



AdaBox 006

Created by Tyler Cooper



<https://learn.adafruit.com/adabox006>

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Introduction

Hi there!

[If you're looking to subscribe to AdaBox, click here! \(\)](#)

If you're here, it's because you were given the gift of electronics with an AdaBox! You are a beginner who is getting started with your AdaBox or you just want to relive what it's like being a beginner at electronics again. But most of all, you want to learn how to build and make stuff with electronics! ([If, rather than learn electronics, you'd like to look at pictures of cats instead, please check https://www.adafruit.com/galleries/cats-of-engineering \(\)](#))

And, you're in luck: there's never been a better time.

Gone are the days where you need thousands of dollars of equipment and lots physics/math background. Nowadays, if you want to learn to work with electronics, you can jump right in for \$100 or less, and any sort of computer. And we're talking about learning a lot of electronics - from the basics of analog to the complexities of firmware. With a good pack of parts, you can build a base of knowledge that will take you from your first blinking LED to someone who can start prototyping and inventing custom products.

Who is this for?

Anyone who is interested in learning how to program and has access to a modern web browser. That's pretty much the minimum. Remember, this guide is specifically for people who have purchased or received an AdaBox subscription!

You don't need to know a lot of physics or math, and just like an Art Degree isn't required for making art and being creative, you don't need to have a computer science degree. It helps if you're comfortable using computers but that's a skill most people pick up through life.

If you know how to program already - great! If not, don't worry, we'll teach you enough to be dangerous.

Who isn't this for?

While you can follow along without an AdaBox, it will not make as much sense unless you have all of the components and more which either came as a gift or purchased yourself - remember, the goal is helping beginners!

If you're an expert, please visit our hundreds other tutorials and jump right in at learn.adafruit.com ()

Who are you?

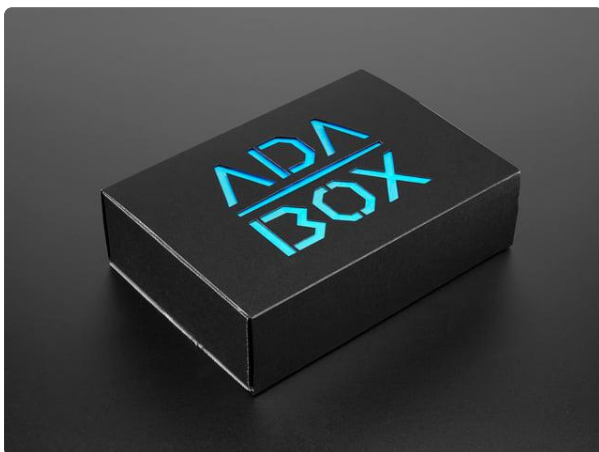
Great question. This is me:

I'm Ladyada, and I love to teach people how to build stuff and how they can be creative with technology.

So, are you ready?

Let's do this thing!

Want to buy past AdaBoxes?



[AdaBox001 - Welcome to the Feather Ecosystem](#)

Please note! This is NOT the subscription version of AdaBox! This is ONLY AdaBox001 that shipped out to AdaBox subscribers in September of 2016. This...

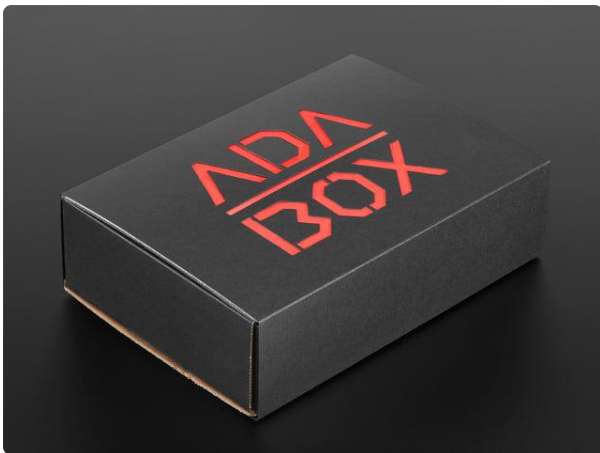
<https://www.adafruit.com/product/3193>



[AdaBox002 – Making Things Move](#)

AdaBox002 - Making Things Move with our Feather Bluetooth LE Mini Robot Rover is the perfect gift for folks who are just getting started in the...

<https://www.adafruit.com/product/3235>



[AdaBox003 – The World of IoT – Curated by Digi-Key](#)

AdaBox003 – The World of IoT (Curated by Digi-Key) is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an...

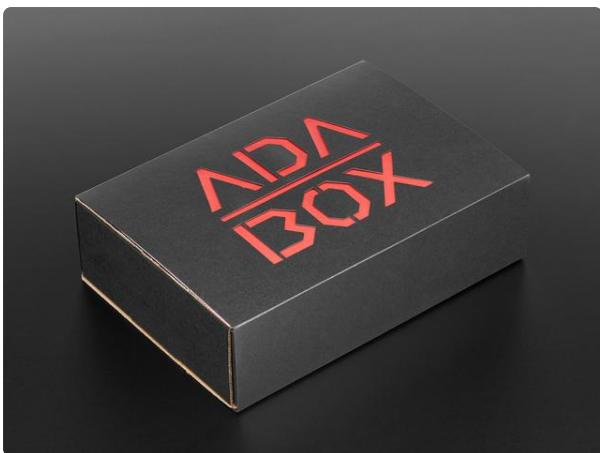
<https://www.adafruit.com/product/3268>



[AdaBox004 – Making Things Dance](#)

AdaBox004 – Making Things Dance is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

<https://www.adafruit.com/product/3370>



[AdaBox005 – Break for Pi](#)

AdaBox005 – Break for Pi is the perfect gift for folks who are just getting started in the world of DIY electronics. It's an excellent...

<https://www.adafruit.com/product/3644>

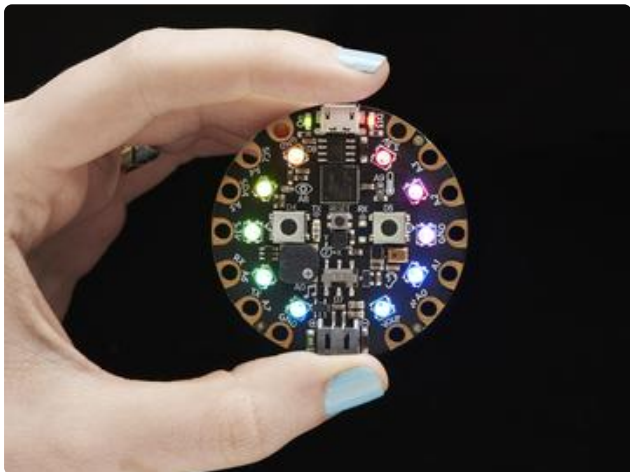
Unboxing AdaBox 006

Feeling the bite of the cold and wind outside? Why not slither indoors and snuggle up with your very own cuddly Python? What? A snake?!

Yessssssssss, this is AdaBox is Python powered!

You'll soon find yourself charmed by the power and flexibility of CircuitPython, not to mention its ease of use. And the Python strikes fast -- with no need for a compiler or IDE, you'll get your code up and running on the board quicker than ever. We think once you try it you'll be hooked by how easy it is.

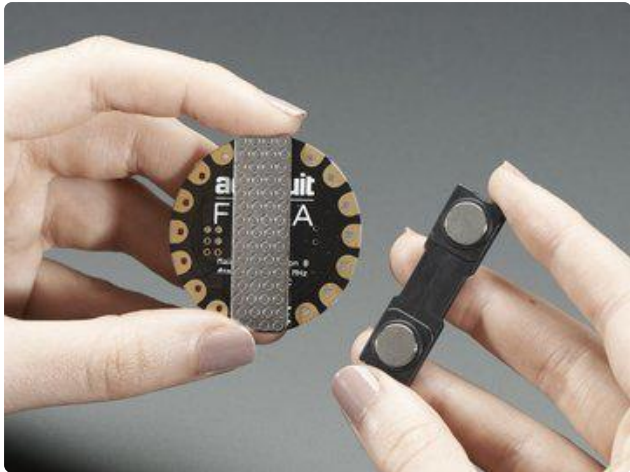
Kit Contents



[Circuit Playground Express \(\)](#) - the next step towards a perfect introduction to electronics and programming. We've taken the original Circuit Playground Classic and made it even better! Not only did we pack even more sensors in, we also made it even easier to program.



[USB Cable - A/MicroB \(\)](#) - your standard A to micro-B USB cable, for USB 1.1 or 2.0. Perfect for connecting a PC to your Circuit Python Express.



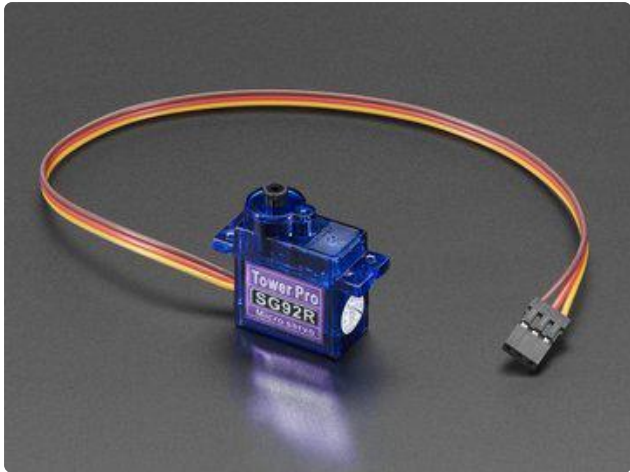
[Magnetic Pin Back \(\)](#) - These magnetic pin backs have two pieces: a metal bar with adhesive strip and a plastic piece with two strong rare-earth magnets. Affix the metal bar to your wearable projects-- it's just the right size! Then attach your wearable to any garment without poking holes in your clothes. The magnets are strong enough to hold up even a hefty circuit!



[Alligator Clips \(\)](#) - Connect this to that without soldering using these handy mini alligator clip test leads. 15" cables with alligator clip on each end, color coded. You get 12 pieces in 6 colors. Strong and grippy, these always come in handy! We often use these in conjunction with a multimeter so we don't have to hold the probes in place.



[Alligator Clips to Jumper Wires \(\)](#) - For bread-boarding with unusual non-header-friendly surfaces, these cables will be your best friends! No longer will you have long strands of alligator clips that are grabbing little wires. These compact jumper cables have a premium male header on one end, and a grippy mini alligator clip on the other.



[Micro Servo \(\)](#) - Tiny little servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds you're used to but smaller. You can use any servo code, hardware or library to control these servos.



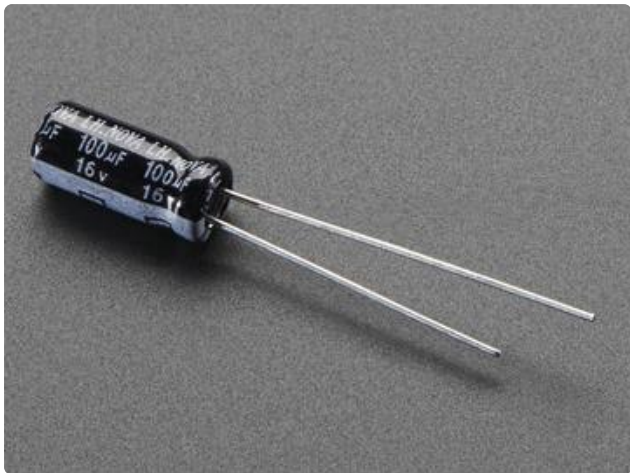
[Copper Foil Tape \(\)](#) - Copper tape can be an interesting addition to your toolbox. The tape itself is made of thin pure copper so its extremely flexible and can take on nearly any shape. You can easily solder to it, and the tape itself can carry current just like a wire. On the back is an electrically conductive adhesive. The adhesive can't carry significant current but it is very handy for sensing applications where you don't want to solder the copper tape.



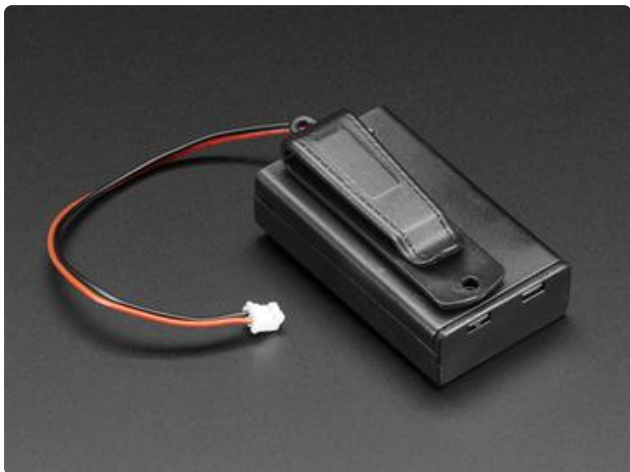
[Mini Remote Control \(\)](#) - This little remote control would be handy for controlling a robot or other project from across the room. It has 21 buttons and a layout we thought was handy: directional buttons and number entry buttons.



[Panel Mount 10K Potentiometer \(\)](#) - This potentiometer is a two-in-one, good in a breadboard or with a panel. It's a fairly standard linear taper 10K ohm potentiometer, with a grippy shaft. It's smooth and easy to turn, but not so loose that it will shift on its own.



100uF electrolytic capacitor - [used for when you want to remove DC offset from analog output so you can listen to it with headphones! \(\)](#)



[AAA Battery Holder w/ Belt Clip \(\)](#) - This battery holder connects 3 AAA batteries together in series for powering all kinds of projects. We spec'd these out because the box is slim, and 3 AAA's add up to about 3.3-4.5V, a very similar range to Lithium Ion/polymer (Li-Ion) batteries, plus it has a nifty on-off switch.



[AAA Batteries \(\)](#)

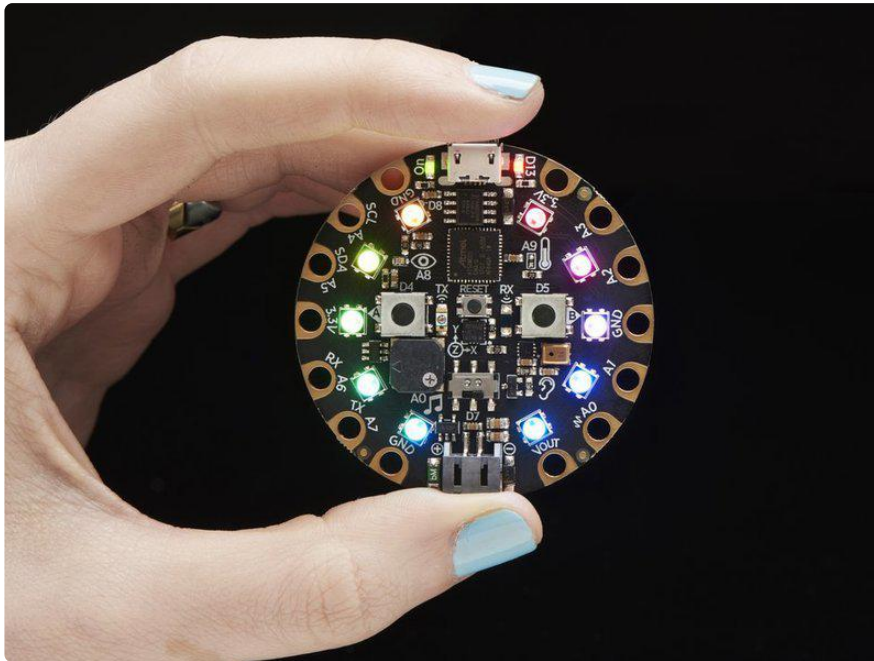


[JST Battery Extension Cable \(\)](#)

Other Contents

- Crafting Supplies
- Adafruit Collectible Pin (subscription only!)

Getting Started with your new AdaBox



The heart of AdaBox 006 is the Circuit Playground Express. This little board is the next step towards a perfect introduction to electronics and programming. We've taken the original Circuit Playground Classic and made it even better! Not only did we pack even more sensors in, we also made it even easier to program.

Start your journey with [Microsoft MakeCode block-based or Javascript programming \(\)](#). Then, you can use the same board to try [CircuitPython \(\)](#), with the Python interpreter running right on the Express. As you progress, you can advance to using Arduino IDE, which has full support of all the hardware down to the low level, so you can make powerful projects.

Because you can program the same board in 3 different ways - the Express has great value and re-usability. From beginners to experts, Circuit Playground Express has something for everyone

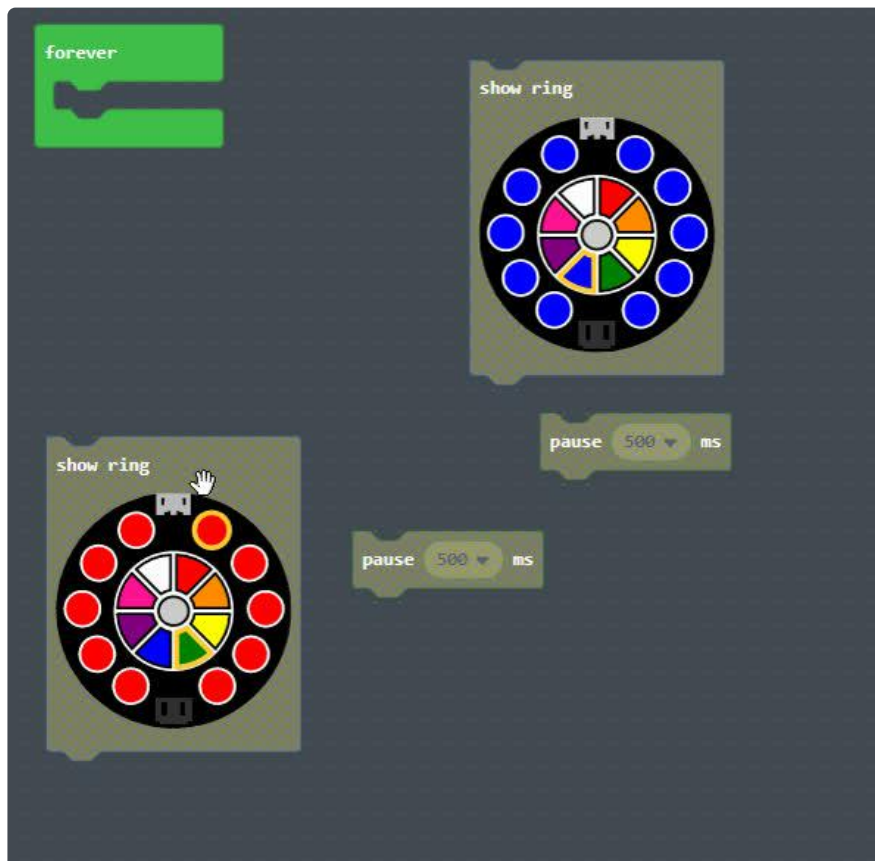
Getting familiar with your new Circuit Playground Express

Before we dive into the fun projects we designed specifically for AdaBox 006, let's get to know the Circuit Playground Express (CPX) a little bit better. Click the button below to check out the guide that will teach you all about your new CPX, and how to get it connected to your computer. Then come back to this guide for more.

Circuit Playground Express Quick Start Guide

Once you have gone through the CPX Guide, in particular the 'setup' part with any drivers and guided tour, come back here! It is time to put your CPX to work with these quick and easy guides. Let's get started...

Circuit Playground Express and MakeCode



Microsoft MakeCode for Adafruit is a web-based code editor for physical computing. It provides a block editor, similar to Scratch or Code.org, and also a JavaScript editor for more advanced users. Try it now at <https://makecode.adafruit.com/> !

Some of the key features of MakeCode are:

- web based editor: nothing to install
- cross platform: works in [most modern browsers](#) () from tiny phone to giant touch screens
- compilation in the browser: the compiler runs in your browser, it's fast and works offline

- blocks + JavaScript: drag and drop blocks or type JavaScript, MakeCode let's you go back and forth between the two.
- works offline: once you've loaded the editor, it stays cached in your browser.
- event based runtime: easily respond to button clicks, shake gestures and more

MakeCode currently supports the Adafruit Circuit Playground Express using any web browser on Mac, Windows, Linux, or ChromeOS. You cannot use iOS or Android on a mobile device (since you can't plug in a USB Key)

[Click Here To Get Started with MakeCode!](#)

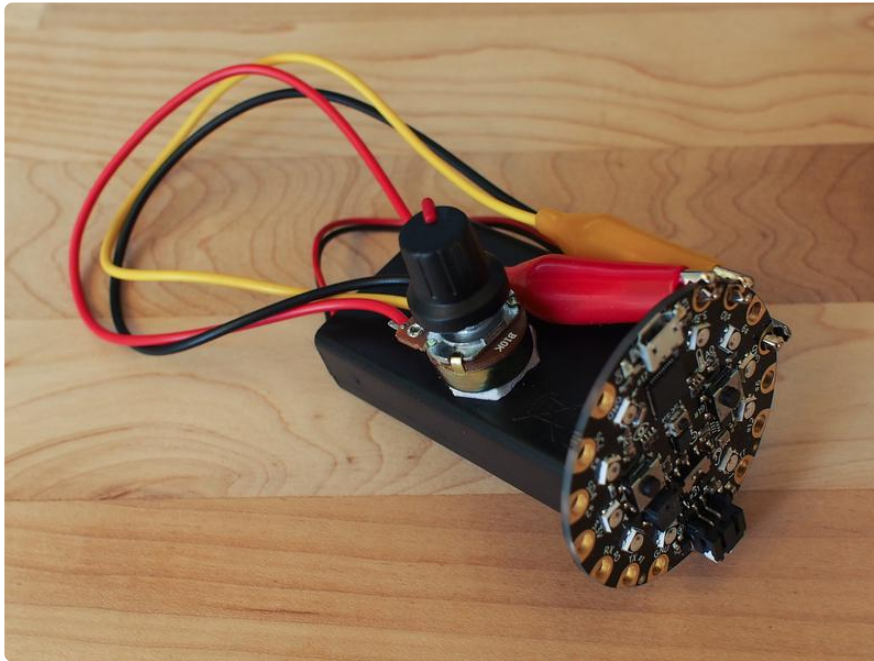
Light Paintbrush

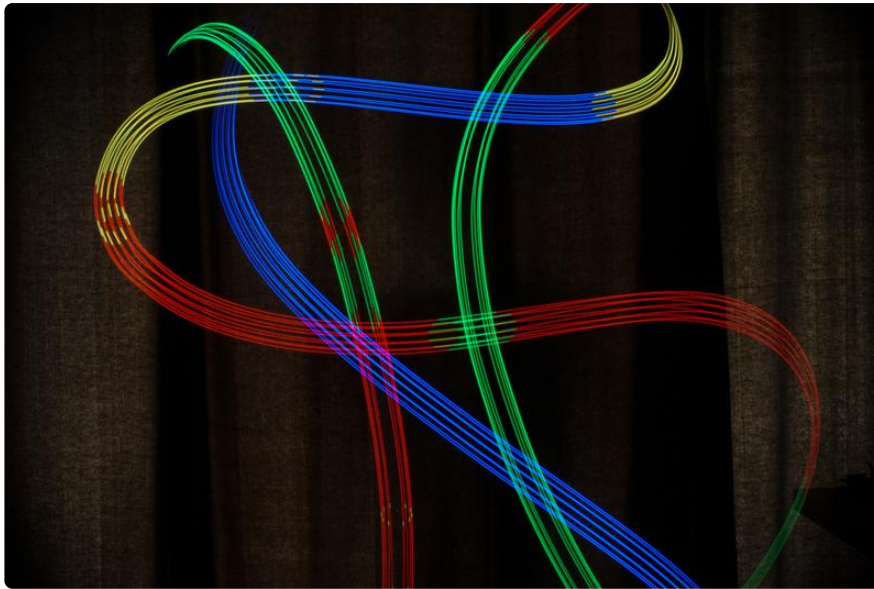
Here's a really fun and beautiful project you can create using your Circuit Playground Express and MakeCode: The Light Paintbrush!



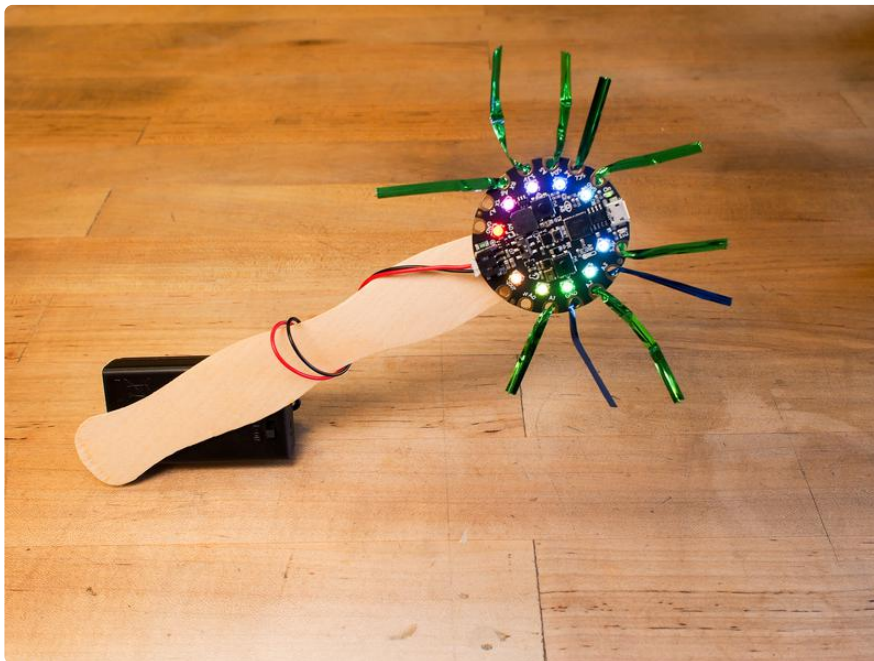
It's a long exposure photography technique where you can "paint" streaks of light into a image. Check out the guide and build your own!

[Light Paintbrush with MakeCode](#)





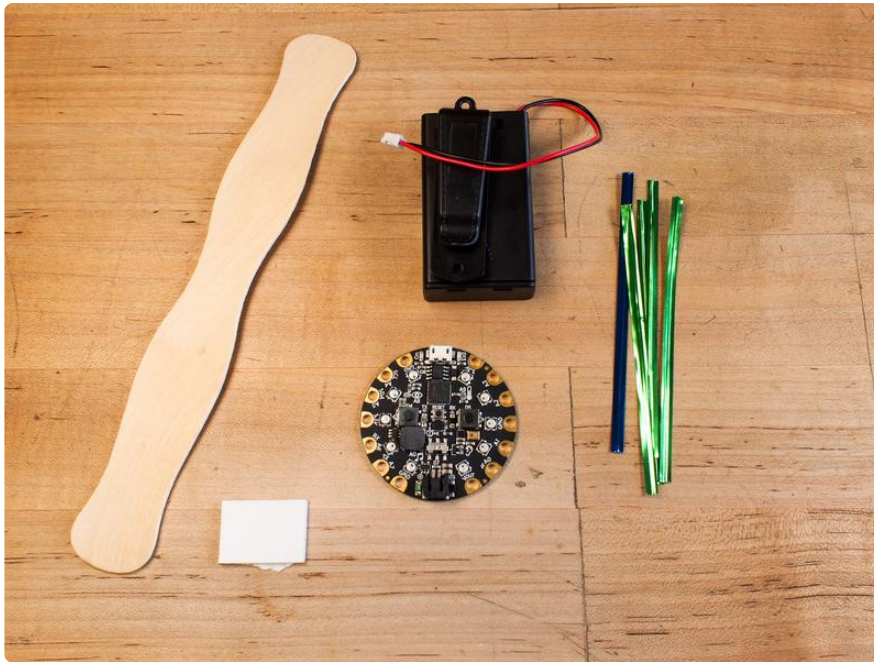
MakeCode a Magic Wand

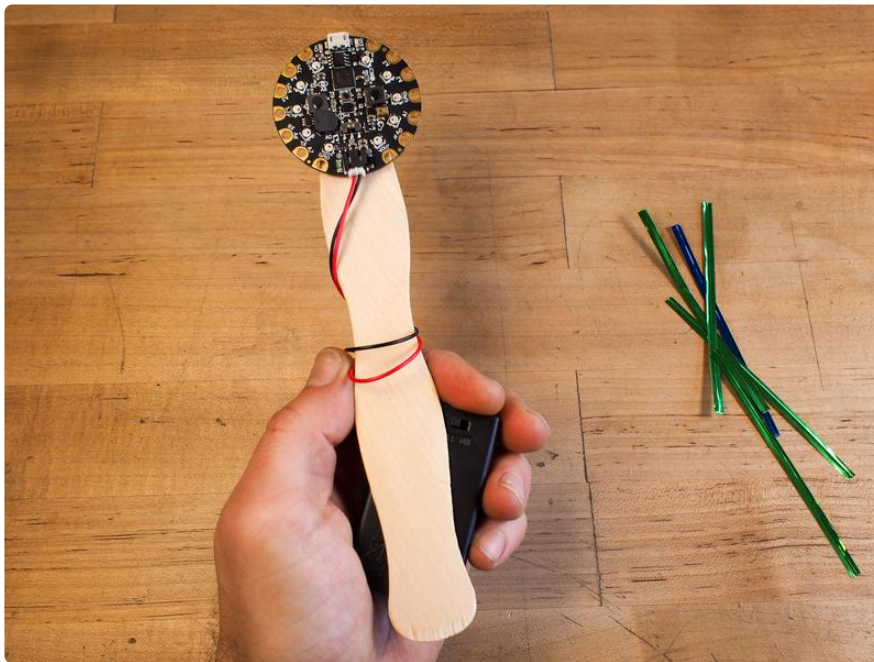
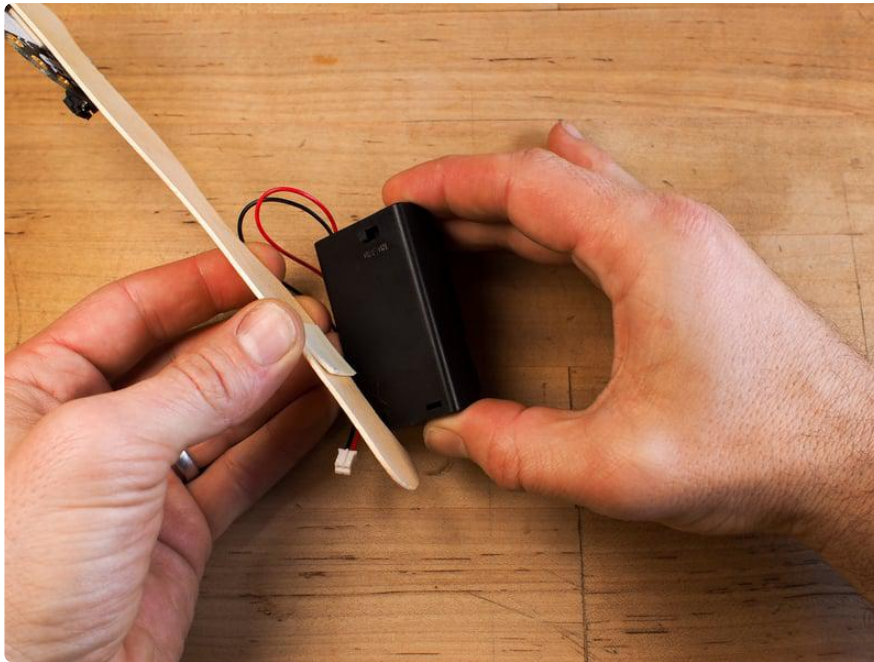


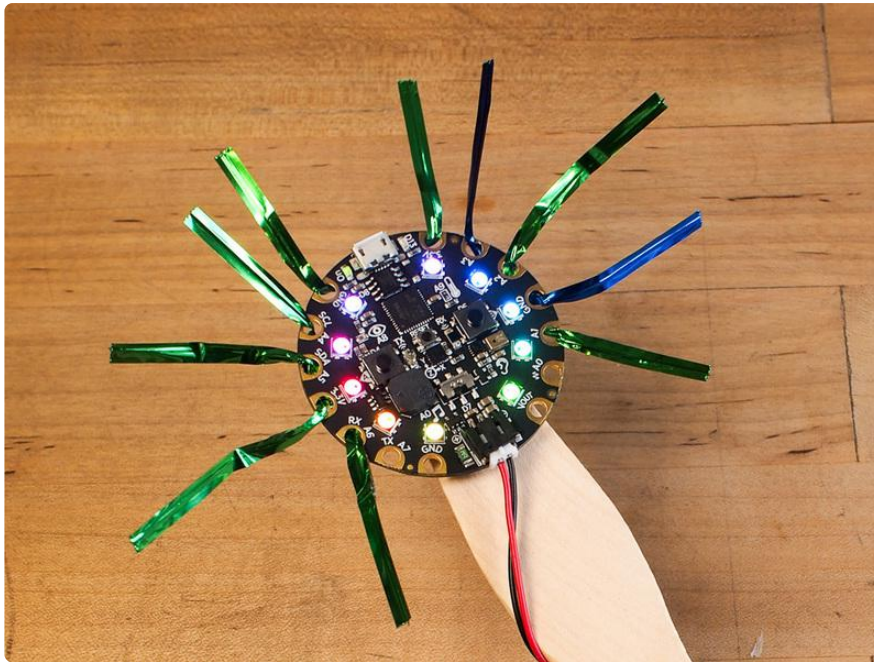
You can make your very own magic wand that has reactive lights and sounds using Make:Code on the Circuit Playground Express! The craft supplies included in the kit will allow you to make the wand, and you can customize it as you like with paint, glue, glitter, googly eye, you name it!

You can use the photos on this page as a launching off point for your creation, and then head to the Sword & Wand project guide for coding!

[Sword & Wand Learn Guide](#)







NeoPixel Dust Bag with MakeCode



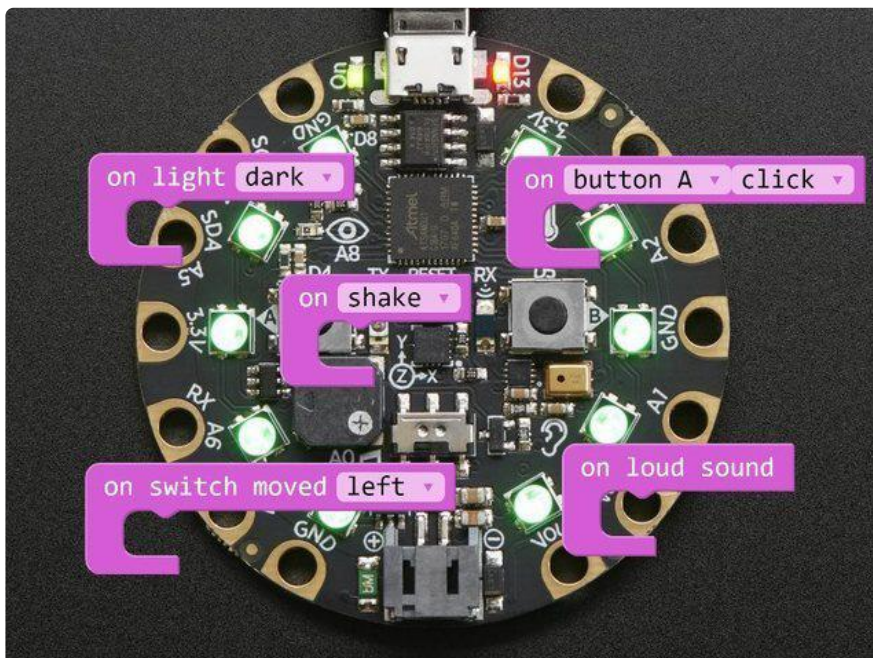
How can your fairy costume be complete without a glowing pixie dust bag?! It sparkles and blinks, and you can squeeze the touch sensor wire to change the colors on the beautifully twinkling NeoPixel ring! This fun, sophisticated-looking prop is easy to build with absolutely no soldering required.



You can program it all with the fun and simple graphical interface of MakeCode, right in your browser. Head to the project Learn Guide page to get started!

NeoPixel Dust Bag Learn Guide

Sensors and MakeCode



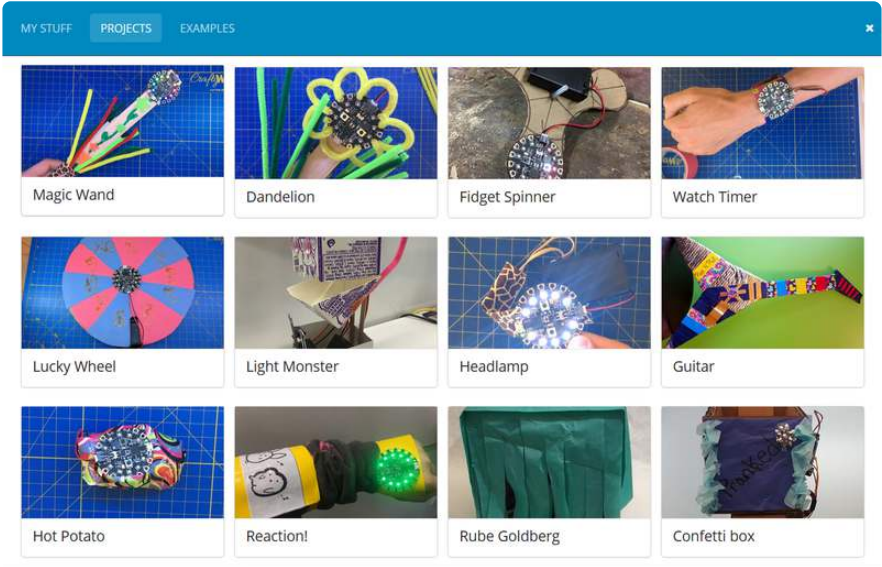
The Adafruit Circuit Playground Express comes packed with built-in sensors. This guide will show you how to leverage them in Microsoft MakeCode. Before you dive into this guide, make sure you have gone through [the previous guide \(\)](#).

More MakeCode Guides!

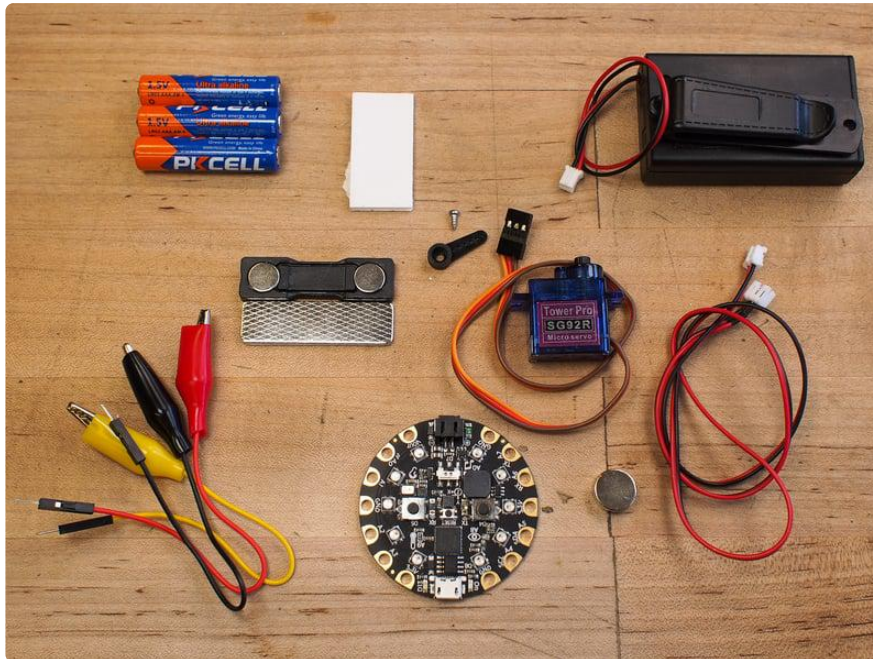


Because the Circuit Playground Express is packed with so many sensors, there is an endless amount of projects you can create. The Adafruit Learning System has many more guides for you to try out. [Check out the MakeCode category \(\)](#) to find inspiration for your next project.

MakeCode also has built in tutorials and guides for many more crafty projects. Click on the Projects button to unlock the projects!



AdaBox 006 CircuitPython Projects



Now that you are familiar with your new Circuit Playground Express, lets use some of the other parts in your AdaBox to build fun projects using powerful CircuitPython. Creative engineer John Park has put together a few great guides the feature parts found in your AdaBox including the [Combo Dial Safe \(\)](#), the [FruitBox Sequencer \(\)](#), and a festive [Snow Globe \(\)](#).

Get Ready, Set, SNAKE!

Start by going through the setup and quickstarts for the Circuit Playground Express with CircuitPython here. You'll learn how to install CircuitPython, edit Python code, and run the REPL for detailed text output. You'll also get started with interacting with the buttons, switches, and other sensors onboard.

Take the Snake Train to Python Land

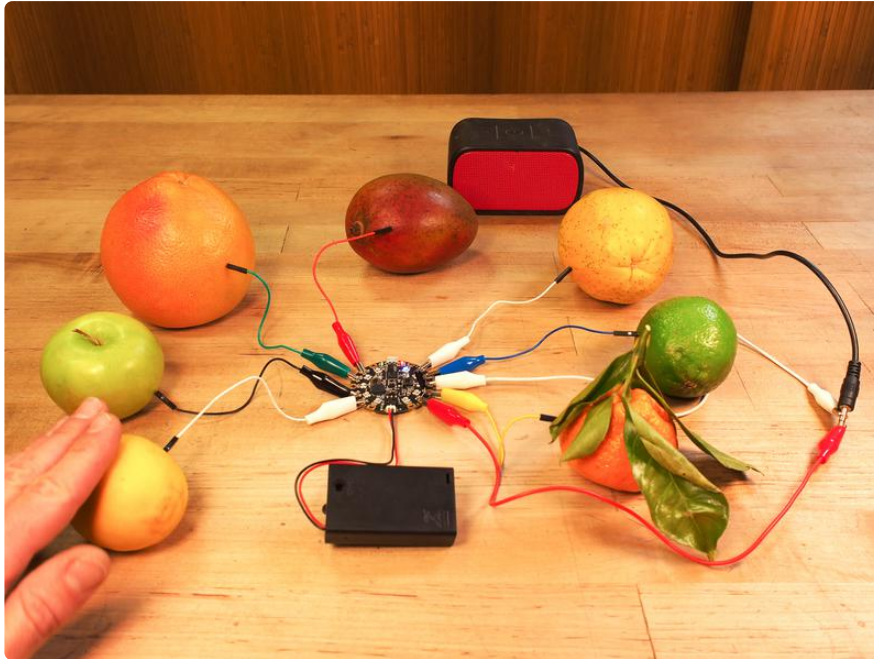
Circuit Playground Snow Globe



You can use your Circuit Playground Express (CPX) to build a fun, interactive, and beautiful holiday snow globe! Using CircuitPython, you can code the CPX to read its built-in accelerometer and detect when the snow globe is being shaken, and then play back a melody and festive light show!!

[Build Your Circuit Playground Snow Globe](#)

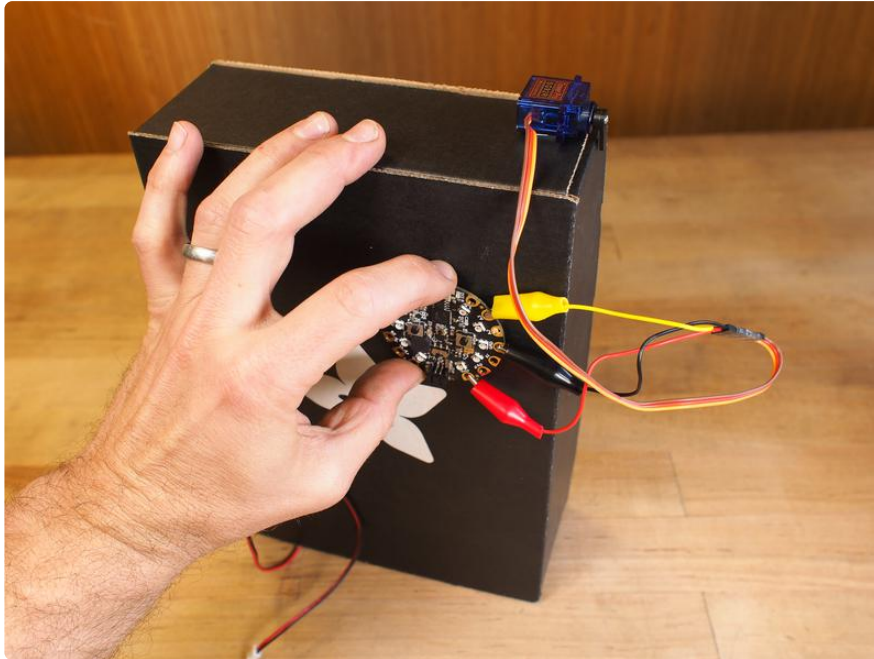
FruitBox Sequencer



Who doesn't love a fat drum beat? Nobody, that's who! You can make your own awesome rhythms once you've built the FruitBox Sequencer! Use the Circuit Playground Express board's built-in capacitive touch sensors plugged into pieces of fruit to program and trigger your beats, in a 16-step sequence. Play back sampled drum sounds in perfect time with the on-board speaker, or optionally, you can plug it into an amplified speaker to rock the crowd!

[Build Your FruitBox Sequencer](#)

Combo Dial Safe



You can build a working combination dial safe using the Circuit Playground Express, a servo motor, a box, and a few magnets, wires, and batteries!

The Circuit Playground Express has everything we'll need to act as a dial that measures rotation, can give feedback through colored lights and sounds, and even control the lock!

You'll be able to code it all in CircuitPython, including reading the built-in accelerometer, setting a custom combinations, and more! Plus, you don't need any compilers or IDEs, just a text editor and a USB cable to connect.

[Build Your Combo Dial Safe](#)

Remote Control Tree Ornament



Have you put up with non-interactive, regular, old, low-tech tree ornaments for too long? Yes you have! But, this is where things change! It's time to build your own Remote Control Tree Ornament with Circuit Playground Express!!

The Circuit Playground Express (CPX) has a built in infrared (IR) sensor, and it's very simple to decode the signals using CircuitPython, thanks to the Adafruit IR Remote library.

We'll program the CPX to read IR blasts from the mini remote control, and use these commands to change the bright, beautiful NeoPixels. Plus, we'll defuse the light and dress it up with an inexpensive hobby store ornament and festive puff balls!

[Remote Control Tree Ornament](#)

This is a great project if you want to learn how to use your Mini Remote Control with the Circuit Playground Express using CircuitPython! You can then adapt this new-found superpower to all kinds of other projects!!

More CircuitPython Guides!



The possibilities are limitless for creating awesome projects using your Circuit Playground Express and coding it with CircuitPython! We've got lots of terrific projects in the Adafruit Learning System that you can check out for some inspiration. In fact, we've got a [whole category for Circuit Playground Express \(\)](#) you can browse, with many more being created all the time.

Here are a few examples to get started:

[Digital Fidget Spinner \(\)](#) (pictured above) by [Tony DiCola \(\)](#) has no moving parts! It's a fun spinner that spins NeoPixels when flicked or tapped!



[Circuit Playground Hot Potato \(\)](#) by [Carter Nelson \(\)](#) shows you how to make a fun, interactive game of hot potato!



[UFO Flying Saucer \(\)](#) by [John Park \(\)](#) uses the accelerometer tilt to control lights and sounds on a fun flying saucer.

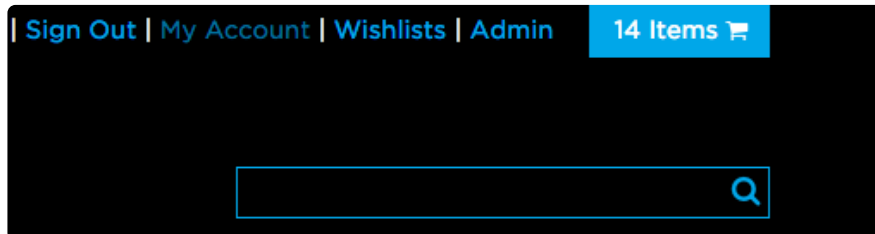
And here are three more great projects from Carter Nelson:

[Dear Diary Alarm \(\)](#)

[Slouch Detector \(\)](#)

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