Cappy Monster M4sk with Animated Eyes

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https://learn.adafruit.com/cappy-monster-m4sk

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Overview

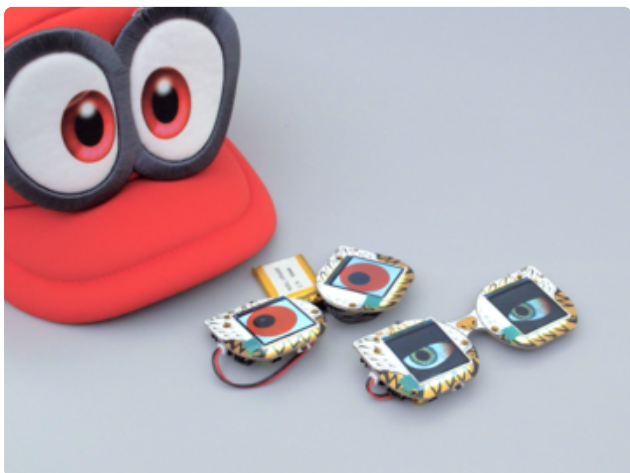This weeks project is making Cappy from Mario Odyssey.

The Adafruit Monster M4sk has everything we need to make this project.

With the Monster M4sk, you can customize the eyes to match the theme of your character.

It's really easy to edit the configuration file and make it look how you want! Just open a file in a text editor. You can change things like the size and color of the iris.

The PCB is designed so that you can break the two eyes apart and bring them closer together.

Splittable

The Monster M4sk features a splittable design! This allows you to cut along the perforations on the PBC to separate the two eyes. the Two boards are then connected via a JST SH 9-Pin cable.

We can even create a longer wire to increase the distance even further like we did with the longer antenna eyes!

Adafruit Monster M4sk

The Adafruit Monster M4sk packs a ton of awesome stuff into one single board. It's running a Cortex M4, it has 8 megabytes of flash storage, USB charging and 2x IPS TFT LCD displays. It also has buttons, light sensor, expansion ports and accelerometer.

Be sure to check out the quick start guide (https://adafru.it/FFT) for the full run down on code and graphics setup.

Set Up Monster M4SK

https://adafru.it/FFT

Parts
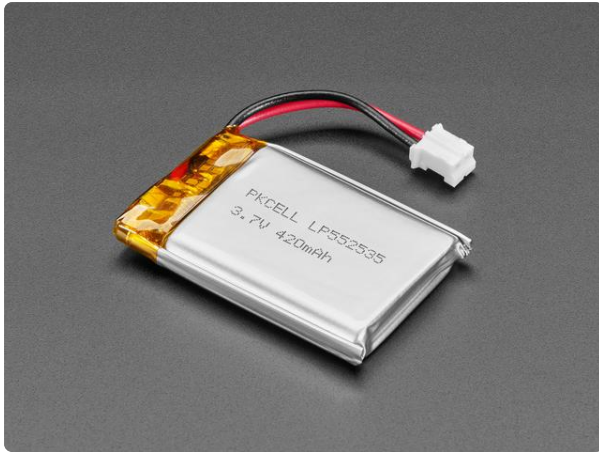
Copy and paste this friendly list of products.

Monster M4sk (http://adafru.it/4343)
9-Pin cable (http://adafru.it/4350)
420mAh battery (http://adafru.it/4236)
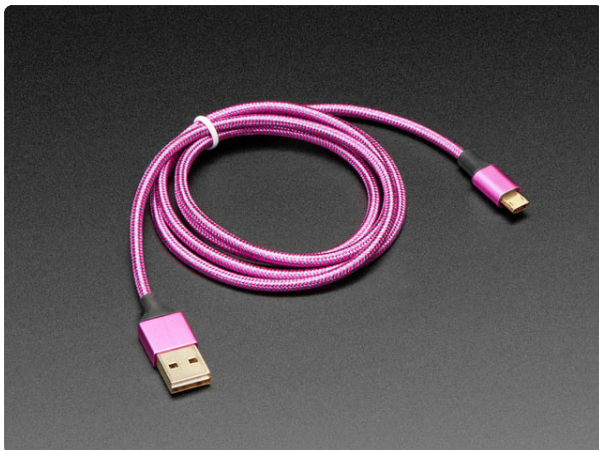Bioworld Mario Odyssey Cosplay Hat (https://adafru.it/FXB)

Adafruit MONSTER M4SK - DIY Electronic Eyes Mask
Peep dis! Have you always wanted to have another pair of eyes on the back of your head? Or outfit your costume with big beautiful orbs? The MONSTER M4SK
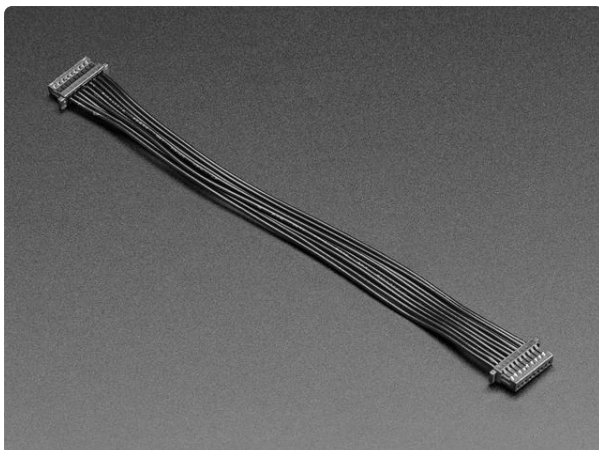https://www.adafruit.com/product/4343

Lithium Ion Polymer Battery with Short Cable - 3.7V 420mAh

Lithium-ion polymer (also known as 'lipo' or 'lipoly') batteries are thin, light, and powerful. The output ranges from 4.2V when completely charged to 3.7V. This...
https://www.adafruit.com/product/4236

Fully Reversible Pink/Purple USB A to micro B Cable - 1m long

This cable is not only super-fashionable, with a woven pink and purple Blinka-like pattern, it's also fully reversible! That's right, you will save seconds a day by...
https://www.adafruit.com/product/4111

JST SH 9-Pin Cable - 100mm long

This 9-pin cable is just about 100mm / 4" long and fitted with JST-SH female connectors on both ends. Compared with chunkier JST-PH these are 1mm pitch instead of 2mm,...
https://www.adafruit.com/product/4350

Slice Craft Knife with Ceramic Blade

Discontinued - you can grab Canary Stainless Steel Non-Stick Cardboard Box Cutter
https://www.adafruit.com/product/4306

Eye Config

Cappy Config File

Once you have gone through the MONSTER M4SK quick start guide, you should have the default "blue hazel" eyes loaded and displaying.

Use our **config.eye** file to change the style of the eyes. Download the file, rename it to **config.eye** and drop it onto the root of the **CIRCUITPY** drive. The drive shows up on your computer when you plug in your Monster M4sk via a known good data+power USB cable.
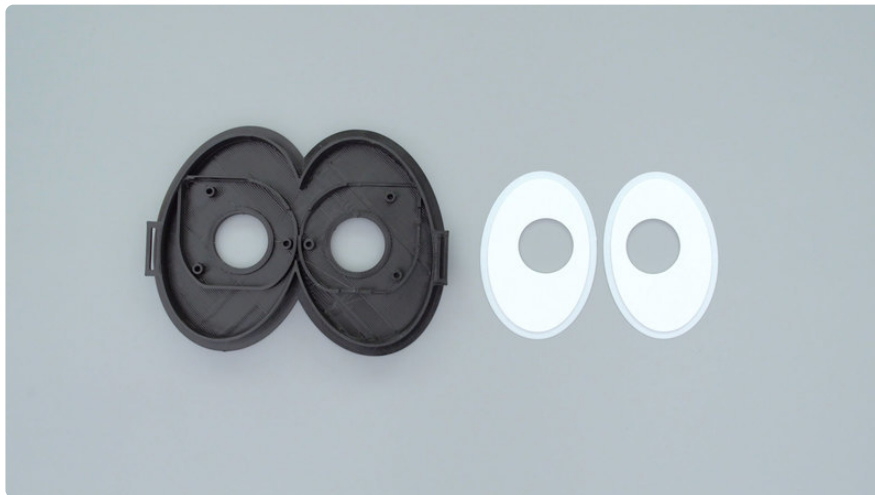
Settings

The size of the eyes where increased to full up most of the display with the iris. The iris, pupil and sclera are solid colors so no need for the bitmap images. Blinks were disabled to match the style of Cappy's eye, so no need for those either.

```
{
  "eyeRadius"      : 125,
  "eyelidIndex"    : "0xFF", // From table: learn.adafruit.com/assets/61921
  "pupilColor"     : [ 0, 0, 0 ],
  "backColor"      : [ 255, 255, 255 ],
```

```
    "irisColor"    : [ 255, 0, 0 ],
    "irisRadius"   : 120,
    "scleraColor" : [ 255, 255, 255 ],
    "left" : {
      "rotate" : 1
    },
    "right" : {
      "rotate" : 1
    }
  }
```

3D Printing

The parts in this kit are designed to be 3D printed with FDM based machines. STL files are oriented to print "as is". Parts require tight tolerances that might need adjustment of slice settings. Reference the suggested settings below.

CAD Files

The parts can further be separated into small pieces for fitting on printers with smaller build volumes. Note: a STEP file is included for other 3D surface modeling programs such as Onshape, Solidworks and Rhino.
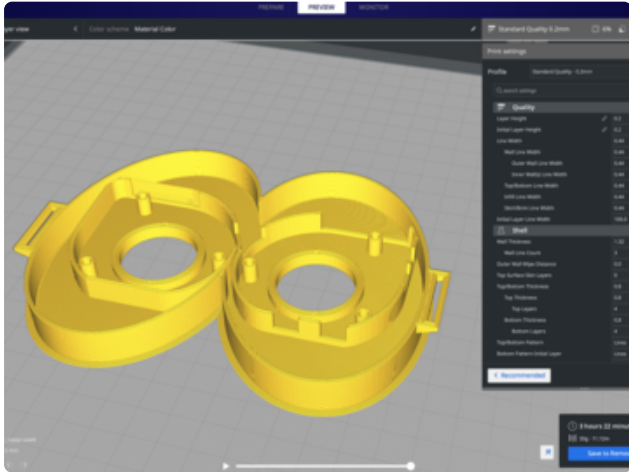
Share, Make, Remix

These parts have been modified to fit all of the electronics and available to download!

Edit Design

https://adafru.it/FXd

Download STLs

Settings
Use these settings as reference. Values listed were used in Cura slicing software.

0.2mm Layer Height / 0.4mm nozzle
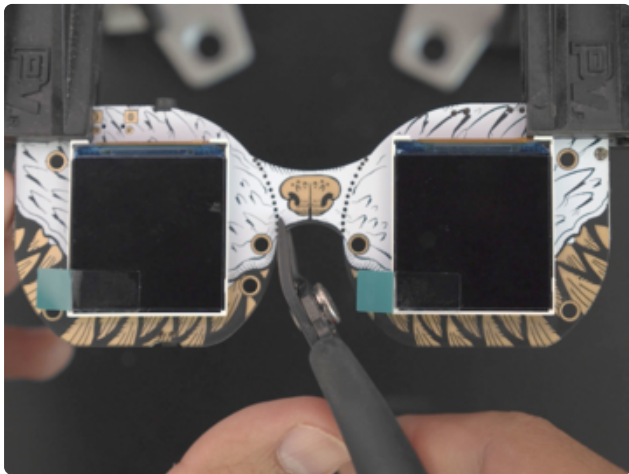0.38mm Line Width (inner & outer widths)
60mm/s printing speed
10% infill
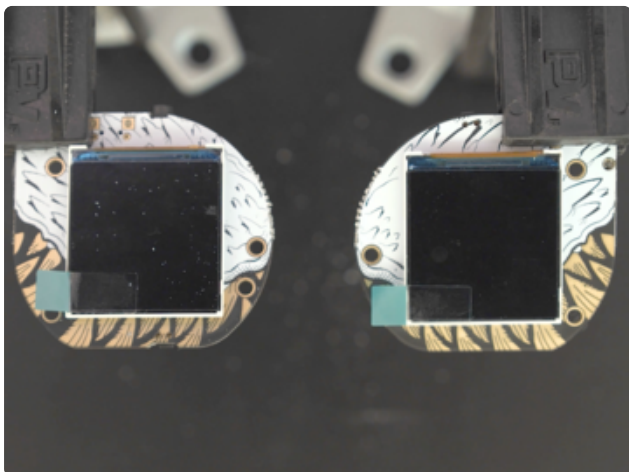Supports: No
Brim: 7mm

Assembly

Cutting PCB requires shark cutters and good eye protection. This is best done by an older maker. Please be careful.
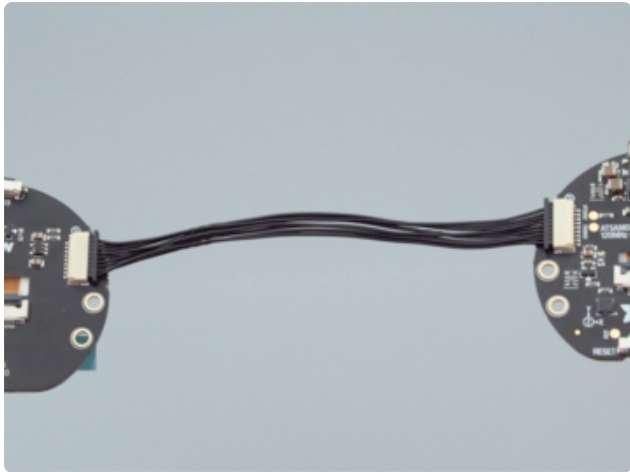

Split Mask
Make sure to split the Monster M4sk in a well ventilated area.

I used a set of panavises to hold the board and then aligned a pair of flush cutters along the perforations on the board near the nose bridge.

Start by cutting the four ends of the perforation and then go back to finish cutting the remaining edges.
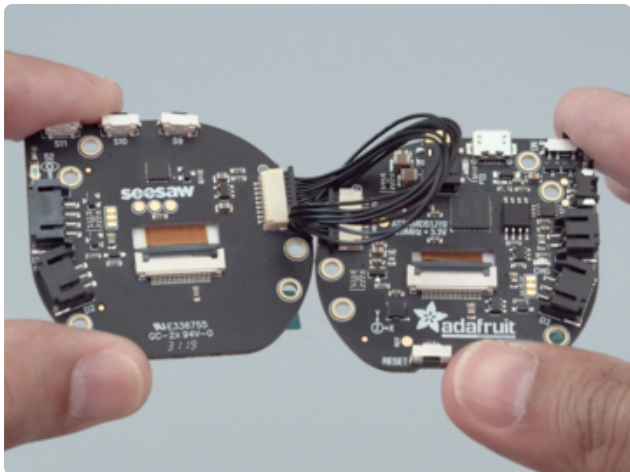
Again, you'll want to do this in a well ventilated area to avoid breathing in any dust and debris.
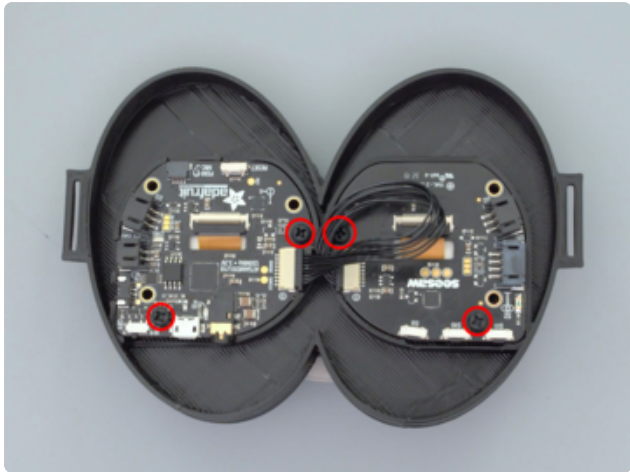
Connect board

Now we can plug in the Monster M4sk cable.

Each PCB has a connector for plugging in the cable.

Bring the two boards close together and carefully shape the wire so it coils to one of the boards.
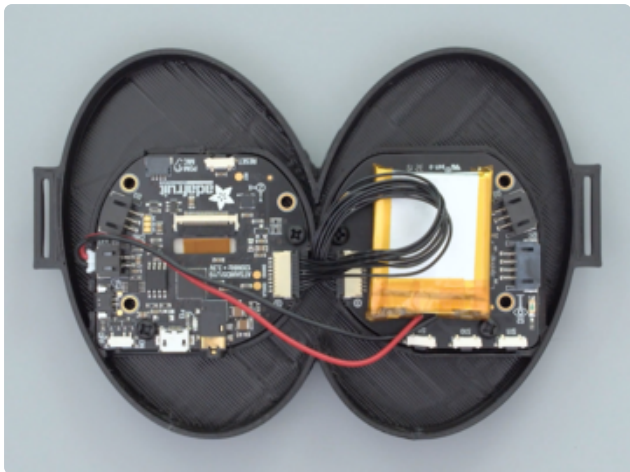
Mount boards

Align the two board in the enclosure.

Four M3 x 5mm nylon screws help to mount the board on the standoffs on the 3D printed housing.

The battery is adhered to the back of the board with a small piece of foam tape.
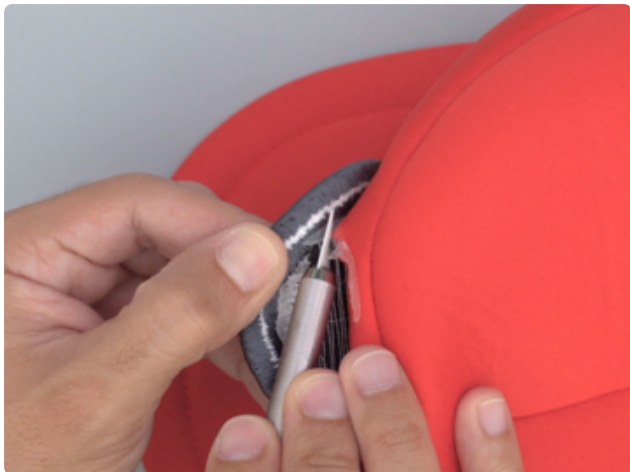

Glue

We used glue to attach the whites of the eyes to the enclosure. Apply a small amount of glue to the part and carefully align to the screen cutouts.

Prep Hat

We can optionally remove the attached Cappy eyes to make sewing the enclosure easier.

We were pretty careful and tried not to cut any of the threads.

The 3D printed case is big enough to cover up any glue stains or strands of thread.

I started by carefully peeling back the eyes and then used the Adafruit Craft Knife with Ceramic Blade (http://adafru.it/4306) to cut the glue away from the hat.

Once removed we'll align the sewing tabs on the enclosure over the hat.

Sew tabs

Position the sew tabs close to the hat.

We used a needle and thread to make a running stitch. Attaching the case with thread allows a bit of flexibility it can run along the shape of the hat.

Complete!

And there you have it! That's how you can make Mario's Cappy with animated eyes!

If you have any projects you'd like to share, we invite you to come on Adafruit's Show and Tell live stream. Attendees get a free vinyl sticker. Also be sure to join Adafruit's Discord server and become apart of the community!