Trinket M0 Using Circuit Python

TechAhoy Project

What is a Tomato Timer?

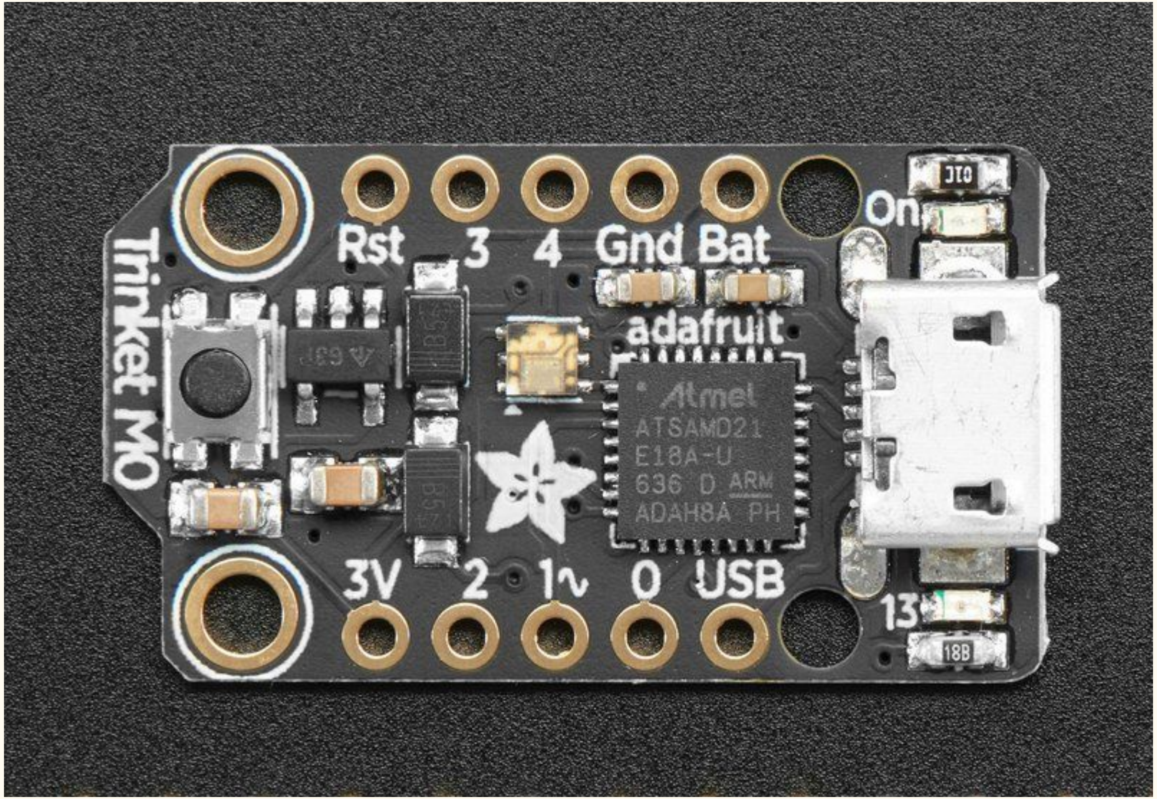
- Productivity Tool Used by Engineers
    - 25 minutes of work
    - 5 minutes of rest.

Materials

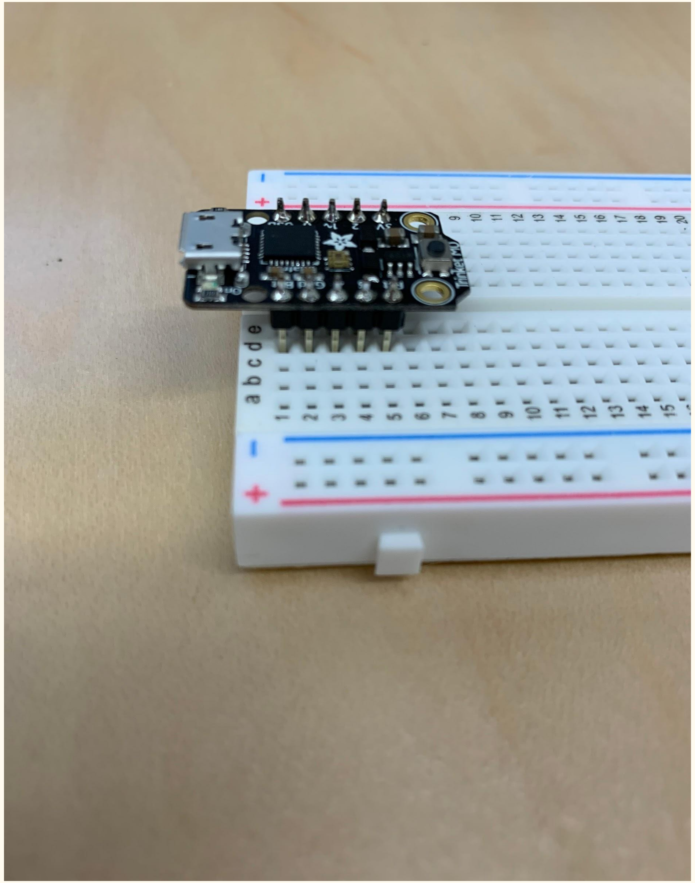
All available at TechAhoy!

- Trinket M0
- 5 LED Strip
- Breadboard (for prototyping)
- Header Pins
- Push Button Switch
- 2 Male Jumper Cables
- 3 Alligator Clips
- Micro USB Data Cable

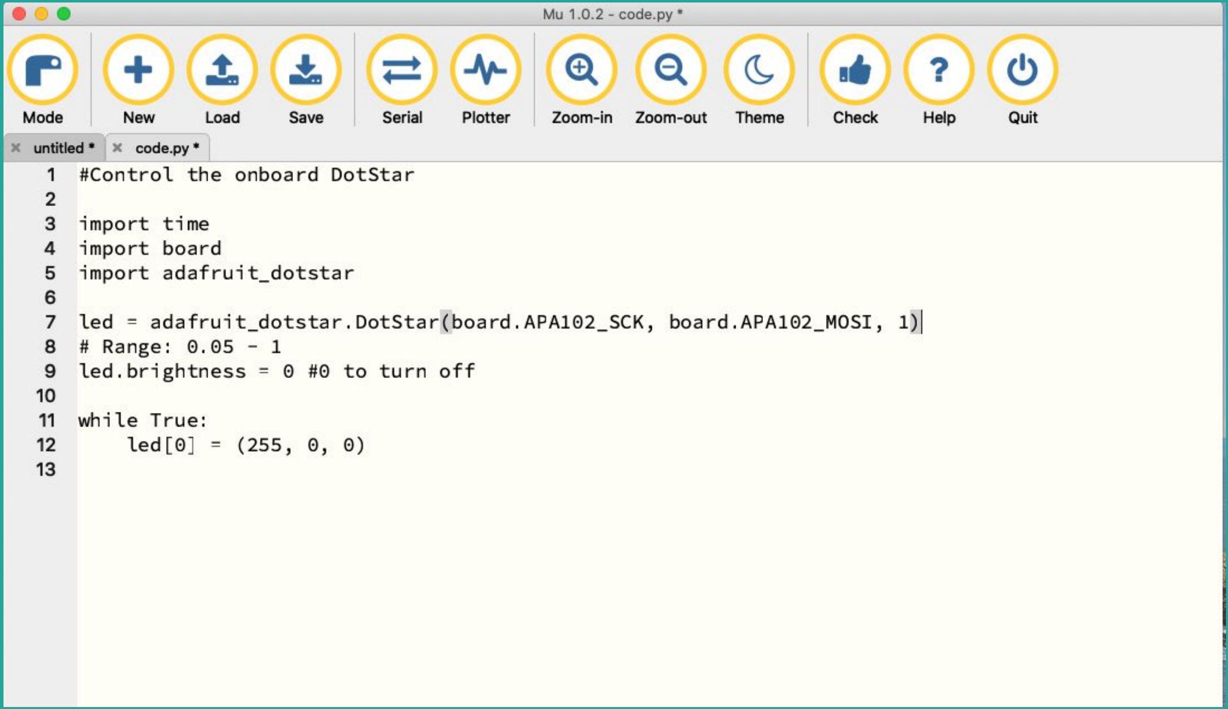
Trinket M0


Trinket M0
Rst
3
4
Gnd
Bat
On
adafruit
Atmel
ATSAMD21
E18A-U
636 D ARM
ADAH8A PH
3V
2
1~
0
USB
13

Bread Board



Introduction to Software



```
#Control the onboard DotStar

import time
import board
import adafruit_dotstar

led = adafruit_dotstar.DotStar(board.APA102_SCK, board.APA102_MOSI, 1)
# Range: 0.05 - 1
led.brightness = 0 #0 to turn off

while True:
    led[0] = (255, 0, 0)

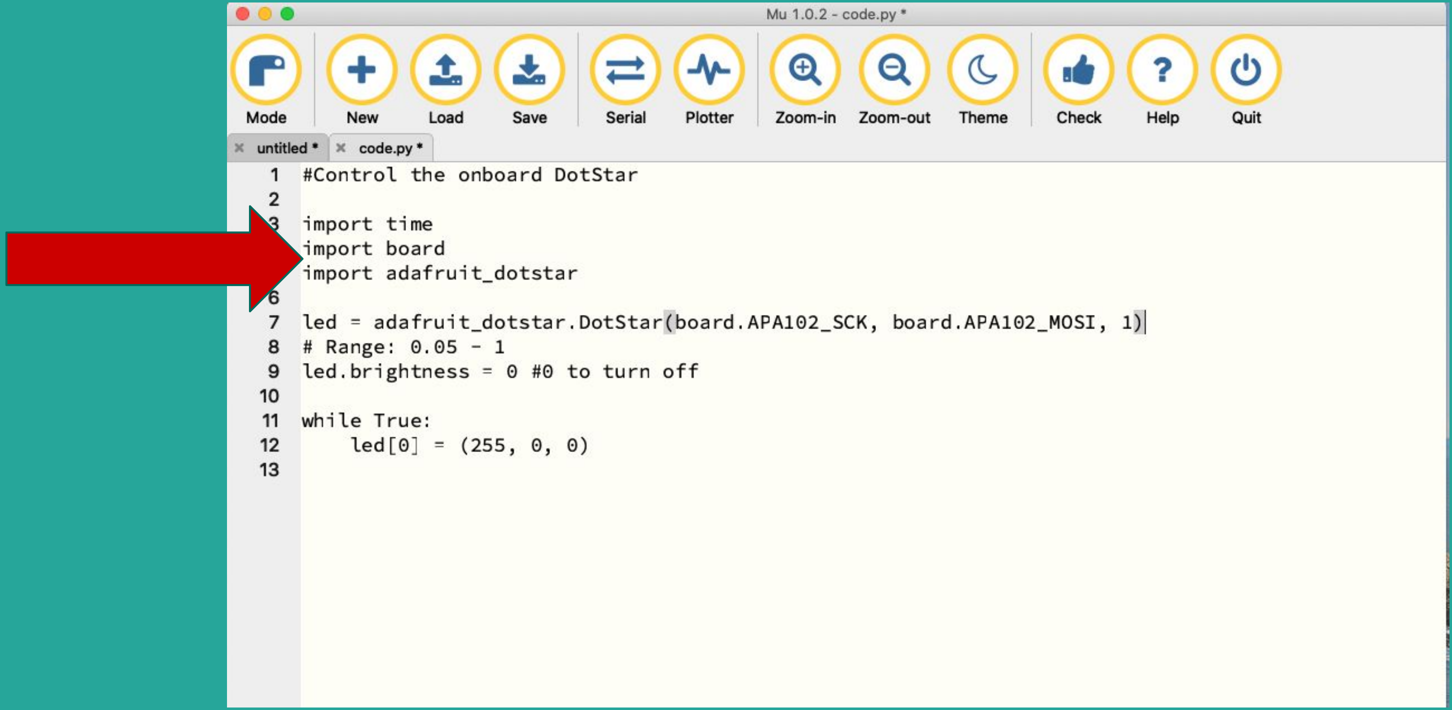
```

Turquoise: (19, 84, 78)

Coral: (100,50,31)

Fuchsia: (255, 0, 255)

IMPORTS



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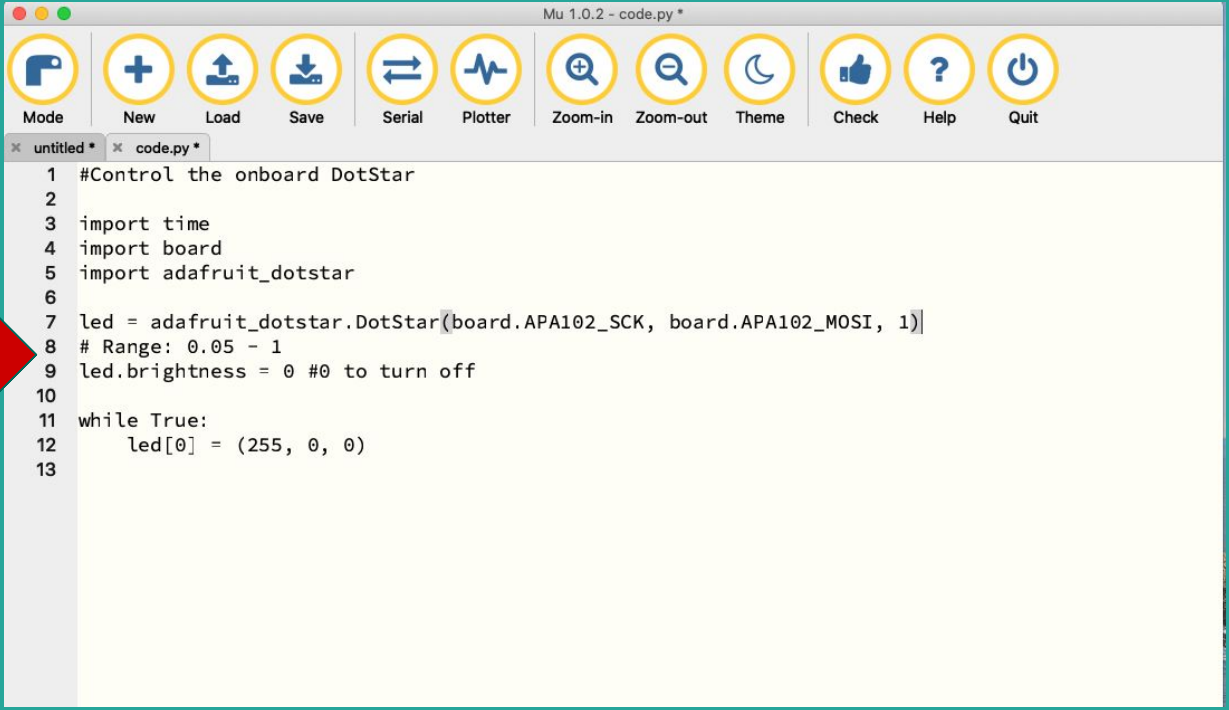
```

SETUP



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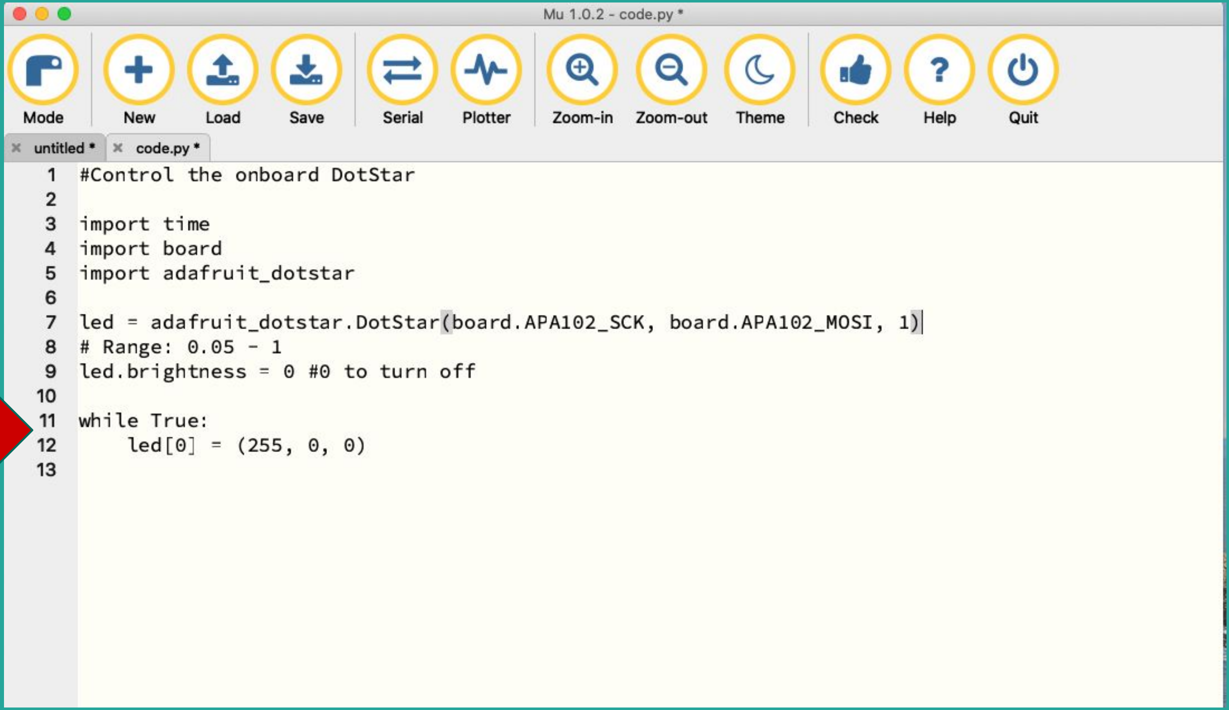
```

THE LOOP



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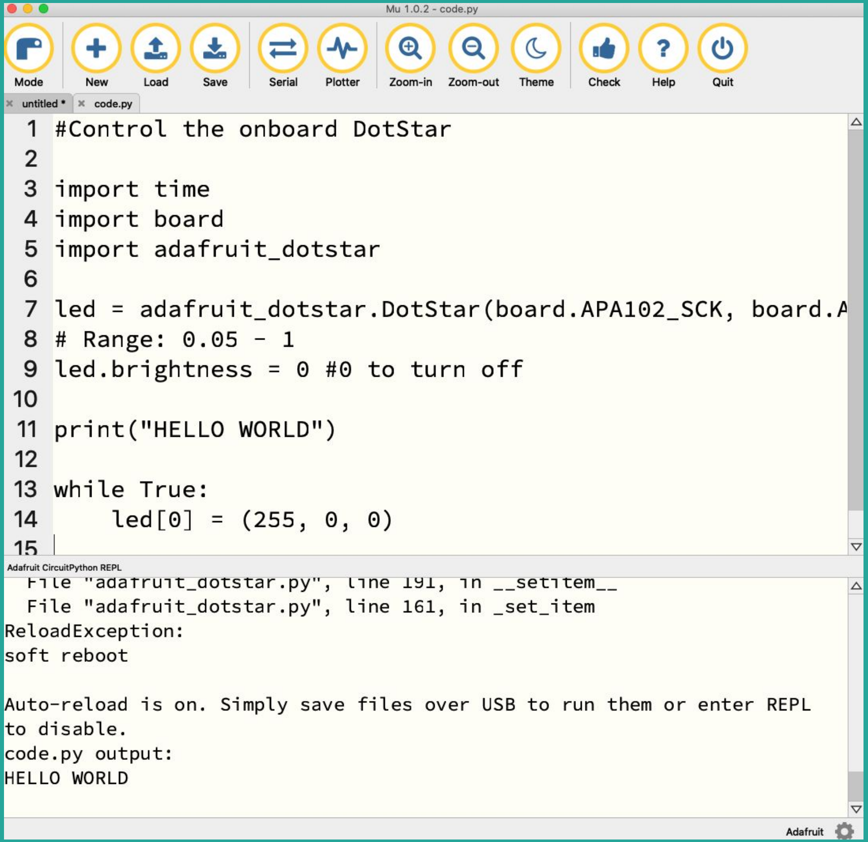
```

Hello World Program



```python
#Control the onboard DotStar

import time
import board
import adafruit_dotstar

led = adafruit_dotstar.DotStar(board.APA102_SCK, board.A
# Range: 0.05 - 1
led.brightness = 0 #0 to turn off

print("HELLO WORLD")

while True:
    led[0] = (255, 0, 0)

```

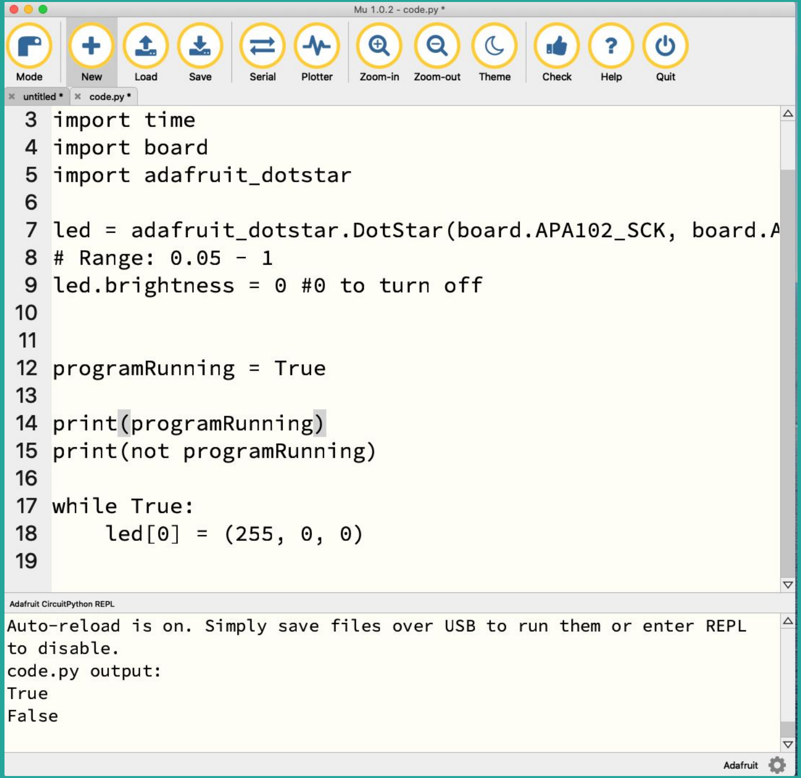
```
  File "adafruit_dotstar.py", line 191, in __setitem__
  File "adafruit_dotstar.py", line 161, in _set_item
ReloadException:
soft reboot

Auto-reload is on. Simply save files over USB to run them or enter REPL
to disable.
code.py output:
HELLO WORLD
```

Boolean Variables

Boolean variables can be thought of as switches:

- On/Off
- 1/0
- True/False



```
import time
import board
import adafruit_dotstar

led = adafruit_dotstar.DotStar(board.APA102_SCK, board.A
# Range: 0.05 - 1
led.brightness = 0 #0 to turn off


programRunning = True

print(programRunning)
print(not programRunning)

while True:
    led[0] = (255, 0, 0)

```

```
Auto-reload is on. Simply save files over USB to run them or enter REPL
to disable.
code.py output:
True
False
```

Small Steps

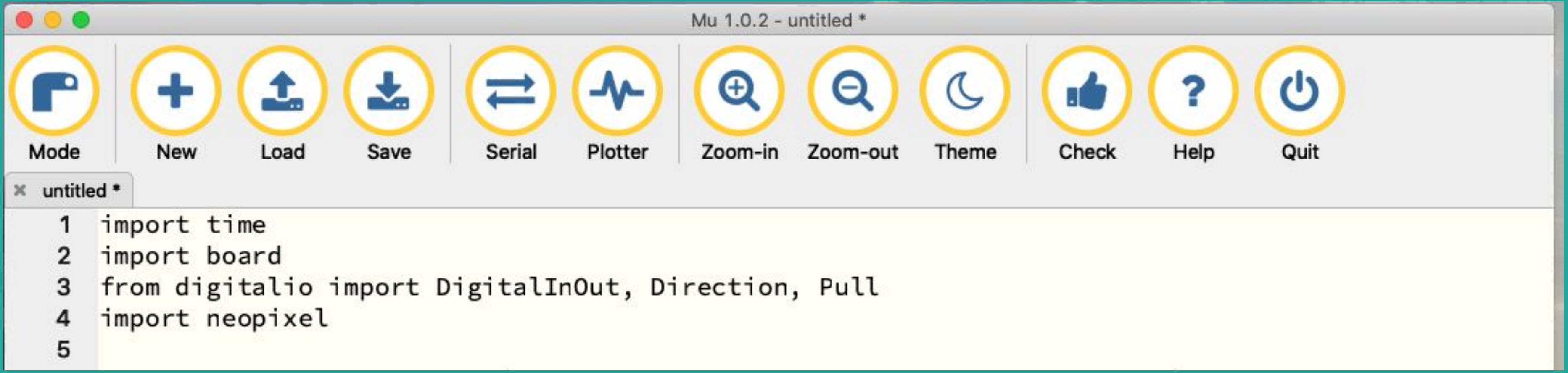
When starting a new project, it is generally a good idea to start with the smallest problem.

Challenge:
Blink Chip’s DotStar
Using time.sleep()

Engineering Problem

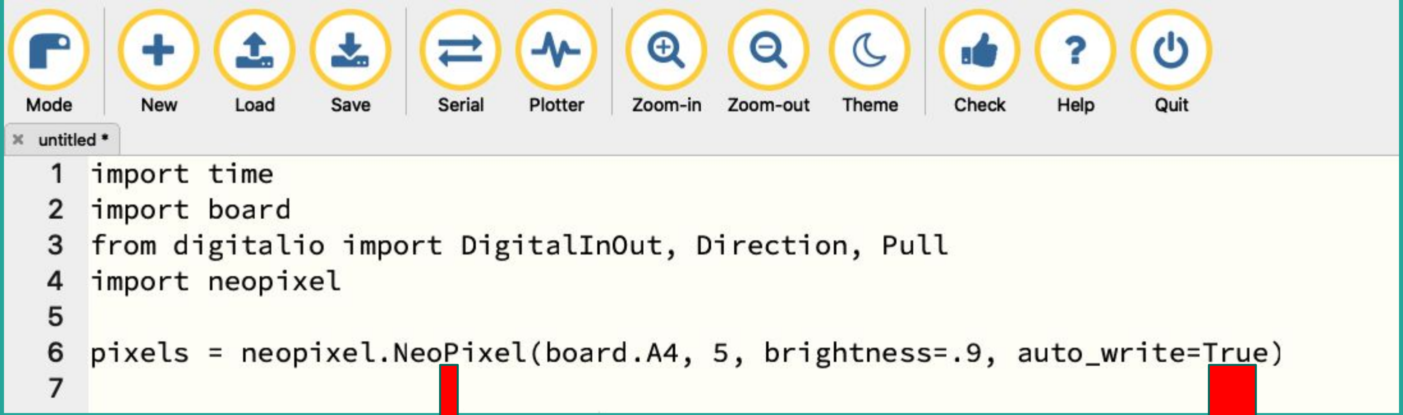
Program chip to light one LED every 5 mins. After 25 minutes, create a 5 minute resting pattern.

Important Imports



```
import time
import board
from digitalio import DigitalInOut, Direction, Pull
import neopixel
```

Hardware Setup



```
import time
import board
from digitalio import DigitalInOut, Direction, Pull
import neopixel

pixels = neopixel.NeoPixel(board.A4, 5, brightness=.9, auto_write=True)

```

Capitalization Matters

Display colors immediately

WIRE THIS!

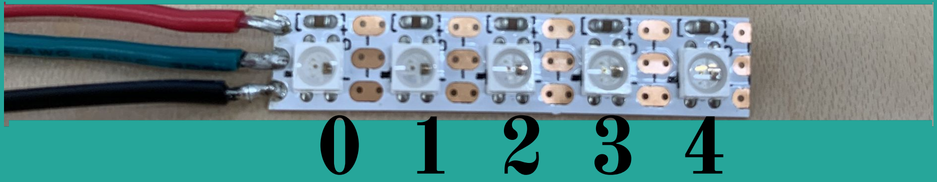
1) Attach alligator clips to the wires of the led strip

2) Connect Information Wire to Pin 4

3) Connect Power Wire to 3V

4) Connect Ground Wire to Gnd

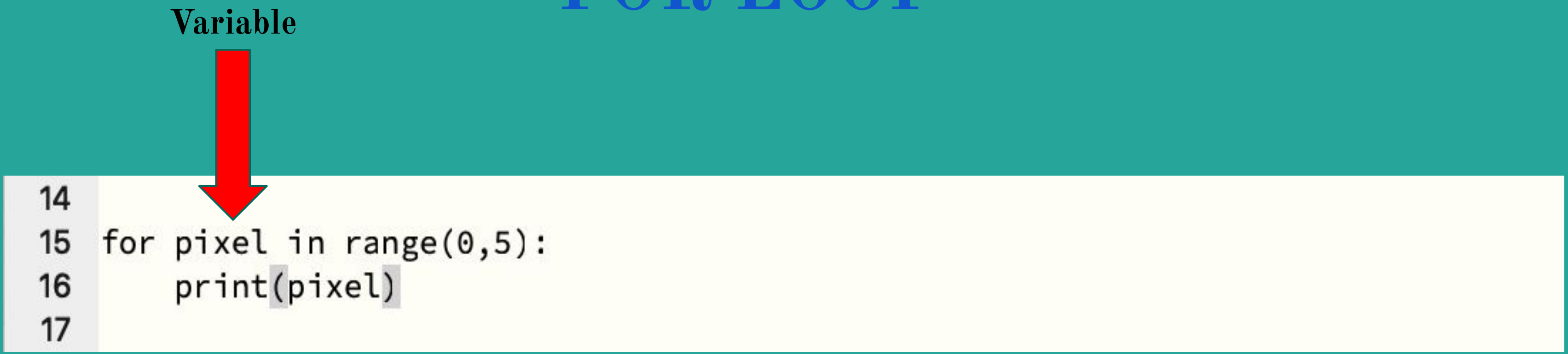
An Array is a List of Data



pixels[3] = (100,0,0) makes the 4th LED red!

Challenge:
Light all of the pixels in the strip

Introducing the FOR LOOP

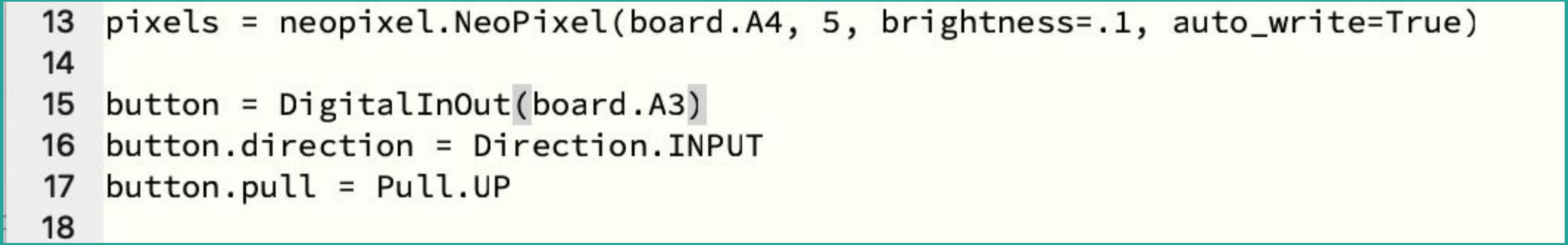


Variable

```
for pixel in range(0,5):
    print(pixel)
```

Challenge: Modify This Code to Light Strip

Button Time



```
pixels = neopixel.NeoPixel(board.A4, 5, brightness=.1, auto_write=True)

button = DigitalInOut(board.A3)
button.direction = Direction.INPUT
button.pull = Pull.UP

```

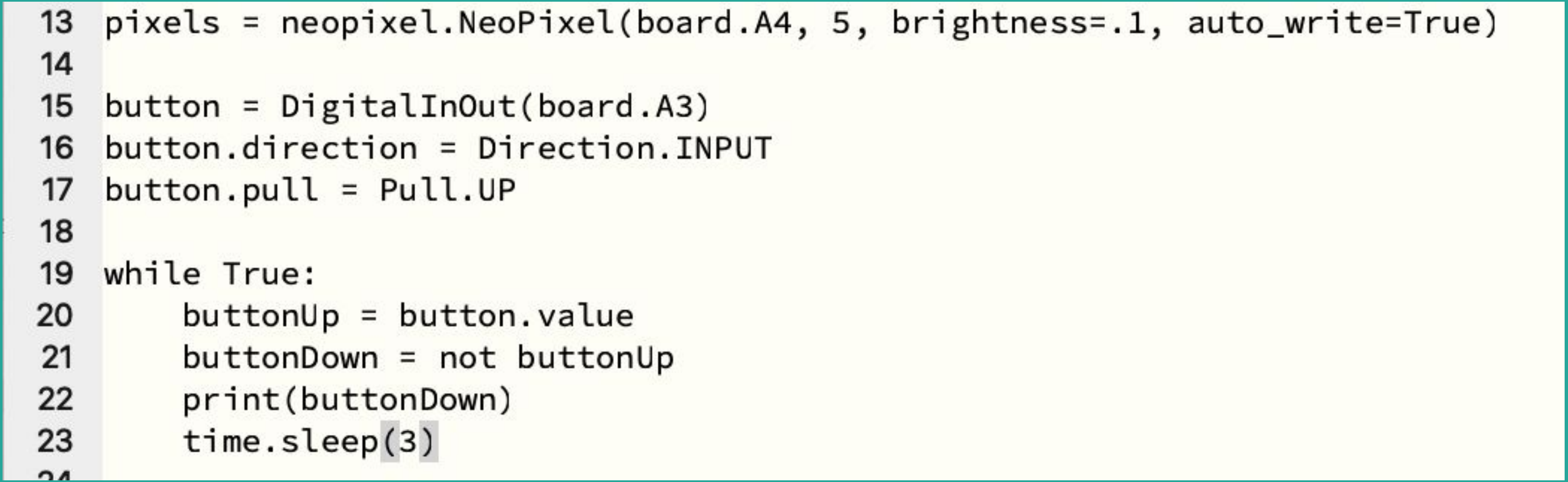
WIRE THIS!

1) Have the button straddle the divider.

2) Connect top left leg to A3

3) Connect bottom right leg to Gnd

LOOP

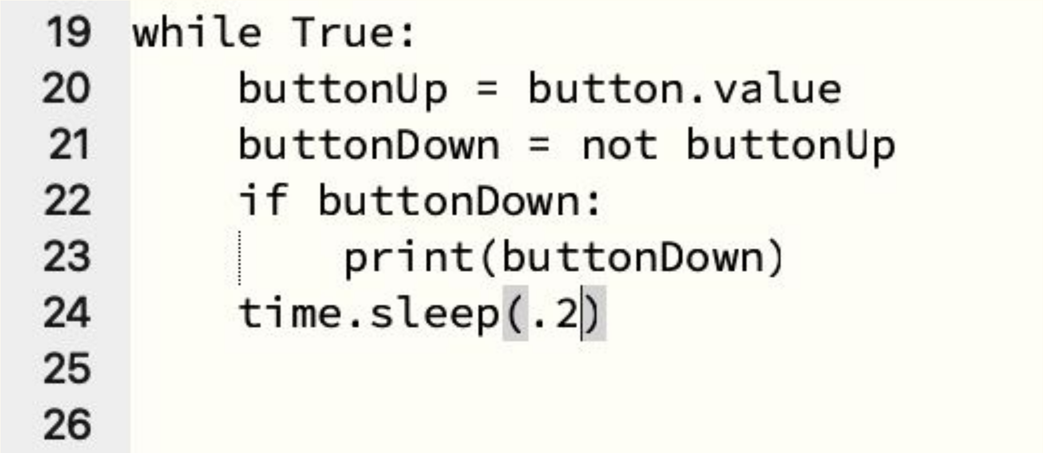


```
pixels = neopixel.NeoPixel(board.A4, 5, brightness=.1, auto_write=True)

button = DigitalInOut(board.A3)
button.direction = Direction.INPUT
button.pull = Pull.UP

while True:
    buttonUp = button.value
    buttonDown = not buttonUp
    print(buttonDown)
    time.sleep(3)
```

Introducing the
IF STATEMENT



```python
while True:
    buttonUp = button.value
    buttonDown = not buttonUp
    if buttonDown:
        print(buttonDown)
    time.sleep(.2)
```

CHALLENGE

Light the first led if button is down.

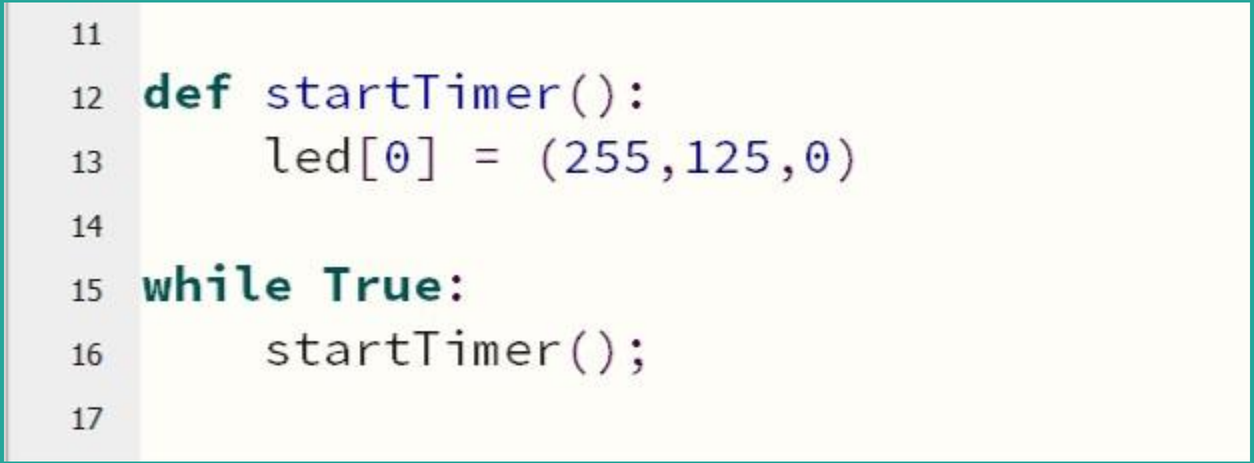
CHALLENGE

Light all the pixels
when button is down.

CHALLENGE

Delay the lighting of each led by 2 seconds.

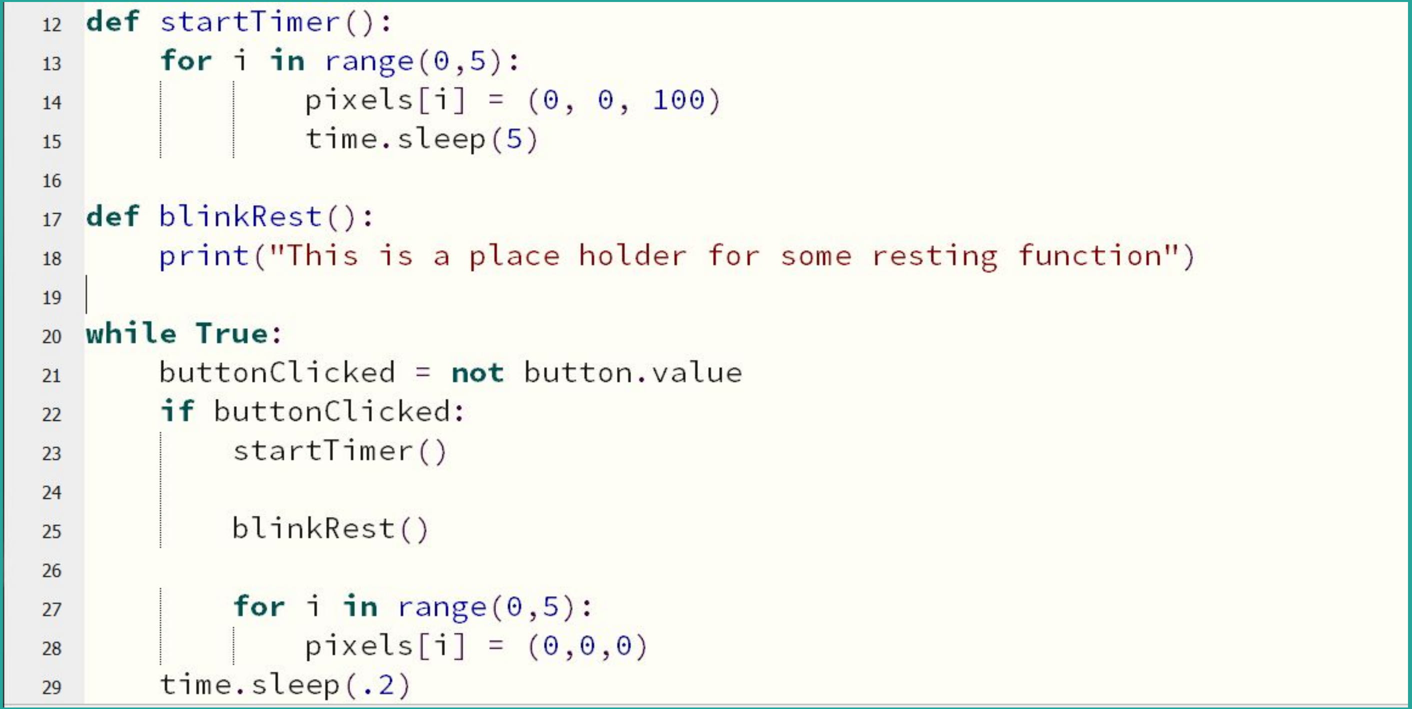
Functions



```
def startTimer():
    led[0] = (255,125,0)

while True:
    startTimer();
```

Functions In Action



```
def startTimer():
    for i in range(0,5):
            pixels[i] = (0, 0, 100)
            time.sleep(5)

def blinkRest():
    print("This is a place holder for some resting function")

while True:
    buttonClicked = not button.value
    if buttonClicked:
        startTimer()

        blinkRest()

        for i in range(0,5):
            pixels[i] = (0,0,0)
    time.sleep(.2)
```