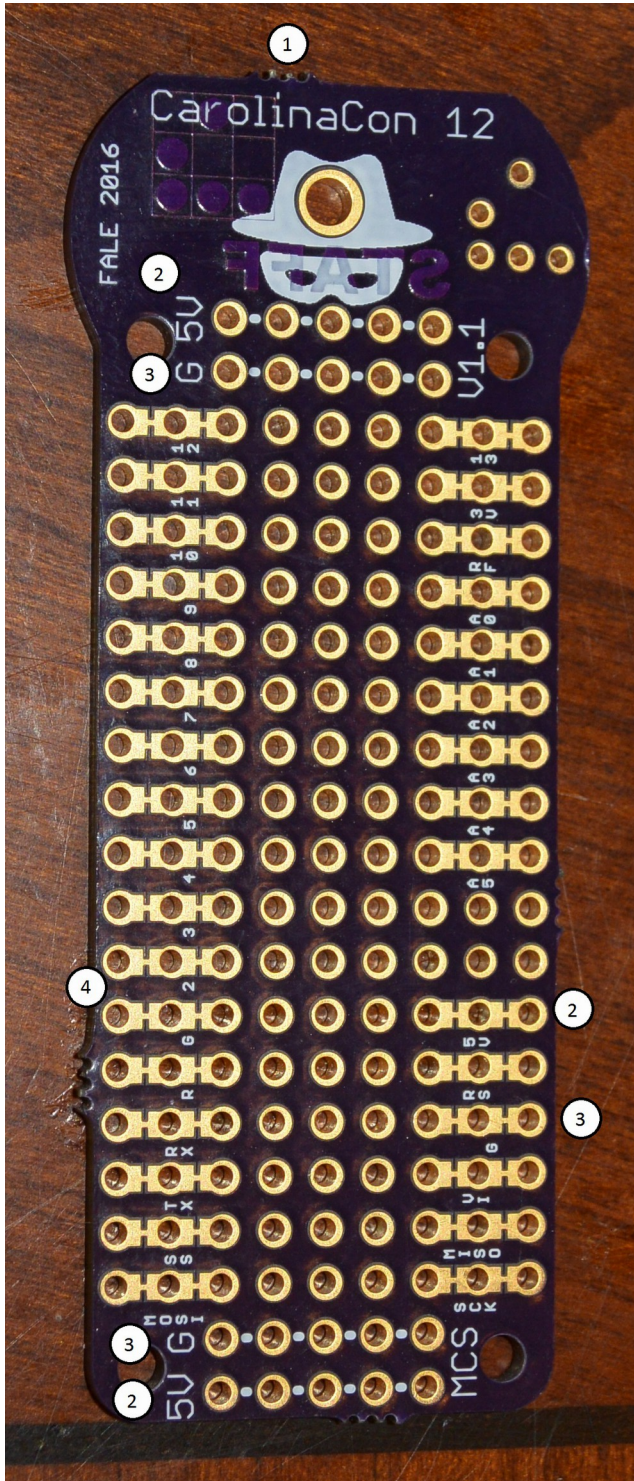# CarolinaCon 2012 Badge Cheat Sheet
or
How I learned to stop worrying and love the Badge.

This is the blank badge for CarolinaCon 12. If you want to be boring you can just attach this to your lanyard and enjoy the con.

However for cool people we have included some electronic elements to give it a bit of flare. You can find the equipment and personnel to help you build this in the Hardware Hacking Village.

A quick summary of relevant pins for the build.

1 – These little purple nurples are left over from manufacturing. Some badges will have spacers still connected to them that can be broken off and discarded.

2 – Positive Terminal: All three of these pin rows are connected internally on the board, you will not need to bridge them. Don't worry about the 5V label as we are only using 3V of power here.

3 – Ground / Negative Terminal: Just like positive all three of these pin rows are connected internally on the board.

4 – These call outs are for standard Arduino pin configurations. Note that the each set of three pins on either side is joined by a narrow bridge, if you need more independent pins for a custom design they can be broken with an exacto knife, razor, or a really persistent fingernail.

Parts

Before we begin putting things together make sure you have all your parts.
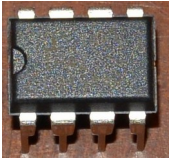
Our chip, a 555 timer.

One 68K Ohm Resistor (Blue Grey Orange bands)
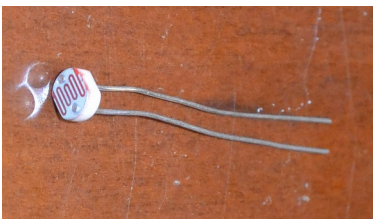
One 1K Ohm Resistor (Brown Black Red bands)

One 470 Ohm Resistor (Yellow Purple Brown bands)
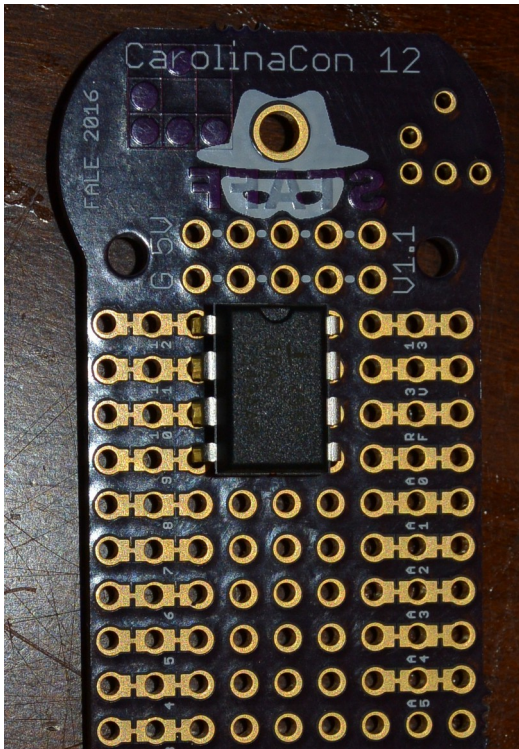
One LED

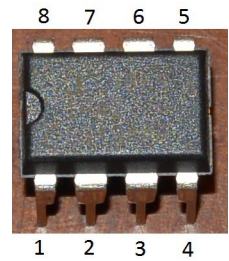One Capacitor

One Photoresistor

One Battery Housing

Not Pictured: 2 AAA batteries and ~6" of Red, Black, Green, and White wire contained in a grey sleeve.

8 7 6 5

1 2 3 4

555 Timer

This is our integrated circuit, the 555 timer.

Place the timer as illustrated in the photo to the left. Make sure the half circle notch on the chip is pointed towards the top of the badge.

You can see the pin callout in the top left image. You can check wikipedia for what each pin actually does if you want to customize or rearrange the badge behavior, but for this tutorial just make sure the chip is in the right position.

*** 555 Timer Note ***

Do not trim all the pins after soldering. Pins 6-8 need to be bridged to the adjacent pin slot. The easiest way to do this is to simply fold the pin over. In the photo to the left you can see that pin 8 has been bridged to the adjacent element. We suggest soldering pins 1-4 first. Then bend over pins 6-8 and solder the pin holes they enter through. Wait until elements are added to the other pin holes before soldering your bridge.
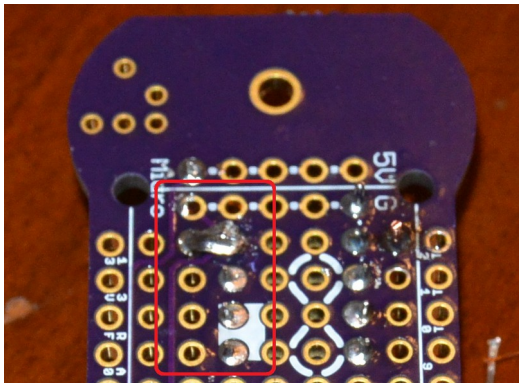
How to Solder

For those that haven't done it before soldering looks intimidating but it's a fairly simple process.

1. Take the hot soldering iron and press it into the element you are soldering. In a second or two the element should be warm enough to apply the solder, though it can take a little longer depending upon thickness and material of the element.

2. Apply the solder to the ELEMENT, not the iron. If the element is hot enough the solder should liquidize and wick onto the element and fill the pin hole.

3. Remove the solder then the iron. Removing the iron first could cool the solder and make it stick. Re-apply the iron if this happens to free the solder.
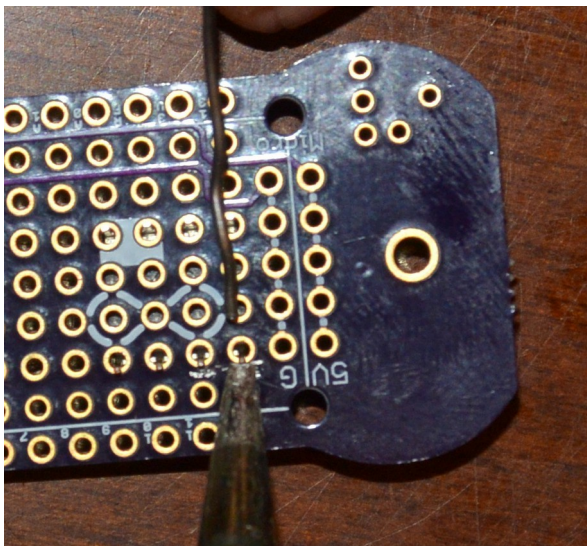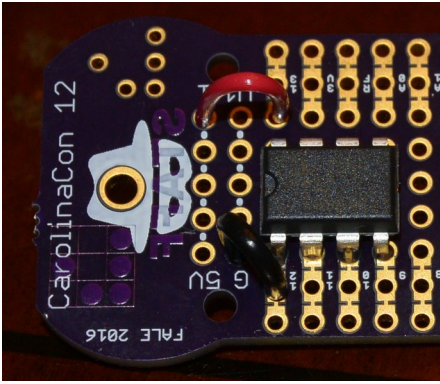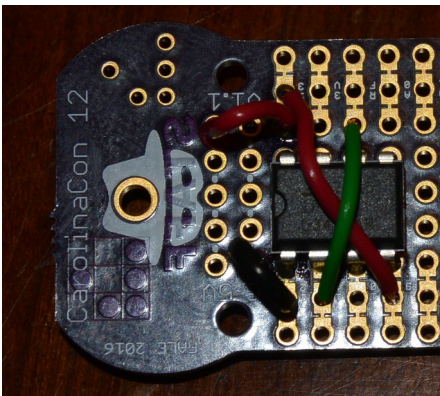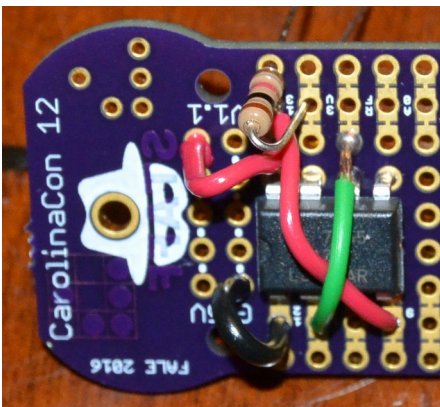
Some Wires
Cut 1/2" lengths of Black and Red wire. Use Black wire to connect Pin 1 to Ground. Use Red wire to connect Positive Voltage to pin 8. <mark>Solder the bridge between Pin 8 and the wire.</mark>
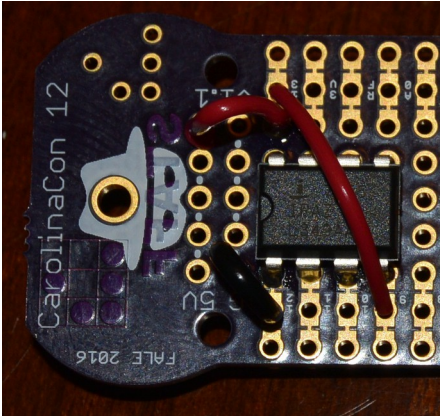
Cut a 1" length of Red wire. Connect Pin 4 and Pin 8 as shown.
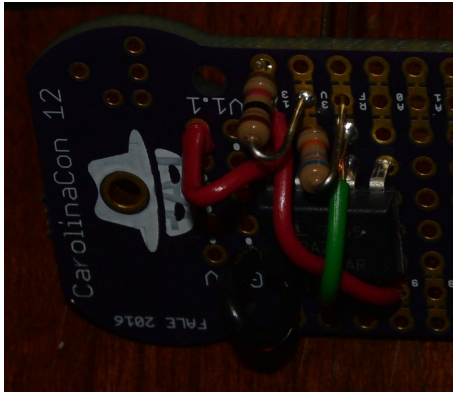

Cut a 1" length of Green Wire. Connect Pin 2 to Pin 6 as shown. <mark>Be sure to bridge Pin 6 to the adjacent wire.</mark>
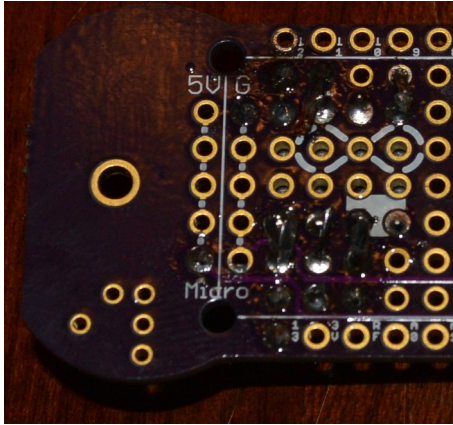

1K Ohm Resistor (Brown Black Red)
The resistor connects to Pin 8 and Pin 7 as shown. When soldering connections do not bridge Pin 7 yet, the next step adds an element to that pin hole.
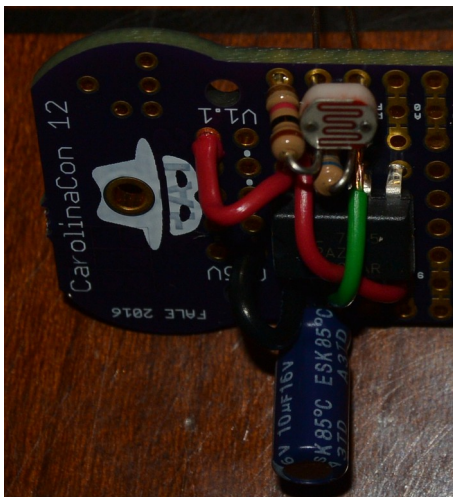
68K Ohm Resistor (Blue Grey Orange)

The resistor connects to Pin 7 and Pin 6 as shown. You will need to bridge pin 7 to the adjacent resistor leg.

Check Connections

Thus far your board should look something like this on the reverse side. Pin 5 is not used so it can be snipped off. Note the bridging of pins 5-8 to their adjacent elements.
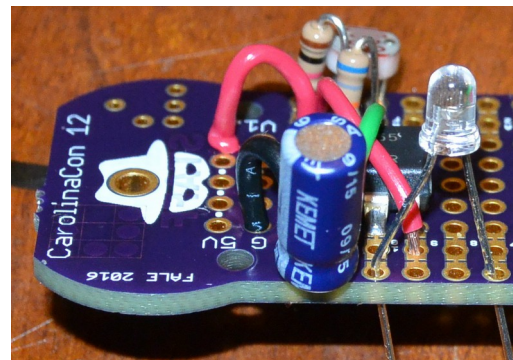
Photoresistor

The Photoresistor connects to Pin 7 and Pin 6 as shown.

Capacitor

The Capacitor connects to Pin 1 and Pin 2. The capacitor has a positive and negative side. The negative side has a grey stripe running down the side and needs to be attached to Pin 1 (better illustrated in the photo below).
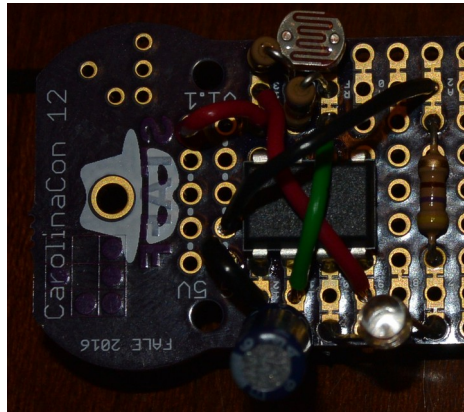
LED

The LED is connected to Pin 3 and a free row below (7 on the board callouts as pictured). The LED has polarity and must be inserted the right way, the longer leg is the positive leg and connects to Pin 3.
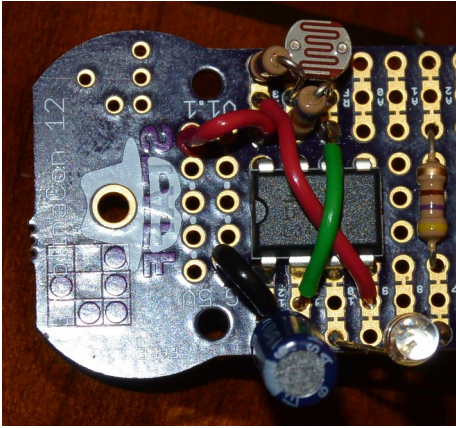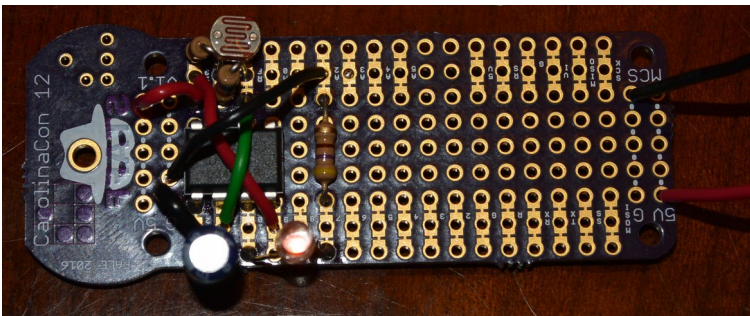
470 Ohm Resistor (Yellow Purple Brown)
Connect the resistor to the same row as the LED and across the board to the other set of connected pins holes.

Another Wire
Cut a 1 1/2" Black Wire to connect the 470 Ohm Resistor to the row of Ground pin holes.

Test
Put your batteries in the Battery Housing and test the board as illustrated. If done properly the LED should blink at various speeds depending on how much light the photoresistor is exposed to.

Finishing Touches
You may want to trim the Battery Housing cables to better position it. It can easily be attached to the board by wrapping the board and housing in electrical tape. The LED is very low power and our test board lasted over a week, so don't worry about taking the batteries out or turning it off over the weekend.

Hope you enjoyed this guide. We look forward to seeing what electronic shenanigans the attendees of Carolinacon 12 get up to with this year's badge.

About the Author