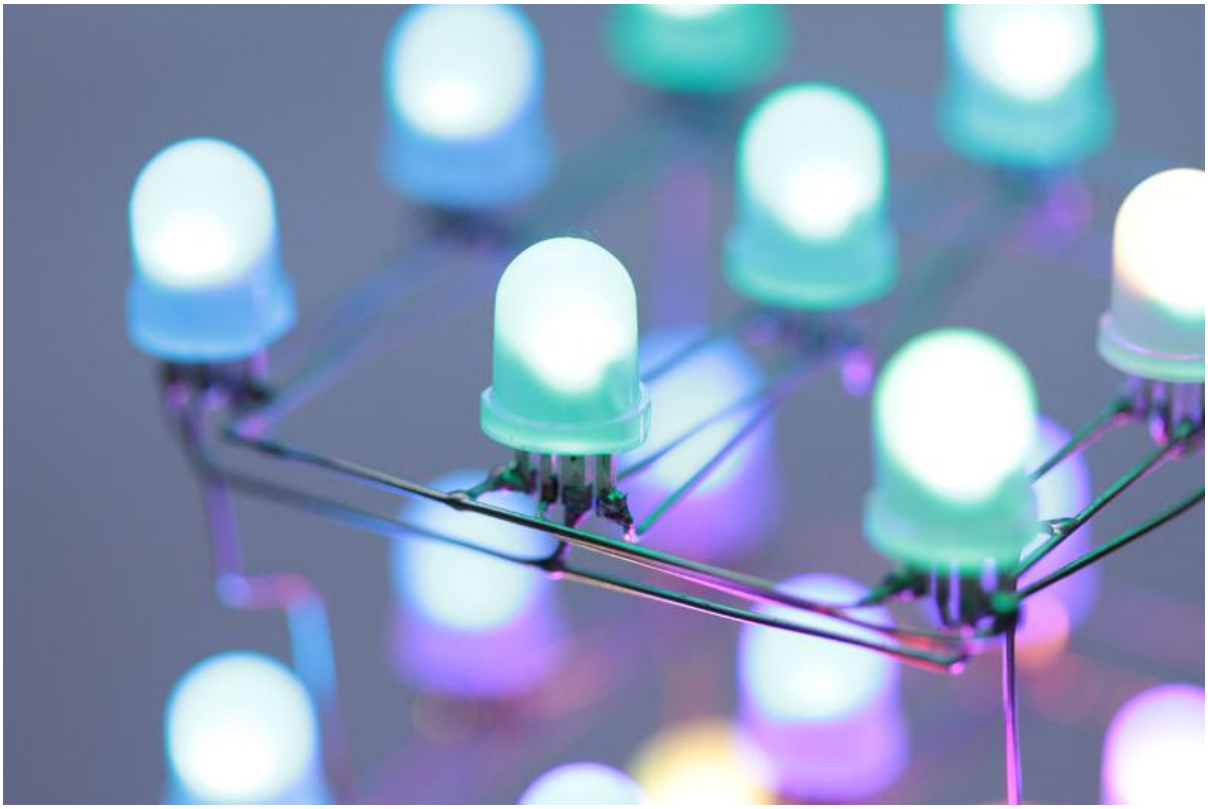
Free-Wired 3x3x3 NeoPixel Cube

Created by Rick Winscot



https://learn.adafruit.com/free-wire-3x3x3-neopixel-cube

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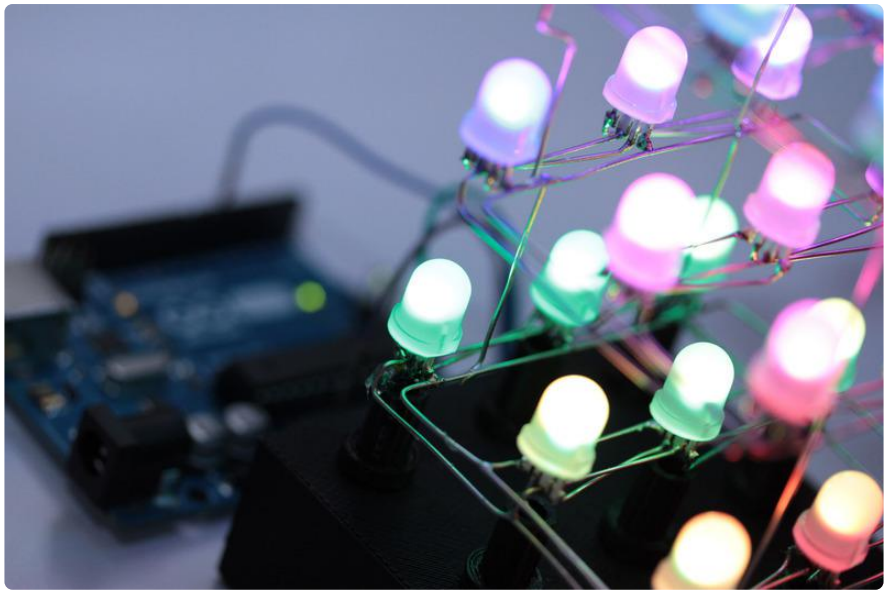
Overview

NeoPixels are amazing... they simplify lighting projects and can be driven by a wide variety of microcontrollers.

That's right, no shift registers, charlieplexing, or fancy setups. Just one pin! This makes them great for something complex-shaped like a 3D cube



The 3x3x3 cube is crazy bright... and wicked awesome!

Parts!

For this project you'll need

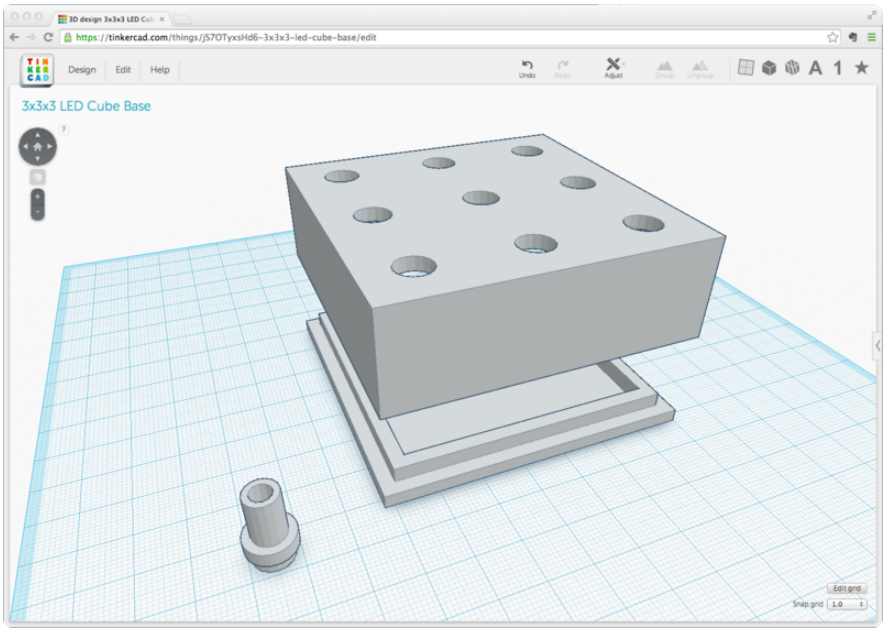
- 27 x Thru-hole NeoPixels (if you get 30 you'll have spares in case you need them) ()
- Something to drive them, like a Trinket 5V ()
- 5V 2A power supply is plenty ()
- On/Off Power button ()
- DC panel-mount jack ()
- Wire, solder, soldering iron, hand tools...

A 3D printer can print out the custom base, or you can craft something custom with wood or cardboard

3D Print the Base

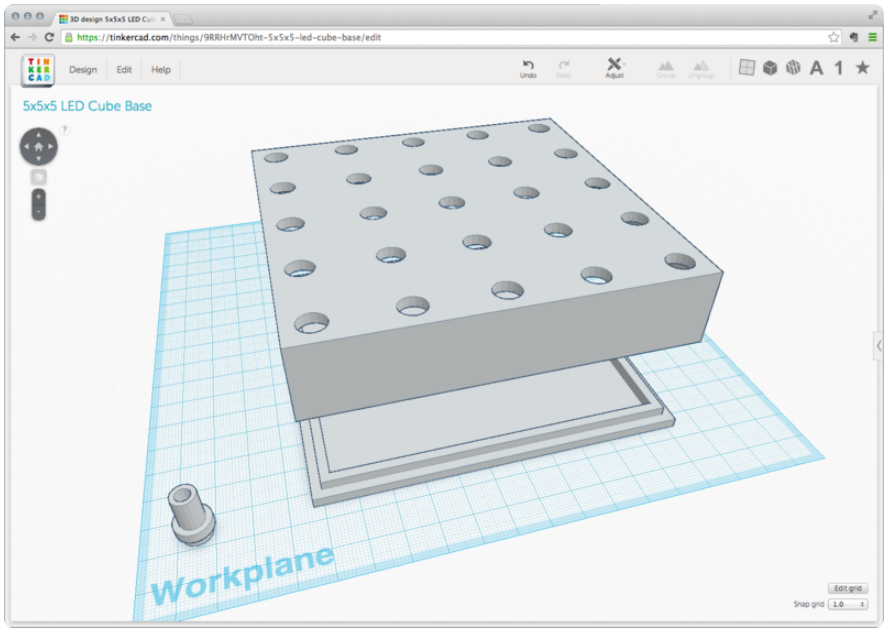
These bases were designed to serve as a soldering template as well as a case for your electronics. You will need one cover, one base, and nine posts.

Print em' up and let's get started!



3D Models (.stl files)

For the 5X5 cube, you will need one cover, one base, and twenty-five posts.

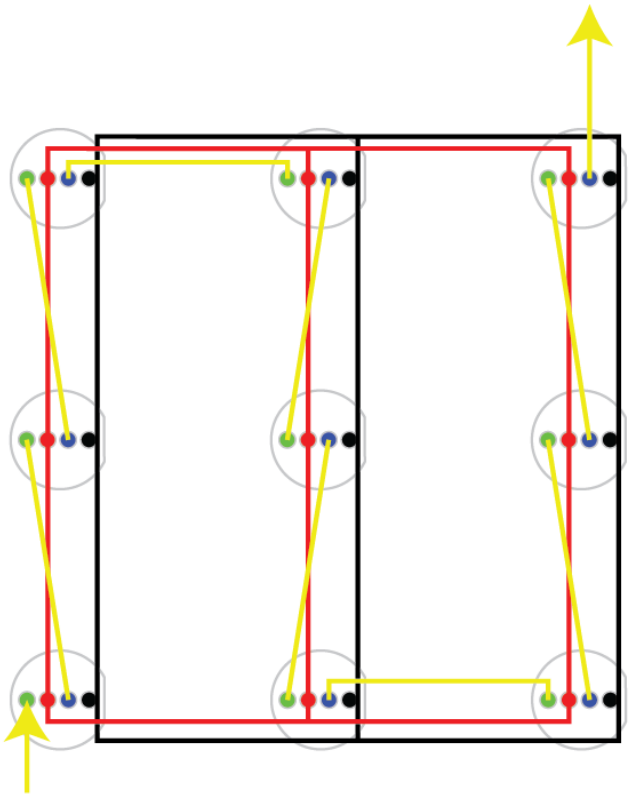


3D Models (.stl files)

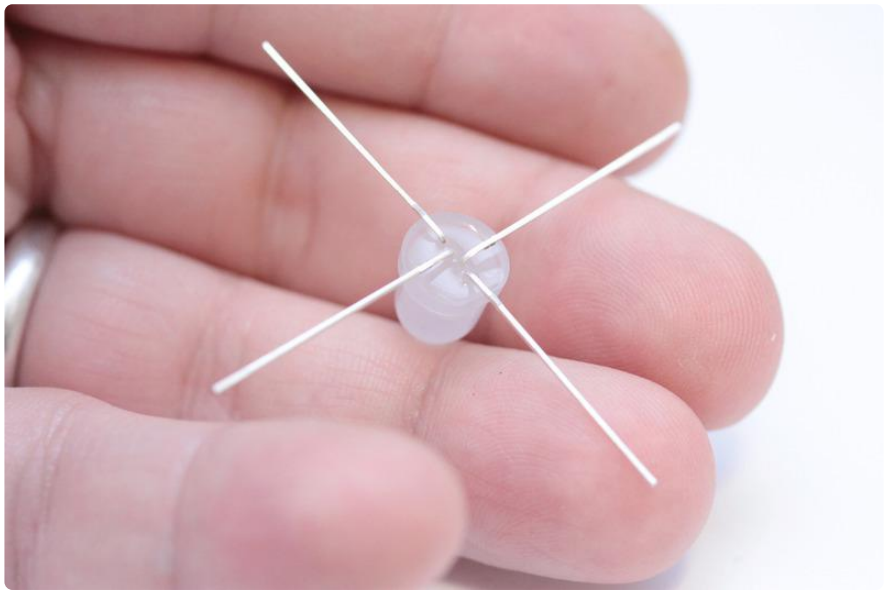
LED Layout

Here are two options to consider for your cube... Soldering Sunday () LEDs have stout legs with a distinct pattern that might help prevent wiring errors.

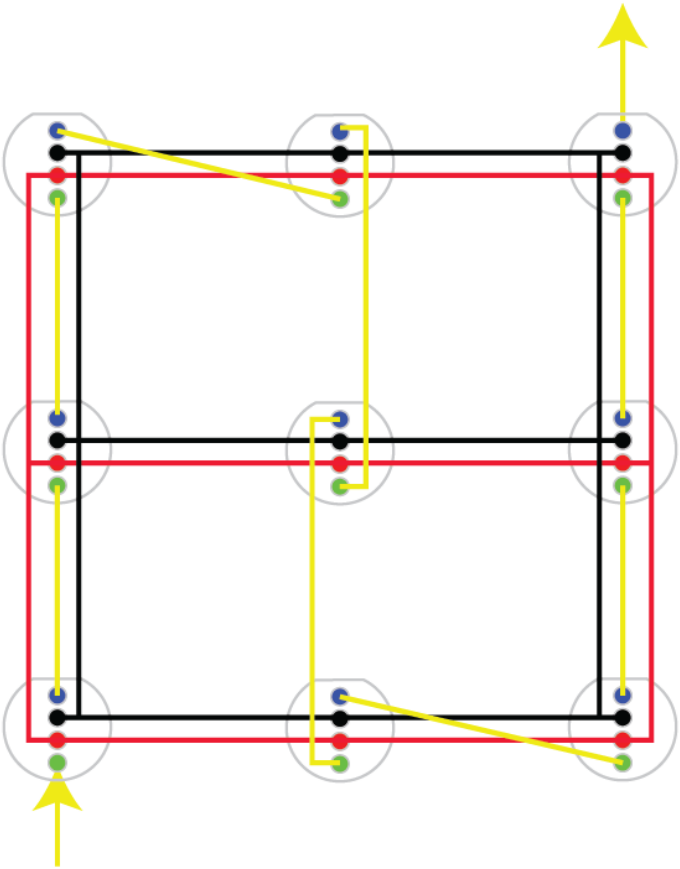
Traces will have to stack vertically to prevent crossing connections... especially the signal.



Adafruit has some nice 'leggy' LEDs (http://adafru.it/1734) that can help simplify ground / power connection hook-up.

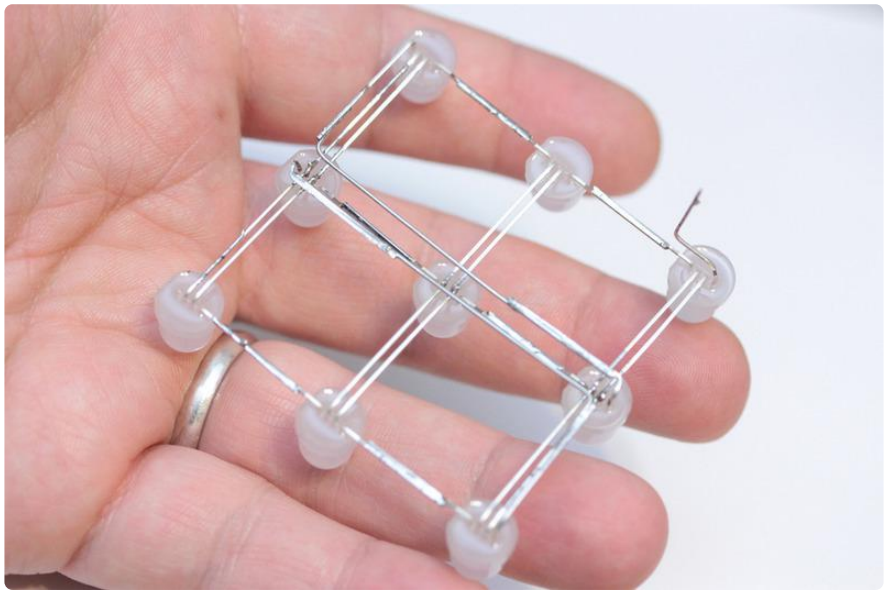


If the distance between LEDs is roughly the length of one of the legs, hook-up of power and ground is going to be easy peasey.



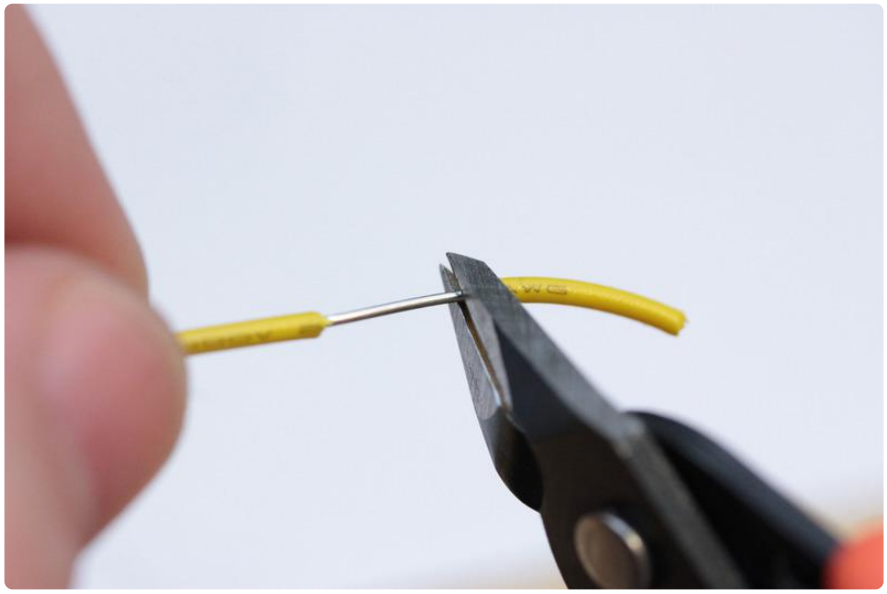
Stack each new level by matching the signal out of the lower level to the signal in of the level above. Add vertical connections for power and ground... completing the structure of the cube.

Be creative... and sketch out a couple wiring diagrams before you start soldering.

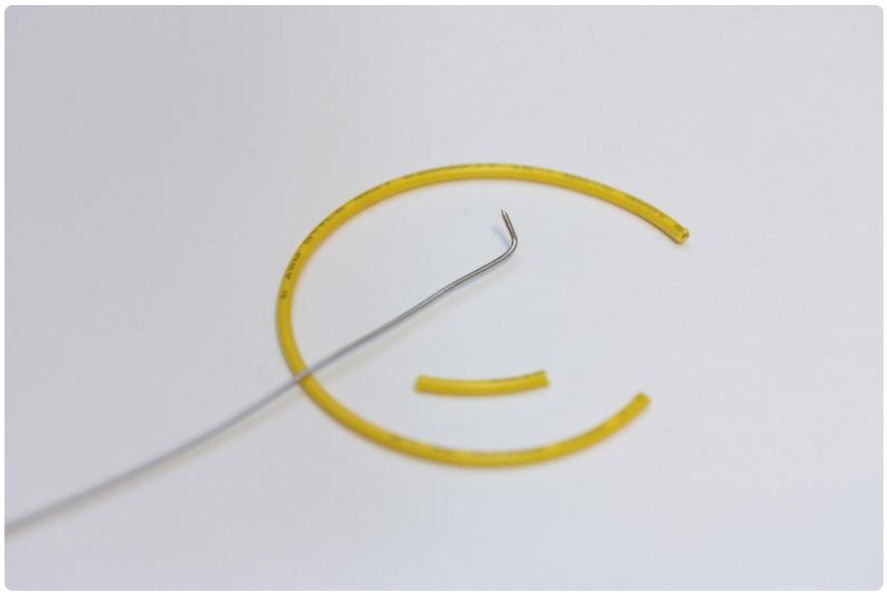


Solder-bling

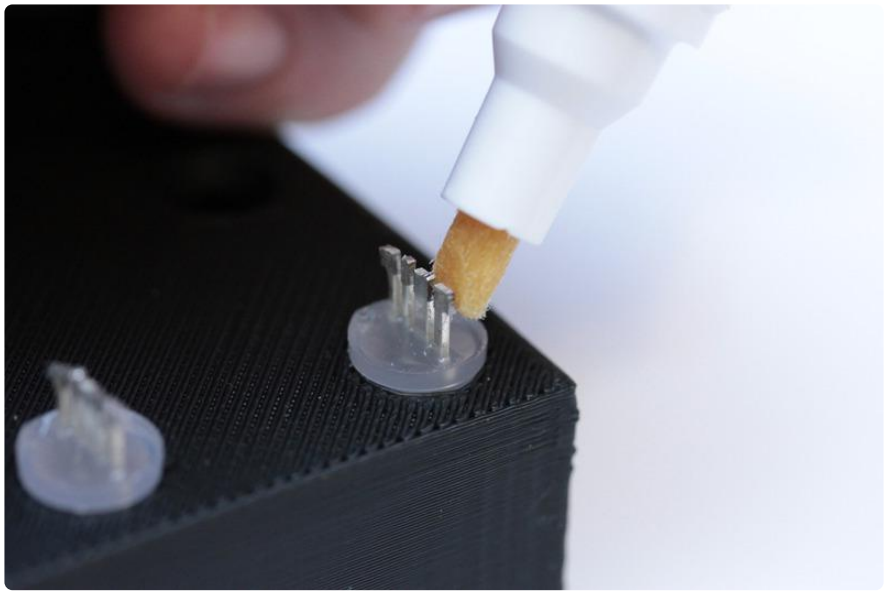
Insulation on the wire will compete with the LEDs visually...



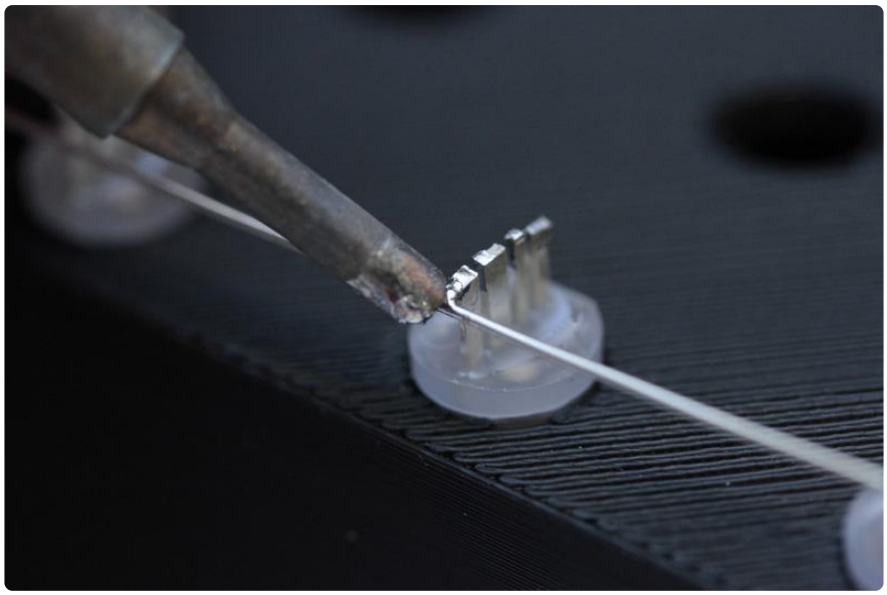
You're going to need a mile of this stuff; make your segments as long as possible.



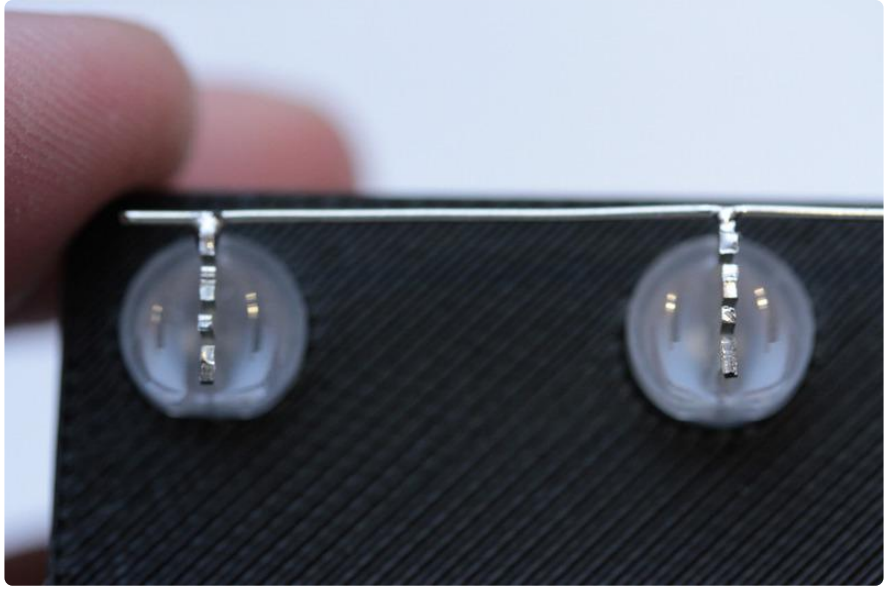
Rosin core solder will work a treat... or you can use a flux pen.



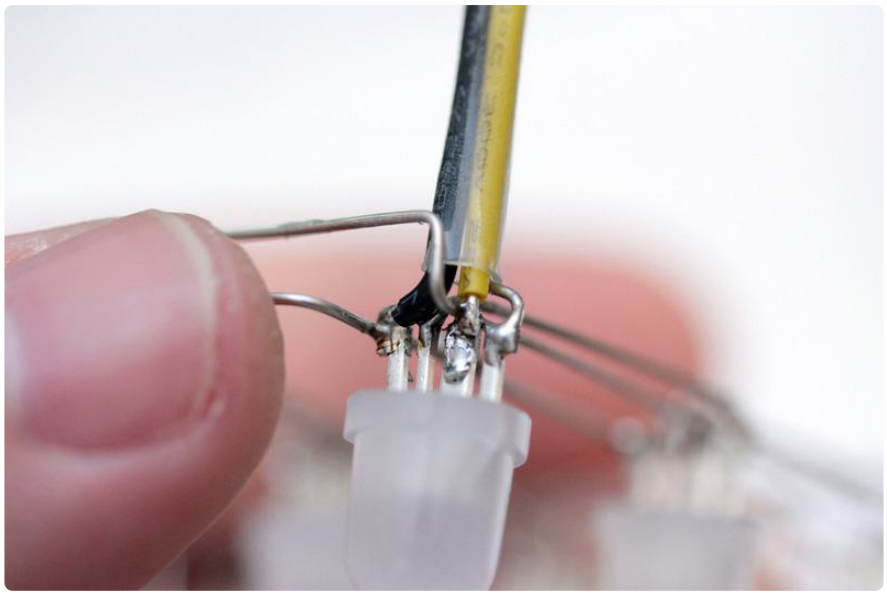
Follow your template as you solder, making sure that each joint is strong and doesn't bridge any of the LED legs.



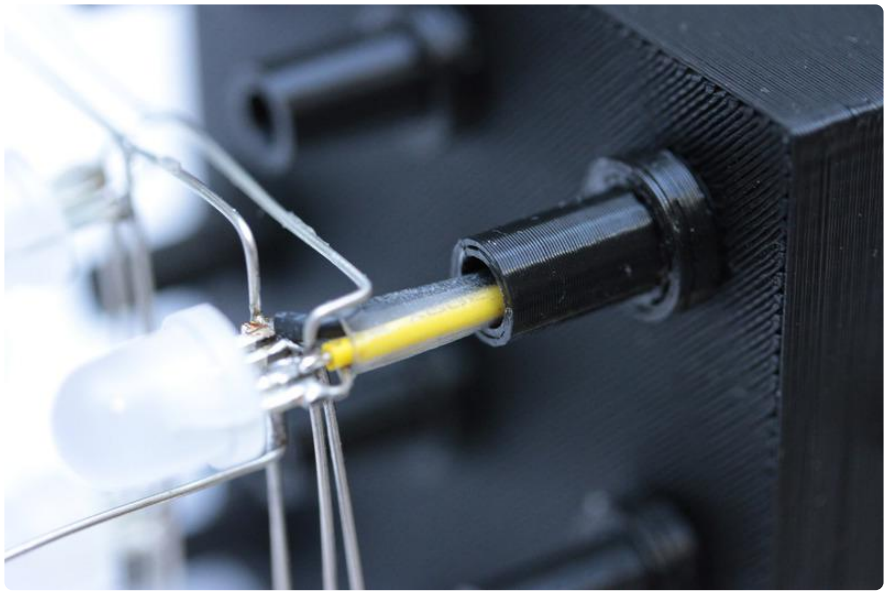
Soldering on the outside gives you a little more space and can help prevent short circuits.



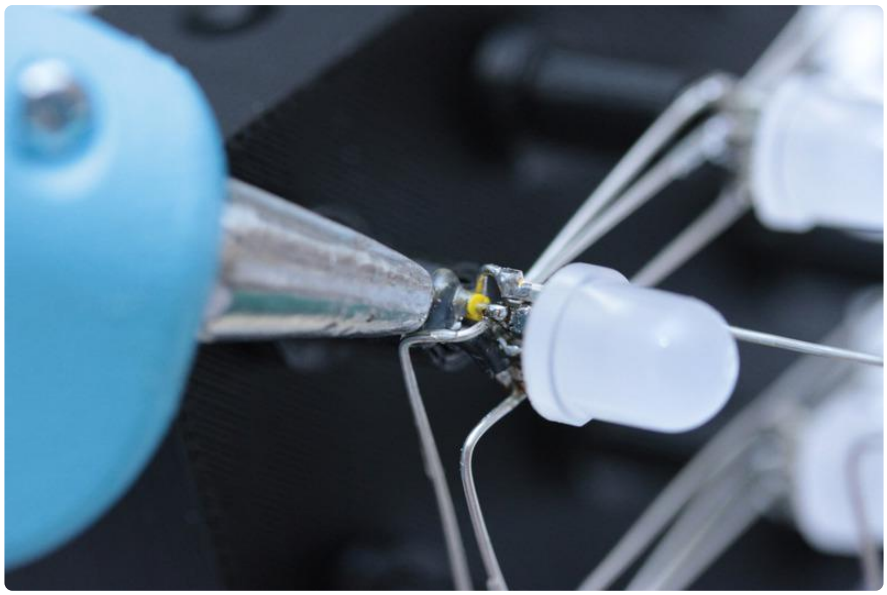
Time to solder the lines that drive your cube: power, ground, and signal-in.



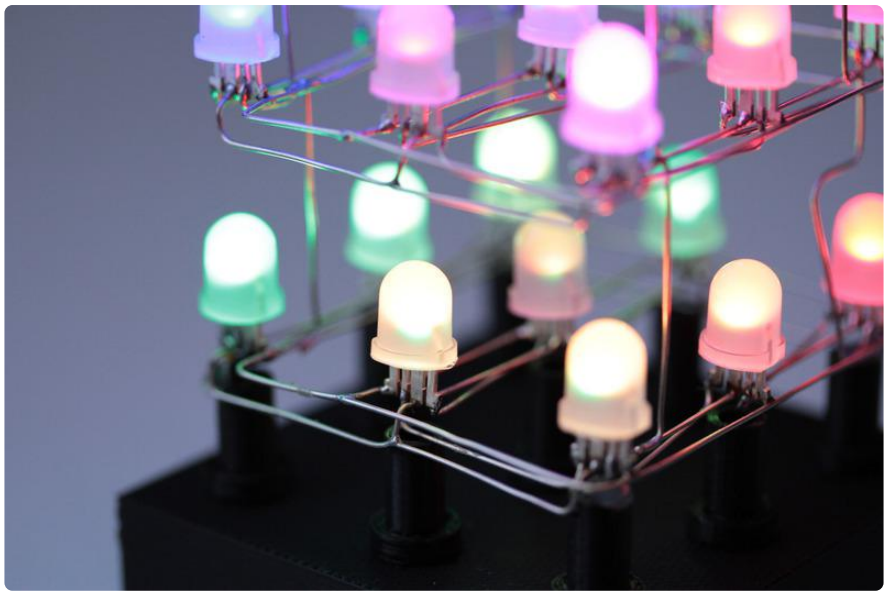
Pass those connections through one of the posts and into the base.



Add a bit of hot glue to each of the corners / posts.

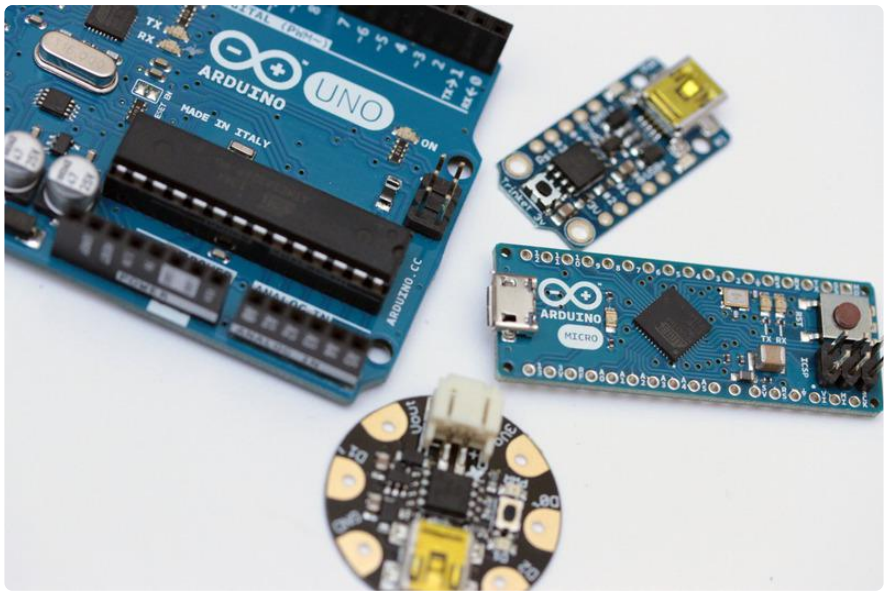


At this point you may want to solder a temporary connection to the cube, and run a 'strandtest' to make sure that everything is hooked-up correctly.



Brainz

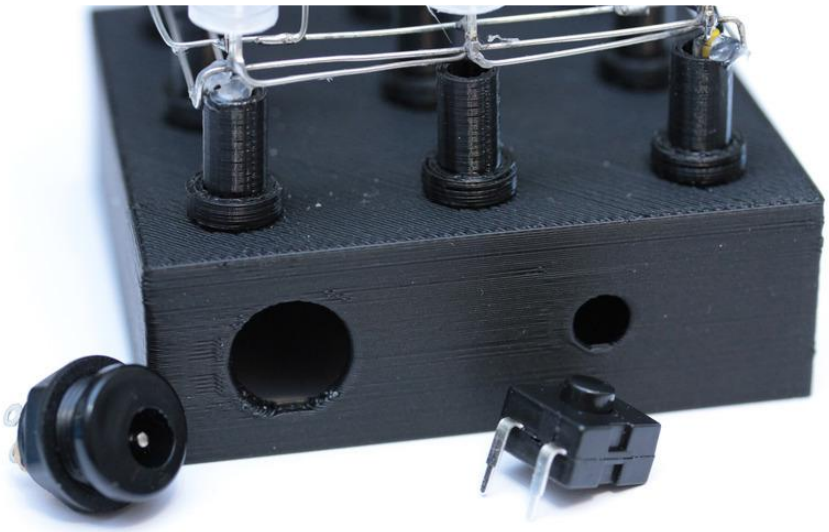
There are so-many awesome choices to drive your cube... Arduino UNO, Micro, Trinket, and Gemma to name a few.



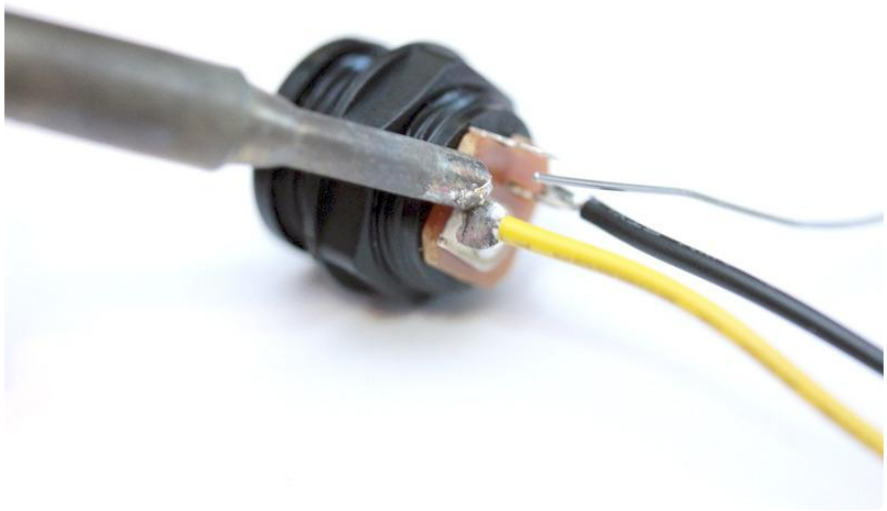
The smaller microcontrollers will fit in either base, whereas the UNO will only fit in the larger of the two.

Let's give Trinket a try!

Grab a barrel socket and your on/off switch.

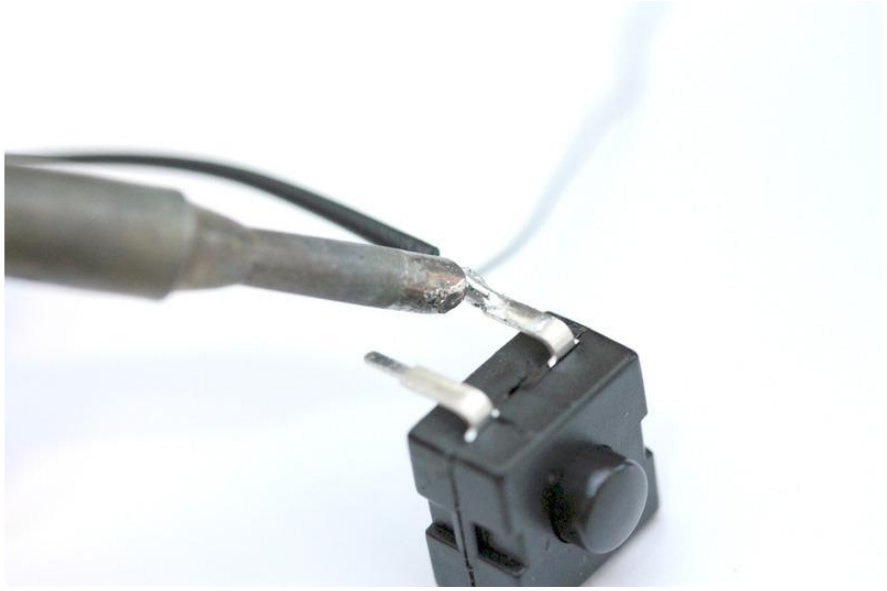


Solder short leads to the barrel connector.



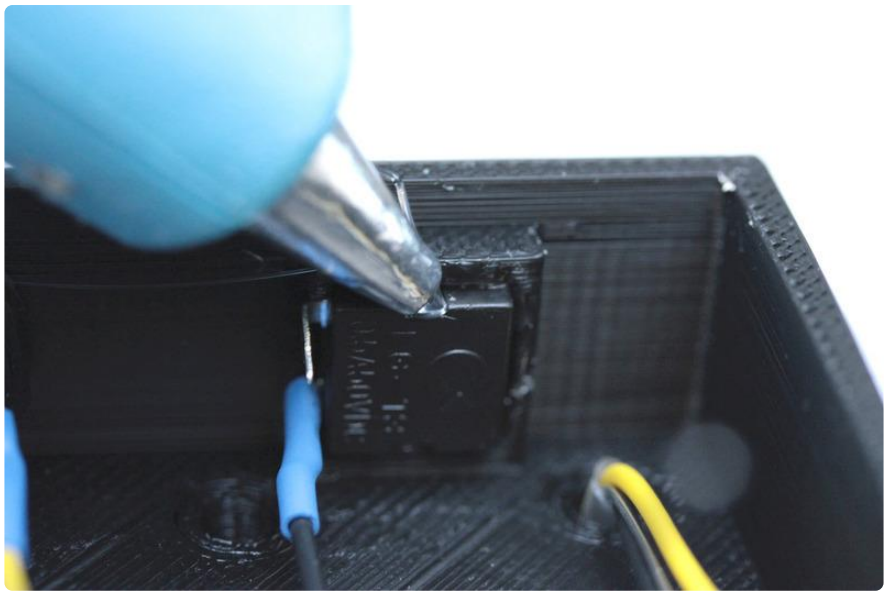
Solder one short ground connector to the on/off switch. The other lead on the switch will combine the ground from the NeoPixels and barrel connector.

We will solder those after these two components are installed in the base.



A bit of shrink-tube makes things look nice and can help prevent shorting.

Install the barrel connector and on/off switch... a little hot glue on both will make things permanent.



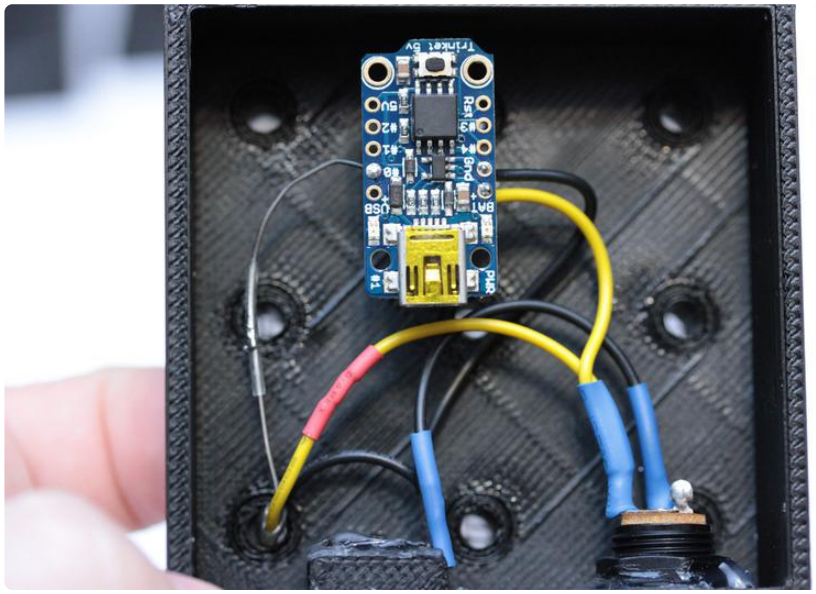
After installing the two components you can finish soldering power and ground through the on/off switch.

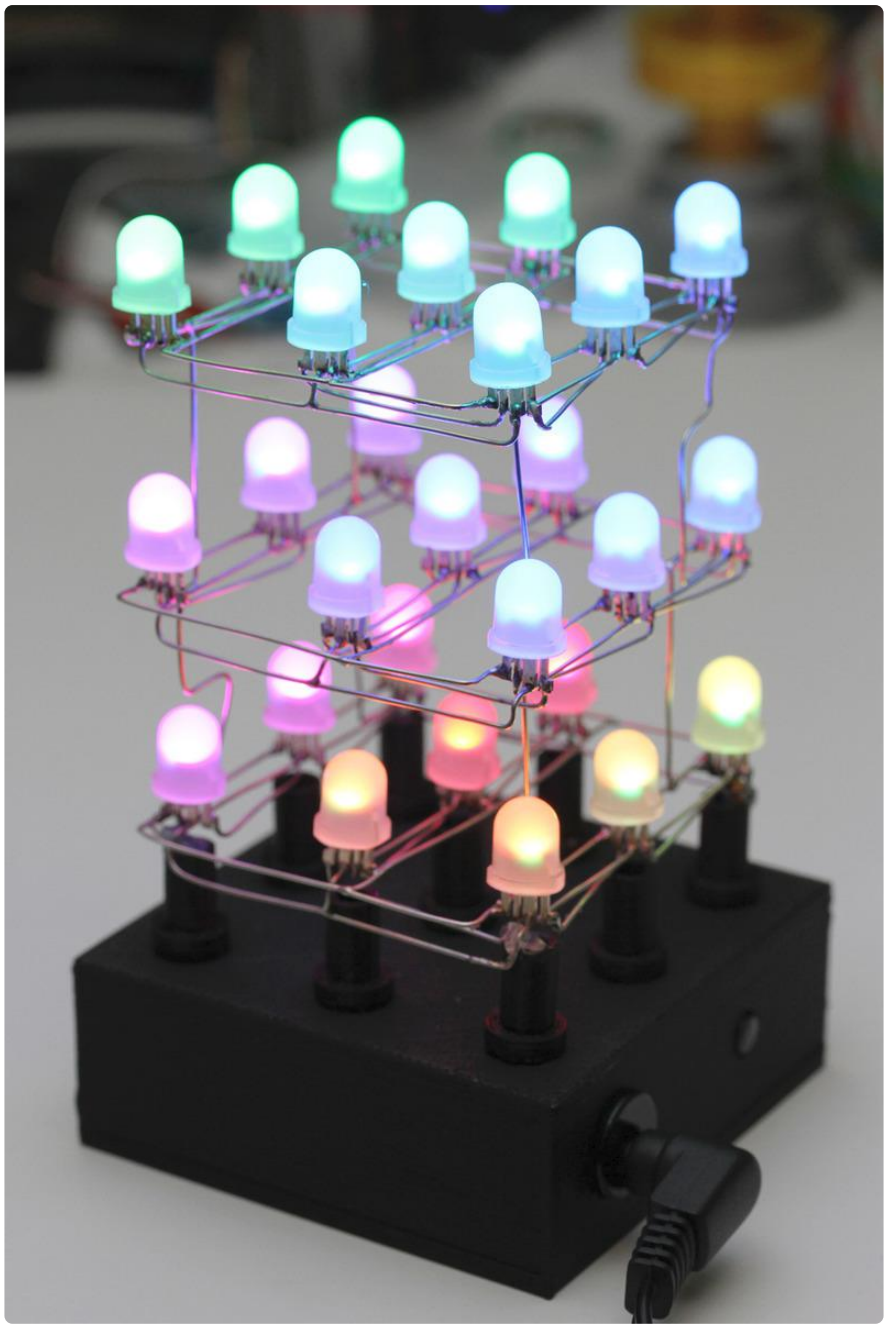
The end-product would look something like this... I made the mistake of cutting some of my wires a little short.

I decided to combine the ground connections on the on/off switch and power on the barrel connector.

- bare wire = pin #0 (NeoPixel signal in)
- yellow = power (BAT pin)
- black = ground

If everything checks-out, glue the base cover in place and lets pump some electrons through this thing!



Light-em' Up

No fancy coding needed to make this cube dazzle everyone... the standard Neo Pixel 'strandtest' does the job nicely!