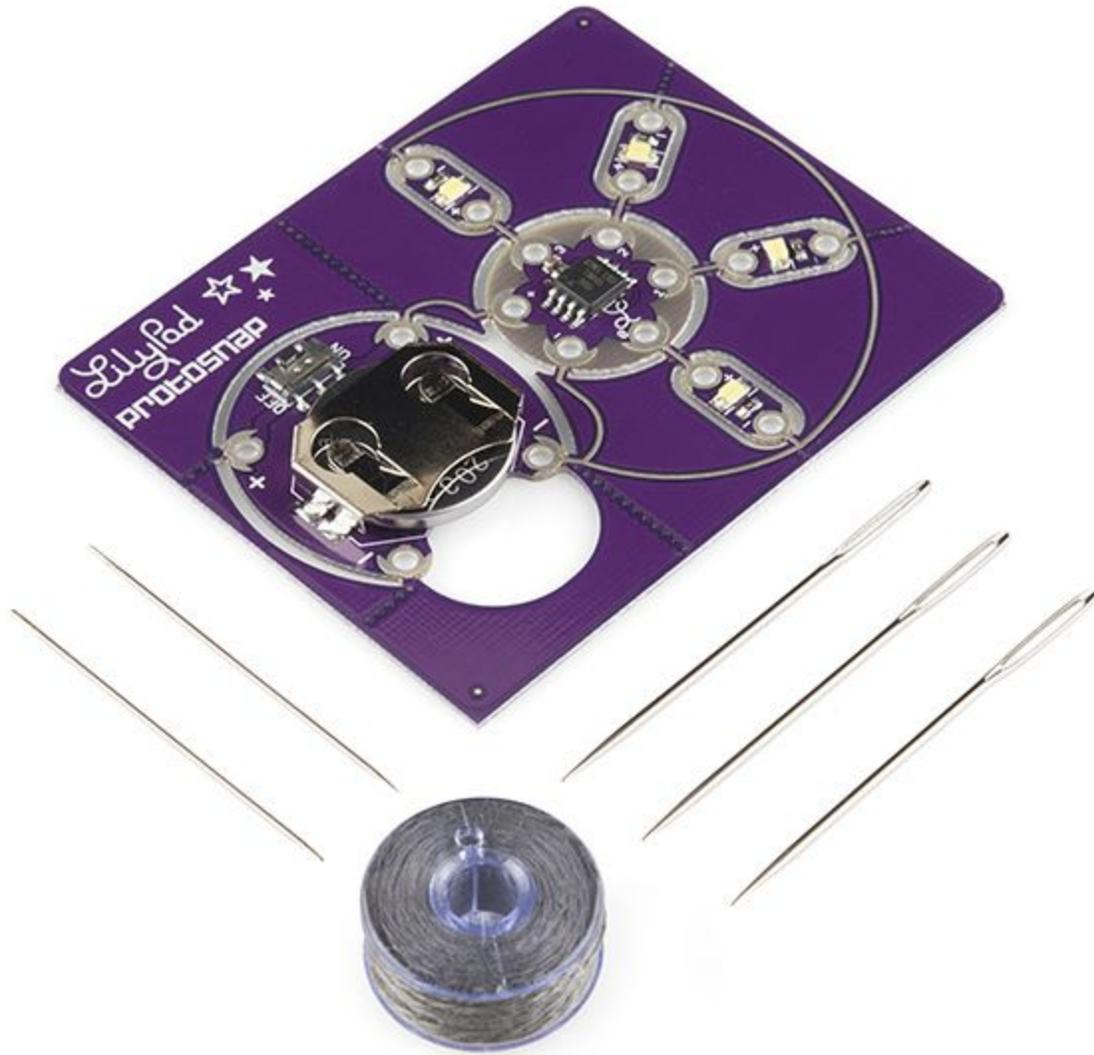


# Introduction to E textiles



We used the LilyPad twinkle board for our projects.

The ProtoSnap LilyTwinkle board is a very simple way to jump right into e-textiles. By including the LilyTwinkle, a coin cell battery holder (with built-in switch), and four white LEDs the ProtoSnap

LilyTwinkle board easily allows you to add some sparkle to any project. The kit comes with a needle set and 30 feet of conductive thread!

## Sewing Tips

### Tips For Successful Sewing

- Make sure to pull your thread all of the way through your fabric to eliminate loose sewing traces.
- Be sure to cinch each stitch tight to keep a solid connection.
- Loop your thread around each pin 2-3 times to make a secure connection.
- Keep your stitches close together, and make sure the gaps aren't too big.
- Cut your knots down to keep your traces from touching each other. The cleaner you keep your traces the higher the chances are of getting your project to work on the first try.
- There's a tendency to hide stitches, and hidden stitches are hard to troubleshoot. If you're going to hide a stitch within the fabric make sure to check the trace before covering it up with other fabric.

## LilyPad Basics

There are a few things that are helpful to keep in mind when working with LilyPad components and e-textiles in general:

- Do not sew any components in with the battery installed. There is no risk of getting hurt, but you might drain the battery.
- Any time you make a connection between a component and the thread, make a few loops through the connection hole. The section of metal on the outside of the connection hole is where current will flow between the thread and the component. Often, if there is a short or break in your circuit it is because the conductive thread does not always touch this pad on the component.
- If you have two threads that need to cross, there must be an insulator between them, otherwise the circuit will not work. Try a piece of fabric, a layer of glue or paint, or a tube of heatshrink.
- There are other conductive e-textile materials such as buttons, fabric, yarn, paint and velcro. There are many different ways to use the materials as switches, sensors and more. Have fun and experiment!

## Troubleshooting

When you are sewing together your project you may run into a few snags along the way. There are a few ways to troubleshoot common sewing mistakes.

- Running out of thread: Loop around the existing thread about three to four stitches back. Follow that sewing trace so that the two lines are parallel and touching.
- Bypassing the switch: Use a piece of wire or integrated circuit hooks to jump individual components directly to the battery or the microcontroller. This will tell you if the stitch or the component is the problem.
- Loose sewing traces: Pull everything tight with tweezers or your sewing needle to tighten up the sewing traces. You may also sew over the top of an existing trace.
- LEDs not working? Double check your polarity.