Soldering Techniques and Safety

Lecture 1
Engineering World Health
What is Soldering?

- Joining electrical components to printed circuit boards (PCBs) using a filler metal that has a relatively low melting temperature (several hundred °F)
- Creates a strong electrical and mechanical connection, although the former is more important

http://www.sciencebuddies.org/science-fair-projects/project_ideas/Elec_primer-solder.shtml#soldering
Solder Wire

• Consists of two main components
  – Metal alloy: 60% tin and 40% lead (60/40 Sn/Pb), 63/37 Sn/Pb, or 99.3% tin and 0.7% copper (99.3/0.7 Sn/Cu)
  – Rosin core flux: “cleans” by removing oxide contaminants, allowing the molten metal to flow freely
Soldering Process

• Metal solvent action (i.e., intermetallic bonding) between the solder and PCB pad
  – Alloy consisting of tin (from solder) and copper (from PCB)
• Having good wettability maximizes contact area.

http://www.powerguru.org/soldering-basics/
http://blogs.indium.com/blog/eric-bastow/intermetallics
Soldering Safety Tips

- Safety glasses are also a good idea.
Tinning the Tip

• Apply a thin layer of solder to the tip of the soldering iron.
  – Protects the soldering tip from oxidizing
  – Oxidation causes poor heat transfer and interferes with solder adherence.
• Tin the tip whenever you are not using the soldering iron.

http://www.makerbot.com/docs/openvolver/
Thermal Linkage

• Molten solder flows towards heat!
• Make sure the soldering iron is touching both the component lead and the PCB pad.
  – Otherwise, you will get poor thermal linkage between the component and the PCB. Solder will not flow properly around the component lead and on the PCB pad, creating a poor electrical connection.

http://www.circuitrework.com/guides/7-1-1.shtml
Desoldering

- Used to remove a poor solder joint
- Commonly done with solder wicks or solder suckers
- Reheat (melt) the solder joint and then apply the desoldering tool.

Soldering Techniques Summary

https://learn.sparkfun.com/tutorials/how-to-solder---through-hole-soldering