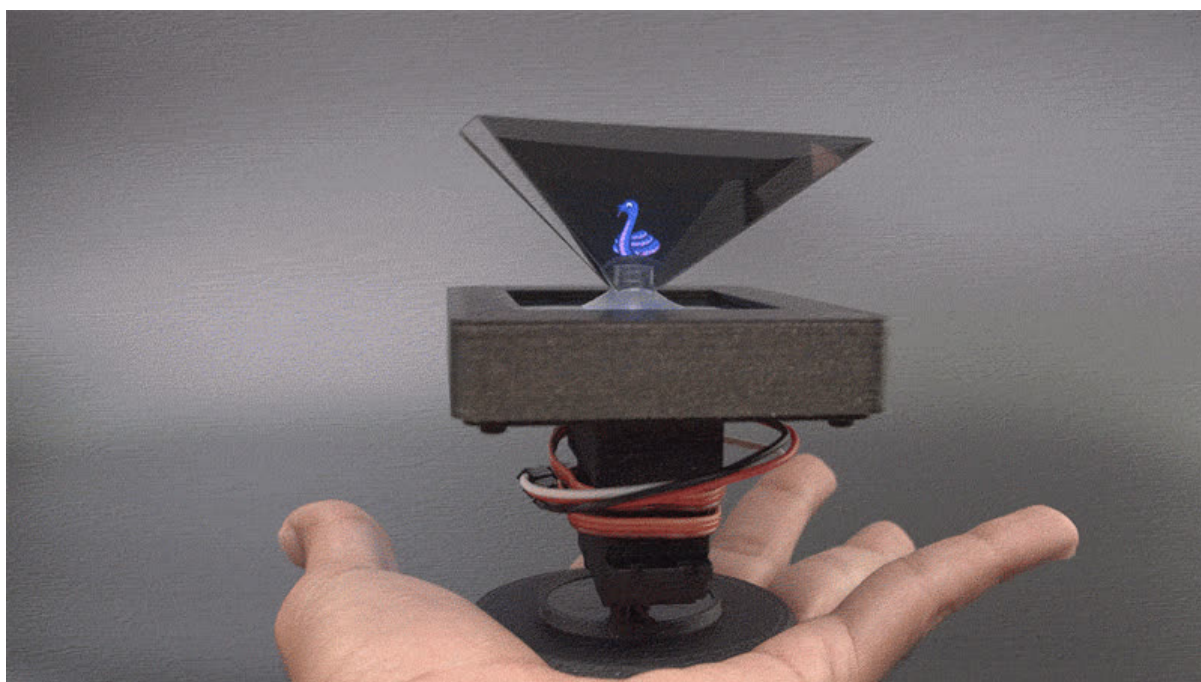




# How to Make Animated Graphics for Hologram Displays

Created by Isaac Wellish



<https://learn.adafruit.com/how-to-make-animated-graphics-for-hologram-displays>

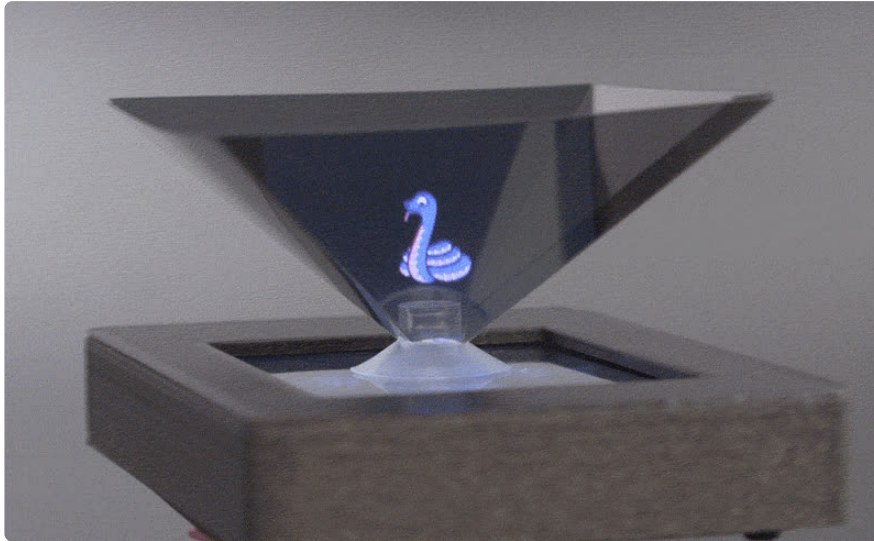
Last updated on 2024-06-03 02:56:18 PM EDT

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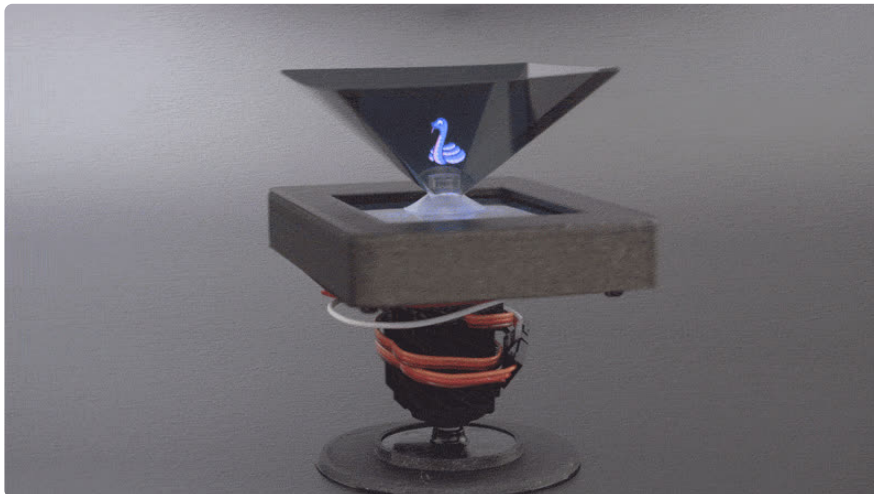
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# Overview



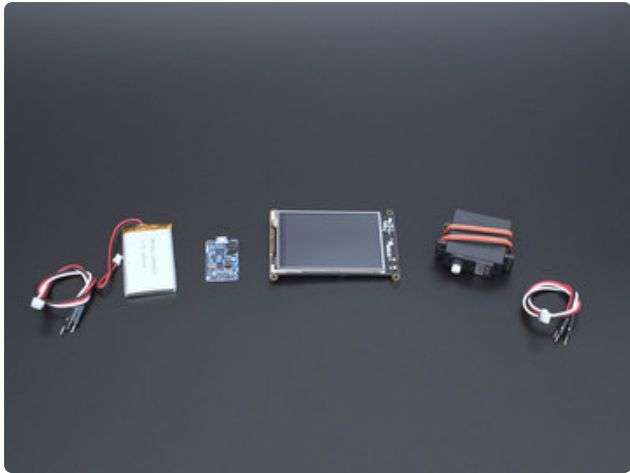
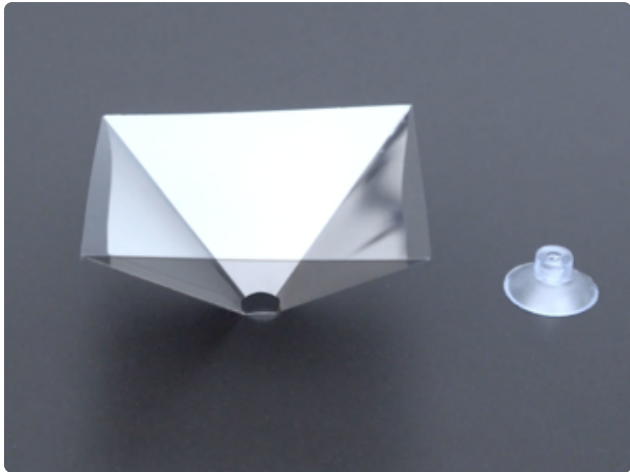
Turn your favorite character into a hologram! Strap a PyPortal to a continuous rotation servo and watch in awe. With a few edits and some formatting, you'll have floating animations in no time.

In this guide we'll go through an example of our own animation starring Blinky, the CircuitPython mascot.



We have a custom 3D printed enclosure you can use as a "vertical holder" which attaches to the servo.

To display the graphics and project onto the hologram module, you can also use a smart phone, or tablet, however you won't be able to attach to the servo to rotate freely



## Parts

Adafruit PyPortal (<http://adafru.it/4116>)

PowerBoost 1000C (<http://adafru.it/2465>)

3.7v 1200mAh Battery (<http://adafru.it/258>)

2X 3-pin JST cable (<http://adafru.it/3893>)

SPDT Slide Switch (<http://adafru.it/805>)

M2.5 Thread Screw (<http://adafru.it/3299>)

(PowerBoost 1000C)

Continuous Rotation Servo (<http://adafru.it/154>)

Hologram Prism for mobile devices (<https://adafru.it/Gf2>)

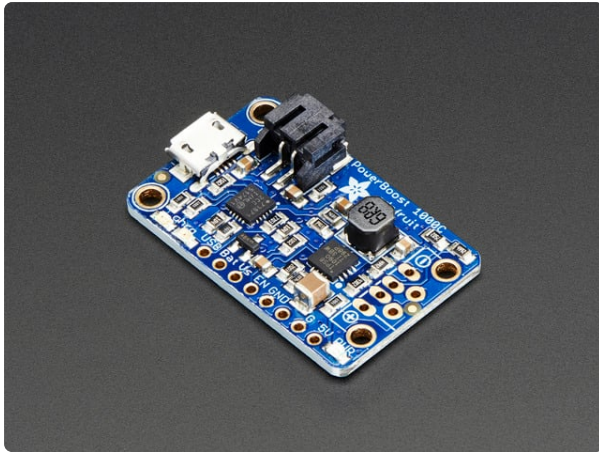


## Adafruit PyPortal - CircuitPython Powered Internet Display

PyPortal, our easy-to-use IoT device that allows you to create all the things for the “Internet of Things” in minutes. Make custom touch screen interface...

<https://www.adafruit.com/product/4116>

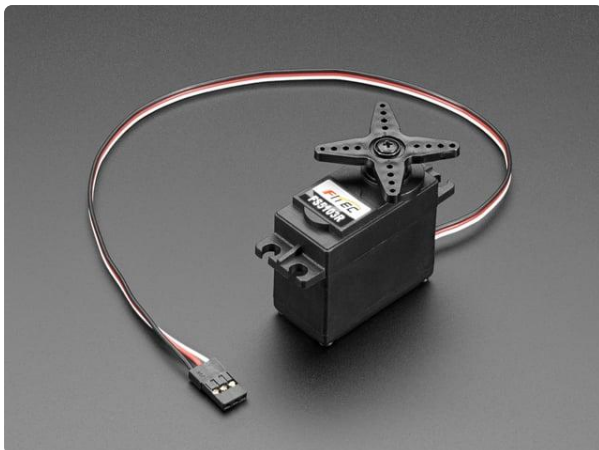




### PowerBoost 1000 Charger - Rechargeable 5V Lipo USB Boost @ 1A

PowerBoost 1000C is the perfect power supply for your portable project! With a built-in load-sharing battery charger circuit, you'll be able to keep your power-hungry...

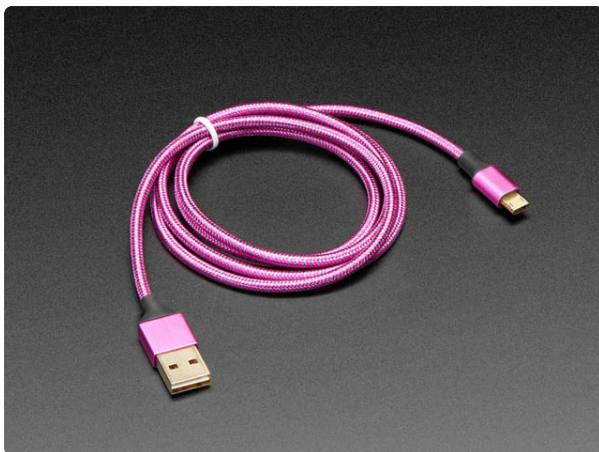
<https://www.adafruit.com/product/2465>



### Continuous Rotation Servo

This servo rotates fully forward or backward instead of moving to a position. You can use any servo code, hardware, or library to control these servos. Good for making simple moving...

<https://www.adafruit.com/product/154>



### 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>



### STEMMA JST PH 2mm 3-Pin to Male Header Cable - 200mm

This cable will let you turn a JST PH 3-pin cable port into 3 individual wires with high-quality 0.1" male header plugs on the end. We're carrying these to match up with our...

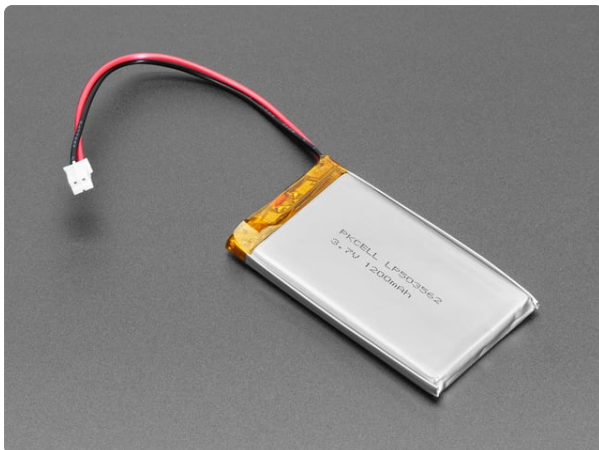
<https://www.adafruit.com/product/3893>



### Breadboard-friendly SPDT Slide Switch

These nice switches are perfect for use with breadboard and perfboard projects. They have 0.1" spacing and snap in nicely into a solderless breadboard. They're easy to switch...

<https://www.adafruit.com/product/805>



### Lithium Ion Polymer Battery - 3.7v 1200mAh

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/258>



### Black Nylon Machine Screw and Stand-off Set – M2.5 Thread

Totalling 380 pieces, this M2.5 Screw Set is a must-have for your workstation. You'll have enough screws, nuts, and hex standoffs to fuel your maker...

<https://www.adafruit.com/product/3299>

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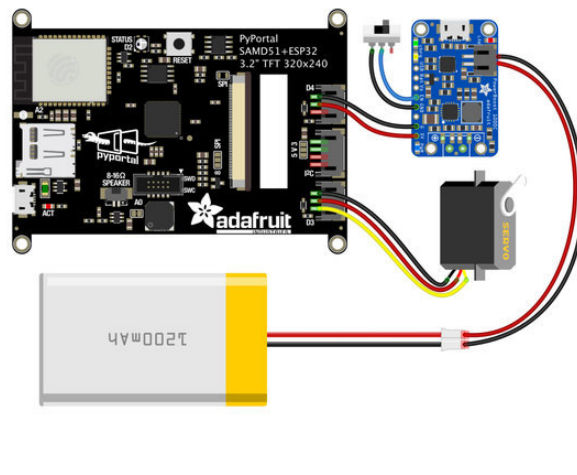
## Circuit Diagram

### Circuit Diagram

The diagram below provides a visual reference for wiring the components. This isn't true to scale, it is just meant to be used as reference. This diagrams was created using [Fritzing software \(https://adafru.it/oEP\)](https://adafru.it/oEP).

# Adafruit Library for Fritzing

Use our Fritzing parts library to create circuit diagrams for your projects. Download the library or just grab the individual parts. Get library and parts from [GitHub Adafruit Fritzing Parts \(https://adafru.it/AYZ\)](https://adafru.it/AYZ).



## Wired Connections

### Slide switch to PowerBoost

- Switch to enable and ground

### Servo to PyPortal

- Ground to ground (D3)
- Signal (D3)
- Voltage to voltage (D3)

### Battery to PowerBoost

- JST to JST port

### PyPortal to PowerBoost

- Ground to ground (D4)

- Voltage to voltage (D4)

---

## Preparing the Graphic

First up, find an animation you'd like to turn into a hologram.

You can use videos or GIFs.

In order for the hologram to work properly, try and find something that is a stand alone object or character rather than a landscape etc. If you can get the subject to be against a black background, that helps too.

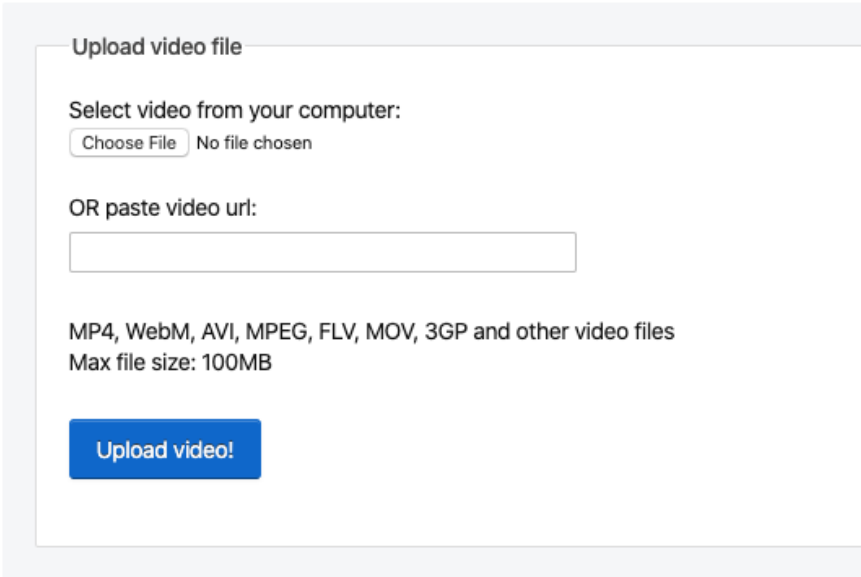
[Giphy](https://adafru.it/GeU) (<https://adafru.it/GeU>) has some great options to choose from.

If you can find multiple angles of the animation that is a huge plus, but if not, the same graphic can just be rotated for each angle.

Please make sure the animation is in GIF format.

If the animation is a video file, you can convert it to GIF format with [ezgif.com](https://ezgif.com) (<https://adafru.it/Ekt>). Head [here](https://adafru.it/GeV) (<https://adafru.it/GeV>) to convert video to a GIF. Simply upload the video file, make any changes you might want and output as a gif. You can right click and save the file somewhere handy.

### Video to GIF converter

The image shows a web interface for a 'Video to GIF converter'. It has a light gray border. At the top, there's a header 'Upload video file'. Below it, the text 'Select video from your computer:' is followed by a 'Choose File' button and the text 'No file chosen'. Then, there's a section 'OR paste video url:' with an empty text input field. Below that, it lists supported video formats: 'MP4, WebM, AVI, MPEG, FLV, MOV, 3GP and other video files' and specifies 'Max file size: 100MB'. At the bottom, there is a blue button with the text 'Upload video!'.

We will be using the below GIFs to make the hologram animation featured in the guide.





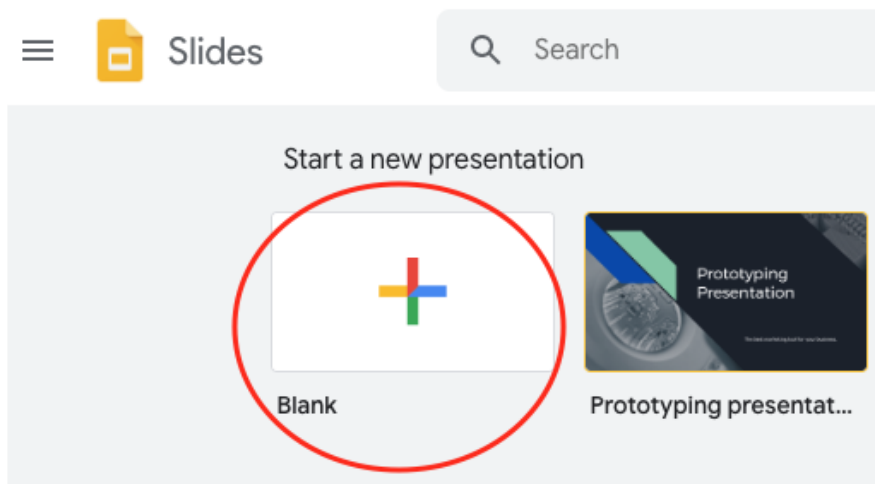
## GIF placement

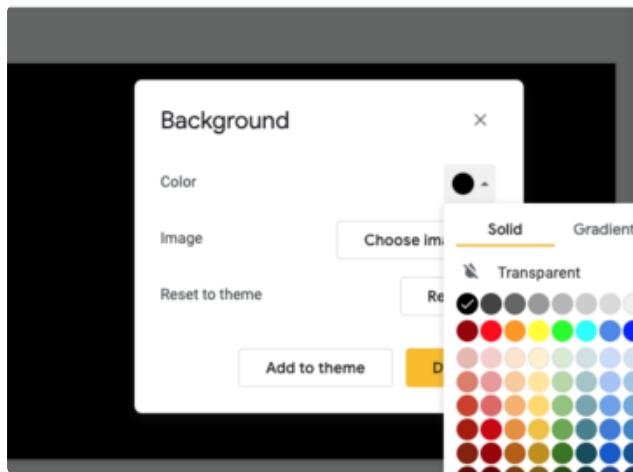
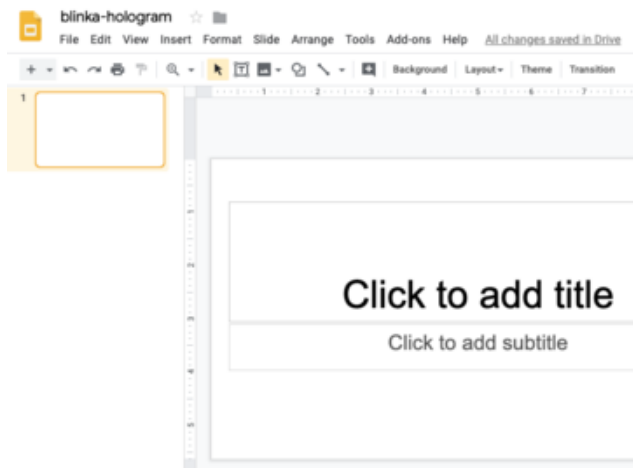
We're going to use Google Slides to place the GIFs the in the right orientation for the hologram.

If you have a Google account head to the [Slides site \(https://adafru.it/GeW\)](https://adafru.it/GeW).

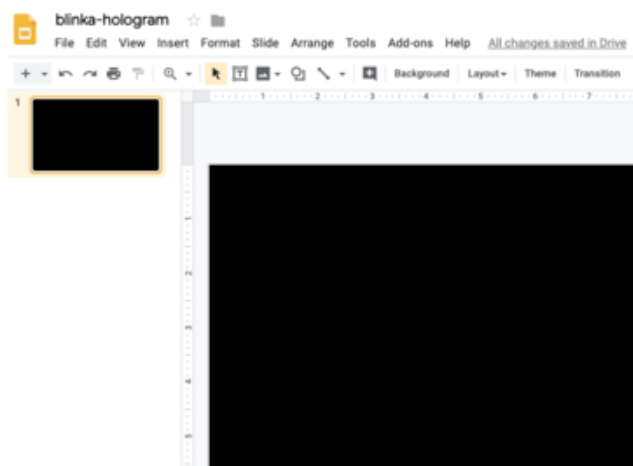
If you don't have a Google account you will need to make one to use Slides.

Under "Start a new presentation", click "Blank"

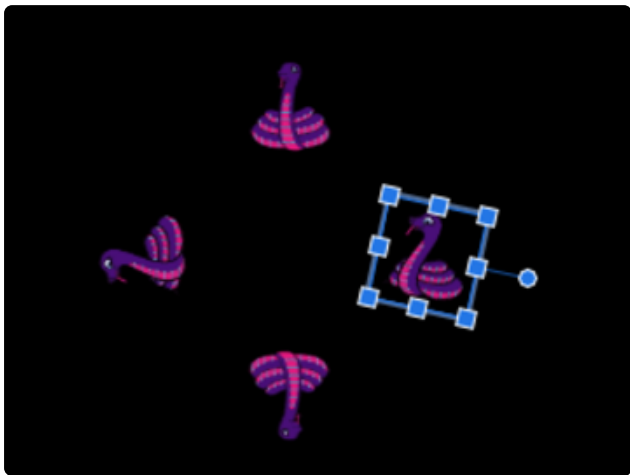
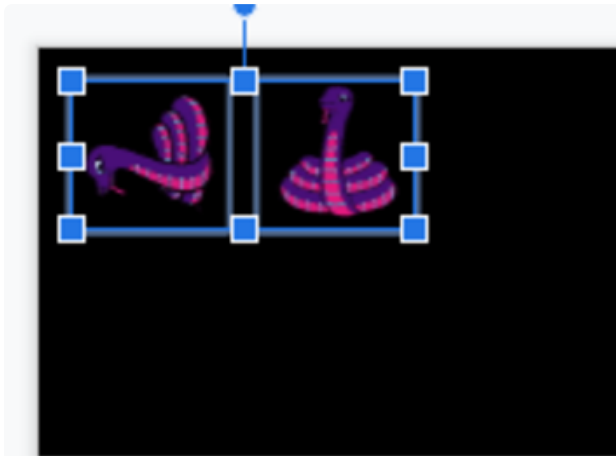




Delete the default text elements and change the background of the slide to black.

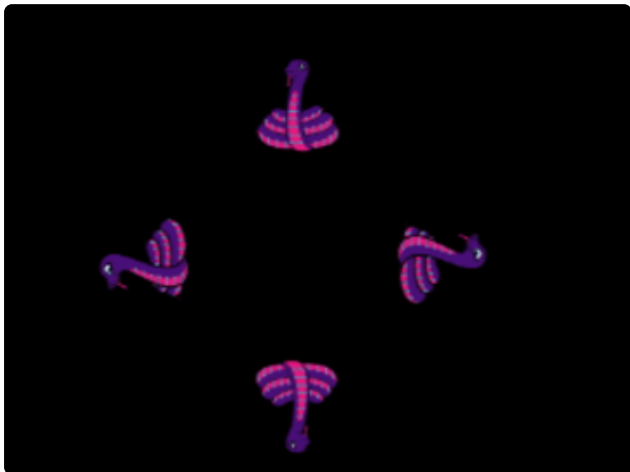


## Orient the GIFs



Drag the GIFs onto the slide.

Orient them accordingly. They must be opposite and equidistant from each other as best as possible.

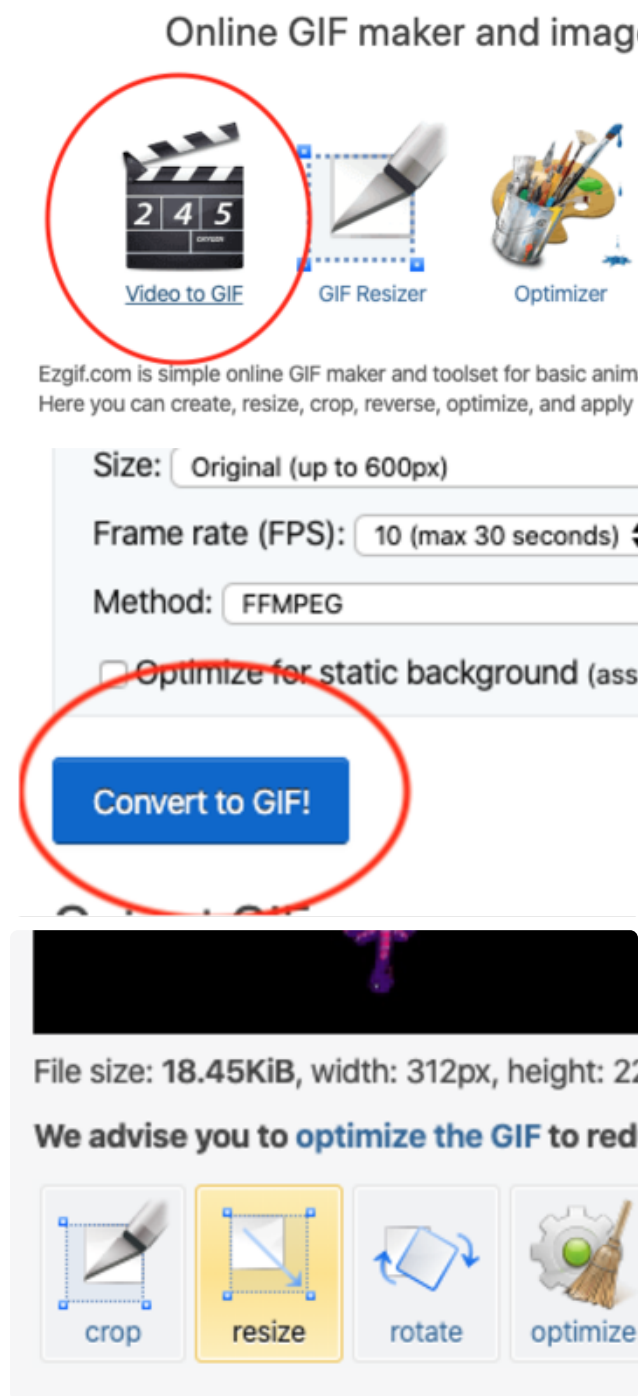


## Screen recording

Take a screen recording of the GIFs playing for 2 seconds or so.

If you have a Mac you can use [QuickTime \(https://adafru.it/GeX\)](https://adafru.it/GeX) to screen record. For PC you can use [Apowersoft's screen recorder \(https://adafru.it/GeY\)](https://adafru.it/GeY) or another free screen recorder of your choice.

## Create the GIF



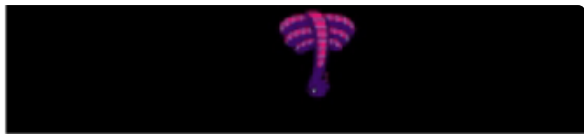
Head to [ezgif.com \(https://adafru.it/GeZ\)](https://adafru.it/GeZ) and select **"Video to GIF"**

Upload the video, and click **"Convert to GIF"**

Next click the **"resize"** tool

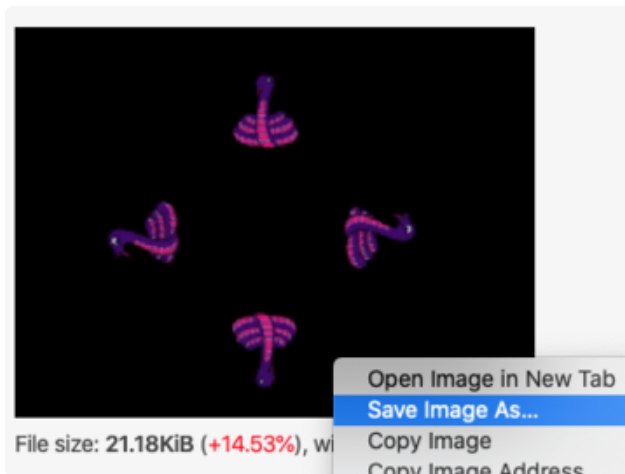
Change the size of the GIF to **320 (height) x 240 (width)** and click **"Resize image"**

Lastly save the GIF somewhere on your computer

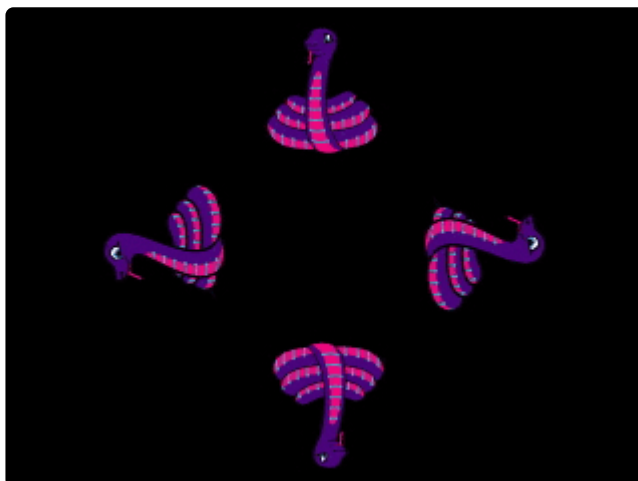


File size: 18.5KiB, width: 312px, height: 222px

Width:  (Empty = auto)  
Height:  (Empty = auto)  
Percentage:



Below is the GIF we made for the guide, if you'd like to use for an example hologram. Right click the GIF and save it somewhere handy on your computer.

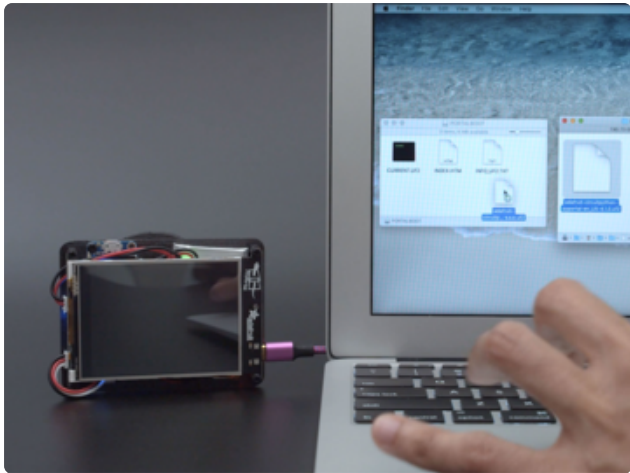


Next we'll prepare the PyPortal to upload the GIF.



---

# Software



## Upgrade Firmware

Let's get the PyPortal setup with latest firmware. The simplest way is to download the UF2 file from [circuitpython.org](https://circuitpython.org) and drop it on to the **PORTALBOOT** drive.

Plug in your PyPortal via a known good data+power USB cable.

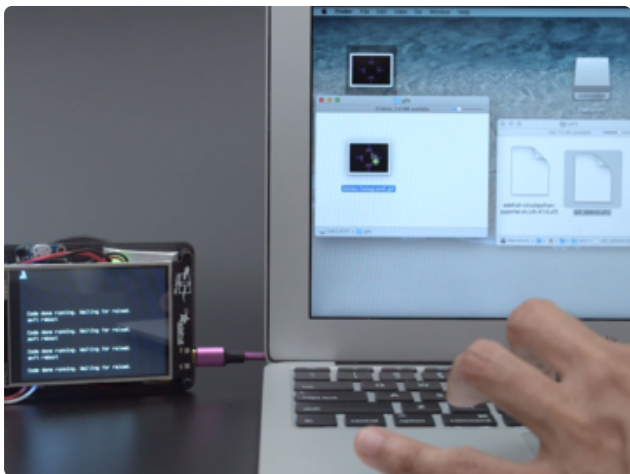
Double press the reset button and wait for the NeoPixel to turn green.

The **PORTALBOOT** drive should show up on your computer.

Download the UF2 file below and drop it onto the root of the **PORTALBOOT** drive.

[Download PyPortal Firmware](https://adafru.it/Egk)

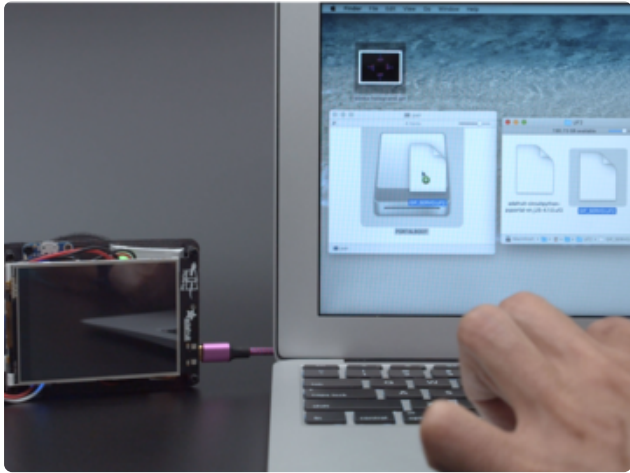
<https://adafru.it/Egk>



## Loading GIFs

The drive will automatically reboot and load as a USB drive titled **CIRCUITPY**.

Open the drive and create a new folder named **gifs**. Download our demo images and drop them into the **gifs** folder.



## Playing GIFs

Make sure you have added all of your desired gifs to the folders. After that, you will need to download the **GIF\_SERVO.UF2** file below.

Double press the reset button and wait for the NeoPixel to turn green.

The **PORTALBOOT** drive will show up on your computer.

Upload the **GIF\_SERVO.UF2** file to the **PORTALBOOT** drive, making sure you rename the file to **code.py**.

**GIF\_SERVO.UF2**

<https://adafru.it/Ge->



## GIF Configuration

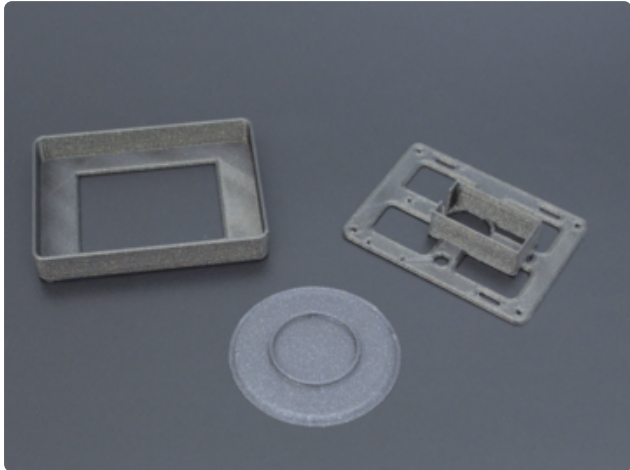
The screen should turn blue with a dialog box and text. By default, the GIF player uses a configuration file that lets you specify how to play back the GIF. The configuration file can be optional, but if you'd like to use one use the link below to get it. It's not necessary, so press the TAP icon to proceed and play back your GIFs.

**GIF Playback Configuration**

<https://adafru.it/E-l>

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# 3D Printing



## 3D Printed Parts

Parts are designed to be 3D printed with FDM based machines. STL files are oriented to print "as is". Parts are listed below with file name and description. Parts require tight tolerances that might need adjusting slice setting. Reference the suggested settings below.

You can download the STL files below or from [Thingiverse \(https://adafru.it/ZdJ\)](https://adafru.it/ZdJ):

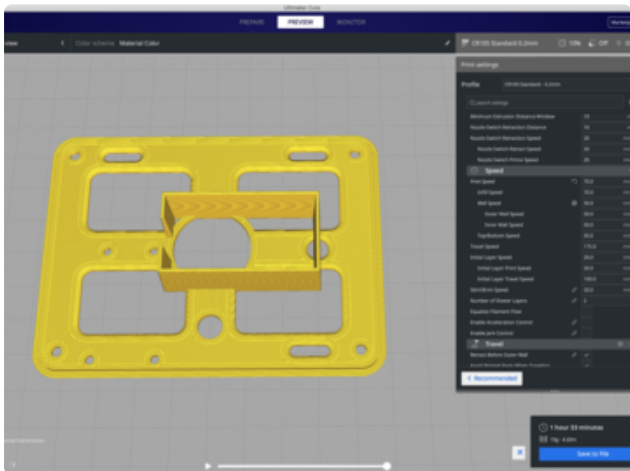
**Hologram\_PyPortal.zip**

<https://adafru.it/ZdK>

And the Fusion 360 model, if you'd like to learn from or modify the design:

**Edit Design**

<https://adafru.it/Gf0>



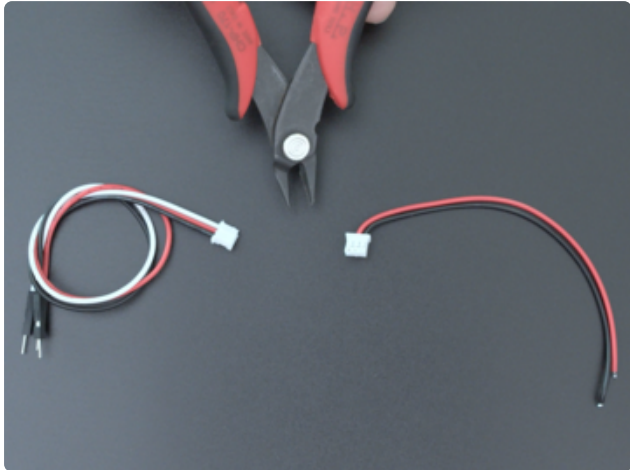
## Slice Settings

Use these settings as reference. Values listed were used in [Ultimaker's CURA 3.X \(https://adafru.it/C26\)](https://adafru.it/C26) slicing software.

0.2mm Layer Height / 0.4mm nozzle  
0.4mm Line Width (inner & outer widths)  
40mm/s printing speed  
20% infill  
Supports: No  
Brim Line Count: 5

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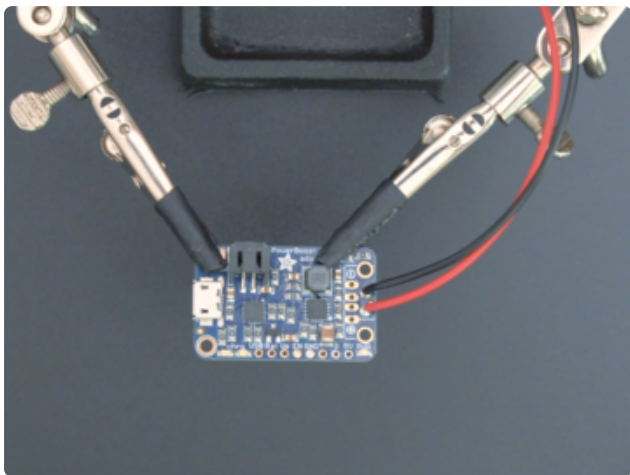
# Assembly



## Prep Wires

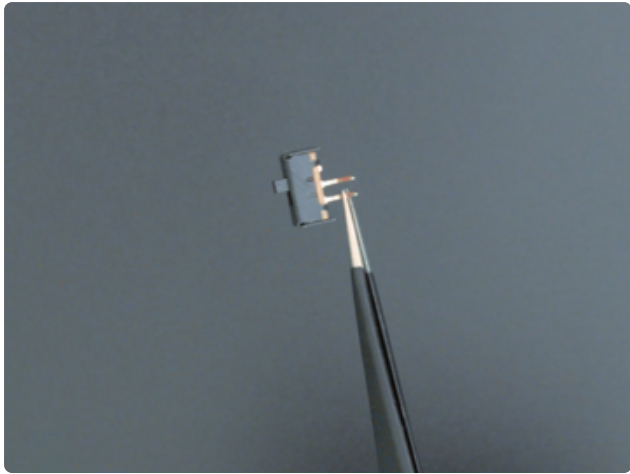
I used two [JST PH 3-Pin to Male Header Cables](http://adafru.it/3893), (<http://adafru.it/3893>) one to solder to the PowerBoost and the other cables to connect the servo.

For the PowerBoost cable, we'll only need the red and black wire. I removed the third white wire. Trim and tin the ends of the red and black wires.



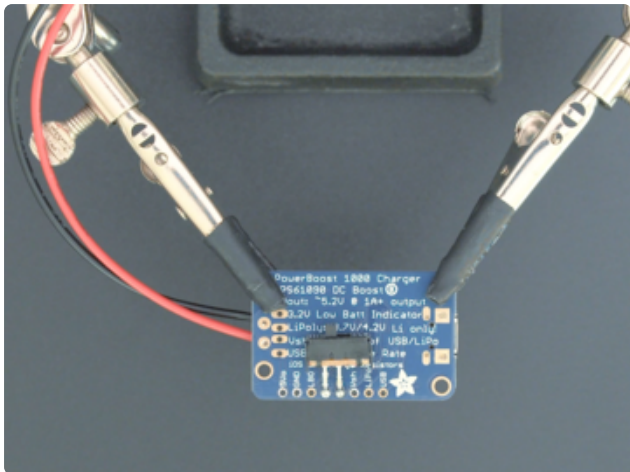
## Solder PowerBoost

Solder the red wire to the + side and the black wire to the - side of the PowerBoost.



## Prep Slide Switch

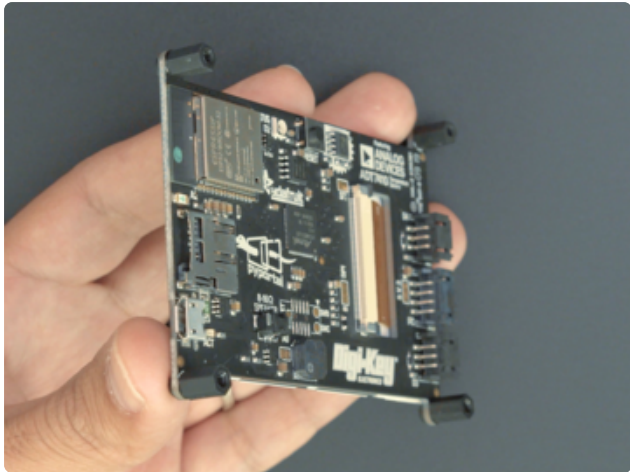
We can add a slight bend to the slide switch pins so it can sit on the back of the through holes on the PowerBoost. I then trimmed off the third pin to easily fit it on the board.



## Solder Slide Switch

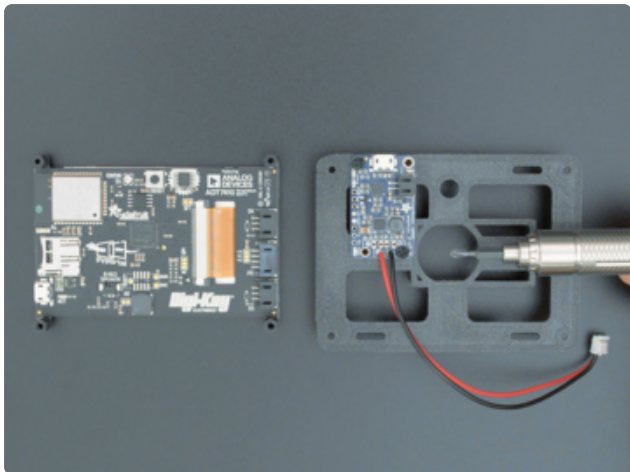
Tin the **EN** and **GND** on the PowerBoost and then solder the slide switch into place.





## PyPortal Standoffs

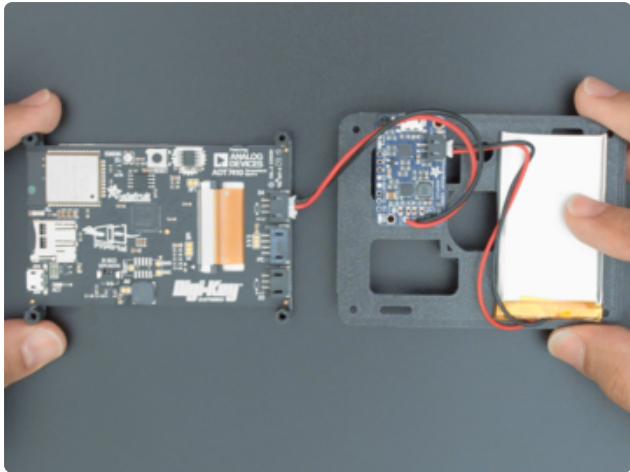
We'll need to elevate the PyPortal so it can sit over the PowerBoost and Battery. I used 8mm long nylon standoffs with 5mm M2.5 screws to the mounting tabs on the PyPortal.



## Mount PowerBoost

Align the printed PyPortal mount to the **reset button cutout**. The PowerBoost mounts with the USB port pointing out so we can easily access it for charging the battery.

I used M2.5 5mm screws to mount the PowerBoost.



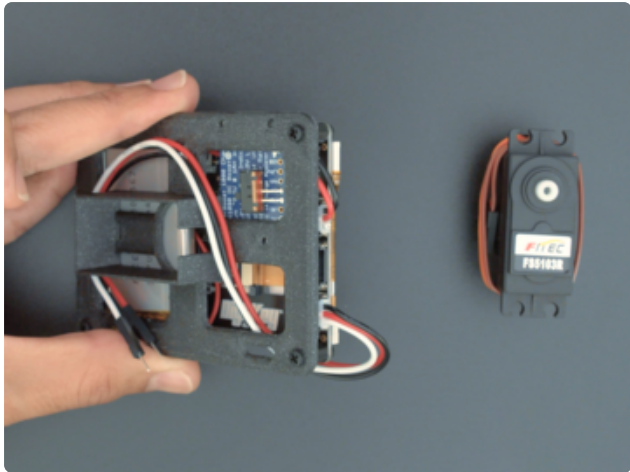
## Mount Battery

Orient the battery so the wires can plug into the PowerBoost. Plug the battery into the Power Boost and the wire on the PowerBoost to the D4 port on the PyPortal.



## Mount PyPortal

Align the PyPortal with the printed mount and use four more M2.5 5mm screws to secure it to the mount.

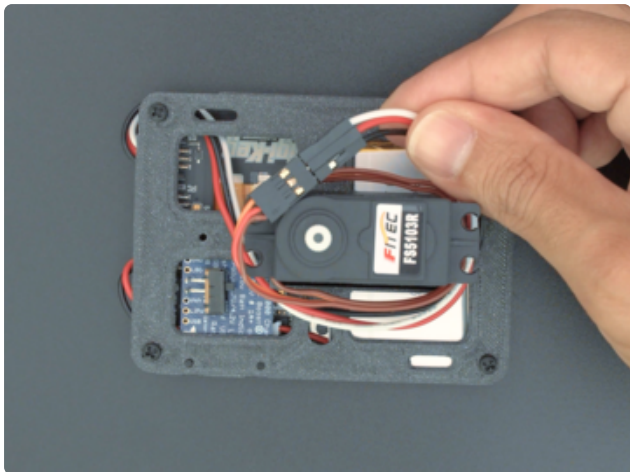


## Servo cable

Pass the JST cable for the servo through the printed mount and connect it to the D3 port on the PyPortal.

## Mount and connect servo

Align the servo with the wire cut out on the walls on the printed mount.



Plug the male ends into the female ends of the servo. The white wire connects to the orange wire on the servo. Black connects to brown and red connect to the red wire on the servo.



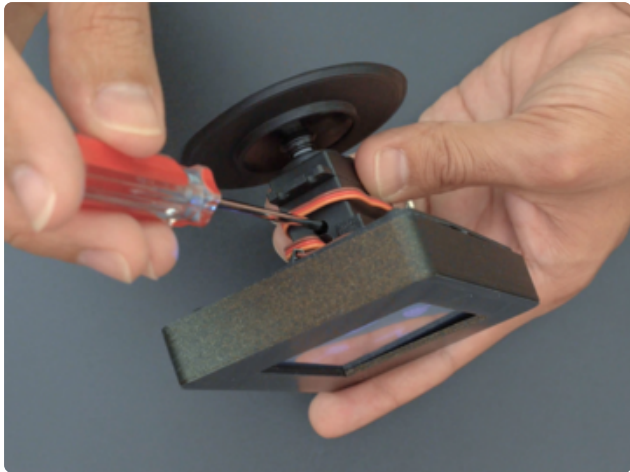
## Servo horn

The servo includes a circular horn that press fits into the servo. I wrapped the excess wires around the servo body.



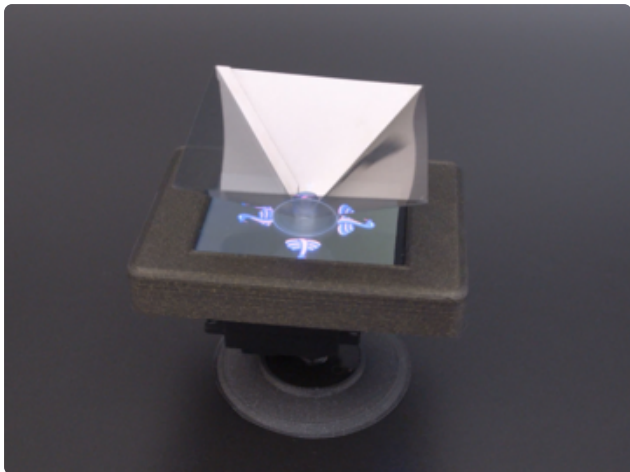
## Horn base

The circular servo horn is then press fitted into the larger printed circular base.



## Place Cover

To prevent light leaking on the sides of the PyPortal, we can place the front cover of the display.

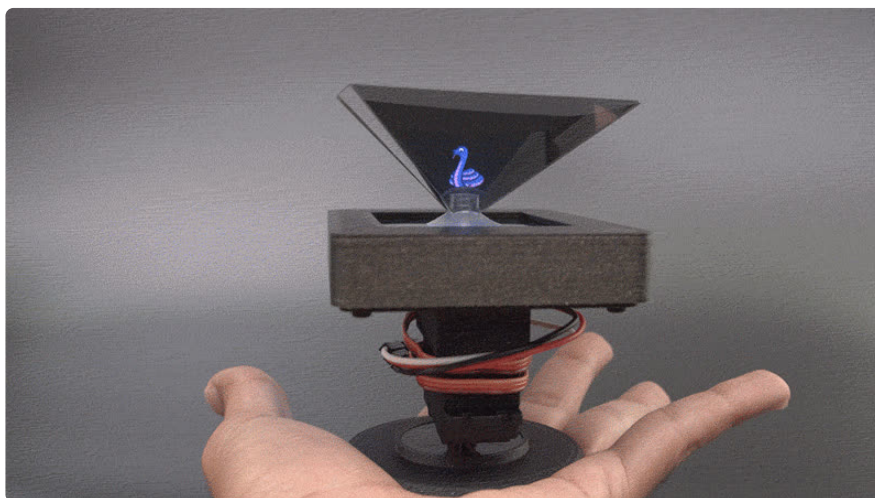


## Servo Speed

If your servo has a Potentiometer, we can adjust the speed and direction with a screw driver.

## Complete!

Fit the prism in the center of the hologram graphics so the four quadrants align and reflections can project on each side of the prism.





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# Test Out the Hologram

To try out the hologram, place the projector prism on top of and in the center of the screen with the animation.

If the hologram is faint, try turning the brightness up on the screen or moving some place darker.

## Smart Phone / Tablet Examples

Here are a couple of slick examples from the Spectre website to test out your prism with a phone or tablet.

Robot

Rocket

Bee

Fairy

Octopus

For more info, here's a video from Specre on how to use the prism: