



# LED Eye Prosthetic

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<https://learn.adafruit.com/led-eye-prosthetic-tutorial>

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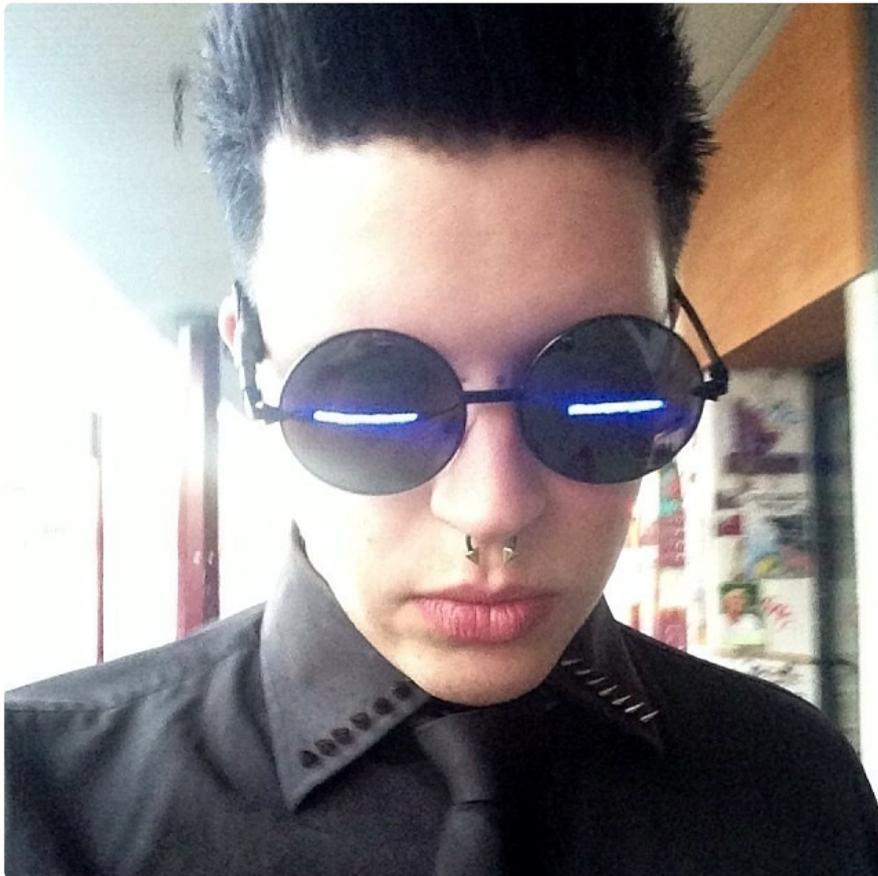
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# Overview

These LED augmentations can help you with your cyberpunk costume or other design that requires glowing eyes. This is a super cheap, simple circuit comprised of a battery and LEDs. You will need patience and a steady hand, however.

Make sure your soldering iron has a fine tip and use SMD LEDs in size 1206. This size has about a 1mm distance between the terminal foot and the top of the acrylic cap, allowing a 1mm enamel wire to sit in that gap very comfortably.



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# Parts List

For this project you will need:

- 20x SMD LEDs, size 1206. Pick any colour you want, you could even mix and match (as long as they have the same forward voltage)!
- 1mm enamelled single core copper wire - this is also called 'Magnet wire' and can be a little tough to get in less than 100' spools
- [CR2032 battery \(http://adafru.it/654\)](http://adafru.it/654)
- [CR2032 battery breakout with switch \(http://adafru.it/1871\)](http://adafru.it/1871)
- [Fine tip curved tweezers \(http://adafru.it/422\)](http://adafru.it/422)

- [Flush diagonal cutters \(http://adafru.it/152\)](http://adafru.it/152)
  - [Soldering iron \(http://adafru.it/1204\)](http://adafru.it/1204) with [fine tip \(http://adafru.it/1249\)](http://adafru.it/1249)
  - Permanent marker
  - craft knife or sandpaper
  - Soft jaw clamp
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## Prepare wires



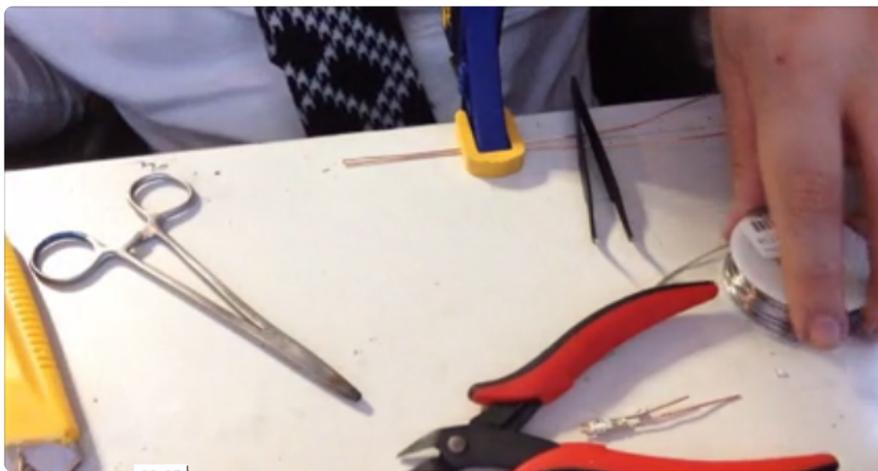
Start by cutting two lengths of enamelled wire to encompass your head, leaving about 4 to 5cm extra on each side.



Mark one of these wires with a sharpie along its length, to denote a negative wire.



Twist these two wires together along their length, remembering to leave about 4cm each end untwisted for the LED mounting points. Cut wires equally into two lengths.



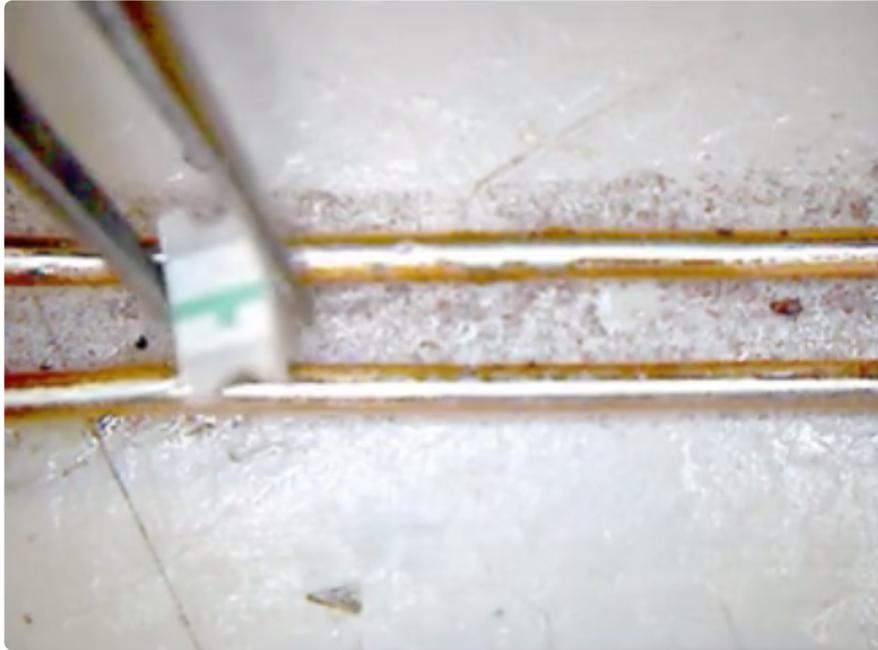
Using sandpaper or a craft knife, strip all the enamel off the 4 straight ends of the two lengths. Tin the wires with solder, making sure to only coat them and not leave lumps on the terminals.

**Make sure to completely clean the wire ends of enamel before trying to solder, or you will fail!**

Using the soft jaw clamp, affix one of the wire lengths to the table, and arrange the straight ends to leave a 2mm gap.

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## Solder LEDs



Drop an LED face down into this gap using curved tweezers, arranging them so the green line points towards the black negative wire marked earlier.



I find it's handy to make the gap between the wires slightly smaller than 2mm, so the wires pinch the LED in place by the plastic cap. This helps to stop it sucking itself back to the soldering iron by surface tension.

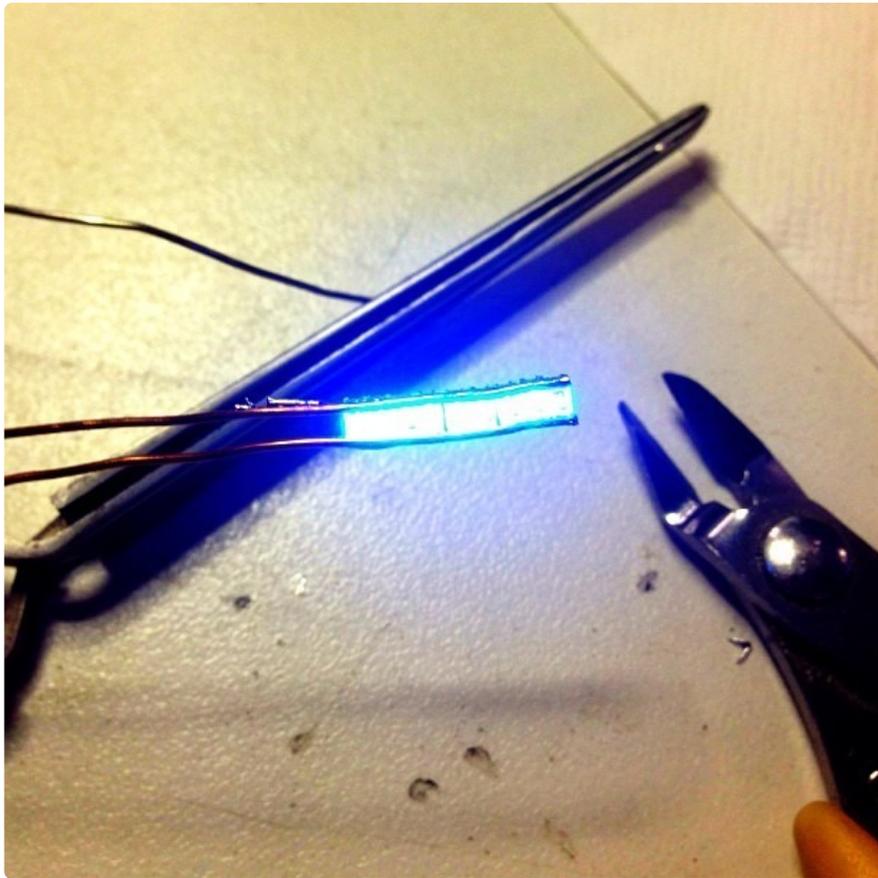


Continue to add LEDs into the gap and solder them in place directly next to each other, until you have the desired length of LED line. Allow it to completely cool.

Be patient, take your time, clean up messy solder as you go. To clean up lumps, run the soldering iron along the outside edge of the wire quickly, so as to not heat it up enough to remelt the existing links, but just enough to smooth out surface irregularities. This may take a few tries but you'll get the knack of it.



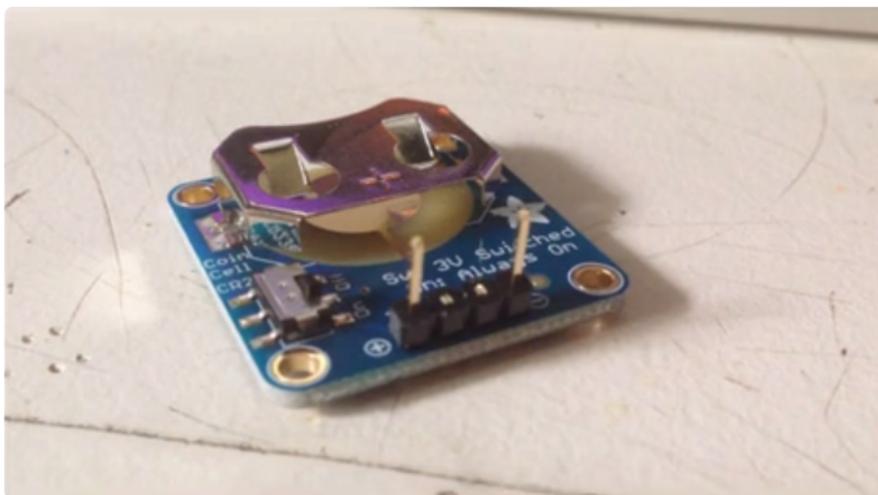
Repeat this step with the other section of wire. Clip off any remaining wire flush with the last LED in the line.



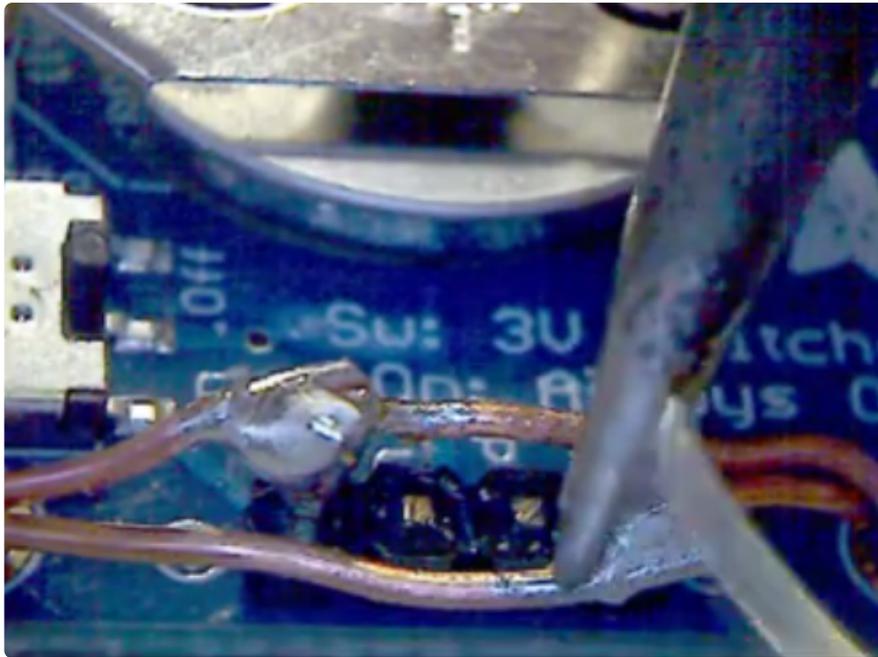
Once you're all done, touch the remaining loose ends to either side of your CR2032 battery to test the connection. If any LEDs do not illuminate, make sure they're placed in the right way round, and strengthen any solder connections that look bad. Once it's all good, it should look like the photo above.

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## Attach battery holder



The good news is that the hard part is over, and if you weren't a soldering pro before, you are now. Get your Adafruit switched CR2032 battery clip, Solder the four header pins in place. Clip off the two middle ones, they'll only get in the way.



Thread the free ends of the two wire twists through the large holes for a bit of strain relief and arrangement. Strip off a small amount of enamel on the remaining 4 ends, solder the negative wires to GND and the positive wires to SW.

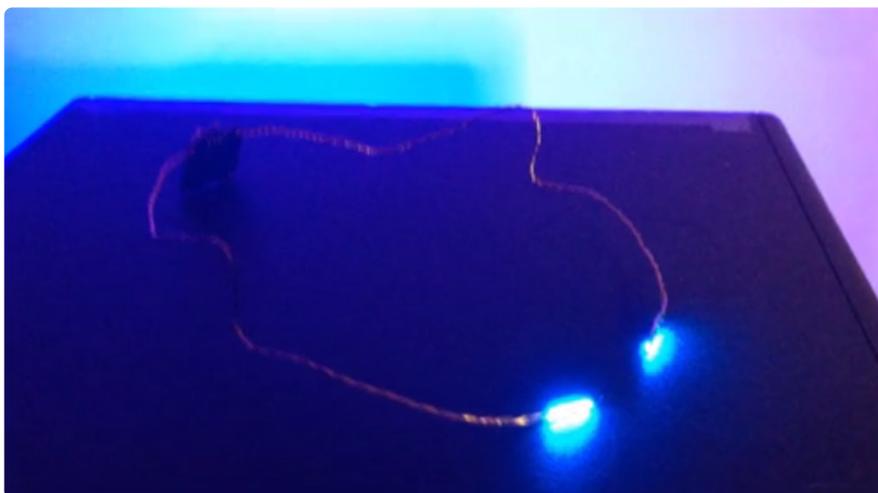
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## Why thread the wires through the holes first?

With the wires outside of the holes, any movement in the wire is concentrated on the solder points, which is structurally weak. When threaded through the holes first, the movement is concentrated at the holes where the wire is much stronger, and any pulling on the wires will direct the force in direct opposition to the strength of the other wire, adding further strain relief.

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## Shape it to your skull

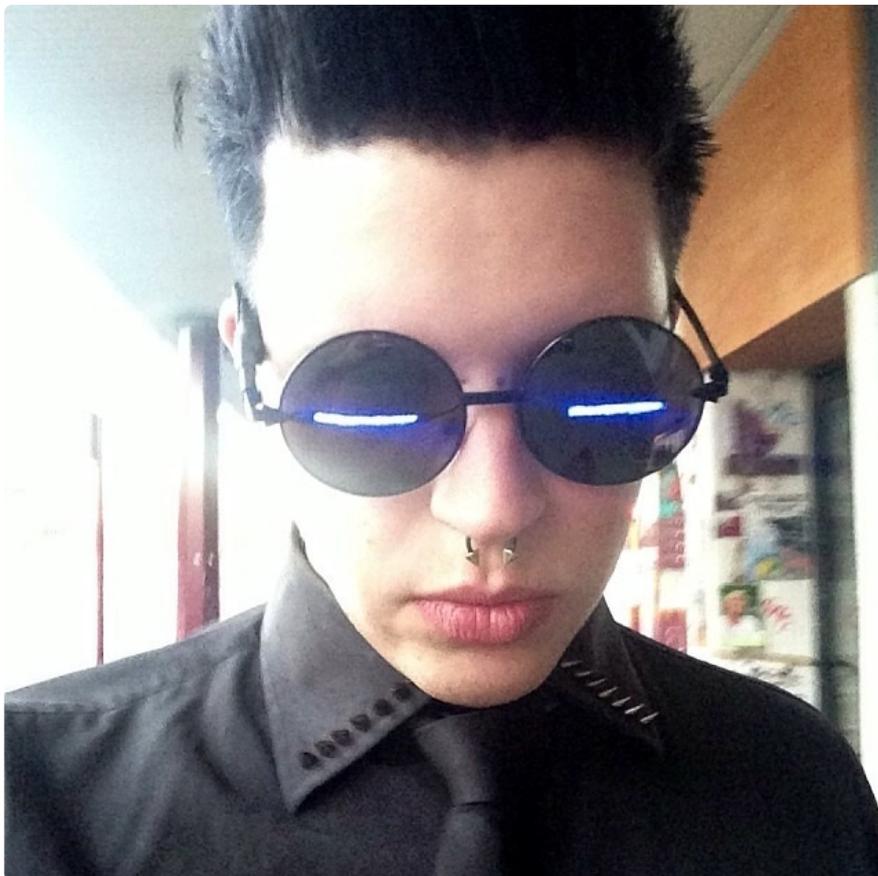


With the battery clip on the back of your neck, start shaping the wires around and over your ears. It should eventually look something like this.

It's kind of like wearing sunglasses backwards, the ear loops should rest over the top and down the front of your ears to hold itself steady. form the led's in front of your eyes, facing out.

If you're going to be wearing it in a high action situation, you can also use heatshrink and stainless steel wire reenforce the stricture, or to add spring to the loop around the back of the neck to grip your head better.

## Wear it!



You're done! Power it up and run around in the dark! The LEDs only throw light forward, so it should interfere with your vision very little. If desired, glue small strips of black plastic to reduce light bleed. This aug is very bright and you should easily be able to see your way around even in a pitch black room. Wear behind sunglasses for an 80's cyberpunk look :D



