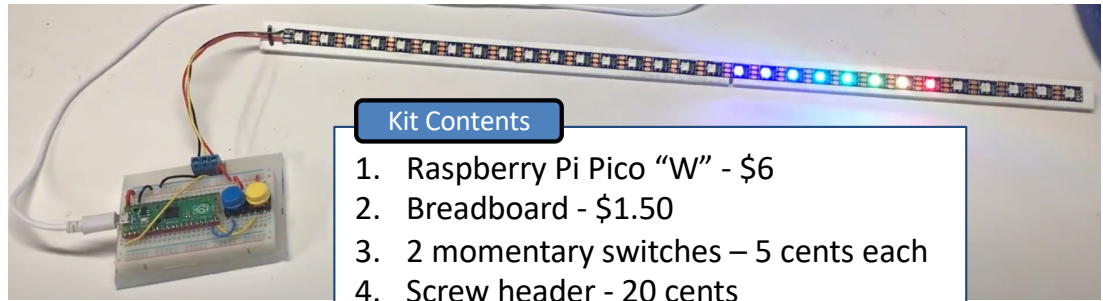




Moving Rainbow

2022 IoT Hackday



Kit Contents

1. Raspberry Pi Pico "W" - \$6
2. Breadboard - \$1.50
3. 2 momentary switches – 5 cents each
4. Screw header - 20 cents
5. LED strip (SW2812B) – \$4 to \$7.5

Step 1: Use buttons to change the mode

What do the buttons do? Do they go forward and backward in pattern?
How many "modes" are there? What is your favorite pattern?

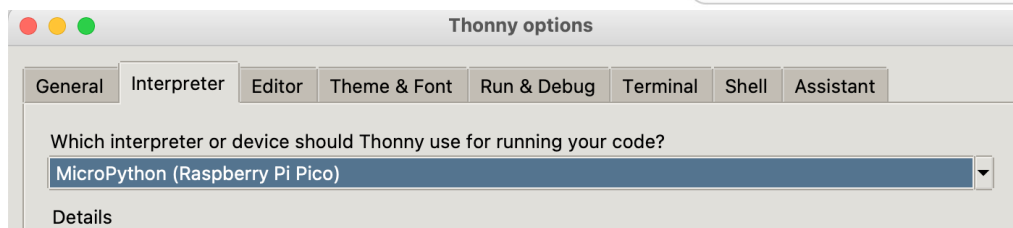
Step 2: Install Thonny on your Mac or PC

Go to <https://thonny.org>
Download the version for your PC or Mac
Set the Interpreter to be MicroPython (Raspberry Pi Pico)



Download version **3.3.13** for
[Windows](#) • [Mac](#) • [Linux](#)

For the curious: [4.0.ob3](#)



Step 3: Connect the USB to the Pico

Connect the USB from your PC to the Pico
Press Stop/Reset and check prompt

```
MicroPython v1.19.1-88-g74e33e714 on 2022-06-30; Raspberry Pi Pico W with RP2040
Type "help()" for more information.
>>>
```

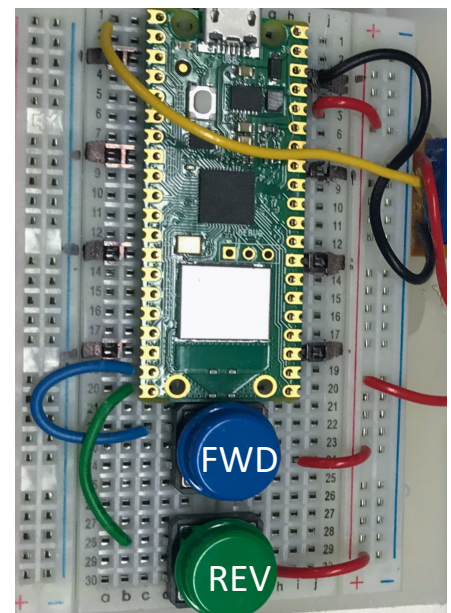
Step 4: Find the Blink program

<http://dmccreary.github.io/moving-rainbow>

Step 4: Run the Blink Program

```
1 from neopixel import NeoPixel
2 from utime import sleep
3
4 NEOPIXEL_PIN = 0
5 NUMBER_PIXELS = 60
6
7 strip = NeoPixel(machine.Pin(NEOPIXEL_PIN), NUMBER_PIXELS)
8
9 while True:
10     # turn first red pixel on for 1/2 second
11     strip[0] = (255,0,0)
12     strip.write()
13     sleep(.5)
14
15     # turn off for 1/2 second
16     strip[0] = (0,0,0)
17     strip.write()
18     sleep(.5)
```

Mode Buttons



MicroPython NeoPixel Code Examples

Sample Preamble

```
from neopixel import NeoPixel
from utime import sleep
NEOPIXEL_PIN = 0
NUMB_PIXELS = 60
strip = NeoPixel(machine.Pin(NEOPIXEL_PIN), NUMB_PIXELS)
```

Sample Moving Pixel

```
10 delay = .03
11 while True:
12     for i in range(0, NUMBER_PIXELS - 1):
13         # turn index red pixel on for a short delay
14         strip[i] = (255,0,0)
15         strip.write()
16         sleep(delay)
17
18     # turn off
19     strip[i] = (0,0,0)
```

Color Codes

```
red = (255, 0, 0)
orange = (140, 60, 0)
yellow = (255, 255, 0)
green = (0, 255, 0)
blue = (0, 0, 255)
cyan = (0, 255, 255)
indigo = (75, 0, 130)
violet = (138, 43, 226)
purple = (255,0,255)
white = (128, 128, 128)
off = (0,0,0)
```

Sample Labs

<http://dmccreary.github.io/moving-rainbow/lessons>

1. Press the forward (FWD) and back (REV) mode buttons to change the pattern
2. Get "blink" lab to work
3. Change the color of the blink lab
4. Change the "delay" time in the blink lab – what happens around 0.01 seconds?
5. Make a single pixel fade in and out
6. Simulate a heartbeat pattern (on for 1/10 of a second, off for 1.5 seconds)
7. Make a pixel appear to move from one pixel to the next
8. Change the color and speed of the moving pixel
9. Try one of the 20 patterns in the lessons section
10. Add debug code to the button press code. Use another pin for the buttons.
11. Try all the modes
12. Create your own mode pattern
13. Learn how to solder solid wires to ends of an LED strip or battery pack
14. Hook up a battery to breadboard rails
15. Connect 5v, GND and DATA wires and verify the LED strip works
16. Hook up LED circuit in series with 330-ohm resistor
17. Create a web page and use it to control the colors of the LED strip
18. Use your phone to change the colors of the LED strip
19. Create a program that gets the weather report from a web service
20. Hook up an OLED display to your kit and practice some drawing
21. Walk around and ask people about their career and what they enjoy
22. Visit the CoderDojoTC Micropython site: <https://www.coderdojotc.org/micropython>