

Wristbit control Proficient Carrier

Tips:

1) Before downloading the program, we need to import the superbit library file to the micro:bit board of the car.

More detail, please check [1.Preparation before class]--[How to import python library file].

2) After the program is downloaded, open the power switch of wrist:bit and car normally, they will be automatically paired, and they can be controlled within the range of signal transmission.

1. Learning goals

In this lesson, we will learn to use Wrist:bit control Proficient Carrier by Python programming.

2.Wireless communication principle

Through the micro:bit radio module, different devices can work together through a simple wireless network. When the radio function is turned on, a simple wireless local area network is generated. The micro:bit board with the radio function turned on can be set parameters to communicate within the effective range.

Wireless communication is divided into sending and receiving two program blocks, set the radio group of radio to the same group, two micro:bit boards can communicate.

3.Code and analysis

Please check the .py file for the detailed program of this course.

Wrist:bit code:

```
1 from microbit import *
2 import neopixel
3 import radio
```

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

```

4 Red = (255, 0, 0)
5 Orange = (255, 165, 0)
6 Yellow = (255, 255, 0)
7 Green = (0, 255, 0)
8 Blue = (0, 0, 255)
9 Violet = (148, 0, 211)
10 White = (255, 255, 255)
11 Black = (0, 0, 0)
12 color_lib = {'Red': Red, 'Orange': Orange, 'Yellow': Yellow, 'Green': Green,
13             | 'Blue': Blue, 'Violet': Violet, 'White': White, 'Black': Black}
14
15 def RGBLight_more_show(first, num, color):
16     global np
17     np.clear()
18     for i in range(first, first + num):
19         np[i] = color_lib[color]
20     np.show()

```

This program is used to define RGB lights of different colors and define the function RGBLight_more_show to control the color of RGB lights.

This function will be called in the main loop.

```

60 display.show(Image.HEART)
61 np = neopixel.NeoPixel(pin1, 1)
62 radio.on()
63 radio.config(group=1)

```

display.show(Image.HEART): Display the heart pattern on the micro:bit matrix;

np = neopixel.NeoPixel (pin1, 1): RGB lamp initialization settings, a total of 1 RGB lamps, connected to the P1 pin of the micro:bit board;

radio.on(): Turn on the wireless function, because the wireless function consumes more power and occupies memory, so it be closed by default. We can also use radio.off() to turn off the wireless function;

radio.config(group=1): configure wireless group=1, other micro:bit devices with wireless group=1 can communicate with each other, the default is 0. The selectable group is 0~255. The set group value needs to be consistent with the setting of the handle, otherwise it cannot communicate normally;

```

22 def send_control():
23     gesture = accelerometer.current_gesture()
24     if gesture == "face up":
25         radio.send('0')

```

Define **send_control()** function be used to control car.

if the wrist:bit is facing upward, the micro:bit dot matrix displays X and sends the string '0';

if the wrist:bit detects vibration, the RGB light of wrist:bit turns off and sends the string '1';

If the micro:bit logo up, the micro:bit dot matrix displays the arrow points to the south and sends the string 'D';
 if the micro:bit logo up, the micro:bit dot matrix displays the arrow points to the north and sends the string 'C';
 if the micro:bit tilt left, the micro:bit dot matrix display arrow points to the west and sends the string 'B';
 if the micro:bit tilt right, the micro:bit dot matrix display arrow points to the east and sends the string 'A';
 if the micro:bit button A is pressed, the RGB light of wrist:bit lights up red and sends the string 'E';
 if the micro:bit button B is pressed, the RGB light of wrist:bit lights up green and sends the string 'F';
 when the A and B buttons are pressed at the same time, the RGB light of wrist:bit lights up yellow and sends the string 'H'.

Proficient Carrier car code:

```
1 # -*- coding: utf-8 -*-# E
2 from microbit import *
3 import tinybit
4 import radio
5 import neopixel
```

First, we need to import the library needed for this lesson from micro:bit, superbitt library is dedicated to superbitt car; neopixel is used to control RGB lights; radio for micro:bit wireless communication function.

```
7 Red = (255, 0, 0)
8 Orange = (255, 165, 0)
9 Yellow = (255, 255, 0)
10 Green = (0, 255, 0)
11 Blue = (0, 0, 255)
12 Violet = (148, 0, 211)
13 White = (255, 255, 255)
14 Black = (0, 0, 0)
15 color_lib = {'Red': Red, 'Orange': Orange, 'Yellow': Yellow, 'Green': Green,
16             'Blue': Blue, 'Violet': Violet, 'White': White, 'Black': Black}
17
18 def RGBLight_more_show(first, num, color):
19     global np
20     np.clear()
21     for i in range(first, first + num):
22         np[i] = color_lib[color]
23     np.show()
```

This program is used to define RGB lights of different colors and define the function RGBLight_more_show to control the color of RGB lights.
 This function will be called in the main loop.

```

np = neopixel.NeoPixel(pin12, 4)
display.show(Image.HAPPY)
radio.on()
radio.config(group=1)
superbit.servo270(superbit.S1, 120)

```

np = neopixel.NeoPixel (pin12, 4): RGB lamp initialization settings, a total of 4 RGB lamps, connected to the P12 pin of the micro:bit board;

display.show(Image.HEART): Display the heart pattern on the micro:bit matrix;

radio.on(): Turn on the wireless function, because the wireless function consumes more power and occupies memory, so it be closed by default. We can also use **radio.off()** to turn off the wireless function;

radio.config(group=1): configure wireless group=1, other micro:bit devices with wireless group=1 can communicate with each other, the default is 0. The selectable group is 0~255. The set group value needs to be consistent with the setting of the handle, otherwise it cannot communicate normally;

superbit.servo270(superbit.S1, 120): The servo is initialized to 120°. The car shovel is flatting.

```

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

```

incoming = radio.receive(): Receive the wirelessly transmitted data and save it in the incoming variable;

if incoming is 'A', the car move forward;
 if incoming is 'B', the car move backward;
 if incoming is 'C', the car spin left;
 if incoming is 'D', the car spin right;
 if incoming is 'O', the car stop.

If incoming is 'E', the RGB lights become red and car shovel is flatting.

If incoming is 'F', the RGB lights become green and car shovel is unloading.

If incoming is 'H', the RGB lights become yellow and car shovel is is lifting.

If incoming is 'I', the RGB lights will be closed.

! Note:

The incoming value needs to correspond to the value sent by the wrist:bit. Only the same value can receive and execute commands.

Note:

- 1 - The capital letter/lowercase letters must be distinguished !
- 2 - Correct spelling!
- 3 - Keywords such as # need a space between the content.
- 4 - You can only use the Tab key (tabulation key) for indentation.

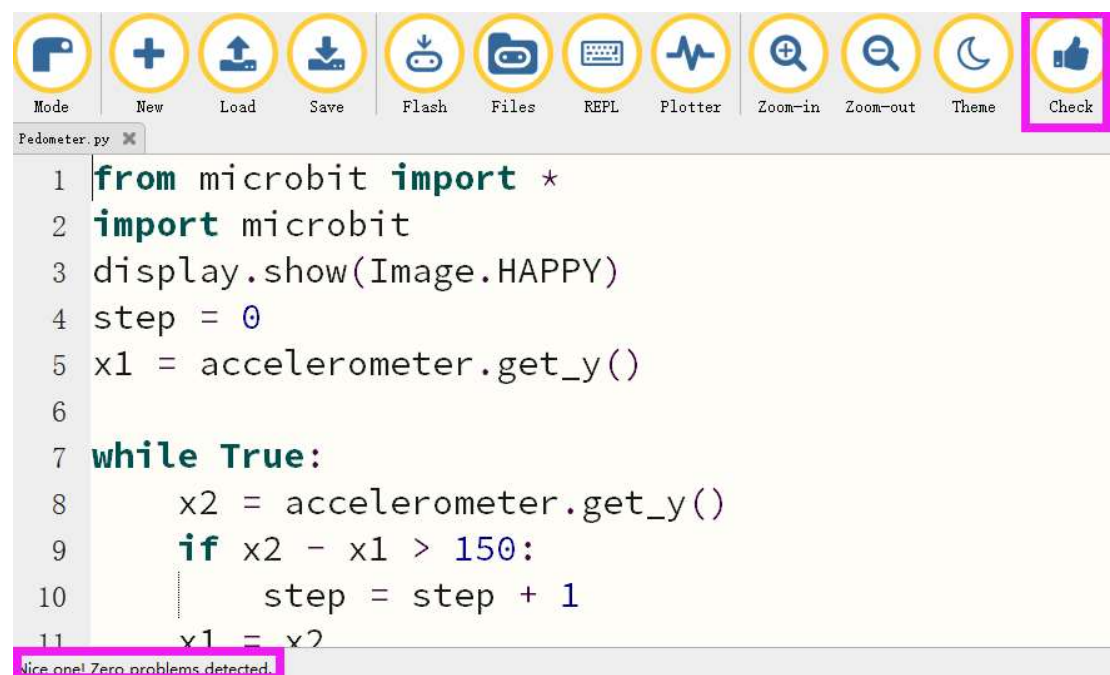
4. Programming and downloading

4.1 You should open the Mu software, and enter the code in the edit window.

Note! All English and symbols should be entered in English, and the last line must be a space.

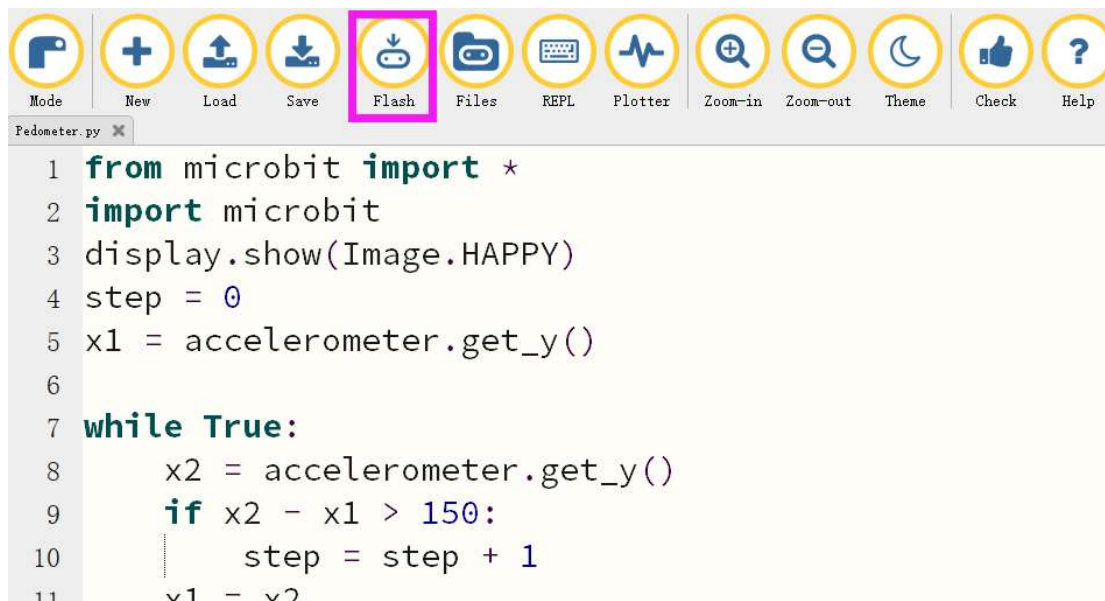


4.2 As shown in figure, you need to click the Check button to check if our code has an error. If a line appears with a cursor or an underscore, the program indicating this line is wrong.



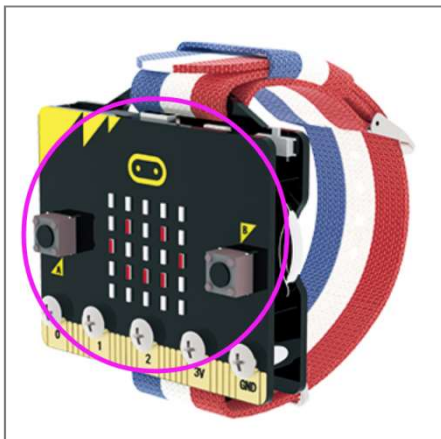
4.3 You need to connect the micro data cable to micro:bit and the computer, then

click the Flash button to download the program to micro:bit.



4.4 If the download failed, please confirm whether the micro:bit is connected to the computer through the micro USB data cable, and confirm whether the super:bit Python library has been imported.

5. Experimental phenomena



We need to download Proficient-Carrier-code.py file into micro:bit board of Proficient Carrier.

We need to download Wristbit-code.py file into micro:bit board of Wristbit.

Take wrist:bit on your left wrist as shown below.



Proficient Carrier dot matrix of will display a smile. Wrist:bit dot matrix will display a heart pattern.

if the wrist:bit is facing upward, car will stop;

if the micro:bit tilt left, the micro:bit dot matrix display arrow points to west, car will back;

if the micro:bit tilt right, the micro:bit dot matrix display arrow points to the east, car will advance;

If the micro:bit logo up, micro:bit dot matrix display points to the south, car will spin left;

if the micro:bit logo down, micro:bit dot matrix display points to the north, car will spin right;

if we press the button A, the RGB lights of the Wrist:bit and the car will become red. The car shovel is flatting.

When we press button B, the RGB lights of the Wrist:bit and the car will become green. The car shovel is unloading.

if we press the A and B buttons at the same time, the RGB lights of the Wrist:bit and the car will become blue. The car shovel is is lifting.

if we shaking the Wrist:bit, the RGB lights of Wrist:bit and the car will off.