

## 1. Introduction to Circuit Playground

1. Arduino environment and microprocessor
  - Arduino history and ecosystem
  - Standard Arduino vs CP
  - CP as instrument and learning tool as much as a microcontroller platform
2. CP Hardware features (see Hardware Reference)
  - Onboard inputs
  - Onboard outputs
  - Overlap pins
  - IO connections
  - Power

## 2. Arduino IDE and setup

1. IDE main features
2. CP install via board manager if not already included
3. Sketches (i.e. programs)

## 3. Hands-on examples

1. Run Blink
  - From Arduino examples
  - From CP example [CP01\_blink]
  - Try delay command
2. Register capacitive touch [CP02\_capsense]
  - Try different pins. Change your capacitance.
  - Serial monitor vs. serial plotter
  - Using USB cables for two-way serial communications
3. Display light levels [CP03\_lightsense]
  - Could this be used as a proximity sensor or a break-beam sensor?
  - A phototransistor sensitive to human sight wavelengths
4. Display temperature levels [CP04\_tempsense]
  - How responsive and accurate is this thermistor?
  - Try F conversion (operation nesting)
  - Commenting/uncommenting groups of lines
5. Display sound levels [CP05\_soundsense]
  - Clap on/Clap off? Consider the delay setting and the baud rate
  - Storing sensor value in a variable

- The print command
6. Display acceleration [CP06\_accelsense]
    - Note direction of X, Y, & Z on board silkscreen
    - Why is Z around  $9.8 \text{ ms}^{-2}$ ?
    - What is the plotter displaying?
    - Try adjusting G range, library commands/properties
    - Can use a tap sensor with interrupts
  7. Use buttons and slider [CP07\_buttonswitch]
    - Trace logic of if/else statements
  8. Blinky lights! [CP08\_neopixels]
    - WS2812 RGB LEDs with driver requiring a microcontroller, ~20ma each element, single data wire, come in *many* form factors
    - Addressing individual pixels and setting color + brightness with setPixelColor
    - Using colorWheel
    - For loops
  9. Buzz [CP09\_buzz]
    - Two ways to buzz – using the CP library vs more direct Arduino calls
    - Hyperlinks in the comments.
  10. Display sound levels on LED graph [CP10\_volume\_meter]
    - Input and output on board
    - If statement series
    - Consider the possibilities as a wearable sensor/indicator
    - Implementing a peaking meter?
  11. Dear diary alarm [CP11\_diary]
    - Multi element: button, neopixels, buzzer, light sensor
    - Note work in setup loop
    - While loop
    - Bool trigger variable
    - Why an alarm threshold?
  12. Multi game [CP12\_multi]
    - Using slide switch to change the function of the CP
    - Creating and calling functions in Arduino

#### 4. Expansion and further learning

1. Circuit Playground Library Command Reference and other libraries
2. External inputs and outputs
3. Form factor issues
4. <https://learn.adafruit.com/introducing-circuit-playground>