



LilyPad E-Sewing ProtoSnap Hookup Guide

Introduction

The LilyPad E-Sewing ProtoSnap is a great way to explore how buttons and switches behave in simple e-sewing circuits before crafting your project. This guide will go over the individual components in the E-Sewing ProtoSnap and how to break it apart to prepare for use in a project. You can follow along with this guide for both the E-Sewing ProtoSnap and E-Sewing ProtoSnap Kit.



LilyPad E-Sewing ProtoSnap

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LilyPad E-Sewing ProtoSnap Kit

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Suggested Reading

If this is your first sewable electronics project, we recommend you read our LilyPad E-Sewing tutorial.



LilyPad Basics: E-Sewing

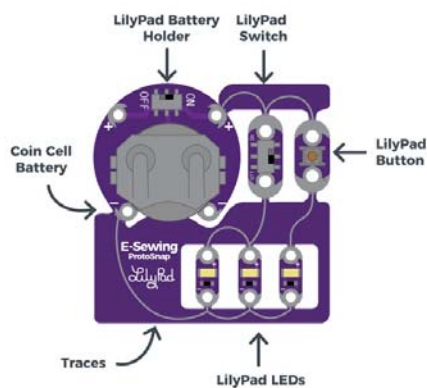
DECEMBER 17, 2016

Learn how to use conductive thread with LilyPad components.

Hardware Overview and Features

⚠ Don't snap apart your LilyPad E-Sewing ProtoSnap until you're ready to use the pieces in a project. If you leave the pieces attached to the board, you'll be able to prototype and test your project before you start sewing.

Like other LilyPad ProtoSnap series boards, the individual pieces of the board are pre-wired - allowing you to try out the function of the circuit before sewing. The E-Sewing ProtoSnap includes three white LilyPad LEDs: two connected to a LilyPad Slide Switch and one connected to a LilyPad Button Board. A LilyPad Coin Cell Battery Holder with a 3V Coin Cell Battery provides the power for the circuit. These parts are connected together by conductive pathways called traces.



Required Materials and Tools

If you are using the E-Sewing ProtoSnap Kit, you will also have:

- Conductive Thread
- Needle
- 9"x12" sheet of craft felt

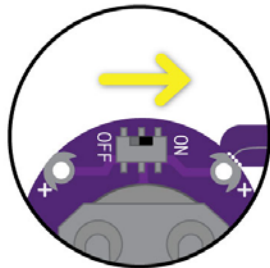
To create a finished project with the E-Sewing ProtoSnap you will also need:

- *Materials listed above (if not using the E-Sewing ProtoSnap Kit)*
- Felt or fabric to stitch your circuit into
- Pen, marker, or chalk
- Scissors
- Hot glue gun (with extra glue)
- *Optional:* Craft supplies for decorating (feathers, sequins, buttons, etc.)

Exploring the Sample Circuit

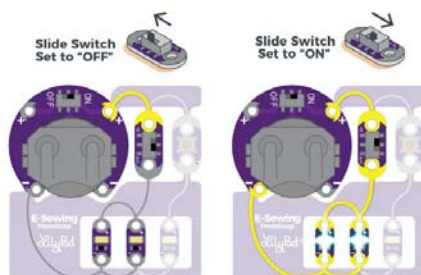
Let's try out the circuit!

The LilyPad Battery Holder at the corner of the ProtoSnap holds a 20mm CR2032 Coin Cell Battery. With the battery installed, slide switch on the battery holder to the ON position.



Using the LilyPad Slide Switch

The LilyPad Slide Switch has a small switch labeled ON/OFF. When moved to the OFF position, parts inside the switch move away from each other and open the circuit (disconnecting it). The LEDs will not light up. When the toggle switch is moved to the ON position, the two sew tabs on the switch are connected, allowing current to flow through and close the circuit. You should see the two LEDs below the switch light up.

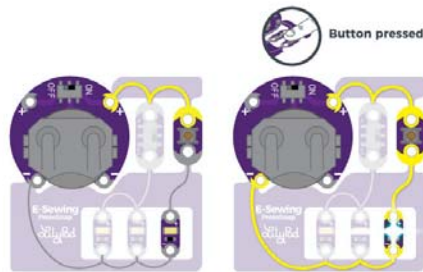


Using the LilyPad Button

The LilyPad Button Board is also a type of switch. The circuit that is connected to the far right LED is open when the button is left by itself. When you press the button in the middle of the board, it connects the two sew tabs and allows current to flow through. When you let go of the button,

the connection is opened again, and the button springs back into place. This button is an example of a momentary switch – it is only active when an action is applied.

This is slightly different from the slide switch, which is an example of a maintained switch, meaning its state remains the same until changed.

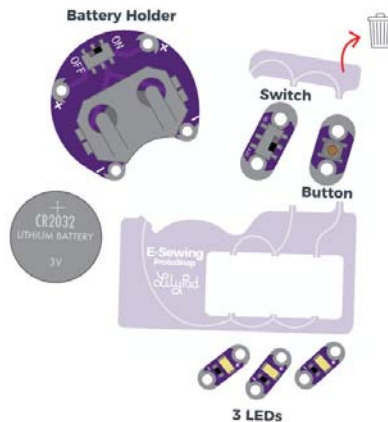


Learn more about buttons and switches in our [Switch Basics tutorial](#).

Stitching into a Project

Ready to sew into a project? First, slide the coin cell battery out of the battery holder and set aside.

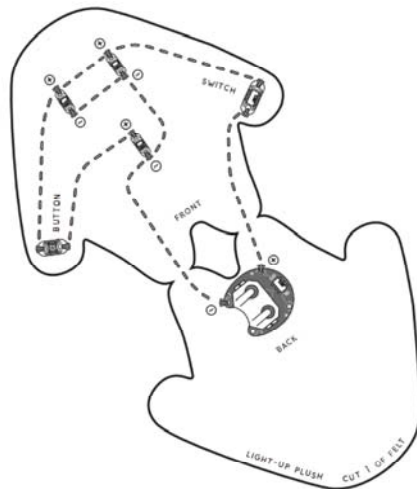
Carefully snap apart the connected components on the E-Sewing ProtoSnap panel to prepare for sewing. Discard the non-sewable pieces and scraps. Use a set of pliers or diagonal cutters if you are having trouble snapping the pieces apart. You will end up with six individual LilyPad pieces: the battery holder with battery, three LEDs, button, and switch.



⚠ Always remove your battery when working on your circuit to avoid damaging your components.

Designing Your Project

Sketch on a piece of paper or arrange the LilyPad pieces on your felt or fabric to form your design. At this point, you can recreate the connections the pieces had in the ProtoSnap format or design your own new configuration. Keep in mind that the positive tabs of the LED must connect to the button or switch in order to be controlled by them. The negative tabs of the LEDs should connect back to the negative tab on the battery holder.



The image above is an example of a project diagram using the E-Sewing ProtoSnap. For instructions and downloadable template, visit the [Light-Up Plush tutorial](#).

When your circuit design is finalized, secure the LilyPad pieces on your project with a small dab of hot glue or fabric glue, making sure not to cover the holes in the sew tabs. Double check the orientation of the LilyPad pieces against your diagram (or template if using a SparkFun design) before gluing.



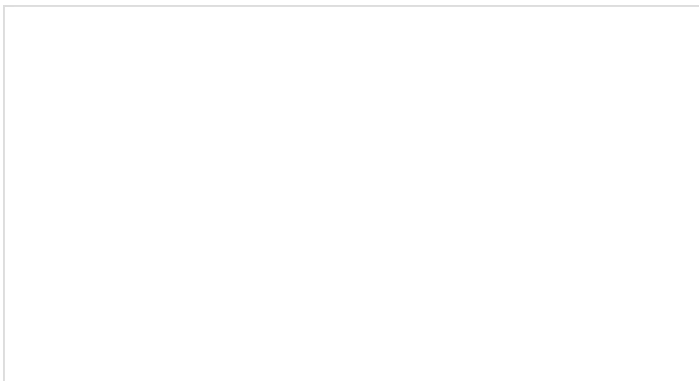


To help you plan your stitch lines, draw your circuit onto the fabric with chalk or a washable marker.



After arranging the circuit, carefully connect each LilyPad component together with conductive thread stitching. Each connection between components should be a separate piece of conductive thread and avoid crossing other stitch lines.

If have never sewn with conductive thread this tutorial covers the basics.



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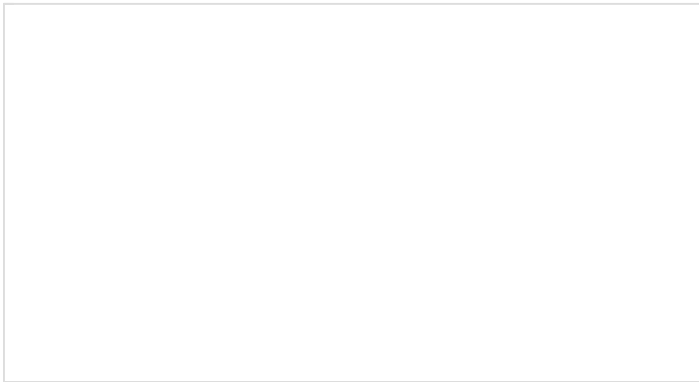
Learn how to use conductive thread with LilyPad components.

Troubleshooting

With any electronics project, there are times you will have to troubleshoot if your circuit isn't working. If your circuit isn't lighting up, try a new battery or check that your project is switched on. Check your sewing for any loose threads or ends that may be touching other parts of your circuit and causing a short circuit. Learn more about troubleshooting your project in the LilyPad Basics: E-Sewing tutorial.

Example Projects and Templates

Check out the Light-Up Plush project tutorial for step-by-step instructions on using the E-Sewing ProtoSnap in a project.



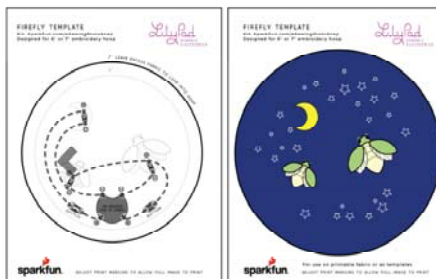
Light-Up Plush

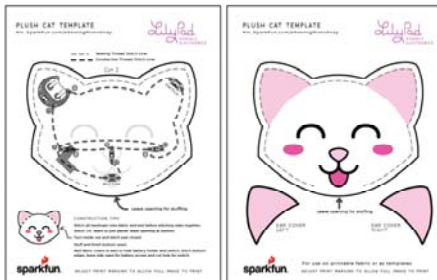
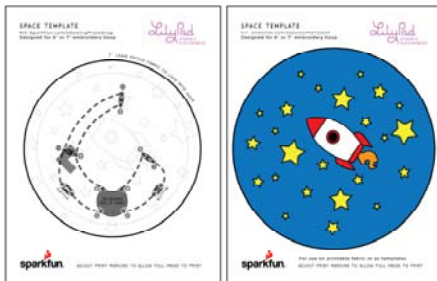
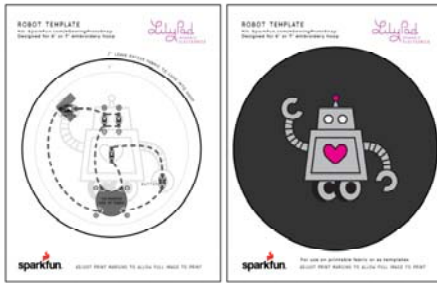
DECEMBER 16, 2016

Craft a light-up plush with LilyPad LEDs controlled by pressing a button and sliding a switch in the creature's hands.

Project Templates

Looking for some more project ideas? Below are a few templates to use with an embroidery hoop or making another plush. Click on the button to download and print (2 pages each).



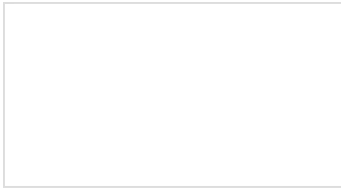


Resources and Going Further

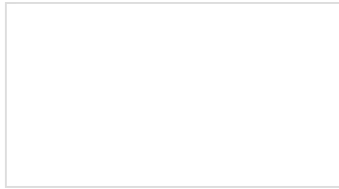
For more information about the LilyPad E-Sewing ProtoSnap, check out the resources below:

- Schematic
- Eagle Files
- Template Downloads
 - Firefly Template
 - Robot Template
 - Space Template
 - Plush Cat
- LilyPad Portal
- GitHub Repository

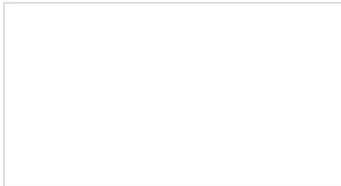
Here are some more LilyPad sewable electronics projects to try:



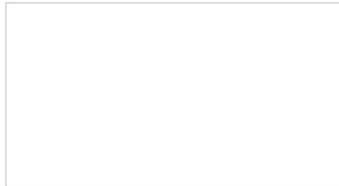
Light Up Pennant with E-Textiles
Show your school spirit, geek pride, or fandom with a light up pennant using the LilyTwinkle or LilyPad Arduino.



Night-Light Pennant with LilyMini ProtoSnap
Use the pre-programmed LilyMini ProtoSnap to make an interactive pennant that reacts to ambient light levels.

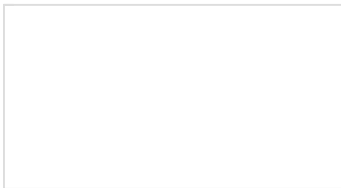


Illuminated Mask
Use LilyPad LEDs, a switched battery holder, and coin cell battery to make a fun light up mask for your next costume party.

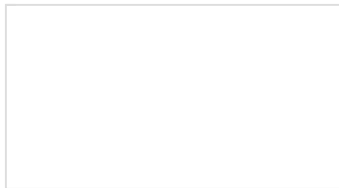


Twinkle Zodiac Constellation
Create a quick and easy piece of e-textile art based on a Zodiac sign using a LilyTiny, LilyPad LEDs, battery holder, conductive thread, and coin cell battery.

Learn more wearable electronics techniques in these resources:



Insulation Techniques for e-Textiles
Learn a few different ways to protect your conductive thread and LilyPad components in your next wearables project.



Planning a Wearable Electronics Project
Tips and tricks for brainstorming and creating a wearables project.



Powering LilyPad LED Projects
Learn how to calculate how many LEDs your LilyPad project can power and how long it will last.