Adafruit CircuitPlayground Library Documentation

Release 1.0

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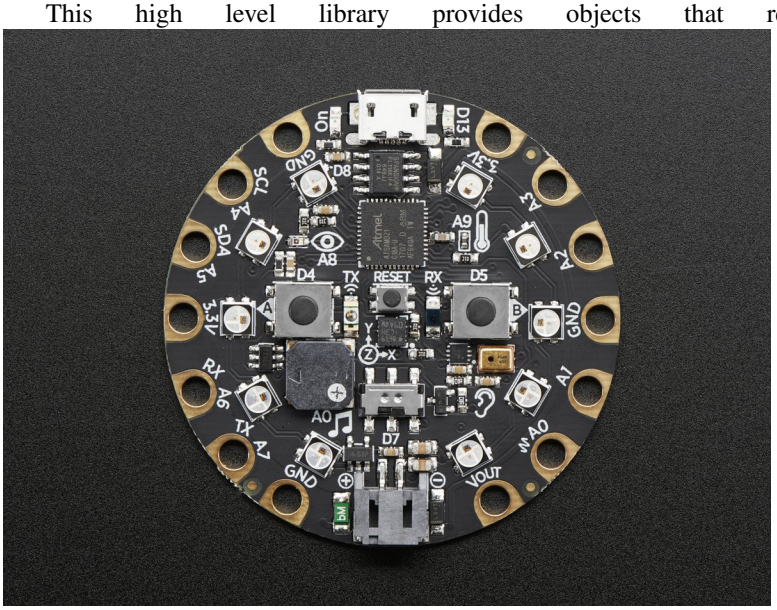
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This high level library provides objects that represent CircuitPlayground hardware.



CHAPTER 1

Installation

This driver depends on many other libraries! Please install it by downloading the Adafruit library and driver bundle.

CHAPTER 2

Usage Example

Using it is super simple. Simply import the *cpx* variable from the module and then use it.

```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        print("Temperature:", cpx.temperature)
    cpx.red_led = cpx.button_b
```

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-
↪circuitplayground --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/acceleration_simpletest.py

```
import time
from adafruit_circuitplayground.express import cpx

while True:
    x, y, z = cpx.acceleration
    print(x, y, z)

    time.sleep(0.1)
```

Listing 2: examples/pixels_simpletest.py

```
# CircuitPython demo - NeoPixel

import time
from adafruit_circuitplayground.express import cpx

# The number of pixels in the strip
numpix = 10


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):
        return (0, 0, 0)
    if pos < 85:
        return (int(pos * 3), int(255 - (pos*3)), 0)
```

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```
    if pos < 170:
        pos -= 85
        return (int(255 - pos*3), 0, int(pos*3))
    pos -= 170
    return (0, int(pos*3), int(255 - pos*3))


def rainbow_cycle(wait):
    for j in range(255):
        for i in range(cpx.pixels.n):
            idx = int((i * 256 / len(cpx.pixels)) + j)
            cpx.pixels[i] = wheel(idx & 255)
        cpx.pixels.show()
        time.sleep(wait)


cpx.pixels.auto_write = False
cpx.pixels.brightness = 0.3
while True:
    rainbow_cycle(0.001)     # rainbowcycle with 1ms delay per step
```

Listing 3: examples/shake_simpletest.py

```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.shake(shake_threshold=20):
        print("Shake detected!")
```

Listing 4: examples/tapdetect_simpletest.py

```
from adafruit_circuitplayground.express import cpx

# Set to check for single-taps.
cpx.detect_taps = 1
tap_count = 0

# We're looking for 2 single-taps before moving on.
while tap_count < 2:
    if cpx.tapped:
        tap_count += 1
print("Reached 2 single-taps!")

# Now switch to checking for double-taps
tap_count = 0
cpx.detect_taps = 2

# We're looking for 2 double-taps before moving on.
while tap_count < 2:
    if cpx.tapped:
        tap_count += 1
print("Reached 2 double-taps!")
print("Done.")
```

Listing 5: examples/tapdetectsimple_simpletest.py

```
from adafruit_circuitplayground.express import cpx

cpx.detect_taps = 1

while True:
    if cpx.tapped:
        print("Single tap detected!")
```

Listing 6: examples/tone_simpletest.py

```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        cpx.start_tone(262)
    elif cpx.button_b:
        cpx.start_tone(294)
    else:
        cpx.stop_tone()
```

Listing 7: examples/touched_simpletest.py

```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A1:
        print('Touched pad A1')
    if cpx.touch_A2:
        print('Touched pad A2')
    if cpx.touch_A3:
        print('Touched pad A3')
    if cpx.touch_A4:
        print('Touched pad A4')
    if cpx.touch_A5:
        print('Touched pad A5')
    if cpx.touch_A6:
        print('Touched pad A6')
    if cpx.touch_A7:
        print('Touched pad A7')
```

5.2 adafruit_circuitplayground.express

CircuitPython driver from CircuitPlayground Express.

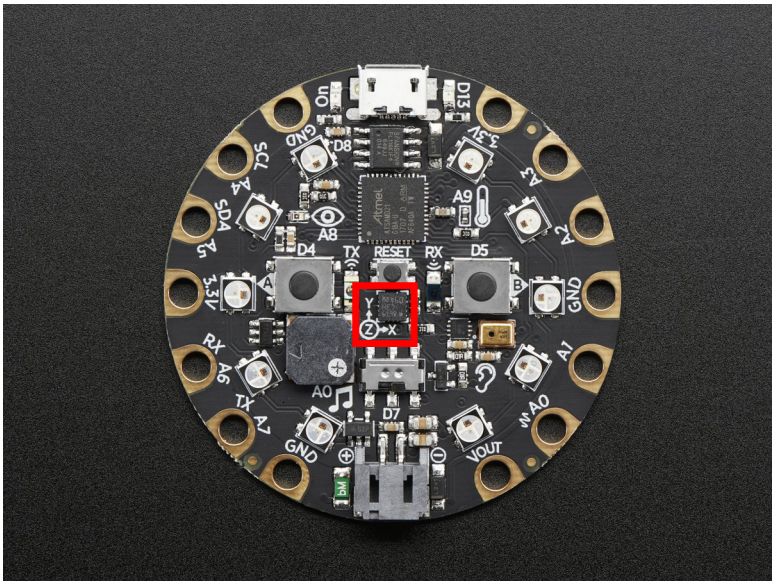
- Author(s): Kattni Rembor, Scott Shawcroft

class adafruit_circuitplayground.express.**Express**

Represents a single CircuitPlayground Express. Do not use more than one at a time.

acceleration

Obtain data from the x, y and z axes.



This example prints the values. Try moving the board to see how the printed values change.

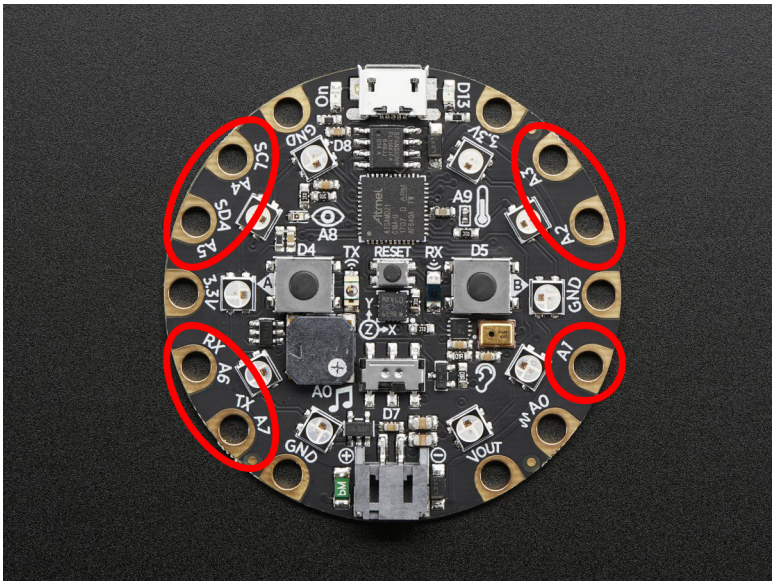
```
from adafruit_circuitplayground.express import cpx

while True:
    x, y, z = cpx.acceleration
    print(x, y, z)
```

adjust_touch_threshold(*adjustment*)

Adjust the threshold needed to activate the capacitive touch pads. Higher numbers make the touch pads less sensitive.

Parameters **adjustment** (*int*) – The desired threshold increase



```
from adafruit_circuitplayground.express import cpx

cpx.adjust_touch_threshold(200)
```

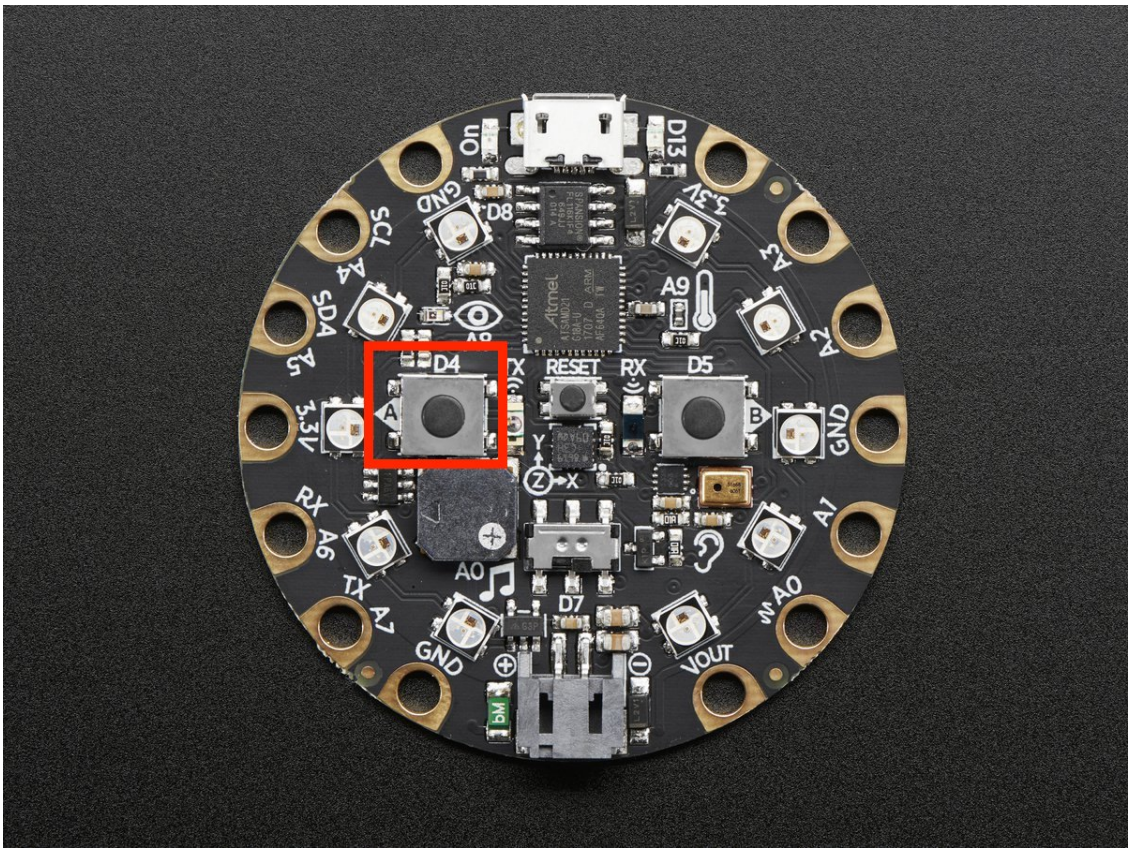
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```
while True:
    if cpx.touch_A1:
        print('Touched pad A1')
```

button_a

`True` when Button A is pressed. `False` if not.

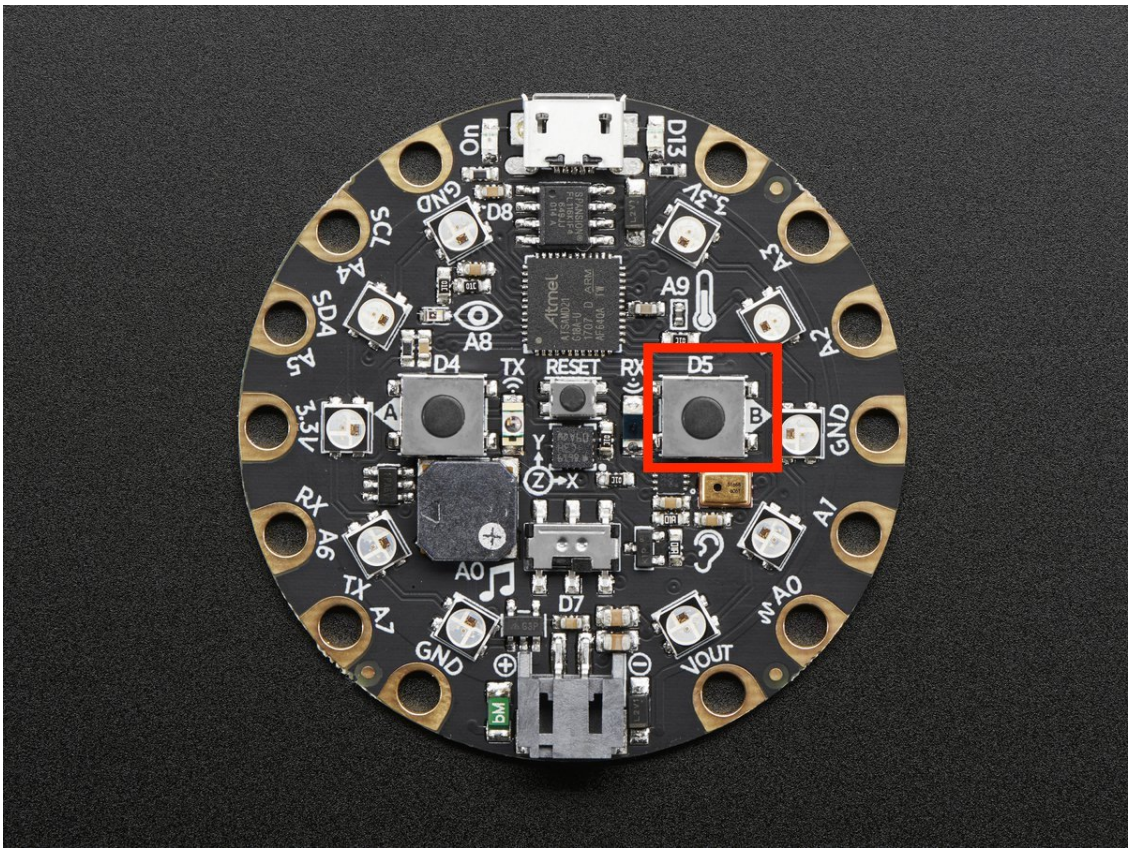



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        print("Button A pressed!")
```

button_b

`True` when Button B is pressed. `False` if not.

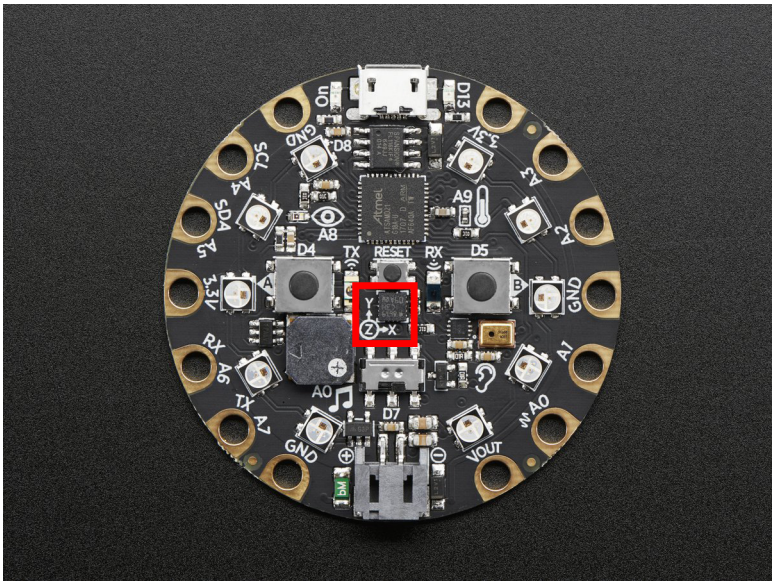



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_b:
        print("Button B pressed!")
```

detect_taps

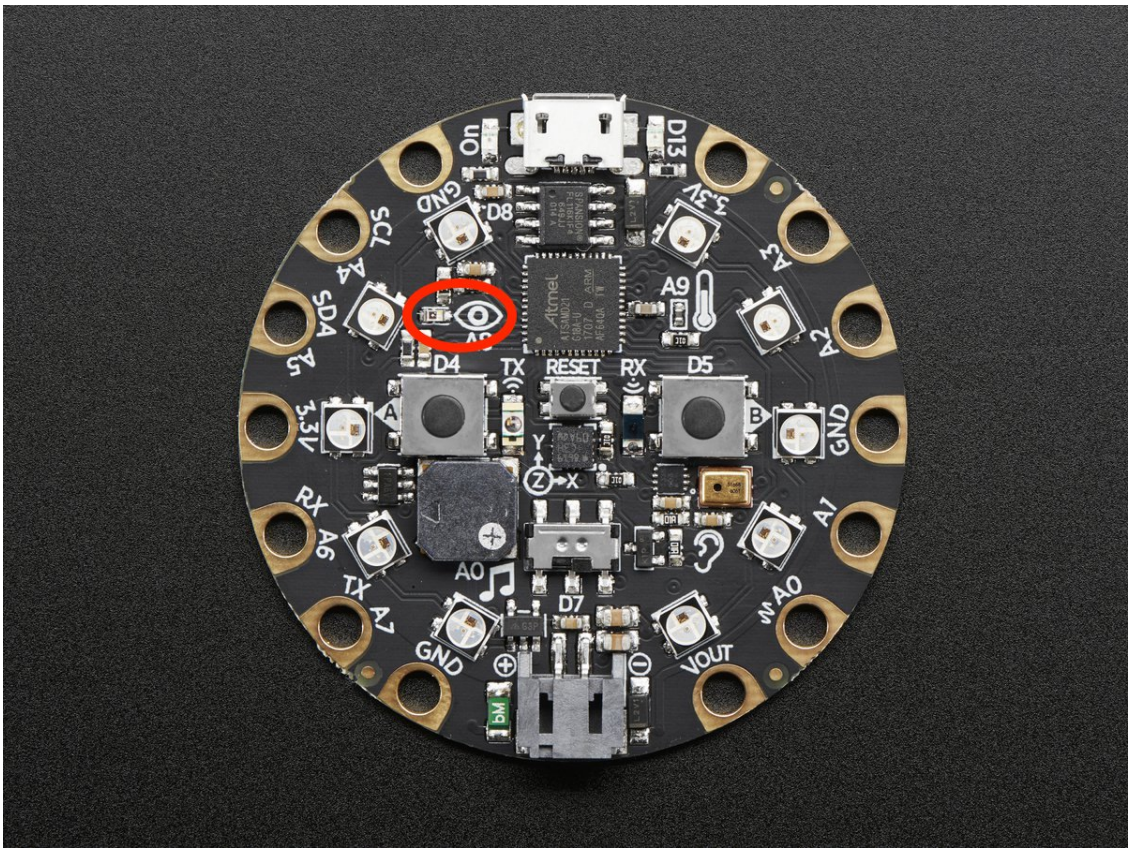
Configure what type of tap is detected by `cpx.tapped`. Use `1` for single-tap detection and `2` for double-tap detection. This does nothing without `cpx.tapped`.




```
from adafruit_circuitplayground.express import cpx

cpx.detect_taps = 1
while True:
  if cpx.tapped:
    print("Single tap detected!")
```

light
The brightness of the CircuitPlayground in approximate Lux.



Try covering the sensor next to the eye to see it change.

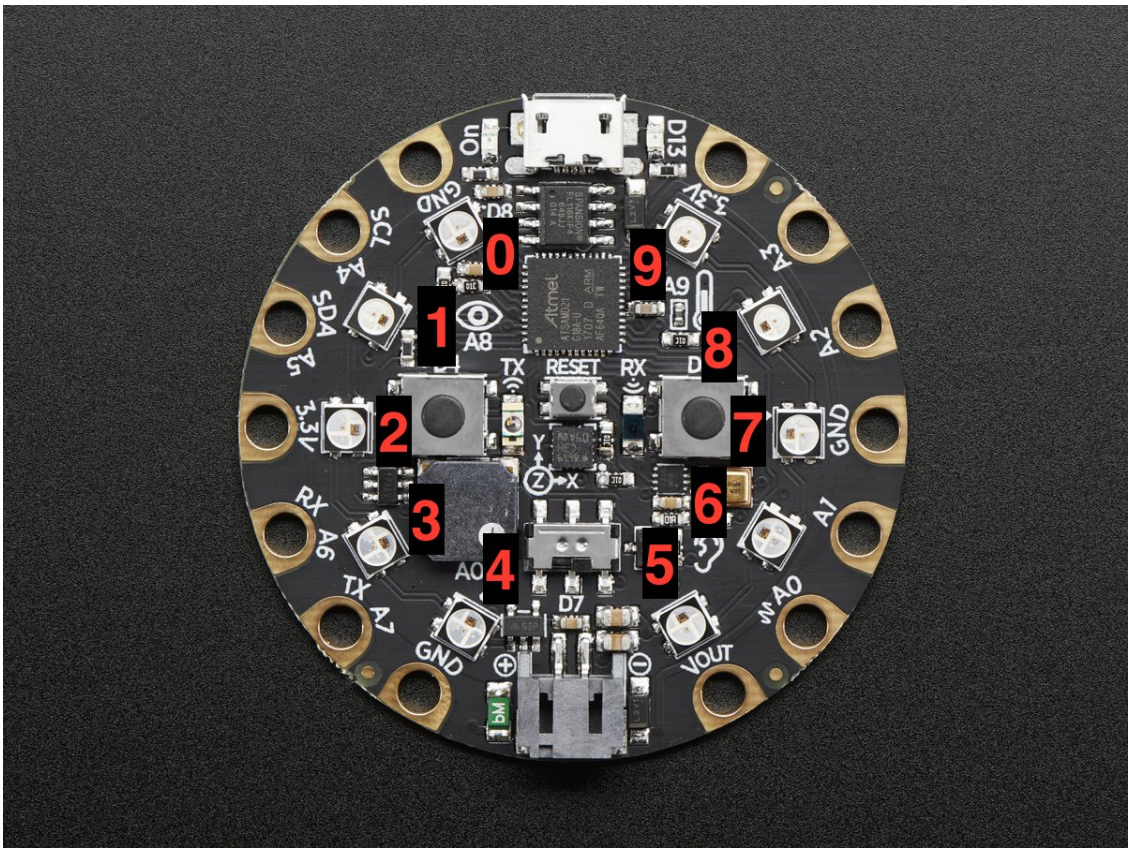
```
from adafruit_circuitplayground.express import cpx
import time

while True:
    print("Lux:", cpx.light)
    time.sleep(1)
```

pixels

Sequence like object representing the ten NeoPixels around the outside of the CircuitPlayground. Each pixel is at a certain index in the sequence as labeled below. Colors can be RGB hex like 0x110000 for red where each two digits are a color (0xRRGGBB) or a tuple like (17, 0, 0) where (R, G, B). Set the global brightness using any number from 0 to 1 to represent a percentage, i.e. 0.3 sets global brightness to 30%.

See `neopixel.NeoPixel` for more info.



Here is an example that sets the first pixel green and the second red.

```
from adafruit_circuitplayground.express import cpx

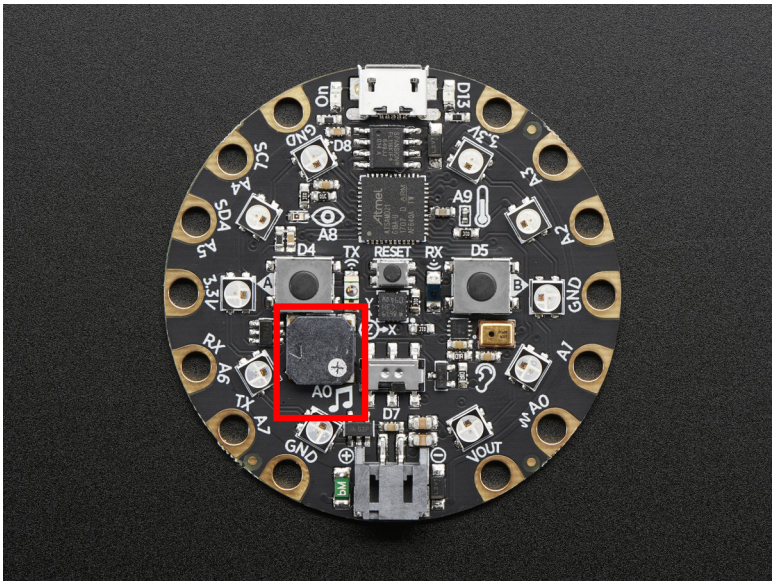
cpx.pixels.brightness = 0.3
cpx.pixels[0] = 0x003000
cpx.pixels[9] = (30, 0, 0)

# Wait forever. CTRL-C to quit.
while True:
    pass
```

play_file(*file_name*)

Play a .wav file using the onboard speaker.

Parameters **file_name** – The name of your .wav file in quotation marks including .wav




```
from adafruit_circuitplayground.express import cpx

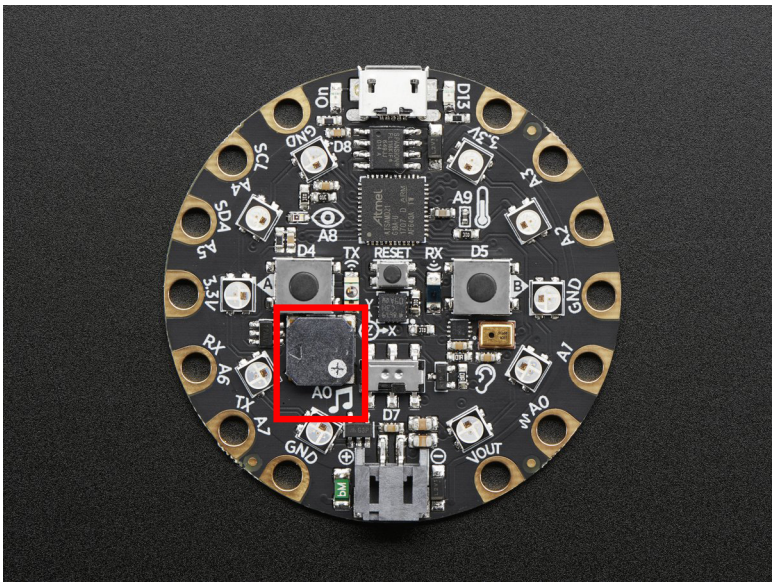
while True:
    if cpx.button_a:
        cpx.play_file("laugh.wav")
    elif cpx.button_b:
        cpx.play_file("rimshot.wav")
```

play_tone (*frequency*, *duration*)

Produce a tone using the speaker. Try changing frequency to change the pitch of the tone.

Parameters

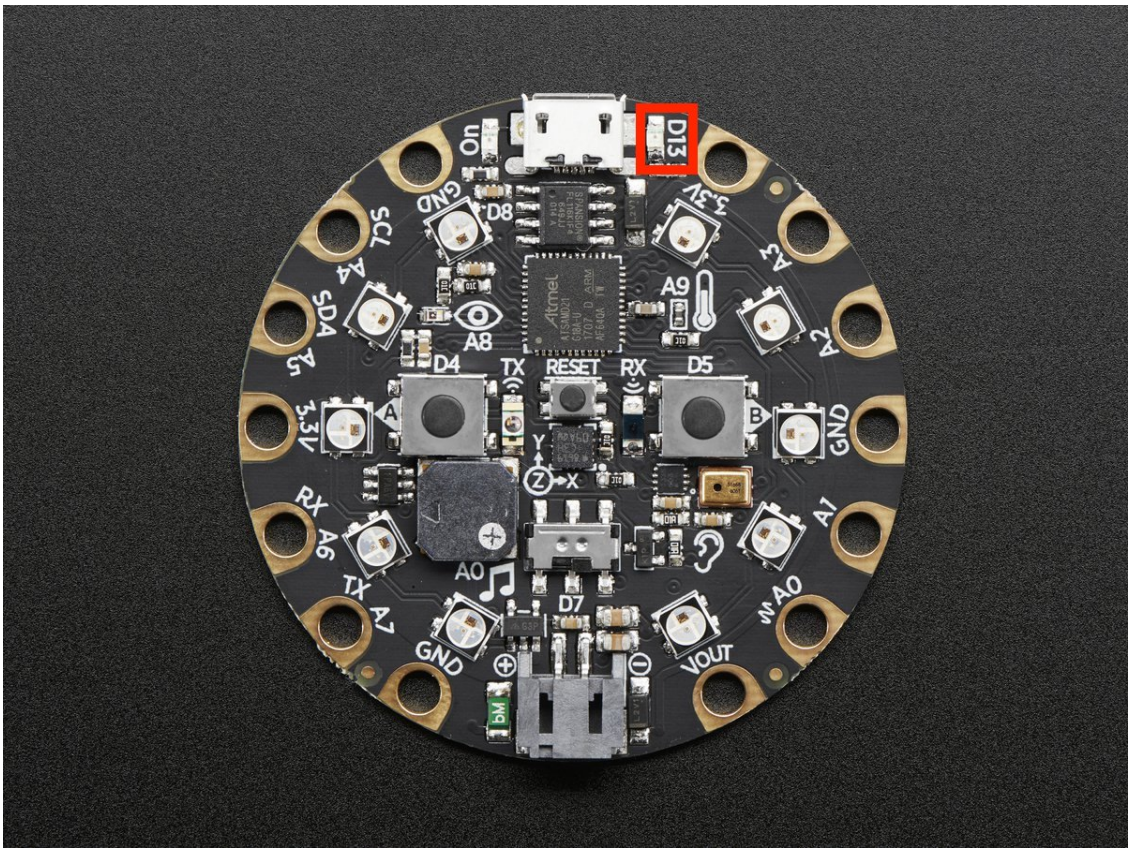
- **frequency** (*int*) – The frequency of the tone in Hz
- **duration** (*float*) – The duration of the tone in seconds



```
from adafruit_circuitplayground.express import cpx

cpx.play_tone(440, 1)
```

red_led
The red led next to the USB plug marked D13.

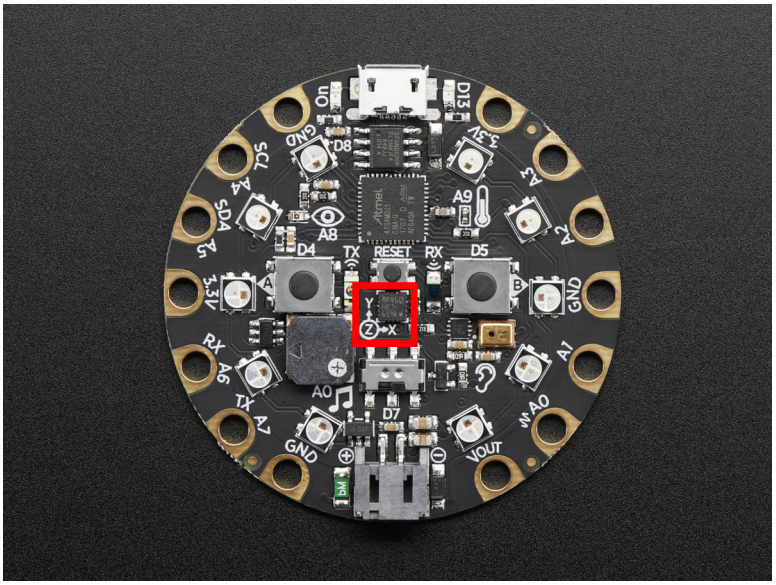



```
from adafruit_circuitplayground.express import cpx
import time

while True:
    cpx.red_led = True
    time.sleep(1)
    cpx.red_led = False
    time.sleep(1)
```

shake(*shake_threshold=30*)
Detect when device is shaken.

Parameters **shake_threshold** (*int*) – The threshold shake must exceed to return true (Default: 30)




```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.shake():
        print("Shake detected!")
```

Decreasing `shake_threshold` increases shake sensitivity, i.e. the code will return a shake detected more easily with a lower `shake_threshold`. Increasing it causes the opposite. `shake_threshold` requires a minimum value of 10 - 10 is the value when the board is not moving, therefore anything less than 10 will erroneously report a constant shake detected.

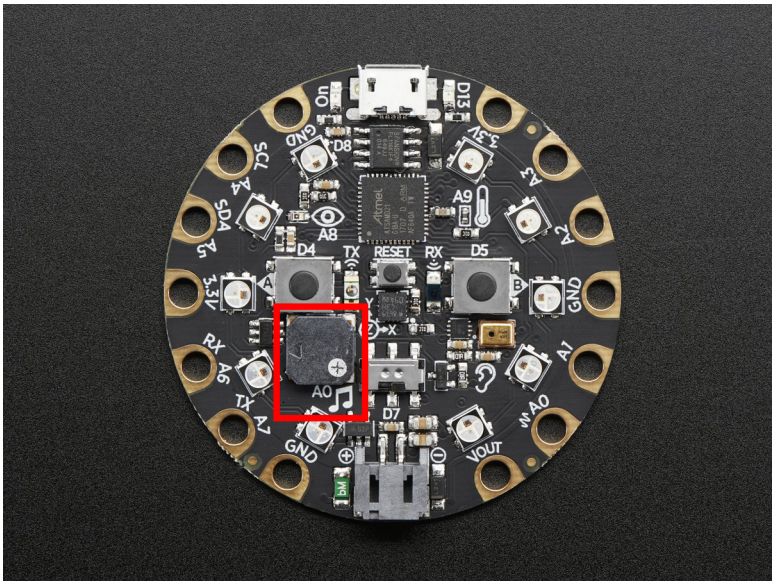
```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.shake(shake_threshold=20):
        print("Shake detected more easily than before!")
```

start_tone(*frequency*)

Produce a tone using the speaker. Try changing frequency to change the pitch of the tone.

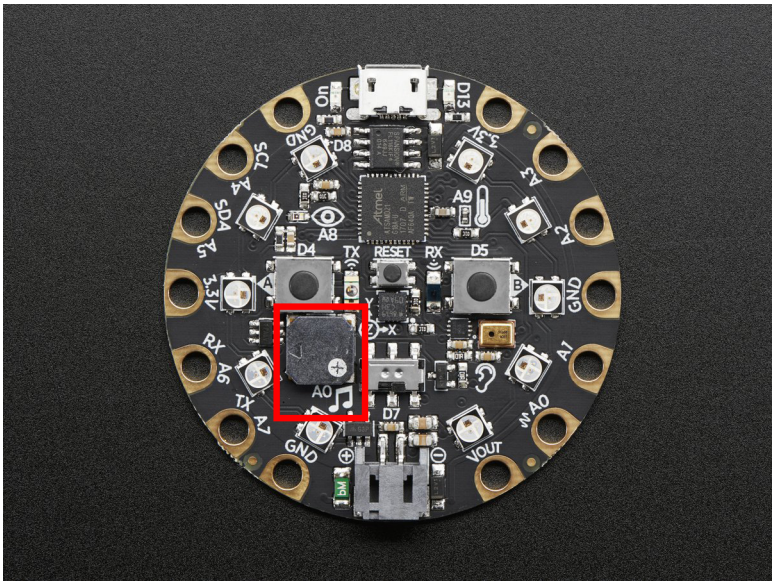
Parameters **frequency** (*int*) – The frequency of the tone in Hz




```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        cpx.start_tone(262)
    elif cpx.button_b:
        cpx.start_tone(294)
    else:
        cpx.stop_tone()
```

stop_tone()
Use with start_tone to stop the tone produced.




```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
```

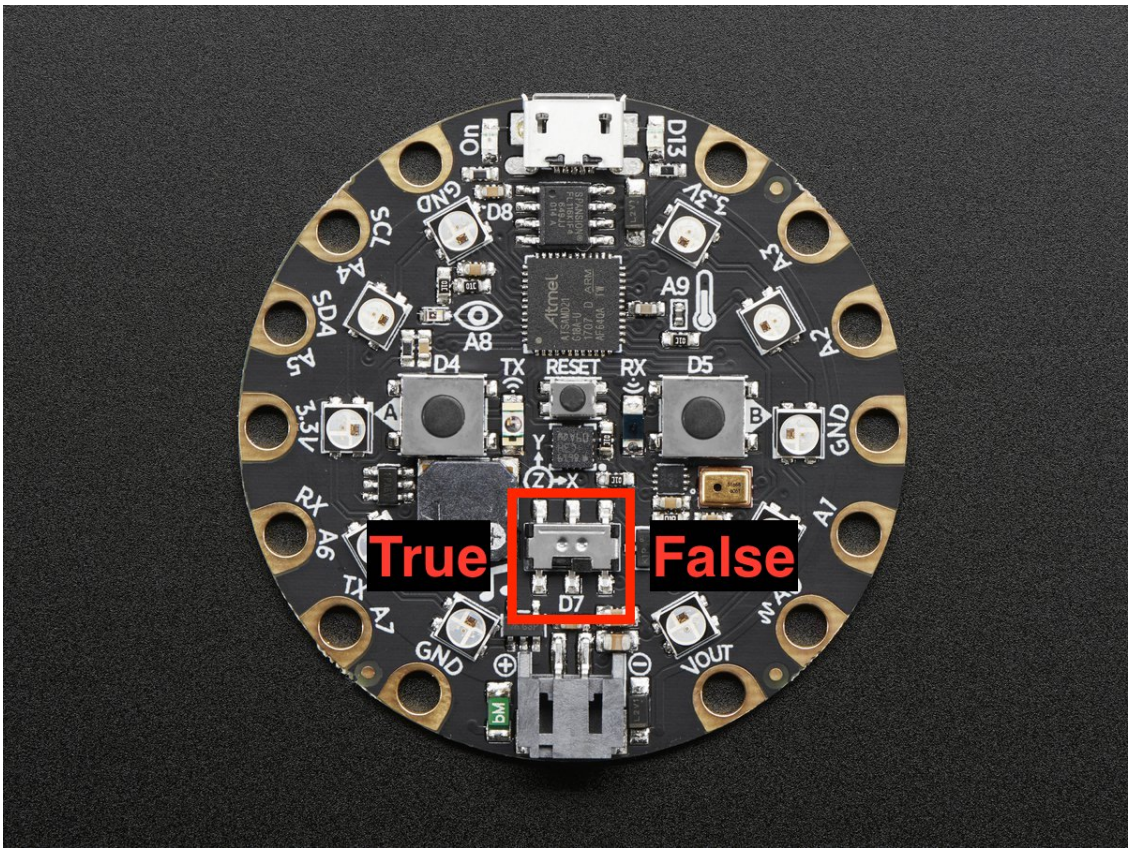
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```
        cpx.start_tone(262)
    elif cpx.button_b:
        cpx.start_tone(294)
    else:
        cpx.stop_tone()
```

switch

`True` when the switch is to the left next to the music notes. `False` when it is to the right towards the ear.

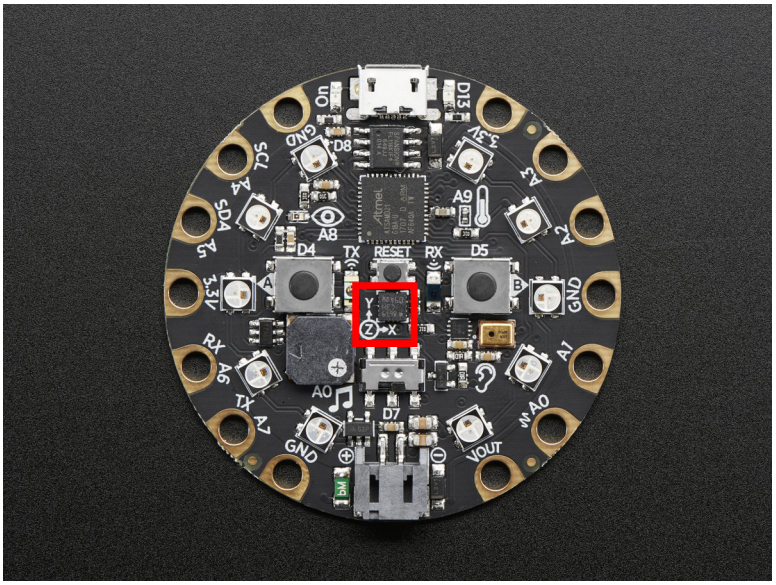



```
from adafruit_circuitplayground.express import cpx
import time

while True:
    print("Slide switch:", cpx.switch)
    time.sleep(1)
```

tapped

True once after a detecting a tap. Requires `cpx.detect_taps`.



Tap the CPX once for a single-tap, or quickly tap twice for a double-tap.

```
from adafruit_circuitplayground.express import cpx

cpx.detect_taps = 1

while True:
    if cpx.tapped:
        print("Single tap detected!")
```

To use single and double tap together, you must have a delay between them. It will not function properly without it. This example uses both by counting a specified number of each type of tap before moving on in the code.

```
from adafruit_circuitplayground.express import cpx

# Set to check for single-taps.
cpx.detect_taps = 1
tap_count = 0

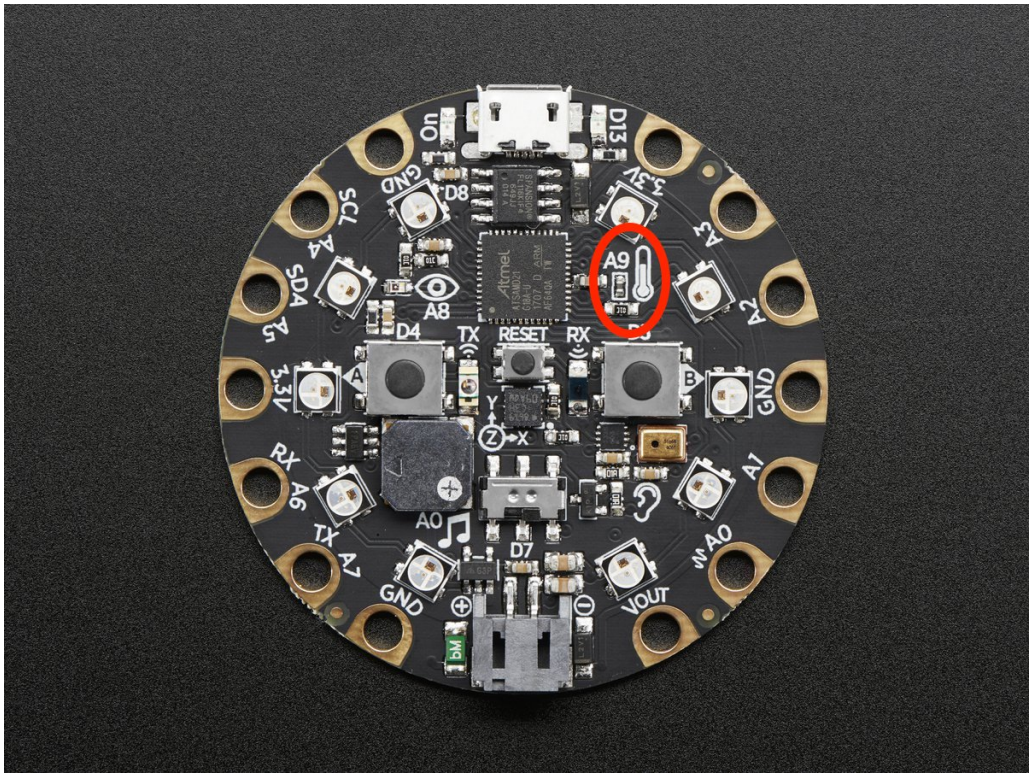
# We're looking for 2 single-taps before moving on.
while tap_count < 2:
    if cpx.tapped:
        tap_count += 1
print("Reached 2 single-taps!")

# Now switch to checking for double-taps
tap_count = 0
cpx.detect_taps = 2

# We're looking for 2 double-taps before moving on.
while tap_count < 2:
    if cpx.tapped:
        tap_count += 1
print("Reached 2 double-taps!")
print("Done.")
```

temperature

The temperature of the CircuitPlayground in Celsius.



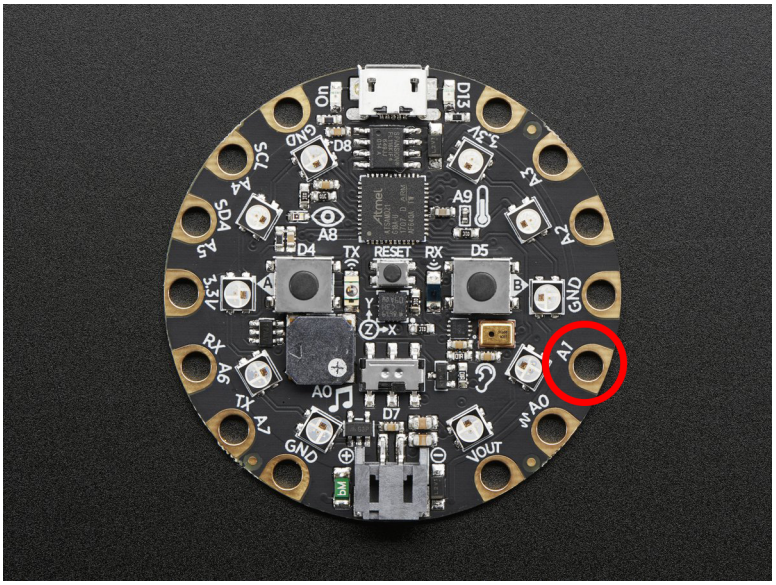
Converting this to Farenheit is easy!

```
from adafruit_circuitplayground.express import cpx
import time

while True:
    temperature_c = cpx.temperature
    temperature_f = temperature_c * 1.8 + 32
    print("Temperature celsius:", temperature_c)
    print("Temperature fahrenheit:", temperature_f)
    time.sleep(1)
```

touch_A1

Detect touch on capacitive touch pad A1.

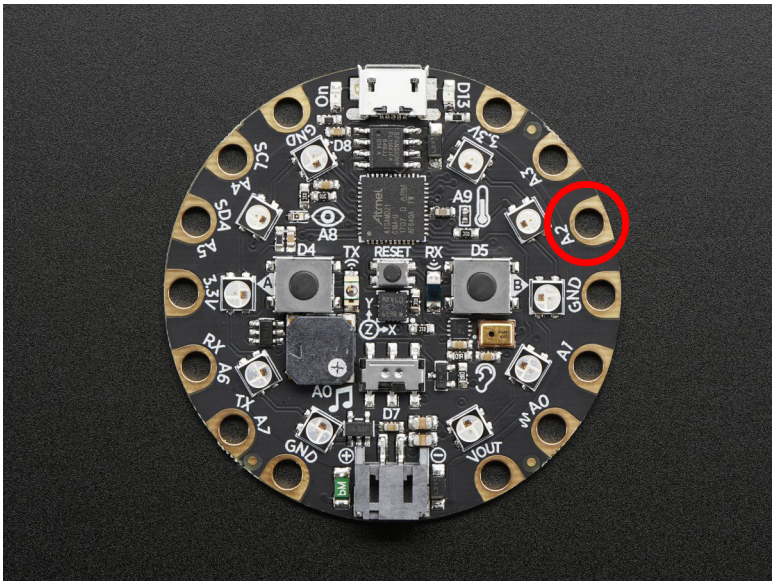



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A1:
        print('Touched pad A1')
```

touch_A2

Detect touch on capacitive touch pad A2.

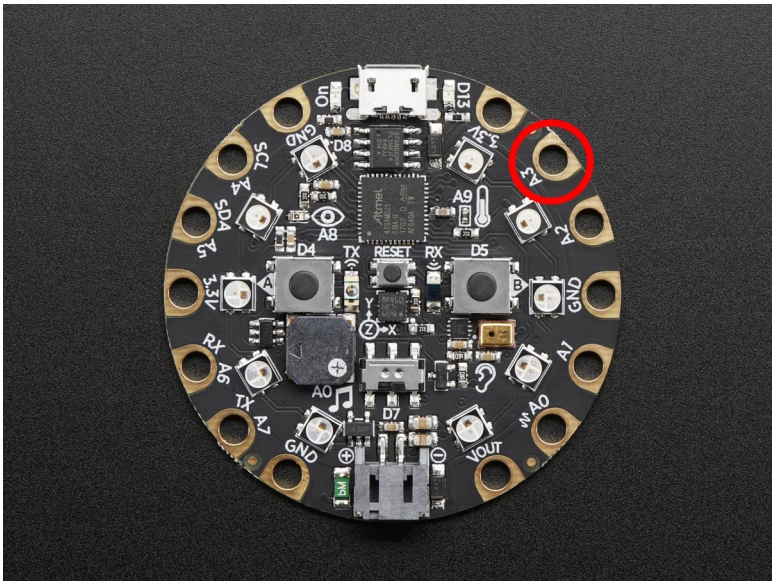



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A2:
        print('Touched pad A2')
```

touch_A3

Detect touch on capacitive touch pad A3.

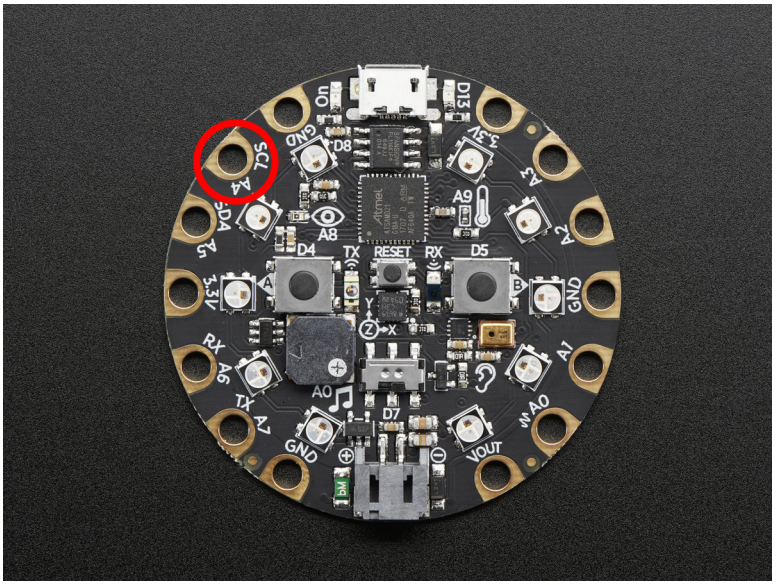



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A3:
        print('Touched pad A3')
```

touch_A4

Detect touch on capacitive touch pad A4.

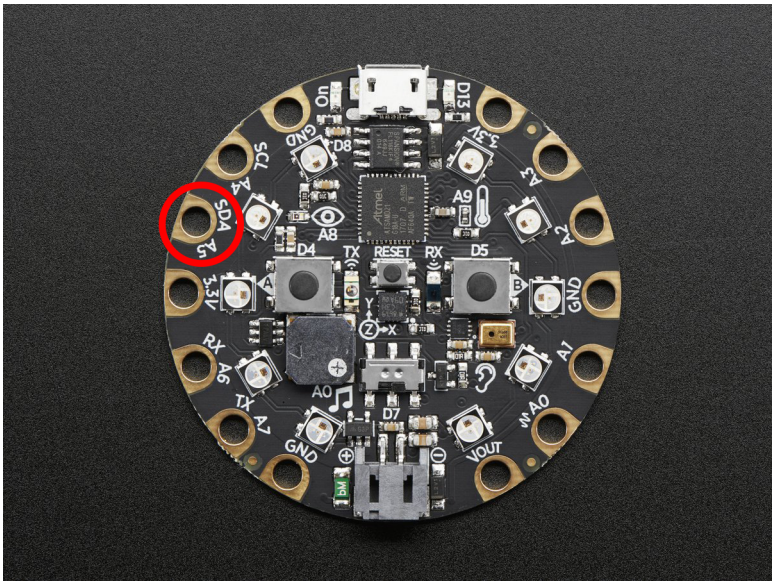



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A4:
        print('Touched pad A4')
```

touch_A5

Detect touch on capacitive touch pad A5.

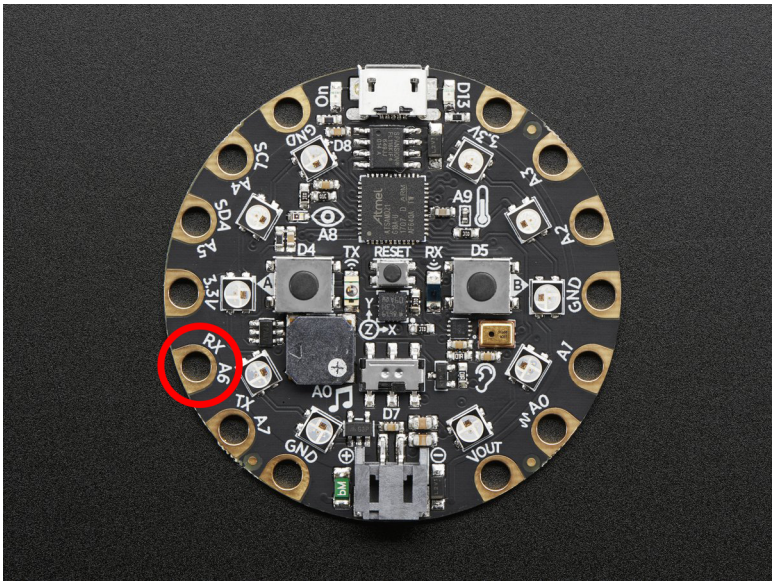



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A5:
        print('Touched pad A5')
```

touch_A6

Detect touch on capacitive touch pad A6.

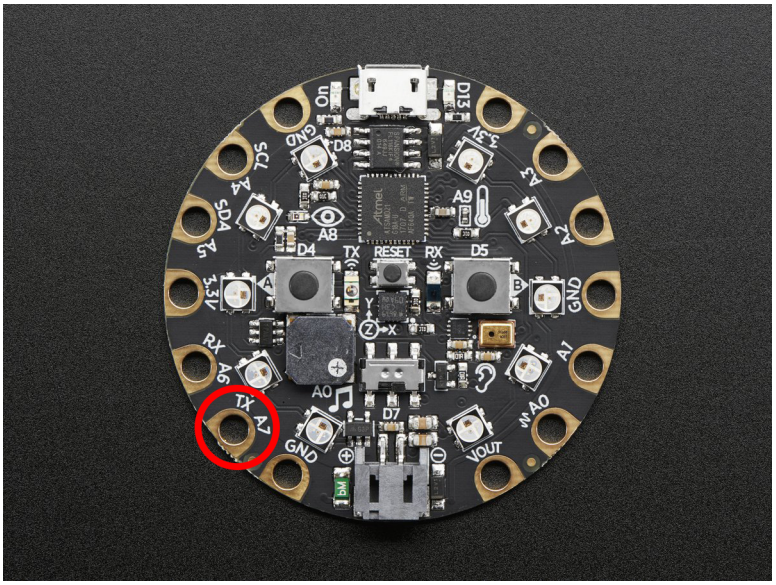



```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A6:
        print('Touched pad A6')
```

touch_A7

Detect touch on capacitive touch pad A7.




```
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.touch_A7:
        print('Touched pad A7')
```

class adafruit_circuitplayground.express.**Photocell**(*pin*)

Simple driver for analog photocell on the CircuitPlayground Express.

light

Light level in SI Lux.

adafruit_circuitplayground.express.**cpx = <adafruit_circuitplayground.express.Express object**

Object that is automatically created on import.

To use, simply import it from the module:

```
from adafruit_circuitplayground.express import cpx
```

CHAPTER 6

Indices and tables

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