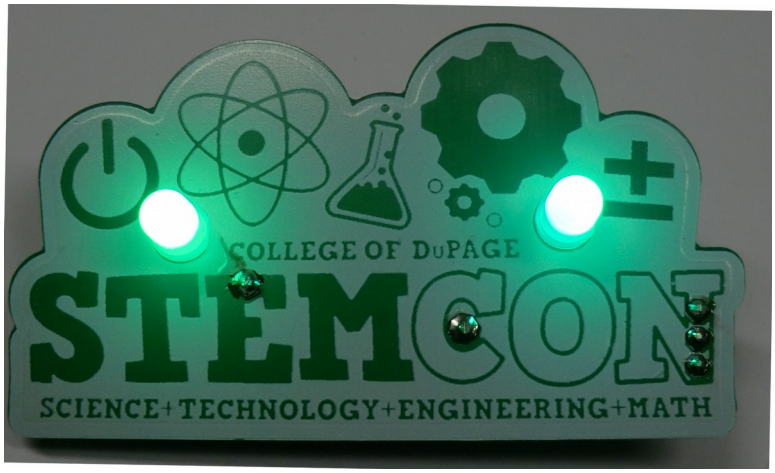
Kit 38 – College of DuPage STEMCON Blinkie



The heart of this blinkie is a tiny chip embedded in each of the LEDs. When power is applied, the chip tells the LED to turn on and off, or to color change.

By building this blinkie, we hope you have a lot of fun, as well as learn how easy it is to assemble and solder a circuit, and gain a desire to learn more!

First, open up the kit and **review the contents.** Looking from left to right, and top to bottom there should be the following parts:

Contents:

- Battery holder
- Pin Back
- Power switch
- Green on white COD STEMCON circuit board
- Two LEDs – Light Emitting Diodes
- CR2032 battery

Got everything to start? If not, give us a shout.

Soldering Hints

Soldering is not like gluing: Both the "pad" (shiny circle or square on the circuit board) and the component (wire coming up through the hole) must be hot enough so the solder flows around them, making an electrical connection.

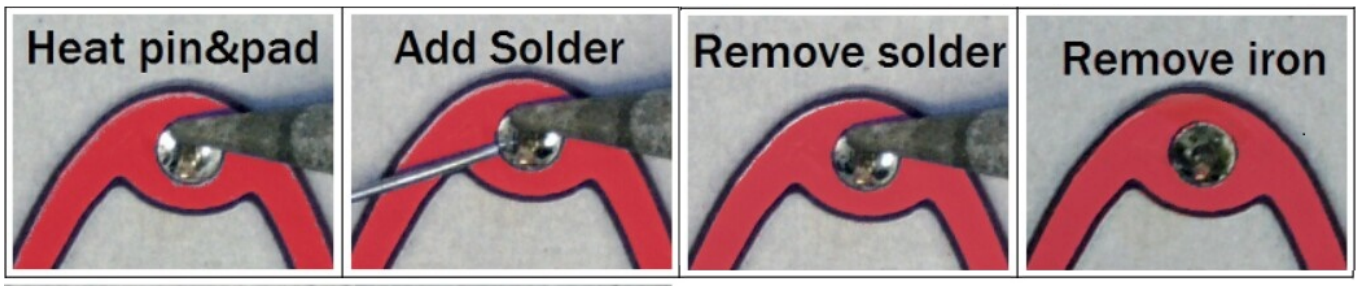
For the purposes of learning how to solder, you do not need to be perfect. With a little bit of practice, your soldering skills will rapidly improve. The goal is to have fun while learning, and your skill will develop as you have fun. Happy soldering!

Here's how to make a good joint:

- Prepare the joint. Bend the component lead slightly after it passes through the printed circuit board (this helps hold it in place while soldering). Ex: Bend LED leads into a "V".
- Prepare the soldering iron. It should be up to temperature – The red LED on the station should turn on and off now and then. Clean the tip by plunging it into the stainless steel wool in the jar. Melt a little solder (a 2mm length) onto the tip so it's shiny. This is called "tinning". The solder coating helps conduct heat from the tip to the joint. If the iron doesn't get shiny, contact a Tech who has special tip cleaner.

1. Place the tip in contact with the component lead AND the printed circuit board pad.
2. Place the solder against the joint directly opposite the tip. It should melt within 2 seconds, and flow around the joint. If it takes longer than that, you're not getting enough heat into the joint. Use only a TINY bit of solder.
3. Remove the solder, but keep the soldering iron in place until the solder flows freely and completely covers the joint. If the heat is removed too soon, the solder will tend to "ball up" and not stick well to the conductors. The solder joint should look "wetted", with concave shapes.
4. Remove the soldering iron and let the joint cool without movement at room temperature. This usually takes only a few seconds.

- If a joint is moved before it cools, it will take on a dull, satin look that is characteristic of a cold solder joint. A cold solder joint is fragile and conducts poorly – reheat the joint until the solder flows freely, and hold it still until it cools.
- Keep the tip of the soldering iron clean. Push it into and pull it out of the tip cleaner jar several times until it is shiny.

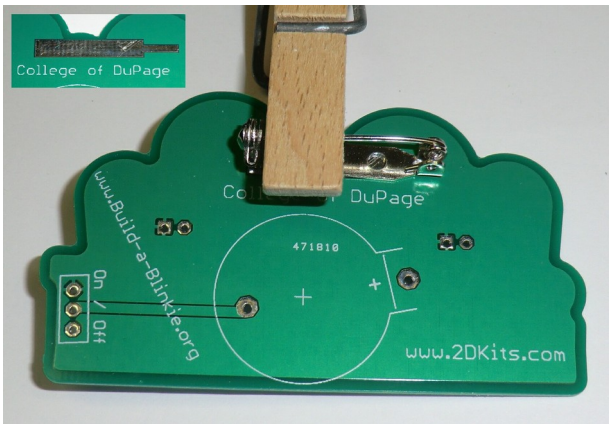


Assembly

Take a look at the completed picture on the first page. The only components that will be visible on the front are the LEDs. The pin-back is soldered to the back. The power switch and battery holder are placed on the back, and soldered on the front.

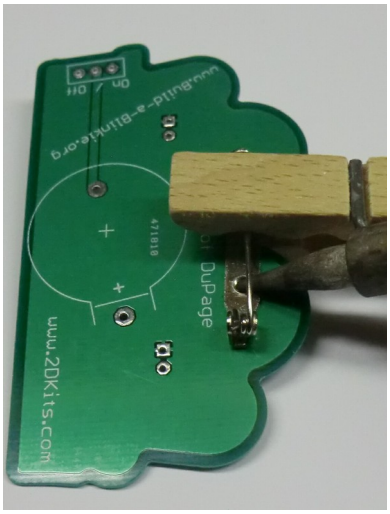
. Solder the pin-back.

- Find the silver stripe on the back of the circuit board where the pin-back will be soldered. (See inset in picture on right)
- Hold the left side of the pin to the board over the silver stripe, with a clothespin, as shown



- Hold the soldering iron tip in the right hole, so it heats both the pin and the stripe.
- After about 10 seconds, feed a little solder into the hole near the tip.
- Take the solder away, wait for the solder to melt into the hole.
- Take the iron away.
- Let it cool a few seconds
- Remove the clothespin.

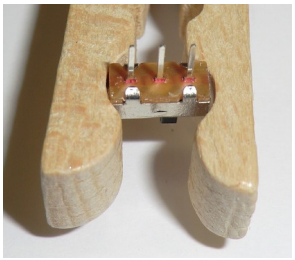
- Now do the same thing with the left hole in the clip – heat, add solder, remove solder, remove iron, let cool.



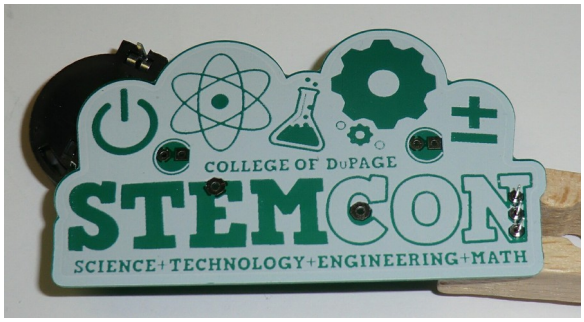
. Installing the switch:

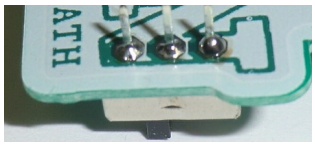
Hold the power switch in the clothespin as shown.

The wires are above the edge of the clothespin



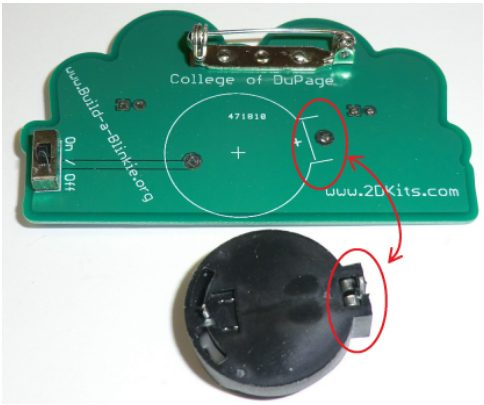
- Flip the board over to the STEMCON side, setting it on the switch wires as shown, and holding up the top left by resting it on the battery holder, both as shown in the picture.
- **Solder ONE WIRE** of the power switch using just a LITTLE BIT of solder.
- Remove the clothespin and **look to see if the switch is straight** – if not, you can use the soldering iron tip to heat the connection you just made, and straighten up the switch, then pull the iron back.
- Now **solder the other two switch wires**.
- The result should look like the lower picture.



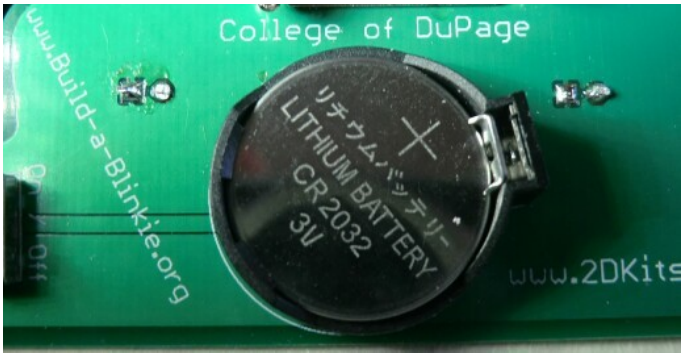


. Adding the **battery holder**

- Flip the board over to the back, and insert the battery holder.
- Important: Match the **square end** with the **square end** printed on the circuit board. (See Photo)
- Use the **clothespin** to hold the battery holder to the circuit board.
- **Flip the board over** to the STEMCON side.
- **Solder** each of the battery holder wires to the circuit board.

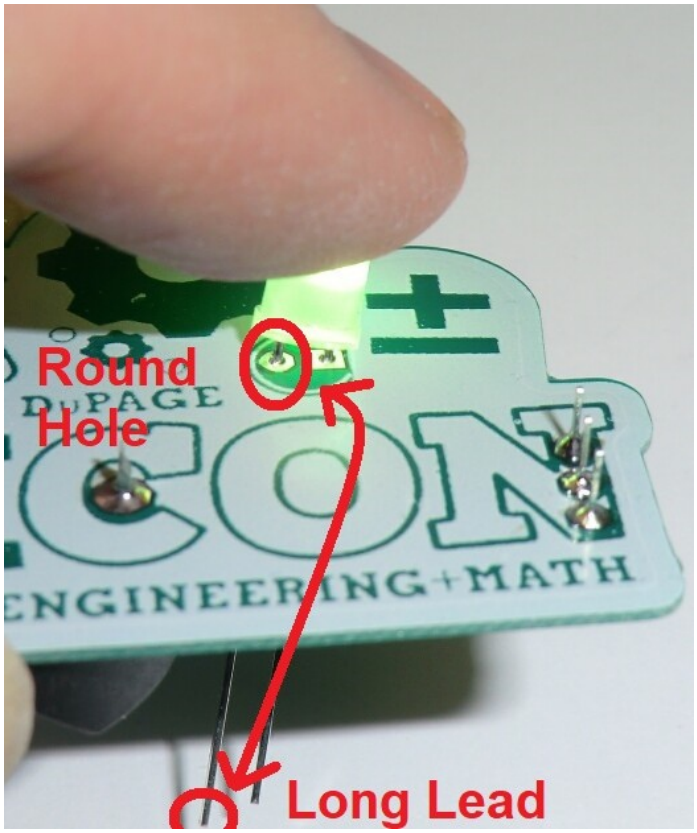


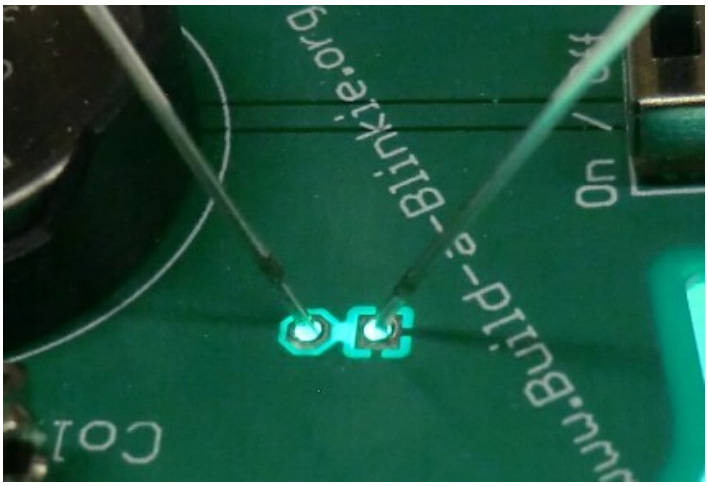
. Insert the battery. The plus sign "+" will face up.
- Angle it into the battery holder and then press down or squeeze hard. It will snap in place.
- Turn the power switch is ON.



In the next few steps, the LEDs will be inserted and tested before they are soldered into the board.

. Insert one LED into the board from the STEMCON side **as follows:**
- Insert the **Long wire** through the **round pad...**
- ...and the **Short wire** through the **square pad**.
- It should start to blink or fade.
- You may need to gently wiggle so it makes contact. If it blinks, great – move to the next step.
- If not, try reversing the LED wires. If that still doesn't work, call a Tech over to help.
- Insert and test the **second** LED



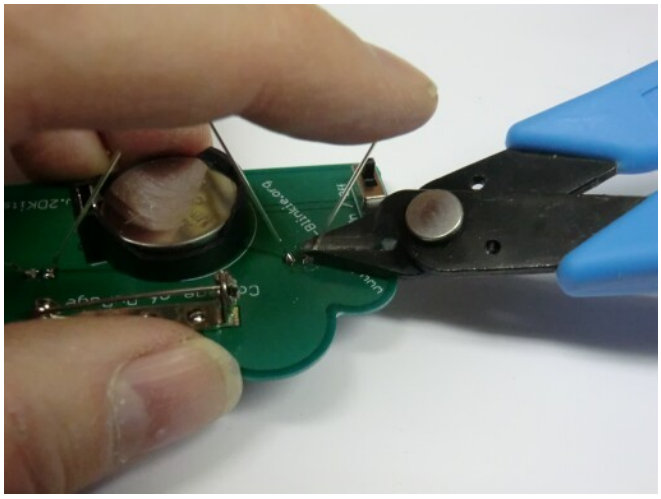


. Turn off the power switch.

  If the LEDS blink in the “off” position, have a Blinkie Tech fix that problem – YOU did NOT do anything wrong.

. Form the LED leads into a “V” as shown:

. Solder the LEDs.



. Trim the excess leads (wires) with the cutters. Hold your finger over the ends of each lead to keep it from flying off when cut.

. You may also want to trim the leads on the front of the board from power switch and battery holder.

. Turn on the board! Enjoy.

. If you plan to use it a lot, NOW is the time to buy EXTRA BATTERIES, they are very cheap AT THE SHOW, compared to local retail stores.

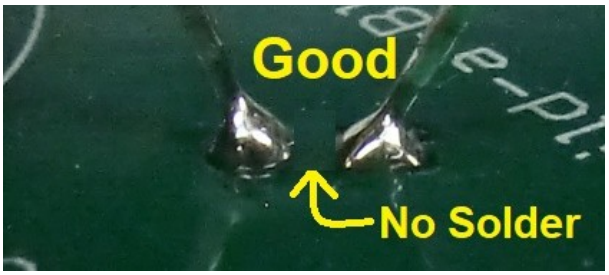
Troubleshooting

If the LEDs don't flash, then you'll need to do a little troubleshooting to finish your project. The following steps should isolate most problems.

Check for, and remove solder bridges. What's a solder bridge? See Picture. Power flows through the bridge, instead of the LED.

If you make a bridge, it is easy to fix. You can often just reheat and pull the tip of the soldering iron through the bridge, breaking it. Or, reheat all the solder and *gently* tap to the board on edge to shake off the excess. Beyond that, we are more than happy to demonstrate various techniques.

A bridge between the two leads of the LED. Current will flow through the bridge, and not the LED, thus the LED will not light up. Fortunately, this is easy to fix.

Here's a picture of a correctly soldered LED:	

- Recheck your solder connections. 80% of all problems are traced to this. Cold solder joints and broken joints will cause erratic performance or failure. Reheat any questionable solder connections until they flow and look shiny and secure.
- Check for bits of solder, wire ends, or other foreign matter which may be lodged in the wiring.
- LEDs reversed. You will need to remove the LED by desoldering, and then solder it in the correct way. Ask a Tech to do this for you.
- The battery is incorrectly inserted. The "+" side of the battery should always be inserted facing up.
- Bad part – it does happen. In over a thousand boards assembled, we've seen two or three parts fail. Send us email, and we will send a replacement part.
- A part got lost/melted/damaged/destroyed while building the kit. It happens – you're not the first (or second, or fiftieth). If you are doing this at a convention, seminar, or class, just let us know. Otherwise, send us email, and we'll see what we can do. We have no problem selling just the parts you need to get it working.

Use

Once built, the use of this blinkie is fairly straightforward. Don't get it wet. Don't stick it in a pocket with a bunch of coins or metal where it might short out. Don't set it on a metal table top or in a metal dish, etc. To prevent it shorting out, you may want to place it in the bag the kit came in when not using it.

ENJOY!!!