Touch Pi: Portable Raspberry Pi

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https://learn.adafruit.com/touch-pi-portable-raspberry-pi

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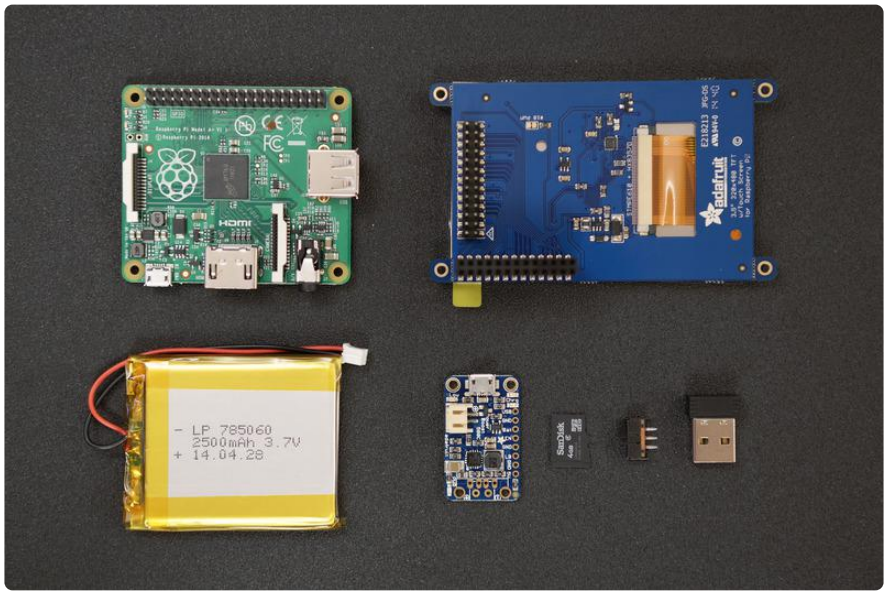
Overview

In this project we're building a portable Raspberry Pi using the model A+, PiTFT 3.5” display, Powerboost 500C and a 2500mAh lithium polymer battery.

We designed this very simple case in CAD - It's a two part enclosure that's fasten together with screws. All the components are panel mounted and fit nicely in a small little enclosure.

This is a great starting point to build on top of, because you can modify the parts to fit your project and reuse any components - It's a very modular design and it's open source so you can make it yours.



Prerequisite Guides

If you're new to the Raspberry Pi, we recommend walking through the following guides.

- Learn Raspberry Pi ()
- Adafruit 3.5" PiTFT ()

Parts

We have all the components to build this project in the side bar and list below.

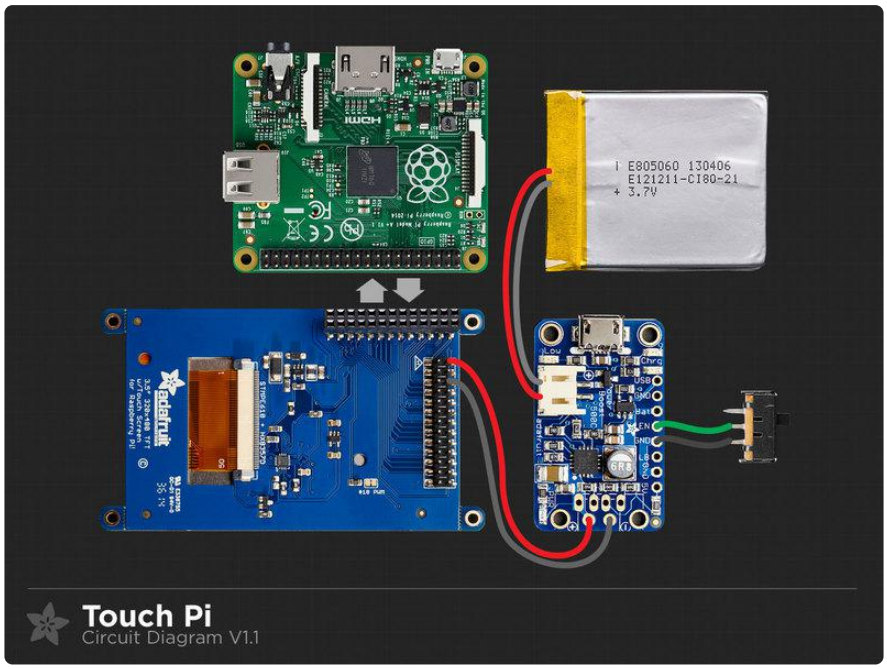
- Raspberry Pi Model A+ ()
- 3.5" PiTFT + Touchscreen (http://adafru.it/2097)
- 2500mAh Lithium Ion Polymer battery ()
- Powerboost 500C ()
- Slide Switch ()
- Miniature Wifi Module (http://adafru.it/814)
- 4GB microSD card (http://adafru.it/102)

Tools & Supplies

We'll need a few hand tools, and few supplies and access to a 3D printer.

- 3D printer () + filament ()
- Soldering iron (http://adafru.it/2163) + solder (http://adafru.it/734)
- Panavise Jr. (http://adafru.it/151)
- Helping third hand (http://adafru.it/291)
- Wire strippers (http://adafru.it/527)
- Flush diagonal cutters (http://adafru.it/152)
- 26AWG silicone cover stranded-core wire ()
- Female/Female jumper wires 40 x 6" ()
- Heat Shrink (http://adafru.it/1649)
- Gaffers tape
- #4-40 3/8 flat Phillips machine screws

Circuit Diagram



Circuit Diagram

Follow the circuit diagram to reference how the components will be connected together. The size of the components and length of wires are not exact - This diagram is meant to be used as a point of reference.

Wire Connections

Slide switch is wired to the EN and GND pins on the Powerboost 500C.

The positive pin from the powerboost is wired to GPIO #2 on the 3.5" PiTFT display. Negative pin is wired to GPIO #6.

The male JST from the 2500mAh battery is connected to the JST connector on the Powerboost500C.

The 3.5" PiTFT display connects to the GPIO header on the Raspberry Pi Model A+.

Configure Display

Easy Install

The PiTFT requires kernel support and a couple other things to make it a nice stand-alone display. We have a detailed step-by-step setup for hackers who want to tweak, customize or understand the PiTFT setup. If you just want to get going, check out the following for easy-install instructions!

Ready to go Image

If you want to start with a fresh image, we have one for Raspbian - click here to download it and install into a new SD card. Unzip and follow the classic SD card burning tutorials ()

Download 3.5" Res Image

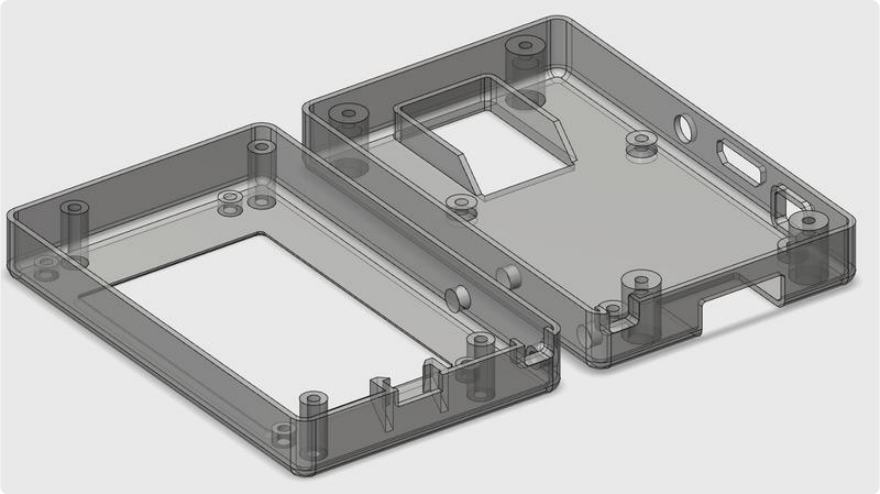
This image is customized for the RESISTIVE touch 3.5" TFT, also known as PID #2097! Not for PID #1601 or 1983

Calibration

For further information on calibration and installation, please visit the Adafruit 3.5" PiTFT guide.

Adafruit 3.5" PiTFT Touch screen

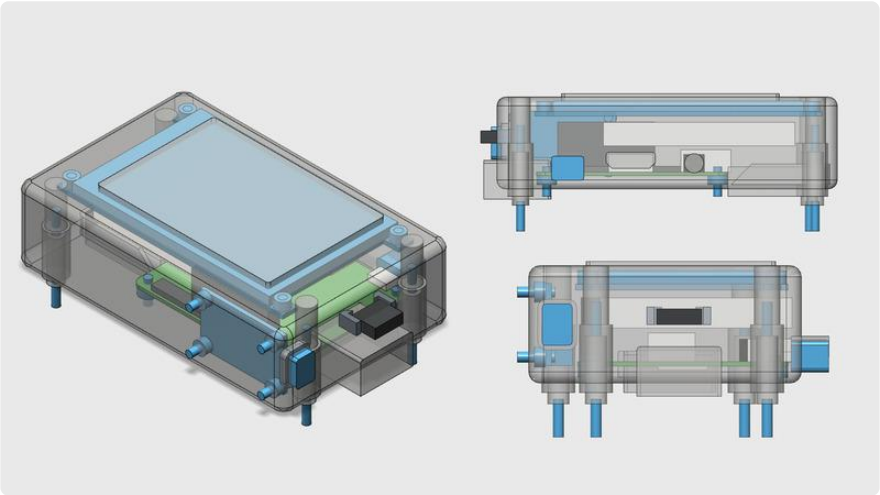
CAD



Ready to print

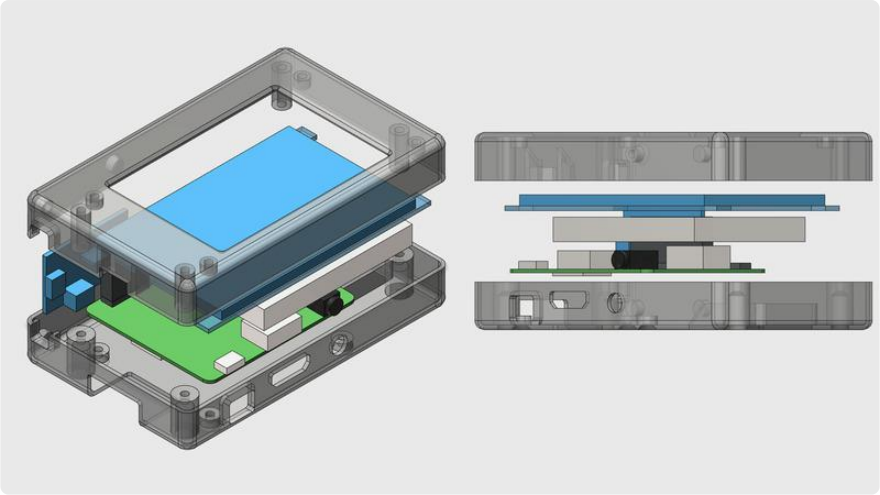
The STL files were optimized to print with no support material on most FDM desktop 3D printers. The parts are oriented in the center of the build area.

Download Files



Open to modify

The 123X and STEP source files are available to download and modify. Parts include original solids that have not been merged. Union boolean parts are also available.

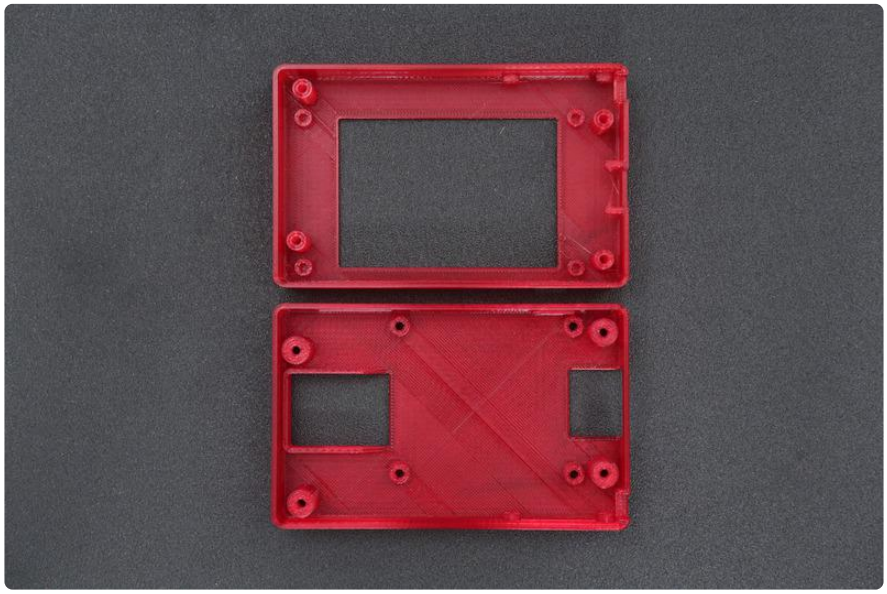


Components

Design include models of components with stand-offs and mounting holes that can be used for reference on other projects.

- Pi A+
- 3.5" PiTFT
- Powerboost 500C
- 2500mAh battery
- Slide switch holder

3D Printing



Download Files

Build Size

115.5mm x, 72.5mm y, 31.5mm z. The parts will fit on all of the open source 3D printers in the Adafruit shop.

Filament

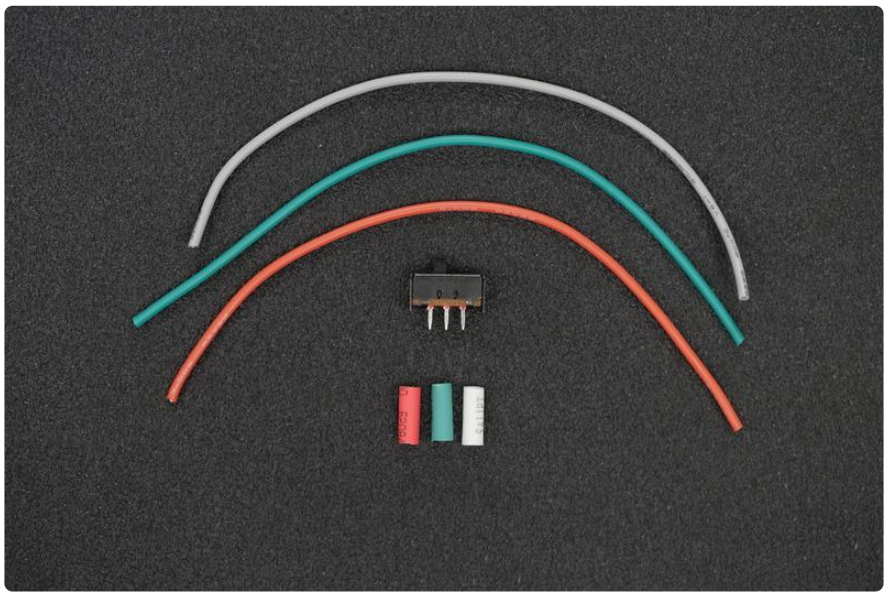
We recommend using PLA filament for minimal warping and best quality. We encourage the experimentation of other filaments like copperFill () and SemiFlex () for special applications.

CURA Slicer Profiles

Our slicer settings for CURA are available to download and import. You can use these profiles as a starting point to dail in your machine.

Get CURA Profiles

Power Circuit



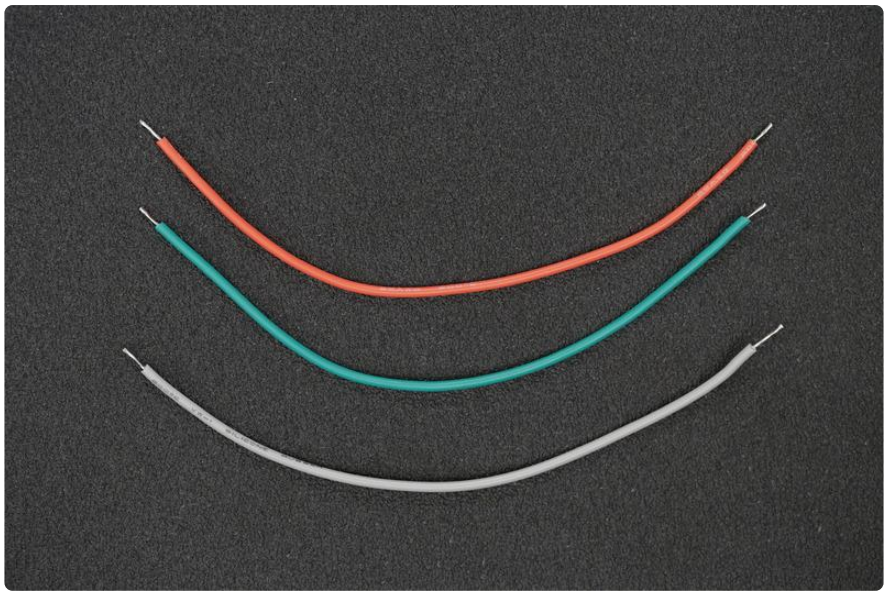
You only need TWO wires for the slide switch. These will connect to EN and GND on the Powerboost.

Prep slide switch

Let's start by measuring three pieces of 26AWG silicone cover stranded-core wire to approximetly 11cm in length. We'll also need three pieces of heat shrink tubing.

Prep wires for slide switch

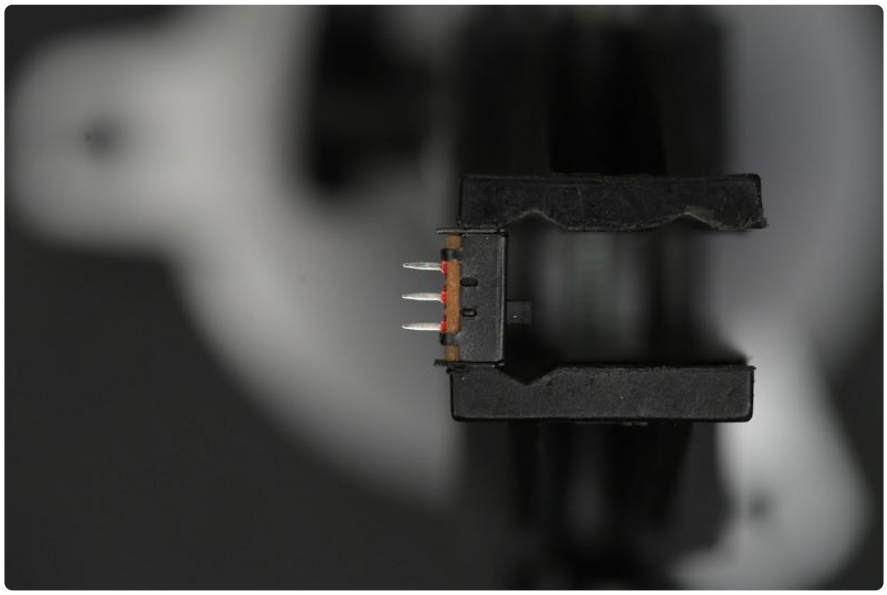
Strip off the ends of each wire using wire strippers. Secure the wire to a helping third hand. Tin the ends of each wire with solder - this will join the strands together.



You only TWO wires, NOT Three!

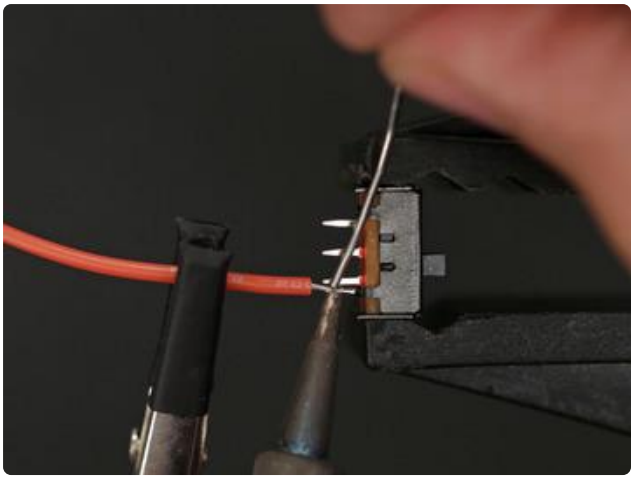
Slide switch wires

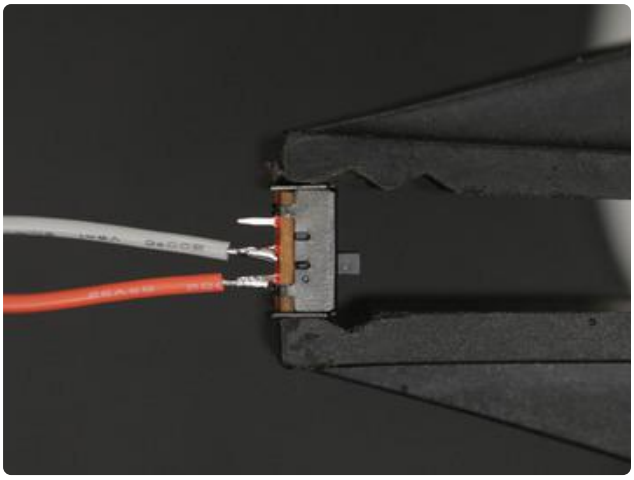
Each wire should have ends stripped and tinned with solder. The colors are nice and help tell connections apart but it's not required - use what ever you have.

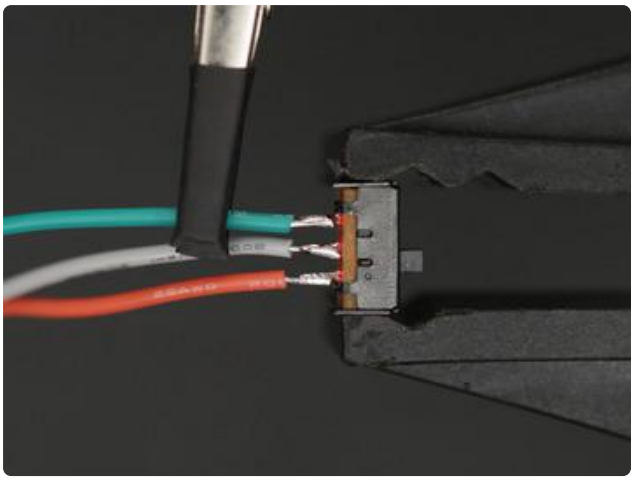


Mount the slide switch to the Panavise Jr.

Place the slide switch into the Panavise Jr. with the terminals facing outward.

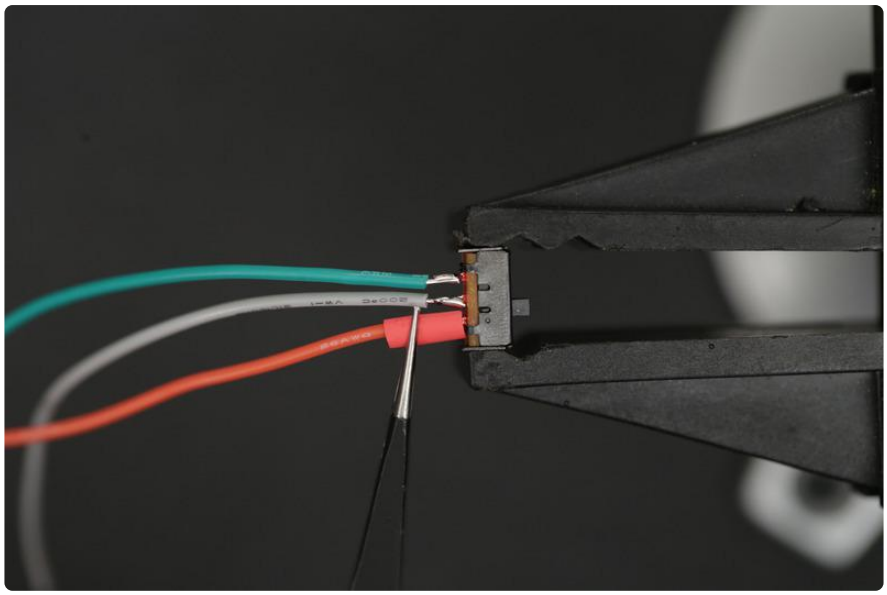






Solder wires to slide switch

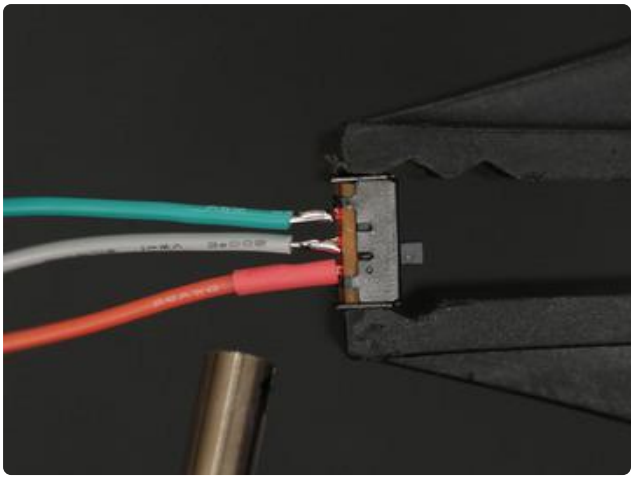
Secure a wire to the helping third hand and position it close to the terminals on the slide switch. Solder the end of wire to terminal. Repeat this for the other two wires and terminals. Ideally you want the red and white wires on the outside - green in the middle.

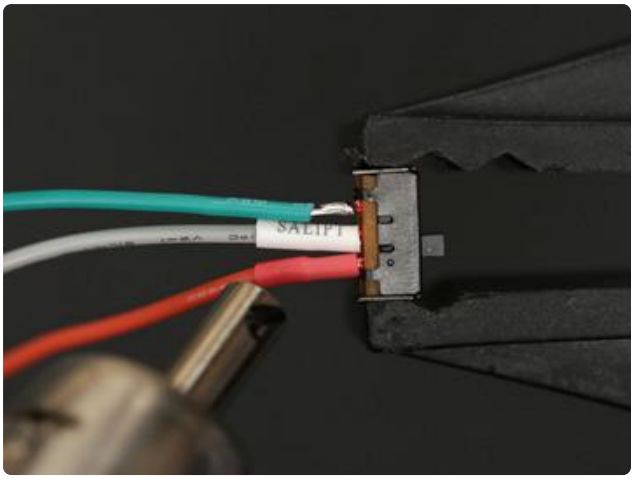


Only TWO wires, NOT THREE!

Add heat shrink tubing

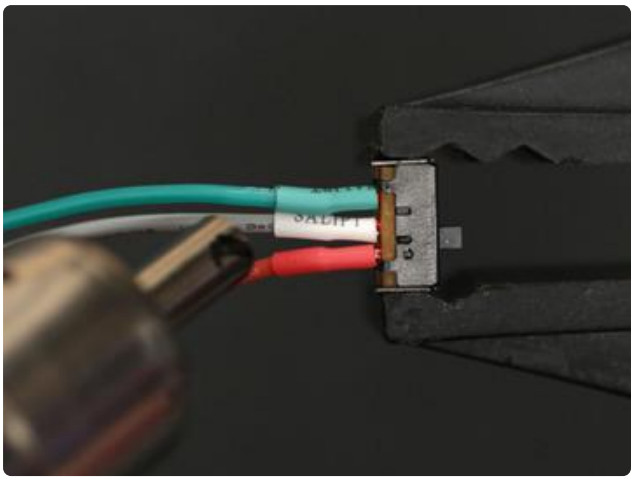
Insert the pieces of heat shrink tubing to each wire.

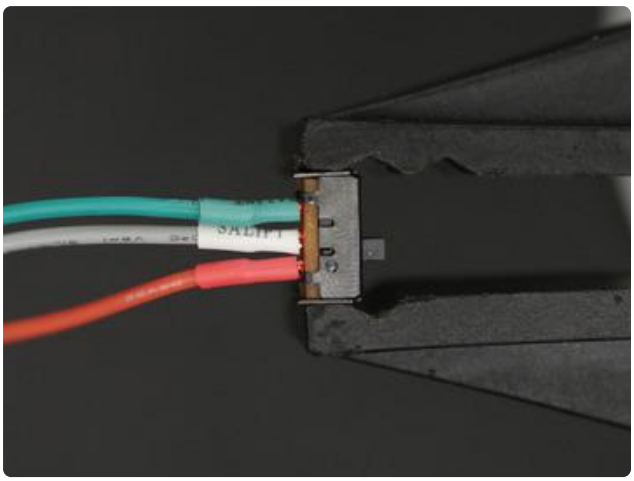


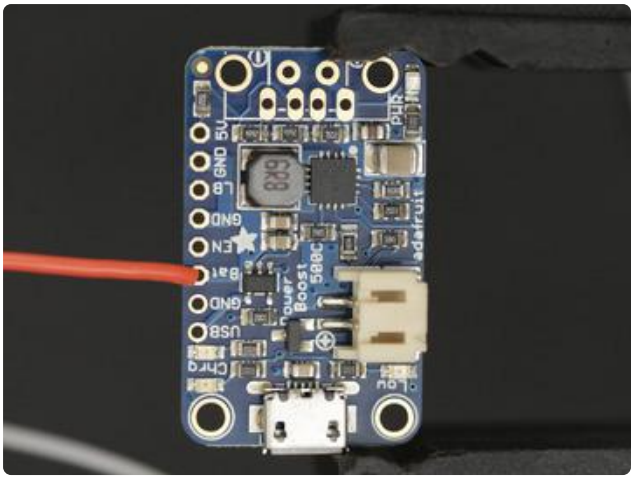


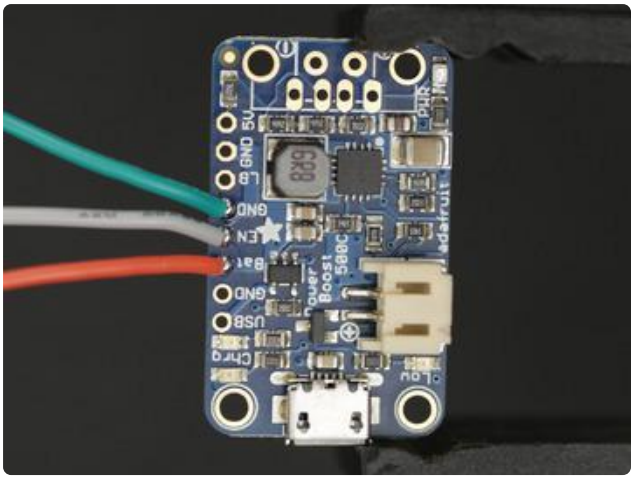
Heat shrink slide switch

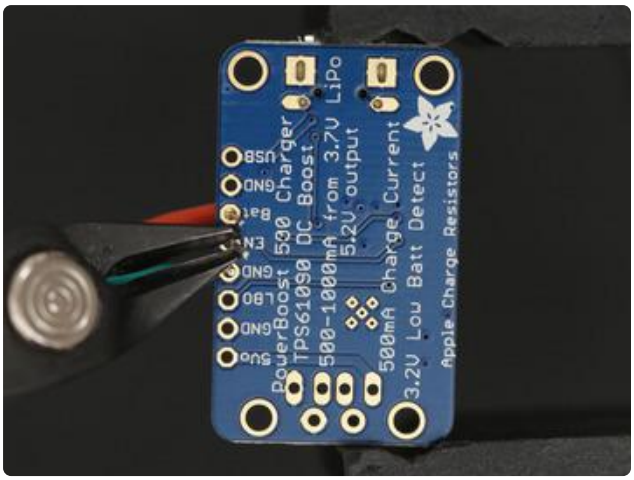
Apply hot air to the heat shrink tubing to secure the exposed soldered wire connection.









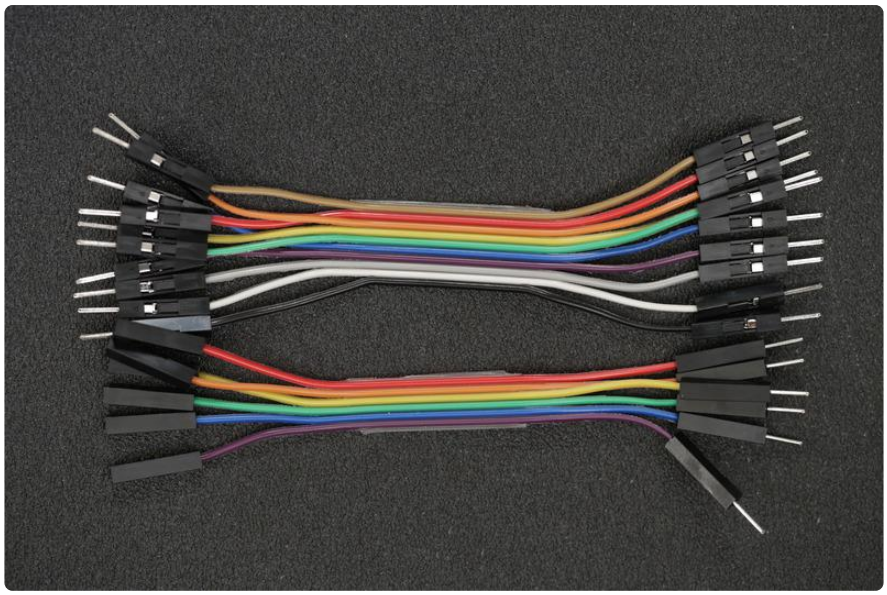


Wire slide switch to Powerboost 500C

Mount the powerboost 500C to the panavise Jr. Insert a wire to END and the other to GND.

Solder wire connections and remove the excess wiring from underneath the PCB with wire cutters.

DO NOT connect any wires from slide switch to BAT!

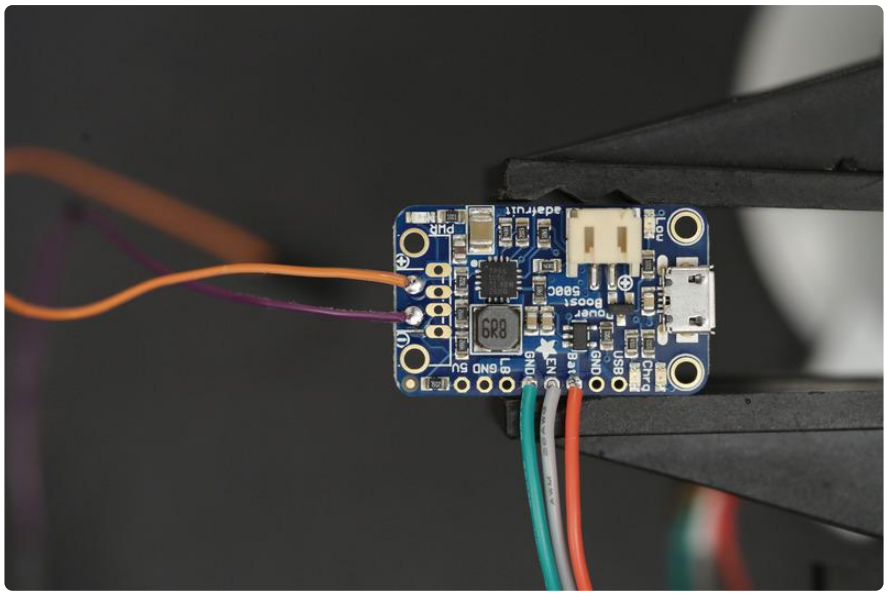


Prep jumper wires

Ideally you want to use longer female/female or male/female jumper wires. 40 x 6" is suffice but the 3" may be too short. In my case I only had shorties so I combined two wires together to make longer cables.

Prep Jumper wires

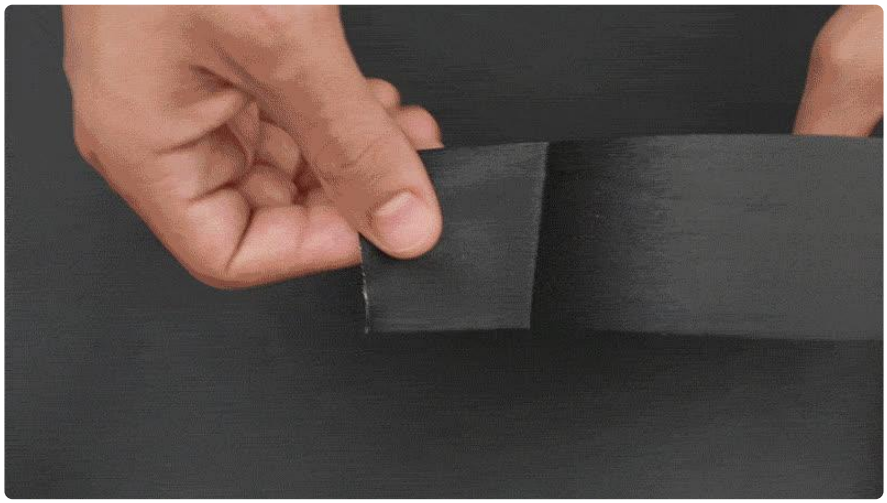
Break off two pieces of jumper wires and cut off the ends from each wire, leaving just one female jumper connector. Strip the ends and tin with solder.



OMG, DO NOT connect any wires from slide switch to BAT on the powerboost.

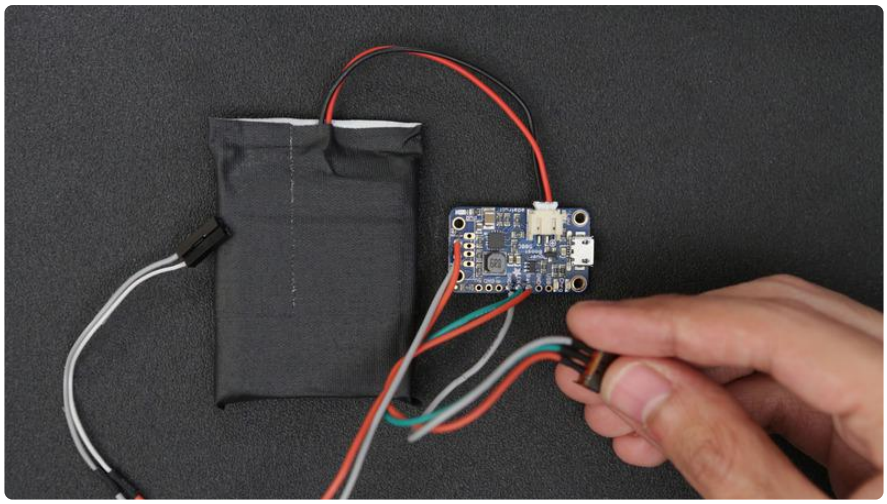
Wire jumpers to Powerboost 500C

Insert the tinned ends of the jumper wires into the postive and negative pins on the Powerboost 500C. Solder wires in place.



Prep Battery

Carefully wrap the 2500mAh lithium polymer in gaffers tape. This will allow for more protection on the surface to prevent it from being punctured.



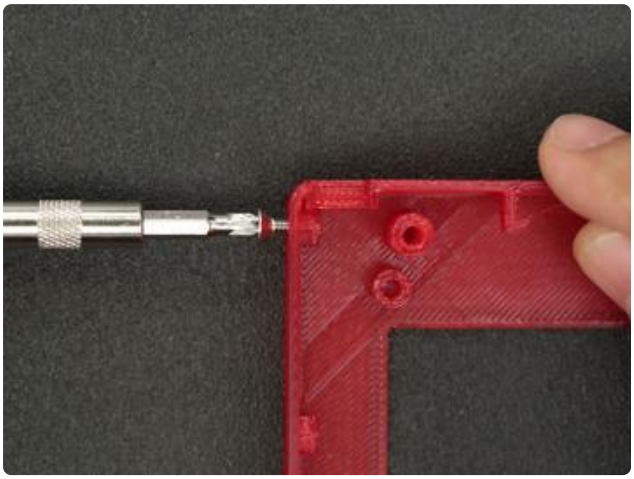
Test Power Circuit

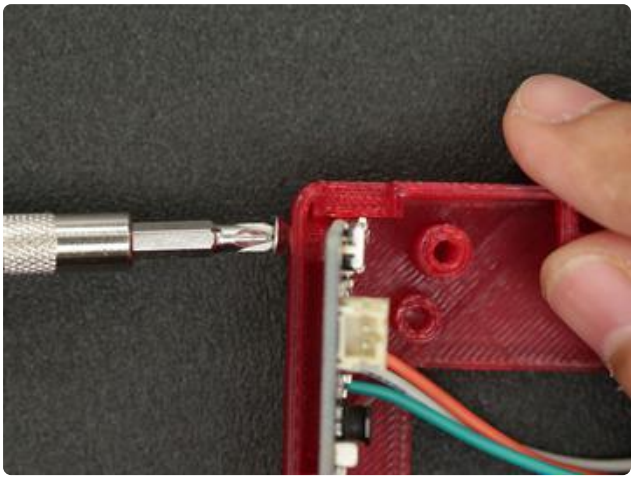
Plug in the JST connector from the battery to the JST port on the Powerboost 500C. The blue LED should turn on.

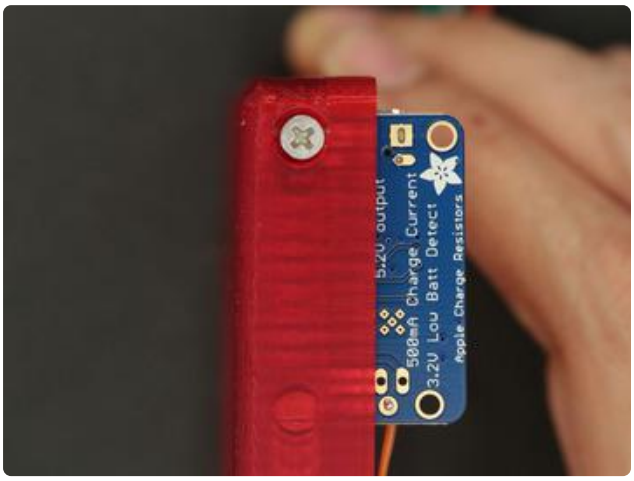
If the LED does not turn on, double check your wiring.

That's it for the power circuit! The next pages will walk through mounting the components to the enclosure.

Mounting Components



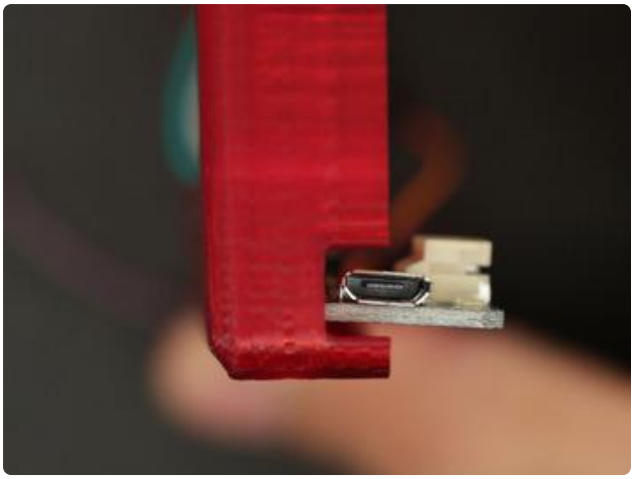


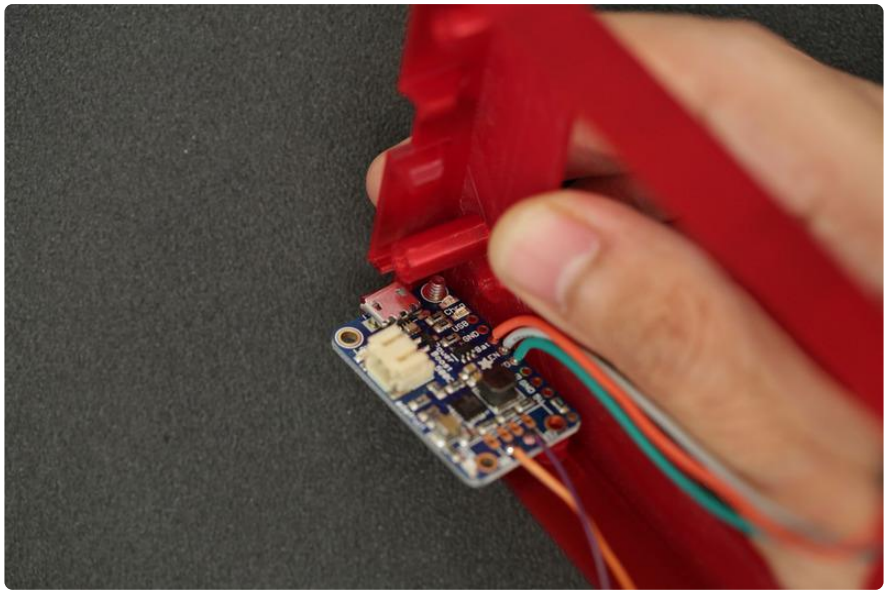


Install Powerboost 500C

Insert and fasten a #4-40 3/8 flat Phillips machine screw into the top enclosure with the single hole on the side - don't fasten all the way, just until it gets through the stand off.

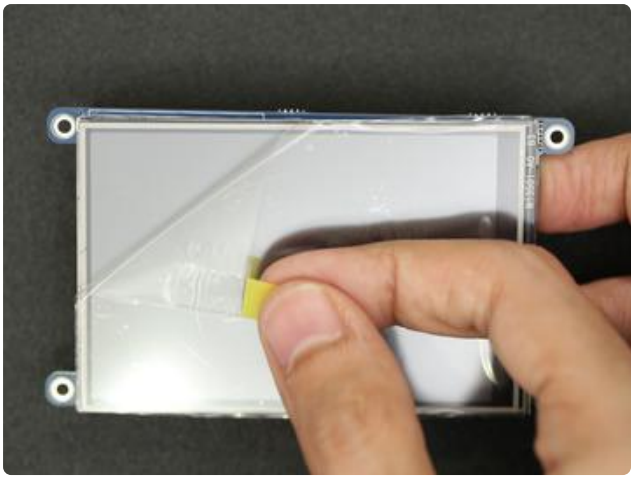
Place the powerboost 500C PCB into the top enclosure part and line up the mounting hole with stand off. The micro USB charging port should be facing towards the cut out.

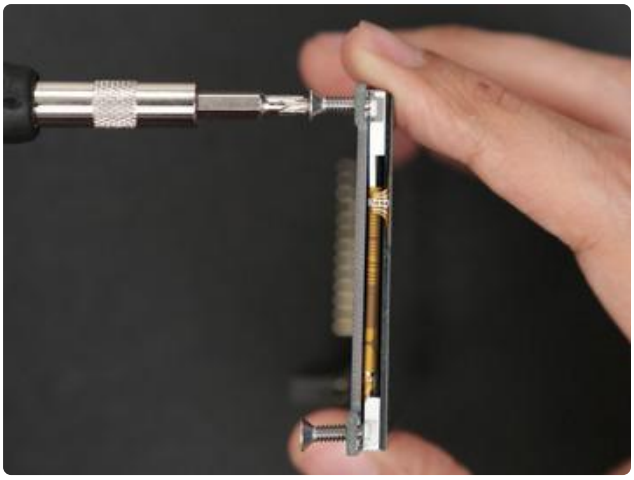


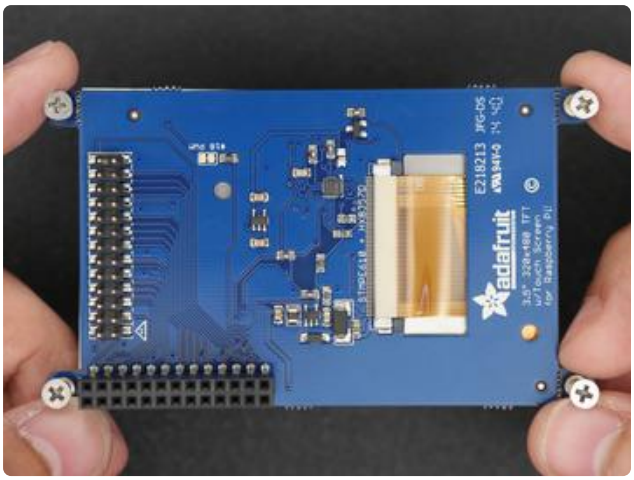


Mounted Powerboost 500C

The PCB is mounted to the top enclosure part with a single screw. Fasten the screw all the way until it's flush with the enclosure.



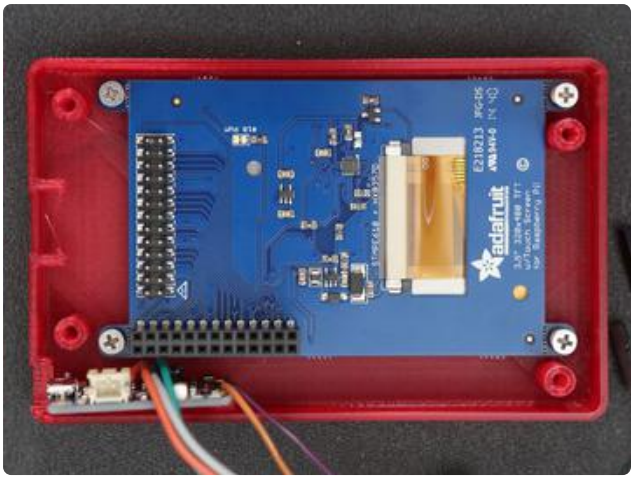


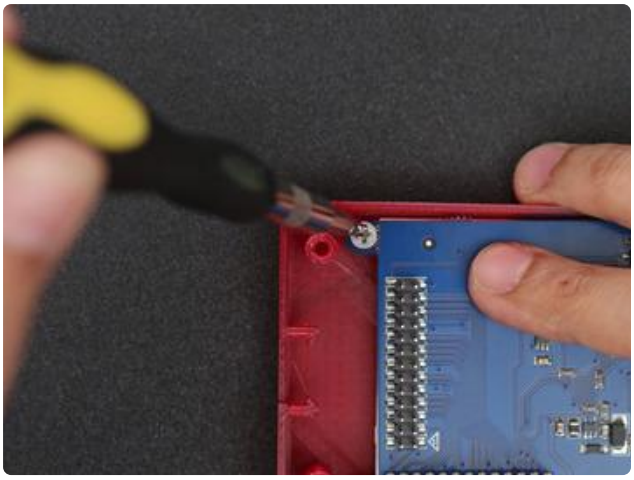


Prep Display

Peel back the corner of the protective cover - this makes it easier to remove once its installed.

Insert four #4-40 3/8 flat Phillips screws into the 3.5" PiTFT mounting tabs with the screw going through the blue PCB side.

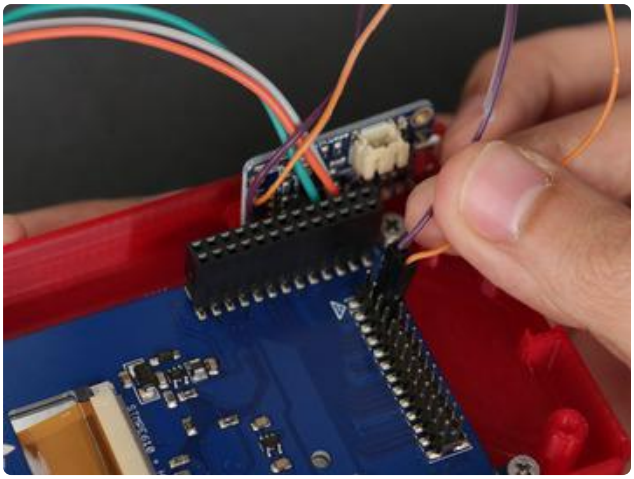


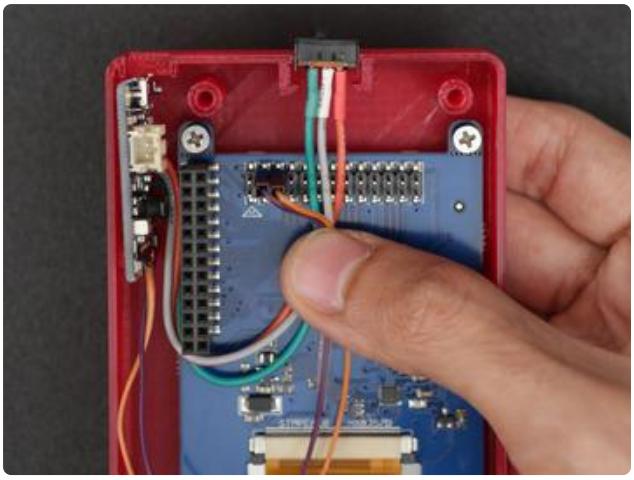


Install Display

Place the 3.5" PiTFT into the top enclosure part with the screen facing the large cut out. The GPIO socket should be near the powerboost 500C.

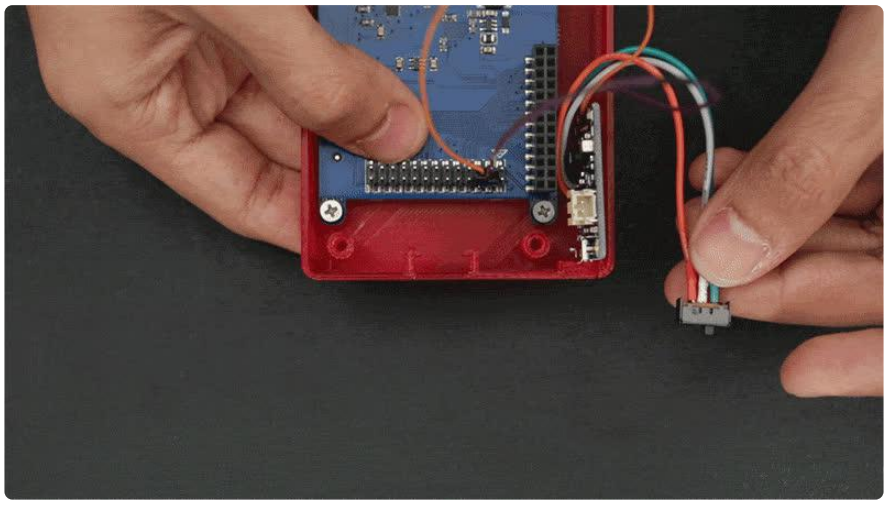
Line up the tabs with the stand offs and mounting holes. Fasten the four screws until they secure the display to the enclosure - Don't fasten all the way, it will start pushing the screen away from the enclosure.





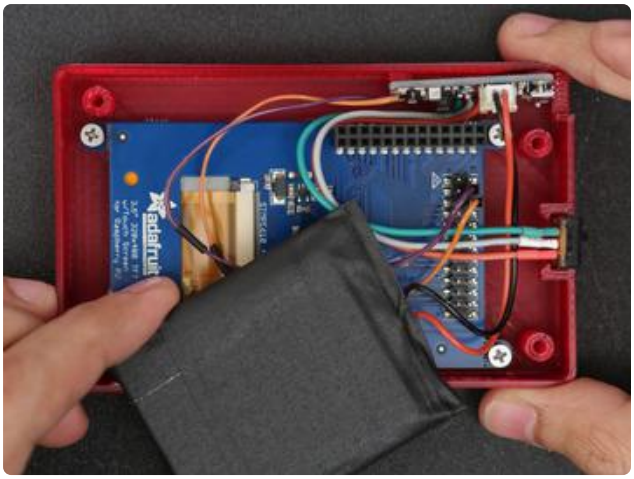
Connect Powerboost 500C to 3.5" PiTFT

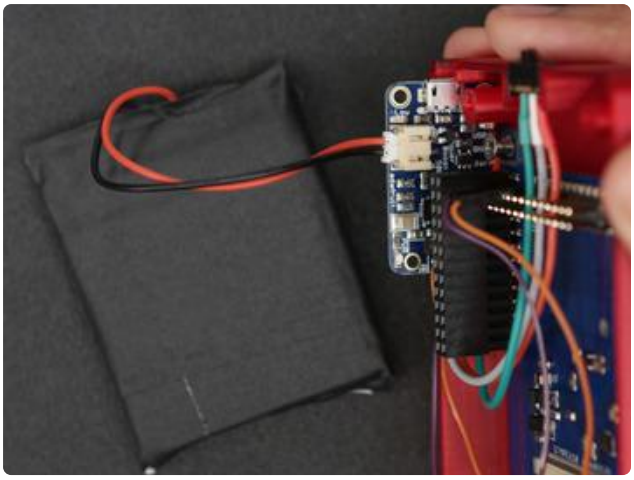
Plug in the negative jumper wire to GPIO #6 on the 3.5" PiTFT GPIO. Connect the postive jumper to GPIO #2.



Install slide switch

Place the slide switch into the cut out with two clips. Wrap the wiring around the socket header and through the GPIO pins. Insert the slide switch into place.

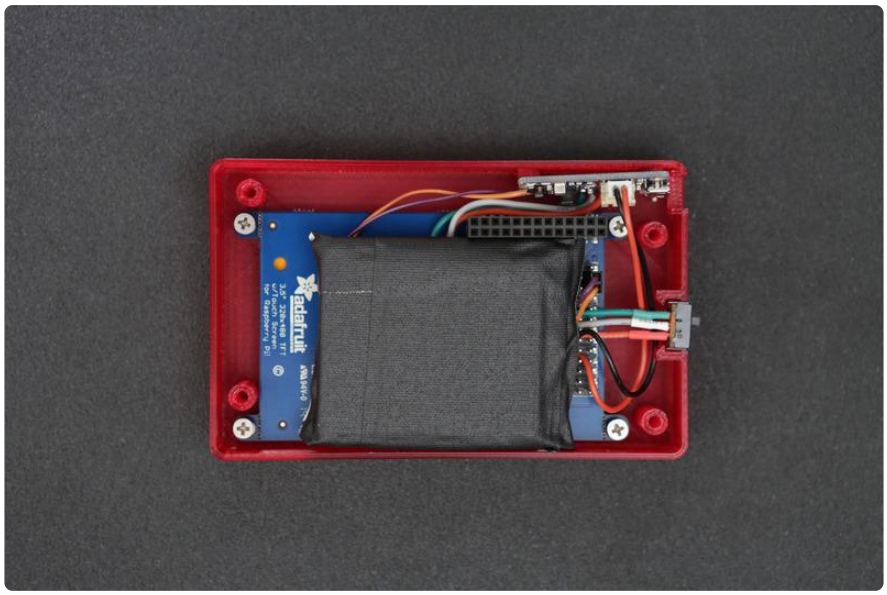




Connect Battery

Plug in the JST connector from the 2500mAh battery into the JST port on the Powerboost 500C.

Place the battery on top of the 3.5" PiTFT away from the GPIO socket and header.

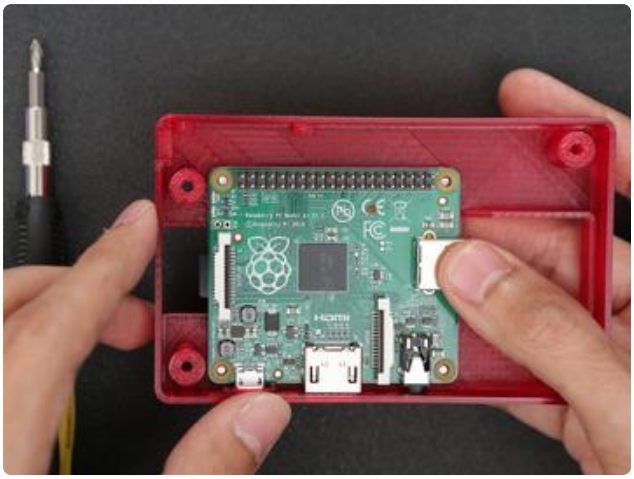


Installed Battery

The 2500mAh lipo battery can rest over the wiring. The JST cable is behind the slide switch in this case. The battery should stay in place once the Raspberry Pi A+ is plugged in.

Install screws

Insert four #4-40 3/8 flat Phillips into the bottom enclosure part. Fasten until the screw threads are protruding through the stand off.



Install Pi A+

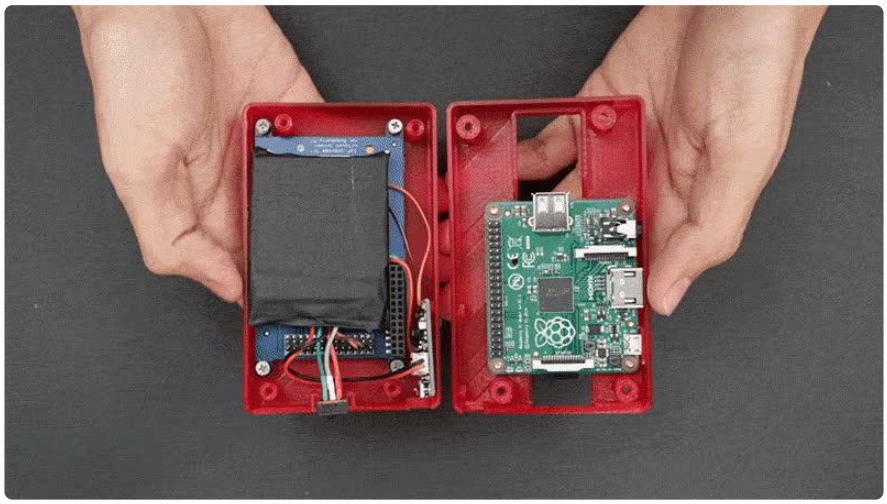
Place the Raspberry Pi A+ on top of the enclosure part with the mount holes lined up with the stand offs. Ensure the Pi is oriented with the ports facing the cut outs.

Mounted Componented

All of the components should be mounted to the enclosure parts. Double check your wiring and ensure there are no kinks.

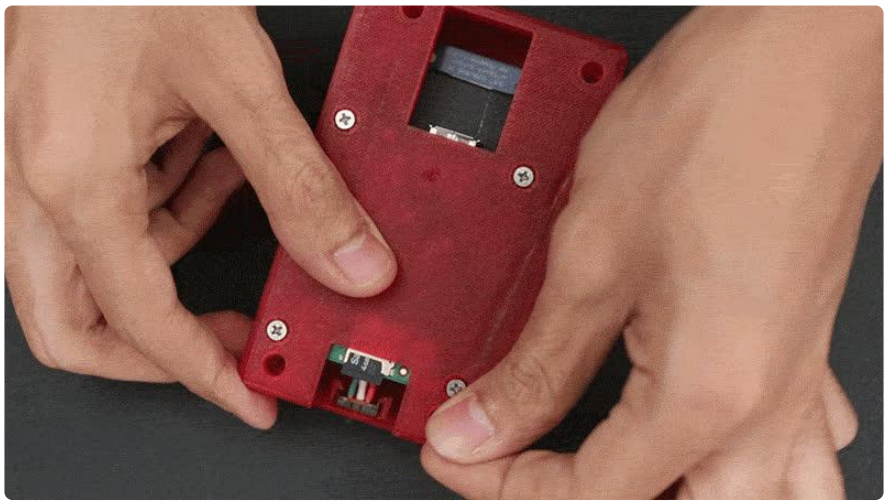
In the next steps we'll close everything up!

Closing Enclosure



Close Enclosure

Position the two enclosure parts and carefully join the Raspberry Pi A+ GPIO header with the socket on the 3.5” PiTFT display. Double check to ensure the all pins are goin into the socket properly - Press them firmly together.



Install screws

Insert four #4-40 3/8 flat Phillips into the bottom enclosure part with the recessed stand offs. Fasten until screw reaches through stand off.

Boot Test

Turn on the Powerboost 500C with the slide switch to test the circuit. The Raspberry Pi A+ should boot.

Finished Touch Pi

And thats it! Now we have a portable Raspberry Pi with touch screen. The battery can be recharged using microUSB. The microSD card, USB, HDMI, audio jack and microUSB port are accessible. The device can be tethered to USB power for extended use cases.