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Overview

Building Obsidian’s Sword from Steven Universe!

This thing was forged from foam core and has a NeoPixel LED strip making it super bright.

Customize LEDs colors and make sound effects when you swing in battle!

It’s a bit over 3 feet (900mm) long and completely made from foam core poster boards.

We used one 20x30 inch foam core boards to create this awesome sword!

The handle, blade and components are detachable so it’s easy to break down and travel with!

We used Microsoft MakeCode to animate the NeoPixel LED strip! Codeblocks makes it fun and easy to learn how to program hardware with the Adafruit Circuit Playground Express!

The NeoPixel LED strip is press fitted into the blade with wires routed through the handle.

Alligator clips makes it easy to connect to the Circuit Playground Express!

We used a inkjet printer and vinyl cutter to make the details out of card stock!
Craft Parts/ Tools
To build this project, all you need are some foam core poster boards and art supplies.

Prerequisite Guides
There's resources in these guides that go beyond what's covered in this tutorial. The MakeCode guide is all about setting up your Circuit Playground Express board.

The Circuit Playground Express introduction guide walks you through all of the pinouts, sensors and everything you need to know.

MakeCode for Circuit Playground Express ()
Introducing Circuit Playground Express ()
Using Vinyl Cutters for Projects ()

Parts List
This is an easy to copy + paste list of parts linked to their individual product pages.

- Adafruit Circuit Playground Express ()
- Adafruit NeoPixel LED Strip w/ Alligator Clips ()
- Small Wire Alligator Clips ()
- 3x AAA Battery Pack w/ JST connector () or a 2200mAh Battery ()
• 2x 20x30 Foam board
• Hobby Knife
• colored Cardstock
• glue stick
• colored markers
• Cricut Vinyl Cutter

Circuit Playground Express
Circuit Playground Express is the next step towards a perfect introduction to electronics and programming. We’ve taken the original Circuit Playground Classic and...
https://www.adafruit.com/product/3333

3 x AAA Battery Holder with On/Off Switch and 2-Pin JST
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...
https://www.adafruit.com/product/727

Lithium Ion Cylindrical Battery - 3.7v 2200mAh
Need a big battery for your project? This lithium-ion battery contains a 2200mAh and a protection circuit that provides over-voltage, under-voltage, and over-current protection. Yet,...
https://www.adafruit.com/product/1781
Adafruit NeoPixel LED Strip w/ Alligator Clips - 60 LED/m
Adding glowy color to your projects has never been easier: no more soldering or stripping wires, clip 'em on and glow! This Adafruit NeoPixel LED Strip with Alligator...
https://www.adafruit.com/product/3811

Small Alligator Clip Test Lead (set of 12)
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....
https://www.adafruit.com/product/1008

Circuit Diagram
Circuit Diagram

This provides a visual reference for wiring of the components. They aren't true to scale, just meant to be used as reference.

Power Pack

The 3xAAA battery pack can supply ~4.5V which is suffice to power the Circuit Playground Express. The battery plugs directs into the JST connector.

NeoPixel Strip + Extension Alligator Clips

The alligator clips from the Neopixel strip connects to the pads on Circuit Playground Express. The wires on the strip will need extension cables to reach around the sword. We used small Alligator clips () to join the strip to the Circuit Playground Express.

Red connects to Vout
White connects to A0
Black connects to GND

Code

MakeCode for Circuit Playground Express

MakeCode is this programming editor that runs in the Google Chrome web browser. It’s has an intuitive interface that’s both block based and text editor.

It works with Adafruit's Circuit Playground Express so you can make interactive projects with the on-board sensors and components. You can drag & drop blocks to make interactive programs using lights and sounds without having to solder or learning a new syntax.

You can alternatively upload code directly to the Circuit Playground Express with WebUSB, see the steps to do so here ().
Setup Circuit Playground Express for MakeCode

To get started, we'll need to head over to the Adafruit MakeCode (1) website and follow the steps below.

1. Plug in your Circuit Playground Express with a USB Cable
2. Press the RESET button. Green light means you're ready to MakeCode
3. Download the UF2 file and drop it onto CPLAYBOOT.

Edit in MakeCode

Upload and Test Code
Once you have your CPX setup with the MakeCode UF2, try testing it out by uploading the code to the board.

Click the link below to open up the program in MakeCode. Click on the pink edit icon near the top of the title to open the code.

This will create a project in MakeCode and allow you to edit, modify and upload the code to the board.
on start block

when the CPX is turned on do the following

set strip

setup an external neopixel strip on the A0 pad of the circuit playground express

set brightness

adjust the brightness of the LEDs on board the Circuit Playground

strip set brightness

adjust the brightness of the NeoPixel Strip

strip set all pixels to (color)

on the strip, set LEDs to Orange

set all pixels to (color)

on the CPX, set LEDs to Purple
Assemble

Cut Templates
We'll start off by printing out all of our paper templates and then carefully cut out each shape using a hobby knife. Next, trace the outlines on foam board and cut each copy. We used strips of blue tape to hold the template in place.

We'll need:

(2) Blade faces
(3) Blade frames
(1) Gem connector
(2) Cross-guard (hands)
(2) paper diffuser
(1) Cardboard Tube (31.65mm diameter)

Download the artwork below

obsidian.zip
Stack Layers
Now we can stack the layers on top of each other to form the blade body and mount the NeoPixel Strip between the layers.

Glue Layers
We applied hot glue to the inner edges of the backing and the two frame pieces. Glue the backing to the first outline piece.

Do NOT glue the top center piece. We will use this as our removable cover.

We'll want to make sure the backing isn't inserted in the outline, stack it on top then glue the inner edges.
Mount NeoPixel Strip
Our LED strip rests inside the blade body by press fitting it into the groove near the tang of the blade.

Slide the wires through and then pull the LED strip so it fits the full length of the blade.

Alligator Clip Extensions
We’ll need to add short extensions for the NeoPixel strip.

This will allow it to reach from the CPX through the handle.
Attach Handle

Bring the paper towel tube near the tang and pass the alligator extension wires through. Pass the wires through to the other end.

Now we can attach the handle by carefully sliding the tang into the paper towel tube.
Attach Guard
Next we'll assemble the sword hilt components. Align the guard to the end of the handle and pass the NeoPixel strip wires through the bigger slit cutout on the guard.

Battery Pack
The battery pack is inserted into the handle with its wire side facing out of the tube. Pass the battery packs wires through the same slit as the LED strip.

Pommel Gem
The guard is attached to the handle with the help of the longer Gem cutout. Press fit the Gems steam through the center slit on the guard.

Connect Circuit Playground Express
The Circuit Playground Express lays on top of the Gem cutout. Use the alligator clips to connect the LED strip and battery wires.
Handle Grip pattern

Now we can wrap the texture pattern to the handle. We used an inkjet printer to print out the pattern.

We used a medium stock 12x12 sized paper to fit the length of the handle.

Roll the paper around the paper towel tube and adhere with glue stick.
Cross-guard
Next we’ll build our cross guard. Printed the cross guard pattern on paper and trace the outline onto a piece of foam core. Cut out two cross-guards using a hobby knife.

Use a glue stick to adhere the texture graphic to the foam core cut outs.

Gem
Now we can adhere the center gem on top of the cross guard.

Attach Cross Guard
Almost fully fused!

Now we can hot glue our assembled cross guard to the hand.

Careful not to glue the cross-guard to the blades.

Allow the glue to dry and then apply more glue to the back sides of the cross guard.

Fusion Complete!

Once the second application of glue dries, we are ready to battle! Use the on/off slide switch on the battery to power the Circuit Playground Express. If you’re using the 2200mAh lipo battery, you can simple unplug the cable from the board.