Workshop II

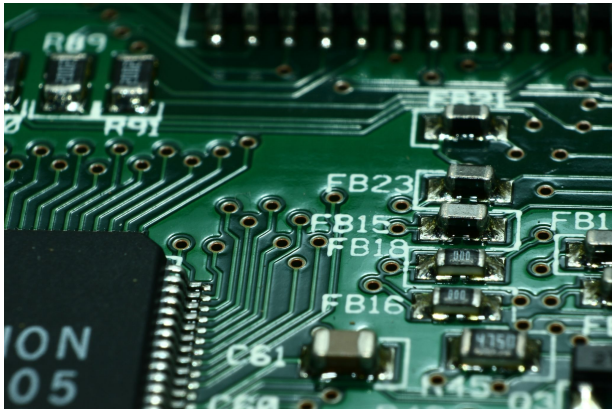
Soldering on PCBs

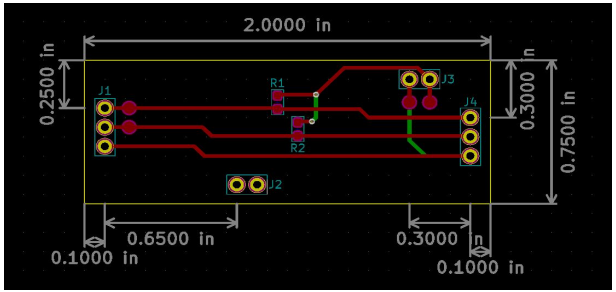
SECTION I

What is a PCB?

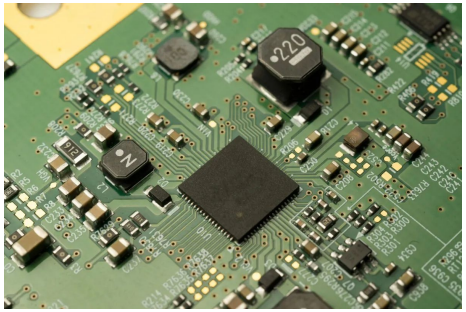
What is a PCB?

- A **Printed Circuit Board (PCB)** is a thin board composed of layers:
  - copper sheets
  - insulator
- **Traces** connect electronic components to form a circuit
- Surface mount devices (SMD) or through hole components can be mounted and routed on a PCB





PCBs vs. Breadboards



Printed Circuit Board

Pros:

Compact - neatly arranged

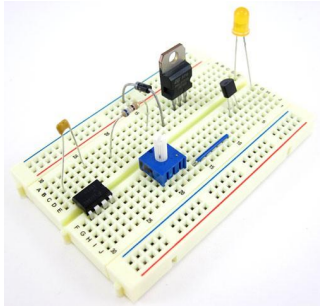
Stable - less likely to disconnect

Complex - ideal for circuits with many of components

Cons:

Harder to design (and modify once printed)

Expensive - requires third party to produce



Breadboard

Pros:

Cheap - great for prototyping

Beginner-Friendly - easy to learn, requires no soldering

Flexible - easy to rewire

Cons:

Unreliable - wires can fall out

Bulky - ideal for circuits with low amounts of components

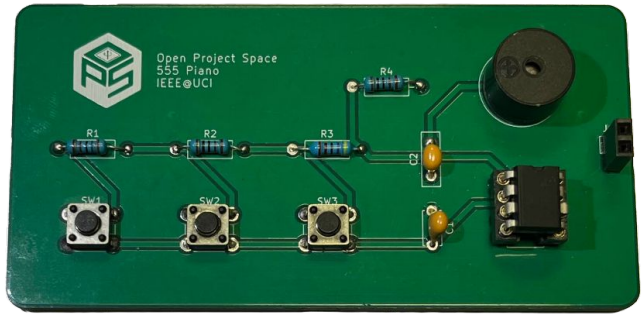
Debugging - hard to troubleshoot

SECTION II

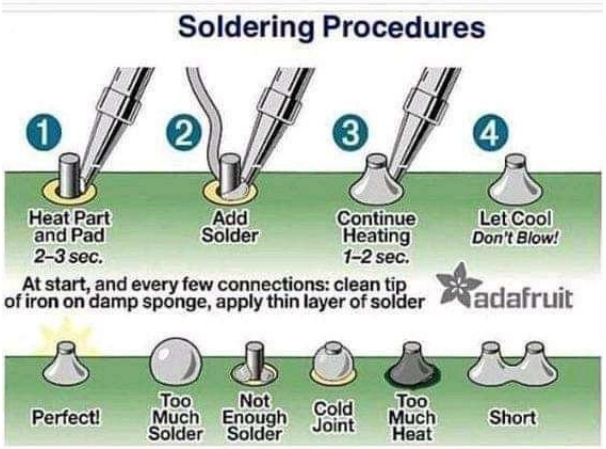
Soldering Components onto a PCB

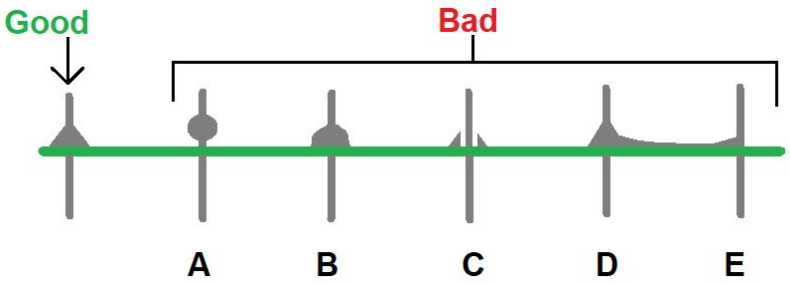
Soldering Components onto a PCB

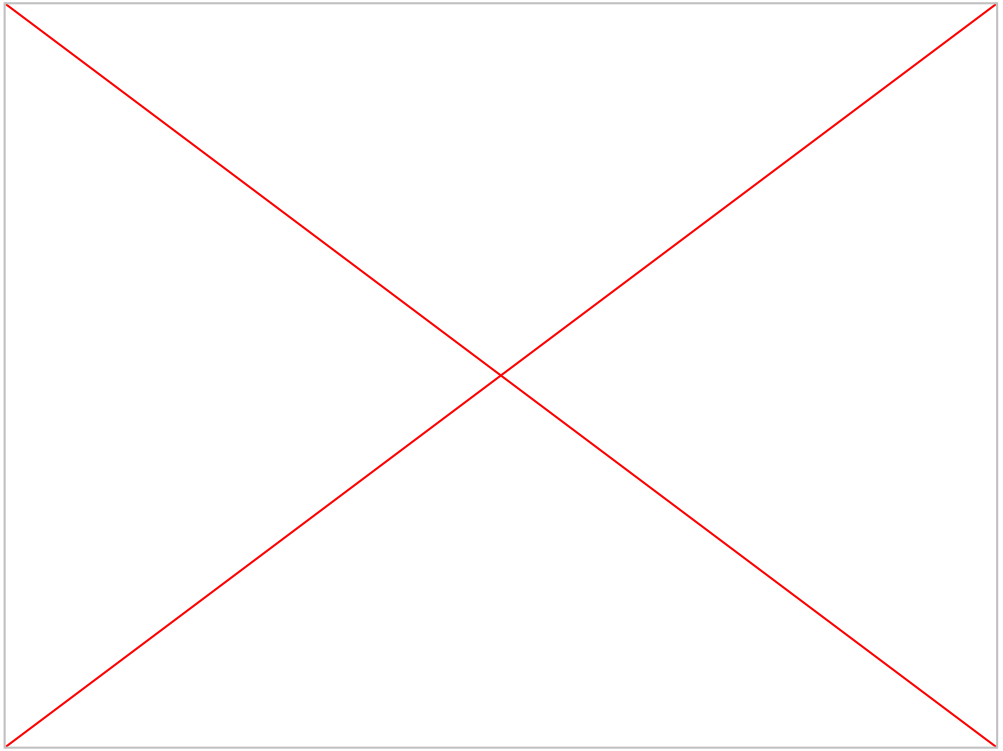
1. **Prototype** your circuit first on a breadboard (Confirm your circuit with a Lab Instructor before soldering)
2. Identify where each component goes on the PCB
3. Slide components into the PCB from the TOP
    a. Bend the leads in the back to make soldering easier
4. Solder components from the back side, NOT the front
    a. Solder shorter components first (ex. Resistor) before soldering taller components (ex. Piezo Buzzer) to make soldering easier



Soldering Components onto a PCB (continued)



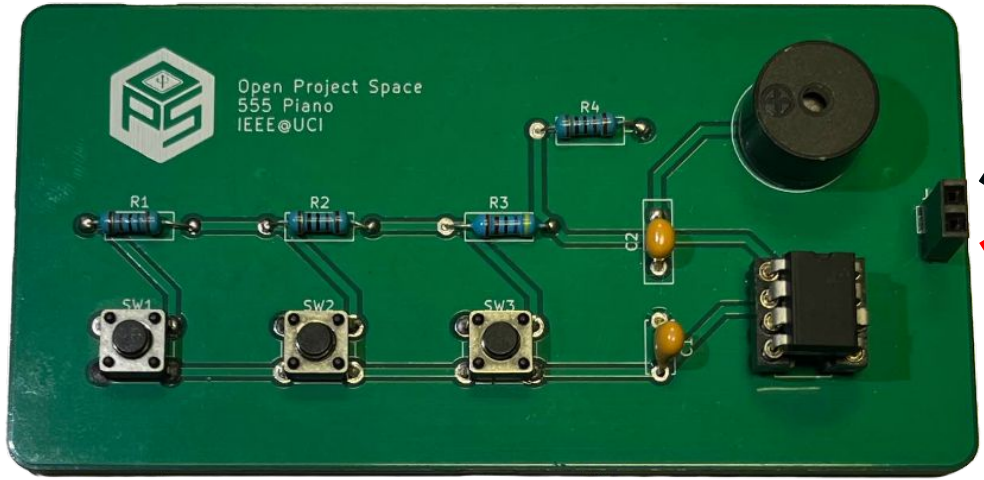




SECTION III

Reminders

Battery



Negative terminal
(black wire)

Positive terminal
(red wire)

A good habit is to unplug components that are not in use.
If a component gets very hot after being plugged in, unplug it immediately
Do Not solder the 555 IC directly. Use the 8 pin header!

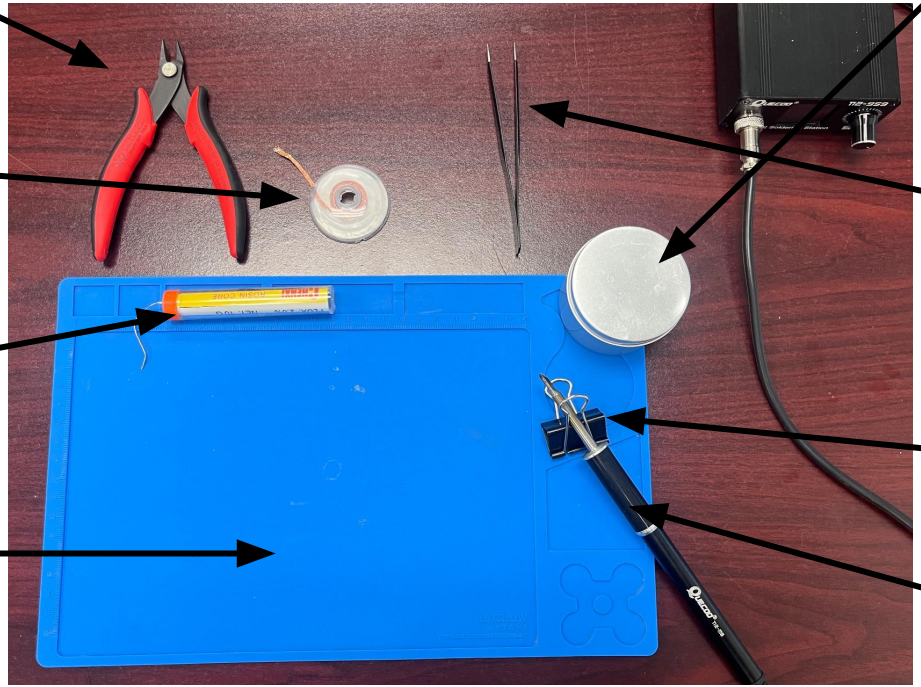
Station Layouts

Flush Cutters (Snips)
- Used to cut wires

Solder Wick
Cleans up excess solder and remove components

Solder Tube
- Dispenses the solder

Blue Silicone Mat -
Your working area, keep all wire clippings and tools on it!



Brass Wool
- Cleans tip of iron w/ rosin of oxidation and solder

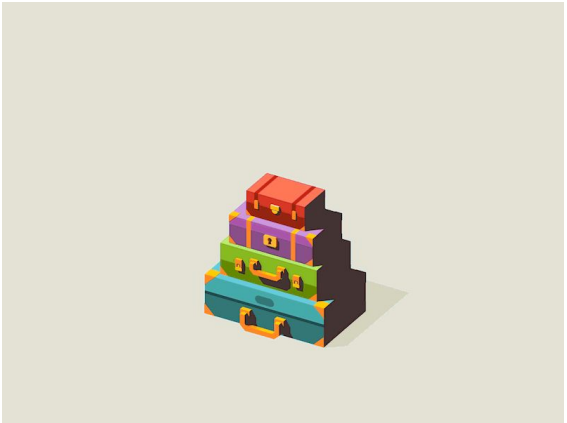
Tweezers -
Hold components and secure in place

Binder Clip -
Holds the hot iron

Soldering Iron
- Heats the solder

Clean up:

1. Turn off, tin the tip and leave in stand to cool
2. Close brass wool tin
3. Collect trimmed leads, cooled solder and any other trash to be thrown away
4. Pack up your things
5. WASH YOUR HANDS!!!!



Our Setup - The Soldering Iron

- The soldering iron comes in two parts, iron tip and iron body
- To assemble it, put the white end of the iron tip into the iron body
- To turn the iron on, toggle the switch on the back of the box the iron body is connected to
- The reading on the box's screen should be 325° C, if not, adjust with the knob on the front
- Before and after soldering, you should tin the iron
  - Tin the iron by melting a small amount of solder on the tip
  - Wipe on brass wool (inside silver cylinder) to get rid of excess tin on iron

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