

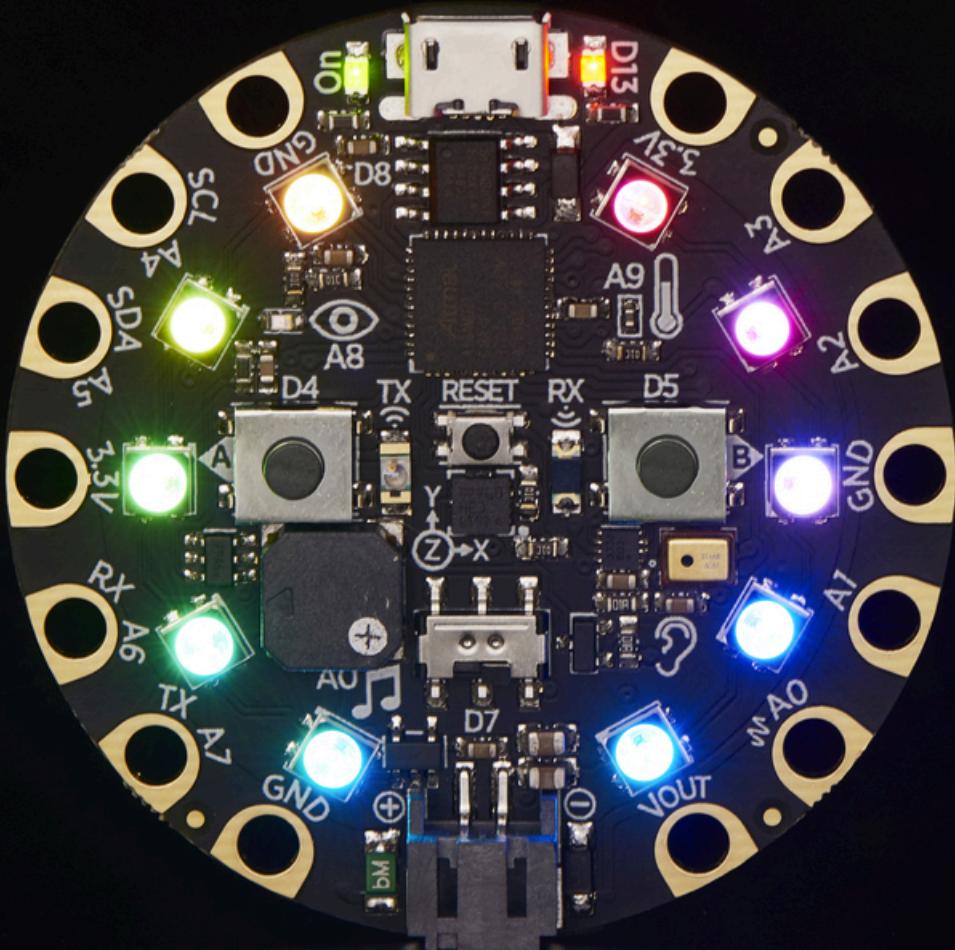
Introduction to Circuit Playground

Adapted from materials by Crystal Hess

Learning Goals

- What is Circuit Playground?
- What is an embedded system?
- How to make an LED blink on an Circuit Playground
- How to make an LED fade on an Circuit Playground
- Vocab: Circuit Playground board, LEDs, compiling a program, uploading a program, digital vs analog

What is a Circuit Playground?



- A small computer on a single chip
 - containing a processor, memory, and input/output
- Typically "embedded" inside some device that it controls
- Small and low cost



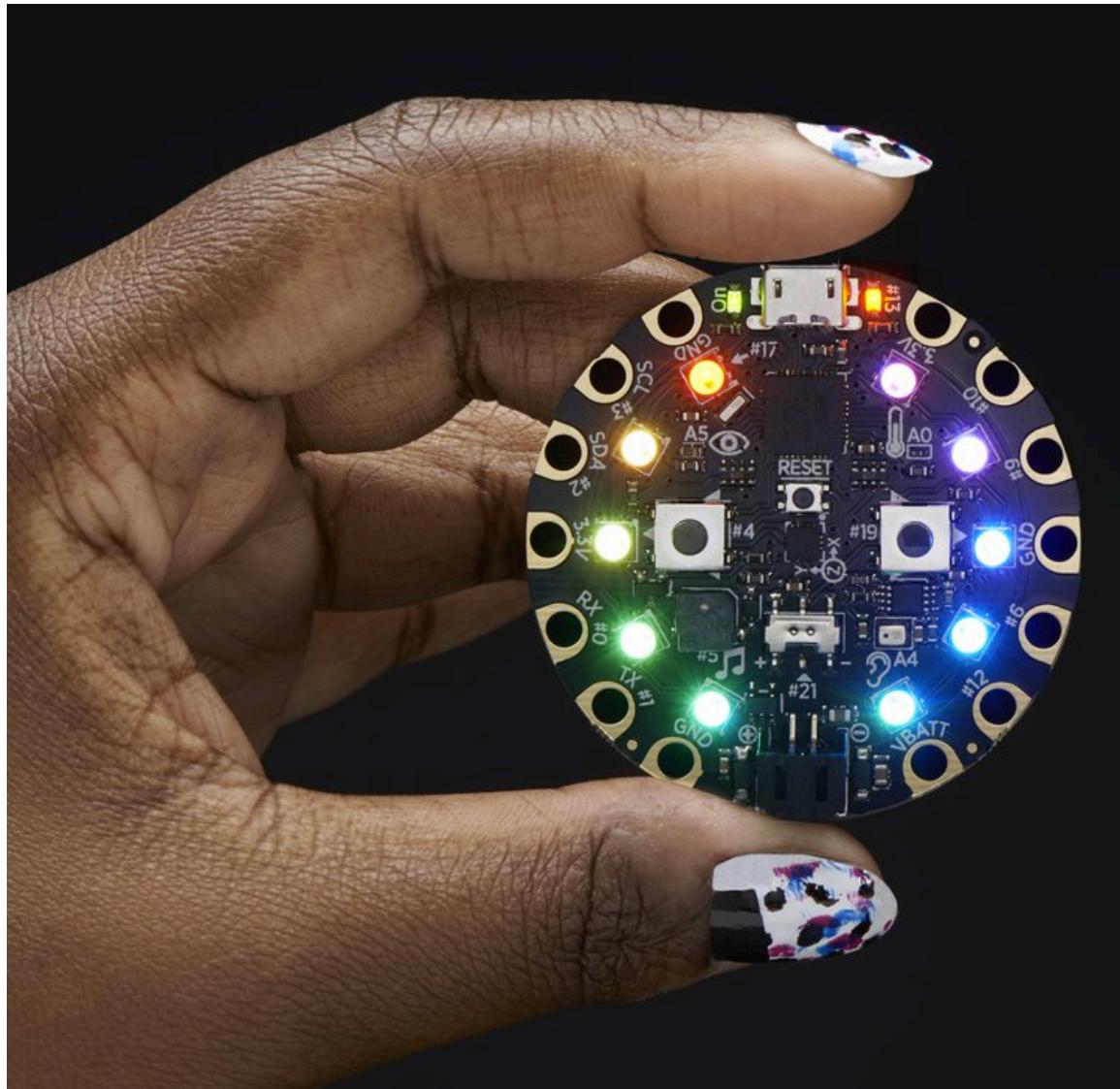


What is an Embedded System?

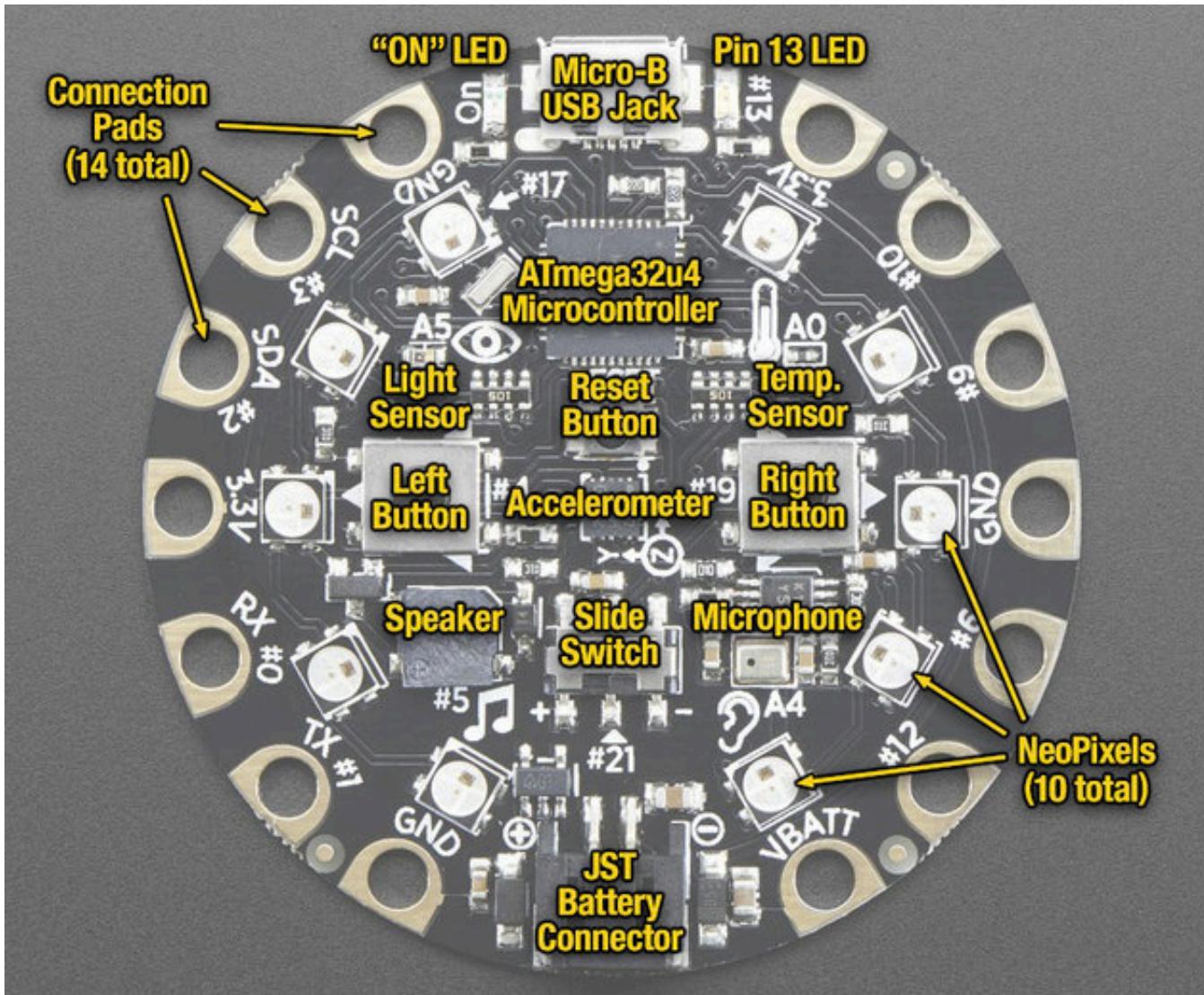
- An **embedded system** is a computer **system** with a dedicated function within a larger mechanical or electrical **system**, often with real-time computing constraints.
- It is **embedded** as part of a complete device often including hardware and mechanical parts.
- **Embedded systems** control many devices in common use today.

Get your own (if you want)

- **Hardware ~ around \$20**
 - Circuit Playground Classic
 - <https://www.adafruit.com/product/3000>
- **Software ~ free**
 - Download at
<https://learn.adafruit.com/circuit-playground-lesson-number-0/install-software-windows>



Layout



Blink Example

Example: Blink

- Hardware
 - Circuit Playground board
 - USB cable
 - Computer w/ internet browser
- Software
 - Launch the [Arduino Web IDE](#)
 - Make an account
 - Select your board
 - Connect the C.P.
 - Open the example Basics → Blink
 - Upload the program

Play with the Code

1. What does **digitalWrite** do? **delay**?
2. What happens if you put // (forward slash, forward slash) in front of a line of code?
3. What happens if you change **pinMode(LED_BUILTIN, OUTPUT)** to say **pinMode(13,OUTPUT)**? What about **pinMode(9,OUTPUT)**?

Circuit Playground Library

Access unique parts of Circuit Playground with their own library.

https://caternuson.github.io/Adafruit_CircuitPlayground/

Including the C.P. Library

- Add the line with “#include” somewhere near the top of your file
- Call “CircuitPlayground.begin()” in setup()
- What are the “()” doing?
- Full Documentation: https://caternuson.github.io/Adafruit_CircuitPlayground/

```
24
25 #include <Adafruit_CircuitPlayground.h>
26
27 // the setup function runs once when you press reset or power the board
28 void setup() {
29     // initialize digital pin LED_BUILTIN as an output.
30     CircuitPlayground.begin();
31 }
32
```

Learning the Library

- Rewrite the Blink program to instead use a NeoPixel instead
- What lines need to change?
- What lines don't need to change?
- How do you know what commands to use?

Fade Example

Example: Fade

- Software
 - Open the example Basics → Fade
 - Upload the program

Play with the Code

1. What happens when you run it as-is?
2. What does changing the **fadeAmount** do? (Try 1, 10, 25, 255)
Why?
3. What does **if (brightness <= 0 || brightness >= 255)** do?
4. What does **fadeAmount = -fadeAmount;** do?

Added Fun

- Make the LED fade out very slowly and then not come back on.
- Make the program fade a NeoPixel instead (how would you do this?)