adafruit learning system

Boombox Beach Bag with Audio Amp and Speakers

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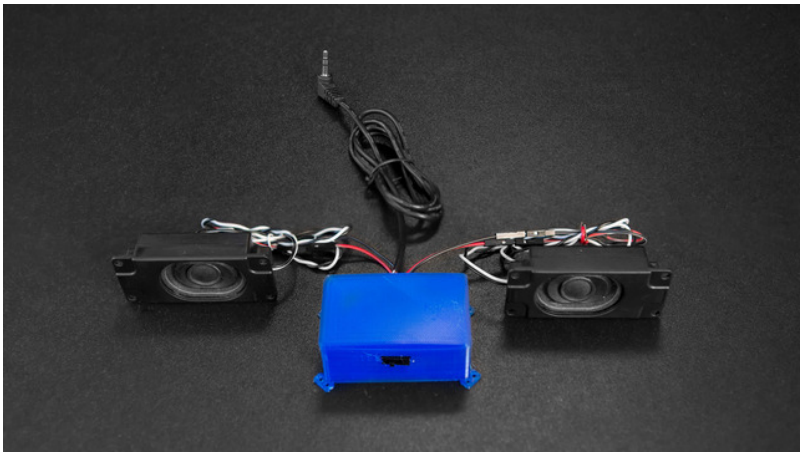
Guide Contents

Overview

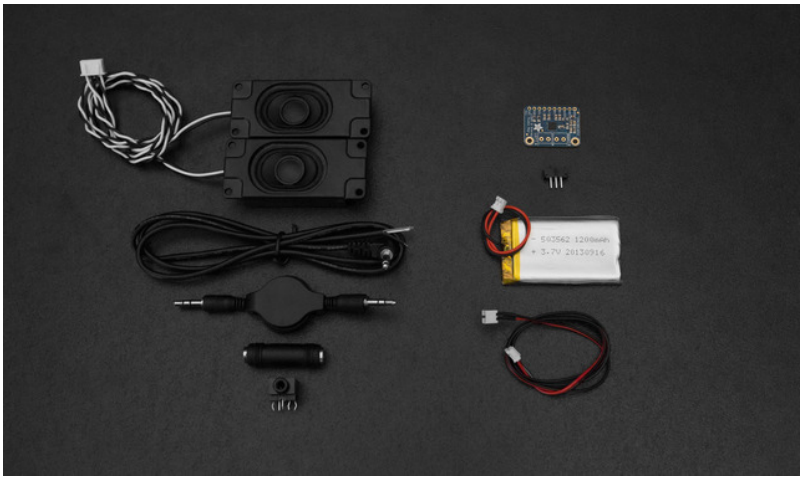
Summer is coming up, so why not build a project just for the beach? Upgrade your old beach bag into a hi-tech beat blastin' bag with one of our mini stereo amplifiers and mini speakers. You can use either the:

- TS2012 stereo amplifier (http://adafru.it/1552)
- MAX98306 stereo amplifier (http://adafru.it/987)

We'll be using the MAX98306 in this tutorial.



A flexible 3d printed enclosure will hold the electronics and this 3.7 watt amp (http://adafru.it/987) will power a pair of these 3W stereo enclosures speakers (http://adafru.it/1669).



Parts & Supplies

- Stereo 3.7w class D amplifier (http://adafru.it/987)
- Stereo enclosured 3W speakers (http://adafru.it/1669)
- Lithium Polymer 1200mAh battery (http://adafru.it/258)
- JST Extension cable (http://adafru.it/1131)
- Slide Switch (http://adafru.it/805)
- 3.5m Plug to Pintail audio cable (http://adafru.it/1700)
- Male/Female Jumper wires (http://adafru.it/824)

Tools

- Wire Strippers (http://adafru.it/527)
- 3D Printer (http://adafru.it/d9z)
- Soldering Iron (http://adafru.it/c7b)
- PanaVise (http://adafru.it/151)
- NinjaFlex filament (http://adafru.it/1690)

3D Printing

Download STLs
http://adafru.it/ddp

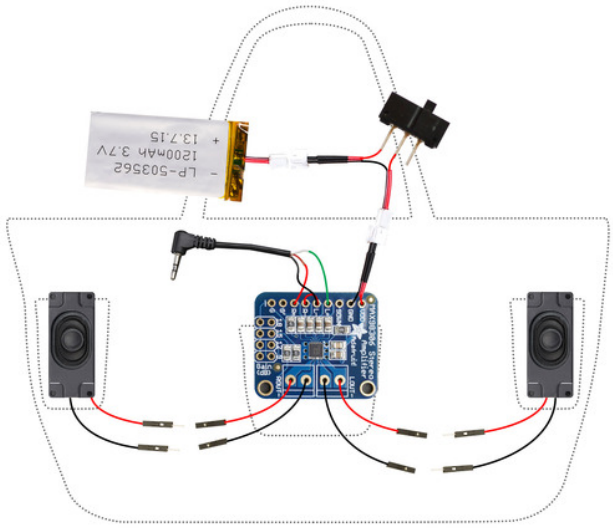
ampbox-flex.stl	NinjaFlex @230 No Raft/Support %15 infill 2 shells 0.2 layer height 45/150 speeds	Takes about an hour to print the box and lid

NinjaFlex filament

The enclosure design was optimized for printing with flexible material like ninjaflex (http://adafru.it/1690), filaflex or makerbot flexible filament. The lip tightly grips onto the box, making a secure enclosure for the components. The tabs on the corners allow you to easily pin the enclosure to any type of textile.

For tips and more detail, check out our guide on getting started (http://adafru.it/daS) with NinjaFlex.

Circuit Diagram

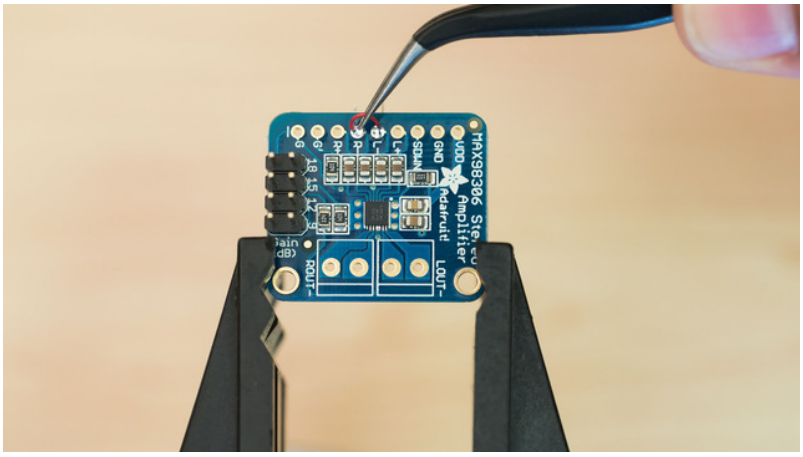


The circuit diagram above illustrates how the components connect together. Although the components aren't to scale, the outline of the beach bag gives you an idea of where to place the components.

Beach Bag Wiring

Depending on the design of the beach bag, you will need to plan the location of the speakers and amplifier. Our beach bag has two pockets on the side and one in the middle. The two speakers can fix inside the left and right pocket while the audio playing device can rest in the middle pocket. The amplifier enclosure will be pined to the inside of the bag, right bend the middle pocket.

Assembly



Start by mounting the MAX98306 to a panavise or third-helping-hand. Tin the pins listed below with solder to the board. Using a small piece of wrapping wire, solder one end to **R-** and the other to **L-** on the MAX98306 board.

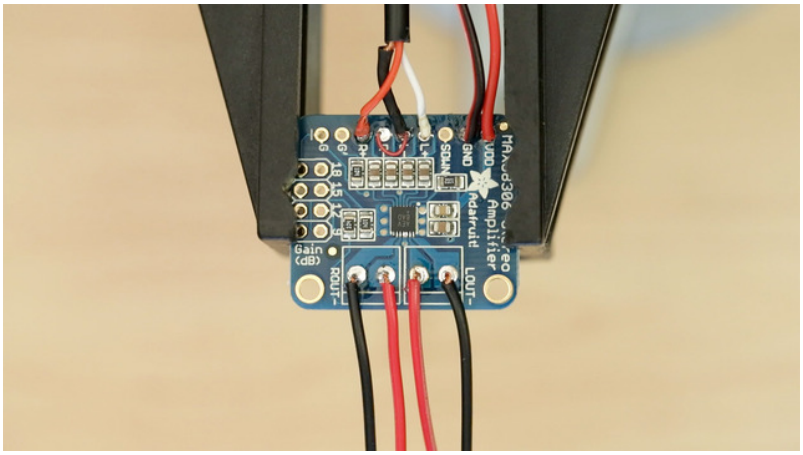
TPA2016

VDD
GND
R+
L+
R-
L-
Right+
Right-
Left+
Left-

Pin Reference

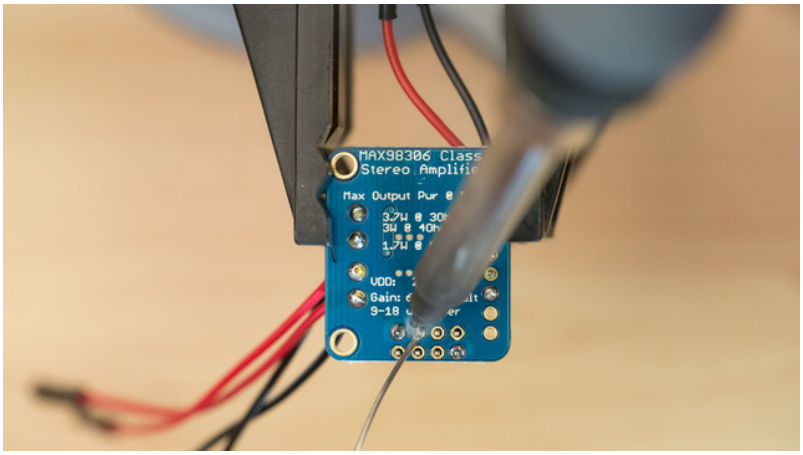
The list below is a reference for the wire connections.

JST Extension:	PigTail:	Speakers:
• VDD to Positive (Red) • GND to Negative (Black)	• L- to Black • L+ to White • R+ to Red	Left & Right: + to Red - to Black



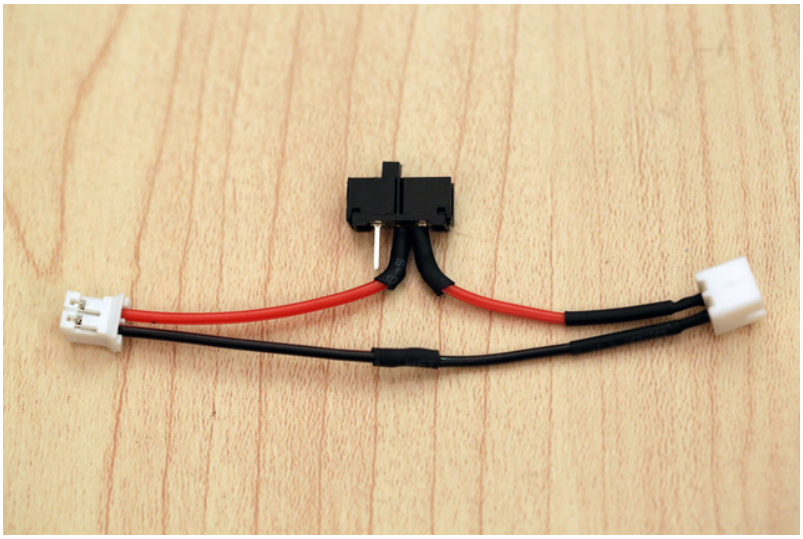
Add Gain Selection

Use third hand (http://adafru.it/291) to help hold the 2x4 pin header for gain selection to the top of the board as shown below.



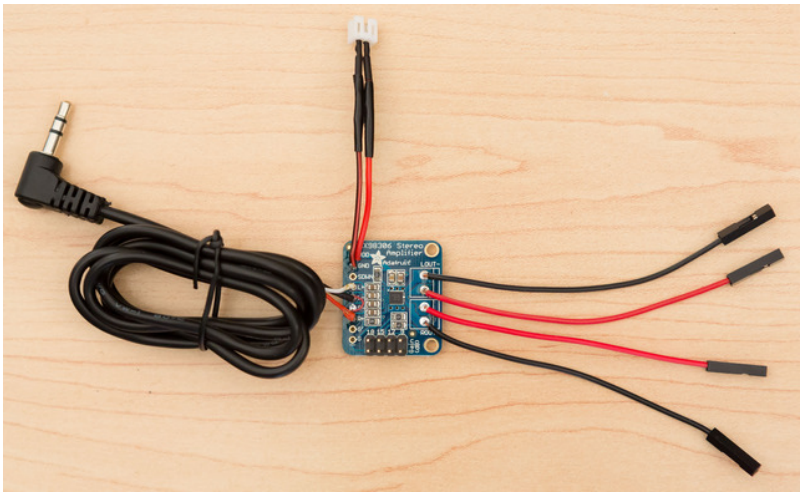
Powering the Amplifier

To power the amplifier, we'll need to cut the female end of the JST extension cable and solder it to the **VDD** and **GND** pin. To make powering efficient, we'll create a slide switch adapter to make the lithium polymer battery turn off and on with the slide switch using another JST extension cable.



Slide Switch Adapter

Use a JST extension cable to create a slide switch adapter. The positive cable will split a connection to the two terminals of the slide switch. You will need to shorten the length of the JST extensions as short as possible. To avoid soldering the JST extension that is connected to the switch, use another JST extension to solder into **VDD** and **GND** pins.

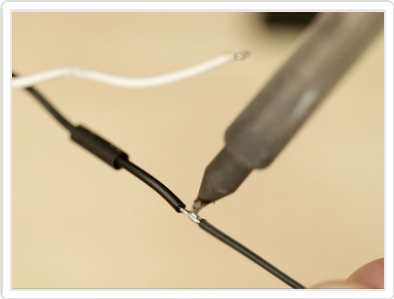


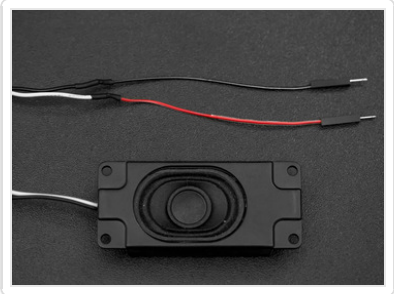
3.5mm Stereo Plug to Pigtail

Use a wire stripper to expose a small piece of each wire at the end of the cable. The white wire needs to be soldered to the **L+ pin**. The red wire will connect to the **R+ pin**. The black wire connects to the **L- pin**. You will need to jump the **R-** and **L-** pins with a separate wire.

Stereo Speaker Set

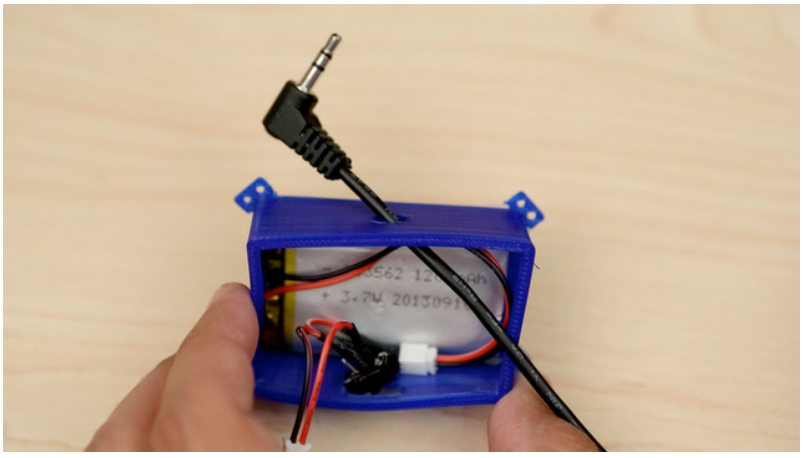
A male jumper wire soldered to each channel allows you to quickly connect and disconnect the speakers. Female jumper cables will need to be soldered to the **left+** and **right+** pins on the TPA2016. Each channel will need a red and black wire soldered to the pin.





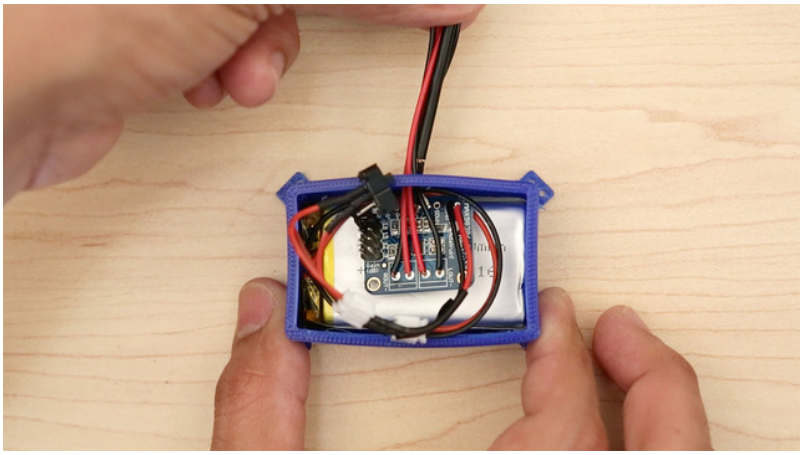
Modify Speakers

Snip off the connector at the end of the speaker set. Use a wire stripper to exposure each wire. Tin the exposed wires to make the connections easier. Solder the male jumper cables to each of the speaker wires. Use a piece of shrink tubing to secure the soldered connections.

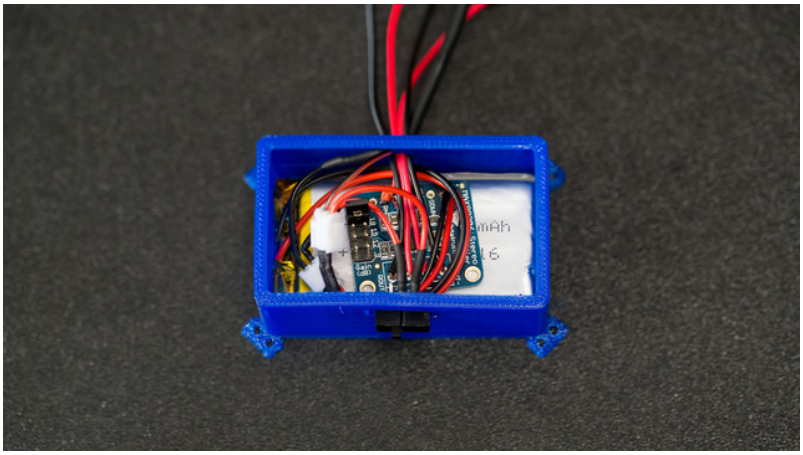


Wiring the amplifier enclosure

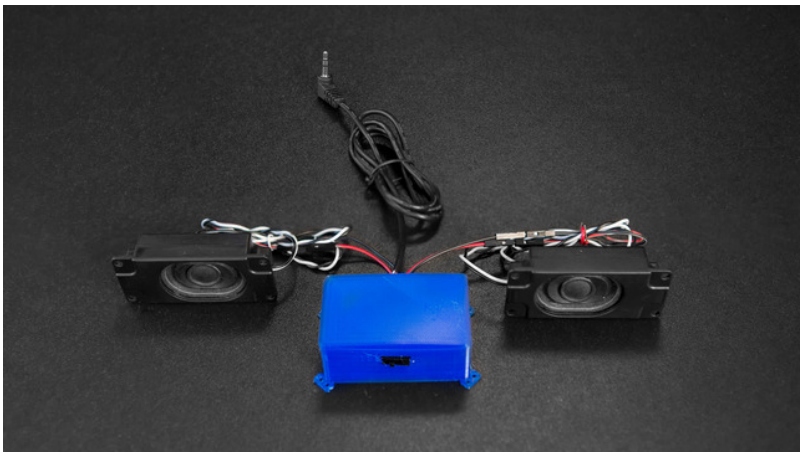
Place the 1200mAh lithium polymer battery inside the enclosure. Stretch the hole in the center side of the enclosure and squeeze the headphone plug through.



Thread each of the female jumper wires one by one through the same hole. Pull all the wires through until the amplifier can fit inside the enclosure, on top of the lithium polymer battery.



Carefully position the slide switch adapter into the rectangle hole located on the side of the enclosure. Gently adjust and arrange the wires so they aren't bunched up. You should be able to fit all the components and cover the lid.



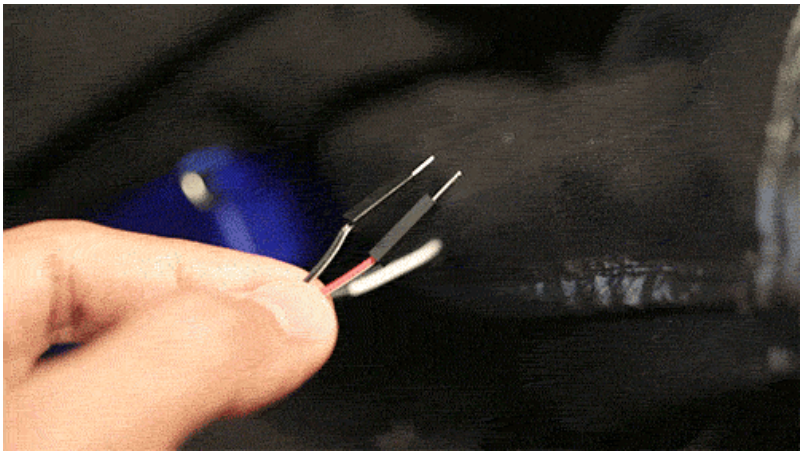
Testing Circuit

Plug in the speaker wires to the female jumpers that are soldered to the amplifier. Ensure the

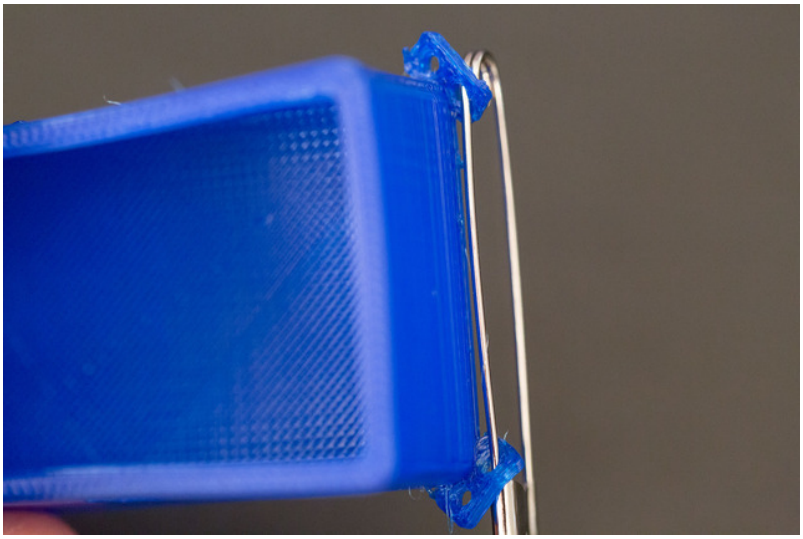
negative and positive wire match up. Slide the switch on and plug an audio device to the 3.5mm stereo cable.

Beach Bag Wiring

The shortest distance of the speaker wiring to the amplifier is near the bottom of the side pockets. Use scissors or a cutting blade to cut/poke a hole in the bag small enough to fit the wires through.



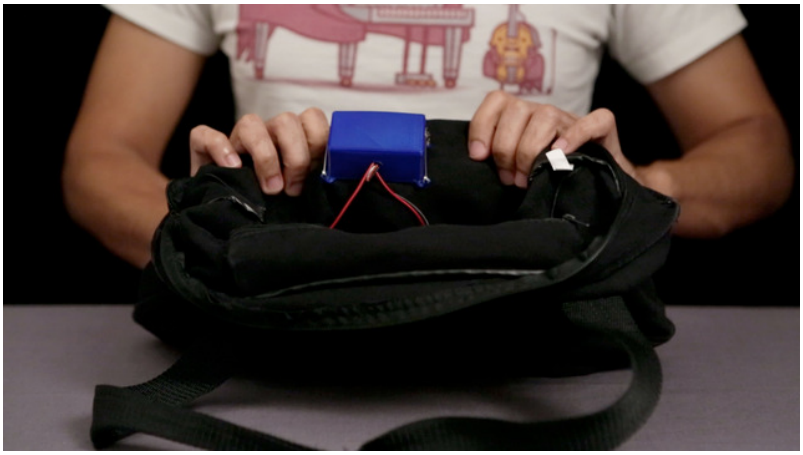
Pull the wires all the way through until the speakers are right up against the inside of the pocket. The excess speaker wire can be tucked away or hidden with tape or whatever else you can think of.



Attaching Amplifier Enclosure

The enclosure has tabs on the sides for easily safety pinning to textiles. For a more permanent and stable installation, sew the tabs into the textile.

Wires run along the bottom of the bag with the slide switch positioned near the middle, facing the top of the bag for easy access. Flip the switch on and plug in your phone or audio player in and test it out!



Take this beach blasting bag to the next level and attach a flexible solar panel to keep the tunes rocking for hours! Follow the Solar Charging Bag tutorial (http://adafru.it/ddq) for all the steps need.