



7" Portable Multitouch Raspberry Pi Tablet

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Overview

Portable Raspberry Pi Tablet

In this project, we'll show you how to build a portable Raspberry Pi 2, using a 7" capacitive multitouch display, an Adafruit PowerBoost 1000C and a 2500mAh battery. Our 3D printed enclosure fits all of the components making an all-in-one, compact Raspberry Pi tablet.

7" Multitouch Display

In this build, we're using the official 7" multitouch display from the Raspberry Pi foundation. It features a beautiful IPS display and includes the drivers to work on a Raspberry Pi 2.

The 3D printed enclosure gives you access to all of the ports. Instead of stacking all of the boards on top of each other, this design allow the components to be spread out, making a slim package.



Parts List

Below is a list of parts used in this project. You can optionally choose to make it portable by including an Adafruit PowerBoost 1000c and a 2500mAh lithium polymer battery. You will also need some hardware screws to mount the components to the enclosure.

- [Pi Foundation PiTFT - 7" Touchscreen Display \(http://adafru.it/2718\)](http://adafru.it/2718)
- [Raspberry Pi 2 Model B \(http://adafru.it/2358\)](http://adafru.it/2358)
- [200mm Flex Cable for Raspberry Pi \(http://adafru.it/1647\)](http://adafru.it/1647)
- [Adafruit PowerBoost 1000C \(http://adafru.it/2465\)](http://adafru.it/2465)
- [2500mAh Lithium Ion Polymer Battery \(https://adafru.it/enl\)](https://adafru.it/enl)
- [SPDT Slide Switch \(https://adafru.it/drN\)](https://adafru.it/drN)

Tools & Supplies

Here's a list of tool used to get this project completed. If you don't have access to a 3D printer, you can send your parts to [3DHubs.com \(https://adafru.it/efH\)](https://adafru.it/efH) to have them printed and shipped to you.

- 3D Printer (<https://adafru.it/fUw>)
- Filament (<https://adafru.it/enm>) (ABS, PLA, etc.)
- Wire Strippers (<https://adafru.it/dDI>)
- Screwdriver (<https://adafru.it/f76>)
- Soldering Iron (<https://adafru.it/ide>)
- 26 gauge Silicone stranded-core wire (<https://adafru.it/egK>)
- M3 x .5 x 6M screws (<https://adafru.it/iNB>)
- #2-56 3/8 machine screws (<https://adafru.it/iNC>)



3D Printing



Three of four parts are photographed. Use the table below to reference parts

<https://adafru.it/iND>

<https://adafru.it/iND>

Printing Settings

Use the settings below for reference. The parts were test printed on the Ultimaker 2, Type A Machines Series 1 and the FlashForge Creator Pro. We used Simplify3D to slice the parts using our custom profiles. You can download our profiles for Simplify3D below.

<https://adafru.it/ikd>

<https://adafru.it/ikd>

7inTouchCase.stl	230c Extruder	about 6 hours to print all parts.
7inTouchLid.stl	2mm Retraction	
7inTouchFrame.stl	10% infill	
7inTouchBat.stl	2 Shells	
	60mm/s print speed	
	90mm/s travel speed	

Customize Original Design

The parts were designed in Autodesk Fusion 360. The design has been made public, and available to download in different formats if you'd like to use a different CAD software package.

<https://adafru.it/uBR>

<https://adafru.it/uBR>

Materials

We recommend using PLA material to reduce warping while printing. Although the parts can be printed in different types of filament, such as copperFill, bambooFill, ABS, PET and Nylon.

Tolerances

The parts were tested with common printing settings (listed in the table). With a parameter of 2 shells, there's only a few areas where tolerances really matter - 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.

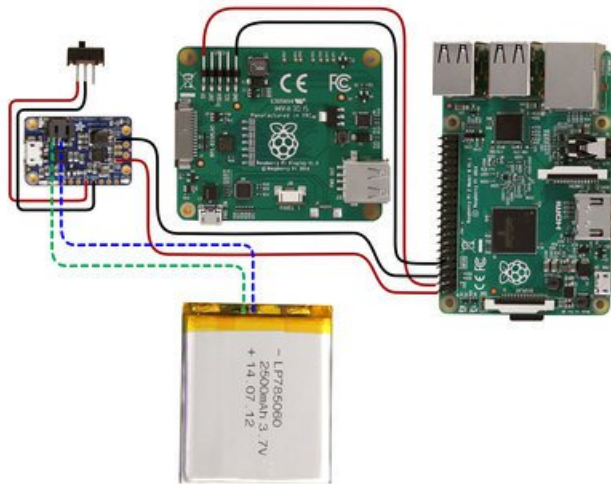
Bed Leveling

Any parts with large surface require a well leveled build plate. If you're using a heated bed, you can minimize warping. Blue 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.

Circuit Diagram



The Circuit Diagram

PowerBoost1000C

The slide switches connect to the **EN** and **GND** pins the Adafruit PowerBoost1000C.

The 2500mAh batteries plugs into the **JST** connector on the PowerBoost1000C. You can charge the battery by connecting a microUSB cable.

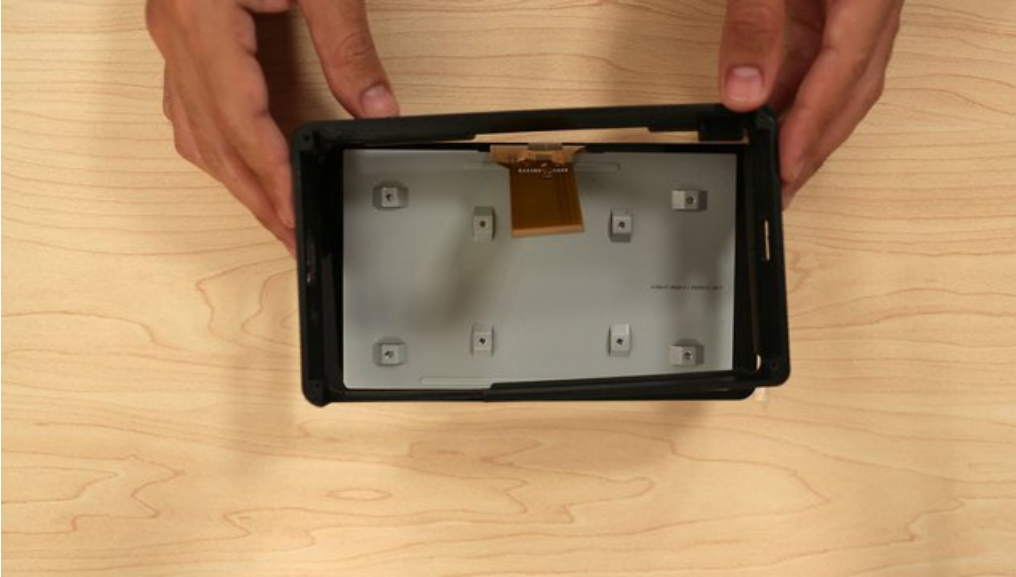
Raspberry Pi 2:

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

Display Driver:

+Positive and **-Negative** pins on the Driver Board connect from **5V** and **GND** labeled on the Display Driver to the Pi on GPIO pins **#4** for **Power** and **#9** for **Ground**

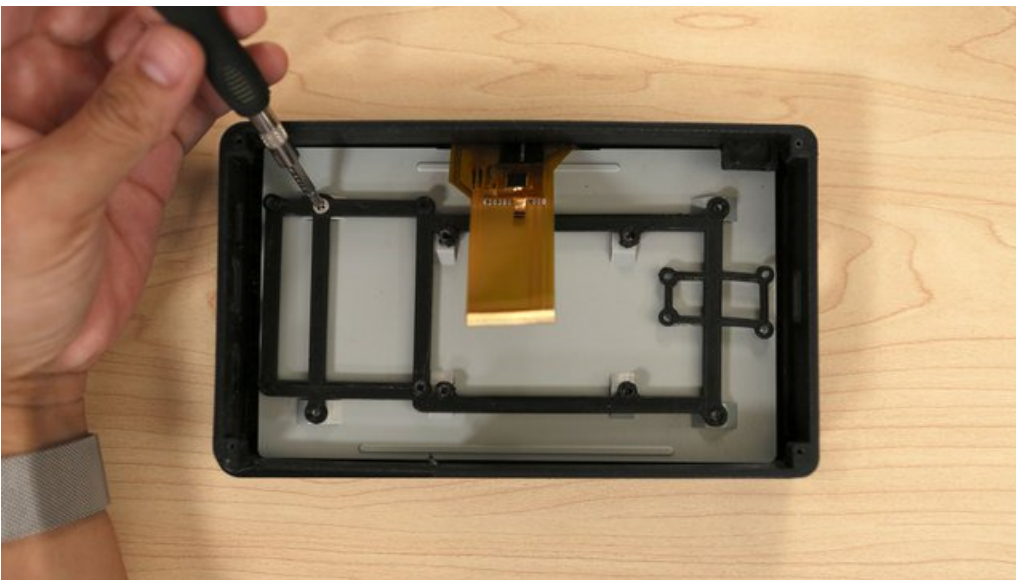
Assembly



Mount Case to Display

The enclosure casing can be mounted to the back of the display by attaching the tabs to the edge of the screen.

Place the frame over the display and line up the opening with the ribbon cable. Carefully bend the frame to fit the tabs onto the display.

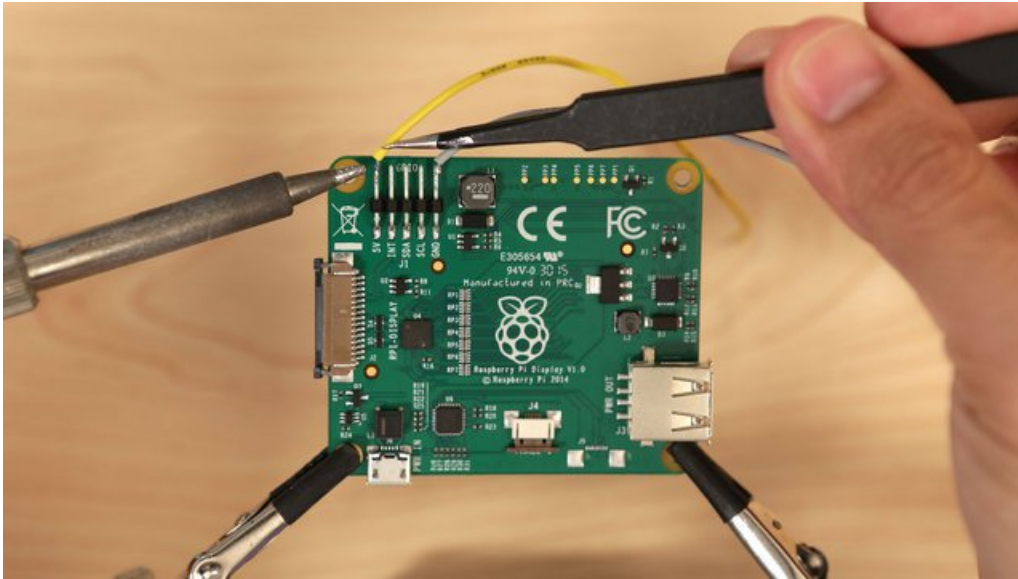


Mount frame to display

The frame bracket is mounted to the back of the display and spreads the boards out to keep the enclosure compact.

Place the frame over the back of display and line up mounting holes.

Insert and fasten four M3 x .5 x6M flat Phillips screws into the frame to secure it to the back of the display.

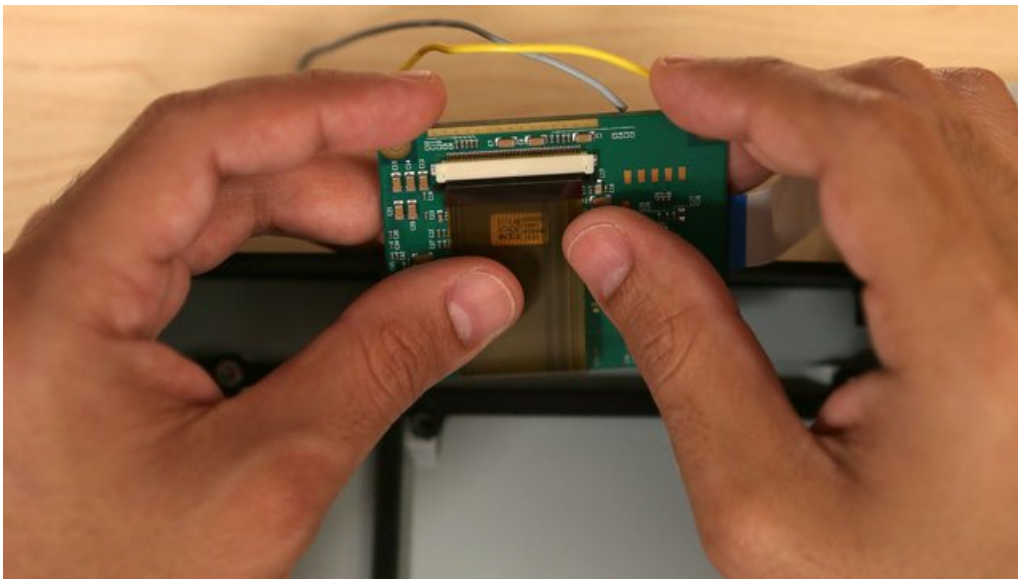


Solder wires to Display Driver

Measure and cut two 26AWG silicone-coated stranded wires. Strip and tin the tips of each wire.

Use a pair of helping-third hands to secure the display drive. Tin the pins labeled **5V** and **GND** on the display driver.

Solder one wire to the pin labeled **5V** for power. Solder the other wire to **GND**.



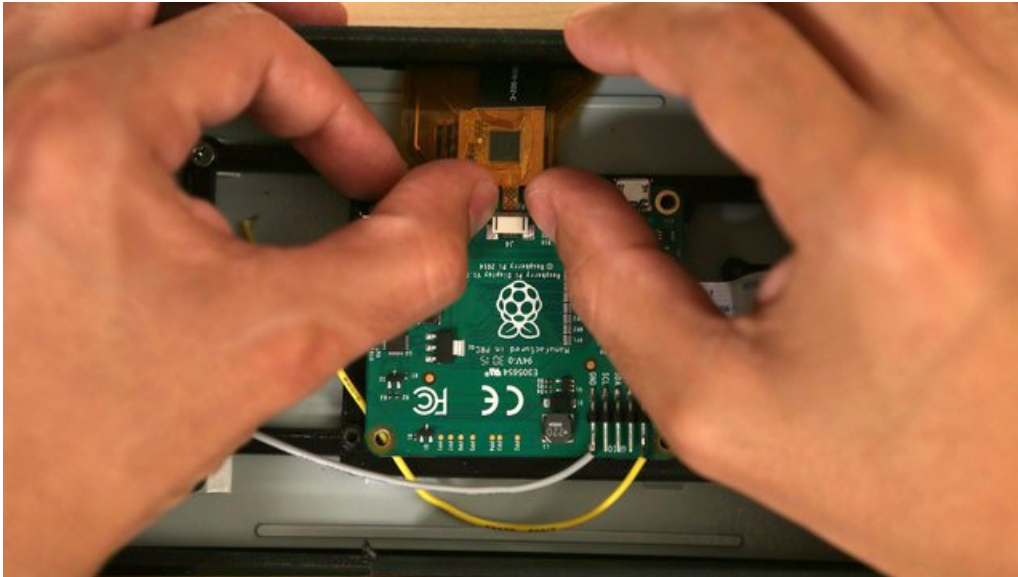
Connect wide ribbon cable to Display Driver

Open the latch on the display driver and insert the wide ribbon cable from the display. Close the latch to secure the cable.

Connect 200mm ribbon cable to Display Driver.

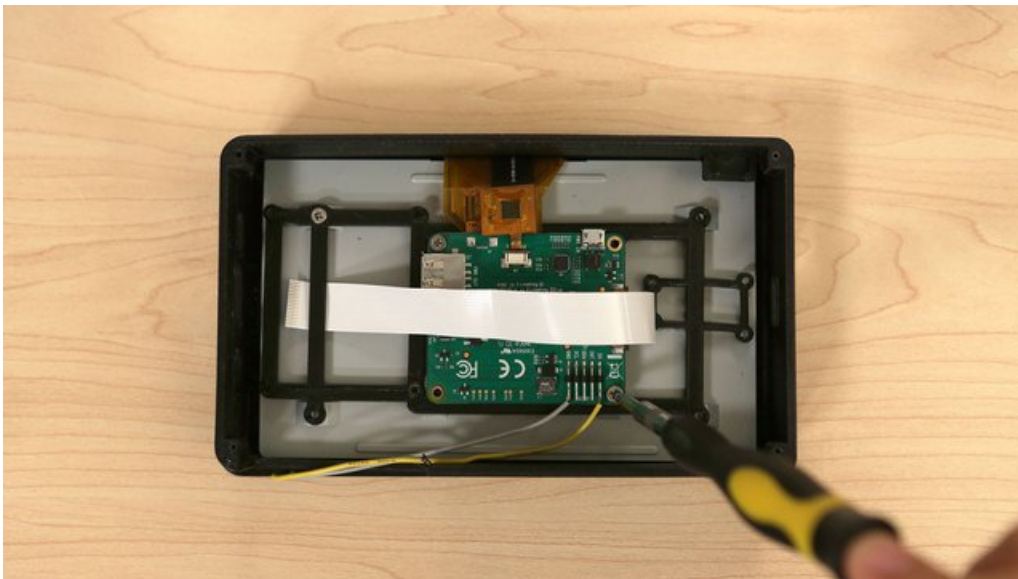
Open the latch on the side of the Display Driver and insert the 200mm ribbon cable. Close the latch to secure it in

place.



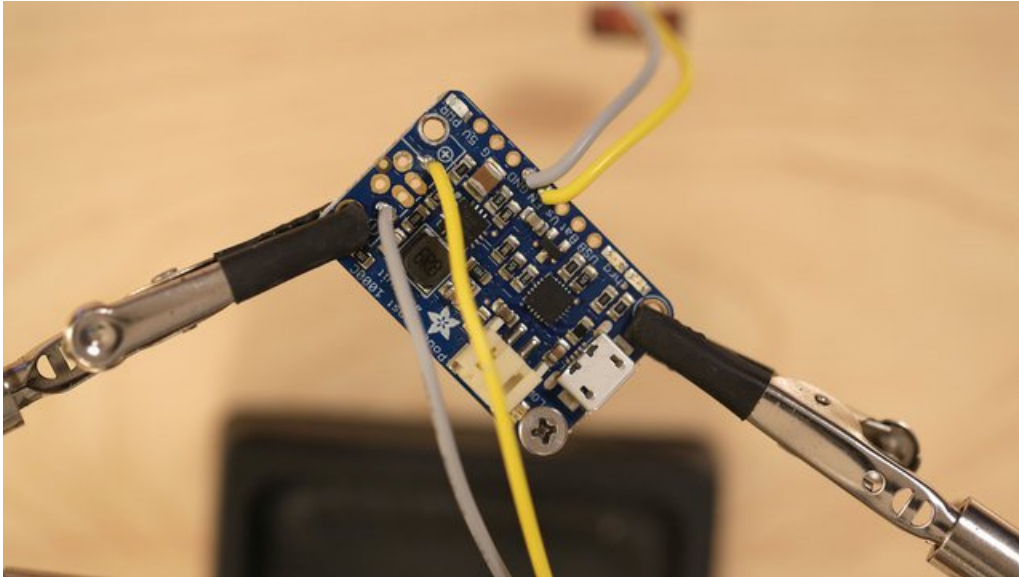
Connect mini ribbon cable to Display Driver

Open the latch on the small slot and insert the narrow ribbon cable. Ensure the ribbon cable is fully seated before closing the latch.



Mount Display Driver to frame

Insert two M3 x .5 x 6M flat Phillips machine screws into the two mounting holes on the Display Driver PCB (You only need to use two, as shown on the photo).



Connect Slide Switch to PowerBoost 1000C

Cut one of the leads from the slide switch (far left or right, not middle). We only need two leads.

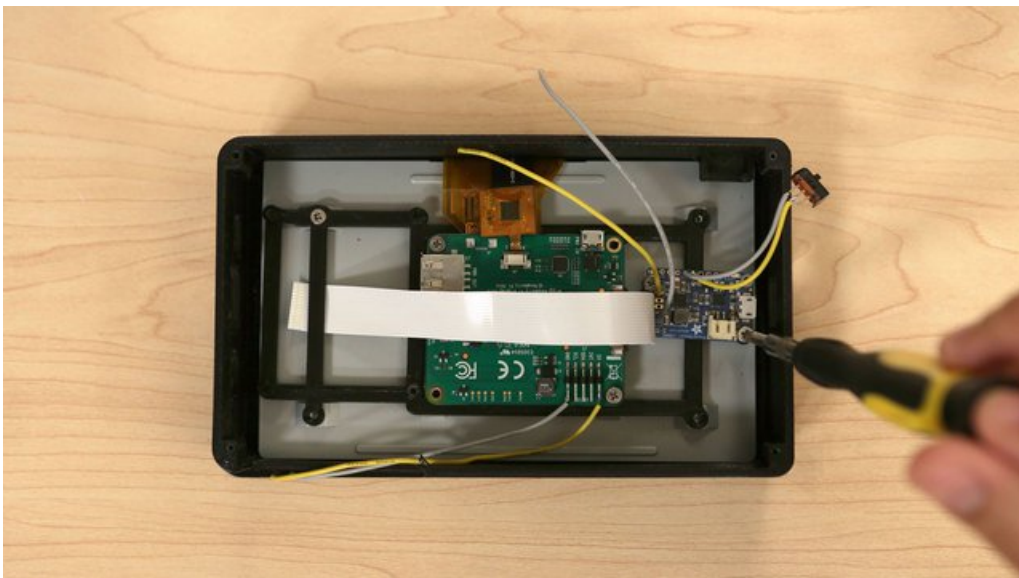
Secure the slide switch to a set of helping third hands. Tin the two leads by adding a bit of solder.

Measure and cut two 26AWG silicone coated stranded wires. Strip and tin tips of each wire.

Solder wires to the leads on the slide switch

Solder one wire from slide switch to **EN** pin, and the other to **GND** on the Adafruit PowerBoost 1000C.

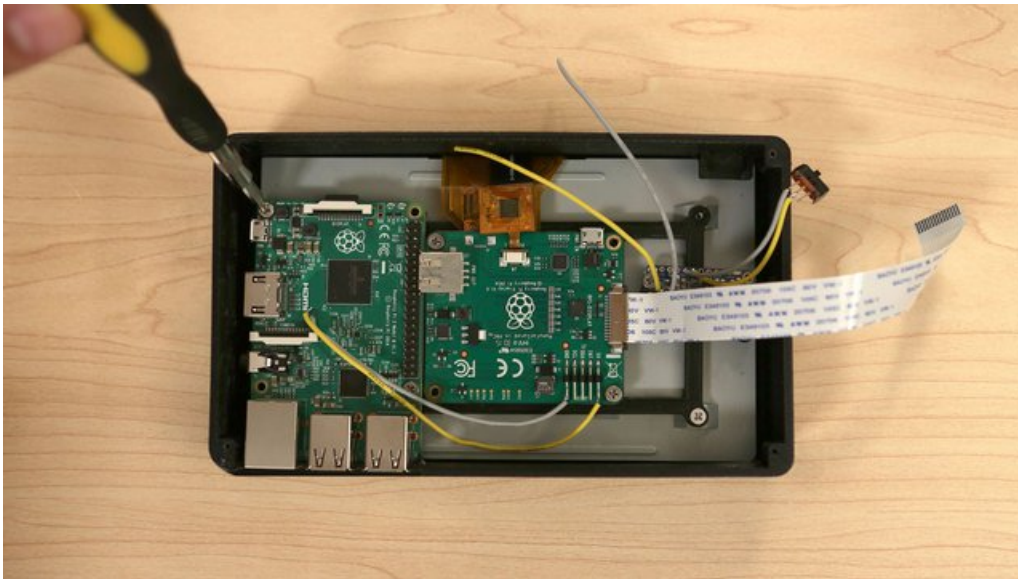
Measure and cut another set of 26AWG silicone coated wires. Strip and tin the tips of the wires. Solder one to the positive pin and the other to the negative labeled pin on the PowerBoost 1000C.



Secure PowerBoost 1000C to Frame

Insert two M3 x .5 x 6M flat Phillips machine screws into the mount holes on the PowerBoost 1000C. Fasten screws to create threads in the mounting holes and remove them.

Lay the PowerBoost 1000C over the frame and line up the mounting holes. Insert the two M3 machine screws back and fasten to secure the PCB to the frame.



Mount Raspberry Pi to Frame

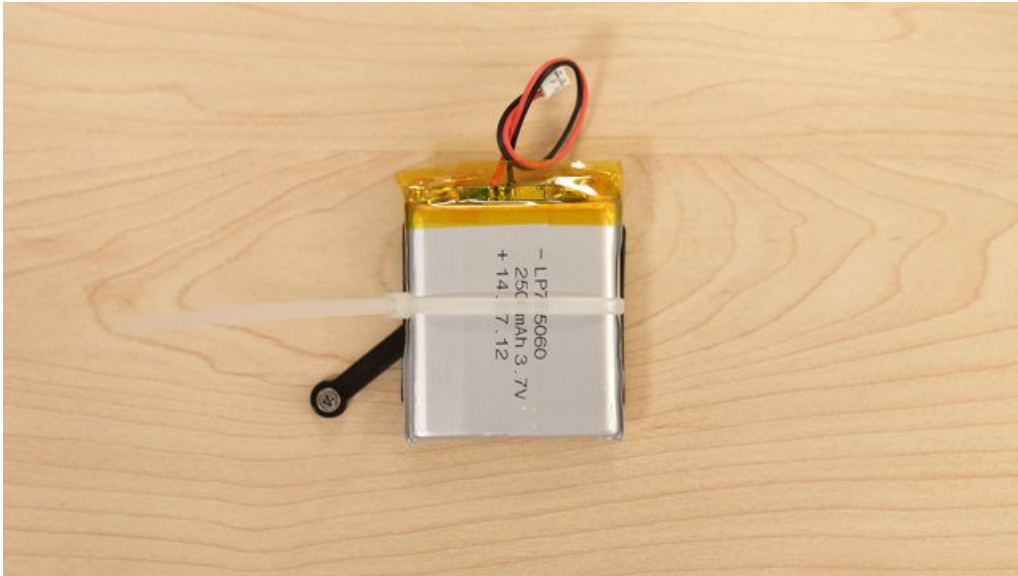
Lay the Raspberry Pi 2 over the frame with ports facing cutouts on the enclosure casing.

Insert four M3 x .5 x 6M flat Phillips machine screws into the Raspberry Pi and fasten to mount it to the frame.



Mount lipo to battery frame

Insert two M3 screws into the battery frame. Lay the battery over the frame. Insert and loop a ziptie through the slits on the battery frame to hold it in place.



Secure lipo to battery frame

Tighten the ziptie to securely hold the lipo battery to the battery frame.



Mount battery frame to Raspberry Pi

Place the battery frame over the Raspberry and line up the two screws from the battery frame with the mounting holes on the Pi. Use a screwdriver to fasten the two screws into the Pi.



Connect wires to Raspberry Pi GPIO

Solder the wire from the **negative** pin on the PowerBoost 1000C to **GPIO #6** on the Raspberry Pi.

Solder the **positive** wire from the PowerBoost 1000C to **GPIO #2** on the Raspberry Pi.

Solder the wire from the **5V** pin on the Display Driver to **GPIO #4** on the Raspberry Pi.

Solder the wire from the **GND** pin on the Display Driver to **GPIO #9** on the Raspberry Pi.



Connect 200mm ribbon cable to Raspberry Pi

Open the display port latch on the Raspberry Pi. Slightly twist the 200mm ribbon display and insert it into the display port in the correct orientation.

Ensure the ribbon cable is properly seated before closing the latch.



Mount slide switch to enclosure

Insert the slide switch into the cutout on the enclosure casing.

If the slide switch doesn't fit into the cutout, use a hobby knife to remove some material from the cutout to widen it.

You can use a pair of flat pliers to insert the slide switch through the cutout.

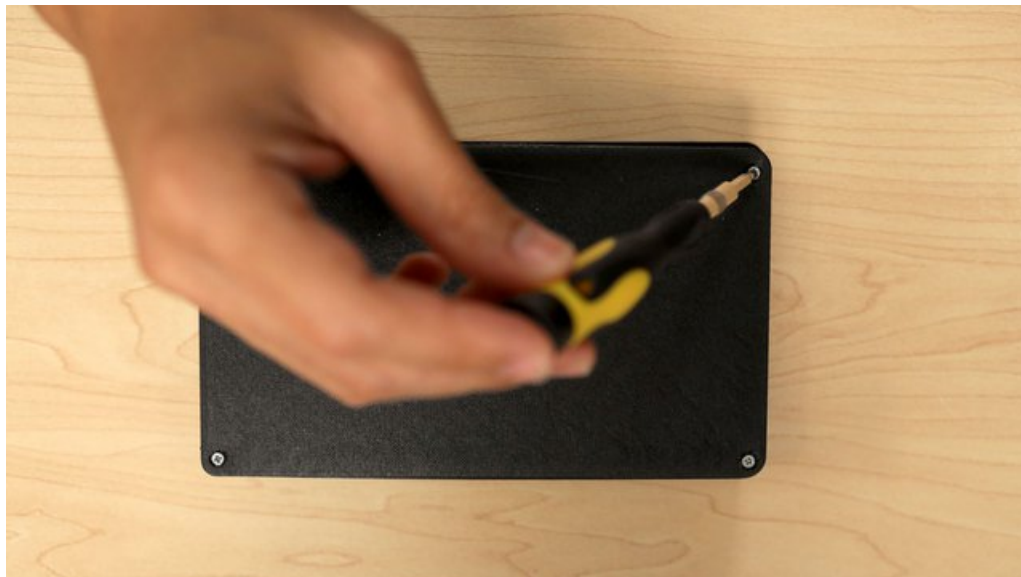
Don't force the slide switch all the way through, just enough to protrude half way through the port.

If the slide switch is loose, use hotglue or E6000 to permanently secure it in place.



Insert screws to enclosure cover

Orient the cover so the cutouts on the lip are lined up with the ports.



Secure cover to enclosure casing

Lay the cover over the enclosure casing and press it in. Insert and fasten four #2-56 flat Phillips machine screws into the corners to secure the cover to the casing.



Remove protective film from Display

It's a good idea to keep the film on until your finished with the assembly to prevent any scratches.

Screen Orientation

To flip the screen 180° we'll need to open `/boot/config.txt` in your favourite editor and add the line:


```
lcd_rotate=1
```



Complete!

The 2500 mAh battery lasts for a little over two hours. Insert a microUSB cable to the microUSB port on the PowerBoost 1000C and connect the cable to a power source to recharge the lipo battery. You can optionally leave the microUSB cable connected for extended usage.

Want a bigger battery?

We do offer a large battery, a [6600mAh lithium ion battery \(http://adafru.it/353\)](http://adafru.it/353) will give you about 5+ hours of usage. But, this unfortunately will not fit in the current enclosure design.

You can however, modify the case to be tall (or thicker) to compensate for the space needed to enclose the battery.

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