



instructables

LED Xmas Tree!



by ThomasVDD

Christmas is not the same without a Christmas tree; but as I live in a dorm room, I don't have the space to put a real one. So that's why I decided to make my own Christmas tree instead!

I've wanted to experiment with edge lit acrylic for a while now, and this seemed a good project to try it out.

The idea is that you shine light on the edge, and that it refracts on any imperfections (scratches or engravings) in the acrylic; thus lighting up the plexi. I wanted to go one step further and make it dual color: a green tree, with a red star on top!

Let's get building!



Step 1: Parts & Tools

Parts

- Acrylic (PMMA / Plexiglas) sheet
- Green LED 5 mm x4
- 82 Ohm resistor x4
- Red LASER pointer
- Micro USB breakout board or USB cable
- Prototyping board

Tools

- Soldering Iron
- Drill
- Sandpaper (coarse grid)
- 3D printer (for the base)
- Laser cutter (for the acrylic)



Step 2: Electronics

To light up the acrylic, we'll need some - you guessed it - lights!

We'll use both green LEDs and a red LASER module for the dual color effect.

The idea is that the LEDs will light up the bottom part of the tree, while the laser will cover the top part, since the beam is more focused.

$$R = U/I$$

$$R = (\text{USB voltage} - \text{LED voltage})/\text{LED current}$$

$$R = (5V - 2.5V)/30\text{mA}$$

$$R = 82 \text{ Ohm}$$

Solder the resistor to the negative side of the LED, and connect the other leads of the resistor in a circle.

Take apart a cheap laser pointer and take out the LASER module itself (this also includes the lens).

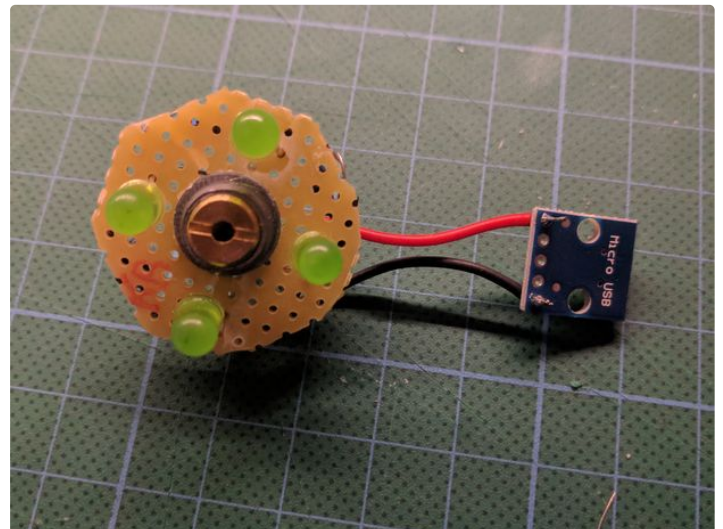
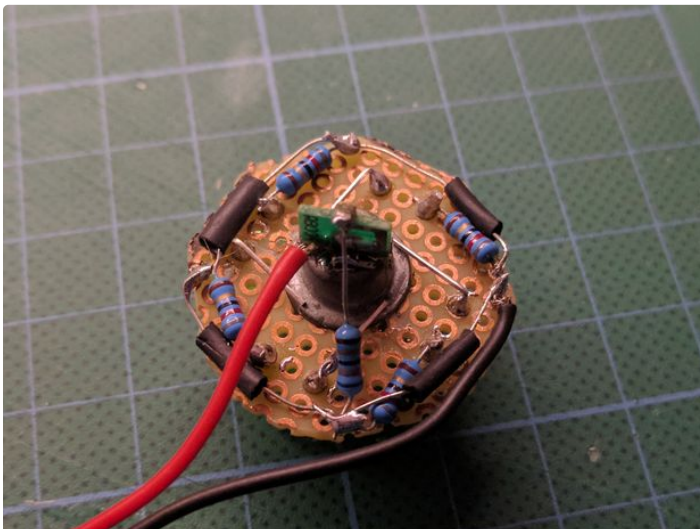
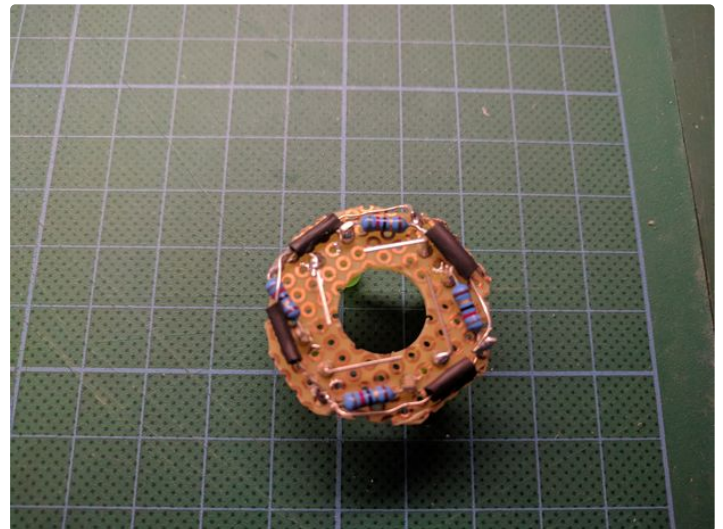
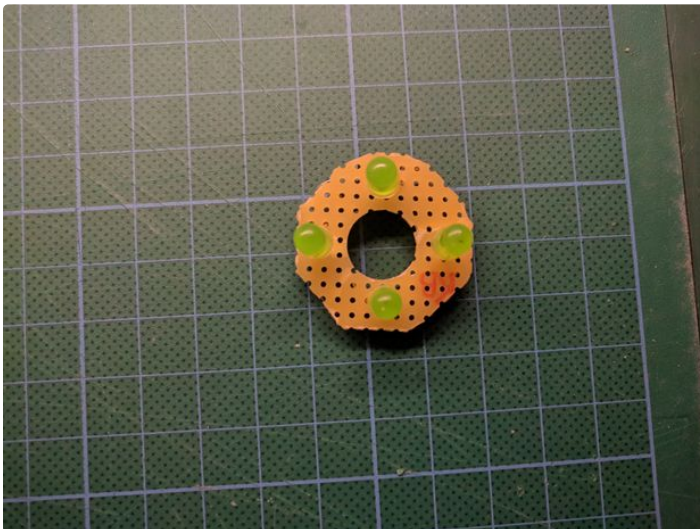
Start by cutting a piece of perfboard of 13x13 pads and drill a 12 mm hole in the center. Then insert 4 LEDs into the holes and solder them in place. They should not touch the perfboard, but hover about 2 mm above it.

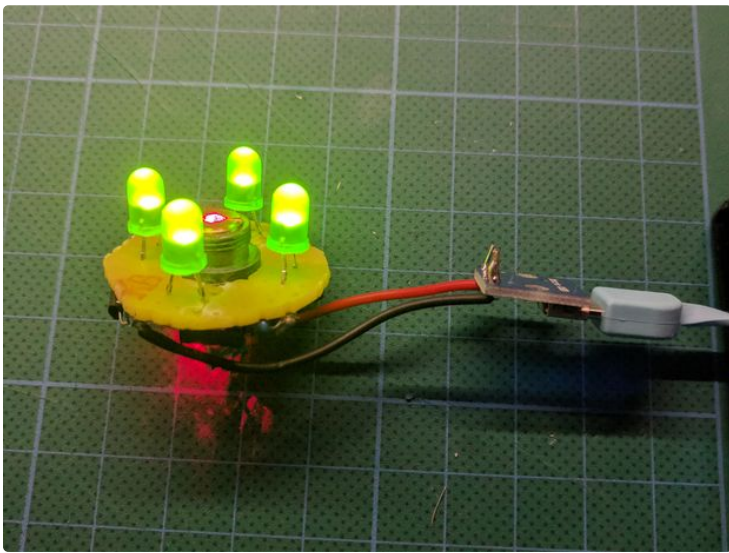
It's now time to add the current limiting resistors to the LEDs, which can be calculated by Ohms law:

Mine had a metal casing, which happened to be the positive terminal.

We can now insert the LASER module into the hole and bend the positive leads of the LEDs onto it.

Finish off by connecting the positive and negative leads to the micro USB breakout board. Also test if everything lights up as expected.





Step 3: Mechanical Build

Now that we have the electronics out of the way, we will make the piece that will actually light up.

Cut the pieces out of 3 mm acrylic. If you have access to mat acrylic, that's the easiest way to go. Otherwise, take clear acrylic and sand the surface such that it becomes mat and will refract the light.

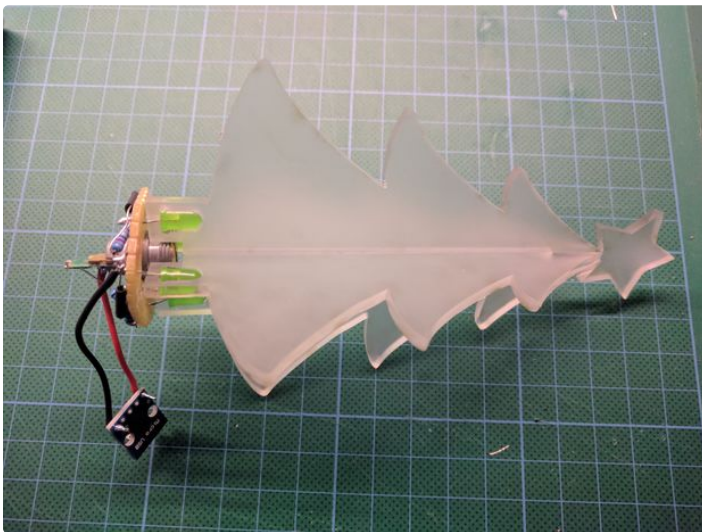
Slide both pieces into one another and fit them over the LEDs. This is most easily done with a twisting

motion. Wrap some black electrical tape around the LEDs to contain the light.

The next step is assembling the base. Print out both parts; be careful: they are mirrored versions of each other, don't print the same one twice. Now insert the assembly we made before into the base.

That's all there is to it!





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Step 4: Test & Enjoy!

We're done! The only thing left to do is to test our new Christmas Tree.

Insert a micro USB cable into the tree and enjoy the mood lighting! While its not a big tree, it sure gives some Christmas vibe :)

I hope you liked the project and are inspired to make something similar. Feel free to check out my other instructables!

