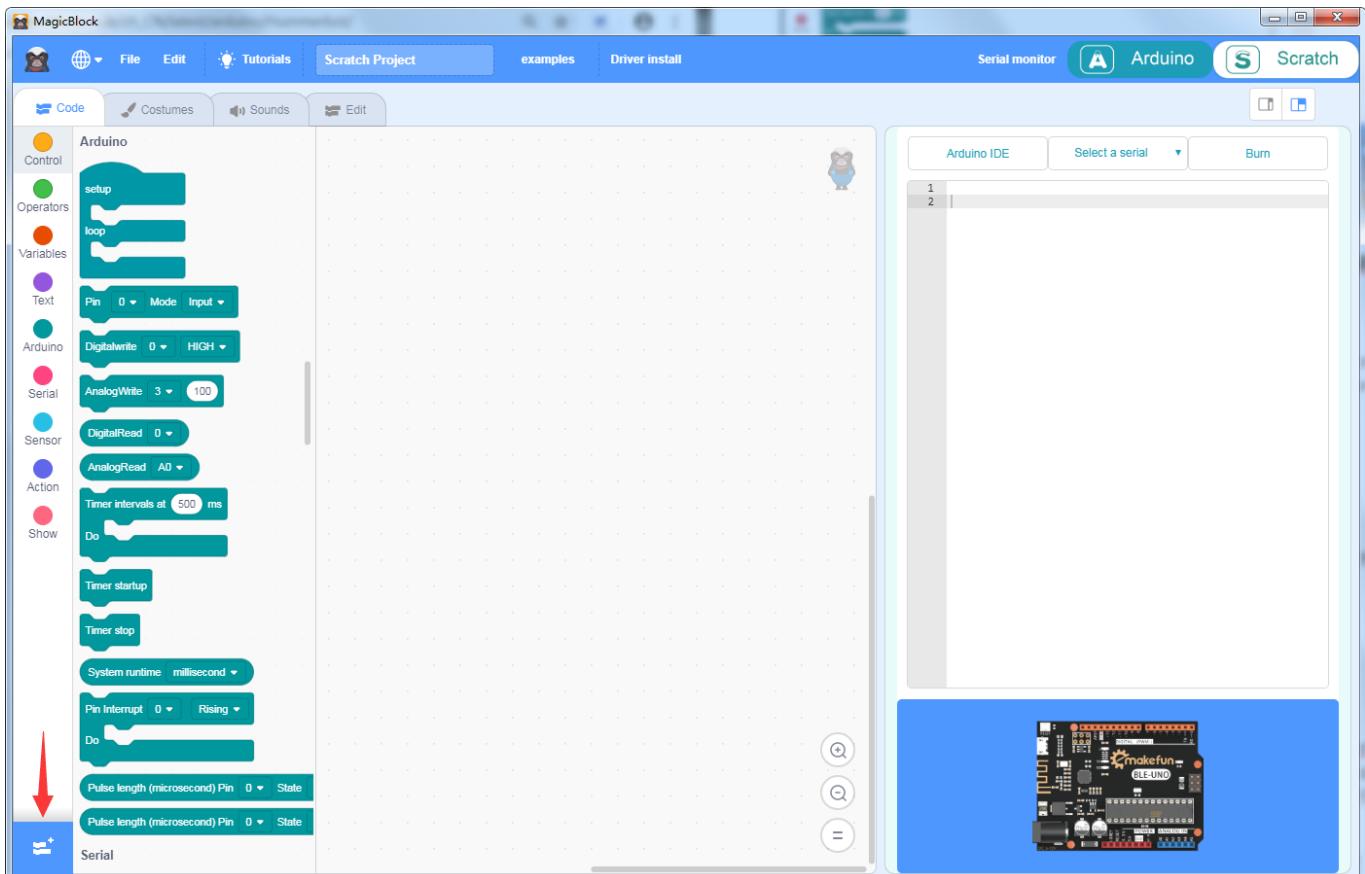
As mentioned earlier, magicblock can be divided into two modes: Arduino mode and scratch mode (switch in the upper right corner of the magicblock interface), Arduino mode is upload mode, and scratch mode is real-time mode. Arduino mode is that after we have written a program with a graphic block, the graphic block will be automatically converted into Arduino C++ code. Then we need to connect the computer and hummerbot with USB cable, and through magicblock Upload the code to hummerbot. In the scratch mode, you need to install firmware in hummerbot, and always connect with the computer through USB line or Bluetooth. Click the graphic block to send commands to hummerbot in real time to control hummerbot. This document only introduces the process of programming for hummerbot in the Arduino mode of magicblock



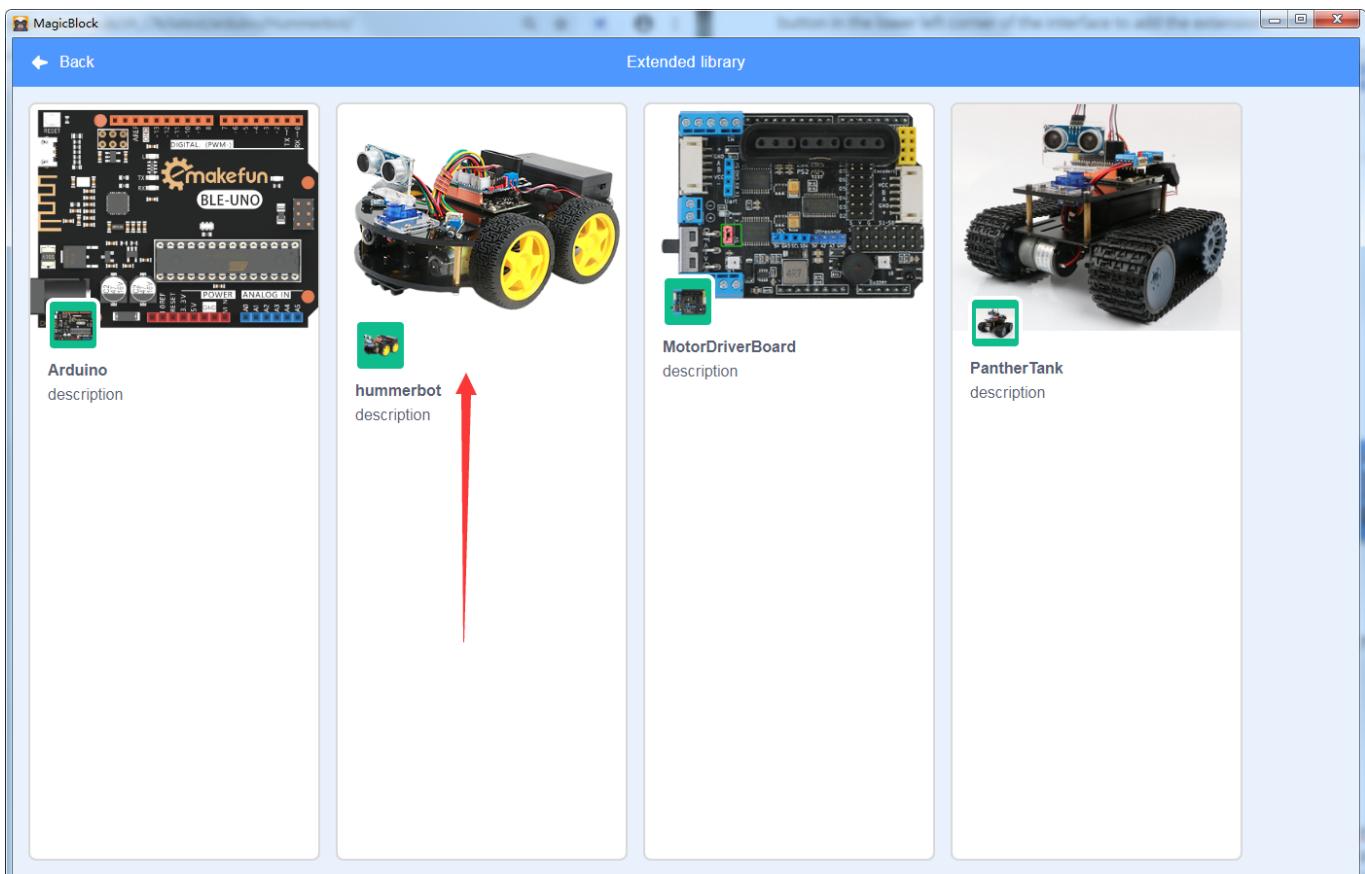
Using magicblock to upload program for hummerbot

Open the hummerbot extension on magicblock

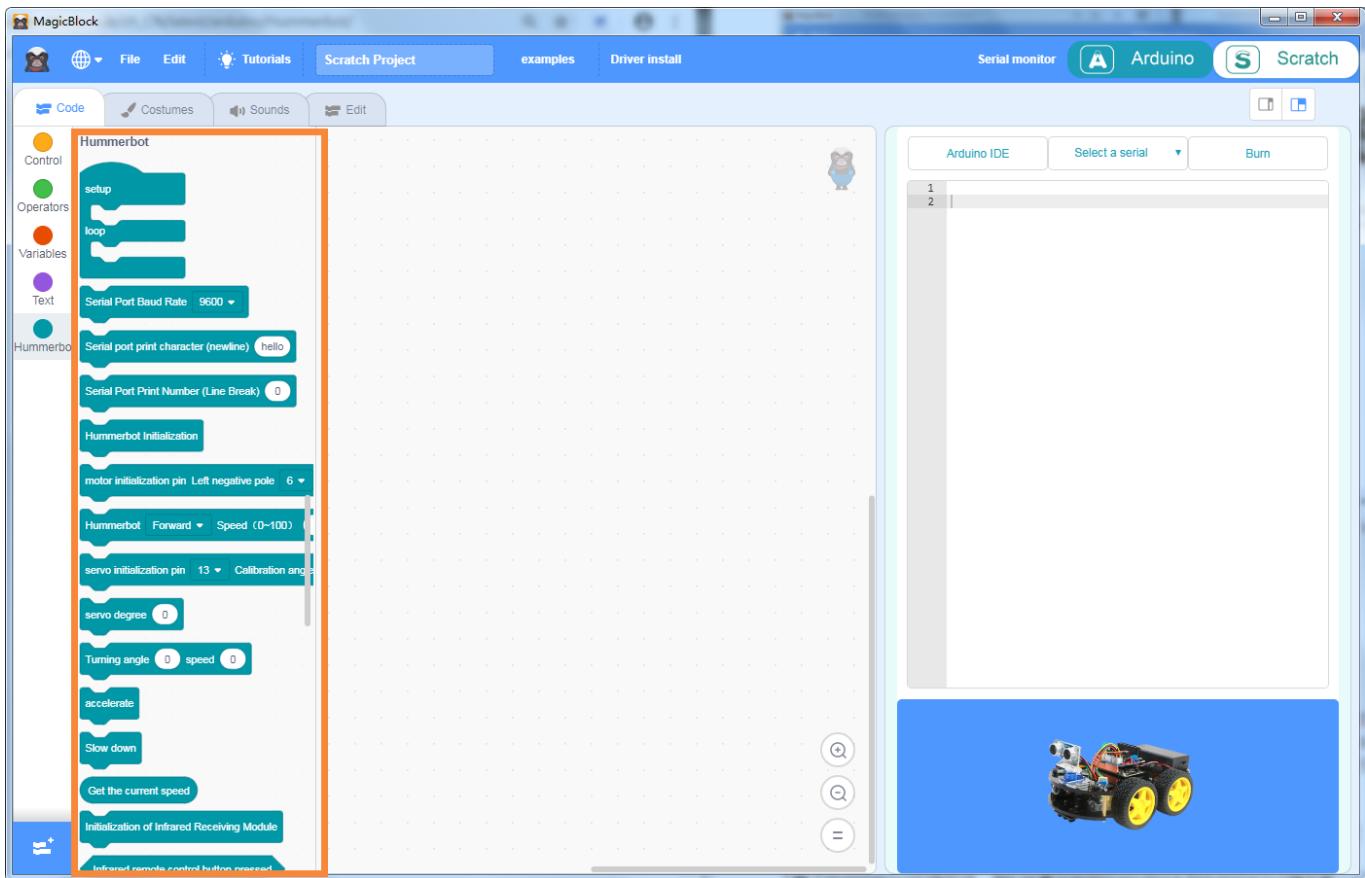
First of all, we need to switch the mode to Arduino mode, because the default mode is scratch mode when opening magicblock. We can click the Arduino button in the upper right corner, and then click the blue button in the lower left corner of the interface to add the extension



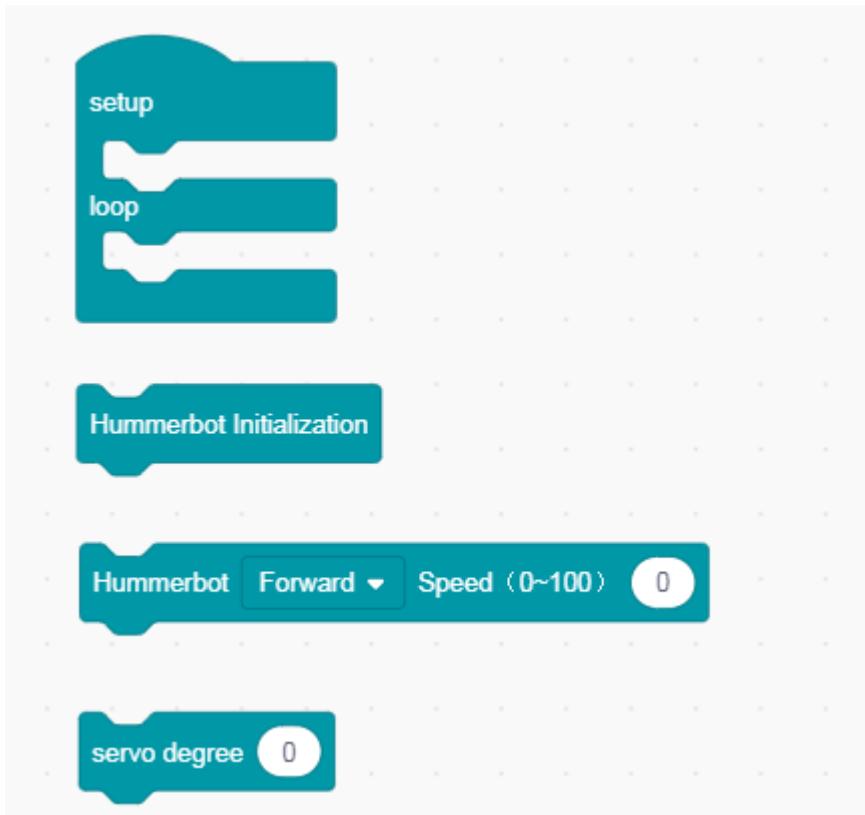
Select extension interface appears, left click to select hummerbot extension



After selecting the hummerbot extension, the hummerbot extension will appear in our graphics block area. It contains all the graphics blocks used for programming by hummerbot



How to use hummerbot block



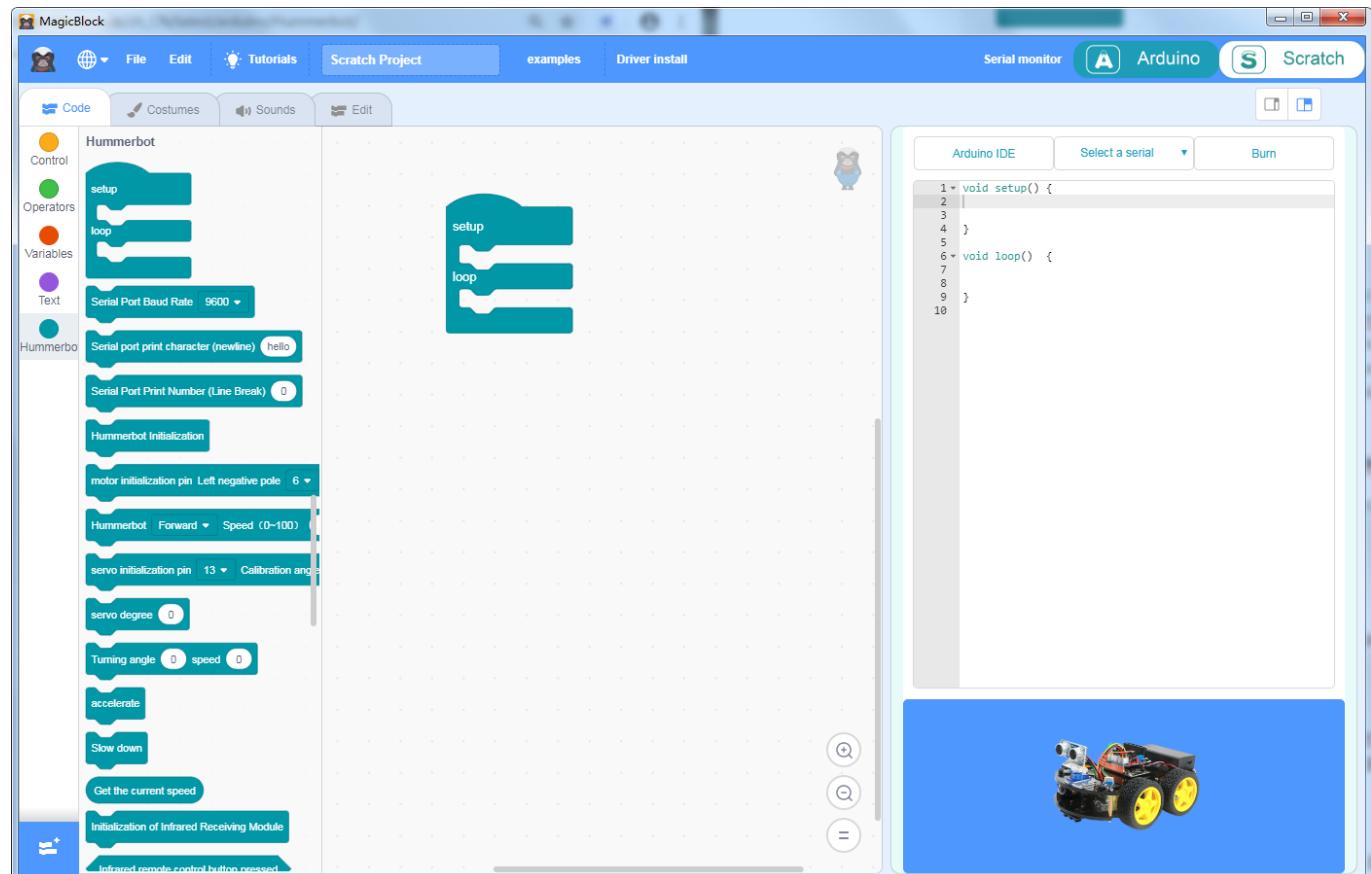
The first graphics block of hummerbot is the setup / loop graphics block, which is the main graphics block. Every program of hummerbot needs to use it, and other graphics blocks of hummerbot need to be put into the setup or loop of this graphics block. In the setup, initialization program graphics blocks such as motor initialization, infrared initialization, ultrasonic initialization,

etc. are put into the loop Program graphics blocks that may be executed multiple times, such as the forward, backward, acceleration, deceleration, etc. of hummerbot

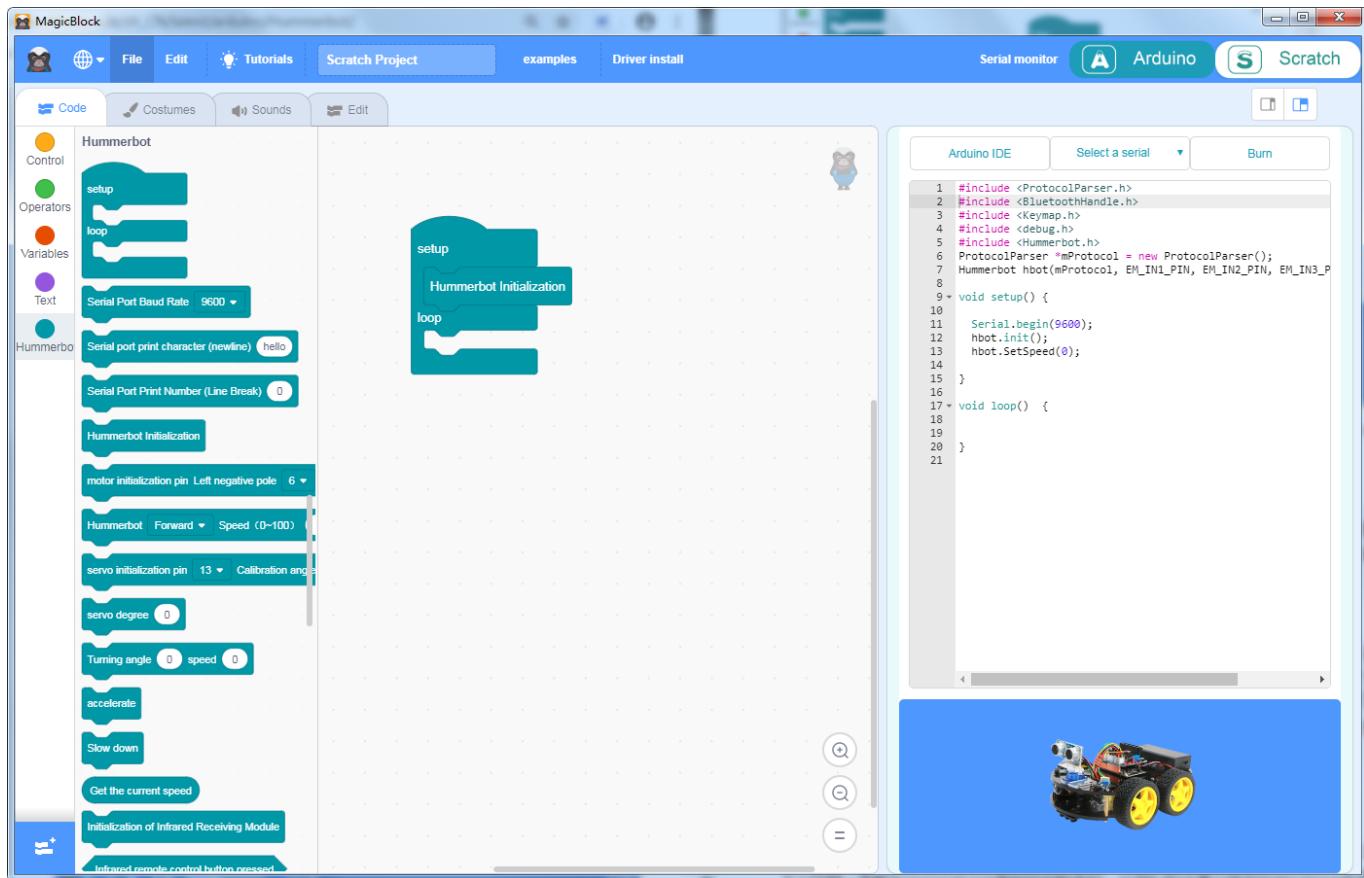
Write the first program for hummerbot: hummerbot moves!

After understanding the graphics block of hummerbot, we try to write the first program for hummerbot with magicblock: hummerbot, move forward!

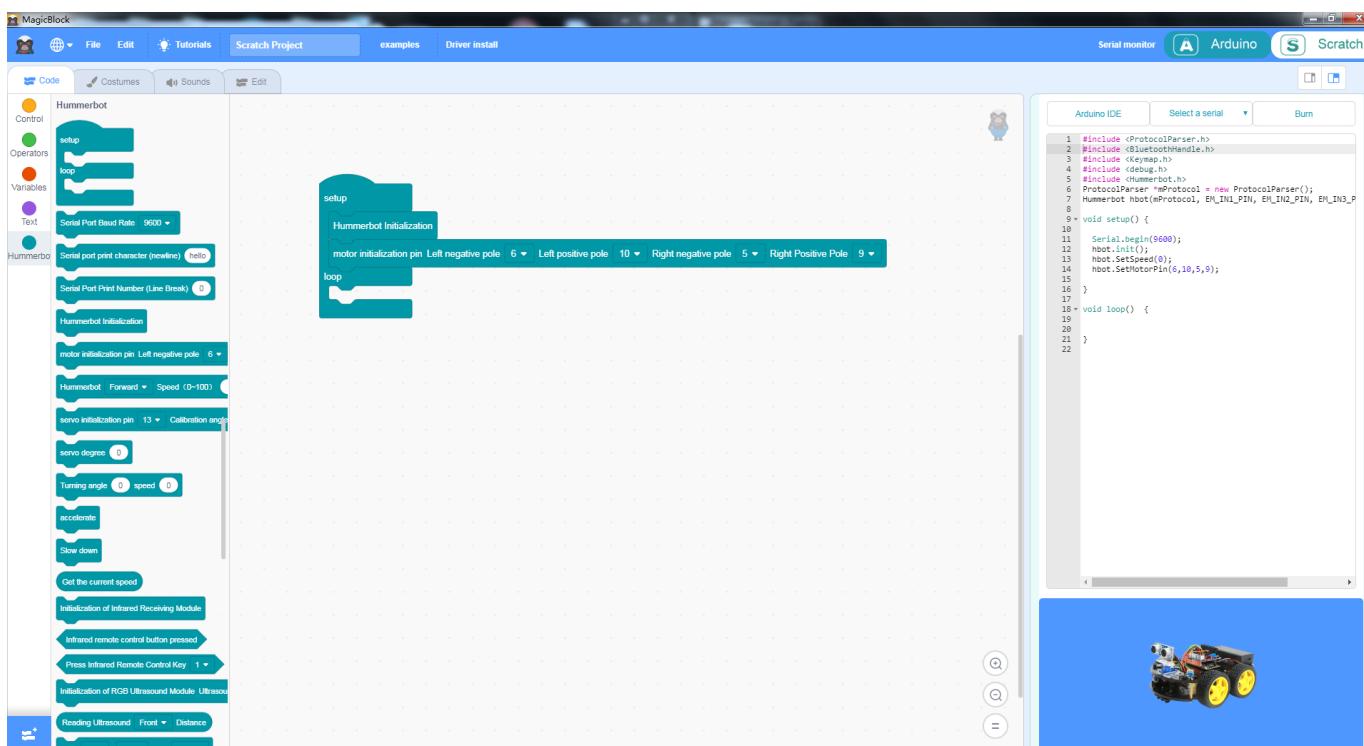
Step 1: drag the setup / loop block to the programming area



Step 2: initialize hummerbot, drag the "Hummer car initialization" graphic block into setup, which is used to initialize the motor of hummerbot, and set the initial speed to 0

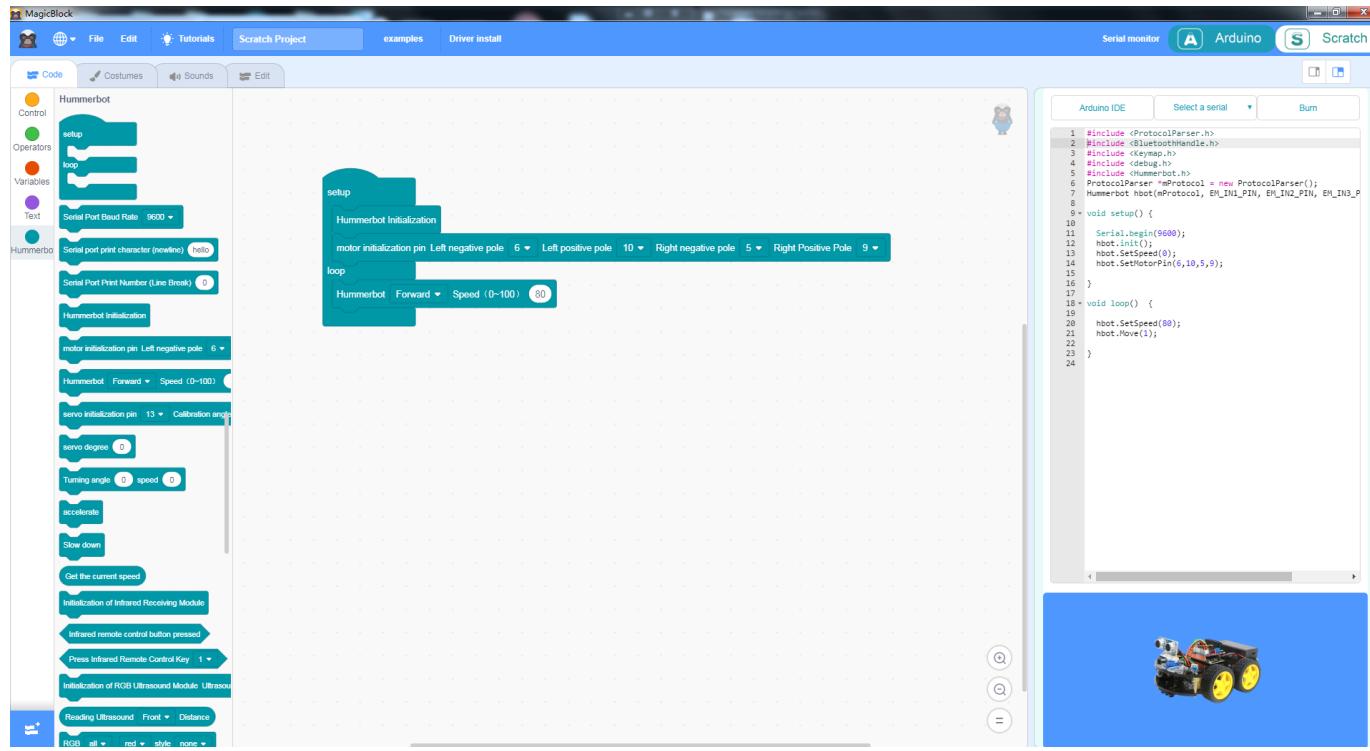


Step 3: initialize the motor pins. Drag the "motor initialization" graphic block to the bottom of "Hummer car initialization" in the setup. This graphic block is used to initialize the four motor pins of hummerbot, which are 6, 10, 5, 9 by default. We can click the drop-down box to modify the four pins. This requires us to modify the actual wiring of the four motors to be consistent with the program



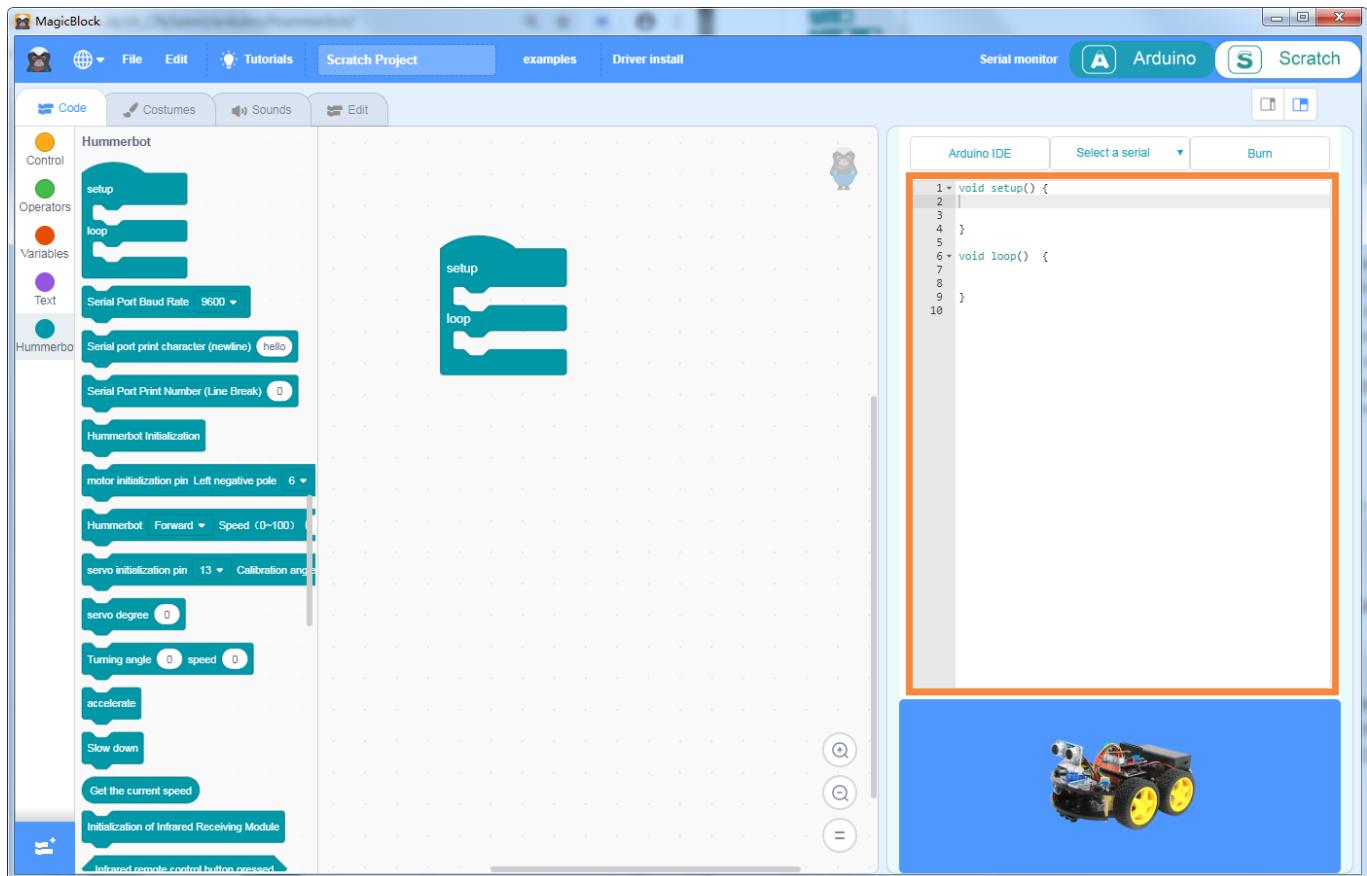
Step 4: drag the graphic block that controls the progress of hummerbot to the loop. Generally, do not drag it into the setup, because setup is the initialization graphic block, and all the programs in

it are executed only once. If you drag the graphic block of hummerbot's progress directly into the setup, after uploading the program, hummerbot will not move, because the program of hummerbot's progress ends in an instant when the program is running So we need to drag the program graphic block related to hummerbot action into the loop program. The effect of the following program is that hummerbot will continue to move forward

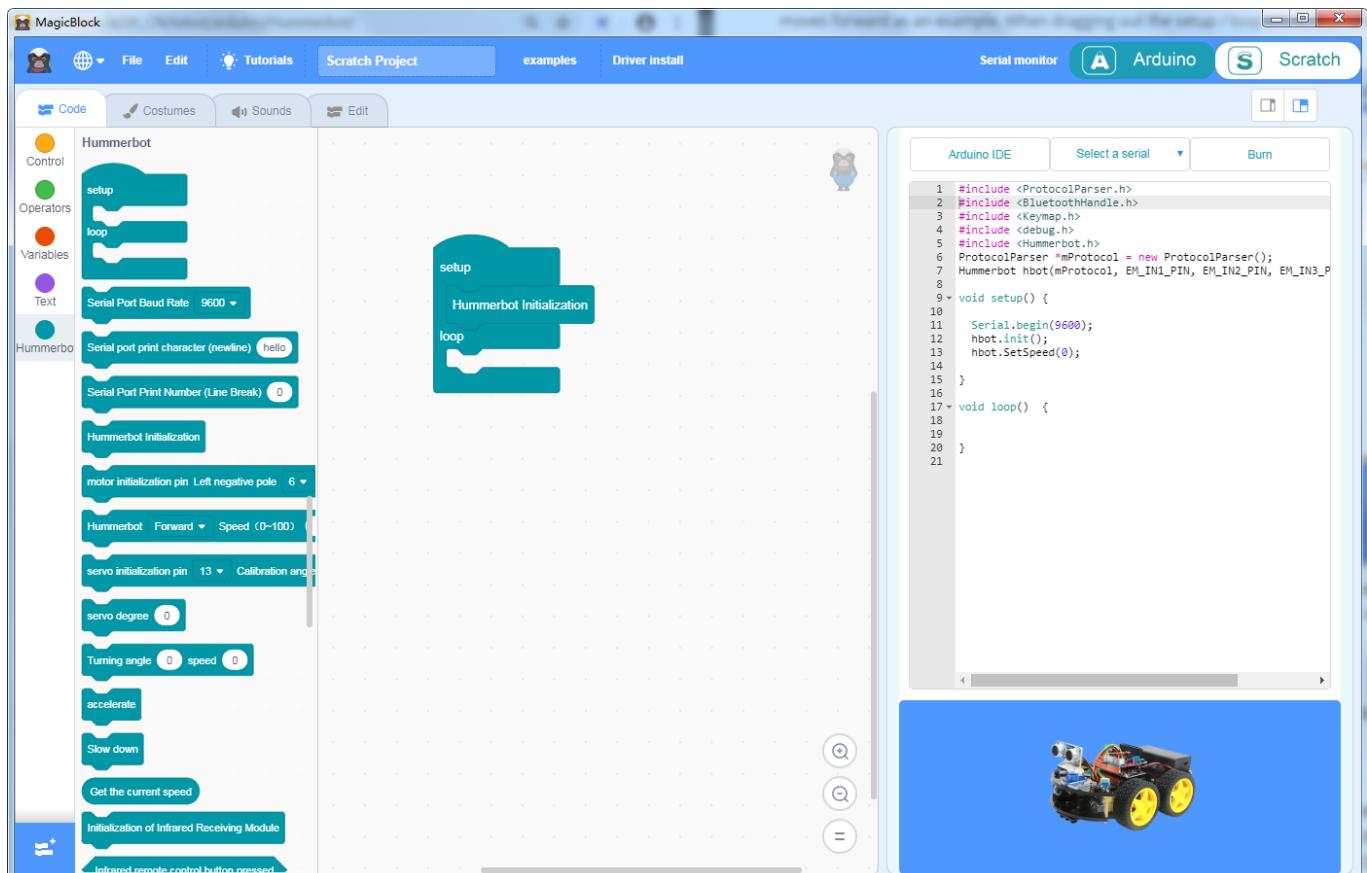


Recognize code areas

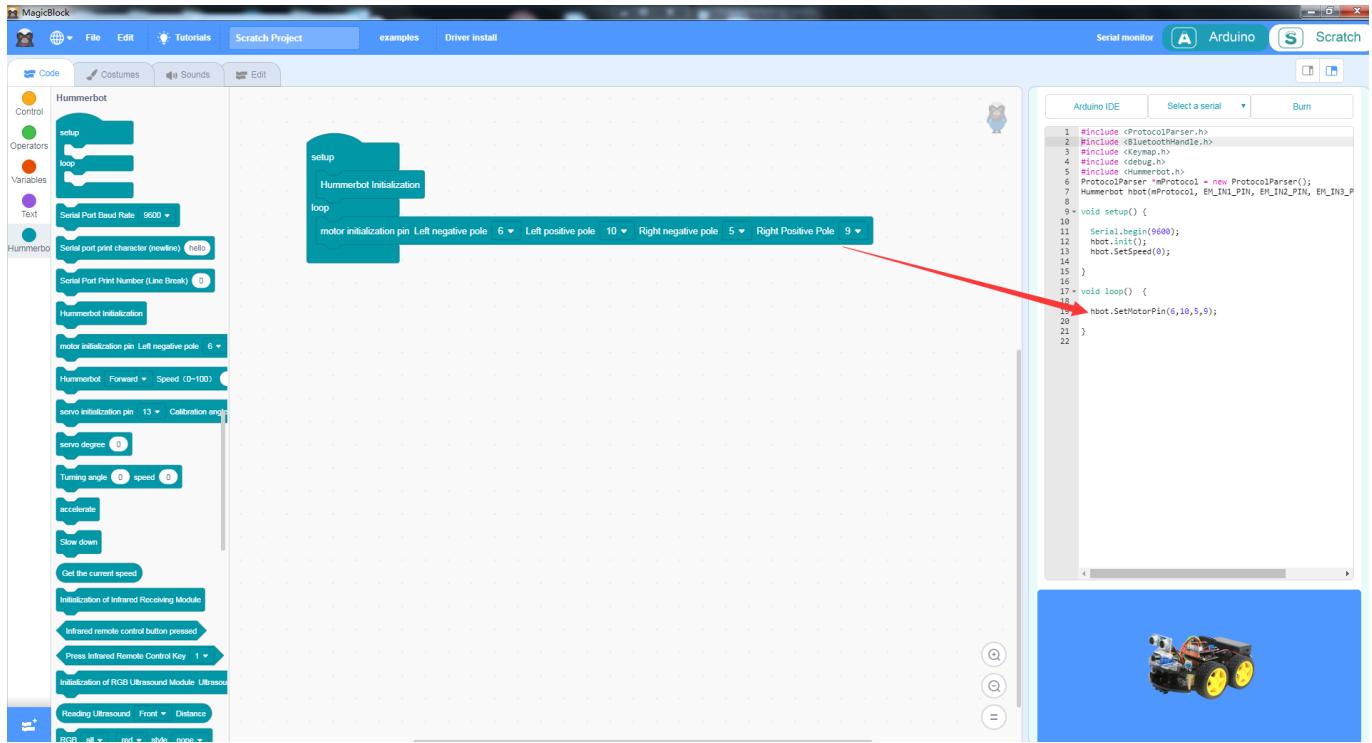
Through the previous introduction, we can write a program for hummerbot to make it move forward. Now, let's study how hummerbot moves through the real meaning of the graphic block code. Let's focus on the right side of the magicblock interface: code area. When we use the graphic block to program for hummerbot, we will find that each graphic block is dragged, One or several sections of code will be generated in the code area. That's right. This is the basic reason that we actually upload the program to hummerbot, that is, the program that can make hummerbot move. Take the program that hummerbot moves forward as an example. When dragging out the setup / loop block, two functions appear in the code area, namely, the setup() and loop() functions



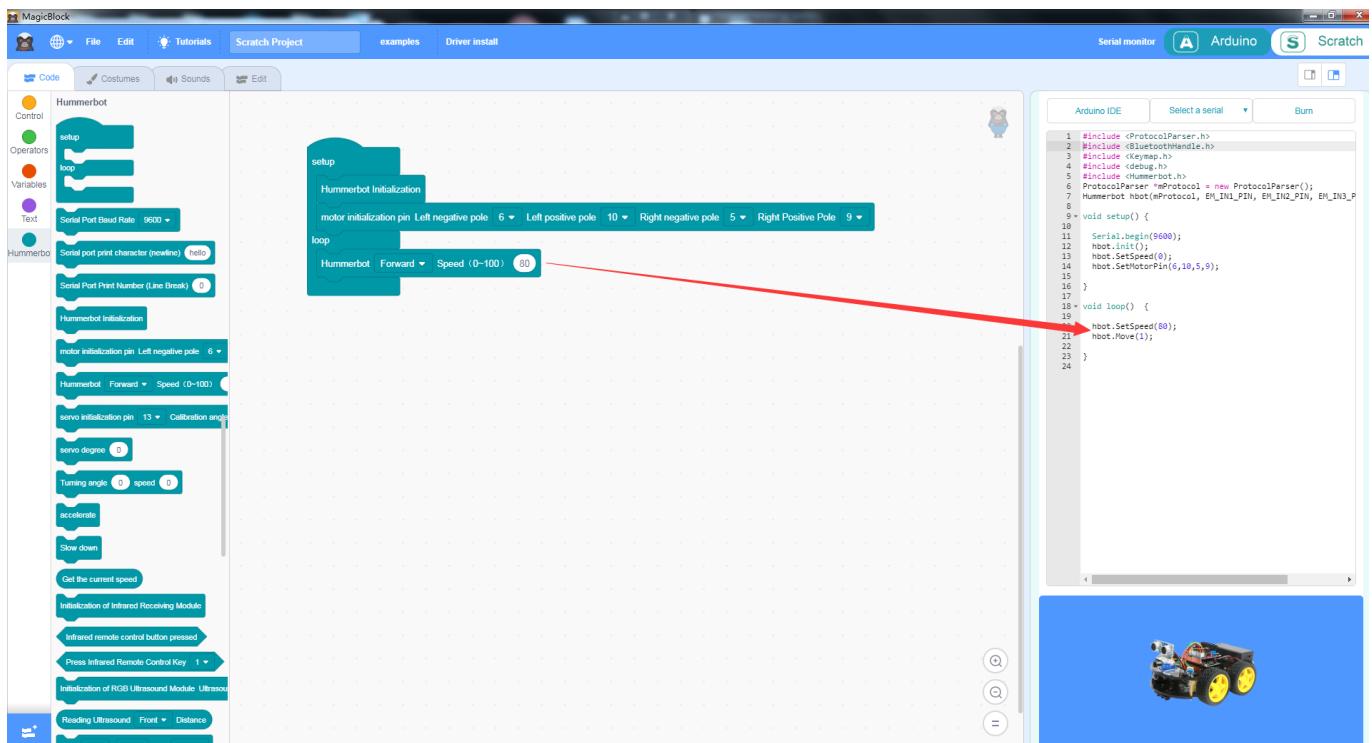
Then drag and pull out the "Hummer cart" initialize the graphics block into the setup, observe the code, find that the graphics block introduces some header files, and then call the init () initialization function of Hummerbot and SetSpeed () to set the speed function in the setup function.



Then we drag out the motor initialization block and put it into the setup. We can find the bottom line of the setup code: hbot.setmotorpin (6,10,5,9); this is the Arduino code represented by this block

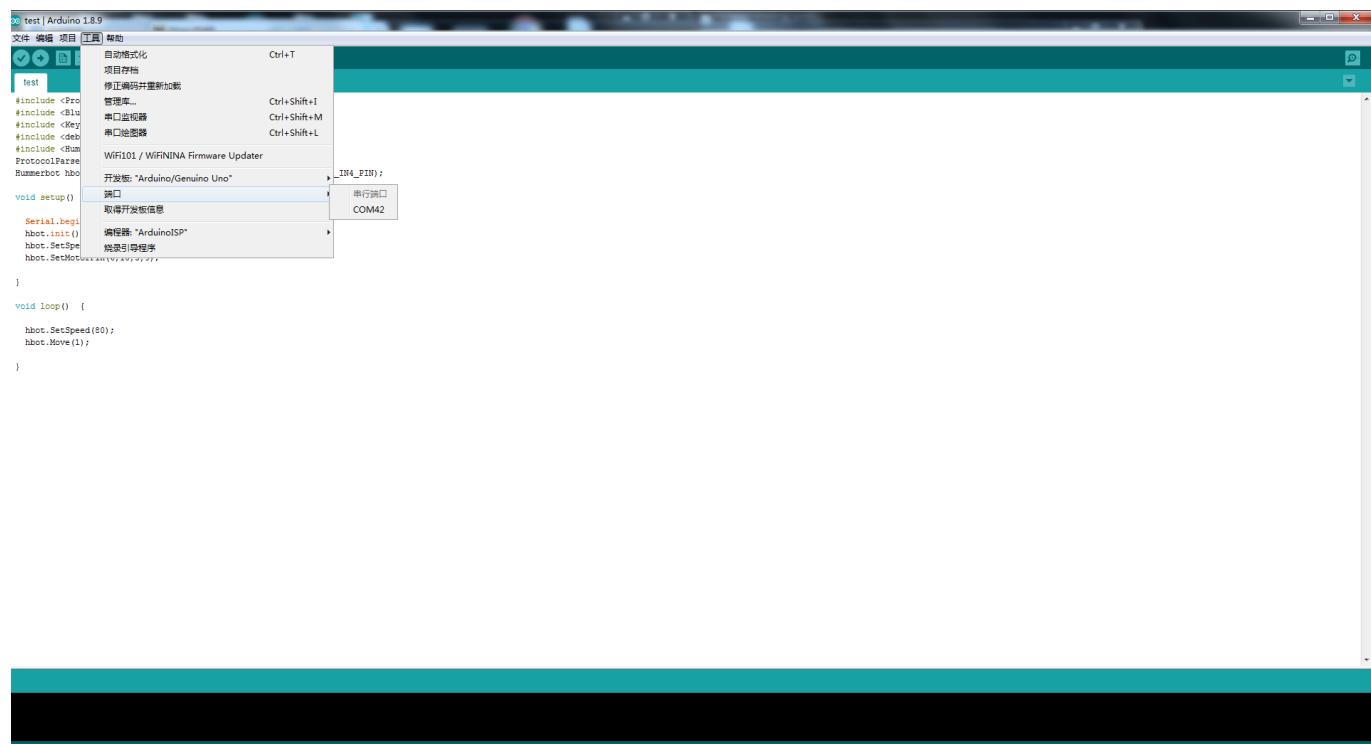


We drag the last graphic block "Hummer car forward, speed 60" to the loop, and there are two lines of code in the right code area. They are the code to set hummerbot forward and the code to set hummerbot speed. At this step, the code in the code area is the complete code of a hummerbot forward program. Next, we need to upload this code to the loop On hummerbot, you can let hummerbot move according to the program we wrote

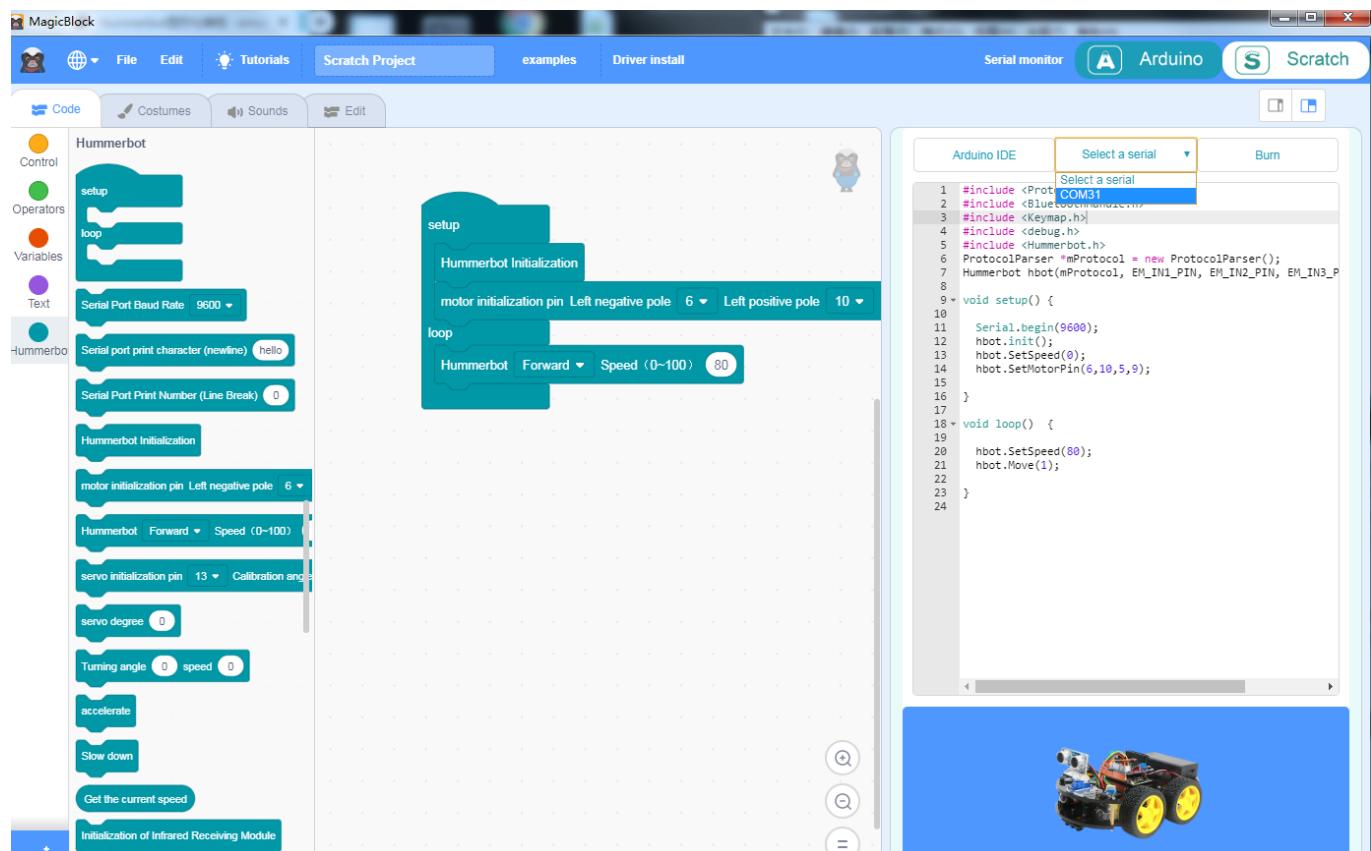


Uploading program

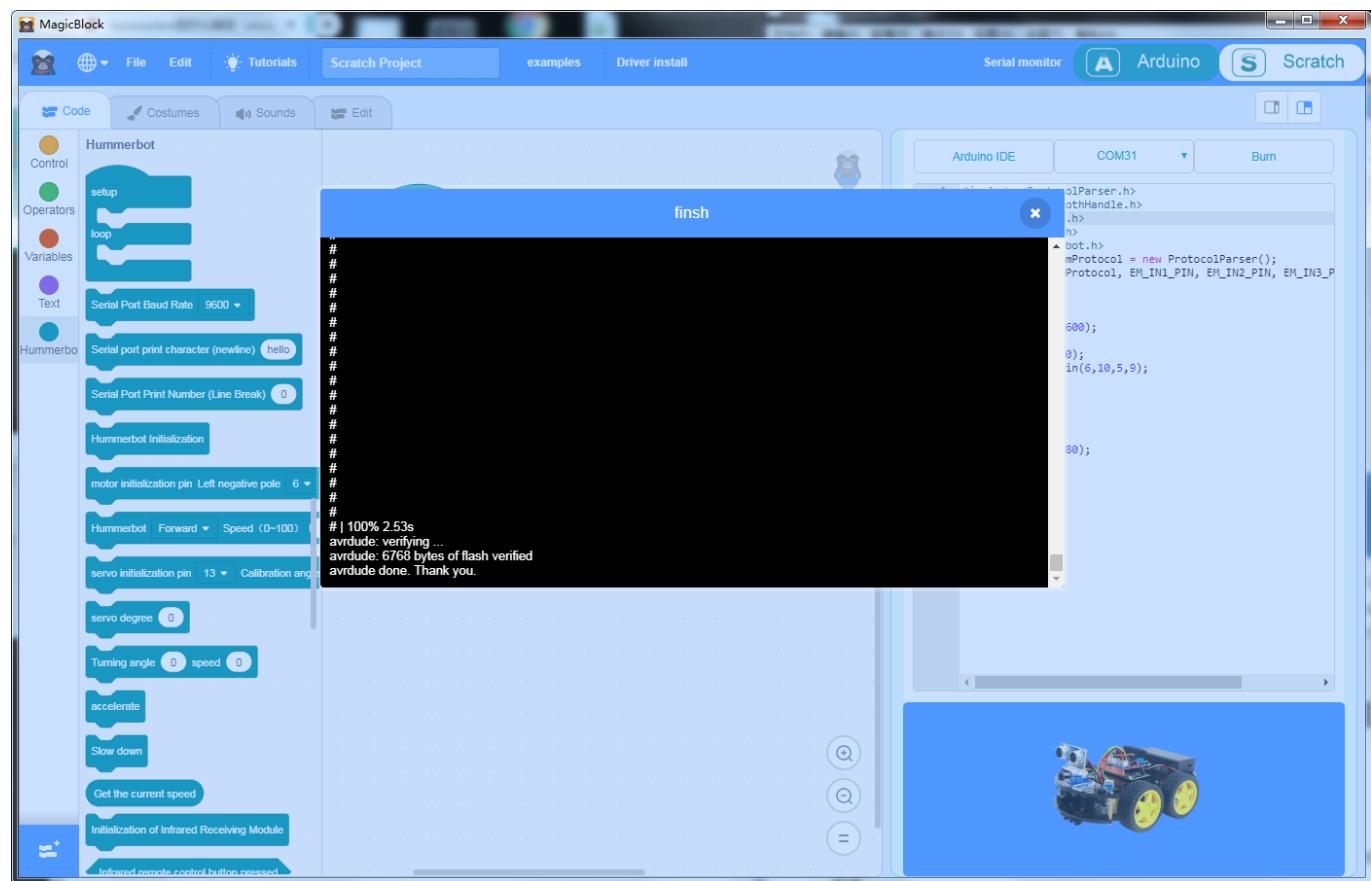
There are three buttons at the top of the code area: "open Arduino ide", "please select serial port" and "burn". Click "open Arduino ide", an editor called Arduini ide will pop up, which can be used to modify the code, compile and upload (select the port before uploading)



Of course, we don't need to open the Arduino ide. We can upload the program by directly clicking the "burn" button, but only if we choose the serial port connection first, otherwise we can't upload. When we connect the computer and hummerbot with the USB cable, click "please select the serial port", and the serial port number will appear. We click the serial port number to connect



Now, click "burn" to upload the program for hummerbot. After the upload is successful, the finish prompt box will pop up. Click "OK" to upload the program successfully. Now, unplug the USB cable, turn on the power of hummerbot, and see how hummerbot executes the program we wrote for it!



Hummerbot modules and magicblock sample program

Motor

Motor introduction

Hummerbot has four DC motors. We use DC motor to control building blocks to let DC motor rotate, so as to drive hummerbot robot to move

Motor test program

We write a simple motor test program with a graphic block: forward 2 seconds, backward 2 seconds, left 2 seconds, right 2 seconds, and then stop 2 seconds



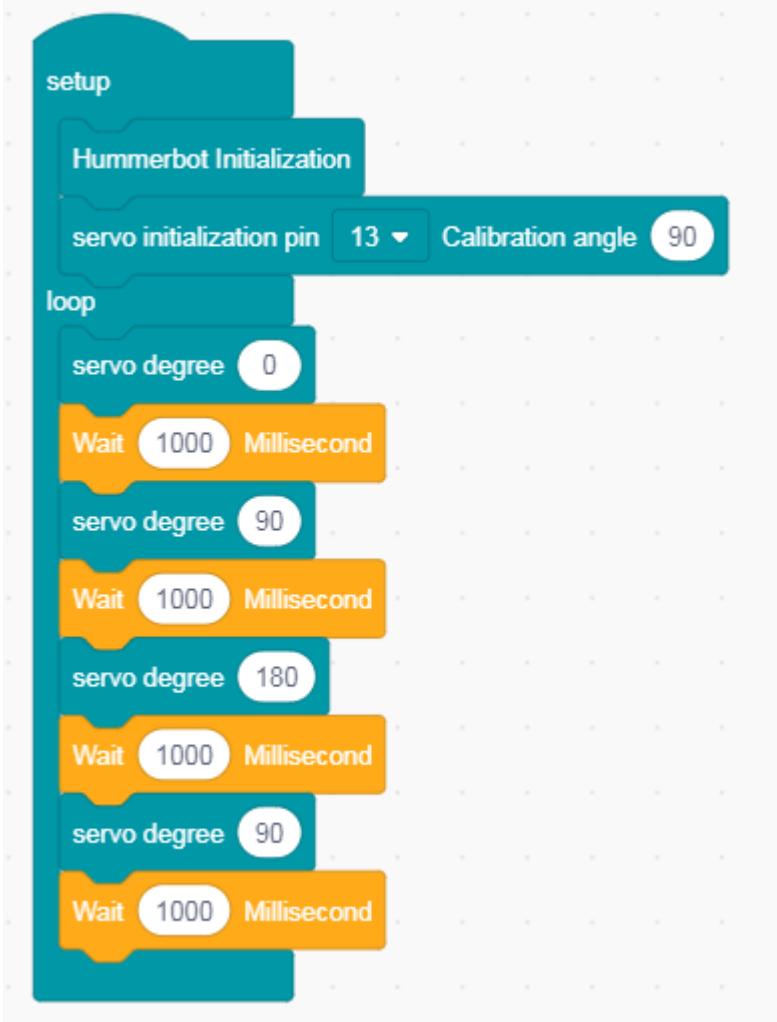
Servo

Servo introduction

The mainly consists of the following parts: steering wheel, reduction gear set, position feedback potentiometer, DC motor, control circuit, etc. when the control circuit board of the steering gear receives the control signal from the signal line, it controls the motor to rotate, the motor drives a series of gear sets, and then drives them to the output steering wheel after deceleration

Servo test program

First, initialize the servo pin and adjust the calibration angle. You may ask what the calibration angle is. In fact, the calibration angle is the angle that the ultrasound we adjusted is facing the front of hummerbot. The ultrasound of hummerbot is installed on the upper end of the steering gear, but there may be a little deviation during the installation, so the steering gear is not facing the front of hummerbot at 90 degrees. At this time, we It is necessary to adjust the calibration angle in the range of 80-100 degrees until the ultrasonic wave is facing the front of hummerbot, so the calibration angle is not just 90 degrees, it is likely to be 80 degrees or 90 degrees. When the angle of the steering gear is adjusted, the steering gear can be turned to the correct angle by using "steering gear angle graphic block"



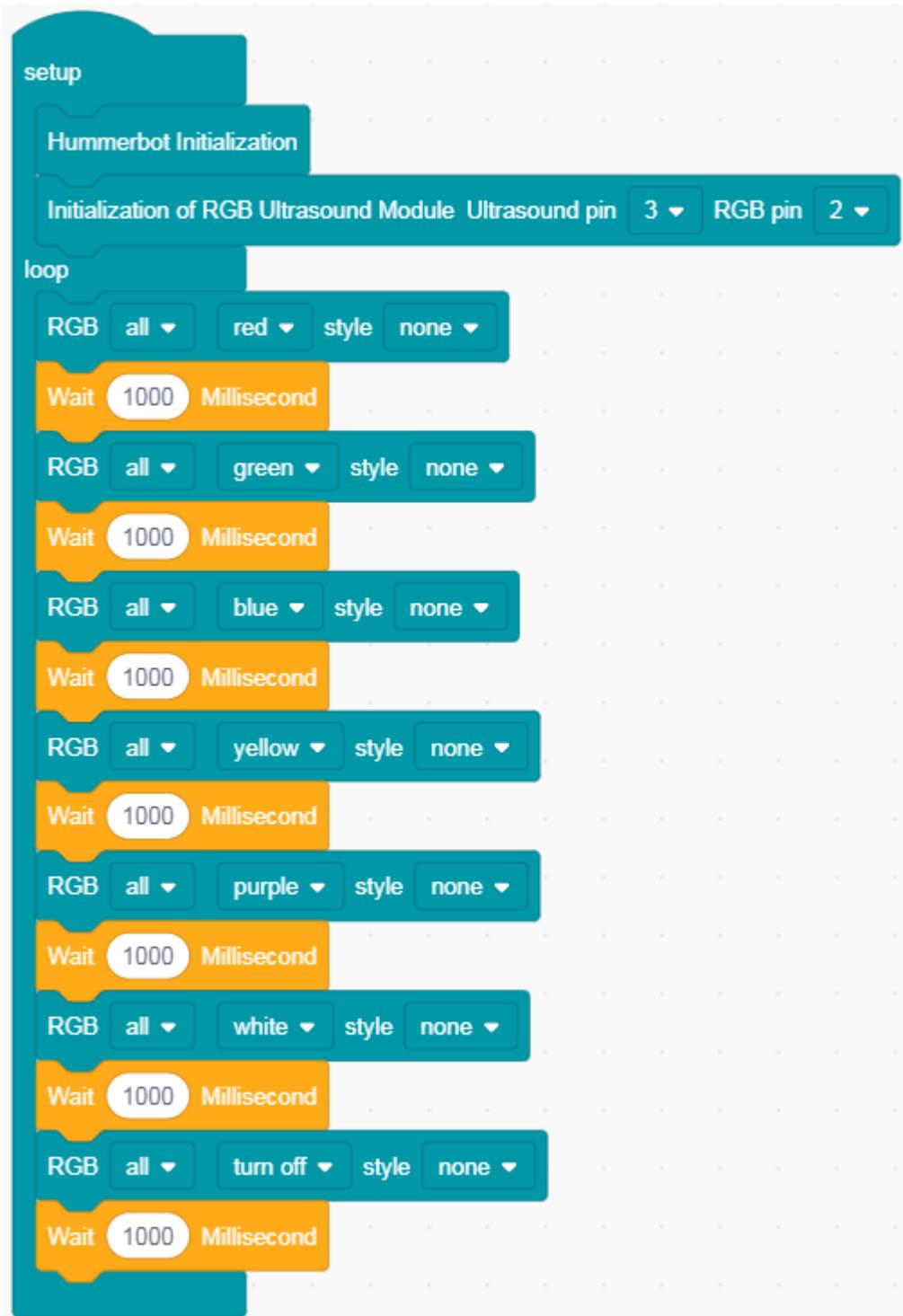
RGB

RGB introduction

Hummerbot has two color lights. They are installed on the ultrasonic module. These two LED lights can emit colorful light. So why can a light emit colorful light? This is related to the three primary colors of light that we learn in physics. The three primary colors of light are red, green and blue, which can be mixed together to present different colors. This is the RGB of hummerbot Principle of lamp

RGB test program

First initialize the RGB ultrasonic module, and then use the RGB graphic block to set the color of the lamp



Ultrasonic module

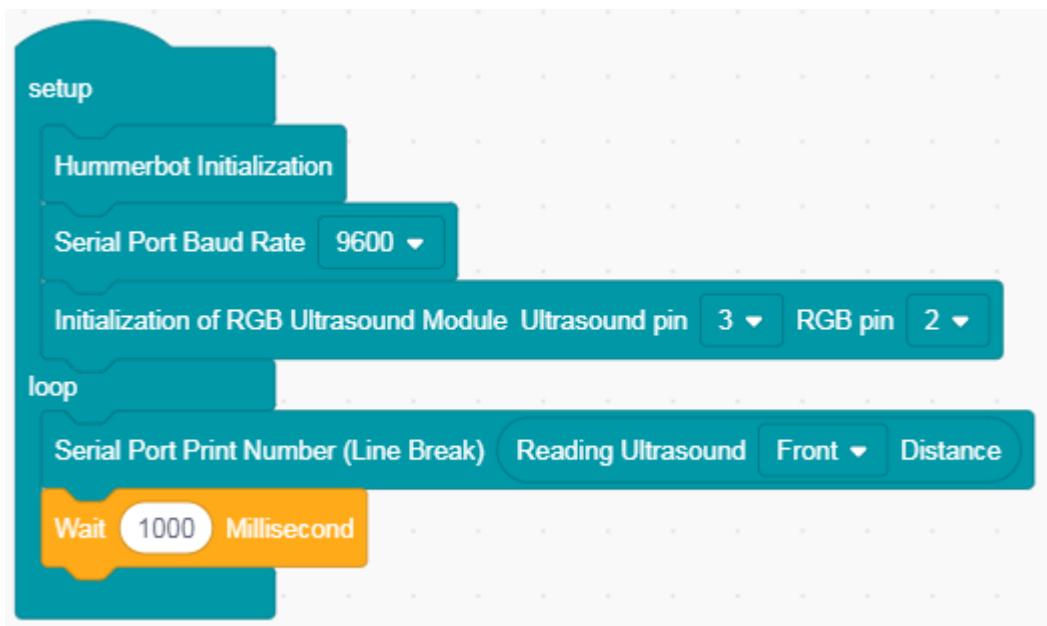
Introduction of ultrasonic module

Ultrasonic sensor is a device that can detect distance by transmitting ultrasonic wave. Ultrasonic wave is a kind of inaudible sound wave, which has the characteristics of returning when touching objects. Ultrasonic sensor has two "eyes", one of which "eyes" emits ultrasonic wave, while the other "eye" receives the ultrasonic wave sent back when encountering obstacles. When one "eye" emits ultrasonic wave, open it Start timing, and stop timing when the other "eye" receives the returned ultrasonic wave. The measured distance of ultrasonic wave = ultrasonic speed × (timing time ÷ 2)



Read ultrasonic distance program

We upload such a program to hummerbot, turn on the serial port monitor, and you can see the distance measured by the serial port printing ultrasonic once a second



Ultrasonic obstacle avoidance program

After testing the ultrasonic module, we can write an ultrasonic obstacle avoidance program for hummerbot by combining the ultrasonic and the steering gear. The idea of the program is that when the ultrasonic reaches the front distance of more than 20, it will go straight ahead. When it is less than 20, it will let the ultrasonic measure the left and right distances. When it is more than 12, it will turn to which side, and then it will continue to measure the front distance and make judgments. Then it will let hummerbot Make corresponding actions

Infrared obstacle avoidance

Introduction of infrared obstacle avoidance module

The principle of infrared obstacle avoidance module is similar to that of ultrasonic module, the difference is that ultrasonic module measures distance by transmitting ultrasonic, infrared obstacle avoidance module measures distance by transmitting infrared, infrared obstacle avoidance module has a pair of infrared transmitting and receiving tubes, which emit infrared, when the infrared

emitted meets obstacles, the infrared is reflected back and received by the receiving tube, green The indicator lights up, and the received infrared signal is processed by the robot's control board, and then the detection distance is calculated

Infrared obstacle avoidance program

The design idea of the infrared obstacle avoidance program is very clear, that is, let the infrared obstacle avoidance module constantly detect the left and right obstacles. If there are no obstacles on the left and right, let the hummerbot move forward. If there are obstacles on the left and right, let the hummerbot move backward. If there are obstacles on the left, turn right. Otherwise, turn left

Ultrasonic + infrared obstacle avoidance program

We have learned the design of ultrasonic obstacle avoidance and infrared obstacle avoidance program. We can combine these two functions to design an ultrasonic infrared obstacle avoidance program

infrared remote control

Principle of infrared remote control

The remote control system is generally composed of a remote control (transmitter) and a receiver. When you press any key on the remote control, the remote control will send a command. After receiving the command from the remote control, the receiver will send the command to the robot's brain. The robot will think about what kind of action to do according to the remote control command, and then control its own limbs to make corresponding actions

Infrared remote control program

We use the six buttons on the remote control to write a simple program to control hummerbot

Bluetooth

Bluetooth module introduction

Bluetooth is a kind of long-distance communication mode. We send the instruction to the Bluetooth module on the robot through the Bluetooth module on the mobile phone app, and then the Bluetooth module on the robot sends the instruction to the brain (main control board) of the robot. The robot controls its limbs to make corresponding actions. At the same time, the robot will also send the instruction to the Bluetooth module installed by itself. The action being done is sent to the mobile app, so that the mobile app can remote control the robot through Bluetooth. The Bluetooth module of hummerbot is installed on the main control board

Bluetooth control program

The Bluetooth control program mainly reads the buttons on the app to let hummerbot react. After uploading the program, open the app to connect the mobile phone and hummerbot through Bluetooth. After the connection is successful, the blue light on the main control board is always on.

After the connection is successful, select the remote control interface, and then you can control hummerbot

PS2

PS2 remote control handle principle

PS2 remote control handle is composed of two parts: handle and receiver. The handle needs two 7 batteries to supply power. Turn the handle switch to on. If the receiver is not searched, the light on the handle will flash continuously. If the receiver handle is not searched within a certain period of time, it will enter the standby mode. The light on the handle will be extinguished. At this time, press the "start" key to wake up the handle and receive it. The working power supply of the device is 3-5v, which cannot be reversed or over-voltage. Otherwise, the receiver will burn out. After normal power on, the handle and the receiver will be automatically paired and connected. In the state of unsuccessful pairing, the green light of the receiver will flash, and the light on the handle will flash. After successful pairing, the green light of the receiver will be on, and the light on the handle will also be on. When the handle and the receiver are connected, we can When the receiver receives these commands, the brain (main control board) of the robot will follow the commands received and let its limbs do corresponding actions

PPS2 remote control program

Light tracing module

Light tracing module introduction

The light tracing function of the light tracing module enables to judge the light intensity of the surrounding environment through the photodiode and output the analog signal. When the photoresistor is illuminated by the strong light, its resistance value drops rapidly, the current passing through increases, the resistance of the photoresistor rises rapidly in the dark environment, and the current passing through decreases. The main control board judges whether there is a light source based on this

Light tracing program

Infrared tracking

Infrared tracking module introduction

The infrared tracking module works by using the characteristics that infrared rays have different reflective properties on the surface of objects with different colors. In the process of robot movement, infrared light is continuously emitted to the ground. When the infrared rays are not reflected back or reflected back but the intensity is not large enough, the robot thinks that this area is its route to go. When the infrared light is reflected back by the machine The human recognizes that the robot thinks that this area is not its route. There are three tracking modules on hummerbot, one on the left, one on the middle and one on the right

Infrared tracking program

Tracking fire

Tracking fire module introduction

The fire extinguishing function module consists of two flame sensors and a fan on the left and right. Based on the automatic tracking function and the fire extinguishing function, hummerbot can continuously detect the fire source during the tracking process. When the fire source is detected, the rudder will turn to the direction of the fire source, turn on the fan to blow out the fire source, and then continue to do the tracking movement

Trace fire fighting procedure