

All About Soldering

Well, mostly...

What is Solder?

- Solder is an alloy, (most commonly of tin and lead), that melts at a temperature lower than the melting point of the constituent metals
- 2 Major types, Leaded and Lead-free
 - Lead-free is now used in most manufacturing due to ROHS regulations
 - Lead Free typically contains silver
- The most common leaded alloy is 60% Tin and 40% lead, and is what most makers will use when soldering. It melts at 370° F
 - Tin melts at 450° F
 - Lead melts at 621° F
- There are LOTS of other solder alloys designed for specific uses

Soldering versus Welding

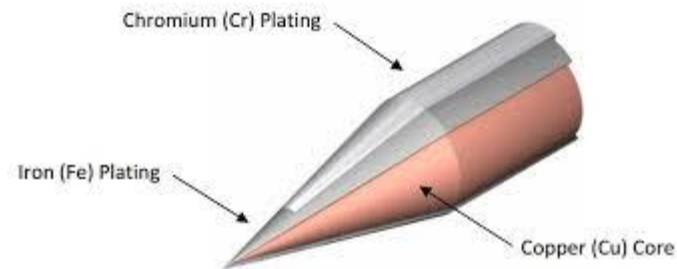
- You may see soldering referred to as “welding” occasionally, most commonly in non-English references
- There is a difference:
 - Welding melts the metals to be joined until they flow together, and typically adds a filler metal of similar composition (i.e., when welding steel the filler is also steel)
 - Soldering does not melt the two metals to be joined, but instead flows a different metal (the solder) over both components to join them
 - Soldering and brazing are similar processes – brazing typically uses a brass filler while solder uses a lead/tin or similar filler

Flux isn't just for capacitors anymore!

- Flux is what makes the solder stick. It cleans the surface of the parts being soldered. It is also what makes the smoke when solder melts.
- There are 2 main types of flux:
- Rosin
 - Rosin is what is used for electronics. Electronic solder is made with the rosin embedded inside the solder itself, so as the solder melts it cleans the parts.
- Acid
 - Acid flux is typically used when attaching metal parts such as steel to each other. Zinc Chloride is a common acid flux. Acid Flux should NOT be used for electronics, and when it is used it must be cleaned to avoid corroding parts.

Preparing the Soldering Iron Tip

- Prior to soldering, the tip of the iron needs to be “tinned”
 - This consists of putting a thin coat of solder on the tip
 - New irons must have this done immediately prior to use
 - Used irons should be cleaned first, then re-tinned



Tip preparation options

The tip needs to be clean prior to tinning

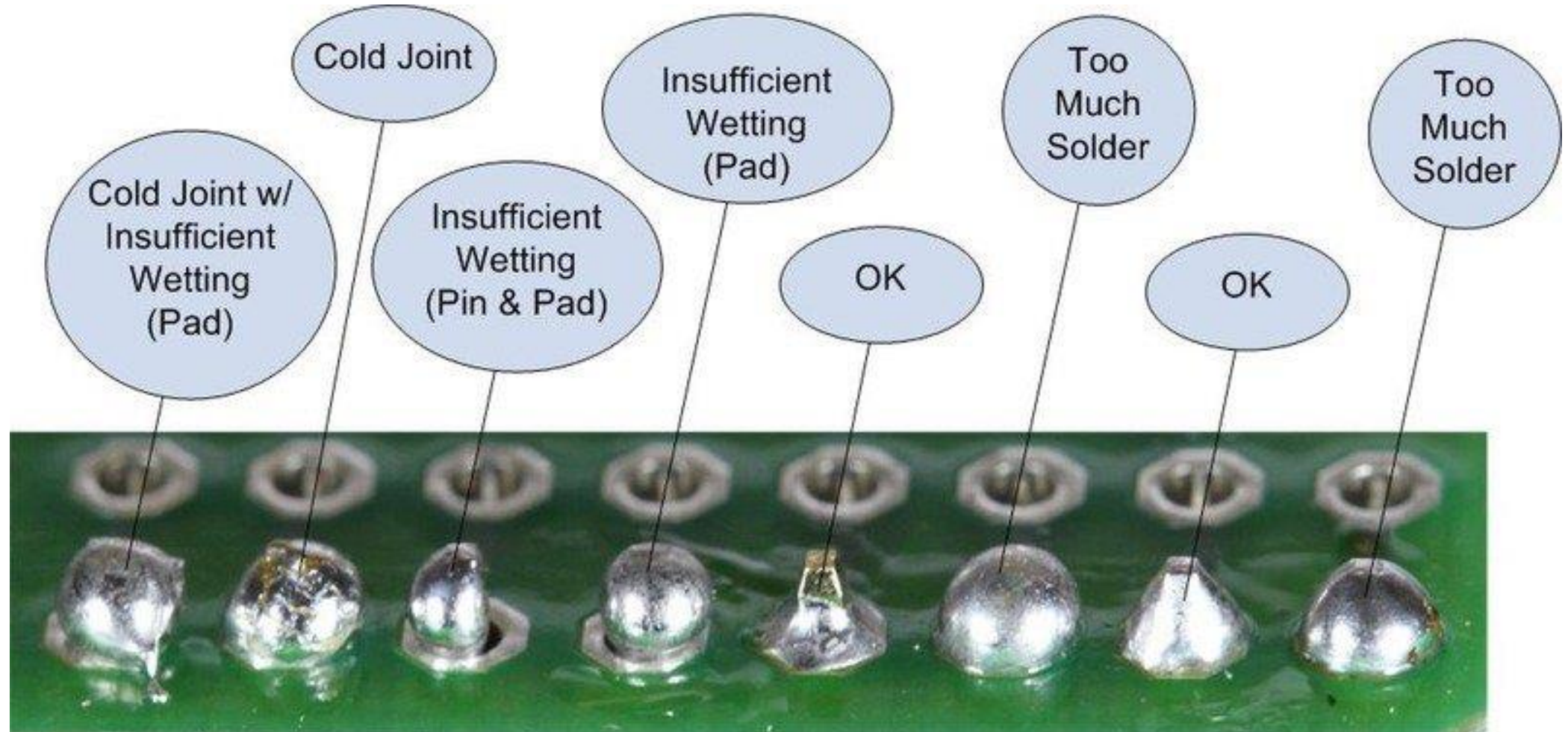


Brass Scouring Pad



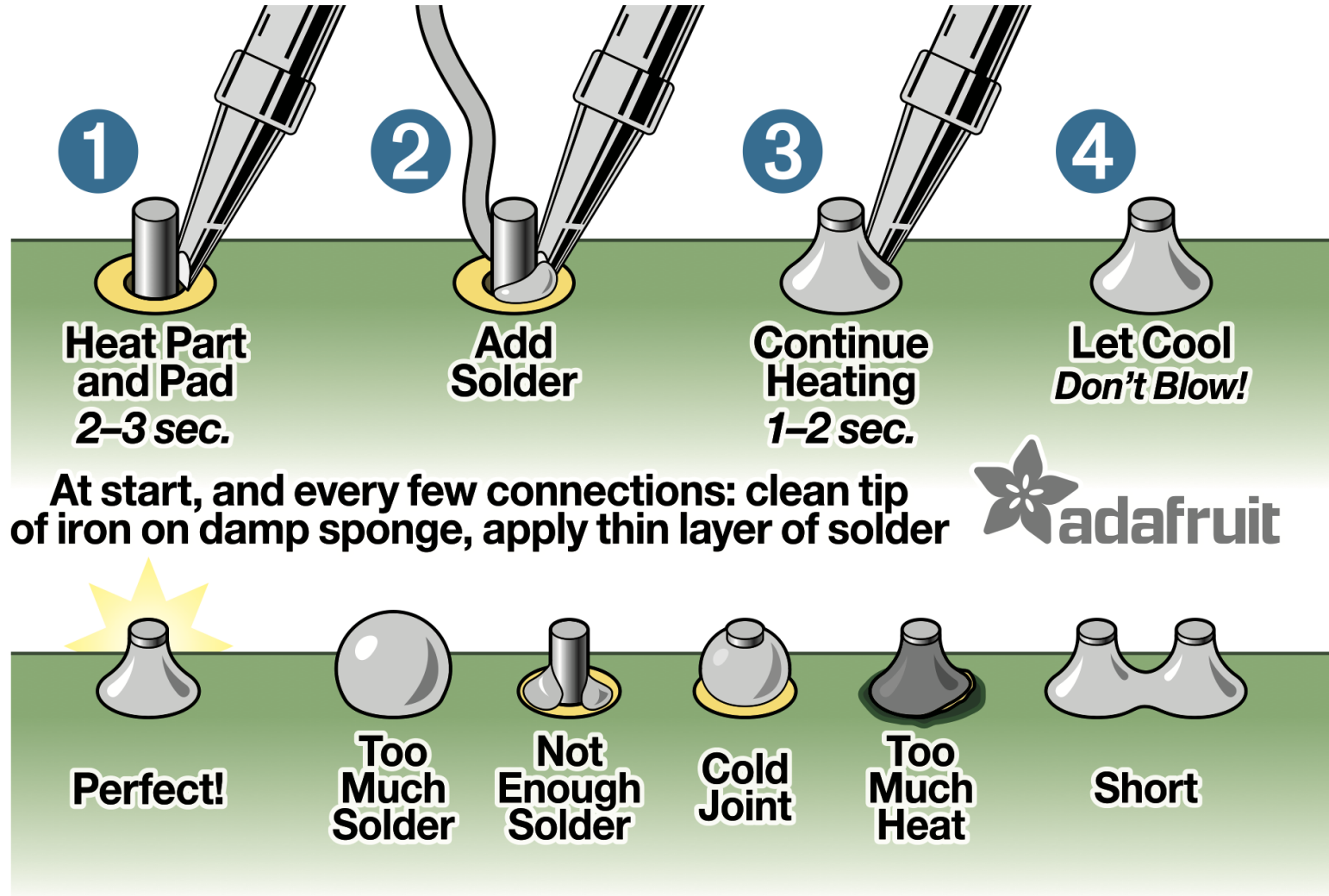
Damp Sponge

What are we trying to achieve?



4 Steps to a Good Solder Joint

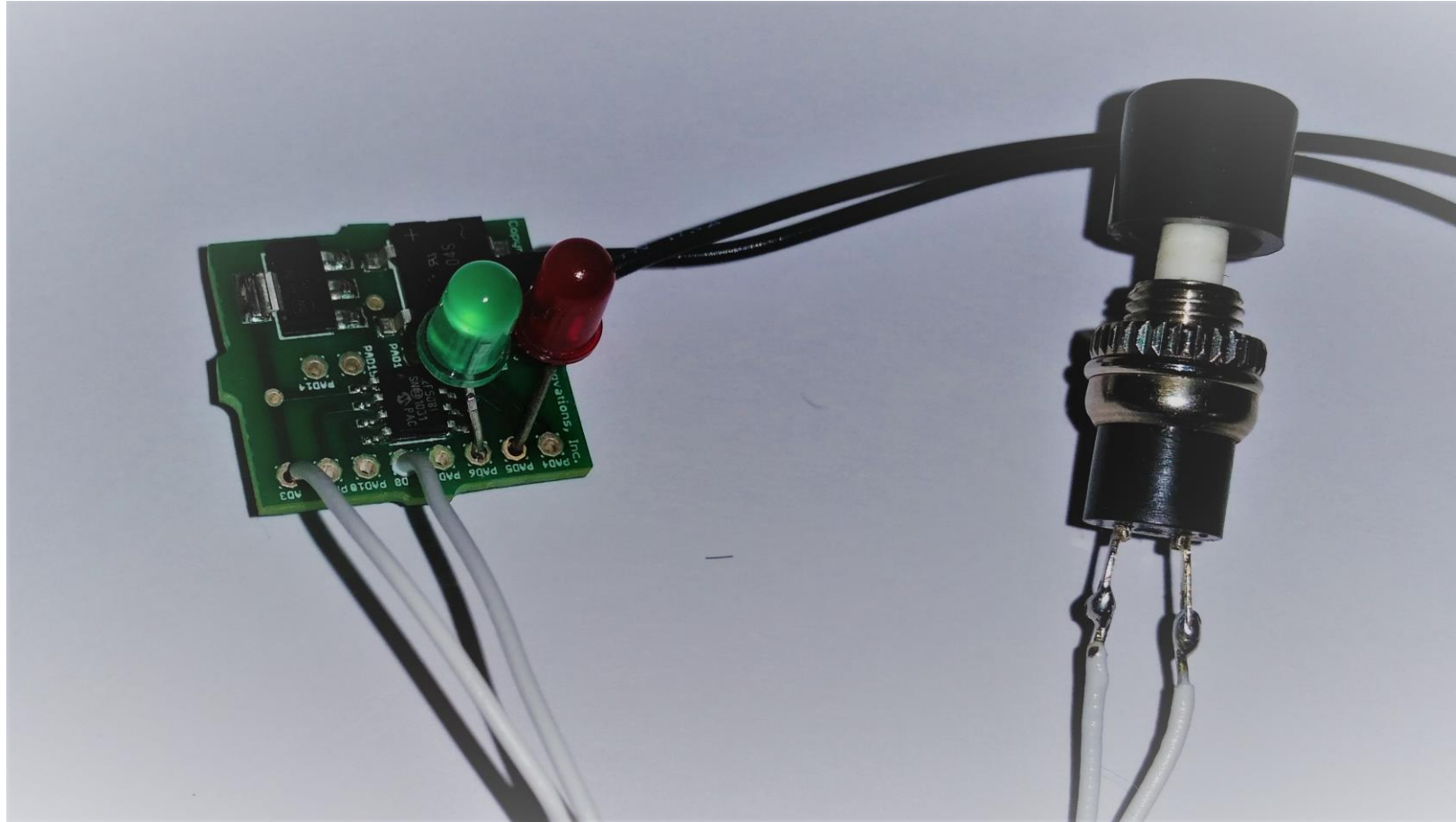
SOLDERING



The fun part – Hands On!

- We're going to solder a "Blinky" – an LED blinker with colors you choose
- The Blinky is partially built – we'll add LEDs and a button
- It is based on a PIC12F508 Microcontroller from Microchip
 - 8 Bit Microcontroller in an 8 pin package
 - \$0.58 from DigiKey, less in quantity
 - Already programmed for this project, but is re-programmable

The Circuit Board – we'll be making one of these

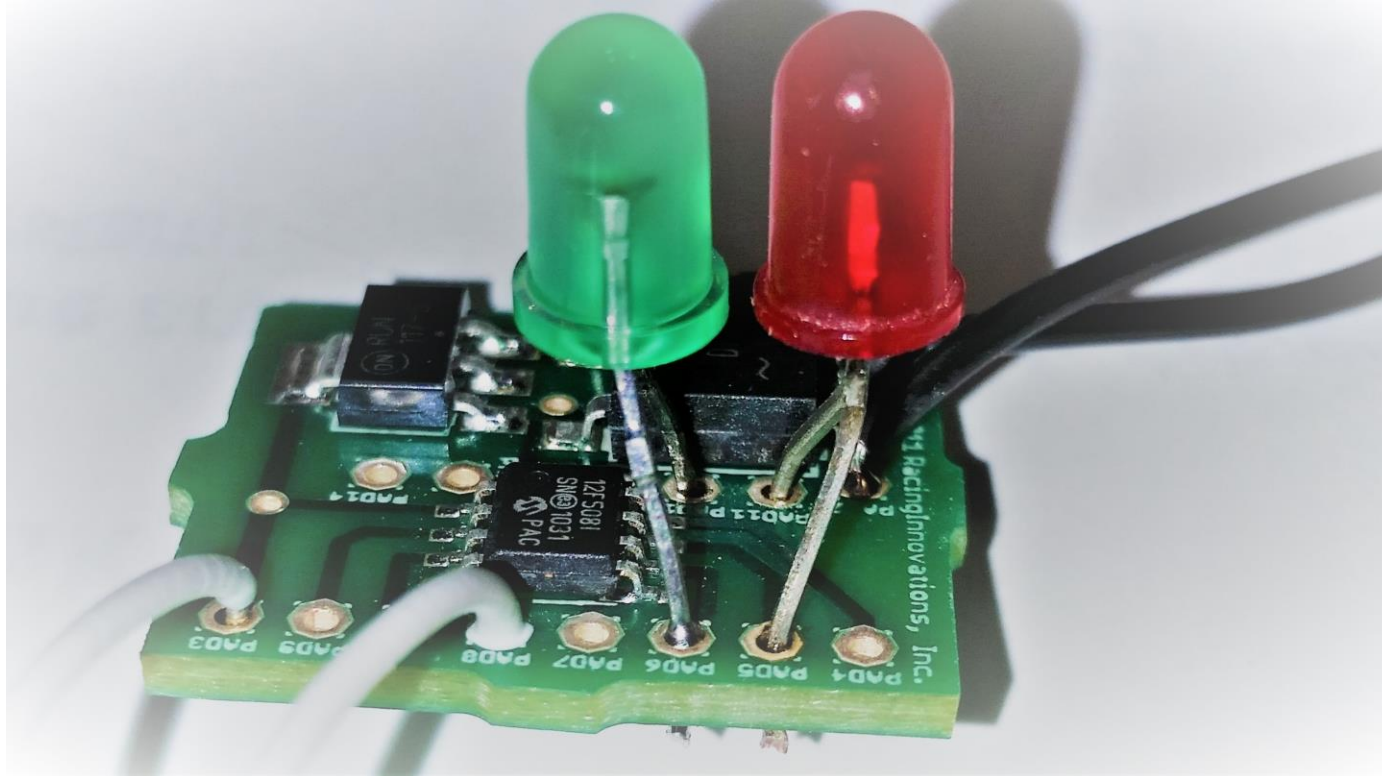


Soldering the button



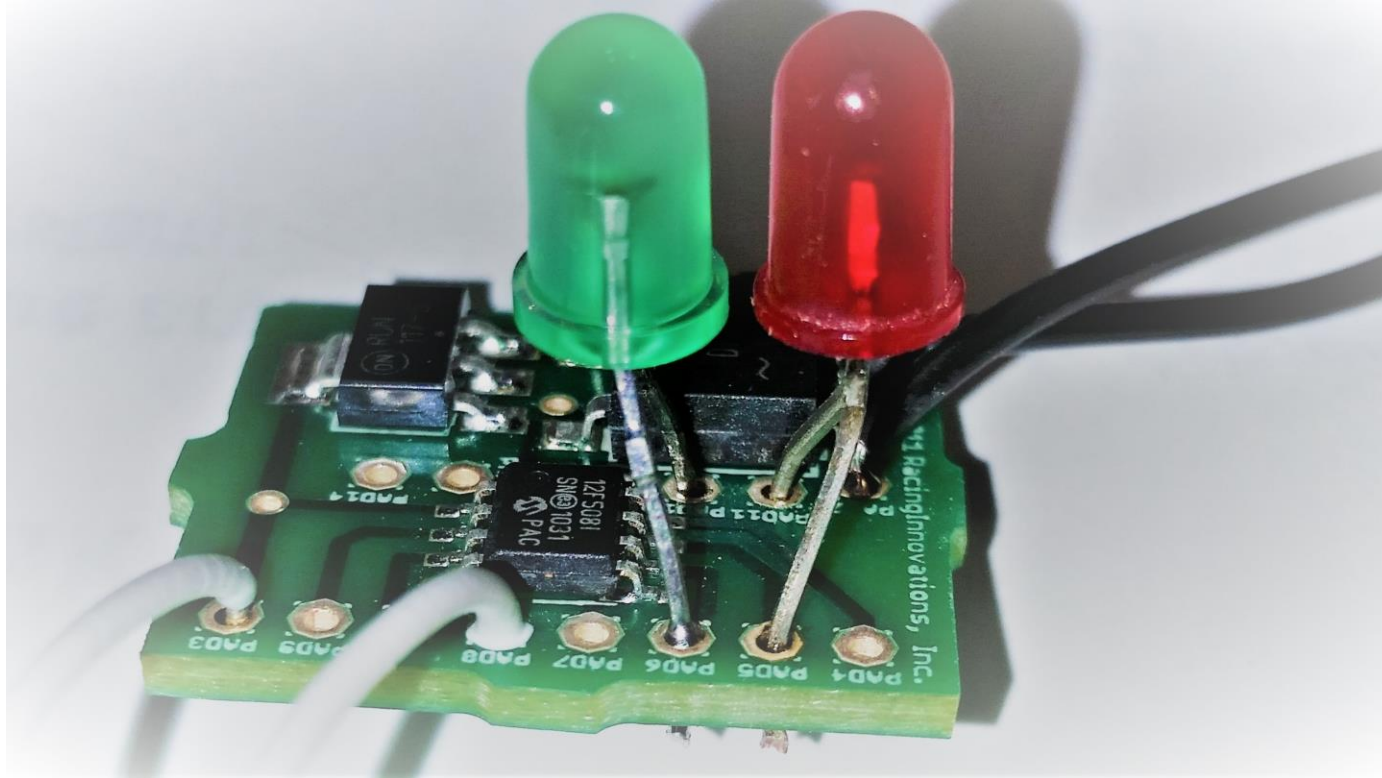
- Cut 2 wires roughly 6 inches long
- Bend 1 end of each 90 degrees and hook it through the hole in the button lead
- Solder it!

Soldering the LEDs



- Pick 2 LEDs – choose colors you like
- Bend the leads so they fit through the holes in the board – **The long lead goes at the edge of the board**
- Flip the board over and solder the leads to the board
- Clip any excess lead wire

Soldering the Button



- Using the same process as for the LEDs, Solder the button wires into the holes as shown in the picture

Test it!

- Hook the 2 black leads to a power source
 - Any source from 6V to 18V will work – AC or DC
- The LEDs should blink alternately
- Pushing the button should stop the blinking

- Thanks for attending - hope it was fun!