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Overview

Making Cosplay Props with 3D Printing + DIY Electronics

Build a creepy cosplay prop with a 3D printing, copper filament and simple electronics! This prop features a built-in trigger that actuates a momentary push button to make an eerie red glow. This guide will walk you through the steps of 3d printing, polishing, soldering and assembling of this project.

Project Expectations

This project is geared towards makers who have basic 3D printing skills and access to a 3D printer. The circuit is very beginner friendly and easily to solder. The 3D parts were designed for large build platforms. The large parts can be split to fit smaller pieces using a tool like MeshMixer from Autodesk. Printing these parts can take up to 24 hours and about 100 grams of material.
Parts

Below is a full list of parts needed to build this project. Be sure to check out the featured products on the right sidebar.

- PLA Filament
- 3D Printer
- copperFill (http://adafruit.it/2128)
- NinjaFlex
- Blue tape (http://adafruit.it/2416)
- Rechargable coin cell (http://adafruit.it/1572)
- Copper foil tape
- 10mm LED
- 6mm Tactile button
- #2-56 3/8 phillips screws

Tools & Supplies

You’ll need a couple of hand tools and accessories to assist you in the build.

- Hakko Flat Pliers
- Flush diagonal cutter
- Scissors
- Knife jimmy (http://adafruit.it/2414), Spatula or Palette Knife
- Dremel polishing kit
Circuit Diagram

10mm LED

The long pin is soldered to the (red) positive wire. The other end of the red wire is soldered to copper tape. The piece of copper is tapped to the positive side of the coin cell battery.

The short pin is soldered to a shorter (blue) negative wire. The other end is soldered to the tactile button.

6mm Tactile Button

A longer (blue) negative wire is soldered to another one of the leads on the button. The short (blue) wire is soldered to lead on the button. The two wires on the button should be diagonally apart.

LIR2450 Coin Cell Battery

Copper tape has an adhesive backing, peel a small portion and stick it on the positive and negative side of the coin cell battery. Leave some of the backing on so the copper doesn’t touch the side of the battery.

3D Printing

PLA Filament

These parts are optimized for printing in copperFill and PLA material. The parts print best without any supports!
Download STLs on Cults3D
Download STLs on Thingiverse

<table>
<thead>
<tr>
<th>syringe-body1.stl</th>
<th>syringe-body2.stl</th>
<th>syringe-nipple.stl</th>
<th>syringe-bottle.stl</th>
<th>syringe-needle.stl</th>
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</thead>
<tbody>
<tr>
<td>@235 copperFill</td>
<td>15% Infill</td>
<td>0.15 Layer Height</td>
<td>3 Shells</td>
<td>5 Top Shells</td>
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<tr>
<td>60mm/s Print Speed</td>
<td>120mm/s Travel Speeds</td>
<td>body1 and body2 pieces take about 3 hours to print each.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>The ninjaflex nipple takes about 45 minutes to print.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Needle parts each take about 30 mins to print.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Bottle part takes about an hour to print.</td>
<td></td>
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</tbody>
</table>

Slicing Software

The recommend settings above should work with most slicing software. However, you are encouraged to use your own settings since 3D printers and slicing software will vary from printer to printer.
Clean up

Prepare the cavity for the tactile button by removing any material around the actuator. It should freely move when the trigger handle is squeezed.

Test snap fit

Use a hobby knife to remove any material around the walls of the cavity and then test fit the snap fit tolerance with the 6mm tactile button.
Prepare standoffs

Tweezers or a small screw driver can be used to slightly enlarge the mounting holes for the standoffs. This will make it easier to create the threads inside the standoffs.

Thread mounting holes

Use #2-56 3/8 screws and small screw driver to create the threads inside the standoffs.

Make sure the threads are straight and not skewed!
Polishing

Polishing brushes and buffs

The white detail abrasive brush, the 280 and 320 grit abrasive buff found in the Dremel polishing kit had the best polishing results.

Polishing speeds

Use the slowest speed on your rotary power tool to polish the surface without damaging base layer.
Polishing techniques

Start with the 280 grit (it's the hardest brush to squeeze.) Use the slowest speeds on the Dremel and begin smoothing out the layers by blending them together. Use a back and forth motion as you polish along the seams.

Focus on one section at a time, try to blend the layers together and go back over sections to even out the surface.

After smoothing out the ridges from the surface, polish each area a second time to bring out more of a metallic shine.
Switch to the white abrasive brush for the contours and hard-to-reach areas.

Polishing compound

The Dremel polishing kit includes a polishing compound. Apply to the surface using gloves. Rub it into the surface to fill in any holes.
Buff

Use the 320 grit abrasive buff to finish and smooth out the surface. The buff really adds contrasting tones to the overall look of the parts.

Comparision

Comparing the surfaces of these parts you can really see how well the polished part comes out. Definitely worth the time finishing your copperFill prints. A great alternative to the rotary tumbler.

Assembly
Measure wires

Lay the wire on top of the handle part and measure how long each wire needs to be for the button, LED and battery.

Tin wires and copper tape

Measure a piece of copper tape. Be careful not to remove the backing. Use a helping-third-hand to assist while tinning. Add a small blob of solder to tape and then solder the measured silicone-coated wire to the ends of the tape.

LED

Solder the negative and positive pins of the LEDs. Use heat shrink to seal the wires.
Coin cell connection

Peel and cut a small portion of the tape backing. Use the sticky side to connect to the positive and negative sides of the battery.

Make sure the backing is over the portion of the tape that touches the sides of the battery.

Fit circuit into body

Insert the tactile button into the cavity right behind the trigger. Carefully bend and tuck the wires into the shelled part of the body. Align the LED to the rear of the handle. Insert the coin cell battery into the half cylinder at the bottom.
Secure tactile button

Apply hot glue to the back of the tactile button to securely hold it in place.

Make sure not to get any glue on the actuator.

Assemble Needle

Apply a small amount of E6000 to each half of the needle. Clamps or binders won’t hold the two pieces in place, so instead hold them together for about 5 minutes until stick.

Put on a pair of gloves before handling E600! Avoid skin contact with this adhesive.
Attach bottle and needle

Add the needle to the front part of the body. Insert the LED into the bottle opening end.

Align both pieces

Fit the second half of the syringe body on top of the first half. Line up the tactile button cavities. Test alignment by checking the trigger to see if it actuates push button and LED. If it doesn't, double check your wiring and ensure the tactile button is secured in place.

Use #2-56 3/8 screws to attach the parts together. Make sure to tuck in any wires that might have slipped out of the sides while screwing the two pieces together.
NinjaFlex rubber nipple

The rubber nipple part can be printed in TPE flexible material. Caramel () NinjaFlex matches pretty close to copperFill. To allow some of the light to pass through to the tip, we used translucent color, water. Use the change filament option to dual print two different colors!

The nipple part grips the top of the bottle, just slip it right on!

Now you are ready to gather all that ADAM! If you ever need to transport this prop for your next con, you easily can disassemble and reassemble it - just be sure to bring your screw driver! The coin cell battery should last a while but it is rechargeable.