

# LED Workshop at the Denver Costume Collective - July 28, 2011

Inga Marie Carmel and Liz Baumann

## Assembling an LED bracelet

1. Cut a piece of fabric about 1-1/2 to 2" wide, long enough to fit around your wrist plus about 3", example is 2x 9"



2. Using conductive thread sew down the battery holder 1-1/2" from the end, then sew 2 snaps near the same end, with a short trace in between. Don't connect the positive and negative sides of the battery to each other!

Fit it around your wrist and sew 2 snaps in the right place at the other end



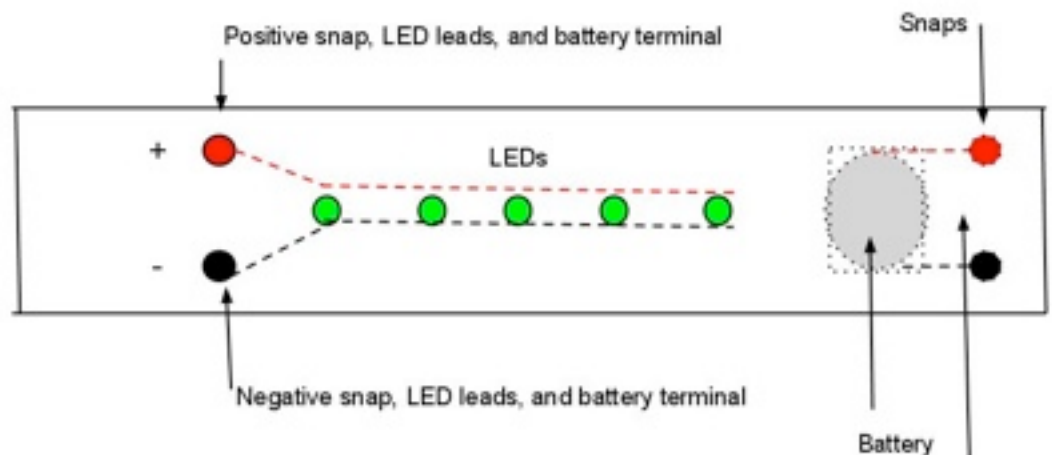
3. Poke your LEDs through the fabric:

the longer LED legs are the positive leads ("accentuate the positive") make sure the positive leads are lined up with the positive on the battery



4. Carefully curl the ends

5. Sew with conductive thread from the snaps at the non-battery end to each LED, one positive, one negative. Sew 2-3 times through each curled LED lead, with small tight stitches. Make all the stitches between LEDs small and tight too.



Snaps act as a switch!

These snaps and the battery are on the reverse side.

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## Doing more than just on/off with one-color LEDs

- Special LEDs: RGB (red-green-blue, i.e. all colors in one LED), LEDs with blink already built in, RGB ones with color cycling already built in. You don't need a microcontroller, with the last two but you are stuck with the set pattern.
- Aniomagic Sparkles - LED components in a kit, has blinky patterns you can control with easy programming
- Microcontrollers: LilyPads, Arduinos. These allow you to make things blink, flicker, blend, do timed sequences, etc. You need a little electronics know-how and some programming expertise (C-based programming)
- LED strips: Unless you just want them on/off, you'll need a little electronics know-how and some programming expertise (C-based programming)
- EL wire: aka Electro-luminescent wire: these run on AC, so to power from a battery you need a DC to AC inverter. To program, you'll need an EL sequencer.
- Fiber Optics
- Sensors (inputs) for use with microcontrollers: accelerometers, microphones, temperature sensors, etc.
- Other outputs such as motors

## Batteries:

- Coin cells (e.g the quarter-size CR2032): pros: small, for low power requirements they're long lasting. cons: not generally rechargeable, not great for larger applications.
- LiPo (Polymer Lithium Ion): pros: rechargeable, small-ish, long life, different life. cons: when it dies you're done unless you have another; connectors require tool to unhook
- 9-volt, AA/AAA (1.5volt per battery): pros: easily obtainable, AA/AAA can be rechargeable. cons: bulkier, not very robust or long-lasting, not always rechargeable
- Note for coin cells and other conventional batteries, you don't necessarily need a battery holder, you can make your own out of something conductive.

## Getting Creative:

- **Diffusing ideas:** fur, fabrics like organza and sheers, felt, flowers, seashells, beads, make molds (epoxy, plastics, glass), stained glass paint, sand the surface of your LEDs
- Other conductivity-related ideas: fabrics - e.g. dress with 2-layered conductive fabric that turns LEDs on when layers make contact; pipe cleaners

## Sources for LEDs and Electronic Components

- For a more comprehensive list: <https://sites.google.com/site/circuitsalon/links>
- UniqueLEDs
- Electron.com (in Prague, but pretty quick and personal service)
- SparkFun (for microcontrollers, conductive thread, etc. - order online only; Boulder)
- JB Saunders for hardware like solder, wire (store; Boulder)
- For those more engineering-inclined: Digikey, Cree, Osram