FISH @ UVA

Soldering Guide

Medical Device Make-A-Thon | November 5–8, 2026 | University of Virginia

Any time you feel unsure or unsafe, please call over a Mentor or Exec Member. We're more than happy to help!

Soldering melts metal to join electronic components so electricity can still flow. It isn't permanent, but it's more of a pain to change than a breadboard, so **prototype on the breadboard first** and only solder once your circuit works.

> **Where and how you can solder**
>
> **SOLDERING IRONS ARE RESTRICTED TO THE PROTOTYPING ROOMS. THEY HAVE EXHAUST FANS AND PROPER WORKSTATIONS.**
>
> **TEAMS MAY NOT REMOVE SOLDERING IRONS FROM THE PROTOTYPING ROOMS.**
>
> **WEAR SAFETY GOGGLES AT ALL TIMES WHEN SOLDERING.**

Tool Guide

Soldering Iron and Solder

Basic Info:

The soldering iron heats up so you can melt solder, which is the metal that joins your parts together. Once it cools, the joint holds your components in place and lets current flow between them.

Safety Info:

SUPER HOT! NEVER LEAVE THE SOLDERING IRON TOUCHING ANYTHING, AND NEVER TOUCH THE TIP.

WEAR SAFETY GOGGLES AT ALL TIMES WHEN SOLDERING. BITS OF MOLTEN METAL CAN FLY OFF.

RETURN THE IRON TO ITS STAND WHEN YOU SET IT DOWN. UNPLUG IT WHEN YOU STEP AWAY.

WORK IN VENTILATION AND AVOID BREATHING THE FUMES.

WASH YOUR HANDS AFTERWARD.

Safety goggles are in each team's kit (2 per team), and there are more in the prototyping rooms.

Soldering Step by Step

1. **Prepare.** Put on your safety goggles. Make sure you're at a prototyping room workstation with ventilation on, and that your circuit already works on the breadboard. Set the parts so they won't move, then place the iron in its stand and plug it in to heat up.
2. **Tin the tip.** Once the iron is hot, touch a little solder to the tip so it gets a thin, shiny coating. This helps heat move from the tip into your joint.

3. **Heat the joint.** Touch the tip to the part you're joining and the pad or wire it connects to at the same time. Give it a couple of seconds so both get hot.
4. **Apply solder.** Touch the solder to the heated joint, not to the iron tip. Let it flow around the joint, then pull the solder away first and the iron right after. Hold your parts still while the joint cools.
5. **Inspect.** Look closely at the joint and compare it with the next section. Redo it if it doesn't look right.
6. **Clean up.** Return the iron to its stand, unplug it when you step away, wash your hands, and put your tools and scraps away.

What a Good Joint Looks Like

- **Shiny and smooth**, not dull, gray or crumbly.
- **Solder flows onto both the part and the pad or wire** it connects to.
- **Small and neat.** You can still see the shape of what you joined.
- **Solid.** Nothing wiggles when you gently test it.

Common Mistakes

Mistake	What goes wrong
Melting solder on the tip only	The solder sits on the iron and never reaches the joint. Heat the joint, then feed solder to it.
Not enough heat	Solder looks dull or lumpy and doesn't stick well.
Heating too long	Parts can get damaged. Heat the joint, add solder, and move on.
Moving parts while the joint cools	The joint comes out rough and weak. Hold still until it's solid.
Way too much solder	Big blobs can connect parts that shouldn't touch.
Soldering before testing	Fixes are harder than on a breadboard. Test first.

Troubleshooting

- **Solder won't stick.** Reheat the joint, make sure the tip has a thin shiny coating, and try again.
- **Joint looks dull or lumpy.** Reheat it and let it flow again.
- **Solder touching something it shouldn't.** Stop and call over a Mentor or Exec Member before you try to fix it.
- **Part feels loose.** Reheat the joint, hold the part still, and let it cool.
- **Iron isn't heating up.** Check that it's plugged in. If it still doesn't heat, ask a Mentor or Exec Member for help.
- **Circuit stopped working.** Go back to your breadboard version and compare.

Need Help?

Soldering takes practice, and everyone starts as a beginner. If you're unsure about any step, call over a **Mentor or Exec Member**. We're happy to help.