Paper Circuit Pin

This quick craft project shows you how to create a circuit using copper tape instead of wire to light up an LED and make a wearable piece of e-craft art.

Before You Begin: Prepare Templates

Print the base templates (double-sided) on cardstock and cut out. Depending on your printer's margin settings, it may take some adjustments to make sure the front and back align. If possible, set your margins to 0 in both your program and print settings. Print your pop up graphics on vellum if you choose and cut out. A hobby knife will help cut around the edges of the spaceship, geek, and robot designs.

Materials Needed:

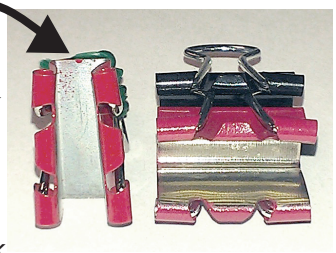
Wishlist for materials available from SparkFun - http://sfe.io/w77090

Printed Templates

5mm LED

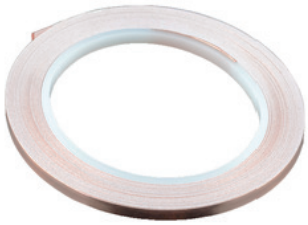
Mini MetalBinder Clip (9/16" x 1/4")

A Note On Binder Clips: This project will only work if using a binder clip with exposed metal on the interior. Plastic or interior painted clips will not work.



12mm Coin Cell Battery (CR1225)

1" Adhesive Pin Back



5mm Copper Tape (~8.5 inches)

Clear Tape

Tools Needed:

Scissors

Hobby Knife

Push Pin

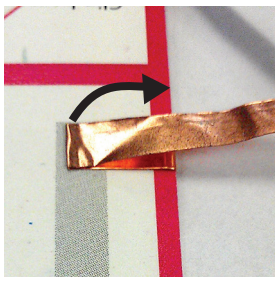
Optional:

Ruler/Bone Folder

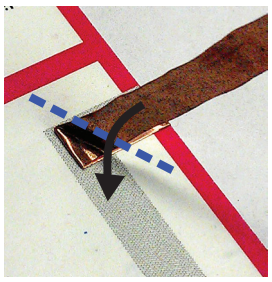
Paper Circuit Pin

STEP ONE: Create Copper Tape Traces

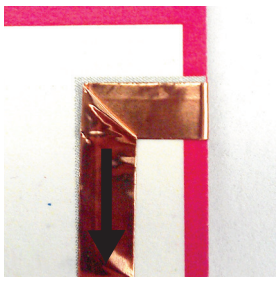
With your copper tape, begin following the grey lines labeled Ⓐ, Ⓑ, & Ⓒ - cutting the tape where marked. Make sure to keep the tape in a continuous line until the cut marks, to go around corners use this folding technique:



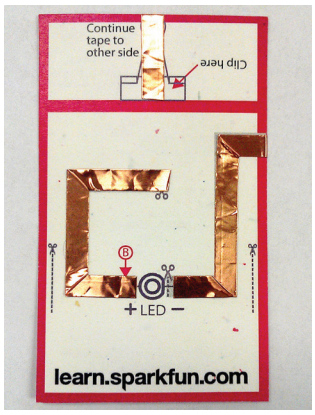
1) At edge, fold tape backwards

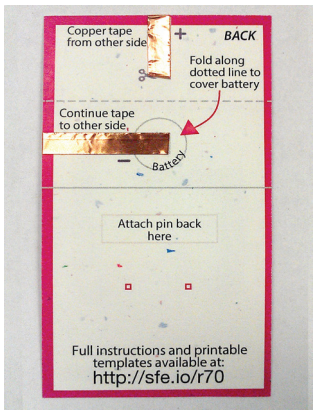


2) Fold at a 45° angle



3) Press flat

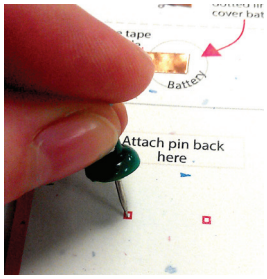


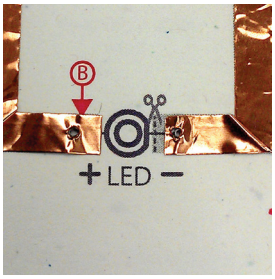


It will look like this when you are finished

STEP TWO: Poke Holes for LED

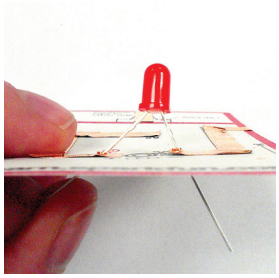
On the back of the template, find the square marks and use a push pin to poke holes all the way through the paper and copper tape on opposite side. This is where your LED will poke through the paper - it's wire legs aren't strong enough to punch through the paper without bending.

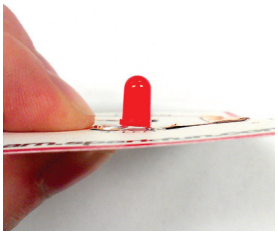


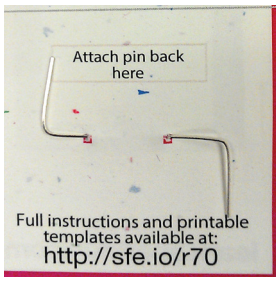


STEP THREE: Attach LED

Flip your project to the front side and push the LED's wires (also called legs) through the holes. Make sure the positive side of the LED is pushing through the copper tape marked + and the other side is through the tape marked - . Push the LED down so that it's legs sit flat against the tape. On the back of the paper, bend the LED legs at an angle to help hold it to the paper. Use clear tape over the legs to secure to the paper on both the front and back sides.





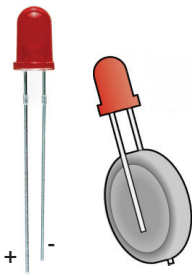


The negative side of the LED is (cathode) is shorter than the positive side (anode).

Here are some other ways to figure out which leg is positive or negative:

> Look down at the LED - there is a flat part on the negative side.

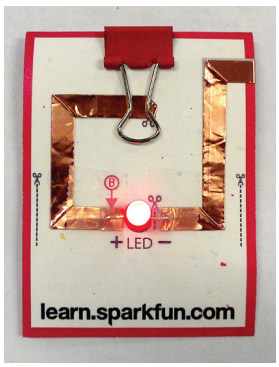
> Hook it up to a battery - the legs on these LEDs slide easily over a coin cell battery. If it doesn't light up one way, flip it around.



STEP FOUR: Make the Battery Holder

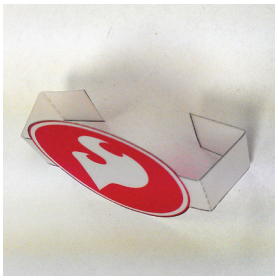
Fold along the dotted line on the back to create a flap to hold the battery. Place the battery positive side up so it makes contact with the copper tape as shown.

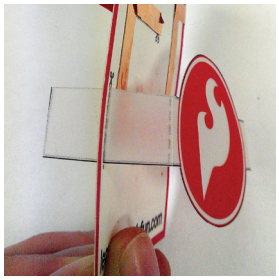
Use the binder clip to hold the battery in place and make sure it is touching the copper tape. Fold the binder clip handles down so they make contact with the tape - the front handle can now act as a switch! Flip it up to break the connection between the copper tape and the battery, and flip down to complete the circuit and power your LED. Congratulations you just completed your paper circuit!



STEP FIVE: Add Some Flair

Now let's prep the pop up design and backlight it with the LED. First fold along the dotted lines so it will stand above the LED.





Next use a hobby knife to cut along the dotted lines on the sides of your paper circuit to creating slots to feed the paper tabs through.

Push the paper tabs through and tape down on the back as shown. Complete the project by sticking a pin back inside rectangle printed on the template.