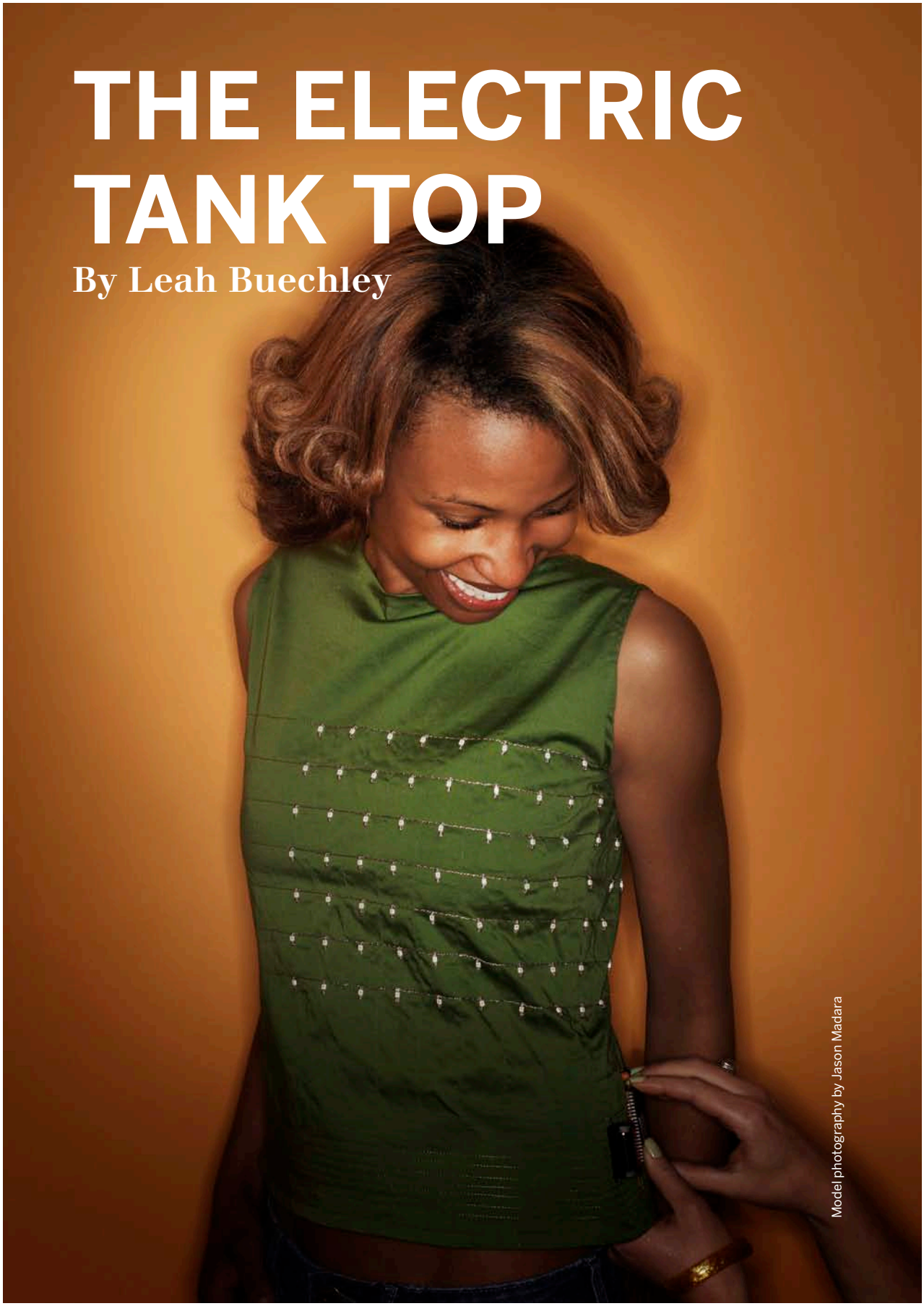
THE ELECTRIC TANK TOP

By Leah Buechley

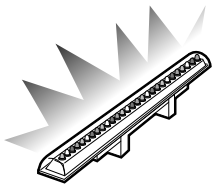


Model photography by Jason Madara

USE SILVER-COATED THREAD AND A MICROPROCESSOR TO MAKE PROGRAMMABLE LED CLOTHING

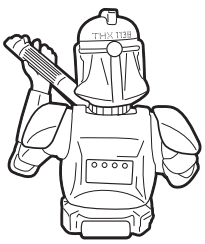
I built this shirt to experiment with wearable computing and electronic technology, and realized along the way that the basic materials were actually quite easy to work with.

There's lots of room for creativity and innovation at all levels, so I was inspired to write this do-it-yourself guide. Everyone should play with this stuff! It's great fun for geeks and divas — build yourself a sparkly fashion accessory and program it with hacker animations. The code I wrote starts a "glider" (a figure in the Game of Life universe) that marches around your garment forever. Play with the code to get other life patterns. You're guaranteed to turn heads whenever you're out on the town.



» The Westin Shanghai has a majestic LED staircase complete with its own sound and light show created by Color Kinetics.

» For the last 30 million years, butterflies have used the same method as LEDs for emitting light.



» For *Star Wars: Episode II, Attack of the Clones* (2002), the LED lights on the back of the clone troopers helmets displayed "THX 1138," paying homage to director George Lucas' famous student movie.

» In the early 1970s, red LEDs were used in the first digital watches like this Hamilton Pulsar.

For links to these and other related stories, check out craftzine.com/01/led.

Illustrations by Tim Lillis

Leah Buechley is a Ph.D. student in computer science and a member of the Craft Technology Group at the University of Colorado at Boulder, where she has found a place that she can unite all her interests. "I get to play with computers and sewing machines, electronics, fabrics, and beads: heaven!"

WHAT YOU'LL NEED

[A] Silver-coated thread members.shaw.ca/ubik/thread/order.html

[B] Surface mount LEDs 100, or as many as you'd like. I used a super-intensity red LED (Digi-Key part #67-1695-1-ND).

[C] AVR ATmega16 microcontroller Digi-Key part #ATMEGA16L-8PC-ND

[D] IC socket for your microcontroller Digi-Key part #A9440-ND

[E] AVR programmer Digi-Key part #ATSTK500-ND

[F] 9-15VDC power supply For your STK500 programmer. Available at RadioShack.

[G] USB serial adapter and included software This will attach your programmer to your computer.

[H] Battery and holder I used a standard 6V camera battery. For the holder, use Digi-Key part #108KK-ND.

[I] On/off switch Digi-Key part #401-1000-1-ND

[J] 30-watt or higher soldering iron and lead-free solder Remember: Keep it lead-free!

[K] Multimeter

[L] T square or ruler

[M] Assortment of silver and brass crimping beads At least twice as many as you have LEDs.

[N] Garment or a piece of fabric and a pattern

[O] Sewing needle, fabric marker, bottle of fabric glue

[P] Scissors

[Q] Sewing machine

[R] Insulating backing fabric (not shown)

For additional info about materials and equipment, visit craftzine.com/01/led.

Photography by Leah Buechley

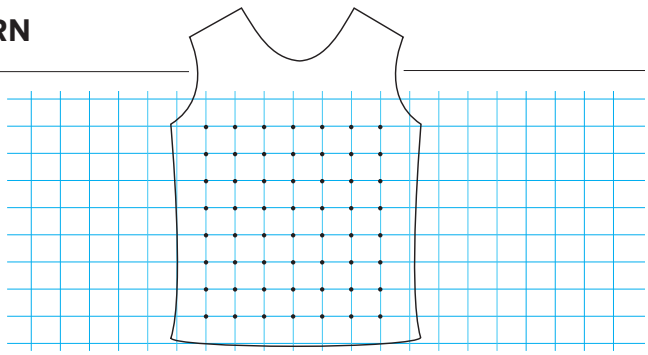
START

CREATE A BLINKING TANK TOP

Time: One Week **Complexity:** Challenging

1. DESIGN YOUR PATTERN

1a. Decide on the number of LEDs you want and their general placement. I decided to sew a simple tank top, and I chose to place the LEDs evenly across my top every 2". Since my tank top is approximately 28" around and 12" tall, I needed 84 LEDs.

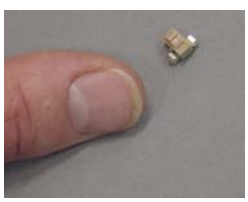


2. MAKE SEQUINS WITH YOUR LEDS AND BEADS

2a. Get crimping beads and surface mount your LEDs. Using a soldering iron with a very clean tip, place the tip of the iron into a bead. Melt some solder onto the outside of the bead. With the soldering iron, drag the bead up to the LED as shown (middle right). When the melted solder touches the LED's contact, the bead will adhere to the LED. Lift the soldering iron out of the bead.

At this stage, you may want to take some measures to distinguish the cathode lead (-) from the anode lead (+) of each LED. The cathode end is often marked with a green line on the front or back of the surface mount package. To distinguish the two, you can solder a brass crimping bead to the cathode lead and a silver bead to the anode lead for each LED.

2b. Solder beads to the leads for your battery and switch, so that they can also be sewn on. This is the switch sequin.



TIP: If your soldering iron tip is dirty, it will stick to the bead and make the job very difficult. If this is happening, you should clean or replace your tip. Once you get the hang of it, you should be able to solder 100 LEDs per hour.