adafruit learning system

Cell Phone Charging Purse

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Last updated on 2013-11-27 03:00:38 PM EST

Guide Contents

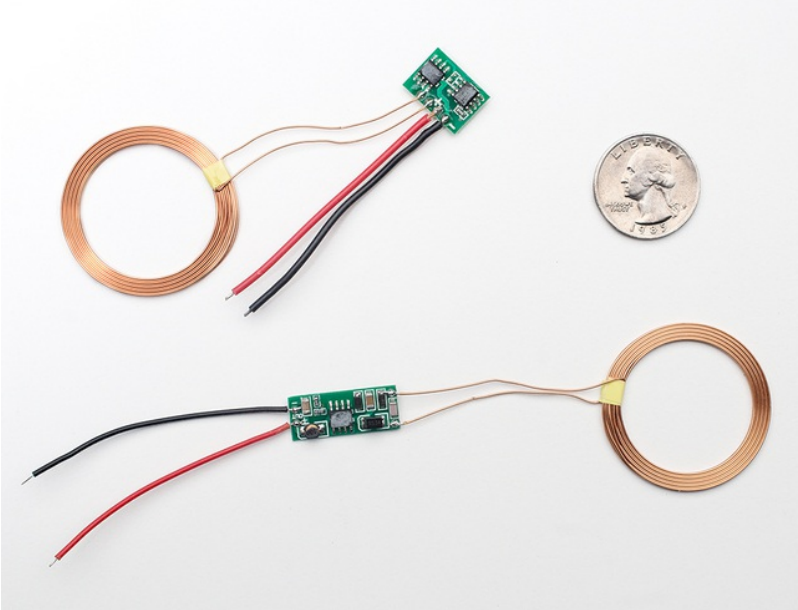
Overview

Make your purse charge your phone! Use an inductive charging set and install one half in your bag and the other to a shelf. Plug in your phone or a backup battery pack, and charge up while your bag is on the shelf. You will need the following supplies:

- Inductive charging set - 5V (http://adafru.it/1407)
- USB DIY connector shell type micro-b (http://adafru.it/1390)
- 9V AC adapter (http://adafru.it/63)
- heat shrink tubing (http://adafru.it/344)

In addition you should grab the following tools:

- soldering iron (http://adafru.it/180) and solder (http://adafru.it/145)
- wire
- pliers (http://adafru.it/146) and wire strippers (http://adafru.it/147)
- helping 3rd hand tool (http://adafru.it/291)
- seam ripper
- needle and thread
- scissors
- multimeter (http://adafru.it/850)

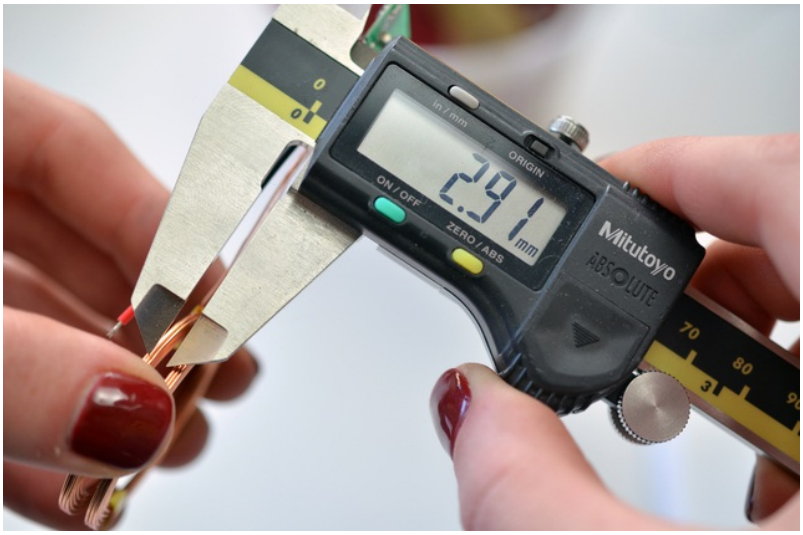


Inductive charging is a way of powering a device without a direct wire connection. Most people have seen inductive charging in a rechargeable electric toothbrush: you may have noticed that you recharge it by placing it into the holder, but there's no direct plug. These chargers work by taking a power transformer and splitting it in half, an AC waveform is generated into one, and couples into the second coil.

This is a basic charger set, and it does work, providing 5V DC output from the output half when the input half is powered with 9V to 12VDC. You can draw as much as ~500mA if the coils are 2 or 3 mm apart. If you only need 100 or 200mA you can be up 7mm apart. For 10mA draw, the coils can be up to half an inch (12.5mm) apart. Any non-ferrous/non-conductive material (eg air, wood, leather, plastic, paper, glass) can be used between the two coils. The material doesn't affect the distance or efficiency. The coils do need to be fairly co-axial, try to get them to be parallel and have the circles line up for best power-transfer. (This is why the electric toothbrush must fit into the plastic holder, it's lining up the two coils for best efficiency)

Because its an air-core transformer, it's fairly inefficient. Only about 40% of the energy in shows up on the other end, but for low power or charging project. If you draw 5V 100mA on the output side (0.5W), you'll need 0.5W * 2.5 / 9V = ~150mA from the input end. The quiescent current is about 70mA at all time, even when the other coil is not anywhere near by.

These are basic modules, probably used for some low cost toy. We don't have any datasheets or specifications for them. We do see a feedback resistor divider on the output side using 0603 SMT resistors so an advanced user could solder in different values to turn it into a 3.3V output.


ORIGIN
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ABSOLUTE


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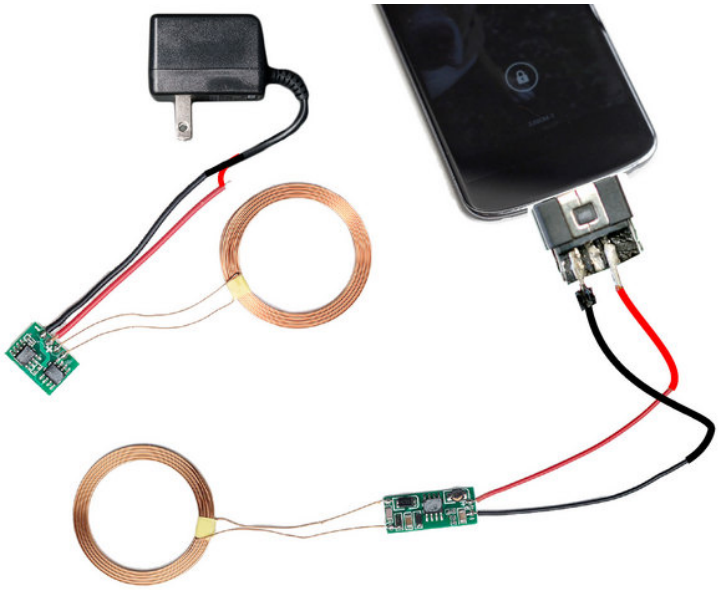
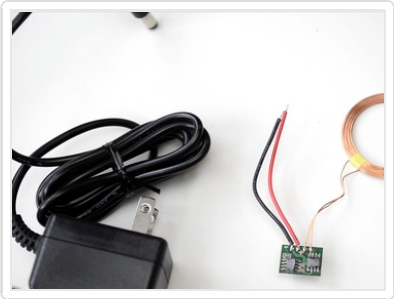
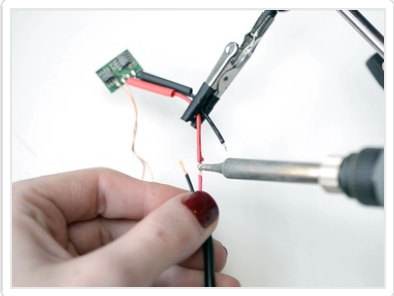
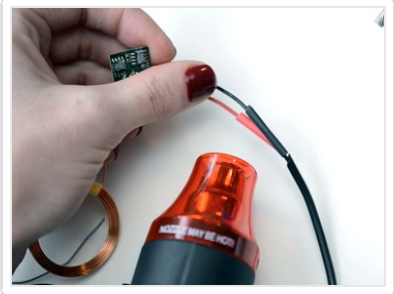
Prepare USB and Power Supply

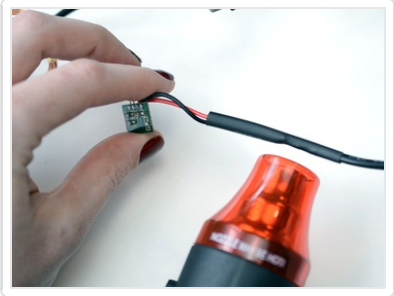


Reference the above circuit diagram when building this project! The coil attached to the more square circuit board attaches to the incoming power, in this case from a 9V AC adapter. The other, more long and skinny, circuit board gets soldered to the USB connector as shown.







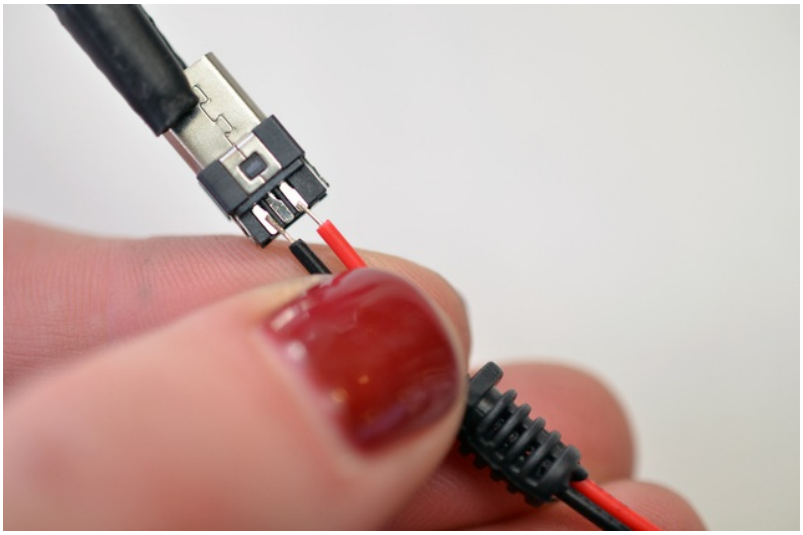


Cut off the barrel connector from the AC adapter, and strip the red and black wires inside. Slide a medium diameter piece of heat shrink tubing over the whole wire, then put a smaller piece on each of the two wires.

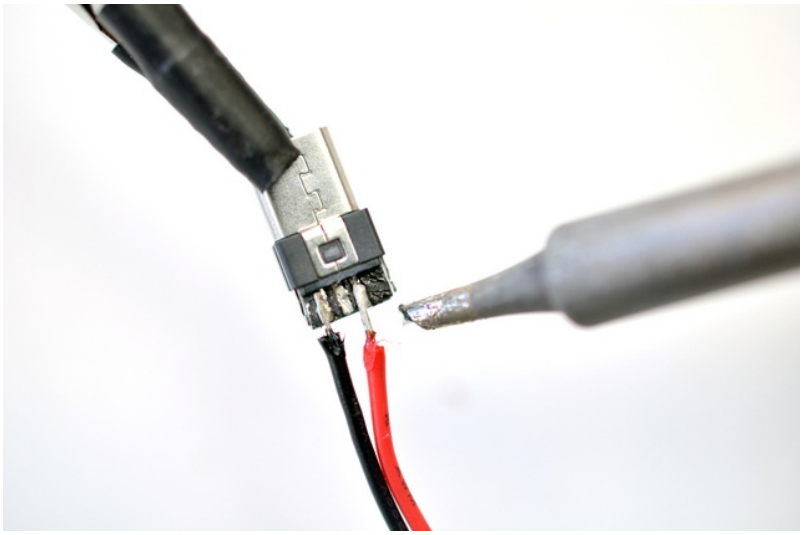
Grab the input power coil (more square circuit board) and with the help of a 3rd hand tool, solder the red wire to the AC adapter's red wire, and likewise with the black wires.

Use a heat gun or lighter to shrink the smaller pieces of heat shrink over the solder joints, then the bigger piece over the whole connection.

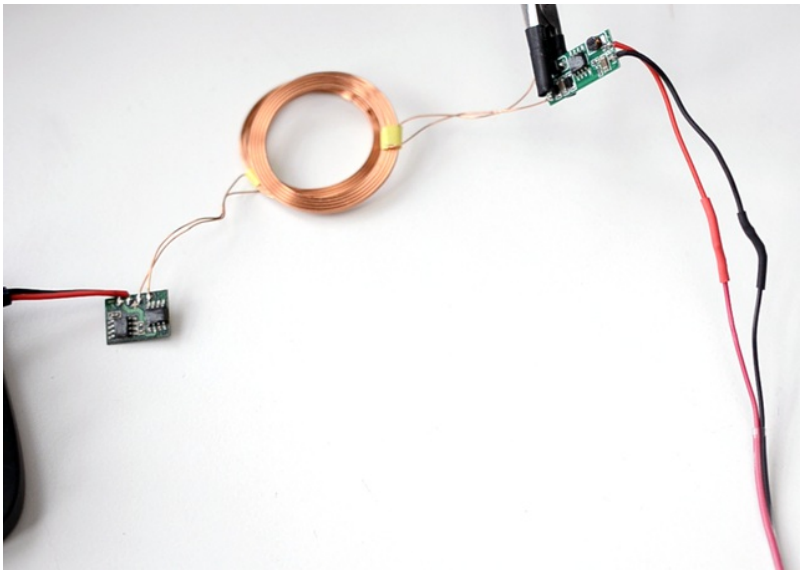
Alternatively, you can plug your AC adapter into a terminal block connector (http://adafru.it/368)and use a screwdriver to secure the circuit board's wires to it. This eliminates the need to solder, but only on this half of the circuit.



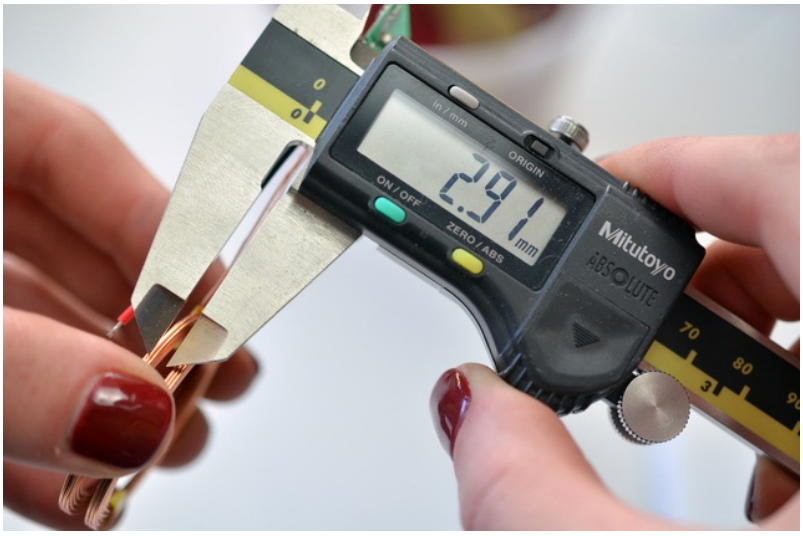
The red and black wires affix to the outer pads on the USB connector as shown above. At this point you may wish to lengthen the wires attached to the long skinny circuit board to give your USB cable some slack inside the bag. When you've got wires of your desired length in place, slide on the strain relief collar that comes with the USB connector.



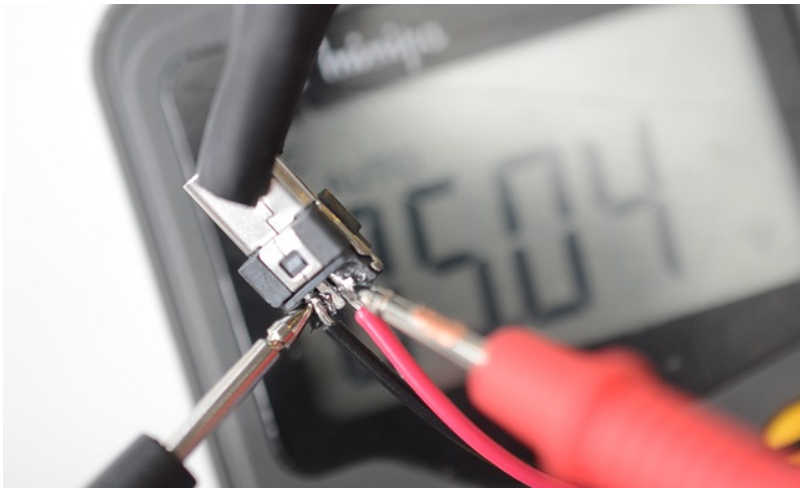
With the help of a 3rd hand tool, tin the pads and wires separately and then reheat with your soldering iron to make the connections.



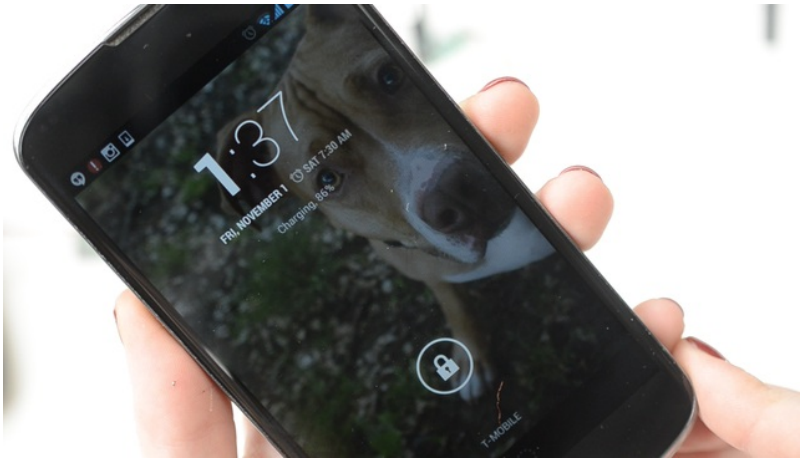
It's time to test your circuit! Plug the AC adapter into the wall and use helping hands or other things on your desk to orient the coils as close as possible to one another. They must be coaxial (parallel).



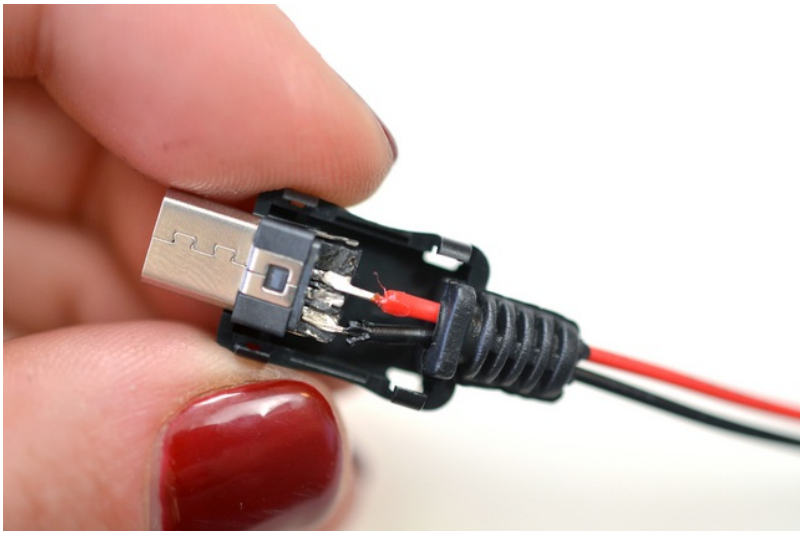
The coils should be 3mm or closer for most efficient energy transfer.



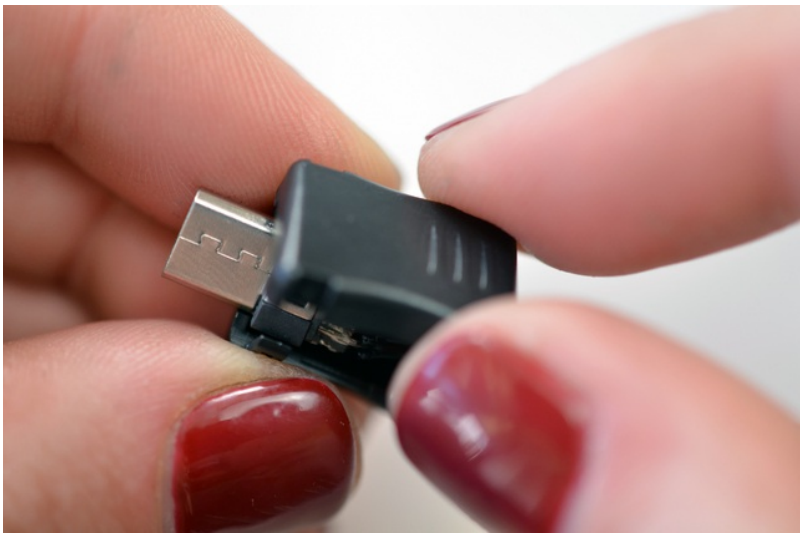
With the coils in place, use a multimeter to test the output on the USB end. It should read 5 volts.



Plug the naked USB connector into your phone and check that it charges. Some phones have more finicky charging requirements than others, so if you have a successful multimeter reading but your phone won't recognize the charge, you might consider charging up one of our backup battery packs (http://adafru.it/1565) instead (which can then be used to charge your phone).

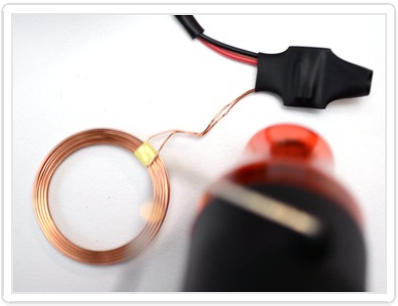


Close up the USB connector by placing the port and strain relief collar in one half of the plastic shell.

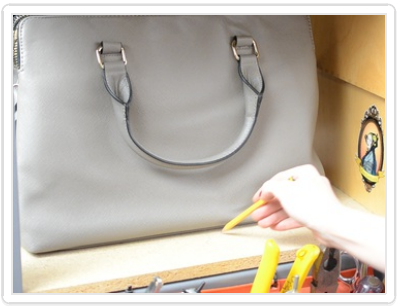


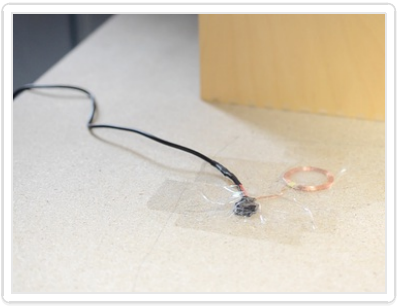
Clip on the other half of the shell and your USB cable is complete!

Create a Charging Shelf



Use a large piece of heat shrink tubing to protect the circuit board. Repeat with the coil assembly that will go in the bag.





Use a pencil to mark your shelf where your bag sits.

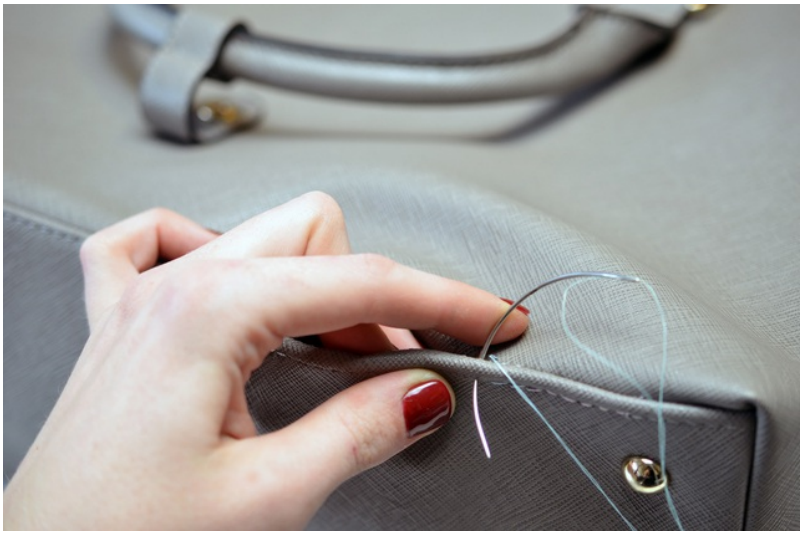
Tape the coil and circuit board to the shelf.

Our bag has steel feet, we can use these to our advantage! Since inductive charging requires precise alignment, affix some magnets to the shelf where the steel feet of the bag rest.

Plug the AC adapter in to the wall.

Install Coil in Bag

Open the bottom of the bag with a seam ripper, and run the USB cable up into the chamber of the purse. Plug it into your phone or battery pack, and slide the induction coil behind the very outer layer of fabric/leather/etc. Tip the bag upright, align with your magnets, and play around with the position of the coil until the two line up and your phone is charging! Tape it in place inside the bag.



Close your bag back up along the seam with coordinating thread and a needle. A curved upholstery needle can come in handy for some types of bags.

That's it! Enjoy your new gadget-charging purse!