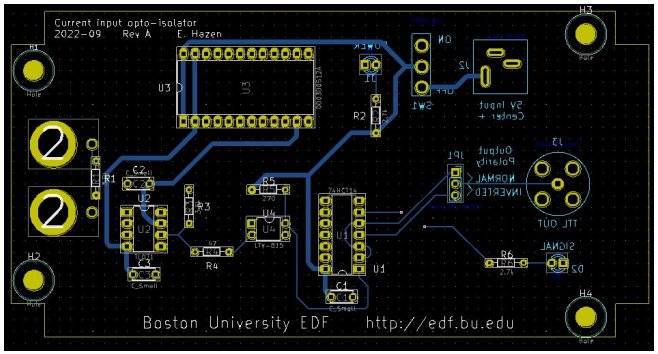
BOSTON UNIVERSITY

BU College of Engineering
Engineering Product Innovation Center

Introduction to Soldering



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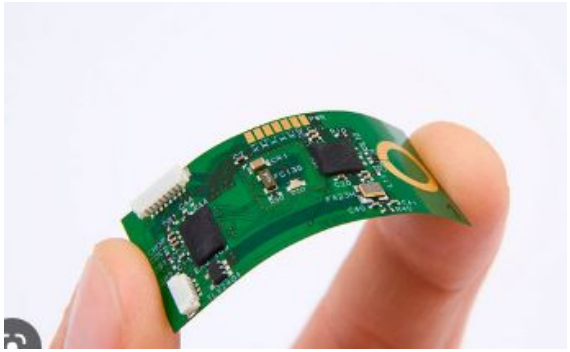
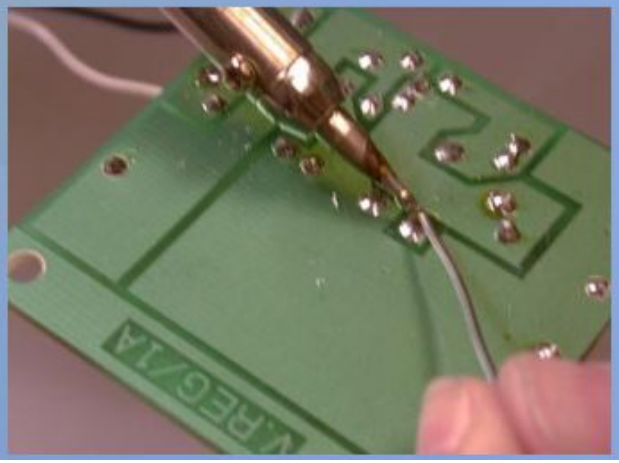


Soldering

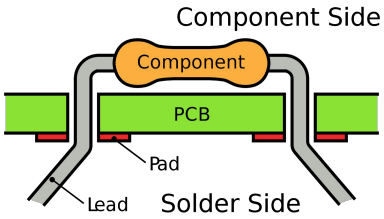
- *Soldering* is the joining of metal objects together. A filler metal ("solder") is melted and flowed into the joint.
- Soldering was practiced in ancient Egypt at least 7000 years ago
- Soldering is used to attach electronic components to a board, and also for jewelery and other applications



Soldering Safety

- The iron gets hot!
  Don't burn yourself. Careful not to splash solder
- Solder is made of lead, which is poisonous
  Wash your hands when you are done; don't eat or drink while soldering
- Snipped component leads fly at high speeds
  Close your eyes or cover board with your hands

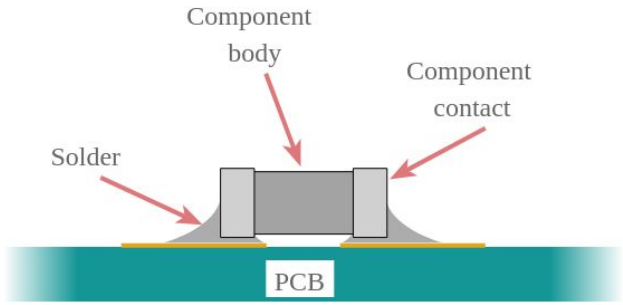
Thru-hole (THT) vs Surface Mount (SMT)

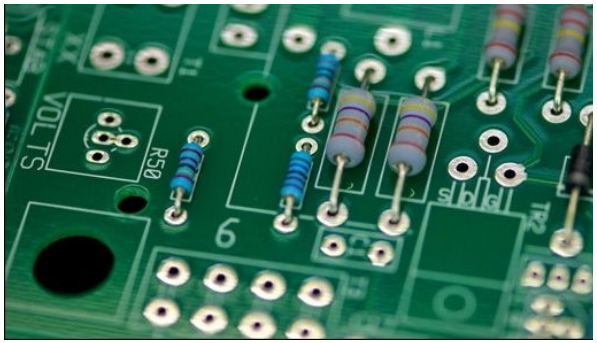


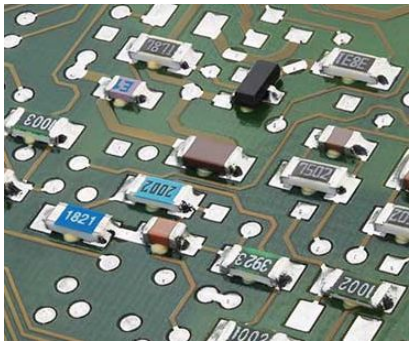
Thru-hole is the original PCB technology. Still in widespread use. Simpler to design and solder.

Requires more board space

Parts availability starting to become a problem

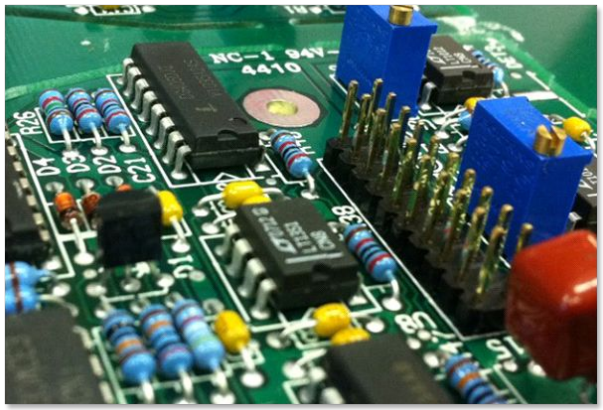




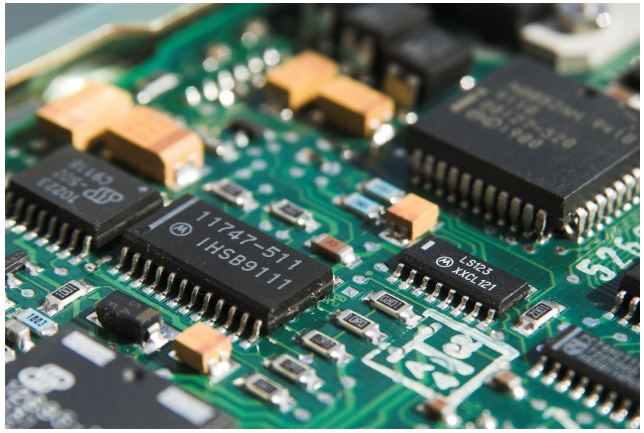


Surface-mount was introduced in the 1980s and is used almost exclusively for large volume manufacturing.

Can be challenging to assemble by hand.



We will learn a bit of both techniques today

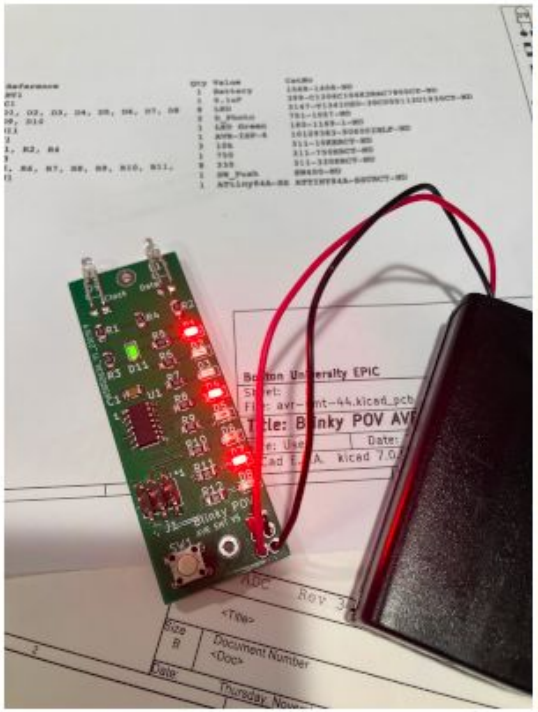


Design Repo: https://github.com/eshazen/blinky-avr-smt

Programming: https://ohm.bu.edu/~hazen/BlinkyPovAVR/prog/test_prog.html

Today's Project!

blinky-avr-smt



Blinky POV soldering project

This is a soldering practice kit which displays a message in the air on LEDs when waved back and forth.

Soldering - Tips and Tricks

- Tin-Lead (PbSn) solder works best
- Get the sponge wet before starting
- Set the iron temperature to ~ 750 F
- Wipe the tip on the sponge and “tin” with new solder before each operation
  (if the tip gets dirty, clean on brass sponge)
- If you aren’t using the iron, turn it off

The tip should look like this before you start soldering anything!

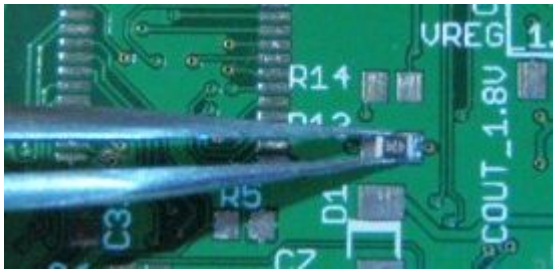
Soldering two-terminal SMDs (resistors, capacitors)

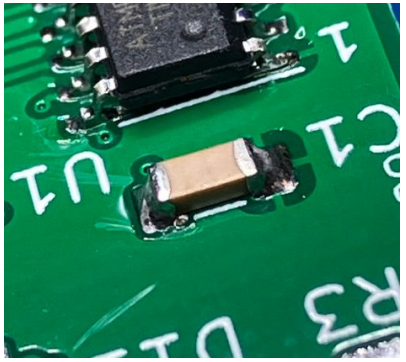
SMD = *Surface Mount Device*

- Apply solder to one pad (“tinning”)
  clean and tin soldering iron
  touch iron to pad *count to 3 slowly*
  feed in some solder
  keep iron on pad *count to 3 slowly*
  remove tip

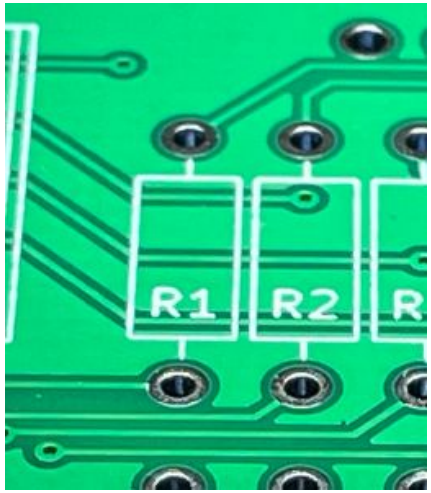
- Heat solder until it melts
  Use tweezers to slide component into place

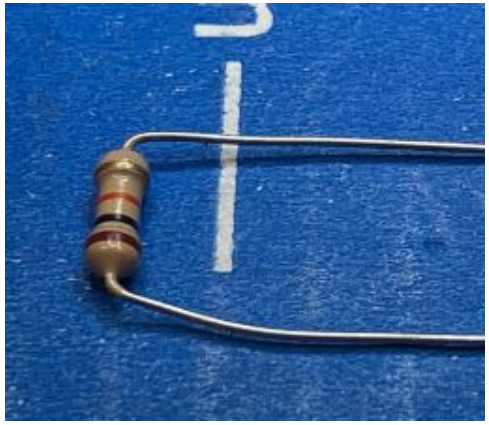
- Heat the other end *count to 3*
  apply some solder
  keep iron on joint *count to 3*



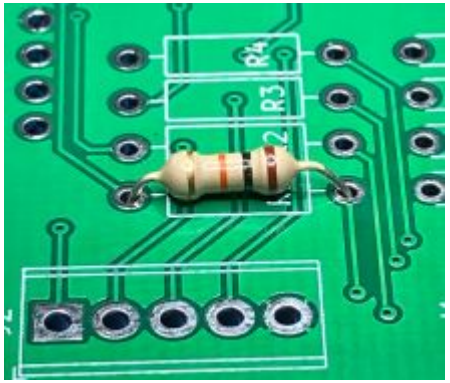


Soldering Thru-Hole Devices



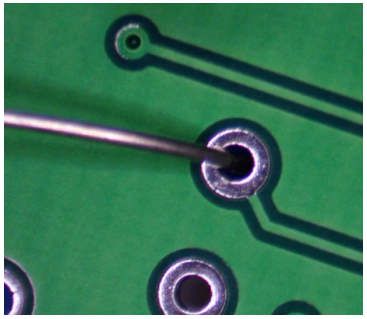


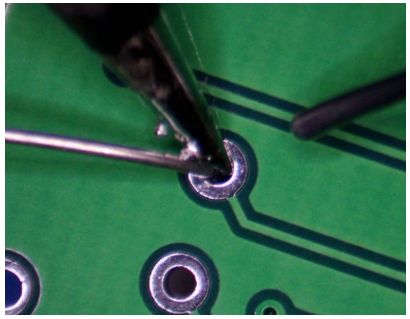
Bend component leads



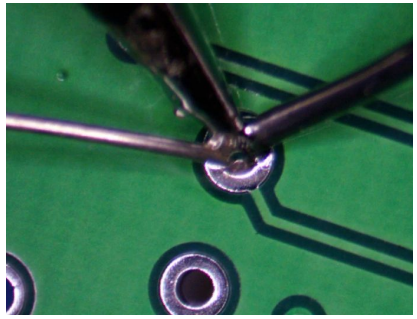
Insert from top side

Bend leads to secure

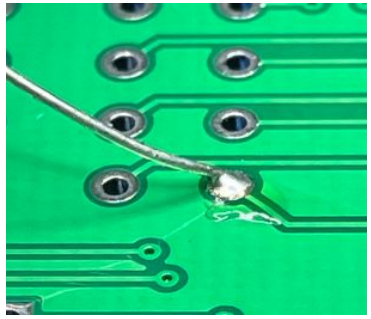




Press iron to pad and component lead ~3s



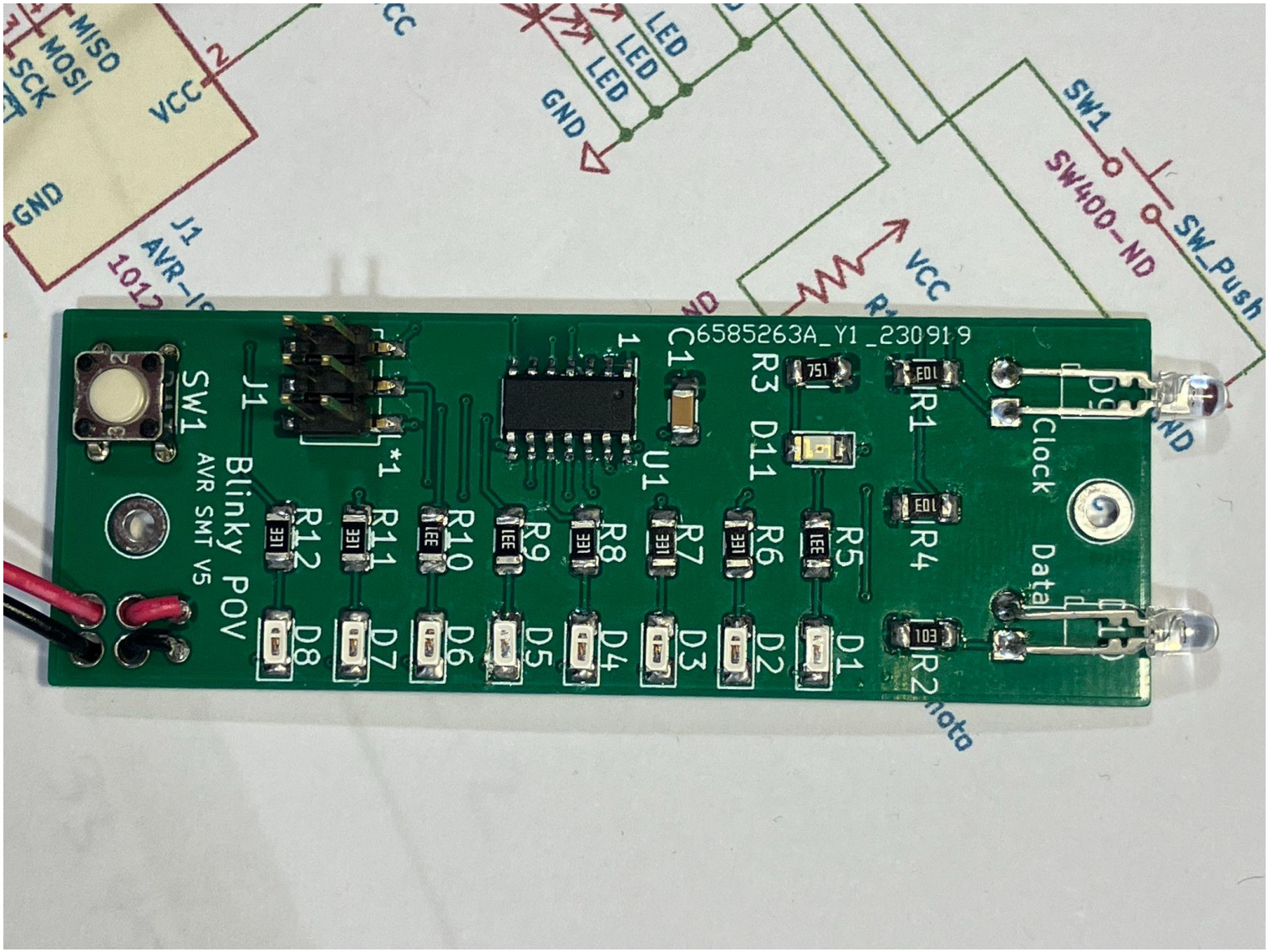
Feed in solder until hole is full



Finished joint

Soldering - suggest to install in order on parts kit

Do all two-terminal SMT first - R, C, D then U1 (ask for help!)



When you're done…

After you finish soldering, *get your work inspected*

(This will prevent damage due to incorrectly installed parts)

Connect battery with **red** wire to *left*

Hold SW1 (button down) when powering up first time to reset the message.

All LEDs should flash.

To program a new message into your board, visit this site:

https://ohm.bu.edu/~hazen/BlinkyPovAVR/prog/test_prog.html