WORKSHOP: DEVICE SIMULATOR EXPRESS

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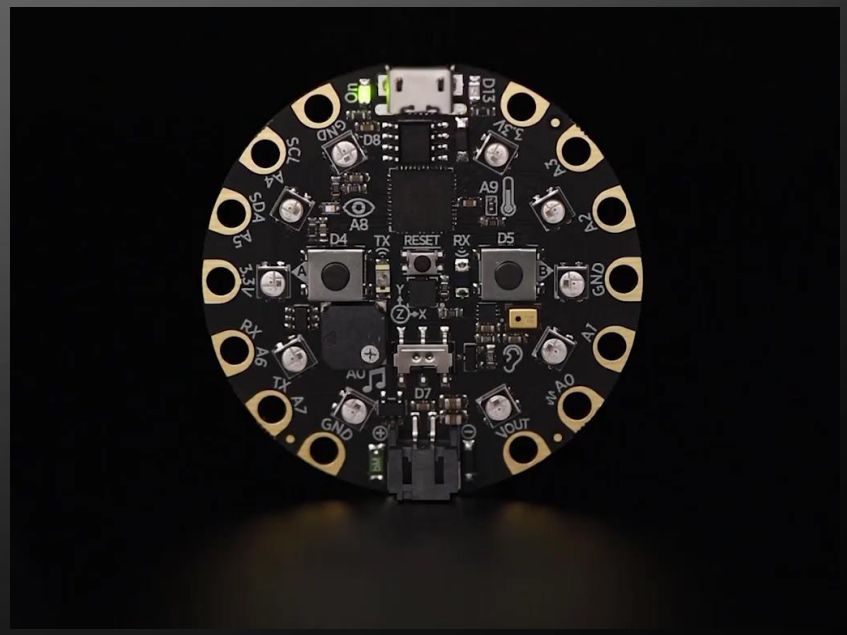


THEGARAGE OSS EVENT

DEVICE SIMULATOR EXPRESS, A MICROSOFT GARAGE PROJECT

- Meet the Team
- Meet the Device
- Meet the Simulator!!!
- Let's Code!

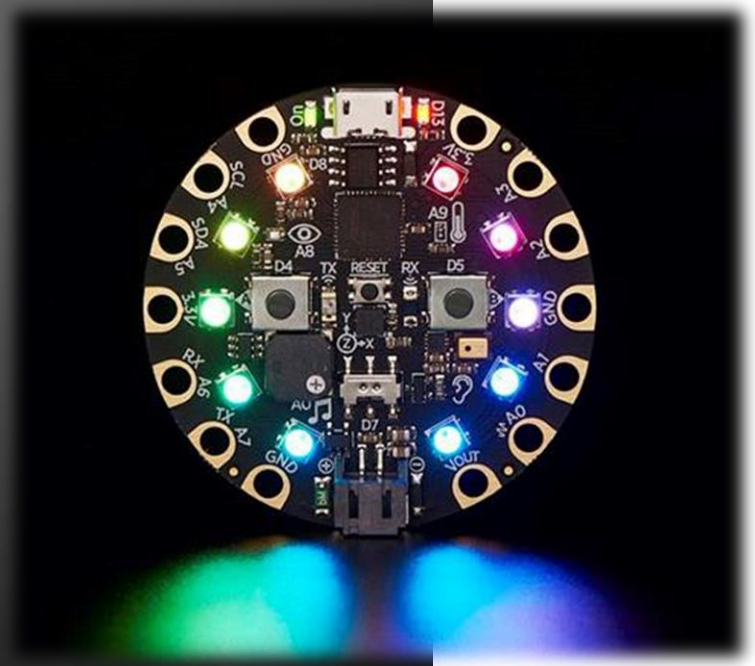
THE TEAM

- Garage Internship
  Vancouver
  Summer 2019
- Coaches: Ahmed Mahdy, Akshay Bakshi, Andrew Clements, Bryan Heredia
- Sponsors: Brett Cannon and Luciana Abud

Lea Akkari, Christella Cidolit, Jonathan Wang, Luke Slevinsky, Michelle Yao, Fatou Mounezo, and Rachel Phinnemore

THE DEVICE

- AdaFruit Circuit Playground Express (CPX)
- Microcontroller
- Sensors Galore
  - Neo Pixels
  - Motion
  - Temperature
  - Light
  - Sound
  - Speaker
  - Buttons
  - Switch
  - Infrared
  - More…



THE SIMULATOR

- Device Simulator Express, A Microsoft Garage Project
- Visual Studio Code Extension
- Open Source Software
- GitHub: https://github.com/microsoft/vscode-python-devicesimulator
- Hardware not required
- Debugging, Intellisense, Templates, Monitor, Deploy to device

LET'S CODE! (PRELIMINARIES)

- Visual Studio Code
  - https://code.visualstudio.com/
- Node
  - https://nodejs.org/en/download/
- Python 3.7.4 or newer
  - https://www.python.org/downloads/

LET'S CODE! (MAIN EVENT)

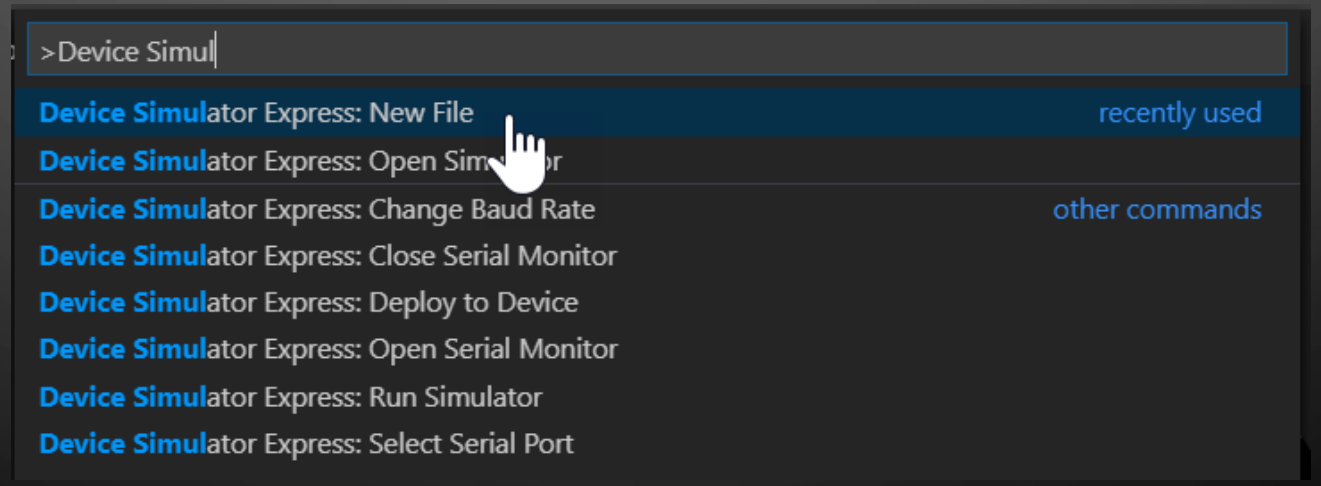
- Device Simulator Express, a Microsoft Garage project
  - https://marketplace.visualstudio.com/items?itemName=ms-python.devicesimulatorexpress

Microsoft

Open Device Simulator Express!

Open VS Code > Control+Shift+P > Device Simulator Express: New File

Save your file, and we're ready to go!



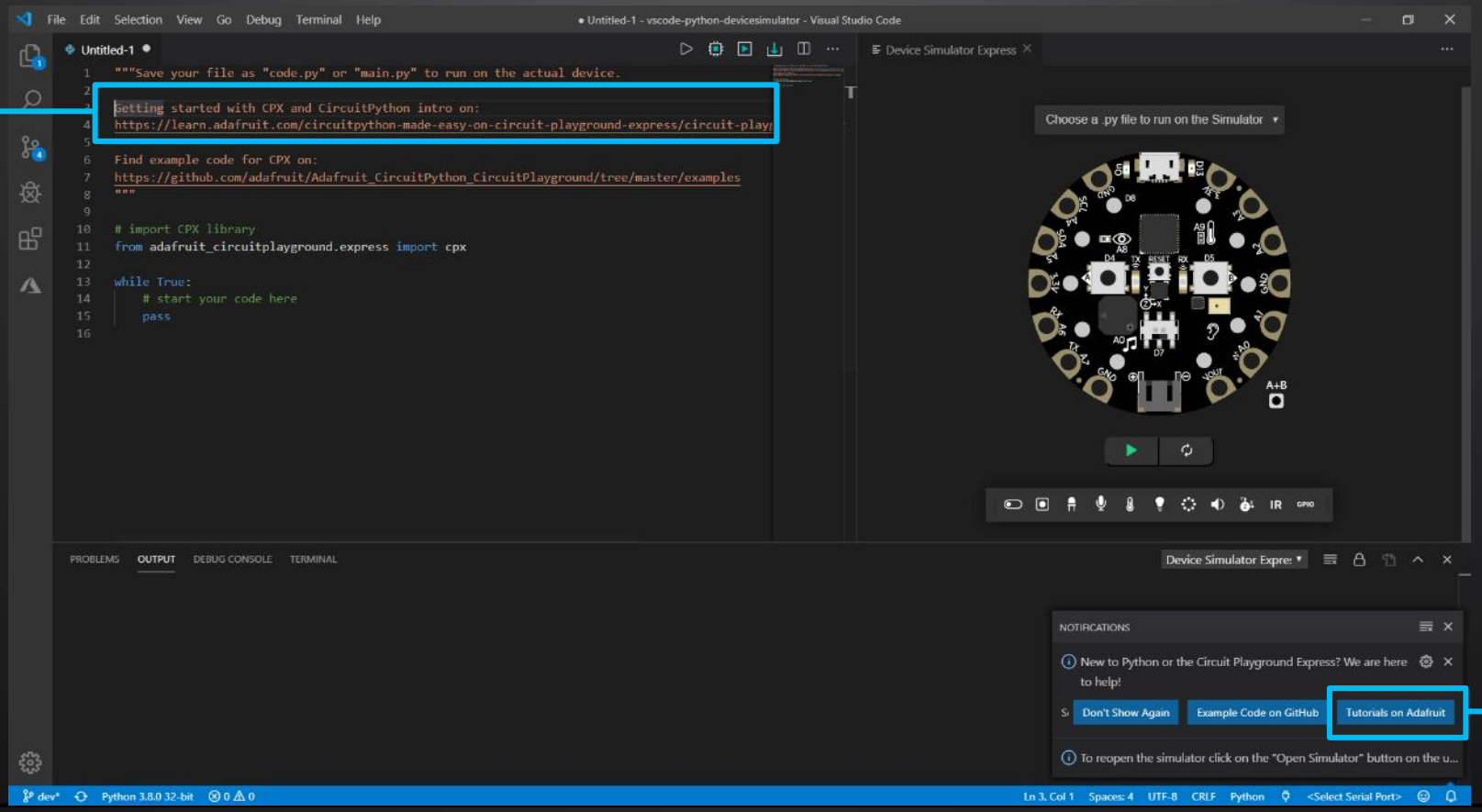
PRE-REQUISITES

- ***Playsound***
  - install by typing the following commands in a console:
  - ***pip install playsound***
- ***Pywin 32***
  - install by typing the following commands in a console (only for Windows computers, you must run it manually):
  - ***pip install pywin32***
- ***Python-Socketio***
  - install by typing the following commands in a console:
  - ***pip install python-socketio***
- ***Requests***
  - install by typing the following commands in a console:
  - ***pip install requests***
- ***Application Insights***
  - install by typing the following commands in a console:
  - ***pip install applicationinsights***

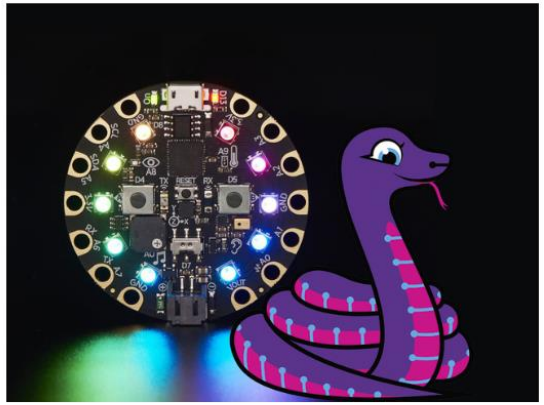
TRY IT OUT!

Let's start with a few examples together!

Open the link here!



Or click here!



CircuitPython Made Easy on Circuit Playground Express

Get started with just a few lines of code!

Circuit Playground Express Library

First Things First

Red LED

Slide Switch

Tap

Shake

NeoPixels

Light

Acceleration

Buttons

Temperature

Start with simple red LED!

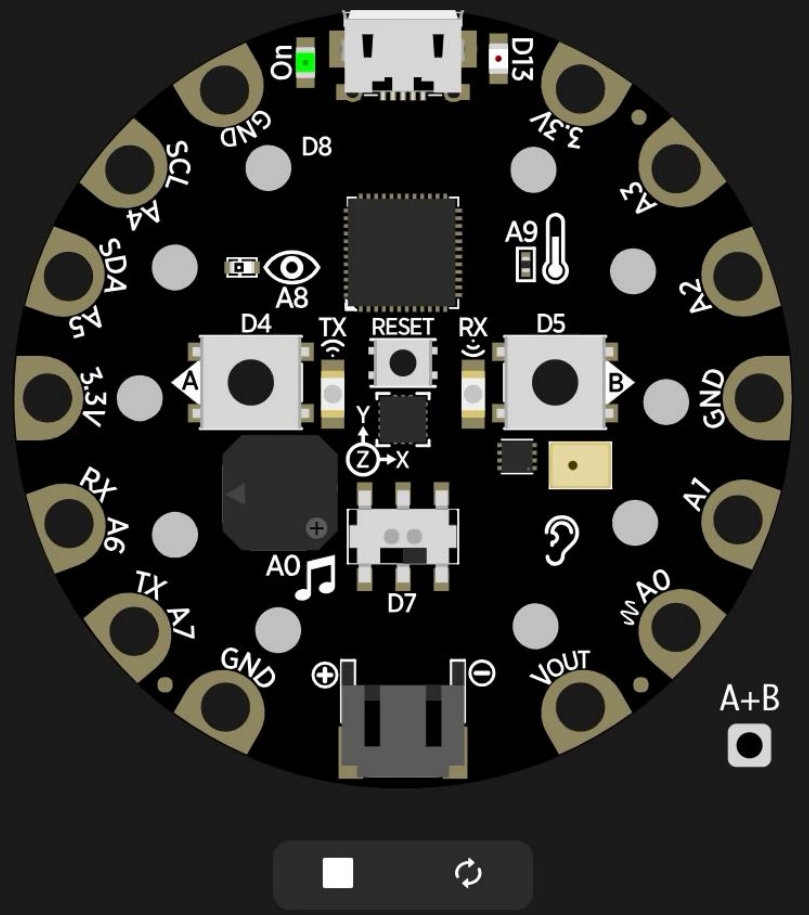
The very first step to starting your microcontroller projects!

EXAMPLE I

Red LED Blink

Copy & Paste the 2nd example code in the "RED LED" tab of the tutorial & try it out!

```
1   import time
2   from adafruit_circuitplayground.express import cpx
3
4   while True:
5       cpx.red_led = True
6       time.sleep(0.5)
7       cpx.red_led = False
8       time.sleep(0.5)
```

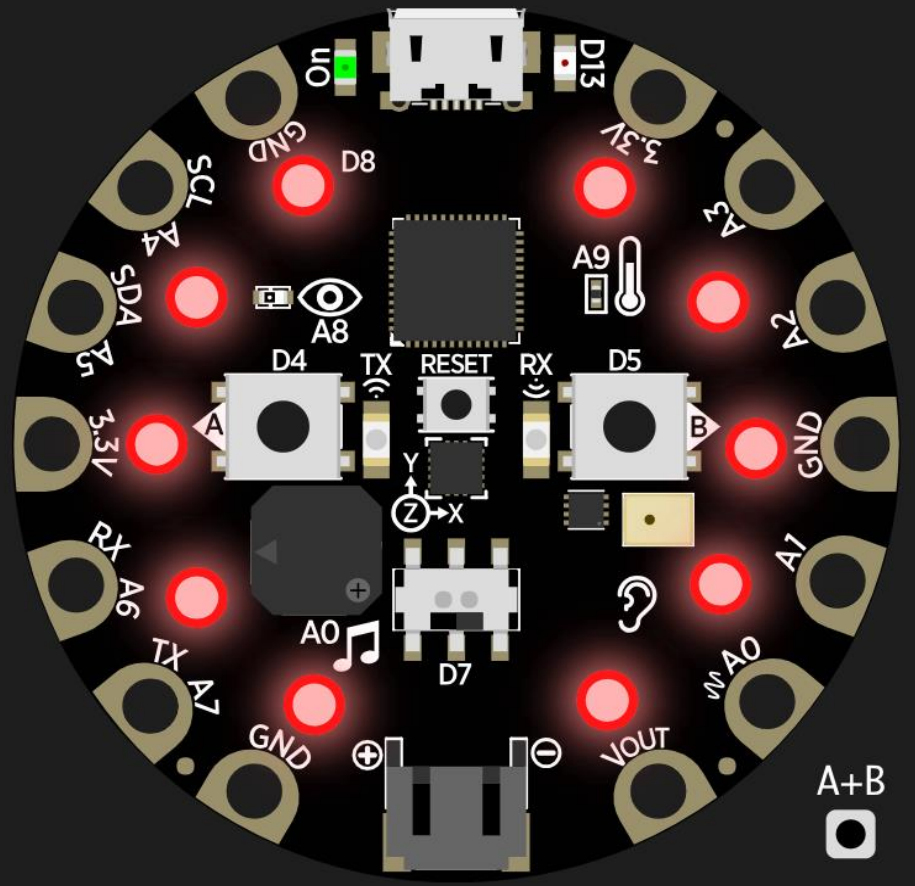


EXAMPLE II

cpx.pixels.fill((r,g,b))

Copy & Paste the 1st example code in the "NeoPixels" tab of the tutorial & try it out!

```
1   from adafruit_circuitplayground.express import cpx
2
3   while True:
4       cpx.pixels.fill((50, 0, 0))
```

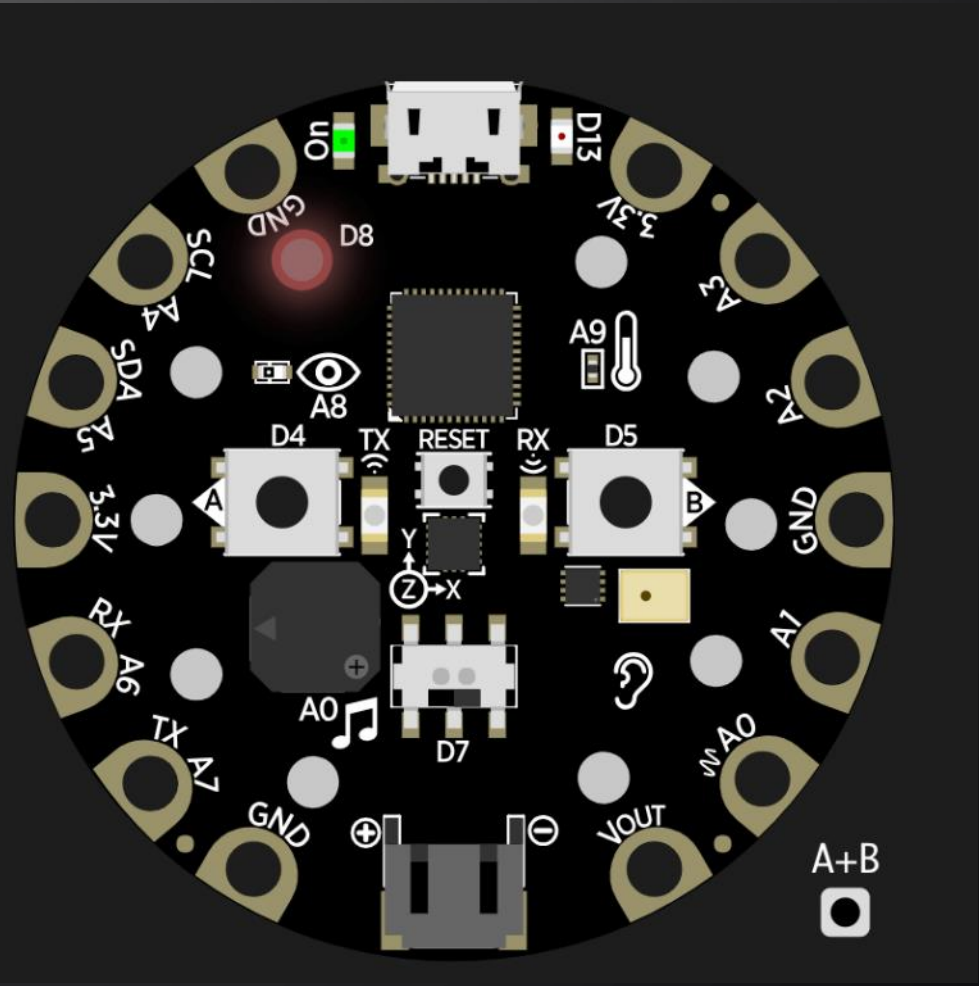


EXAMPLE III

cpx.pixels[0] = (r,g,b)

Copy & Paste the 2nd example code in the "NeoPixels" tab of the tutorial & try it out!

```
1   from adafruit_circuitplayground.express import cpx
2
3   cpx.pixels.brightness = 0.3
4
5   while True:
6       cpx.pixels[0] = (255, 0, 0)
```

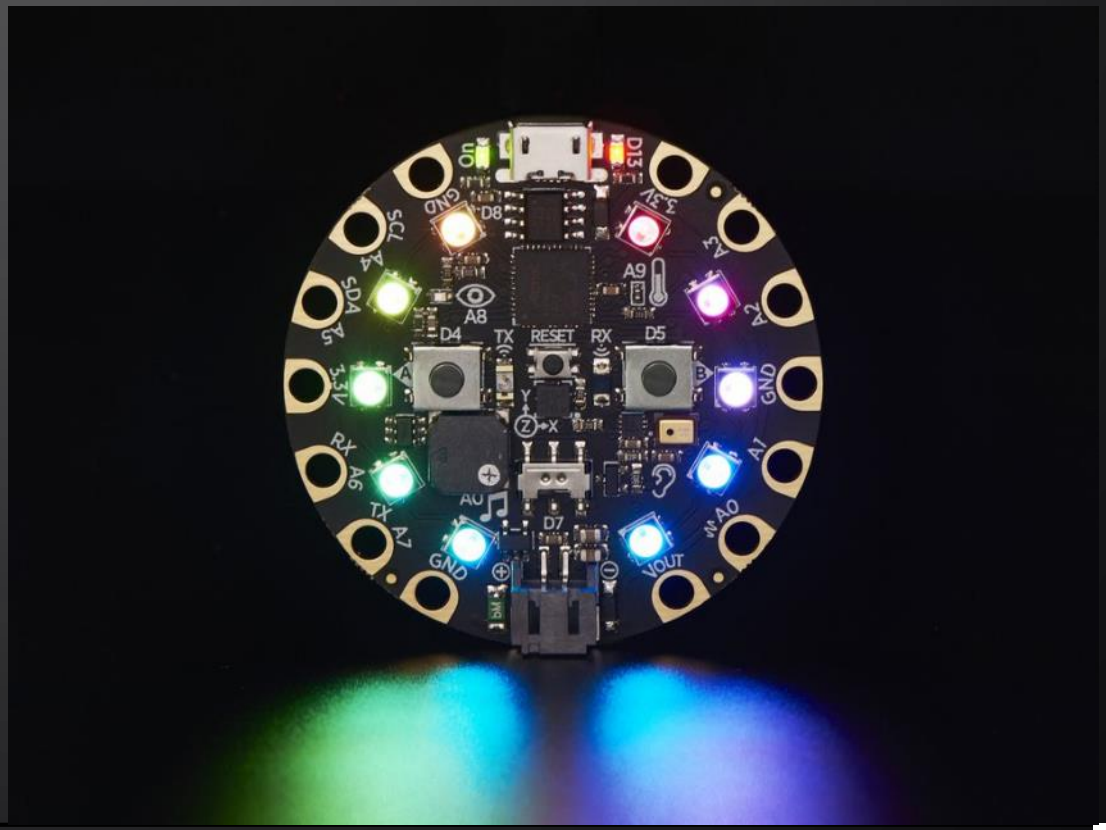


CHALLENGE I

Create a Rainbow NeoPixel Pattern! – 7mins

Requirements

1. Use Device Simulator Express extension to make your CPX show a rainbow color pattern.
2. You can find RGB/hex color online
3. You can work in pairs if you want!



Notes

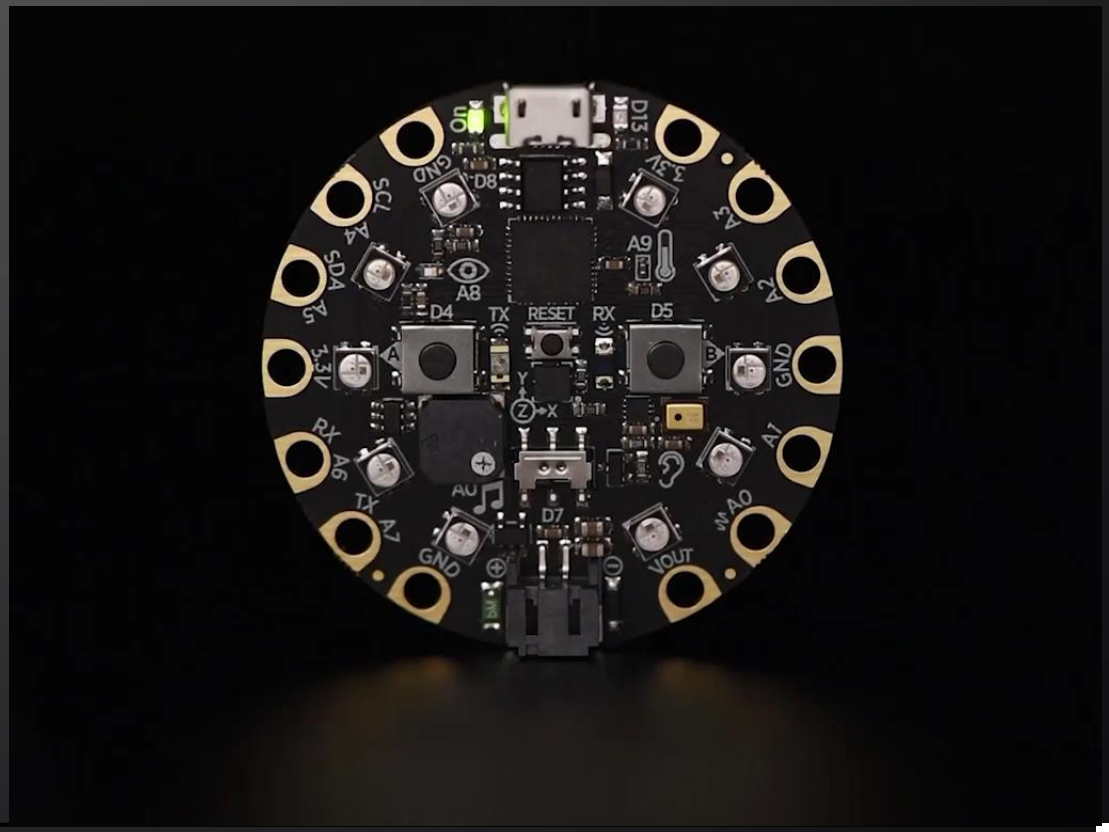
1. You can also use hex color:
   ```
   cpx.pixels[0] = 0xFFFFFF
   ```

CHALLENGE II

Add animation to your Rainbow! – 8 mins

Requirements

1. Use the import time or any other way to add animation & create different sequence for your rainbow!



Notes

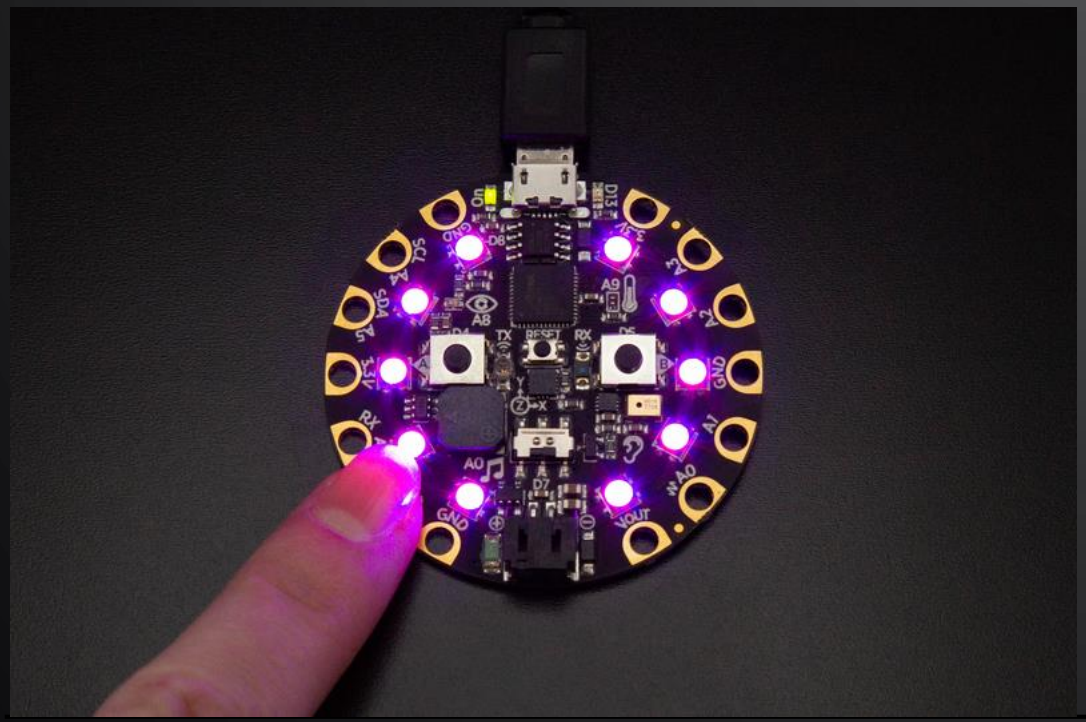
1. You can also use hex color:
   `cpx.pixels[0] = 0xFFFFFF`

FEATURES COMPLETED & PLANNING

Features on the Device	Supported by CPX API	Supported by the Simulator
NeoPixels	✓	✓
Buttons	✓	✓
Sound - .wav	✓	✓
Sound - tones	✓	Opportunity
Light Sensor	✓	✓
Temperature Sensor	✓	✓
Motion Sensor (including Shake)	✓	✓
Capacitive Touch Sensor	✓	✓
Sound Sensor	✗	✗
Green LED	✓	✓
Red LED	✓	✓
Switch slider	✓	✓
IR Transmitter & Receiver	✗	✗

CHALLENGE III

Add other sensors & interactions! – 15mins



Requirements

1. Show us your creativity! Use at least 1 input sensor in your current rainbow project!
   (temperature, push buttons, switch, motion sensor capacitive touch, light sensor, play .wav file…)

Notes

1. You can start a new project besides the rainbow NeoPixels as well!
2. You can use the examples from Adafruit tutorial and GitHub in the comments!