# 10" Raspberry Pi Desktop

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https://learn.adafruit.com/10-raspberry-pi-desktop

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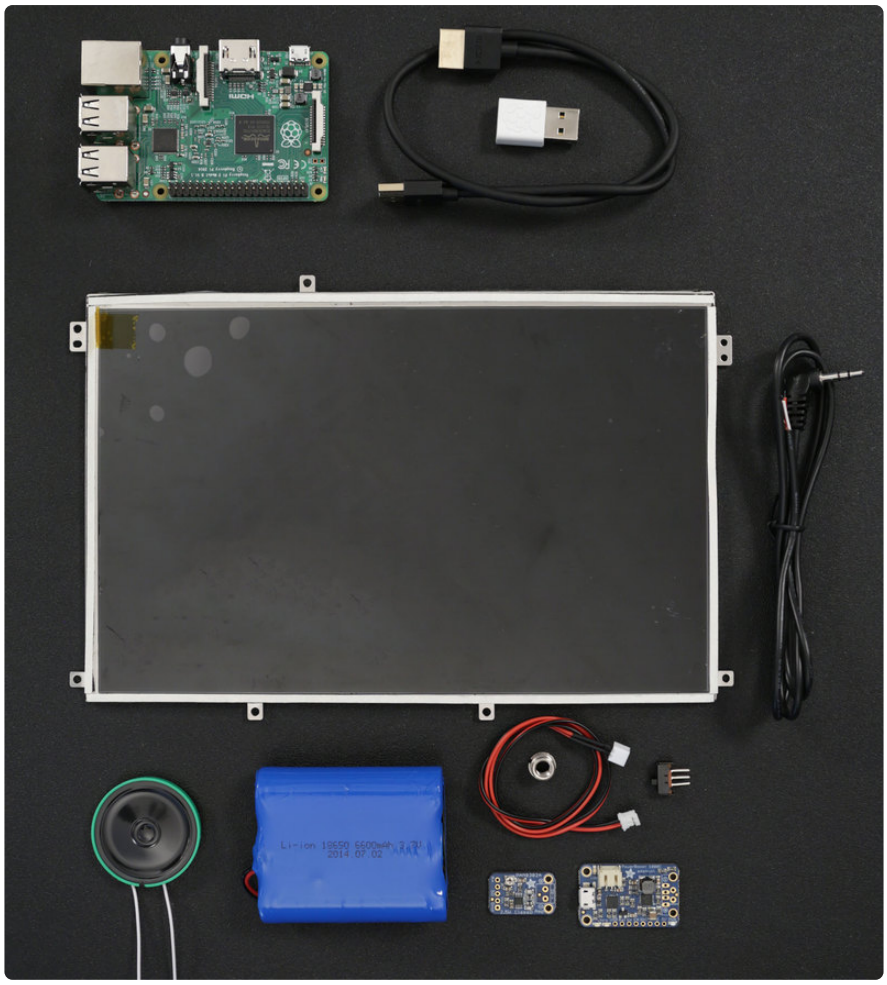
# Overview

## Raspberry Pi Tablet

This project showcases the scalibility of a 3D printed project for the Raspberry Pi. You've see this sorta thing before, an all-in-one portable Raspberry Pi fitted in a nice little 3D printed package with a PiTFT display. So, surely it's trivial to scale that up with the best screen in the shop!


## Make it bigger!

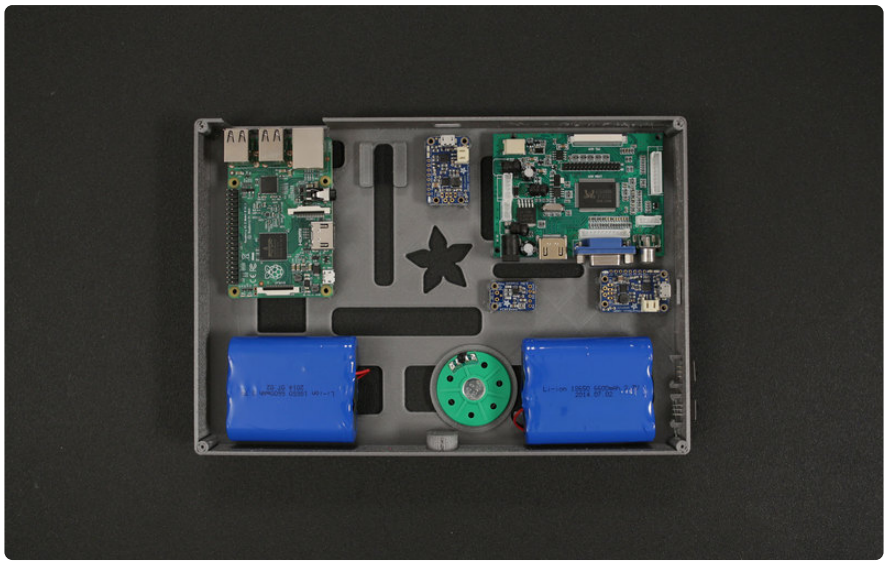
This project takes the DIY approach with **no compromises in cost**. The cost of this build is easily goes over low budget DIY projects, but it's ment to be **premium build**. It will be used for monitoring and wirelessly controlling a farm of printers. A dedicated linux box with a decent sized screen could cost about the same amount, but when the process of building a project is more meaningful than getting the cheapest deal, this sorta thing becomes a trophy item as well as a **functioning utility**. Also, we can mount it to anything and design custom brackets to adjust it in any configuration, and that's pretty **darn cool**.



## Parts List

This are the parts we used in this project, but it can be customized. e.g If you'd like to only have the Raspbery Pi and display. You will need some hardware to mount the components and secure the enclosure.

- 10.1" HDMI 4 PI IPS Display (http://adafru.it/1287)
- Raspberry Pi 2 (http://adafru.it/2358)
- 2x PowerBoost 1000C (http://adafru.it/2465)
- 2x 6000mAh Lithium Ion Battery (http://adafru.it/353)
- PAM8302 Audio Amplifier (http://adafru.it/2130)
- Pigtail 3.5mm Stereo Audio Cable (http://adafru.it/1700)
- HDMI Cable (https://adafru.it/fUu)
- 2x Slide switch (http://adafru.it/805)
- JST-PH extension cable (http://adafru.it/1131)
- Thin plastic speaker (http://adafru.it/1891)
- Kano Keyboard for Pi (https://adafru.it/iXD) (Orange Keyboard)
- 3/8" to 1/4" Adapter Screw (http://adafru.it/2392)
- Swivel-Head Pan Tilt (http://adafru.it/2464)

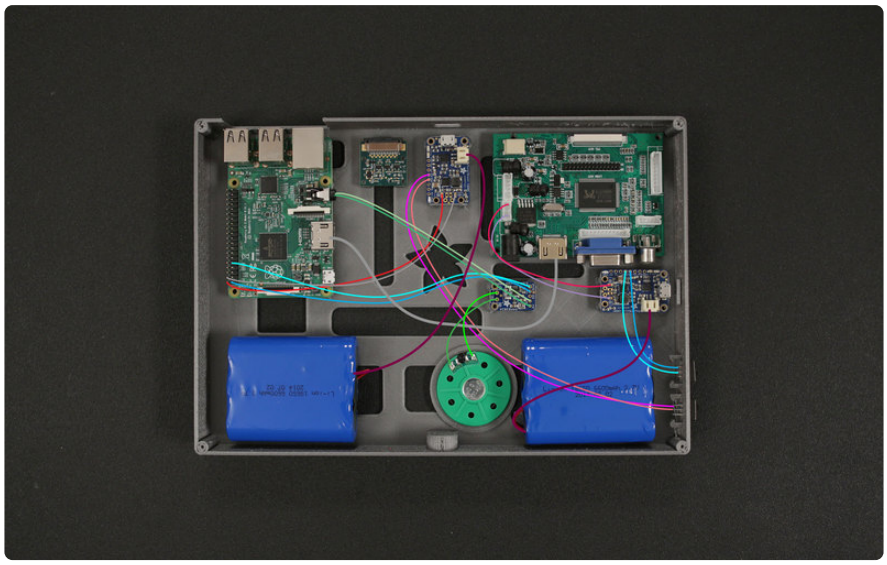


## Tools

Here's a list of useful tool we used to get this project completed.

- 3D Printer (http://adafru.it/2412) with 300mm x 300mm  minimum build volume
- Filament (http://adafru.it/2080) (1.75mm, 2.85mm, ABS, PLA, etc.)
- Wire Strippers (http://adafru.it/527)
- Screwdriver
- Soldering Iron
- Silicone covered stranded-core wire
- Phillip Flat Head #4-40 x 3/8 (https://adafru.it/eIL)
- #2-56 1/8 machine screws
- #2-56 3/8 machine screws

# Circuit Diagram



## The Circuit Diagram

**PowerBoost1000C**

The slide switchs connect to the **EN** and **GND** pins on each PowerBoost1000C.

The 6600mAh batteries plugs into the **JST** connector on the PowerBoost1000C. You can charge the battery by connecting a microUSB cable.

**Raspberry Pi 2:**

**Positive+** and **-Negative** pins on the PowerBoost1000C connect to the Pi on **GPIO #2** for **5V power** and **GPIO # 6** for ground.

**PAM8302 Audio Amplifier:**

**GPIO #1 (3V)** on the Pi connects to **VIN** on the PAM8302. **GPIO #9** connects to **GND** on the PAM8302. The **+Postive** and **-Negative** connections are wired to the **A+** and **A-** on the PAM8302.

The Audio jack plugs into the audio port on the Pi.

**Display Driver:**

**+Positive** and **-Negative** pins on the PowerBoost1000C connect to the **12V** and **GND** labeled on the Display Driver.

The **Slim HDMI cable** connects to the HDMI port on the Raspberry Pi.

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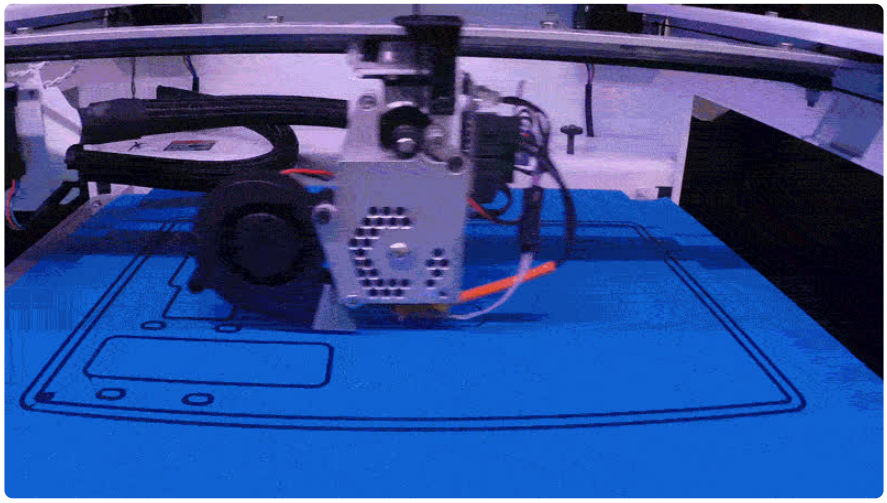
# 3D Printing



## Printing Settings

Use the settings below for reference. The parts were printed on the Type A Machine Series 1. We used Simplify3D to slice the parts using our custom profile. You can download our profile for Simplify3D below.

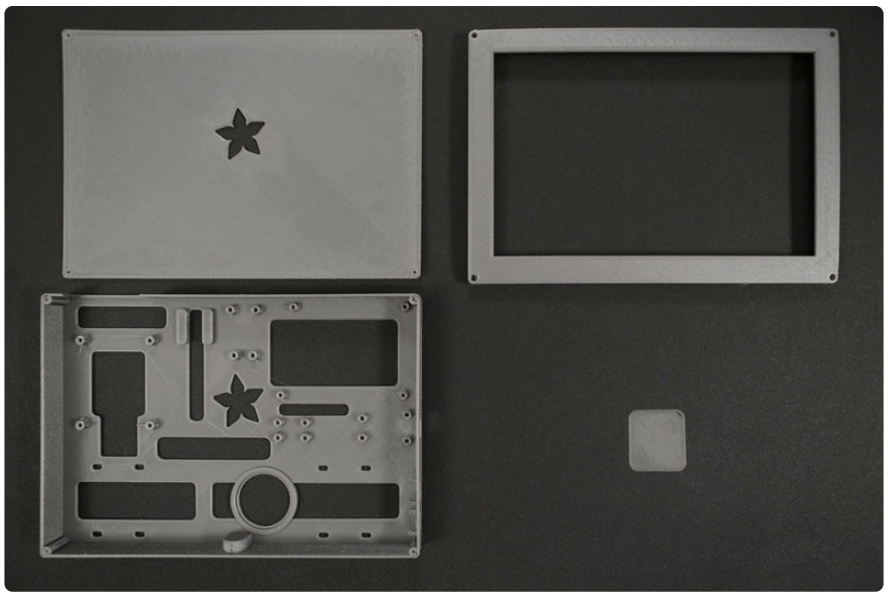
**Type A Machine S3D Profile**

https://adafru.it/fUx

| | | |
|---|---|---|
| rasDesk.stl<br>rasDeskDif.stl<br>rasCover.stl<br>rasDisplay.stl | 245c Extruder<br>2mm Retraction<br>10% infill<br>3 Shells<br>90mm/s print speed<br>200mm/s travel speed | about about 12 hours to print all parts. |

Download STLs

https://adafru.it/fUy



## Customize Design

You can modify the original solids in the CAD files to make a custom project.

## Materials

The parts can be printed in different types of filament. The most common filaments like PLA and ABS will do just fine but you can of course experiement with copperFill, bambooFill, Semiflex, PET and Nylon.

## Tolerances

The parts were tested with common printing settings (listed in the table). With a parameter of 2 shells, theres only a few areas where tolerances really matters - the port cutouts and the mounting holes.

Test fit the parts by inserting the top enclosure part over the Raspberry Pi. Check to see if the cutouts fit over the USB and ethernet ports. If the cutout is too tight, you can loosen it with a filing tool.

The standoffs with counter bores should fit the machine screws listed in the BOM. These can be threaded by fastening in the appropriate sized screw.

## Bed Leveling

Any parts with large surface require a well leveled build plate. If you're using a heated bed, you can minimize warping. Blue tapers tape, build tak, and sticky adhesives can help keep your part flat and adhere to the bed.

## Clean up

If there's any string or artifacts left over from retraction and oozing, clean up the part by trimming them off using a pair of flush snips.

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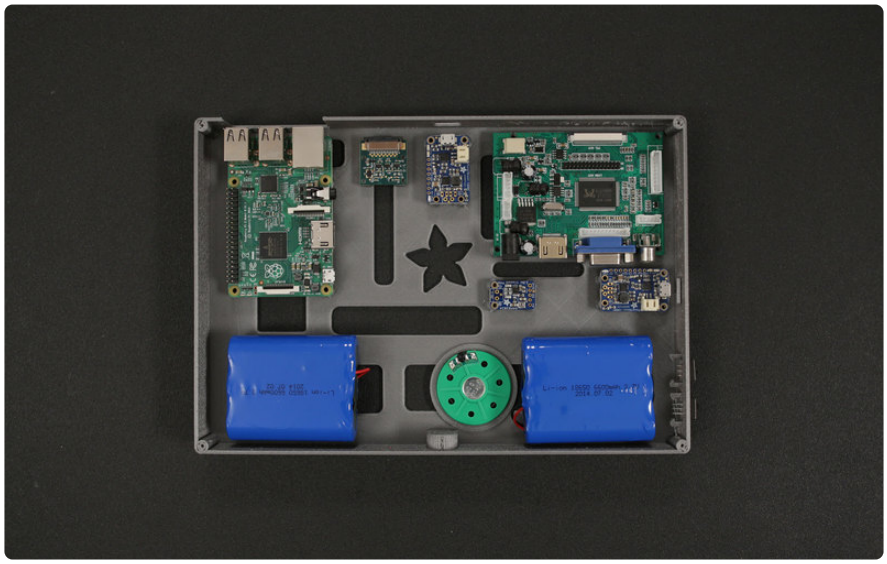
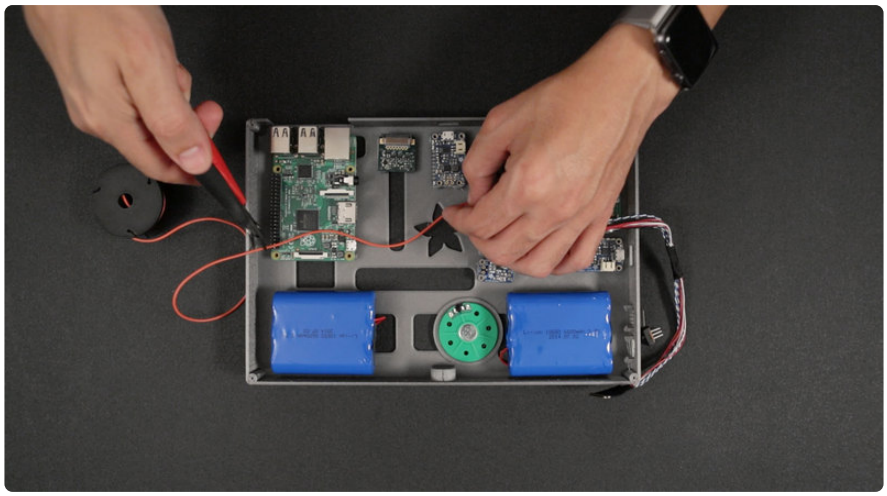
# Assembly



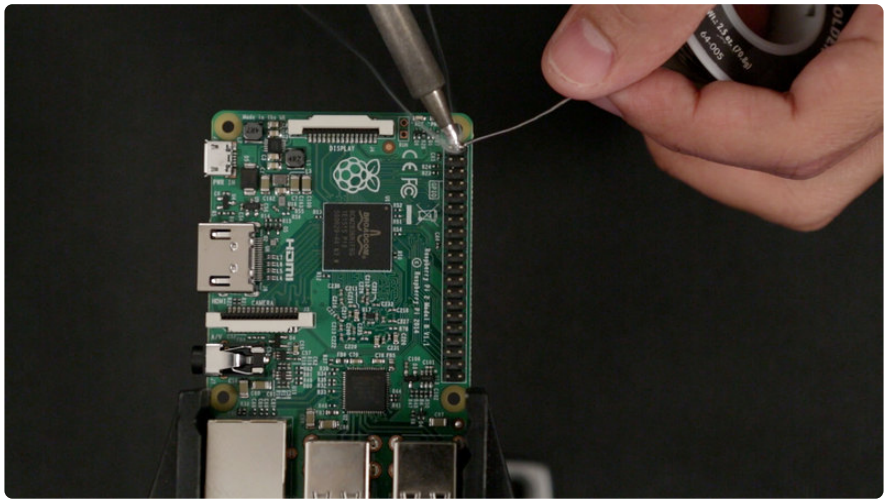
## Arrange Components

Layout the components on each stand-off. Measure how long each wire needs to be. You can alway constumize the the layout by editing the CAD files.



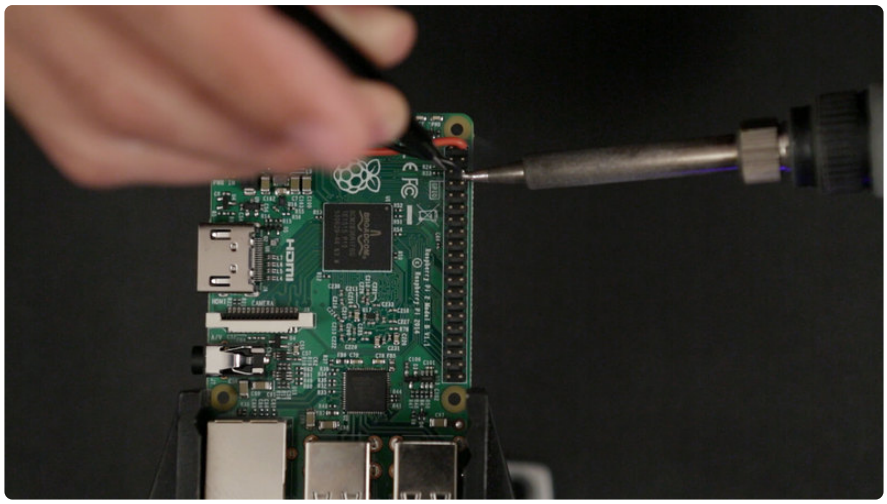
## Measure wires

We can solder wires from the bottom or top side of the GPIO header pins. Measure each wire so there is enough slack when we strip both ends.



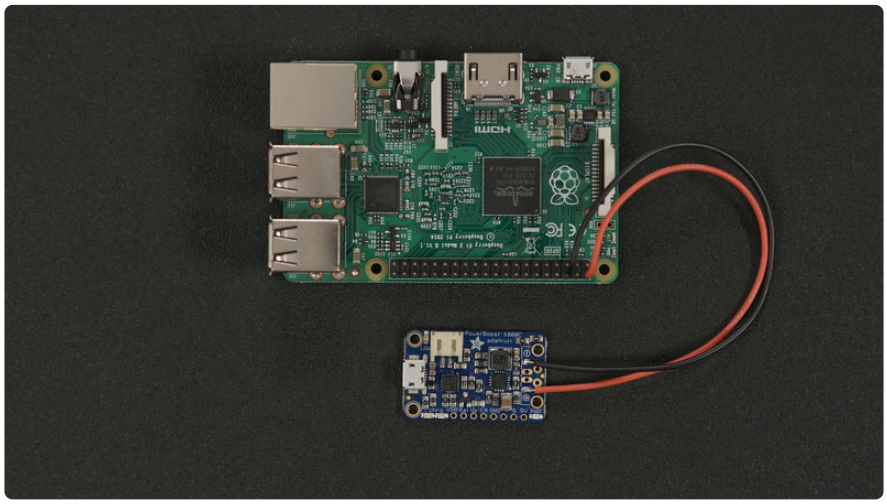
## Tin headers

To make the enclsoure as thin as possible, we can solder directly to the GPIO header pins. Refer to the circuit diagram and connect power and ground to the PowerBoost1000C.



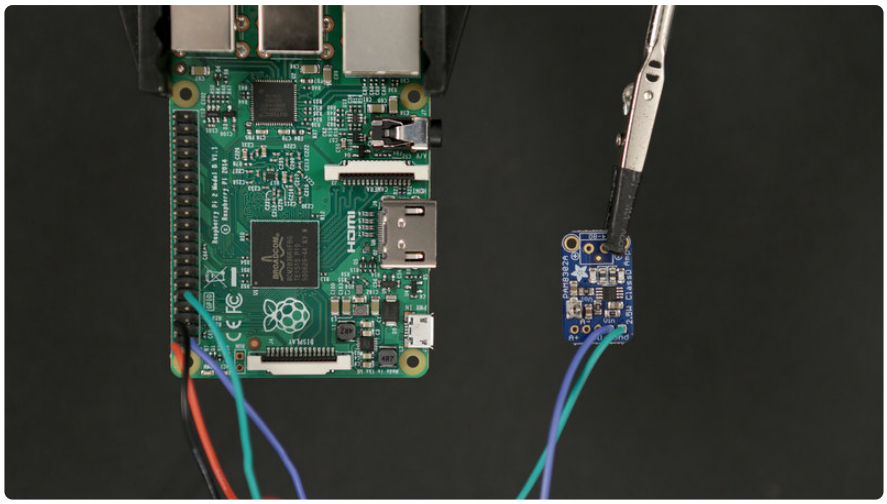
## Solder power and ground

Hold the Pi steady with something like a Panavise Jr. Use tweezers to easily hold wires close to each pin. Solder each wire to the side of the pin.



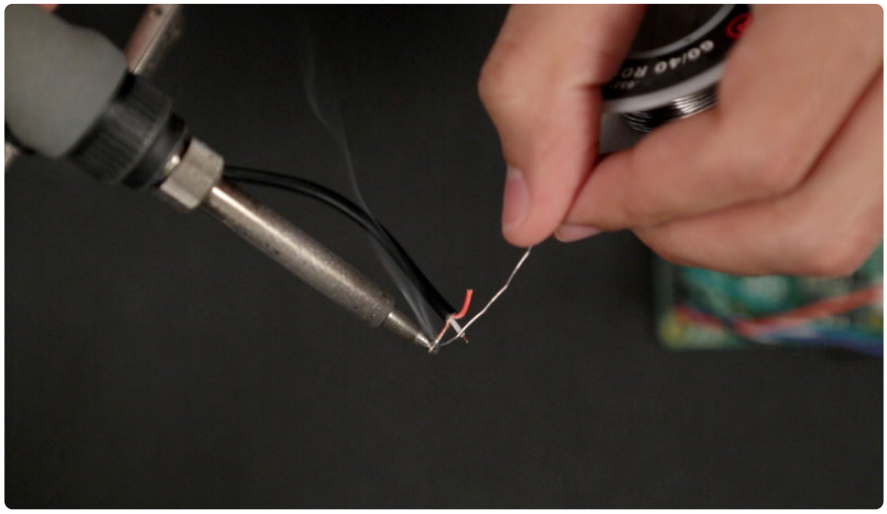
## Solder PowerBoost1000C

Positive and negative pins on the PowerBoost100C connect to pin #2 (5V power) and pin #6 (ground).



## PAM8302 power and ground

Feed power from the Pi to the amp using pin **#1** for power and pin **#9** or **#14** for ground.

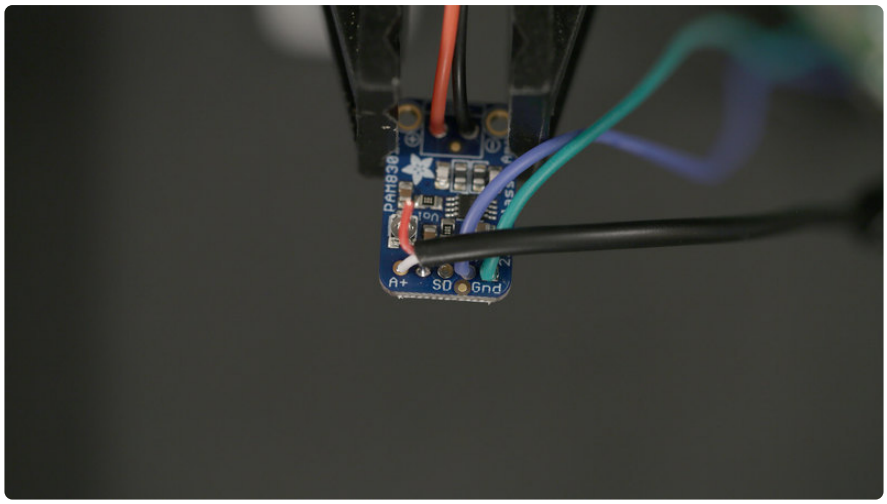


## Audio pigtail cable

Measure the length of cable needed to connect the amplifier to the audio jack on the Pi. Cut the cable to the right length and strip about 1.5cm of insulation.

Twist together the stranded wire and tin to keep it from fraying.

Strip about 5mm of insultation from the red and white wires, then tin both wires.

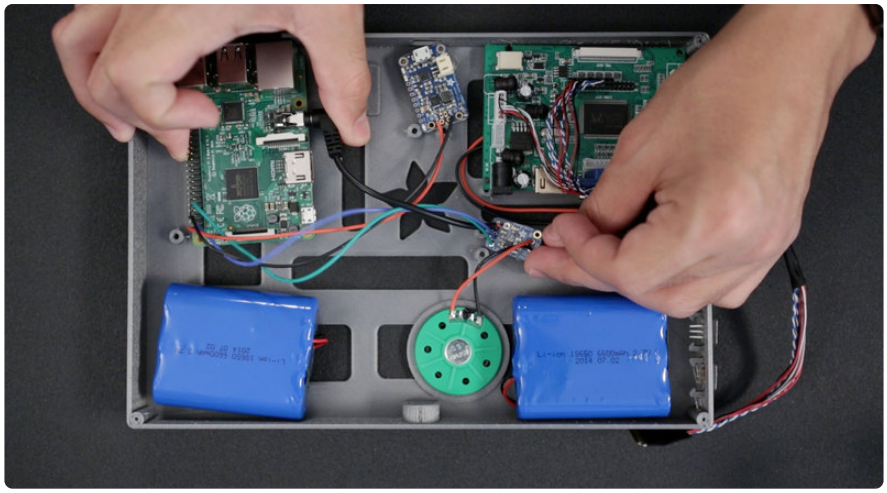



## Solder Audio Cable to Amplifier

Solder the tinned ground wire from the audio cable to the A- pin on the PAM8302.

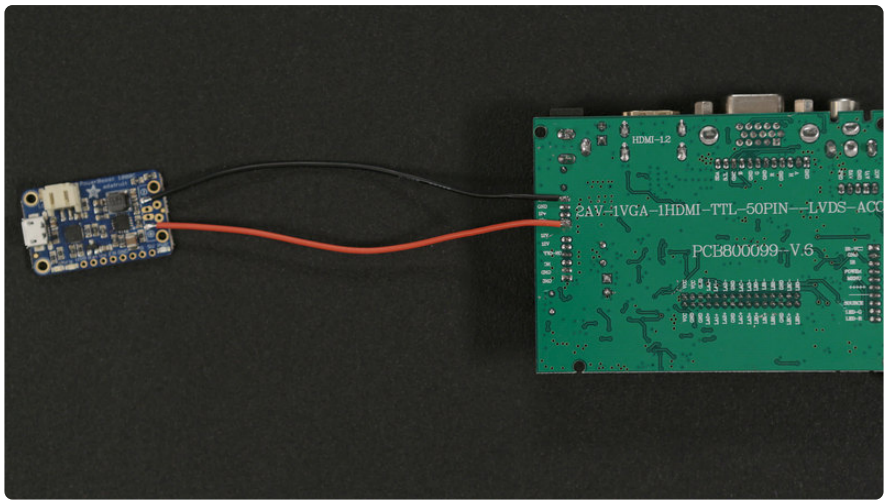
You can solder either the red or white wire to the A+ pin on the PAM8302 (they are the left and right audio channels.)

Red wire **IS NOT** soldered in the photo. Only the white wire.



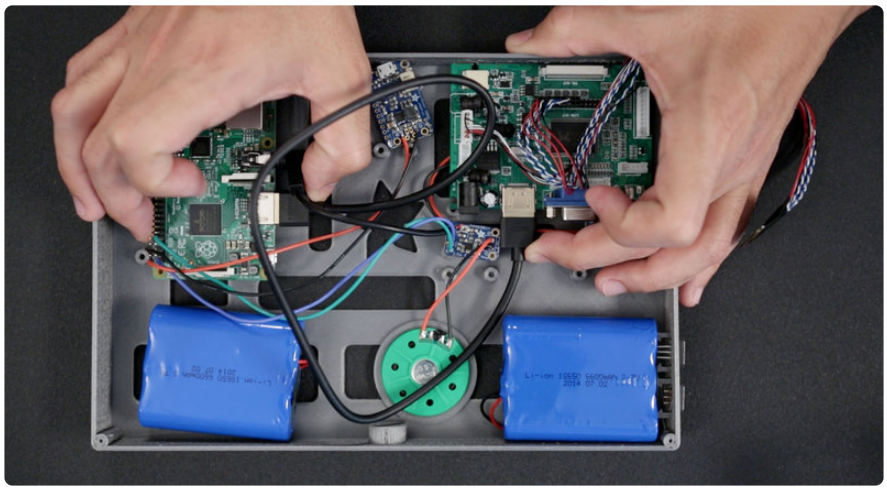
## Plug in audio cable to Pi

Postion and check the audio cable length. You can always solder extra wire if you cut too much off.



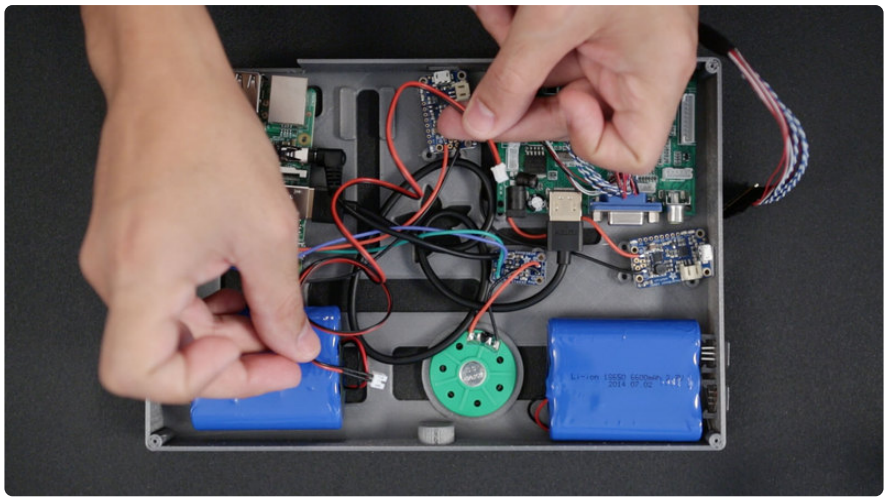

## Solder power and ground to Display Driver

To run the display, we can use a separate PowerBoost100C and 6600mAh battery. Reference the connections to power and ground above and connect to the **+Postive** and **-Negative** pins on the PowerBoost1000C.



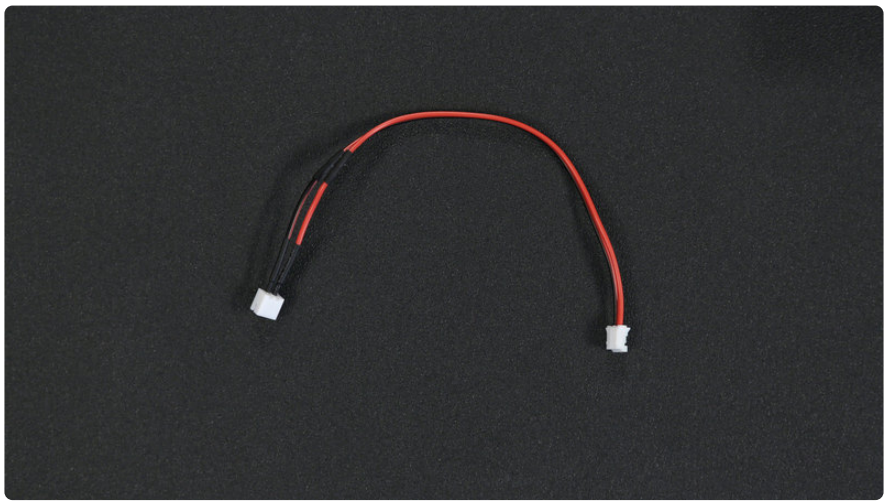
## Connect HDMI

Position the display driver and PowerBoost on the stand-offs. Connect a slim HDMI cable from the driver to the HDMI port on the Pi. Coil the HDMi cable so that it tucks underneath the boards and between the stand-offs.



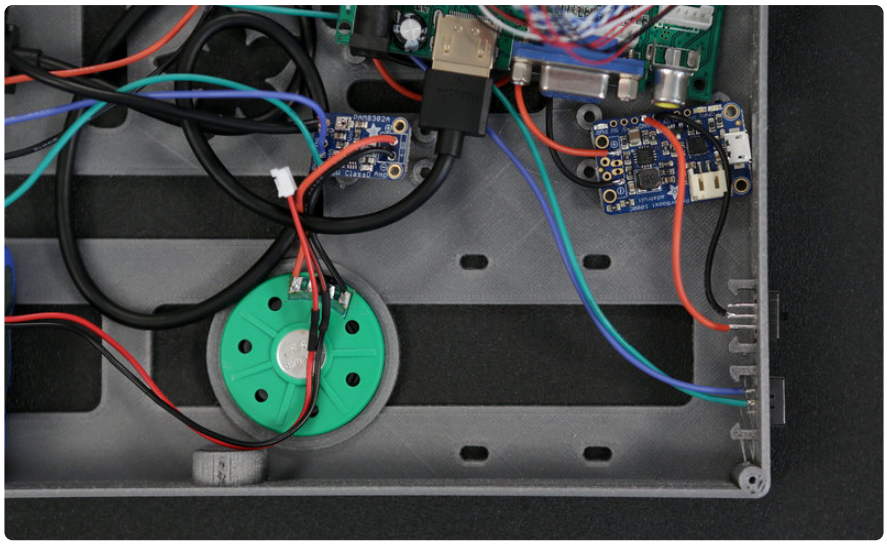
## JST extension

The battery cable for the Pi might not reach the second PowerBoost. Measure and cut a JST extension cable to it help reach the power connector.



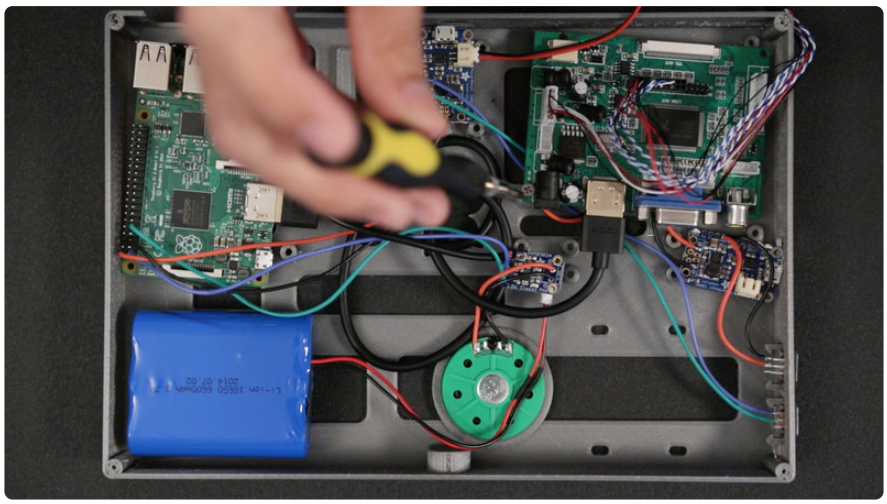
## Shorten JST extension cable

With the desired measurement, cut one the wire short. Strip and tin the ends of the wire to splice them together. Use heat tubing to insultate the exposed connections.



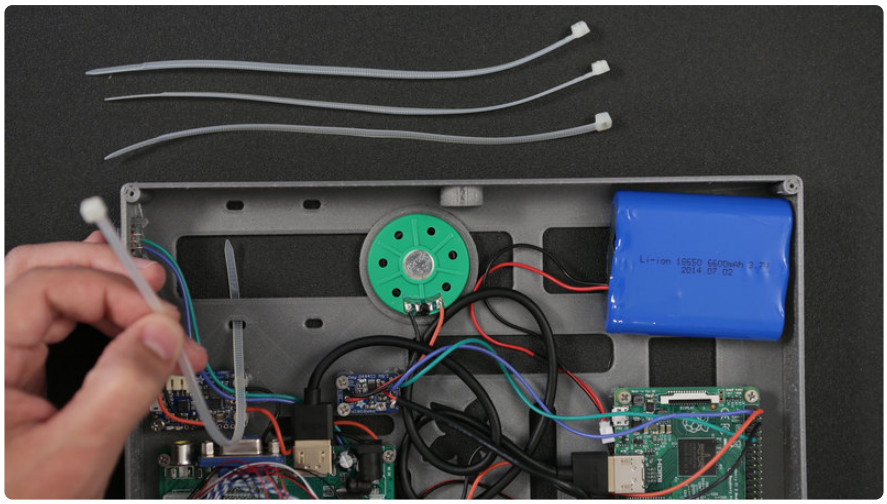
## Slide switch

Measure and cut wires for both of the slide switches. Solder wries to the slide switch first and then insert the switch into each port before soldering to each of the PowerBoost breakouts.



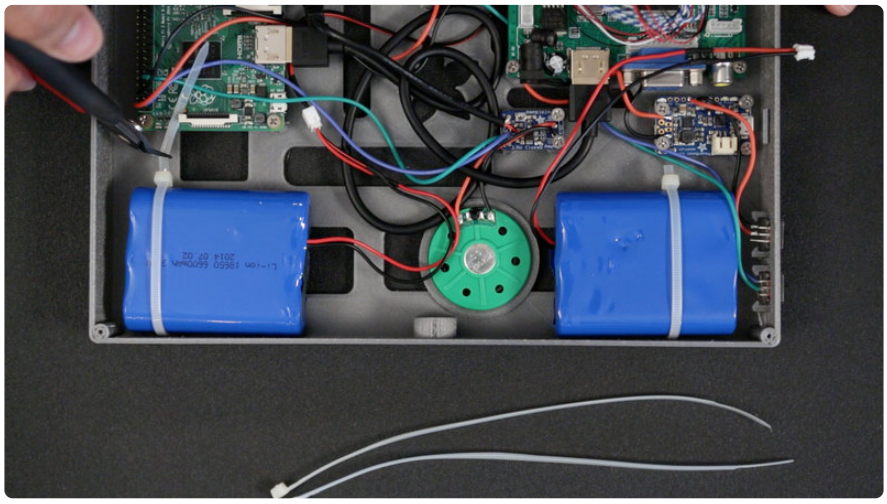
## Mount boards

Use #4-40 3/8 screws to mount each board to its stand-off. To make it easier, we can use dril to tap each board before screwing into the snad-off.



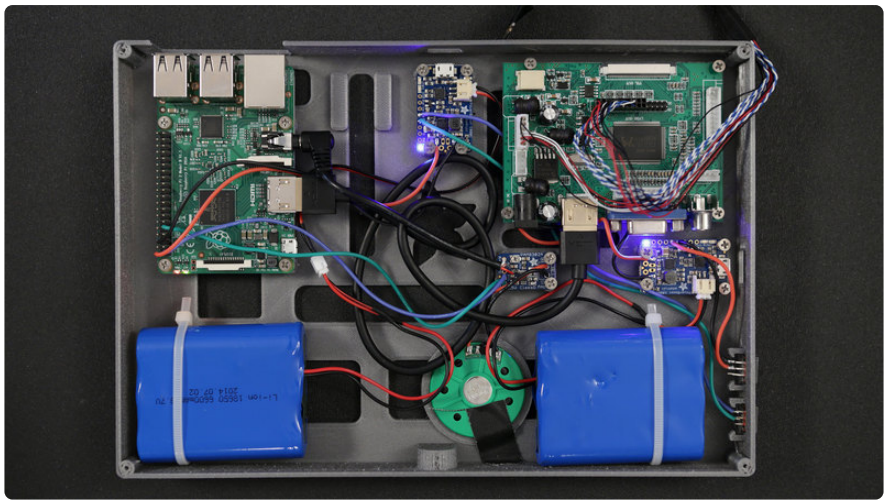
## Zip Tie Batteries

Thread zip ties through the slits. Position the batteries over the enclosure and tighten the zip ties secure the batteries in place.



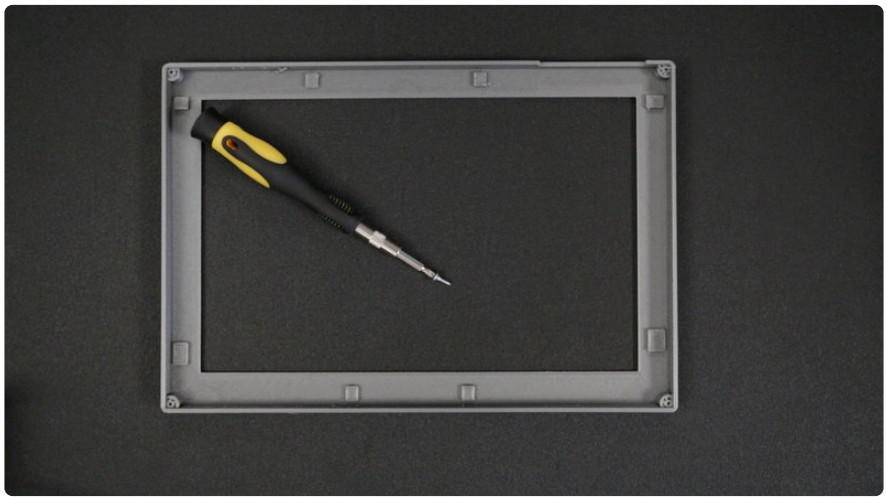
## Trim Zip ties

Cut off the excess from zip ties. Position the locking head near the bottom of the case.



## Power test

Once all of the components are securely mounted, flip power switch on and make sure the connections work.



## Tapping screw threads

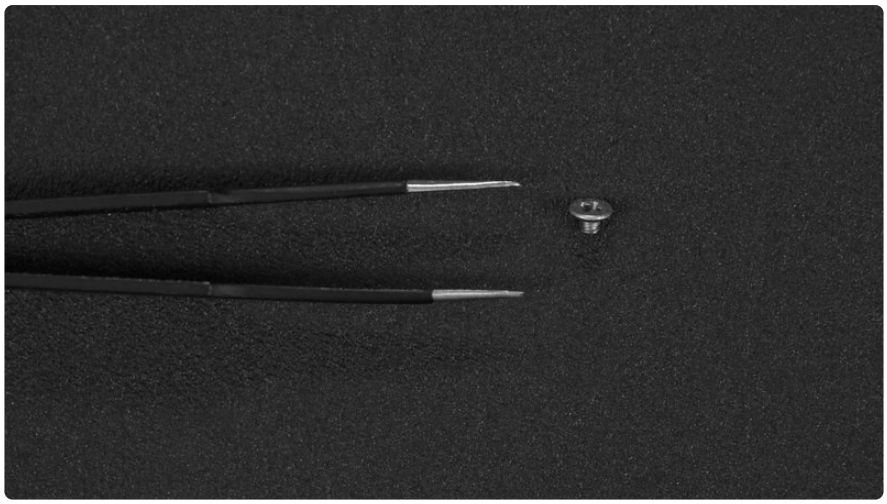
The standoffs on the enclosure frame will need to be tapped. Use a pointy #4-40 wood screw to help puncture through the plastic. Be careful not to make the holes so deep that it pokes through the frame.

## Install Display

Align the display with standoffs on the frame. Make sure the longer tabs match up with the longer elevated tabs on the frame. Mark each hole on all of the tabs and then carfully tap each hole.

## Clean holes

Use flush diagnoal cutters remove excess material left over from tapping the thread. You'll want to make sure the tabs are flush against the display frame.

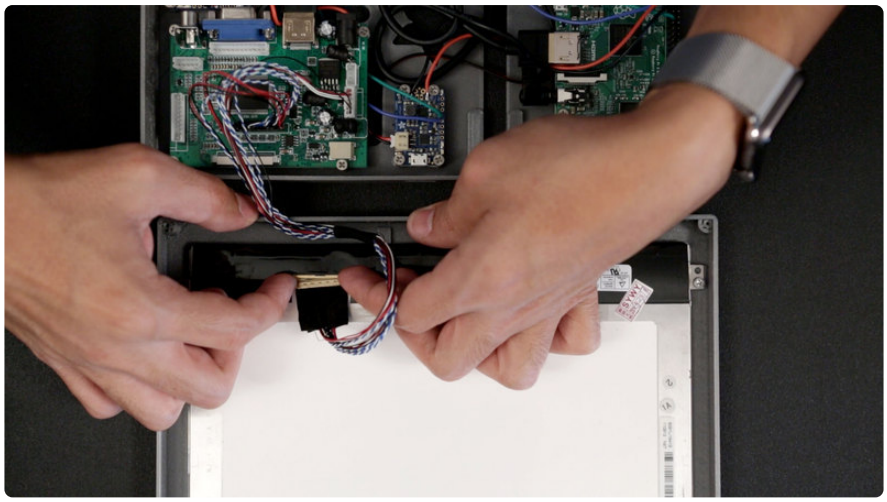


## Screws for Display

The tabs on the display are thin enough to be held in place by short #4-40 1/8 flat phillips machine screws.

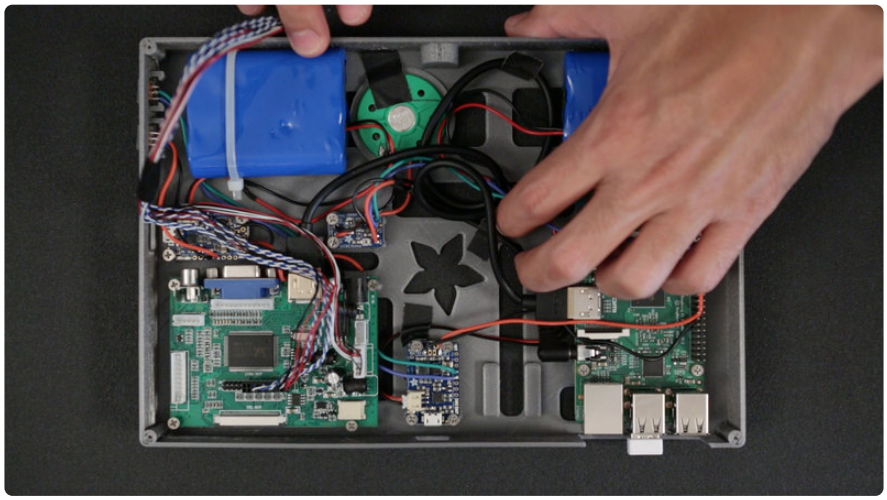
## Display tabs

Mount the display to frame by fastening the screws into the standoffs. If any of the screws pop out, make sure that the hole tapped is deep enough for the screws to have enough material to grip on to.



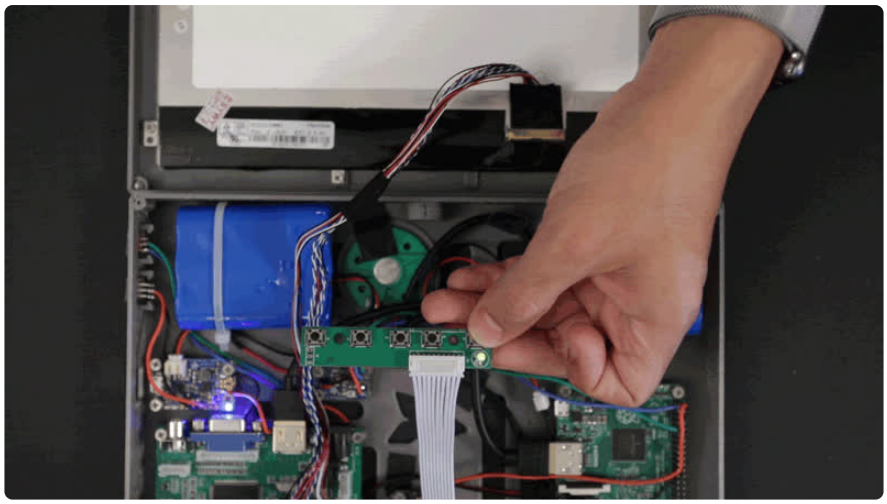
## Connect display

Carefully connect the display to the driver. Arrange the wires so they coil when mounting the display to the case.



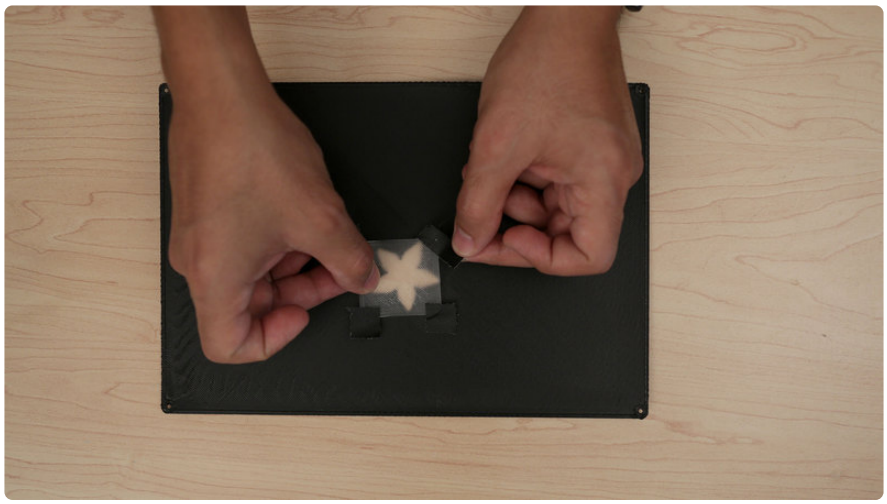
## Arrange wires

The glowing logo cutout works best if the cables are cleared away from covering up the displays backlight. Use gaffers tape to keep wires away from the cutout.



## Display control

Plug in the display controller to turn on the monitor. Set the input to HDMI.
You can disconnect the controller from the driver board to save space. The display will save the input selected on initial start up.



## Diffuser for illuminated logo

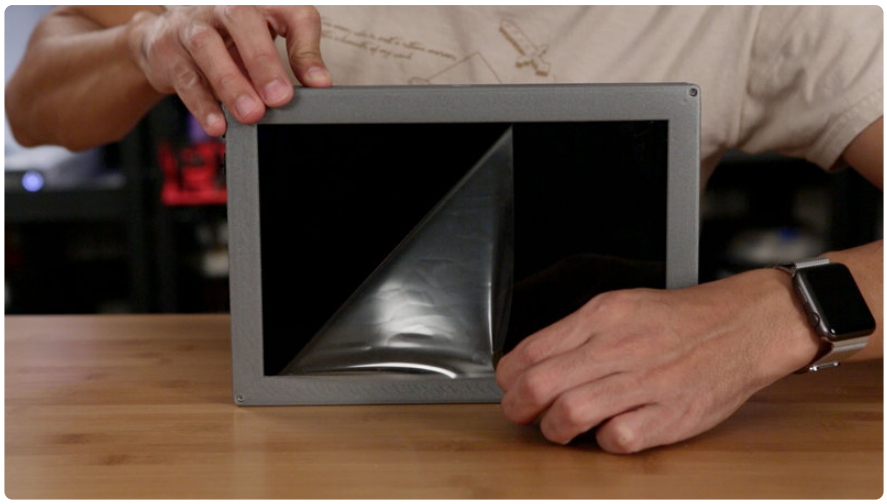
Attach the translucent diffuser part to the inside of the display cover using pieces of gaffer tape.

## Back cover

Align the cover to the back of the case. Use #2-56 3/8 flat phillips machine screws to secure it in place.

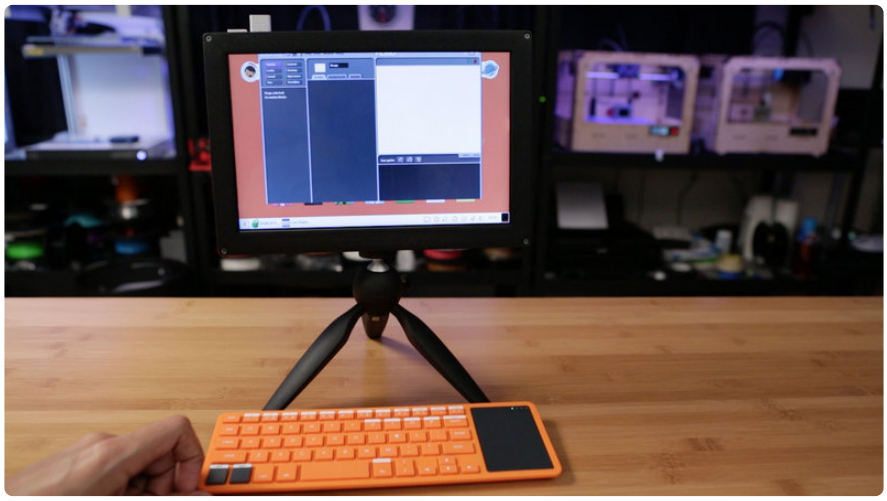
## Install frame

Use four #2-56 3/8 screws to attach the display to the second half of the enclosure.



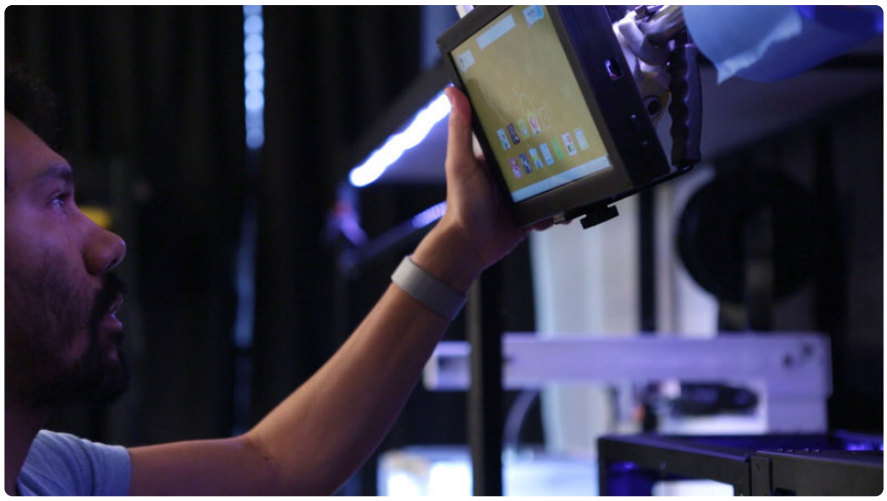
## Remove protective film

Finally, we can remove the plastic film covering on the display. Grip it by the yellow tab and pull it off.



## Tripod attachment

The case is design to sit on any of its sides. You can also attach a 3/8" to 1/4-20 tripod adapter to easily connect it to a tripod!



## Usage

We’re using this project to monitor the bot farm and serve as a dedicated shop computer.

## Recharge the Batteries

Once the lipo batteries have depleted, you can recharge them using a microUSB cable and a power source/adapter. The two microUSB ports on the PowerBoost 1000C are exposed on the side of the enclosure. A yellow LED will light up, indicating charging status. Once the batteries are fully charged, a green LED will light up.