Making a Flower Headband

Step 1: Gather your supplies.

- Assorted colors of crepe paper, felt, or thin fabric
- Plastic headband
- 3V coin cell battery
- A few LEDs
- Conductive tape (This project uses adhesive, conductive tape. You may use foil.)
- Tacky glue
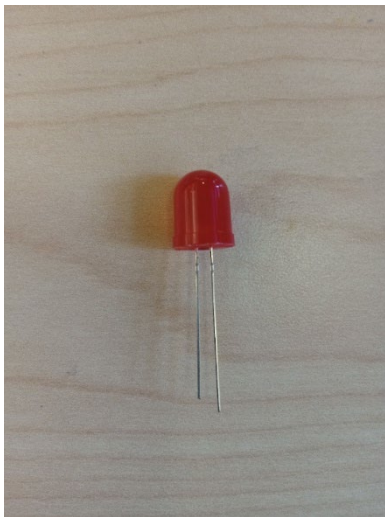- Clear tape
- Small hair pin/clip

Step 2: Set up the laser.

- Book a Glowforge Laser Cutter appointment at your local IDEA LAB
- Review the Glowforge guide on the Central IDEA Lab page.
- Download a free rolled flower template, such as:
  - https://creative-vector-studio.com/product/free-rolled-flower-svg-templates/
  - https://joyincrafting.com/rolled-paper-flower-free-silhouette-template/
- Log in to the Glowforge app and upload the template.
- Place your material on the crumb tray and pin down.
- Select your settings. This project uses settings for crepe paper (Speed: 280, Precision power: 1, # of Passes: 1)
- Decide on the size of your flowers. This project uses 4x4 in. and 9x9 in. width flowers templates.
- Click Print!

Step 3: Create a circuit.

- Line the outside side of your headband with conductive tape, leaving about ½ inch of empty space on each end.
- Line the inside of the headband completely, leaving about 2 inches of extra tape on one end. Fold the extra tape onto itself, adhesive sides together.
- Fold the extra tape lining the inside of the headband over onto the tape lining the outside of the headband. This tape will hold the coin cell battery.

Step 4: LEDs

LED stands for light emitting diode. An LED is a small semiconductor device that produces light when an electric current flows through it. Electrons moving through the LED material collide with "holes" (empty spaces for electrons), causing them to recombine and emit a photon (light particle). **LEDs have a positive (anode) and negative (cathode) terminal**. [see Resources]

In the photo above the cathode (short leg) is on the left, and the anode (long leg) is on the right.

- Decide on where you want to place your LEDs.
- Bend the short legs straight out, forming a 90° angle. Making sure that the short legs only touch the conductive tape lining the outside of the headband, use clear tape to secure them to the headband.
- Fold the long legs toward the inside of the headband, making sure that they only touch the conductive tape lining the inside of the headband. Use clear tape to secure the short legs to the headband.
- Place the battery on the end of the headband with the extra conductive tape, with the positive side (shown below) facing out.

The positive side of the battery. Notice the + sign.

- Fold the extra tape over the battery and tape in place. To make it easier to change the battery you may use a hair pin/clip.

Step 5: Place the flowers on the headband.

- Roll your flowers from the outside to the inside. Place small dabs of glue as you roll.

- When you reach the end of the **small** flowers, snip off the circular tabs. You'll use the opening in the flower to place it over the LEDs. For the larger flowers, glue the circular tabs to the bottoms of the flowers to create a flat surface to attach to the headband.

- Glue the flowers onto the headband.

Resources

[1] https://www.energystar.gov/products/learn-about-led-lighting
[2] https://en.wikipedia.org/wiki/Light-emitting_diode
[3] https://byjus.com/physics/light-emitting-diode/
[4] https://www.youtube.com/watch?v=CIMbjJQNHa0
[5] https://www.colorkinetics.com/global/learn/what-is-an-led
[6] https://diotlabs.daraghbyrne.me/docs/a-simple-internet-appliance/leds/