Adafruit NeoPixel Library Documentation

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Higher level NeoPixel driver that presents the strip as a sequence. This is a supercharged version of the original MicroPython driver. Its now more like a normal Python sequence and features slice support, `repr` and `len` support.

Colors are stored as tuples by default. However, you can also use int hex syntax to set values similar to colors on the web. For example, `0x100000` (`#100000` on the web) is equivalent to `(0x10, 0, 0)`.

Note: The int hex API represents the brightness of the white pixel when present by setting the RGB channels to identical values. For example, full white is 0xffffff but is actually (0, 0, 0, 0xff) in the tuple syntax. Setting a pixel value with an int will use the white pixel if the RGB channels are identical. For full, independent, control of each color component use the tuple syntax.

CHAPTER 1

Dependencies

This driver depends on:

- Adafruit CircuitPython

Please ensure all dependencies are available on the CircuitPython filesystem. This is easily achieved by downloading the Adafruit library and driver bundle.

CHAPTER 2

Usage Example

This example demonstrates the library with the single built-in NeoPixel on the Feather M0 Express and Metro M0 Express.

```
import board
import neopixel

pixels = neopixel.NeoPixel(board.NEOPIXEL, 1)
pixels[0] = (10, 0, 0)
```

This example demonstrates the library with the ten built-in NeoPixels on the Circuit Playground Express. It turns off `auto_write` so that all pixels are updated at once when the `show` method is called.

```
import board
import neopixel

pixels = neopixel.NeoPixel(board.NEOPIXEL, 10, auto_write=False)
pixels[0] = (10, 0, 0)
pixels[9] = (0, 10, 0)
pixels.show()
```

This example demonstrates using a single NeoPixel tied to a GPIO pin and with a `pixel_order` to specify the color channel order. Note that `bpp` does not need to be specified as it is computed from the supplied `pixel_order`.

```
import board
import neopixel

pixel = neopixel.NeoPixel(board.D0, 1, pixel_order=neopixel.RGBW)
pixel[0] = (30, 0, 20, 10)
```

CHAPTER 3

Contributing

Contributions are welcome! Please read our Code of Conduct before contributing to help this project stay welcoming.

CHAPTER 4

Building locally

To build this library locally you'll need to install the circuitpython-build-tools package.

```
python3 -m venv .env
source .env/bin/activate
pip install circuitpython-build-tools
```

Once installed, make sure you are in the virtual environment:

```
source .env/bin/activate
```

Then run the build:

```
circuitpython-build-bundles --filename_prefix adafruit-circuitpython-neopixel --
↪library_location .
```

4.1 Sphinx documentation

Sphinx is used to build the documentation based on rST files and comments in the code. First, install dependencies (feel free to reuse the virtual environment from above):

```
python3 -m venv .env
source .env/bin/activate
pip install Sphinx sphinx-rtd-theme
```

Now, once you have the virtual environment activated:

```
cd docs
sphinx-build -E -W -b html . _build/html
```

This will output the documentation to `docs/_build/html`. Open the index.html in your browser to view them. It will also (due to -W) error out on any warning like Travis will. This is a good way to locally verify it will pass.

CHAPTER 5

Table of Contents

5.1 Simple test

Ensure your device works with this simple test.

Listing 1: examples/neopixel_simpletest.py

```
import time
import board
import neopixel


# On CircuitPlayground Express, and boards with built in status NeoPixel -> board.
↪NEOPIXEL
# Otherwise choose an open pin connected to the Data In of the NeoPixel strip, i.e.␣
↪board.D1
pixel_pin = board.NEOPIXEL

# On a Raspberry pi, use this instead, not all pins are supported
#pixel_pin = board.D18

# The number of NeoPixels
num_pixels = 10

# The order of the pixel colors - RGB or GRB. Some NeoPixels have red and green␣
↪reversed!
# For RGBW NeoPixels, simply change the ORDER to RGBW or GRBW.
ORDER = neopixel.GRB

pixels = neopixel.NeoPixel(pixel_pin, num_pixels, brightness=0.2, auto_write=False,
                           pixel_order=ORDER)


def wheel(pos):
```

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```
    # Input a value 0 to 255 to get a color value.
    # The colours are a transition r - g - b - back to r.
    if pos < 0 or pos > 255:
        r = g = b = 0
    elif pos < 85:
        r = int(pos * 3)
        g = int(255 - pos*3)
        b = 0
    elif pos < 170:
        pos -= 85
        r = int(255 - pos*3)
        g = 0
        b = int(pos*3)
    else:
        pos -= 170
        r = 0
        g = int(pos*3)
        b = int(255 - pos*3)
    return (r, g, b) if ORDER == neopixel.RGB or ORDER == neopixel.GRB else (r, g, b, 0)


def rainbow_cycle(wait):
    for j in range(255):
        for i in range(num_pixels):
            pixel_index = (i * 256 // num_pixels) + j
            pixels[i] = wheel(pixel_index & 255)
        pixels.show()
        time.sleep(wait)


while True:
    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((255, 0, 0))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((255, 0, 0, 0))
    pixels.show()
    time.sleep(1)

    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((0, 255, 0))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((0, 255, 0, 0))
    pixels.show()
    time.sleep(1)

    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((0, 0, 255))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((0, 0, 255, 0))
    pixels.show()
    time.sleep(1)

    rainbow_cycle(0.001)     # rainbow cycle with 1ms delay per step
```

Listing 2: examples/neopixel_rpi_simpletest.py

```
# Simple test for NeoPixels on Raspberry Pi
import time
import board
import neopixel


# Choose an open pin connected to the Data In of the NeoPixel strip, i.e. board.D18
# NeoPixels must be connected to D10, D12, D18 or D21 to work.
pixel_pin = board.D18

# The number of NeoPixels
num_pixels = 30

# The order of the pixel colors - RGB or GRB. Some NeoPixels have red and green␣
↪reversed!
# For RGBW NeoPixels, simply change the ORDER to RGBW or GRBW.
ORDER = neopixel.GRB

pixels = neopixel.NeoPixel(pixel_pin, num_pixels, brightness=0.2, auto_write=False,
                           pixel_order=ORDER)


def wheel(pos):
    # Input a value 0 to 255 to get a color value.
    # The colours are a transition r - g - b - back to r.
    if pos < 0 or pos > 255:
        r = g = b = 0
    elif pos < 85:
        r = int(pos * 3)
        g = int(255 - pos*3)
        b = 0
    elif pos < 170:
        pos -= 85
        r = int(255 - pos*3)
        g = 0
        b = int(pos*3)
    else:
        pos -= 170
        r = 0
        g = int(pos*3)
        b = int(255 - pos*3)
    return (r, g, b) if ORDER == neopixel.RGB or ORDER == neopixel.GRB else (r, g, b,␣
↪0)


def rainbow_cycle(wait):
    for j in range(255):
        for i in range(num_pixels):
            pixel_index = (i * 256 // num_pixels) + j
            pixels[i] = wheel(pixel_index & 255)
        pixels.show()
        time.sleep(wait)


while True:
```

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```
    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((255, 0, 0))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((255, 0, 0, 0))
    pixels.show()
    time.sleep(1)

    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((0, 255, 0))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((0, 255, 0, 0))
    pixels.show()
    time.sleep(1)

    # Comment this line out if you have RGBW/GRBW NeoPixels
    pixels.fill((0, 0, 255))
    # Uncomment this line if you have RGBW/GRBW NeoPixels
    # pixels.fill((0, 0, 255, 0))
    pixels.show()
    time.sleep(1)

    rainbow_cycle(0.001)     # rainbow cycle with 1ms delay per step
```

5.2 `neopixel` - NeoPixel strip driver

- Author(s): Damien P. George & Scott Shawcroft

`neopixel.`**`GRB = (1, 0, 2)`**
Green Red Blue

`neopixel.`**`GRBW = (1, 0, 2, 3)`**
Green Red Blue White

class `neopixel.`**`NeoPixel`**(*pin*, *n*, *, *bpp=3*, *brightness=1.0*, *auto_write=True*, *pixel_order=None*)
A sequence of neopixels.

Parameters

- **pin** (*Pin*) – The pin to output neopixel data on.
- **n** (*int*) – The number of neopixels in the chain
- **bpp** (*int*) – Bytes per pixel. 3 for RGB and 4 for RGBW pixels.
- **brightness** (*float*) – Brightness of the pixels between 0.0 and 1.0 where 1.0 is full brightness
- **auto_write** (*bool*) – True if the neopixels should immediately change when set. If False, *show* must be called explicitly.
- **pixel_order** (*tuple*) – Set the pixel color channel order. GRBW is set by default.

Example for Circuit Playground Express:

```
import neopixel
from board import *

RED = 0x100000 # (0x10, 0, 0) also works
```

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```
pixels = neopixel.NeoPixel(NEOPIXEL, 10)
for i in range(len(pixels)):
    pixels[i] = RED
```

Example for Circuit Playground Express setting every other pixel red using a slice:

```
import neopixel
from board import *
import time

RED = 0x100000 # (0x10, 0, 0) also works

# Using ``with`` ensures pixels are cleared after we're done.
with neopixel.NeoPixel(NEOPIXEL, 10) as pixels:
    pixels[::2] = [RED] * (len(pixels) // 2)
    time.sleep(2)
```

brightness
Overall brightness of the pixel

deinit()
Blank out the NeoPixels and release the pin.

fill(*color*)
Colors all pixels the given ***color***.

show()
Shows the new colors on the pixels themselves if they haven't already been autowritten.

The colors may or may not be showing after this function returns because it may be done asynchronously.

write()
Use `show` instead. It matches Micro:Bit and Arduino APIs.

class neopixel.**NeoPixel_SPI**(*spi*, *n*, ***, *bpp=3*, *brightness=1.0*, *auto_write=True*, *pixel_order=None*)
A sequence of neopixels.

Parameters

- **spi** (*SPI*) – The SPI bus to output neopixel data on.
- **n** (*int*) – The number of neopixels in the chain
- **bpp** (*int*) – Bytes per pixel. 3 for RGB and 4 for RGBW pixels.
- **brightness** (*float*) – Brightness of the pixels between 0.0 and 1.0 where 1.0 is full brightness
- **auto_write** (*bool*) – True if the neopixels should immediately change when set. If False, *show* must be called explicitly.
- **pixel_order** (*tuple*) – Set the pixel color channel order. GRBW is set by default.

Example:

```
import board
import neopixel
```

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```
pixels = neopixel.NeoPixel_SPI(board.SPI(), 10)
pixels.fill(0xff0000)
```

deinit()
Blank out the NeoPixels.

show()
Shows the new colors on the pixels themselves if they haven't already been autowritten.

neopixel.**RGB = (0, 1, 2)**
Red Green Blue

neopixel.**RGBW = (0, 1, 2, 3)**
Red Green Blue White

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