

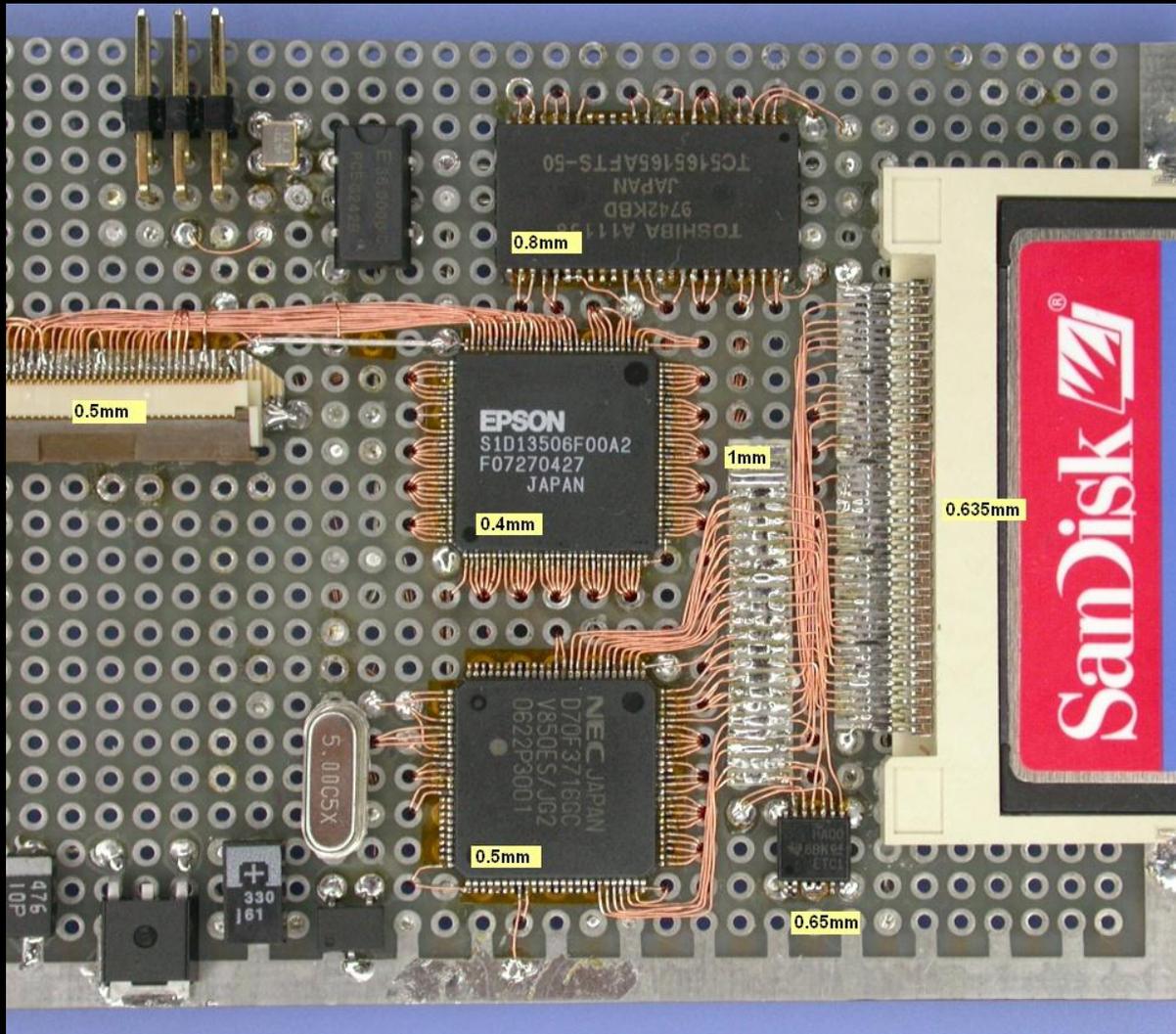
# Surface Mount Soldering

Brad Luyster

# Credit

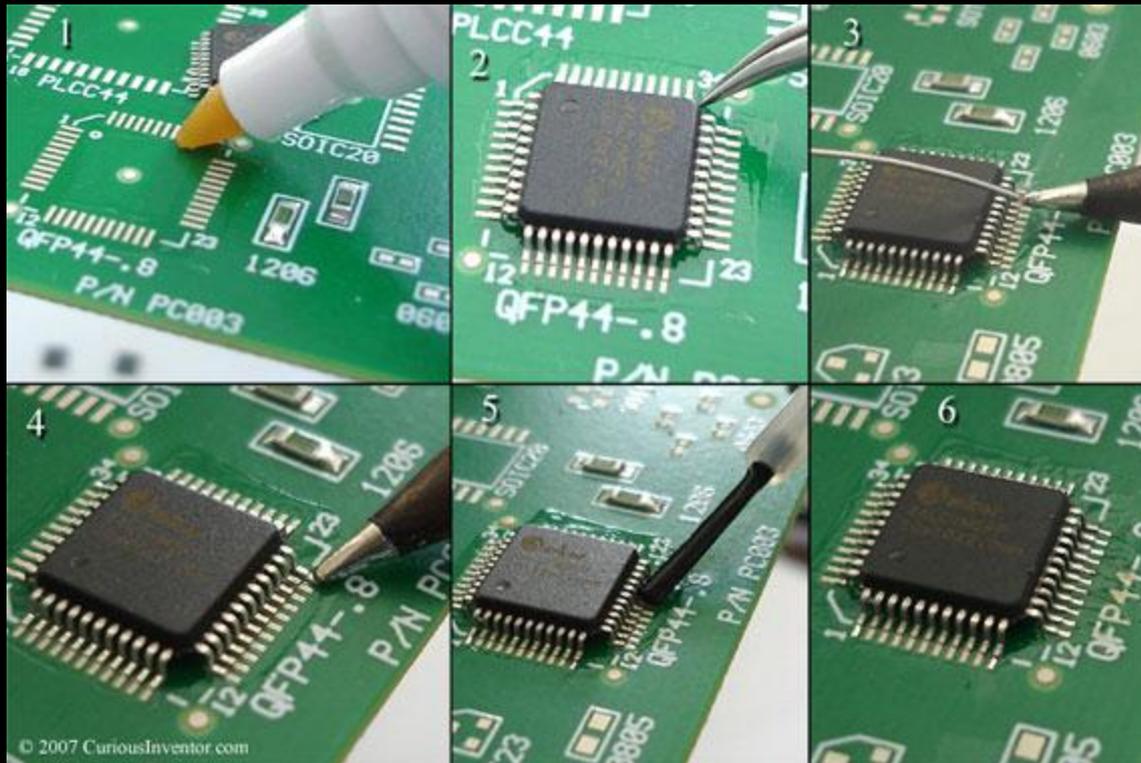
- Many of the photos used throughout this presentation are from SparkFun or Curious Inventor. For more information, different perspectives, and really cool pictures of people soldering impossibly small parts, visit their websites.

# Why We're Here



# Why We're Here

- Just Kidding!
- This is why we're here:



# How This Will Go:

- We're going to show you how to solder each part under the camera
- Then we're going to walk around and help you solder everything together

# Tools and Technique

- Tweezers to grab and position parts
- 10X Loupe to inspect finished joints
- Small Solder
- Solder Wick to fix mistakes
- Flux, the secret sauce of surface mount soldering. It forces solder to flow exactly where you want it, and nowhere you don't.



# Tools and Technique

- Flux
  - A flux pen is nice, but flux can come in many different forms. Use what you like the best.
  - Flux is either ‘Activated’ or ‘Non-Activated.’ Activated flux can corrode solder joints and components, although this is a very long (multiple-decades) process. Non-Activated flux will not. Many people opt to clean their boards of flux residue. For non-critical projects, this isn’t likely necessary.
- Solder Braid
  - Also comes in Fluxed and Unfluxed forms. We recommend getting the kind with flux built in.

# Tools and Technique

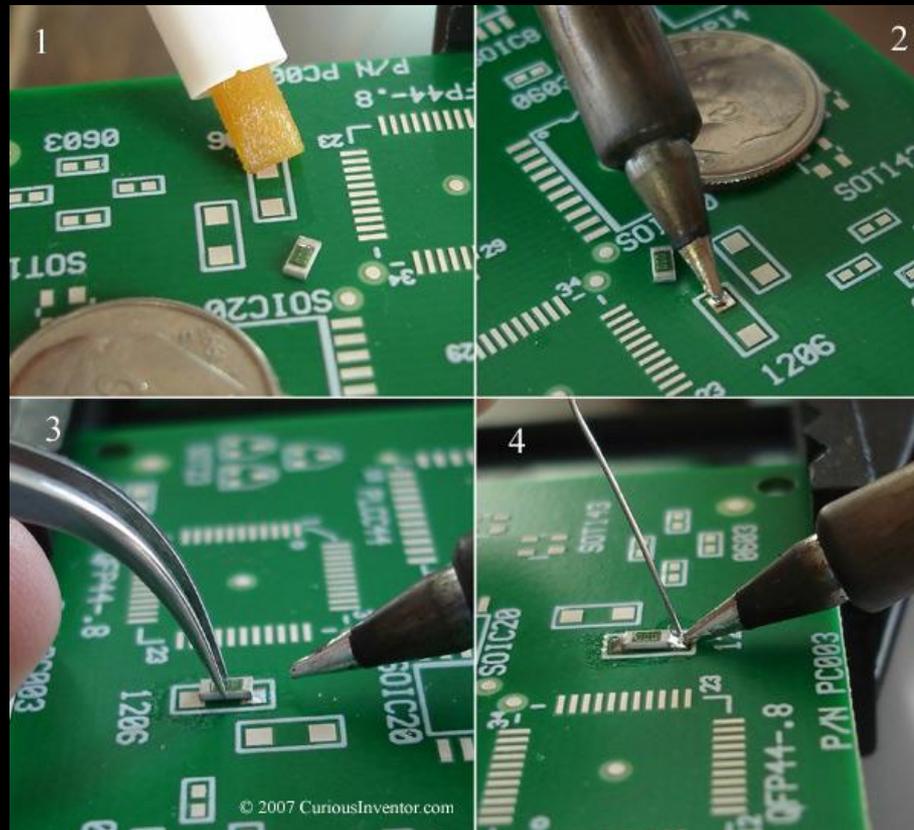
- Soldering Iron
  - The techniques we'll teach you today require a soldering iron with a tip no SMALLER than 1/32". Smaller tips will not allow solder to accumulate on the very end. You can solder 0.5mm components with this tip without any problem at all.
  - The chisel tip is most useful for the techniques we'll be teaching you today, but you can also use bevel tips.

# Tools and Technique

- Hot Air
  - Hot air is absolutely required to solder and desolder leadless packages. Otherwise, you can likely go without. We'll show you how to solder using hot air today, using both wire solder and paste solder. even though you won't be doing it yourself during this workshop.
- Reflow Skillet/Hotplate Method
  - If you can make (or buy) a solder paste stencil, or solder paste syringe, you can easily solder boards by applying solder paste, setting components on the paste, and heating up the board to liquefy the solder. This is the method Sparkfun used to make boards for their first 3 years of existence.

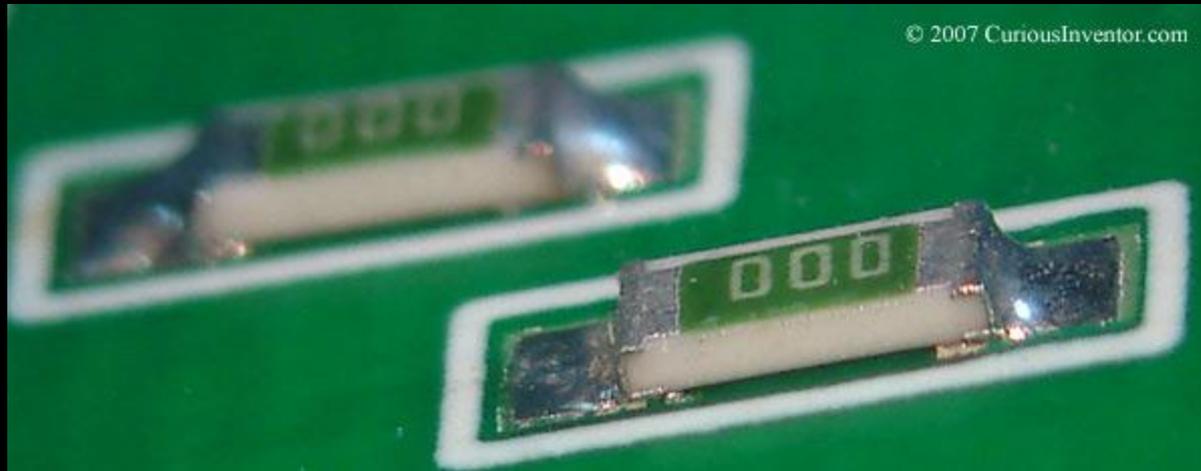
# Tools and Technique

- Soldering Resistors and Capacitors



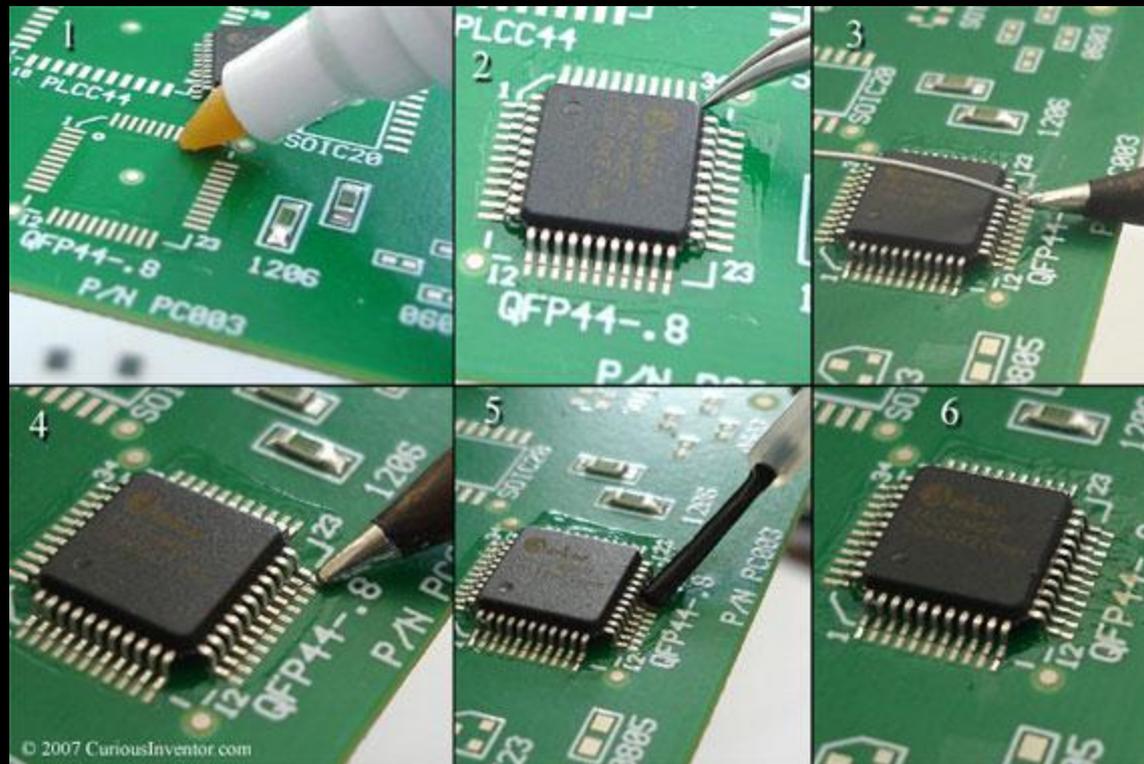
# Tools and Technique

- Soldering Resistors and Capacitors



# Tools and Technique

- Soldering QFP



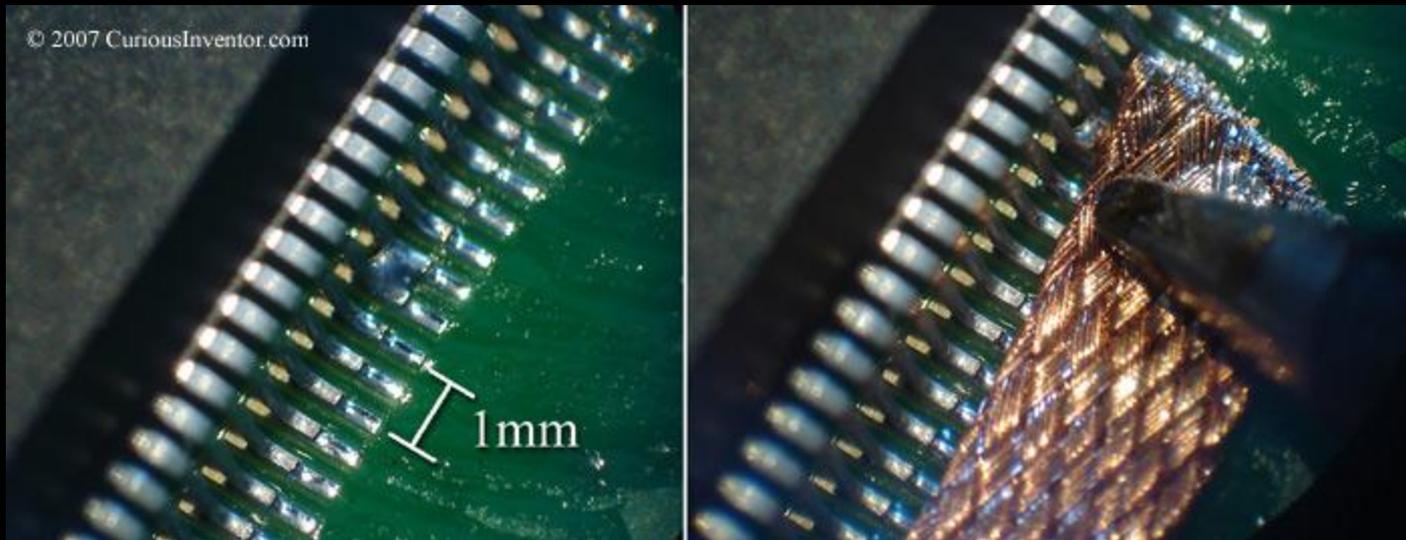
# Tools and Technique

- Soldering QFP



# Tools and Technique

- Fixing Bridges



- You can apply the wick for as long as you like (provided you don't burn the board or the part). Surface tension will retain a minimal amount of solder on the pad.

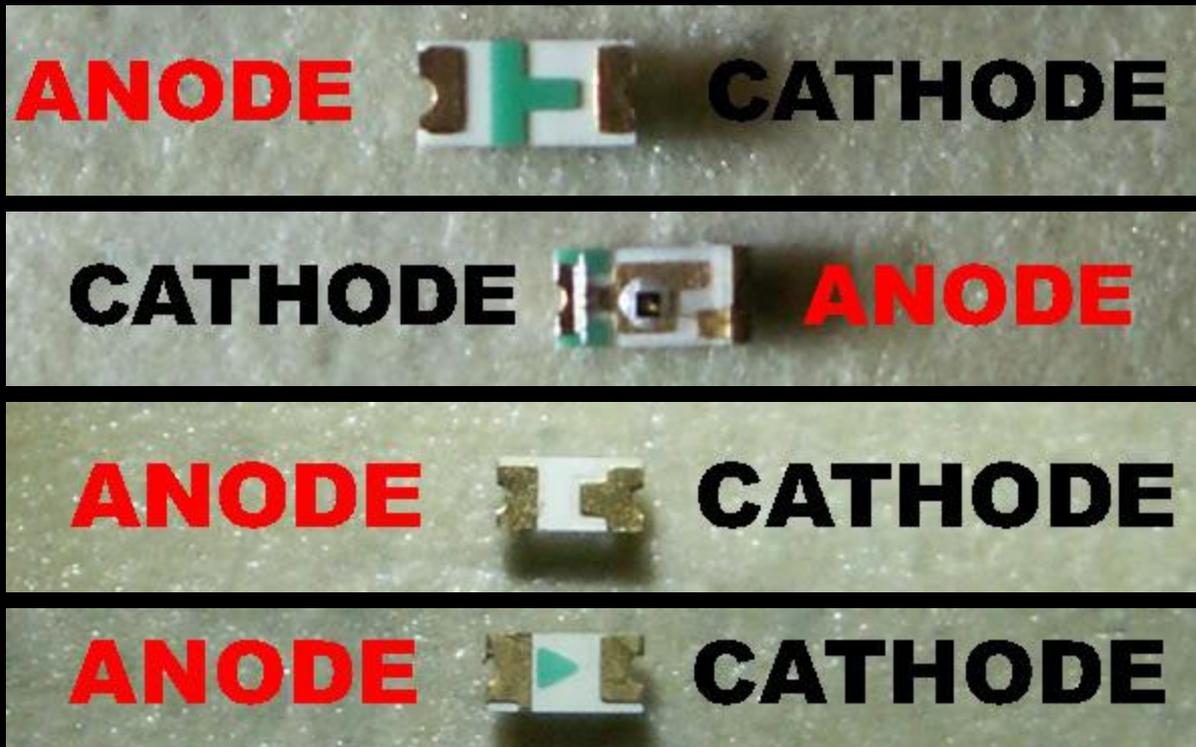
# Tools and Technique

- Surface Mount LEDs
  - On the bottom, SMT LEDs have a small dot or line indicating the Cathode (Negative Terminal). This can be hard to remember, though. You can determine the polarity by using a multimeter's Diode or continuity testing function, though
  - When the LED Lights up, the black probe will indicate the Cathode, and the red will indicate the Anode.



# Tools and Technique

- Surface Mount LEDs



Let's Solder!

# About the AVR Programmer

- Using an AtTiny45V
- Running at 16.5 MHz
  - This is thanks to an internal PLL, and an RC clock at 8.25 MHz
- Using code from LadyAda's TinyISP
- USB Library VUSB

# About the Capslocker

- AtTiny45V
- Different verse, same as the first