DIY Christmas Lights

You will need 4 things

1. 12V DC Power supply with enough power to drive the lights
2. Wire
3. Couplers and parts
4. Ornaments and parts

The intent here is to create an adaptable system with simple standards so others can contribute to the project and we can make this more than just Christmas Lights, but holiday or event lights that are configurable to what you want.

We're starting simple with what I guess we can call version 1.0 in time for Christmas 2023 (at least for me, might be tight for others)

Details:

The system is powered by 12 volts. That allows us to keep the current draw down and power a long string of "Ornaments". In some ways it also keeps the component count down on the "Ornaments".

Those 12 volts are delivered on two wires to each "Coupler" which has terminal blocks on either side to both power an "Ornament" attached to the "Coupler" and also pass the power through to any further "Coupler"/"Ornament" pairs.


Illustration 1: Ornament Couplers (Imagine wires between them)

As shown below, each "Coupler" has the two terminal blocks as well as a 2.54mm pitch female header and two holes. The header has 4 pins, but for version 1.0, only two are used. The other two are reserved for future versions and also provide additional connection support.

There are also the two holes. The bottom one (more to the middle) is there for a 5mm bolt and nut to provide additional mechanical support. The top hole is 5mm and is for mounting to whatever structure you are connecting these lights to (i.e. the roof or rafter tails) **Connection method is up to you and I accept no responsibility for damage.**

Back to the header, the layout is [+][nc][-][nc]. If you are off by one, the "Ornament" will get no power. It is also laid out so the "Ornament" hangs below the "Coupler".
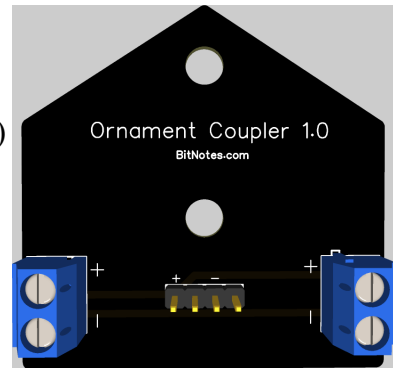

Illustration 2: 3D Render (Note: Header can be either male or female, but Ornament must be opposite)

Now for the "Ornament"s.

I've designed two as of this writing and both use the same interface.

The first is the E26 Globe or "Ornament 2.0". Version 1.0 was one I did last Christmas and was battery powered so you could just hang it on a tree or put it face up or whatever you want. The problem was it went through batteries very fast because they were button cells and even with the efficiency of LEDs, anything remotely bright sucked them dry in just a few hours. I'll include that one for download if you're interested, but I'm abandoning it for now.
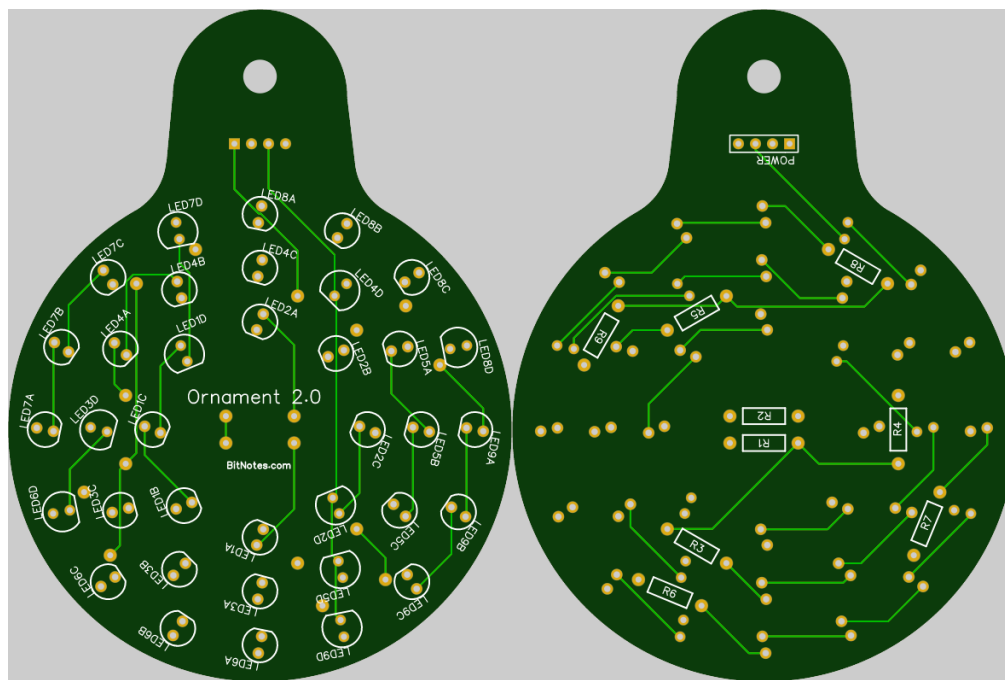
Illustration 3: Globe front and back layout. Note the resistors are on the back.

The Globe has three concentric rings. Each has it's own set of resistors to set the current. Each ring can

be powered in part, in full or in combination with other rings. It's up to you. The innermost ring has two strings of 4 leds in series, the middle has 3 strings and the outer has 4 strings for 16 LEDs. For my first display I'm simply populating the ornaments with 7 different colors and varying which ring is lit. This should result in a rainbow wave of circles.
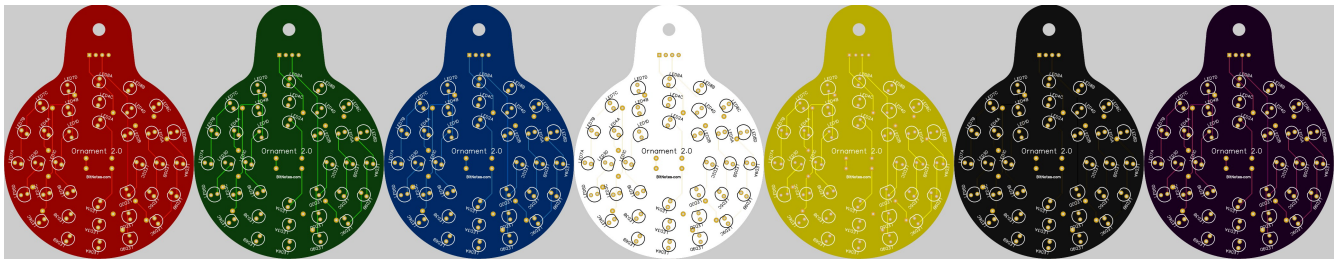
Illustration 4: Ornament 2.0 in multiple solder mask colors

There is also the "C9" shaped bulb or a candelabra shape. That has 4 parallel strings of 4 LEDs in series, each with it's own resistor.

NOTE: I just realized that the mounting hole doesn't match spec, so the downloadable version will be 1.1.
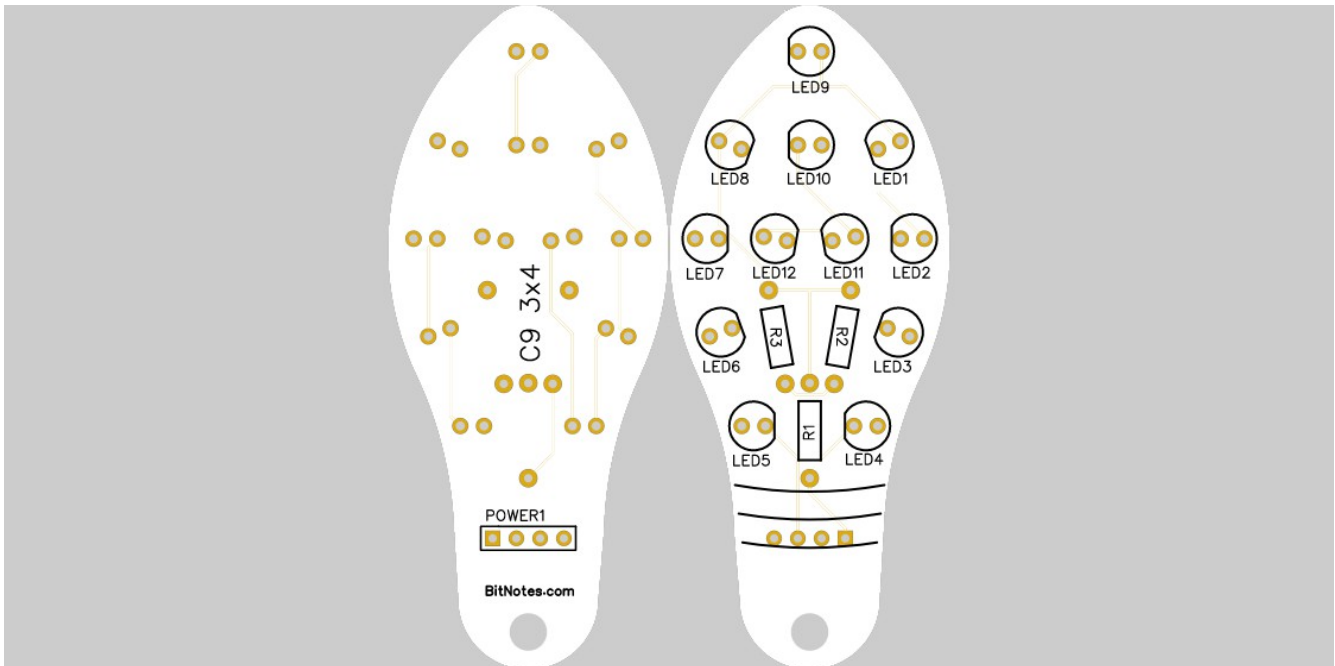
For version 1.0, I'm sticking to just solid colors to see how it all works and so I can get them up in time.

Maybe version 2.0 can have some rudimentary animations and different shapes. (Icicles?)

Gerber files and the latest version of this document are available for download at BitNotes.com.

Have Fun!