Adafruit CircuitPlayground Library Documentation

Release 1.0

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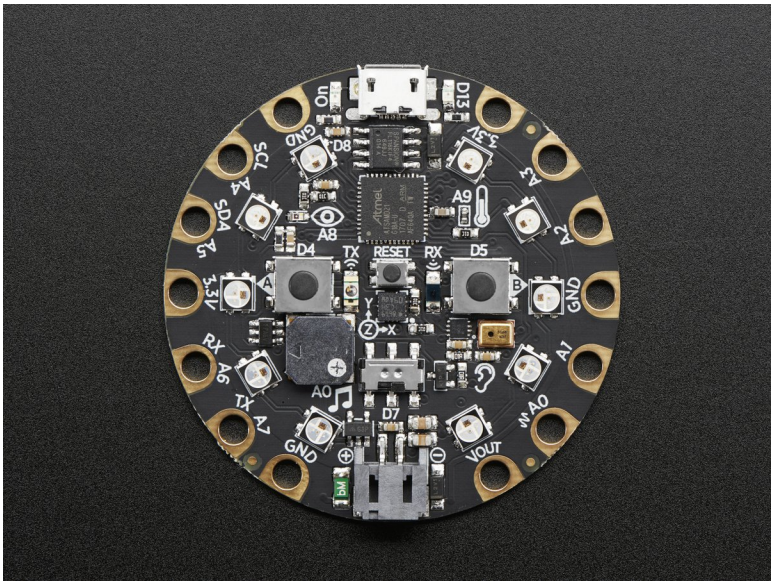
Contents

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/circuitplayground_acceleration.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/circuitplayground_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/circuitplayground_shake.py

```
from adafruit_circuitplayground.express import cpx

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

Listing 4: examples/circuitplayground_tapdetect_single_double.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/circuitplayground_tapdetect.py

```
from adafruit_circuitplayground.express import cpx

cpx.detect_taps = 1

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

Listing 6: examples/circuitplayground_tone.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/circuitplayground_touched.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')
```

Listing 8: examples/circuitplayground_acceleration_neopixels.py

```
"""If the switch is to the right, it will appear that nothing is happening. Move the␣
↪switch to the
left to see the NeoPixels light up in colors related to the accelerometer! The CPX␣
↪has an
accelerometer in the center that returns (x, y, z) acceleration values. This program␣
↪uses those
values to light up the NeoPixels based on those acceleration values."""
from adafruit_circuitplayground.express import cpx

# Main loop gets x, y and z axis acceleration, prints the values, and turns on
# red, green and blue, at levels related to the x, y and z values.
while True:
```

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```
    if not cpx.switch:
        # If the switch is to the right, it returns False!
        print("Slide switch off!")
        cpx.pixels.fill((0, 0, 0))
        continue
    else:
        R = 0
        G = 0
        B = 0
        x, y, z = cpx.acceleration
        print((x, y, z))
        cpx.pixels.fill(((R + abs(int(x))), (G + abs(int(y))), (B + abs(int(z)))))
```

Listing 9: examples/circuitplayground_button_a.py

```
"""This example turns on the little red LED when button A is pressed."""
from adafruit_circuitplayground.express import cpx

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

Listing 10: examples/circuitplayground_button_b.py

```
"""This example turns the little red LED on only while button B is currently being␣
↪pressed."""
from adafruit_circuitplayground.express import cpx

# This code is written to be readable versus being Pylint compliant.
# pylint: disable=simplifiable-if-statement

while True:
    if cpx.button_b:
        cpx.red_led = True
    else:
        cpx.red_led = False

# Can also be written as:
#    cpx.red_led = cpx.button_b
```

Listing 11: examples/circuitplayground_buttons_1_neopixel.py

```
"""This example lights up the third NeoPixel while button A is being pressed, and␣
↪lights up the
eighth NeoPixel while button B is being pressed."""
from adafruit_circuitplayground.express import cpx

cpx.pixels.brightness = 0.3
cpx.pixels.fill((0, 0, 0))  # Turn off the NeoPixels if they're on!

while True:
    if cpx.button_a:
        cpx.pixels[2] = (0, 255, 0)
    else:
```

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```
        cpx.pixels[2] = (0, 0, 0)

    if cpx.button_b:
        cpx.pixels[7] = (0, 0, 255)
    else:
        cpx.pixels[7] = (0, 0, 0)
```

Listing 12: examples/circuitplayground_buttons_neopixels.py

```
"""This example lights up half the NeoPixels red while button A is being pressed, and half the
NeoPixels green while button B is being pressed."""
from adafruit_circuitplayground.express import cpx

cpx.pixels.brightness = 0.3
cpx.pixels.fill((0, 0, 0))  # Turn off the NeoPixels if they're on!

while True:
    if cpx.button_a:
        cpx.pixels[0:5] = [(255, 0, 0)] * 5
    else:
        cpx.pixels[0:5] = [(0, 0, 0)] * 5

    if cpx.button_b:
        cpx.pixels[5:10] = [(0, 255, 0)] * 5
    else:
        cpx.pixels[5:10] = [(0, 0, 0)] * 5
```

Listing 13: examples/circuitplayground_ir_receive.py

```
"""THIS EXAMPLE REQUIRES A SEPARATE LIBRARY BE LOADED ONTO YOUR CIRCUITPY DRIVE.
This example requires the adafruit_irremote.mpy library.

This example uses the IR receiver found near the center of the board. Works with another CPX
running the cpx_ir_transmit.py example. The NeoPixels will light up when the buttons on the
TRANSMITTING CPX are pressed!"""
import pulseio
import board
import adafruit_irremote
from adafruit_circuitplayground.express import cpx

# Create a 'pulseio' input, to listen to infrared signals on the IR receiver
pulsein = pulseio.PulseIn(board.IR_RX, maxlen=120, idle_state=True)
# Create a decoder that will take pulses and turn them into numbers
decoder = adafruit_irremote.GenericDecode()

while True:
    cpx.red_led = True
    pulses = decoder.read_pulses(pulsein)
    try:
        # Attempt to convert received pulses into numbers
        received_code = decoder.decode_bits(pulses, debug=False)
    except adafruit_irremote.IRNECRepeatException:
        # We got an unusual short code, probably a 'repeat' signal
```

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```
        continue
    except adafruit_irremote.IRDecodeException:
        # Something got distorted
        continue

    print("Infrared code received: ", received_code)
    if received_code == [66, 84, 78, 65]:
        print("Button A signal")
        cpx.pixels.fill((100, 0, 155))
    if received_code == [66, 84, 78, 64]:
        print("Button B Signal")
        cpx.pixels.fill((210, 45, 0))
```

Listing 14: examples/circuitplayground_ir_transmit.py

```
"""THIS EXAMPLE REQUIRES A SEPARATE LIBRARY BE LOADED ONTO YOUR CIRCUITPY DRIVE.
This example requires the adafruit_irremote.mpy library.

This example uses the IR transmitter found near the center of the board. Works with another CPX
running the cpx_ir_receive.py example. Press the buttons to light up the NeoPixels on the RECEIVING
CPX!"""
import time
import pulseio
import board
import adafruit_irremote
from adafruit_circuitplayground.express import cpx

# Create a 'pulseio' output, to send infrared signals from the IR transmitter
pwm = pulseio.PWMOut(board.IR_TX, frequency=38000, duty_cycle=2 ** 15)
pulseout = pulseio.PulseOut(pwm)
# Create an encoder that will take numbers and turn them into NEC IR pulses
encoder = adafruit_irremote.GenericTransmit(header=[9500, 4500], one=[550, 550],
                                            zero=[550, 1700], trail=0)

while True:
    if cpx.button_a:
        print("Button A pressed! \n")
        cpx.red_led = True
        encoder.transmit(pulseout, [66, 84, 78, 65])
        cpx.red_led = False
        # wait so the receiver can get the full message
        time.sleep(0.2)
    if cpx.button_b:
        print("Button B pressed! \n")
        cpx.red_led = True
        encoder.transmit(pulseout, [66, 84, 78, 64])
        cpx.red_led = False
        time.sleep(0.2)
```

Listing 15: examples/circuitplayground_light_neopixels.py

```
"""THIS EXAMPLE REQUIRES A SEPARATE LIBRARY BE LOADED ONTO YOUR CIRCUITPY DRIVE.
This example requires the simpleio.mpy library.

```

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```
"""This example uses the light sensor on the CPX, located net to the picture of the eye␣
↪on the board.
Once you have the library loaded, try shining a flashlight on your CPX to watch the␣
↪number of
NeoPixels lit up increase, or try covering up the light sensor to watch the number␣
↪decrease."""
import time
from adafruit_circuitplayground.express import cpx
import simpleio

cpx.pixels.auto_write = False
cpx.pixels.brightness = 0.3

while True:
    # light value remapped to pixel position
    peak = simpleio.map_range(cpx.light, 0, 320, 0, 10)
    print(cpx.light)
    print(int(peak))

    for i in range(0, 10, 1):
        if i <= peak:
            cpx.pixels[i] = (0, 255, 255)
        else:
            cpx.pixels[i] = (0, 0, 0)
    cpx.pixels.show()
    time.sleep(0.05)
```

Listing 16: examples/circuitplayground_light.py

```
"""This example uses the light sensor on your CPX, located next to the picture of the␣
↪eye. Try
shining a flashlight on your CPX, or covering the light sensor with your finger to␣
↪see the values
increase and decrease."""
import time
from adafruit_circuitplayground.express import cpx

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

Listing 17: examples/circuitplayground_neopixel_0_1.py

```
"""This example lights up the first and second NeoPixel, red and blue respectively."""
from adafruit_circuitplayground.express import cpx

cpx.pixels.brightness = 0.3

while True:
    cpx.pixels[0] = (255, 0, 0)
    cpx.pixels[1] = (0, 0, 255)
```

Listing 18: examples/circuitplayground_light_plotter.py

```
"""If you're using Mu, this example will plot the light levels from the light sensor
(located next
to the eye) on your CPX. Try shining a flashlight on your CPX, or covering the light sensor to see
the plot increase and decrease."""
import time
from adafruit_circuitplayground.express import cpx

while True:
    print("Light:", cpx.light)
    print((cpx.light,))
    time.sleep(0.1)
```

Listing 19: examples/circuitplayground_play_file_buttons.py

```
"""THIS EXAMPLE REQUIRES A WAV FILE FROM THE examples FOLDER IN THE
Adafruit_CircuitPython_CircuitPlayground REPO found at:
https://github.com/adafruit/Adafruit_CircuitPython_CircuitPlayground/tree/master/examples

Copy the "dip.wav" and "rise.wav" files to your CIRCUITPY drive.

Once the files are copied, this example plays a different wav file for each button pressed!"""
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        cpx.play_file("dip.wav")
    if cpx.button_b:
        cpx.play_file("rise.wav")
```

Listing 20: examples/circuitplayground_play_file.py

```
"""THIS EXAMPLE REQUIRES A WAV FILE FROM THE examples FOLDER IN THE
Adafruit_CircuitPython_CircuitPlayground REPO found at:
https://github.com/adafruit/Adafruit_CircuitPython_CircuitPlayground/tree/master/examples

Copy the "dip.wav" file to your CIRCUITPY drive.

Once the file is copied, this example plays a wav file!"""
from adafruit_circuitplayground.express import cpx

cpx.play_file("dip.wav")
```

Listing 21: examples/circuitplayground_play_tone_buttons.py

```
"""This example plays a different tone for a duration of 1 second for each button pressed."""
from adafruit_circuitplayground.express import cpx

while True:
    if cpx.button_a:
        cpx.play_tone(262, 1)
```

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```
    if cpx.button_b:
        cpx.play_tone(294, 1)
```

Listing 22: examples/circuitplayground_play_tone.py

```
"""This example plays two tones for 1 second each. Note that the tones are not in a␣
↪loop - this is
to prevent them from playing indefinitely!"""
from adafruit_circuitplayground.express import cpx

cpx.play_tone(262, 1)
cpx.play_tone(294, 1)
```

Listing 23: examples/circuitplayground_red_led_blinky.py

```
"""This is the "Hello, world!" of CircuitPython: Blinky! This example blinks the␣
↪little red LED on
and off!"""
import time
from adafruit_circuitplayground.express import cpx

while True:
    cpx.red_led = True
    time.sleep(0.5)
    cpx.red_led = False
    time.sleep(0.5)
```

Listing 24: examples/circuitplayground_red_led_blnky_short.py

```
"""This is the "Hello, world!" of CircuitPython: Blinky! This example blinks the␣
↪little red LED on
and off! It's a shorter version of the other Blinky example."""
import time
from adafruit_circuitplayground.express import cpx

while True:
    cpx.red_led = not cpx.red_led
    time.sleep(0.5)
```

Listing 25: examples/circuitplayground_red_led.py

```
"""This example turns on the little red LED."""
from adafruit_circuitplayground.express import cpx

while True:
    cpx.red_led = True
```

Listing 26: examples/circuitplayground_slide_switch_red_led.py

```
"""This example uses the slide switch to control the little red LED."""
from adafruit_circuitplayground.express import cpx

# This code is written to be readable versus being Pylint compliant.
# pylint: disable=simplifiable-if-statement

```

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```
while True:
    if cpx.switch:
        cpx.red_led = True
    else:
        cpx.red_led = False
```

Listing 27: examples/circuitplayground_slide_switch_red_led_short.py

```
"""This example uses the slide switch to control the little red LED. When the switch is to the
right it returns False, and when it's to the left, it returns True."""
from adafruit_circuitplayground.express import cpx

while True:
    cpx.red_led = cpx.switch
```

Listing 28: examples/circuitplayground_slide_switch.py

```
"""This example prints the status of the slide switch. Try moving the switch back and forth to see
what's printed to the serial console!"""
import time
from adafruit_circuitplayground.express import cpx

while True:
    print("Slide switch:", cpx.switch)
    time.sleep(0.1)
```

Listing 29: examples/circuitplayground_sound_meter.py

```
"""This example uses the sound sensor, located next to the picture of the ear on your board, to
light up the NeoPixels as a sound meter. Try talking to your CPX or clapping, etc, to see the
NeoPixels light up!"""
import array
import math
import audiobusio
import board
from adafruit_circuitplayground.express import cpx


def constrain(value, floor, ceiling):
    return max(floor, min(value, ceiling))


def log_scale(input_value, input_min, input_max, output_min, output_max):
    normalized_input_value = (input_value - input_min) / (input_max - input_min)
    return output_min + math.pow(normalized_input_value, 0.630957) * (output_max - output_min)


def normalized_rms(values):
    minbuf = int(sum(values) / len(values))
    return math.sqrt(sum(float(sample - minbuf) *
```

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```
                        (sample - minbuf) for sample in values) / len(values))


mic = audiobusio.PDMIn(board.MICROPHONE_CLOCK, board.MICROPHONE_DATA,
                       sample_rate=16000, bit_depth=16)

samples = array.array('H', [0] * 160)
mic.record(samples, len(samples))
input_floor = normalized_rms(samples) + 10

# Lower number means more sensitive - more LEDs will light up with less sound.
sensitivity = 500
input_ceiling = input_floor + sensitivity

peak = 0
while True:
    mic.record(samples, len(samples))
    magnitude = normalized_rms(samples)
    print((magnitude,))

    c = log_scale(constrain(magnitude, input_floor, input_ceiling),
                  input_floor, input_ceiling, 0, 10)

    cpx.pixels.fill((0, 0, 0))
    for i in range(10):
        if i < c:
            cpx.pixels[i] = (i * (255 // 10), 50, 0)
        if c >= peak:
            peak = min(c, 10 - 1)
        elif peak > 0:
            peak = peak - 1
        if peak > 0:
            cpx.pixels[int(peak)] = (80, 0, 255)
    cpx.pixels.show()
```

Listing 30: examples/circuitplayground_tap_red_led.py

```
"""This example turns on the little red LED and prints to the serial console when you␣
↪double-tap
the CPX!"""
import time
from adafruit_circuitplayground.express import cpx

# Change to 1 for detecting a single-tap!
cpx.detect_taps = 2

while True:
    if cpx.tapped:
        print("Tapped!")
        cpx.red_led = True
        time.sleep(0.1)
    else:
        cpx.red_led = False
```

Listing 31: examples/circuitplayground_temperature_neopixels.py

```
"""THIS EXAMPLE REQUIRES A SEPARATE LIBRARY BE LOADED ONTO YOUR CIRCUITPY DRIVE.
This example requires the simpleio.mpy library.

This example use the temperature sensor on the CPX, located next to the picture of␣
↪the thermometer
on the board. Try warming up the board to watch the number of NeoPixels lit up␣
↪increase, or cooling
it down to see the number decrease. You can set the min and max temperatures to make␣
↪it more or
less sensitive to temperature changes.
"""
import time
from adafruit_circuitplayground.express import cpx
import simpleio

cpx.pixels.auto_write = False
cpx.pixels.brightness = 0.3

# Set these based on your ambient temperature in Celsius for best results!
minimum_temp = 24
maximum_temp = 30

while True:
    # temperature value remapped to pixel position
    peak = simpleio.map_range(cpx.temperature, minimum_temp, maximum_temp, 0, 10)
    print(cpx.temperature)
    print(int(peak))

    for i in range(0, 10, 1):
        if i <= peak:
            cpx.pixels[i] = (0, 255, 255)
        else:
            cpx.pixels[i] = (0, 0, 0)
    cpx.pixels.show()
    time.sleep(0.05)
```

Listing 32: examples/circuitplayground_temperture_plotter.py

```
"""If you're using Mu, this example will plot the temperature in C and F on the␣
↪plotter! Click
"Plotter" to open it, and place your finger over the sensor to see the numbers change.
↪ The
sensor is located next to the picture of the thermometer on the CPX."""
import time
from adafruit_circuitplayground.express import cpx

while True:
    print("Temperature C:", cpx.temperature)
    print("Temperature F:", cpx.temperature * 1.8 + 32)
    print((cpx.temperature, cpx.temperature * 1.8 + 32))
    time.sleep(0.1)
```

Listing 33: examples/circuitplayground_temperture.py

```
"""This example uses the temperature sensor on the CPX, located next to the image of
↪a thermometer
on the board. It prints the temperature in both C and F to the serial console. Try
↪putting your
finger over the sensor to see the numbers change!"""
import time
from adafruit_circuitplayground.express import cpx

while True:
    print("Temperature C:", cpx.temperature)
    print("Temperature F:", cpx.temperature * 1.8 + 32)
    time.sleep(1)
```

Listing 34: examples/circuitplayground_touch_pixel_fill_rainbow.py

```
"""This example uses the capacitive touch pads on the CPX. They are located around
↪the outer edge
of the board and are labeled A1-A7. (A0 is not a touch pad.) This example lights up
↪all the
NeoPixels a different color of the rainbow for each pad touched!"""
import time
from adafruit_circuitplayground.express import cpx

cpx.pixels.brightness = 0.3

while True:
    if cpx.touch_A1:
        print("Touched A1!")
        cpx.pixels.fill((255, 0, 0))
    if cpx.touch_A2:
        print("Touched A2!")
        cpx.pixels.fill((210, 45, 0))
    if cpx.touch_A3:
        print("Touched A3!")
        cpx.pixels.fill((155, 100, 0))
    if cpx.touch_A4:
        print("Touched A4!")
        cpx.pixels.fill((0, 255, 0))
    if cpx.touch_A5:
        print("Touched A5!")
        cpx.pixels.fill((0, 135, 125))
    if cpx.touch_A6:
        print("Touched A6!")
        cpx.pixels.fill((0, 0, 255))
    if cpx.touch_A7:
        print("Touched A7!")
        cpx.pixels.fill((100, 0, 155))
    time.sleep(0.1)
```

Listing 35: examples/circuitplayground_touch_pixel_rainbow.py

```
"""This example uses the capacitive touch pads on the CPX. They are located around
↪the outer edge
of the board and are labeled A1-A7. (A0 is not a touch pad.) This example lights up
↪the nearest
```

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```
NeoPixel to that pad a different color of the rainbow!"""
import time
from adafruit_circuitplayground.express import cpx

cpx.pixels.brightness = 0.3

while True:
    if cpx.touch_A1:
        print("Touched A1!")
        cpx.pixels[6] = (255, 0, 0)
    if cpx.touch_A2:
        print("Touched A2!")
        cpx.pixels[8] = (210, 45, 0)
    if cpx.touch_A3:
        print("Touched A3!")
        cpx.pixels[9] = (155, 100, 0)
    if cpx.touch_A4:
        print("Touched A4!")
        cpx.pixels[0] = (0, 255, 0)
    if cpx.touch_A5:
        print("Touched A5!")
        cpx.pixels[1] = (0, 135, 125)
    if cpx.touch_A6:
        print("Touched A6!")
        cpx.pixels[3] = (0, 0, 255)
    if cpx.touch_A7:
        print("Touched A7!")
        cpx.pixels[4] = (100, 0, 155)
    time.sleep(0.1)
```

5.2 adafruit_circuitplayground.express

CircuitPython driver from CircuitPlayground Express.

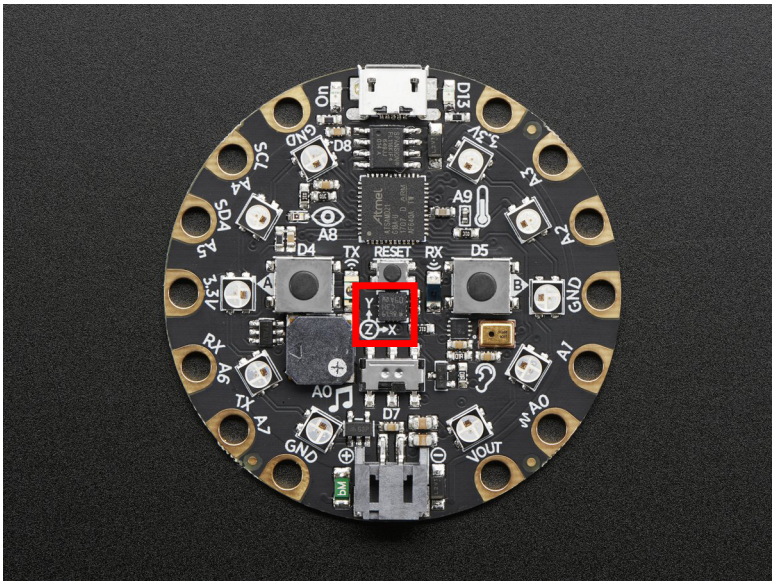
- Author(s): Kattni Rembor, Scott Shawcroft

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.

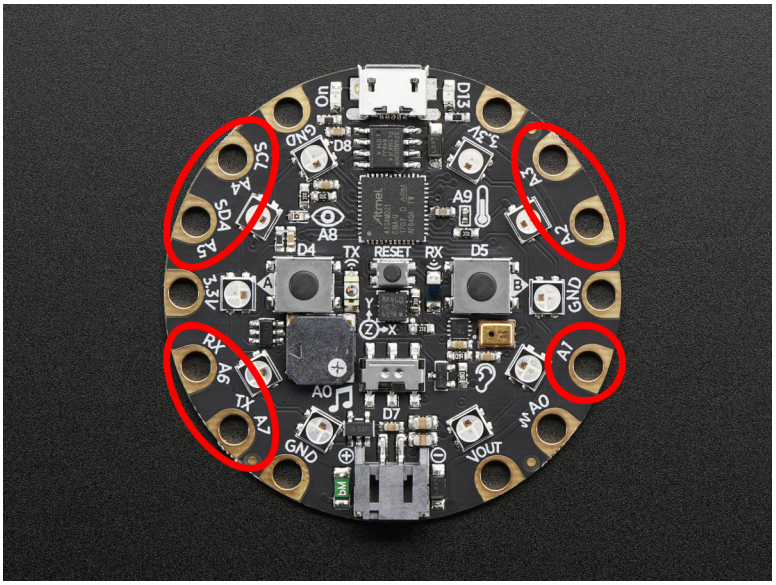
```
from adafruit_circuitplayground.express import cpx

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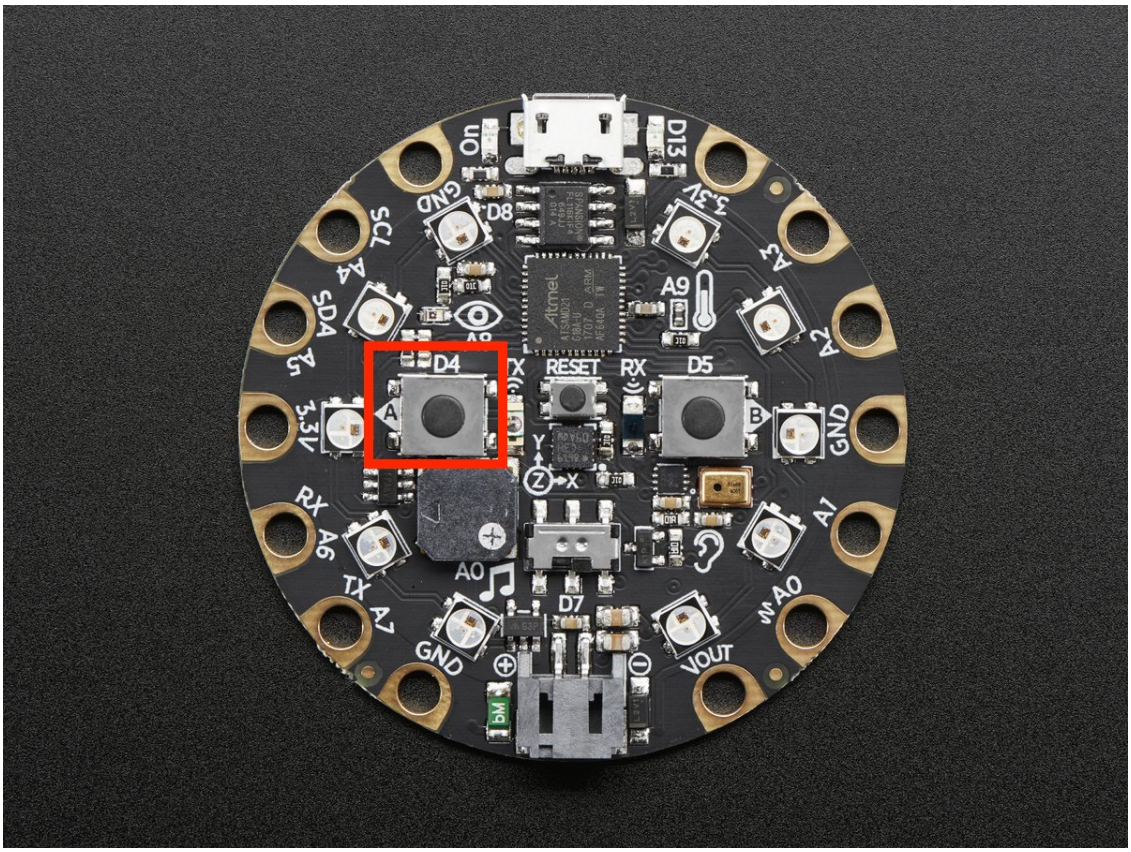
```
while True:
    if cpx.touch_A1:
        print('Touched pad A1')
```

button_a

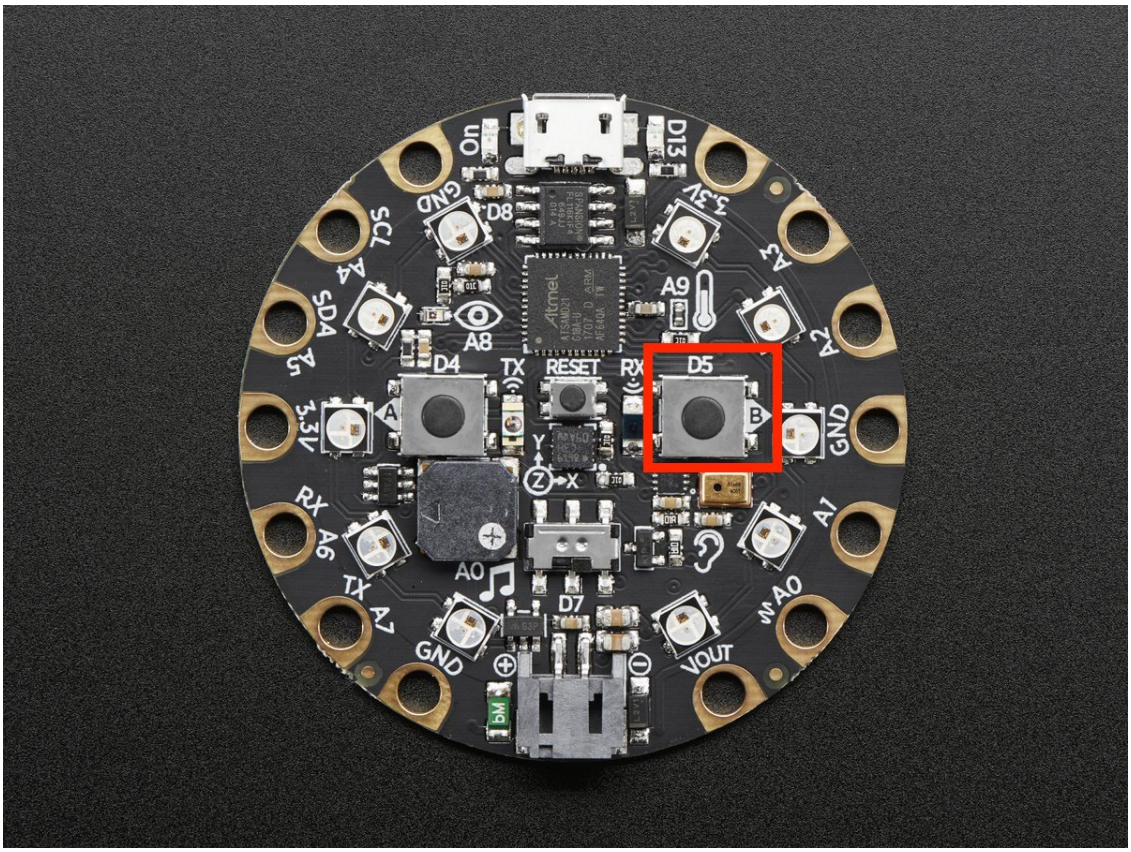
`True` when Button A is pressed. `False` if not.




```
from adafruit_circuitplayground.express import cpx

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

button_b

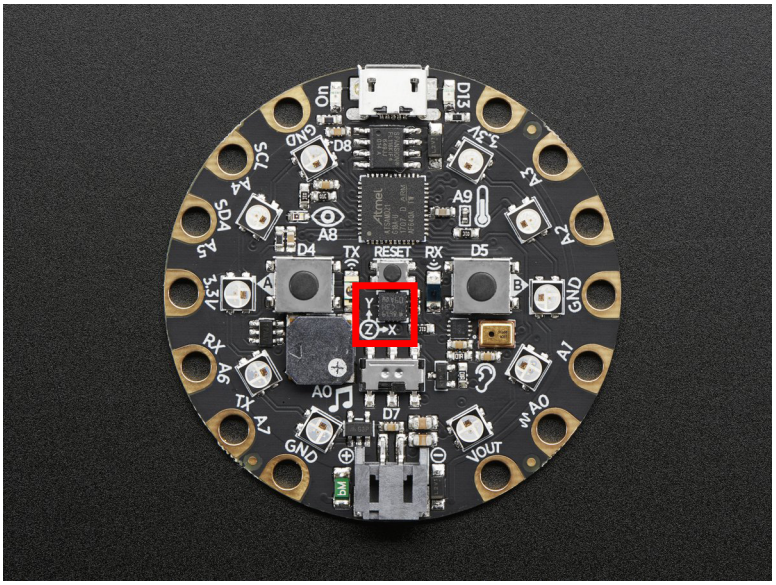
`True` when Button B is pressed. `False` if not.




```
from adafruit_circuitplayground.express import cpx

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

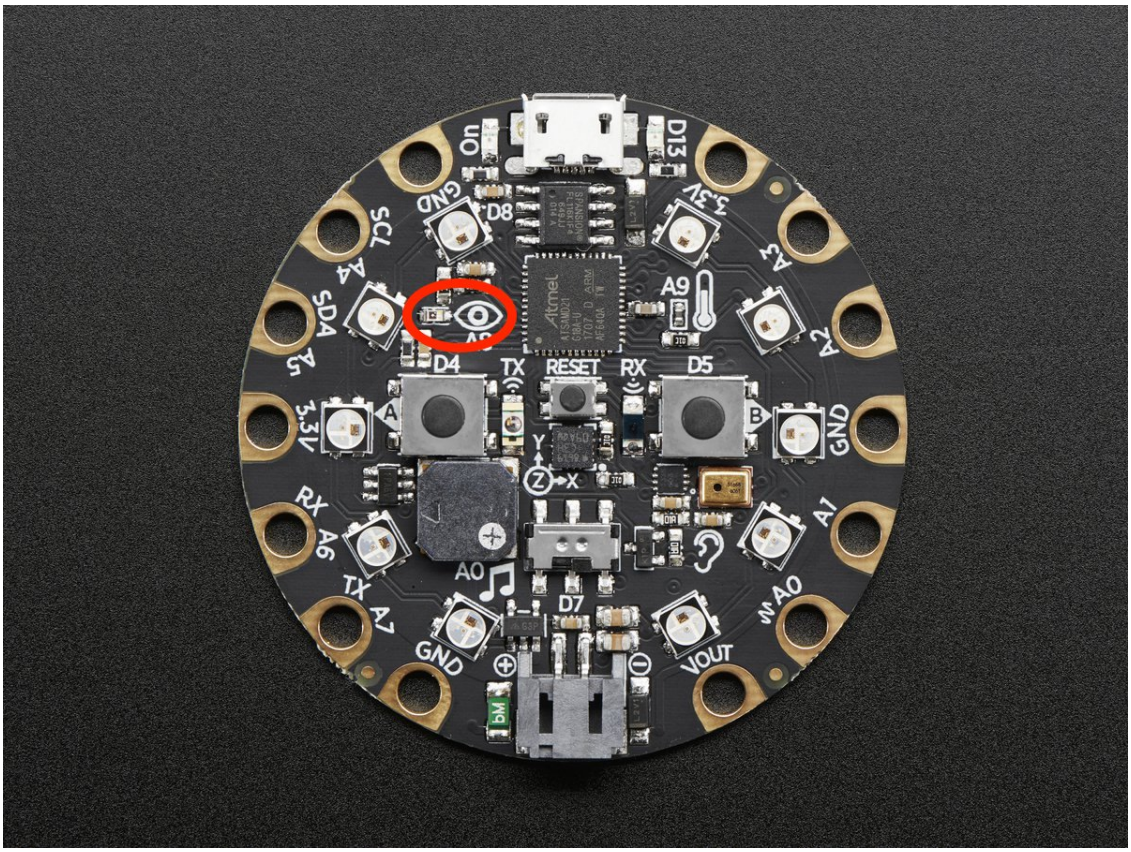
detect_taps

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.



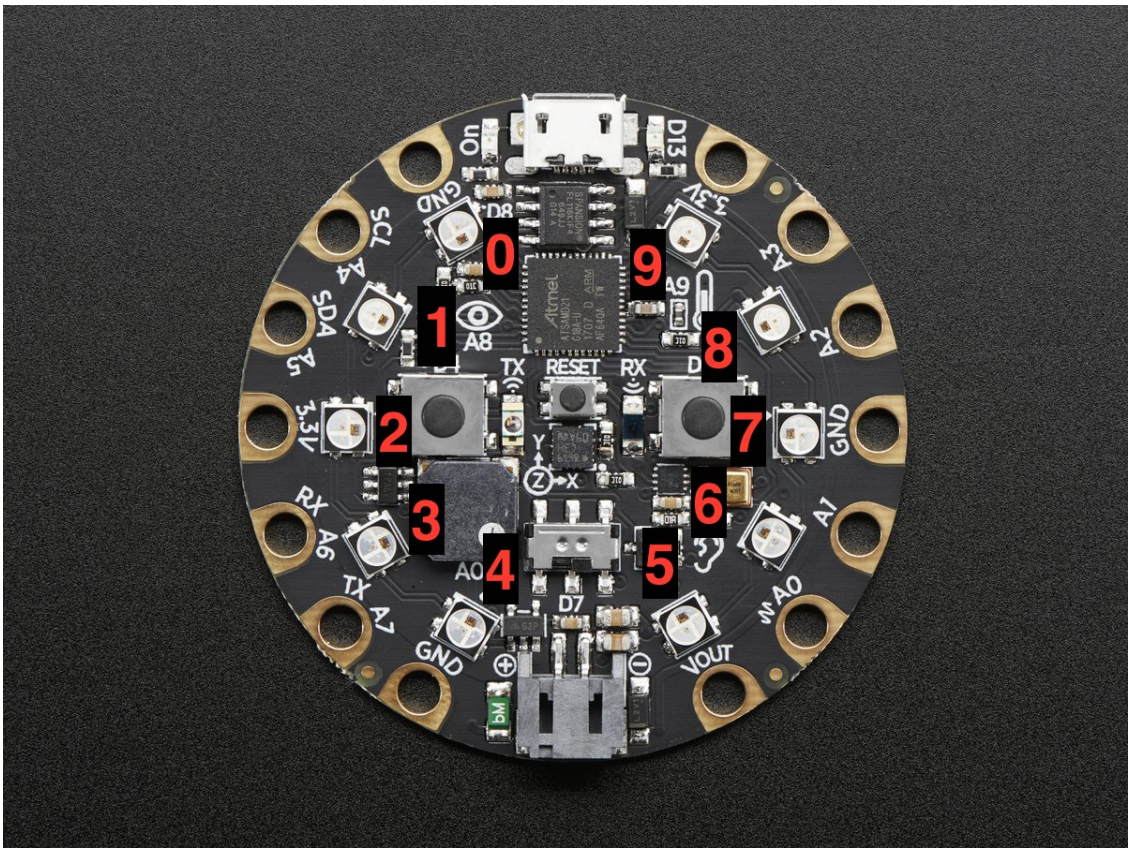
Try covering the sensor next to the eye to see it change.

```
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.



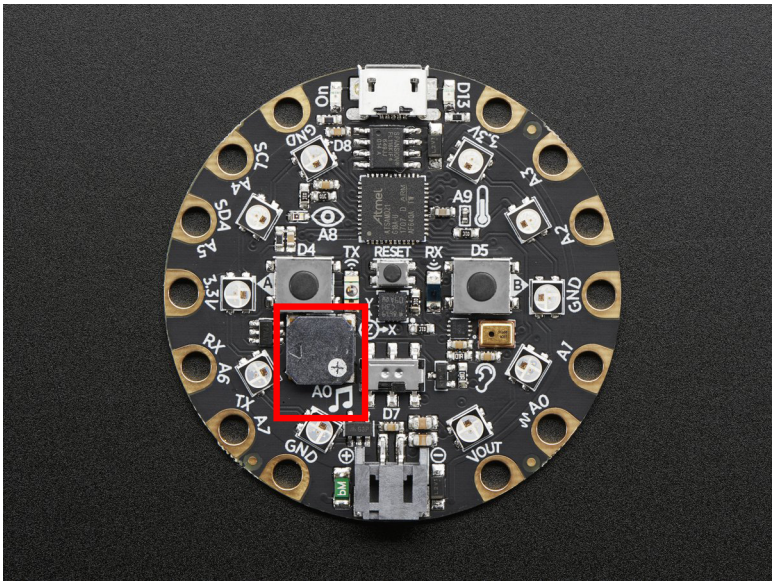
Here is an example that sets the first pixel green and the second red.

```
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



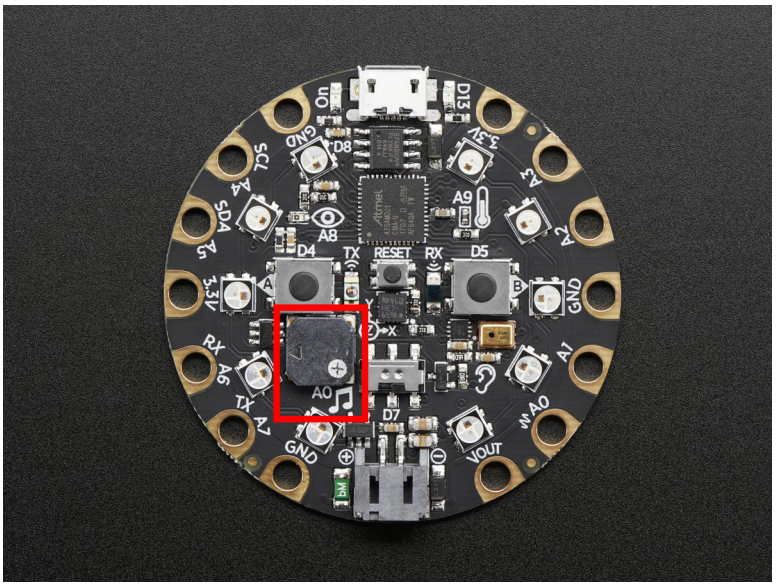

```
from adafruit_circuitplayground.express import cpx

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.

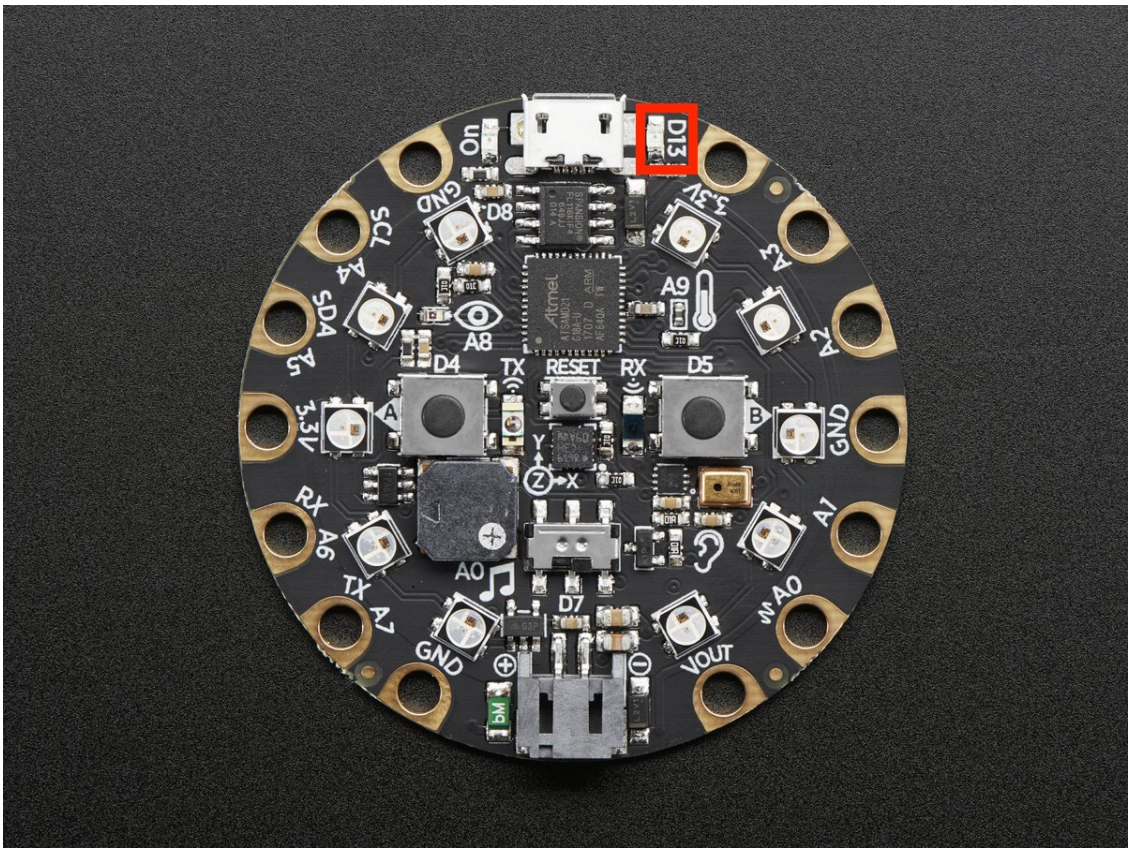
Parameters

- **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)
```

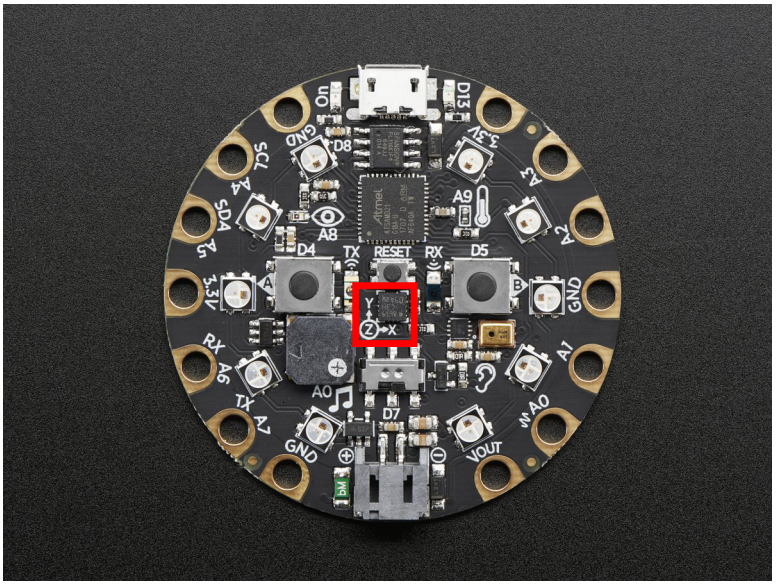
red_led
The red led next to the USB plug marked D13.




```
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!")
```

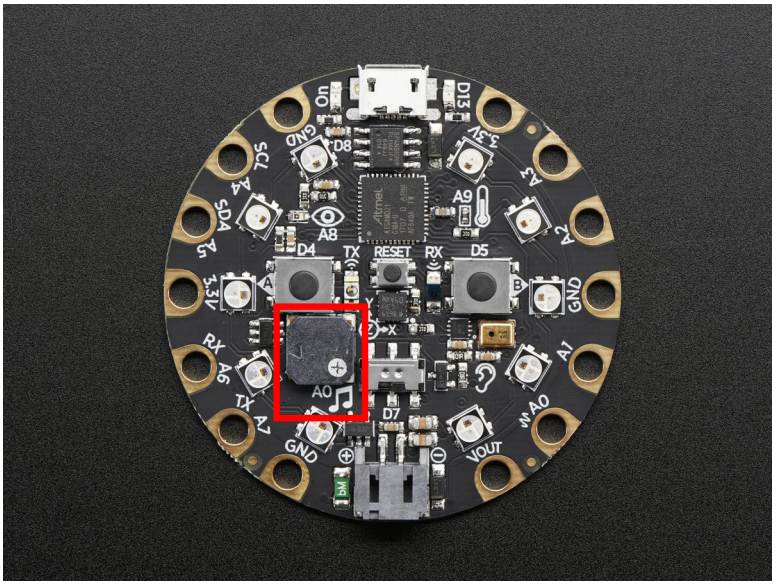
Decreasing `shake_threshold` increases shake sensitivity, i.e. the code will return a shake detected more easily with a lower `shake_threshold`. Increasing it causes the opposite. `shake_threshold` requires a minimum value of 10 - 10 is the value when the board is not moving, therefore anything less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

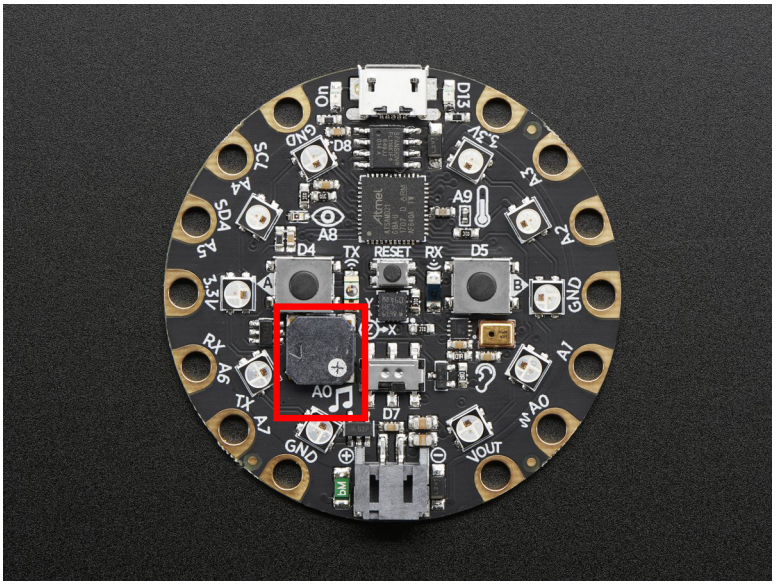
Produce a tone using the speaker. Try changing frequency to change the pitch of the tone.

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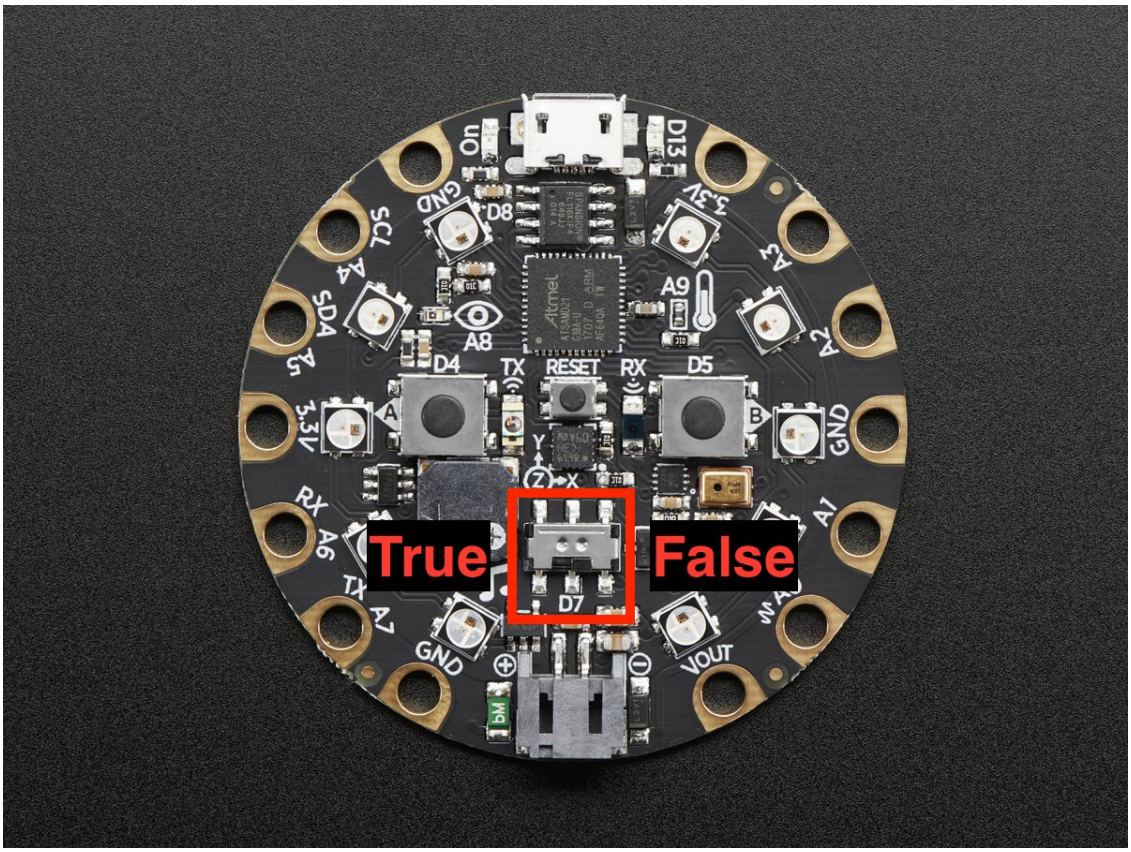
```
        cpx.start_tone(262)
    elif cpx.button_b:
        cpx.start_tone(294)
    else:
        cpx.stop_tone()
```

switch

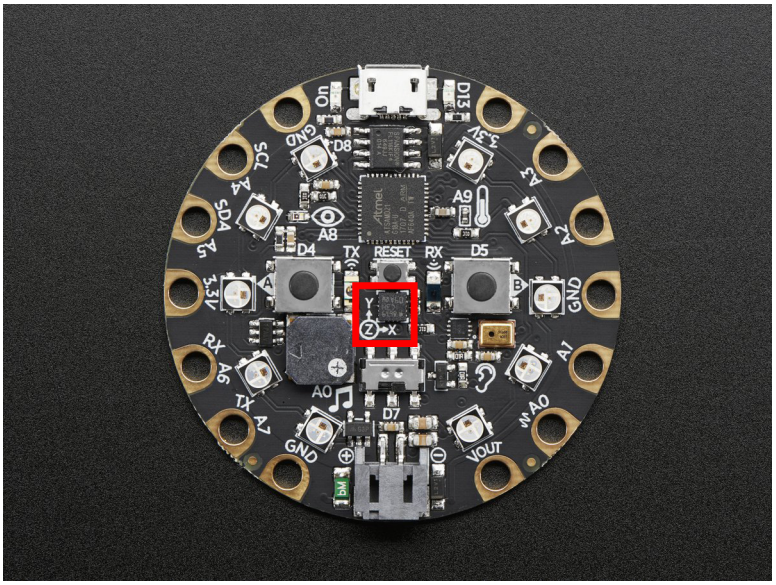
`True` when the switch is to the left next to the music notes. `False` when it is to the right towards the ear.




```
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.

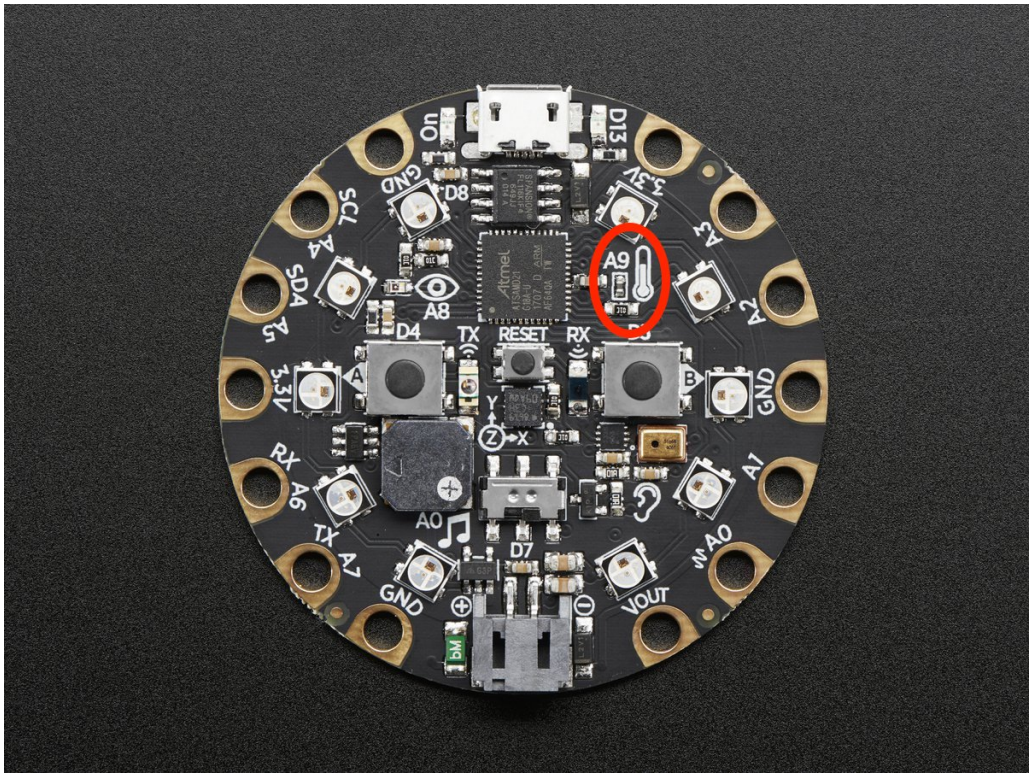
```
from adafruit_circuitplayground.express import cpx

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.

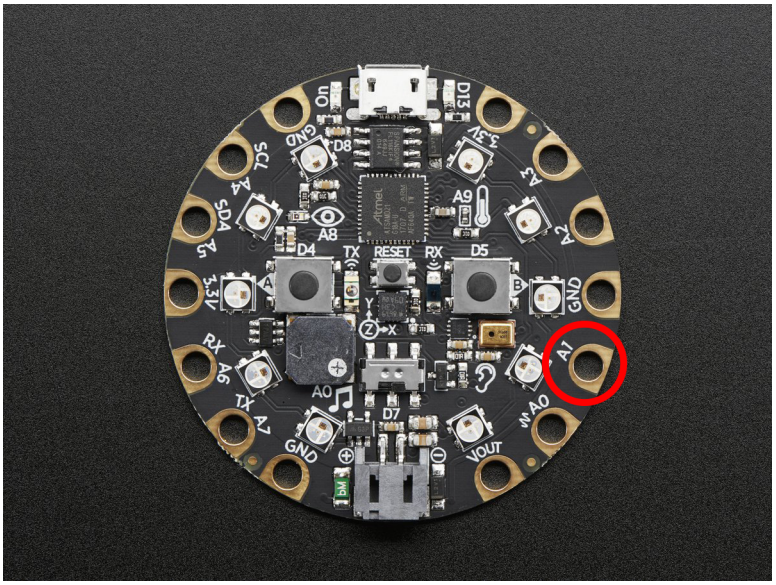


Converting this to Farenheit is easy!

```
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

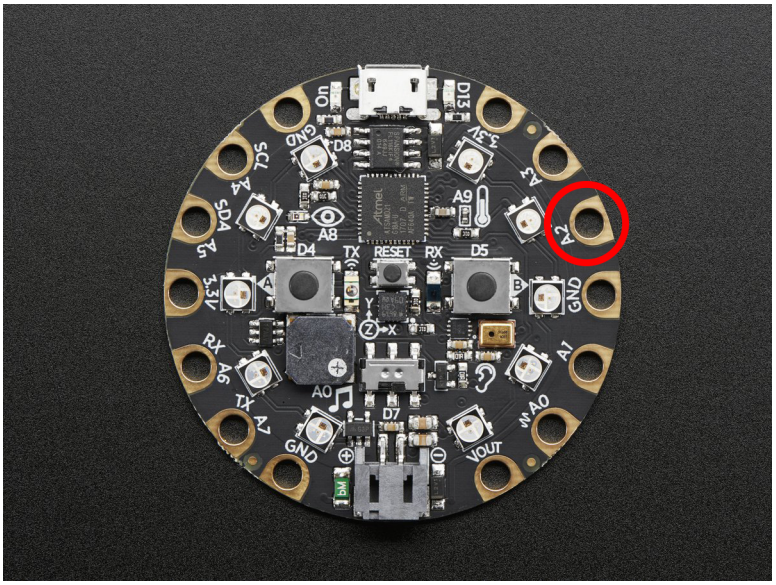
Detect touch on capacitive touch pad A1.




```
from adafruit_circuitplayground.express import cpx

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

touch_A2

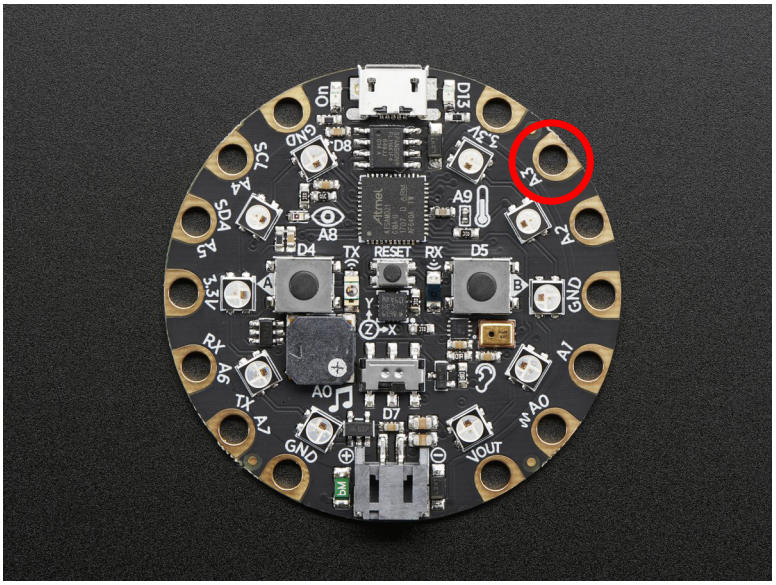
Detect touch on capacitive touch pad A2.




```
from adafruit_circuitplayground.express import cpx

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

touch_A3

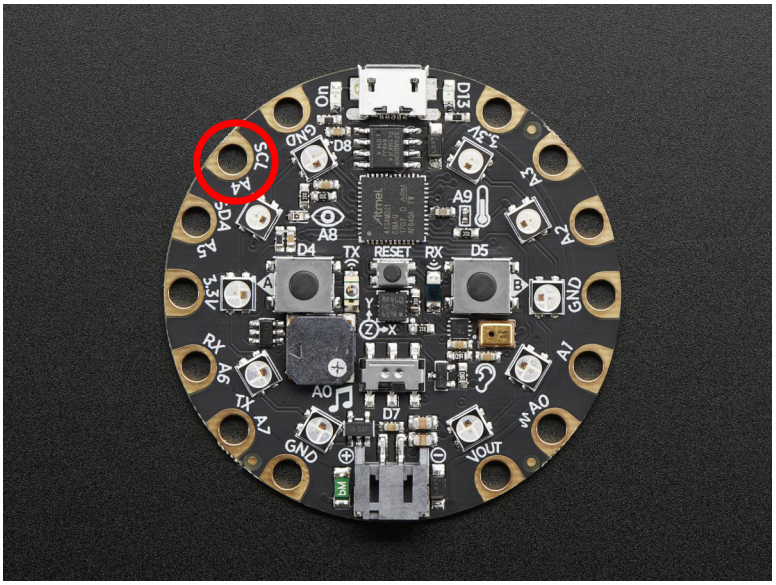
Detect touch on capacitive touch pad A3.




```
from adafruit_circuitplayground.express import cpx

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

touch_A4

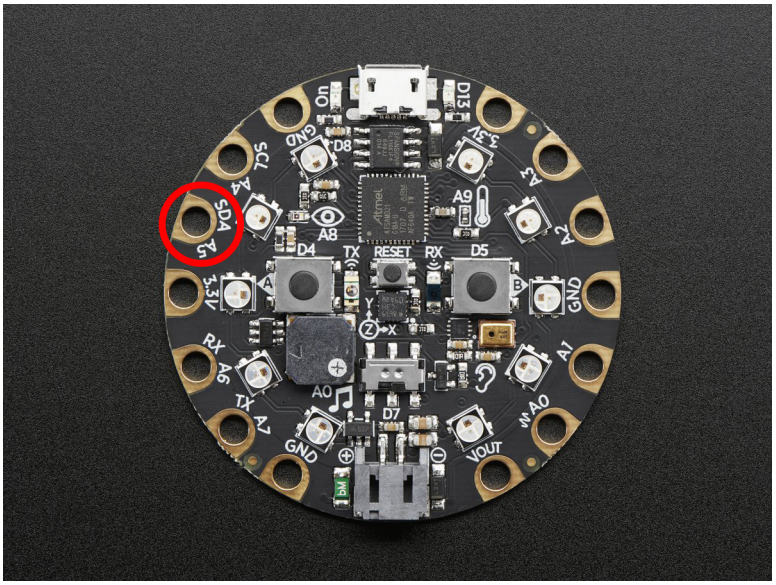
Detect touch on capacitive touch pad A4.




```
from adafruit_circuitplayground.express import cpx

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

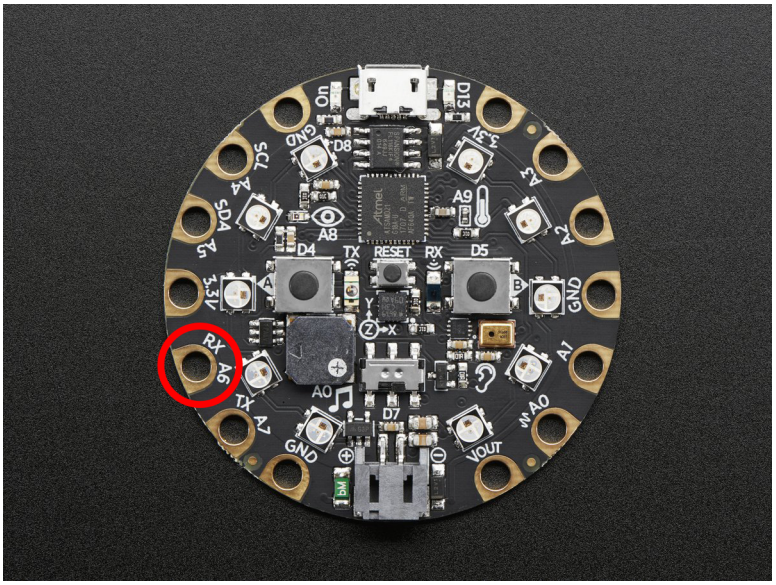
touch_A5

Detect touch on capacitive touch pad A5.



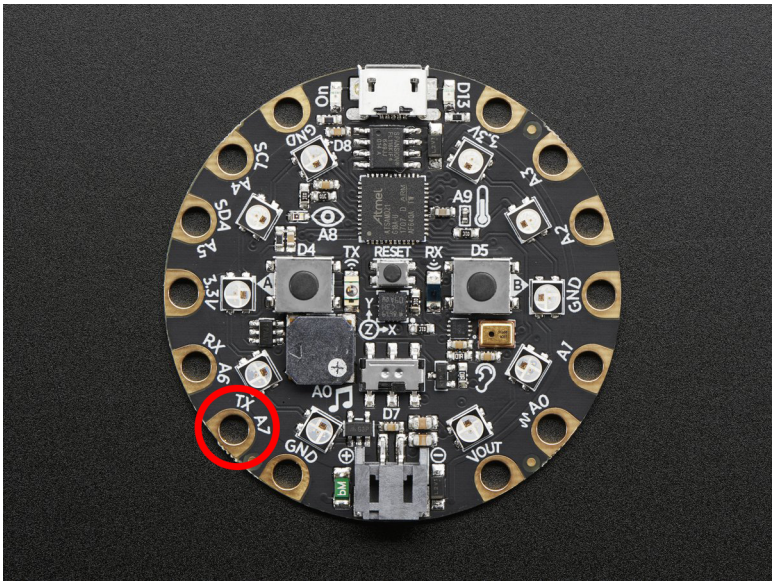

```
from adafruit_circuitplayground.express import cpx

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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- modindex
- search

Python Module Index

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