

The DuKode Studio: Lumenhattio DIY Directions

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Materials

- 20 to 30 Piranha LEDs

with identical voltages (check part specs)

we tried: <http://superbrightleds.com>

- 20 feet of Conductive Thread

we tried: <http://sparkfun.com>

- 1 Spandex Cap

available at sporting or beauty supply stores

we tried: Feel Beauty Supply, Brooklyn

- 1 Sewable Coin Cell Holder

we tried: <http://sparkfun.com>

- 1 Coin Cell Battery

CR2032 220 mAh Lithium Ion

we tried: <http://amazon.com>

- 1 Mid-Sized Needle

- (Optional) 1 SPST Switch

be sure to get a non-momentary switch

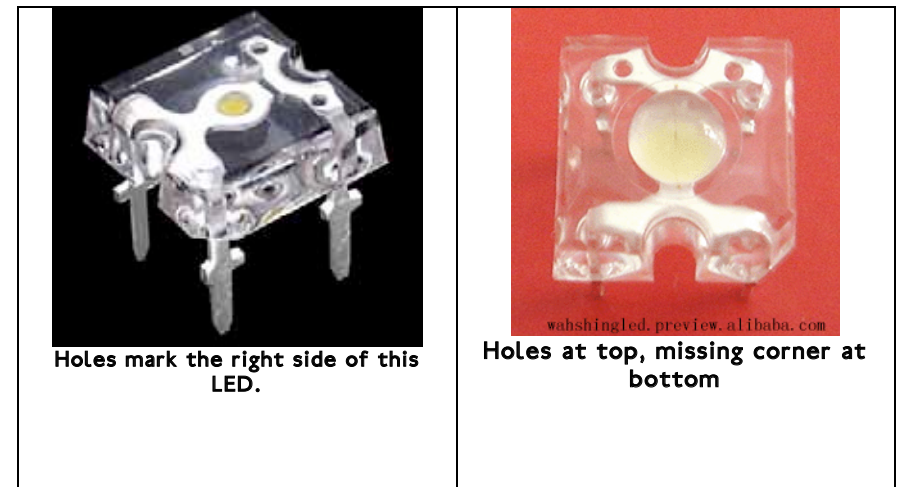
we tried: <http://jameco.com>

- (Optional) Conductive Glue

we tried: <http://thinkgeek.com>

Preliminary Directions (learn about the parts)

1. Study the piranha LED. Like all LEDs, the piranha LED is bipolar, with a positive (+ or anodal) side and a negative (- or cathodal) side. On a piranha LED, two leads are positive and two are negative. Often, one side is marked with holes or a missing corner, as in the photos below:



Preliminary Directions (continued)

2. Study the cell battery. The positive side is marked with a "+" sign, while the negative side is usually unmarked.



3. Determine the polarity of your LED by holding the battery between the LED's two poles. Each side of the battery should touch the two prongs of each pole. Once the LED lights up, you'll know which side of the LED is positive and which side is negative.



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Preliminary Directions (continued)

4. Add the battery holder into your setup. Put the battery into the battery holder and use conductive thread to connect the battery holder to the LED. When the LED is correctly connected to the battery holder, the LED will light up.

IMPORTANT: the thread connecting the positive poles *must not* touch the thread connecting the negative poles.



5. (Optional) Add the switch into your setup. To add your switch, simply cut one of the connecting conductive threads (positive or negative, it doesn't matter) and tie each cut end to one prong of the switch. When you've correctly completed this step, you will be able to control the LED with the switch.



**If you've made
it this far,
congratulations! Now
all you need to do is
some sewing and
gluing to make your
Lumenhattio.**

Make the Lumenhattio

1. Study the spandex cap. If this is your first Lumenhattio, it's a good idea to study the LEDs along the seams of the cap. Using the cap's seams helps to isolate the positive side of the circuit from contact with the negative side of the circuit, thus preventing short circuiting.



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Make the Lumenhattio (continued)

2. Design how the LEDs will be laid out on the cap. In the cap pictured below, we studded 25 LEDs along the center seam of the cap. We used white LEDs only and colored 13 of them red with a Sharpie.

(Red and white LEDs usually have different forward voltages, meaning that they cannot be connected in a parallel circuit without additional parts.)



3. Stud your LEDs on the cap according to the design you planned in Step 2. You will now see why piranha LEDs are used instead of standard 2-prong LEDs—the 4 prongs of the piranha LED provides better stability in attachment to the spandex.



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Make the Lumenhattio (continued)

4. Remember to push each prong *all the way through* the spandex as you stud your LEDs. There's a little "crossguard" on each prong that makes it harder to get the prong through, but once the prong is all the way through, the crossguard will help the prong from slipping out.



5. (Optional) For each studded LED, push matching prongs slightly towards each other (positive to positive and negative to negative). This will help keep the LEDs a little more securely in place. Do not push the prongs all the way down, because you will need to wrap conductive thread around them.



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Make the Lumenhattio (continued)

6. Sew conductive thread to connect all positive prongs together, then press each prong down all the way to fully secure each LED in place. It's important to ensure as much contact between the prongs and the thread—this leads to more reliable performance from your Lumenhattio.



7. Sew conductive thread to connect all negative prongs together, then press each prong down all the way to fully secure each LED in place. Make sure that the negatively-connecting thread has NO CONTACT with the positively-connecting thread.



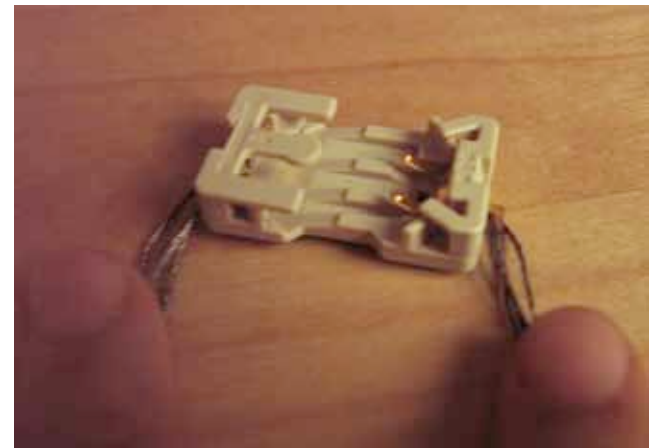
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Make the Lumenhattio (continued)

8. (Optional) Add a tiny drop of conductive glue to each prong/thread contact.

9. Thread the positively-connected thread through the positive lead on the battery holder, then thread the negatively-connected thread through the negative lead on the battery holder. All your LEDS should now light up. If they do not, try reversing the threads' connection to the battery holder. If the LEDS still do not light, check for and remove any contact between the positive and negative threads.

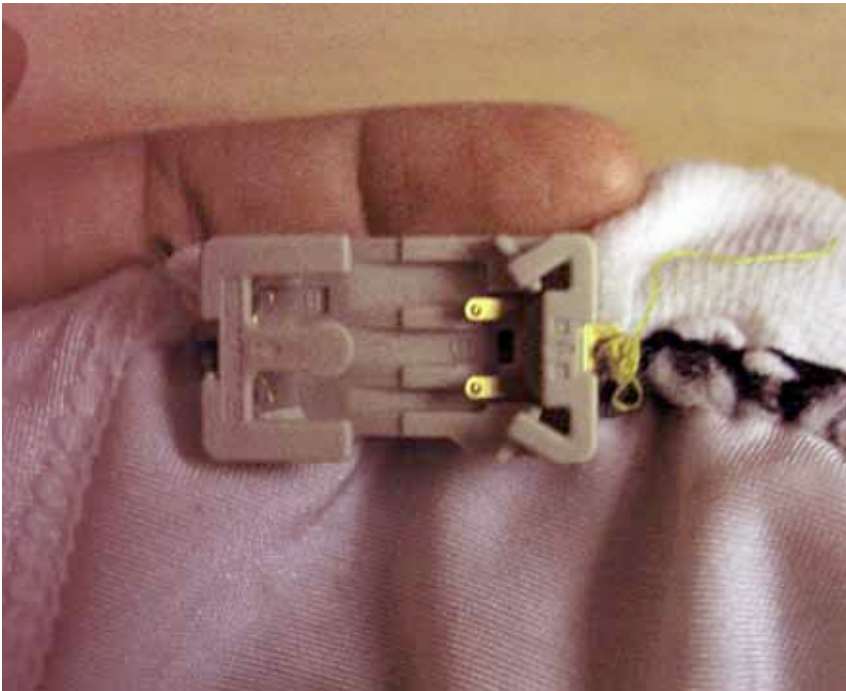


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Make the Lumenhattio (continued)

10. Sew the battery holder securely to the spandex cap.



11. (Optional) Stud the switch near one of the threads. Cut the nearby thread and wind each cut end around a prong of the switch. Press the prongs AWAY from each other—do not allow the cut thread ends to have contact.

12. (Optional) Use conductive glue to secure each end of thread to the switch. You should now be able to control the LEDs with the switch.

If you've made it this far, super congrats!

You now have a working Lumenhattio. Have fun with it, and feel free to send pictures of your caps to info@dukode.com.

