Microbit handle control

1. Learning objectives

In this course, we mainly learn how to use Python programming to control the building block spider with the micro:bit handle.

2. Building block construction

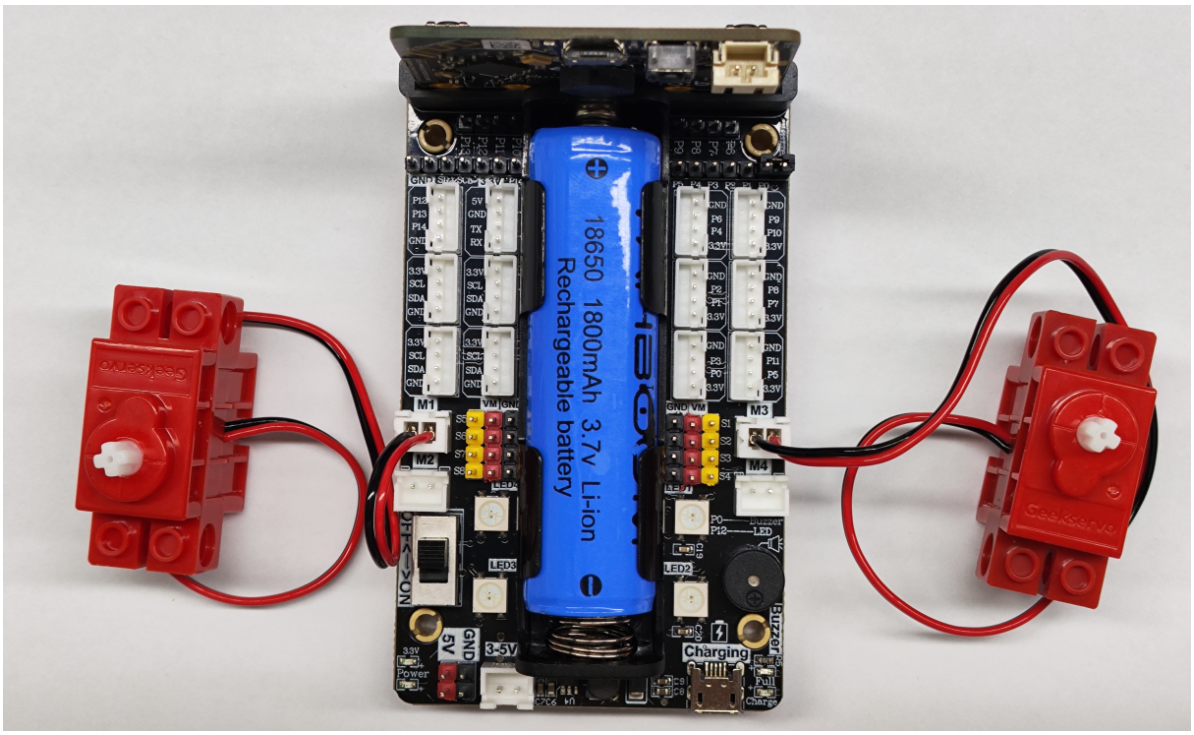
For the building block construction steps, please refer to the installation drawings of [Assembly course]-[Spider] in the materials or the building block installation album.

3. Motor wiring

The motor wiring on the left side of the car is inserted into the M1 interface of the Super:bit expansion board, and the black line is close to the battery side;

The motor wiring on the right side of the car is inserted into the M3 interface of the Super:bit expansion board, and the black line is close to the battery side;

As shown below:



4. Code analysis

4.1 Spider

For the program, please refer to the **Spider code.py** file.

```
from microbit import *
import superbit
import radio
import neopixel
```

First, import the libraries needed for this lesson from microbit: the superbit library is dedicated to the superbit expansion board; neopixel is used to control RGB lights; radio is used for the wireless communication function of micro:bit.

```
radio.on()
radio.config(group=1)
display.show(Image("09090:09090:00900:09090:09090"))
np = neopixel.NeoPixel(pin12, 4)
```

radio.on(): Turn on the wireless function. Because the wireless function consumes more power and occupies more memory, it is turned off by default. You can also use radio.off() to turn off the wireless function;

radio.config(group=1): Configure wireless group=1, so that other microbit devices with wireless group=1 can communicate with each other. The default is 0, and the selectable group is 0~255. The set group value needs to be consistent with the handle setting, otherwise it will not communicate normally;

display.show(Image("09090:09090:00900:09090:09090")): Display a custom pattern on the microbit dot matrix;

np = neopixel.NeoPixel(pin12, 4): RGB light initialization settings, there are 4 RGB lights in total, connected to the P12 pin of the microbit motherboard (you can check the hardware interface manual);

```
while True:
incoming = radio.receive()
if incoming == 'up':
superbit.motor_control(superbit.M1, -255, 0)
superbit.motor_control(superbit.M3, -255, 0)
...
```

In the main loop, determine whether the spider receives the command sent by the handle, control the spider's movement state and the color of the RGB light.

incoming = radio.receive(): Receive data transmitted wirelessly and save it to the incoming variable; if incoming is ‘up’, the spider moves forward, ‘down’ makes the spider move backward, ‘left’ makes the spider rotate to the left, ‘right’ makes the spider rotate again, and ‘stop’ makes the spider stop;

If incoming is ‘R’, the body RGB lights up red, ‘G’ makes the body RGB light up green, ‘B’ makes the body RGB light up blue, and ‘Y’ makes the body RGB light up yellow.

! Note:

The value of incoming needs to correspond to the value sent by the handle. Only the same value can receive and execute commands.

4.2 Handle

For the program, please refer to the **Handle code.py** file.

```
from microbit import display, Image
import ghandle
import radio
```

First, import the libraries needed for this lesson from microbit: the ghanle library is dedicated to the micro:bit hand; radio is used for the wireless communication function of micro:bit.

```
display.show(Image.HEART)
radio.on()
radio.config(group=1)
```

display.show(Image.HEART): Display a heart pattern on the microbit dot matrix;

radio.on(): Turn on the wireless function. Because the wireless function consumes more power and occupies more memory, it is turned off by default. You can also use radio.off() to turn off the wireless function;

radio.config(group=1): Configure wireless group=1, so that other microbit devices with wireless group=1 can communicate with each other. The default is 0, and the selectable group is 0~255. The set group value needs to be consistent with the handle setting, otherwise it will not communicate normally;

```
while True:

if ghandle.rocker(ghandle.up):
radio.send('up')
display.show(Image.ARROW_N)
elif ghandle.rocker(ghandle.down):
radio.send('down')
display.show(Image.ARROW_S)
elif ghandle.rocker(ghandle.left):
radio.send('left')
display.show(Image.ARROW_W)
elif ghandle.rocker(ghandle.right):
radio.send('right')
display.show(Image.ARROW_E)
elif ghandle.rocker(ghandle.pressed):
radio.send('turn_off')
display.show(Image.NO)
else:
radio.send('stop') display.clear()
```

If ghandle.rocker(ghandle.up) is True, it means that the joystick of the handle is pushed up, so that the wireless sends the 'up' command and displays an upward icon;

If ghandle.rocker(ghandle.down) is True, it means that the joystick of the handle is pushed down, so that the wireless sends the 'down' command and displays a downward icon;

If ghandle.rocker(ghandle.left) is True, it means that the joystick of the handle is pushed to the left, so that the wireless sends the 'left' command and displays a left icon;

If ghandle.rocker(ghandle.right) is True, it means that the joystick of the handle is pushed to the right, so that the wireless sends the 'right' command and displays a right icon;

If ghandle.rocker(ghandle. pressed) is True, it means that the joystick of the handle is pressed, so the wireless sends the 'pressed' command and displays the 'X' icon;

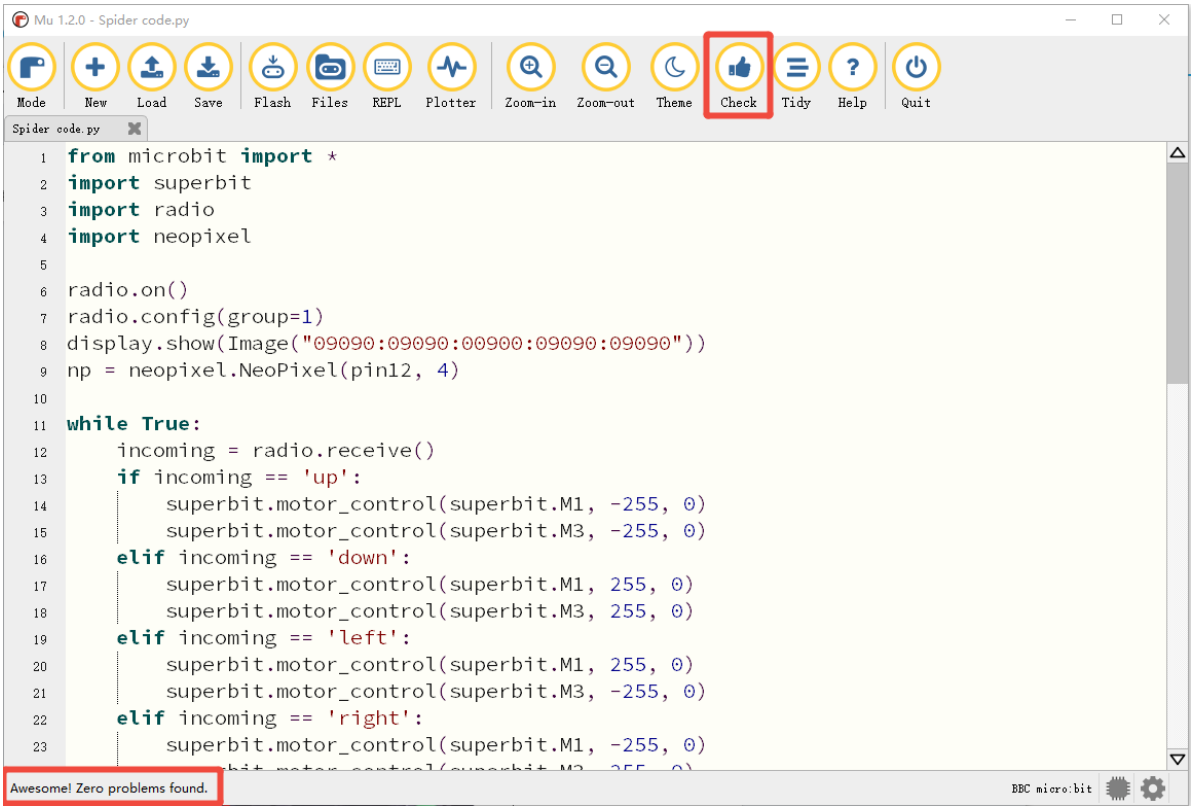
If the remote control has no operation, it sends 'stop' and clears the display;

```
if ghandle.B1_is_pressed():
radio.send('R')
display.show("R")
if ghandle.B2_is_pressed():
radio.send('G')
display.show("G")
if ghandle.B3_is_pressed():
radio.send('B')
display.show("B")
if ghandle.B4_is_pressed():
radio.send('Y')
display.show("Y")
```

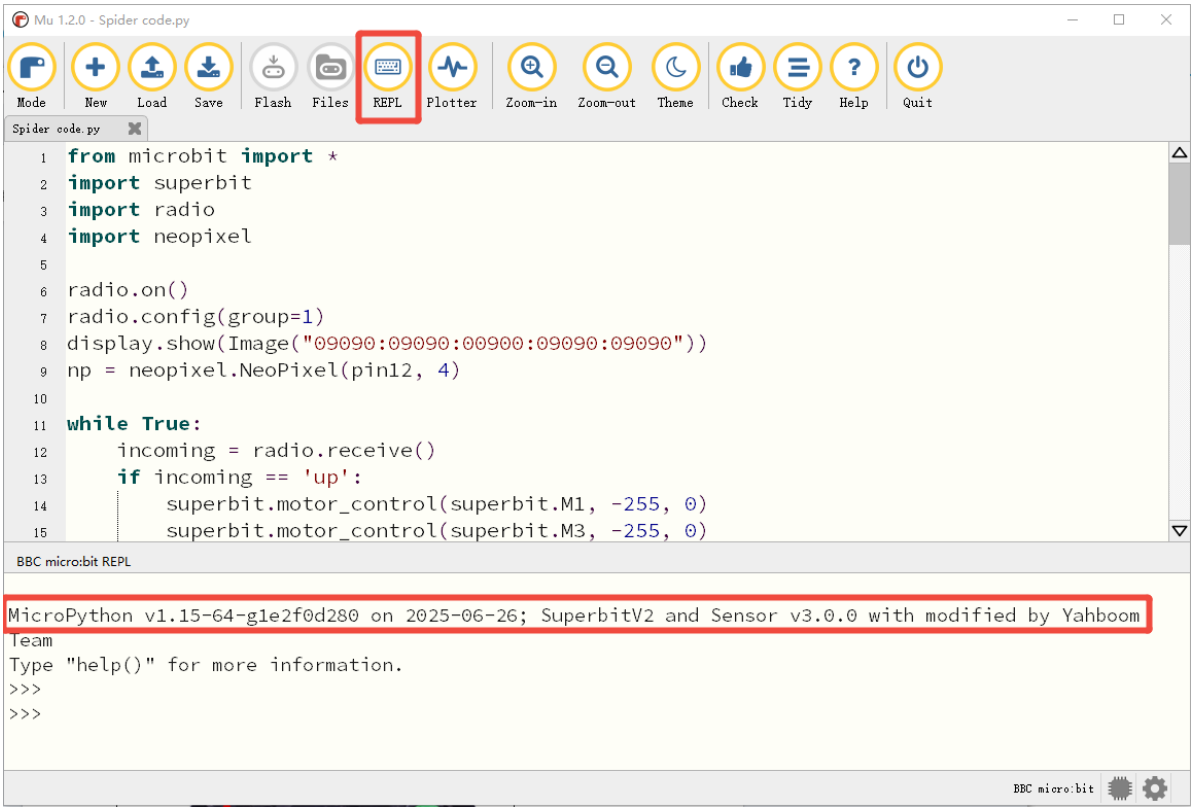
Next, detect the button and send R', 'G', 'B', 'Y' commands corresponding to B1 (red), B2 (green), B3 (blue), and B4 (yellow).

5. Write and download the program

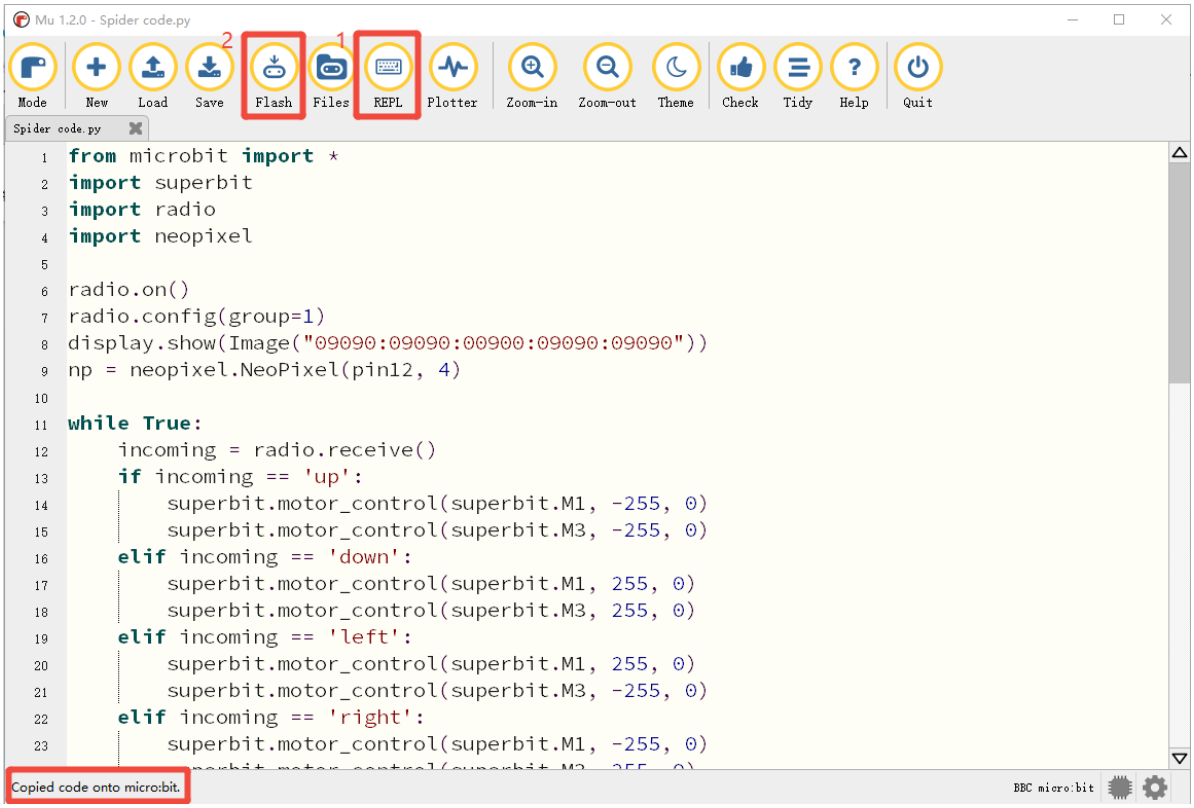
1. Open the Mu software and enter the code in the editing window. **Note! All English and symbols should be entered in English, use the Tab key for indentation, and the last line ends with a blank program.**
2. Click the thumb 'Check' button to check if there are any errors in our code. If a cursor or underline appears in a line, it means a syntax error. Please check and modify it. If there is no error, the lower left corner will prompt that there is no problem with the detection.



3. Click the 'REPL' button to check whether the Superbit library has been downloaded. If not, please refer to [Preparation before class] --> [2.4 Python Programming Guide].



4. After the program is written, connect the computer and microbit mainboard with a microUSB data cable, please click the 'Flash' button to download the program to the micro:bit mainboard. **(You need to click the 'REPL' button again to turn off the import library file function before you can download the program normally).**



5. If the download fails, please confirm whether the microbit is connected to the computer normally via the microUSB data cable and the Superbit Python library has been imported.

6. Experimental phenomenon

We need to download the **Spider code.py** file to the micro:bit mainboard of the spider, turn on the power switch of the spider, and we can see a smiley face pattern displayed on the micro:bit dot matrix;

Download the **Handle code.py** file to the micro:bit mainboard of the handle, turn on the power switch of the handle, and we can see that the micro:bit dot matrix will be initialized to display a heart pattern, and then an "X" pattern will be displayed, indicating that the handle is in the default state and no data is sent.

The two will automatically complete the pairing, and then we can start remote control of the spider.

The handle functions are as follows.