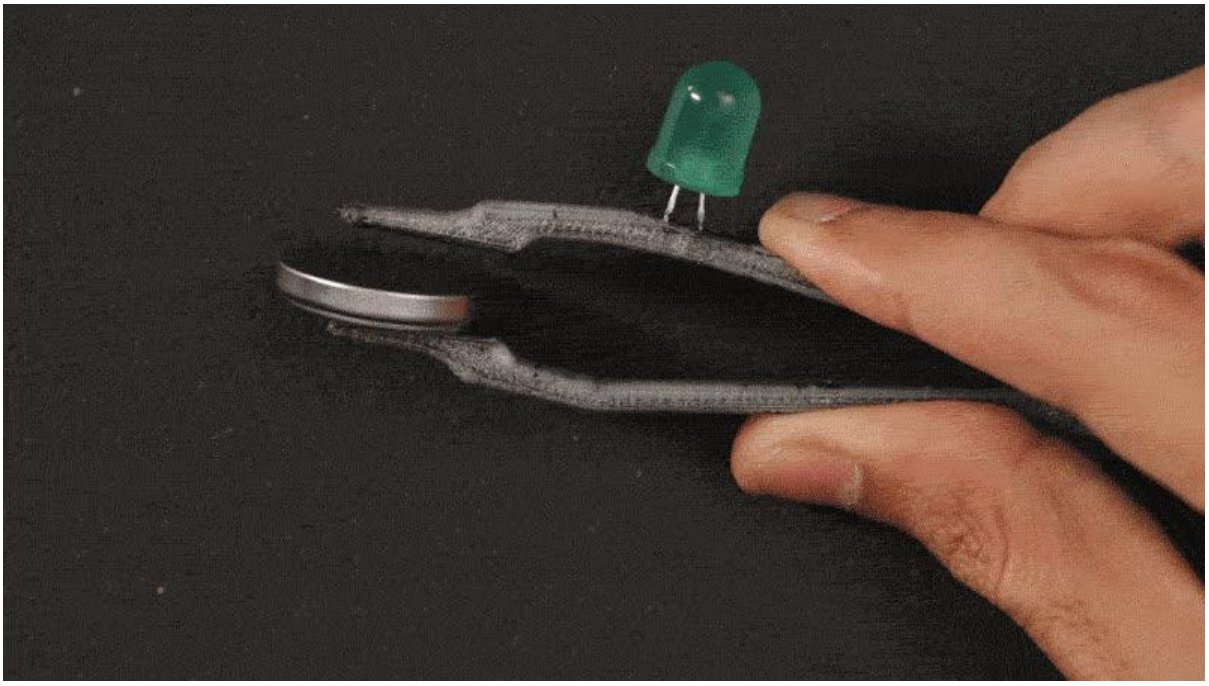
3D Printed Battery Tester

Created by Ruiz Brothers



https://learn.adafruit.com/3d-printed-battery-tester

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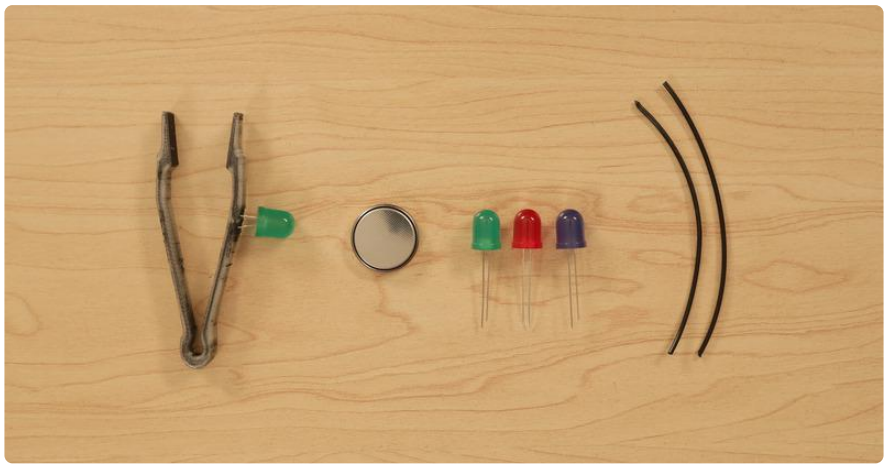
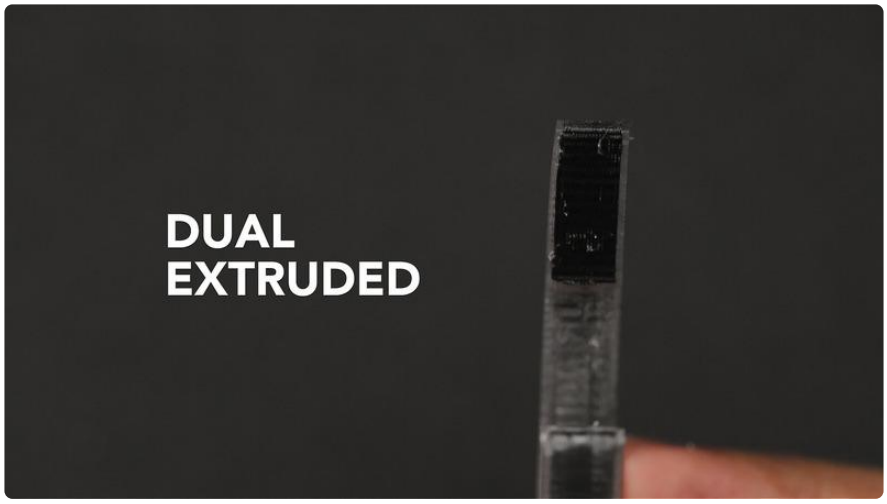
Overview

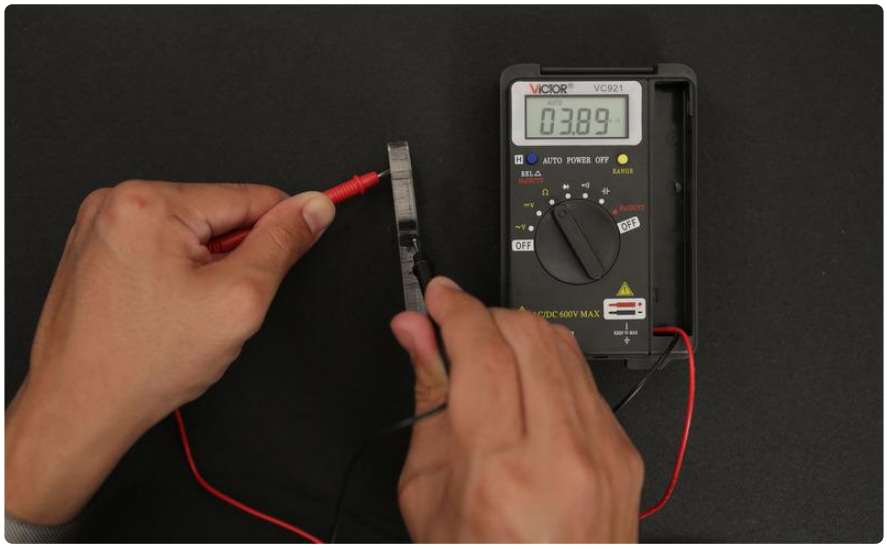


In this project, we'll use conductive filament to create a coin cell battery tester. Using a 3D Printer with dual extruders, we can combine conductive and PLA materials!

This is conductive filament prints like PLA and conductive enough to make working circuits.



Combines with other PLA materials with good layer adhesion. Made from PLA, a dispersant and conductive black carbon. It's a bit more flexible than PLA.



How conductive is it?

It's 30 ohm-cm per centimeter. Thats volume resistivity, which is the resistance through a 1cm x 1cm cube of material. It's resistivity changes depending on features.

3D printed parts perpendicular to layers, through z-layers have a difference of 85 ohm-cm.

Great choice for low-voltage circuitry like capacitive touch sensors and parts that interact with touch screens.
This will easily run a low current arduino, if you're not powering much with it.

Read Proto-Pasts FAQ on Conductive Filament (https://adafru.it/fl8)

Parts

- Diffused LEDs (5mm, 3mm) (https://adafru.it/ck6)or Adafruit LED Sequins (https://adafru.it/dHG)
- Conductive Filament - ProtoPasta (https://adafru.it/2080)
- PLA filament (https://adafru.it/2080)
- Bare Conductive Paint (https://adafru.it/fl9)
- Copper Foil Tape (https://adafru.it/fla)
- LR2450 Rechargable Coin Cell

Tools

- Hakku Flat Pliers (https://adafru.it/flb)
- Hakku Flush Cutters (https://adafru.it/dgB)
- Tweezers (https://adafru.it/flc)
- 3D Printer w/ Dual Extruders (https://adafru.it/d9z)

3D Printing

The parts are optimized to print with dual extruders and no support material. They're oriented in the center.

Download STLs

https://adafru.it/fld

This project was prototyped using the Flashforge Creator Pro.

FlashForge Dual Extruder Profile

https://adafru.it/CfX

trace1.stl trace2.stl tweezer.stl	230c Extruder 20% infill 2 Shells 90mm/s print speed 120mm/s travel speed	about 1 hour

Customize Design

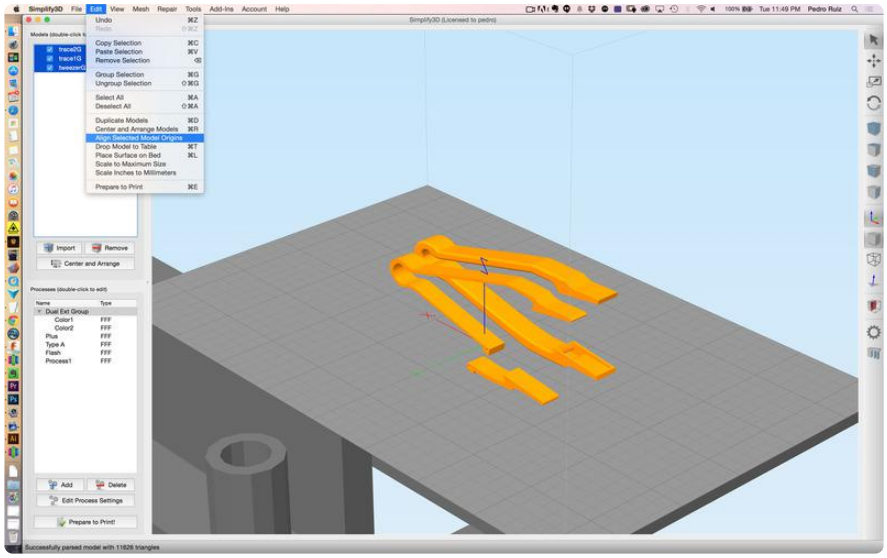
You can modify the original solids in the CAD files to make a custom project.

Materials

The conductive parts can be combined with different types of filament. The most common filaments like PLA, NinjaFlex and ABS will do just fine but you can of course experiement with copperFill, bambooFill, Semiflex, PET and Nylon.

Clean up

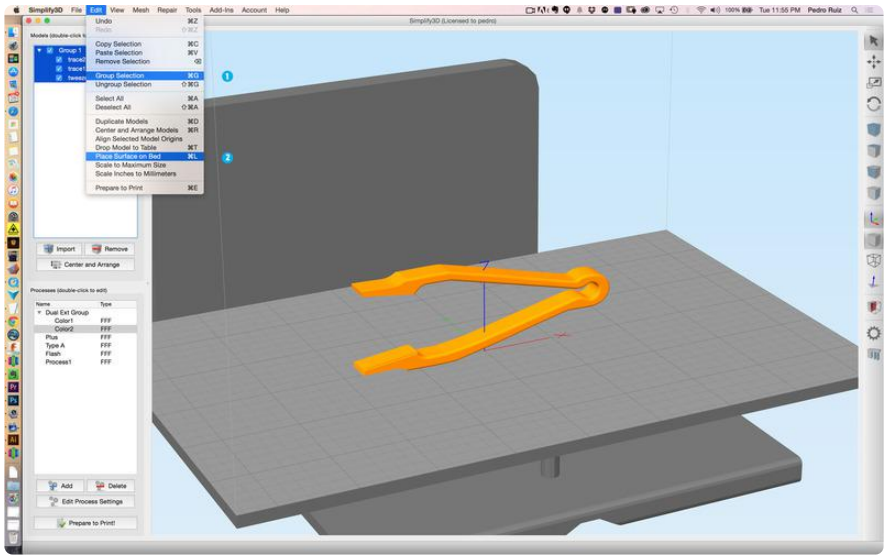
If there's any string or artifacts left over from the ooze shield, clean up the part by trimming them off using a pair of flush snips.



Dual Extrusion Setup

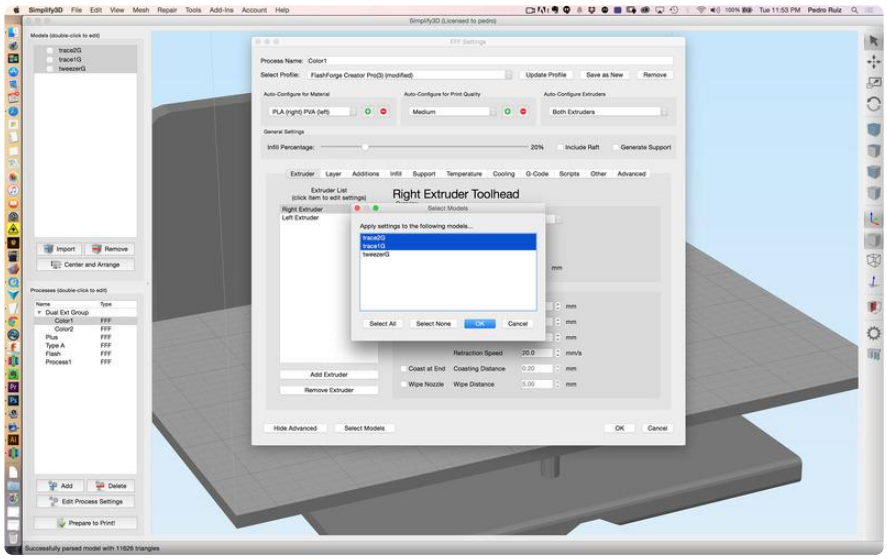
To setup your slicer to print with dual extruders we'll have to first align all of the models. We used Simpliy3D, but the process sould be the same in other slicing programs.

After importing all of the stls into your project, align the model origins under: Edit > Align Selected Model Origins.



Group models

Next we'll have to place all of the stls flat on the bed. To move the objects as one, we'll have to group them together under: Edit > Group Selection.



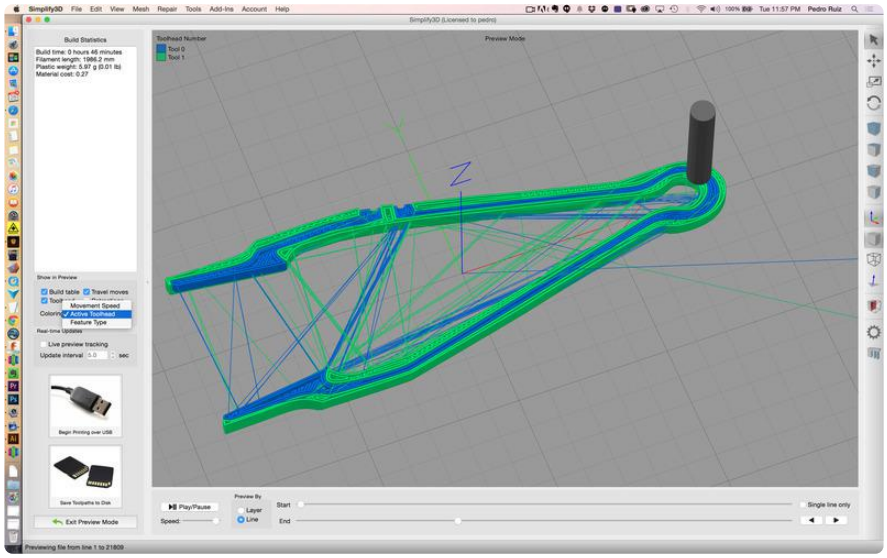
Assigning models to each extruder

Now we'll need to tell each extruder which object to print.

Use the dual extruder wizard under: Tools > Dual Extrusion Wizard to help set up your extruders.

Color 1 is the Right Extruder

Color 2 is the Left Extruder



Verify tool path

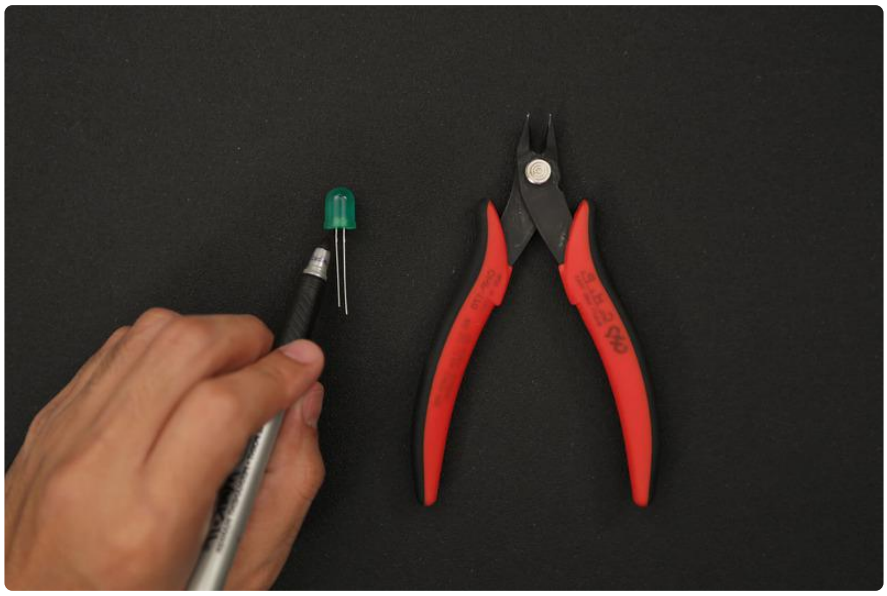
Preview the tool path for each extruder by selecting the Active Toolhead option under the Coloring drop down.

Tool 0 (blue) is the Right Extruder

Tool 1 (green) is the Left Extruder

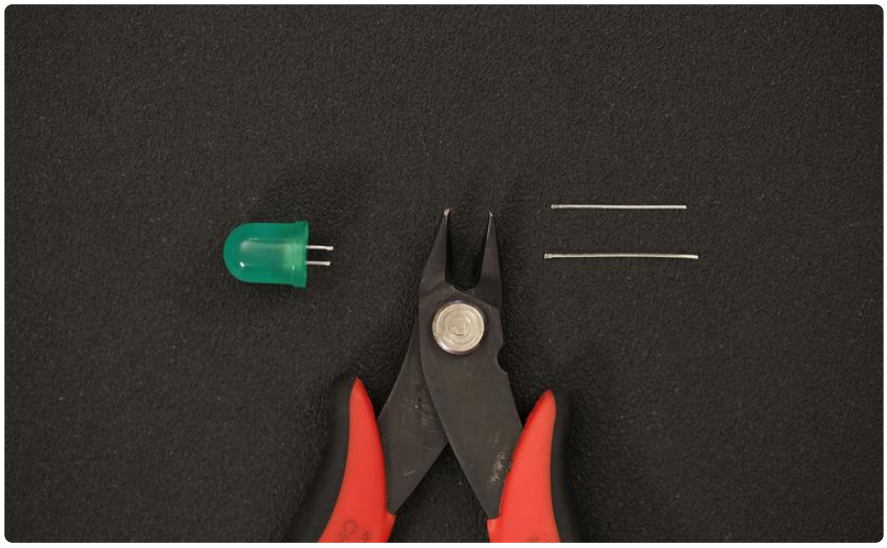
You'll want to make sure that none of the colors overlap each other or the traces will not have a complete path to pass along power.

Assembly



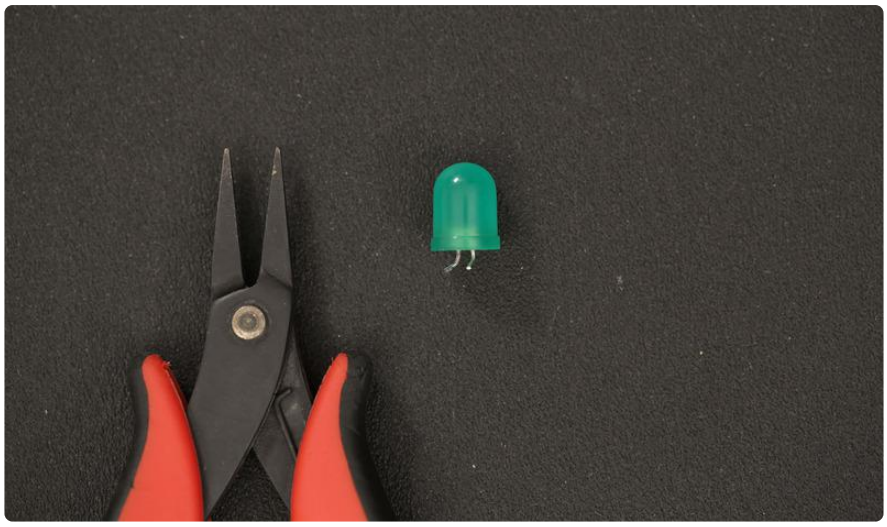
Prepping Standard LED

The tweezer design supports both regular LEDs and the smaller Adafruit LEDs Sequins. If you're using Diffused LEDs with leads, we'll have to cut the leads short to fit into the slots on the tweezer. Mark one the ground lead so you can tell which them a part then they're trimmed short.



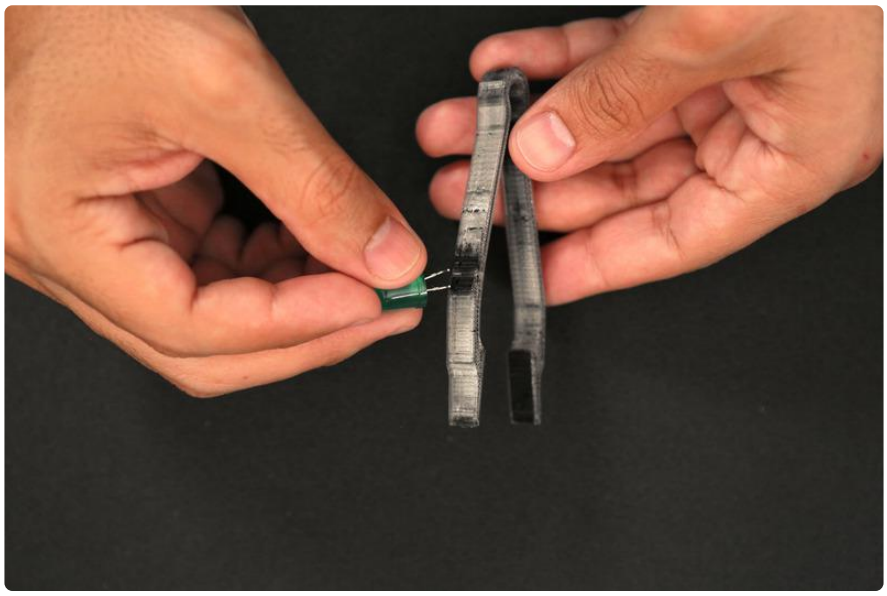
Trim LED Leads

Trim the leads to about 9mm short - these will be fitted into the slots on the tweezer.



Bend leads

Use flat pliers, bend the leads into a 45 degree angle to fit inside the slots.



Attach LED to Tweezers

Insert the leads at an angle so they fit inside the slots. They should have a snug fit.

Ready to Test!

Always check to see which side is positive and negative when testing batteries. You can always mark the end of the tweezers or add + and - symbols by editing the CAD files!

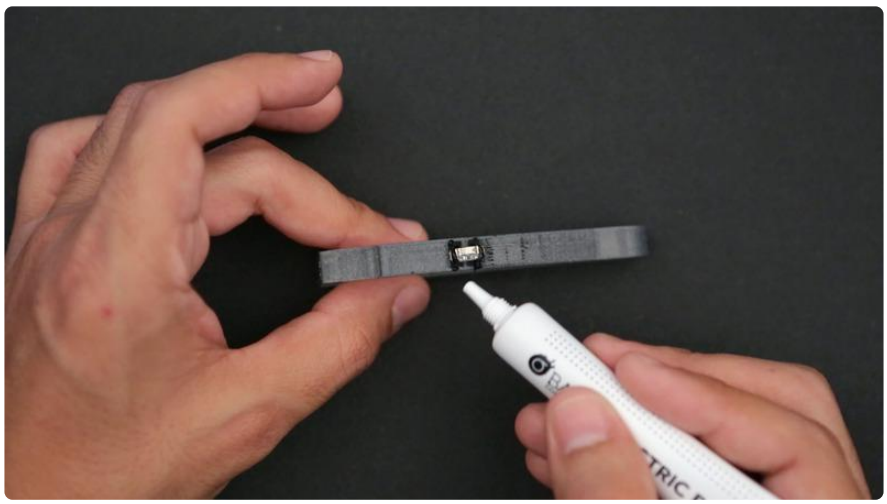
Preparing Sequin LED

The smaller LEDs are easier to attach using a couple of small drops of Bare Conductive Paint.

Make sure not to use a lot, just a small drop or two will make a good connection to the conductive pads on the tweezer.

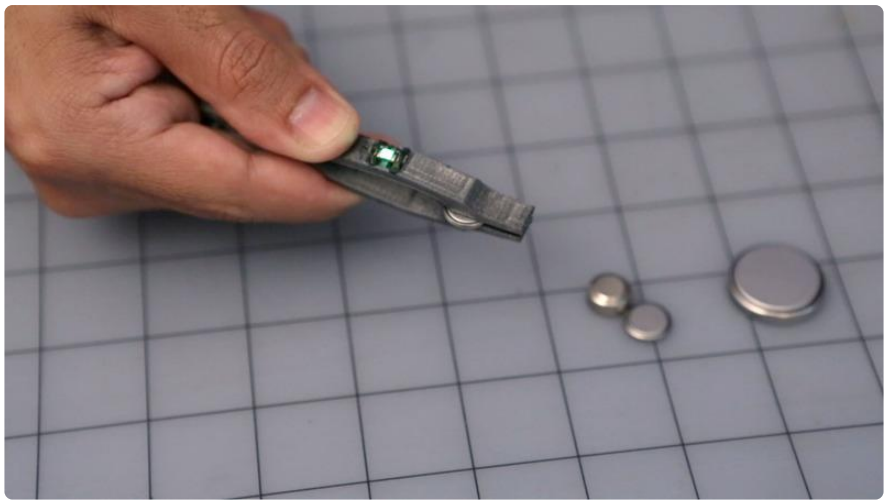
Attach LED Sequin

The LED Sequins are tiny, so use a fine tip tweezer to help position it over the drops of conductive paint. Apply a small amount of pressure to ensure the all of the pads are touching.



Dry time

Let the paint dry for at least 15 minutes. If the LED gets dim, try applying a small amount of conductive paint to the top of the LED Sequin solder pads.



Use it!

You can use this project to test different sized coin cells you might have laying around. Great example of dual extrusion and conductive filament.