Soldering101 Shine

Soldering Kit

Coming soon: Tutorial video at soldering101.com

Let's Shine! Thank you for starting your Soldering101 journey with the Shine. This instruction manual includes photos and a description of each step of your build. Our Shine kit will help you learn soldering and you'll have a fun little circuit board that lights up once you're finished.

Your Soldering101 Shine kit includes the items shown in the photo below.

1. Battery holder
2. Two LED lights (colors may vary)
3. Two resistors
4. Two pushbutton switches
5. Coin cell battery
6. Shine printed circuit board (PCB)
7. 3D printed soldering cradle
8. 3D printed case

Equipment

Things you'll need to build your Shine kit:

- A clean, well-ventilated and safe work area
- Safety glasses or goggles
- Soldering iron and stand. A pen-type soldering iron with a fine tip works great for this type of soldering. Larger "garage" type soldering irons can be tough to use for small circuit board components.
- Lead-free solder. Solder with a diameter of 0.032" or 0.020" works great.
- Flush cutter pliers

Nice-to-have items:

- Silicone soldering mat
- Soldering brass sponge tip cleaner or damp sponge tip cleaner
- Solder sucker

A collection of items we've picked out is available on our home page at soldering101.com.

Safety

Learning to solder is fun, but it's very important to stay safe.

Always wear safety goggles to protect your eyes. Work in a place with fresh air and a clean workbench. Keep any flammable items away from your workspace. It is also important to not have any food or drink near your soldering workspace.

Soldering irons are extremely hot and can burn instantly, so do not touch any of the hot parts. Be sure to put the hot soldering iron on its stand when you're not using it. You will be melting solder, so the solder will also become extremely hot. Be careful not to touch any hot solder or allow any solder to drop on you or anything that could be damaged from it. The printed circuit board and electronic components will also become hot as you solder them. Let any hot items cool to a safe temperature before handling them.

When you are finished soldering, turn off and unplug the soldering iron then let the it cool completely before you put it away. Clean up your workspace to remove any solder or rosin. Finally, wash your hands with soap and water.

Also, please read the safety information that came with your soldering iron and other equipment.

Stay safe and have fun!

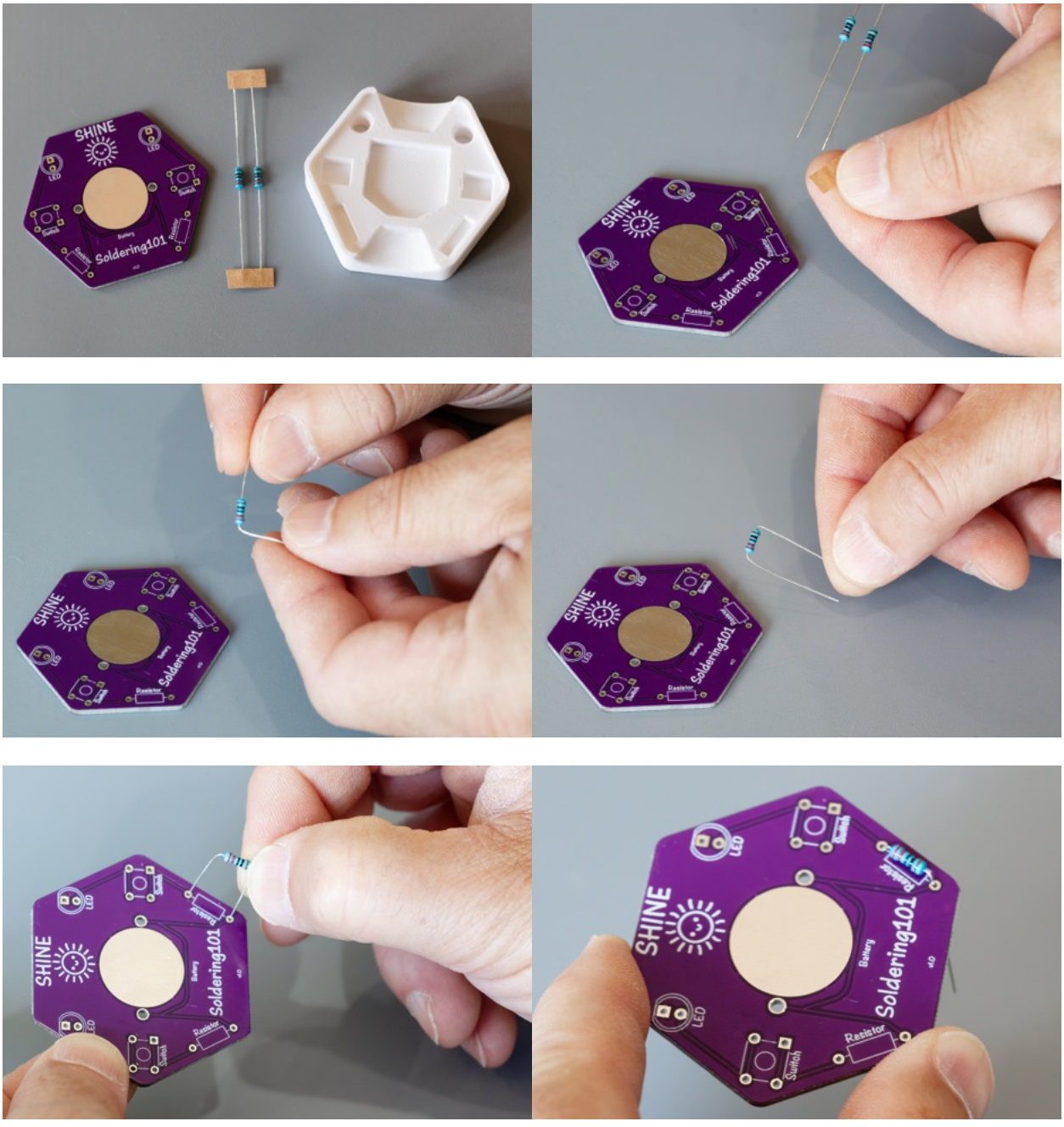
Building your Shine kit

The Soldering101 Shine kit comes with an awesome little 3D printed cradle to help you while soldering. We believe this is the first of its kind and it will help you build your Shine kit easily & correctly. We designed this cradle to hold each electronic component in place so that you can concentrate on soldering instead of worrying about supporting your kit with a tricky “helping hands” tool.

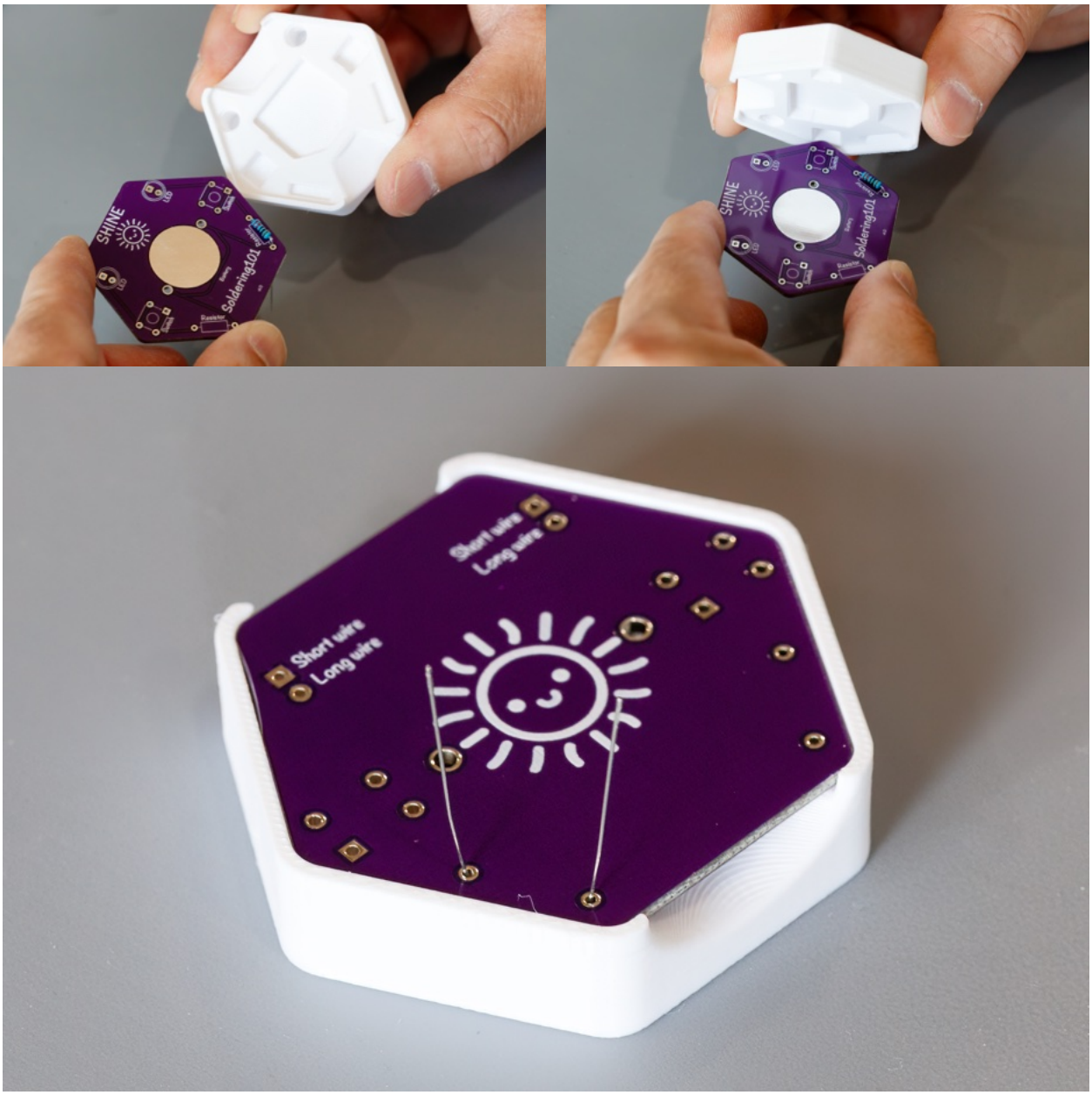
You can see how to use our special cradle in these photos.

Step 1: Prepare the resistors

Find the two resistors and remove the paper tape from the ends. Bend the wires on both sides of one resistor to form a “U” shape with each resistor. Then, insert the resistor into the circuit board. The orientation of the resistor doesn’t matter. It will work either way.



Place the 3D printed cradle on top of the Shine circuit board. There are slots in the cradle that align perfectly with the resistors. Once you have the cradle in place, flip everything over and set the cradle on your workbench. The circuit board should sit flush with the top of the cradle and the wires from the resistor should stick up through the circuit board.



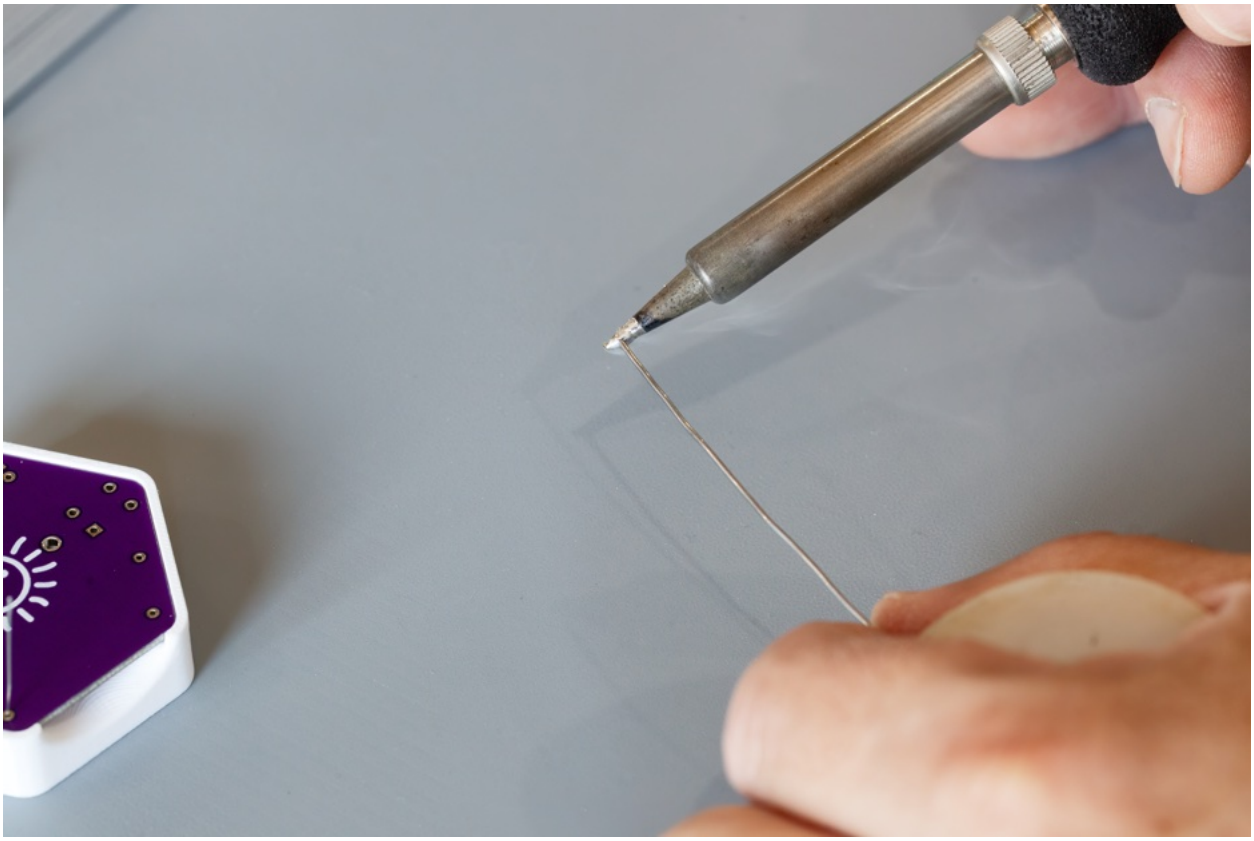
Step 2: Solder the first resistor

Now that the cradle is holding the circuit board and resistor, it's time to solder your first component!

Make sure your soldering iron is resting safely on its stand, then plug it in and turn it on. If your soldering iron has a temperature setting, set it to the temperature recommended for your solder. For lead-free solder, 600-650°F (315-343°C) is a good place to start.

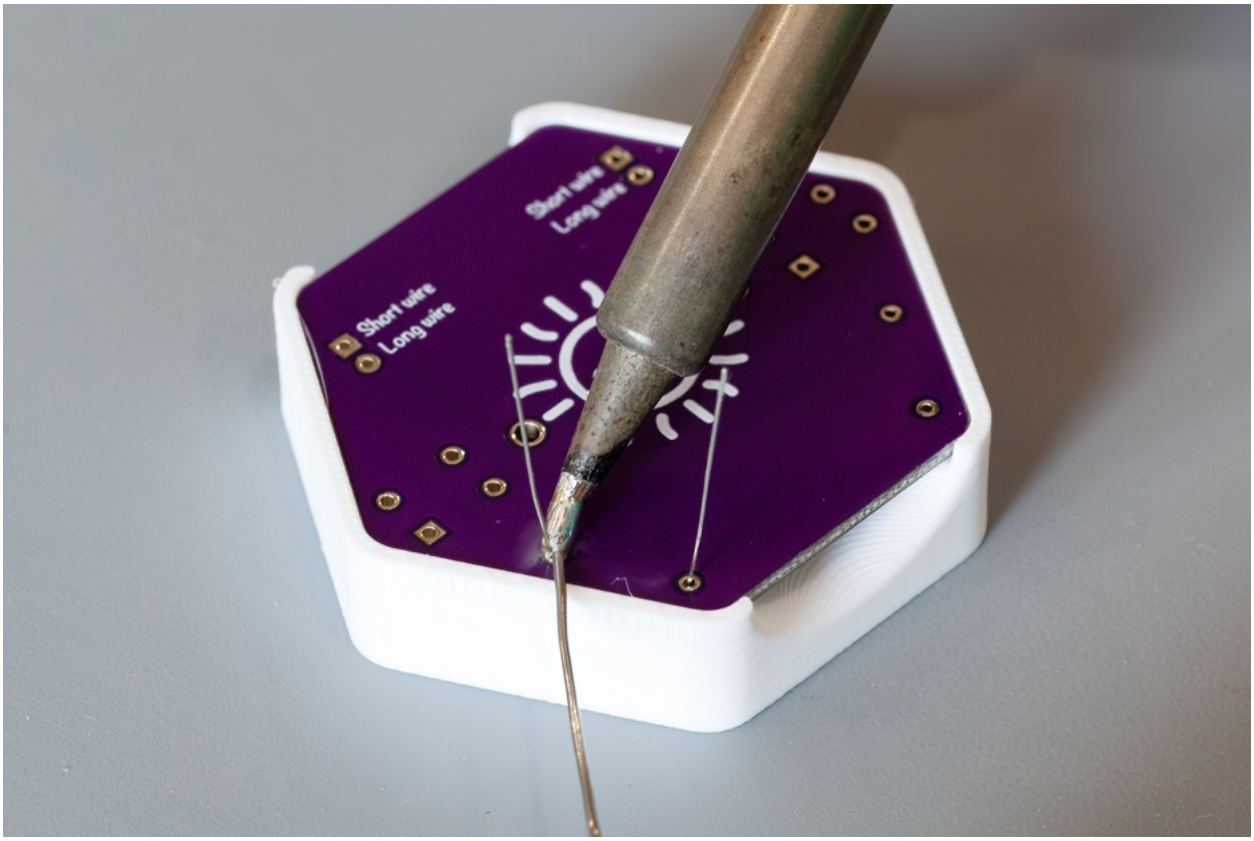
Straighten a section of solder and hold it about 3 inches from the end. Once the soldering iron is hot, touch the end of the solder to the tip of the soldering iron and melt a small amount of solder onto the tip. This is called "tinning" the soldering iron and will help heat transfer better which will make soldering easier.

Later, any time you clean the tip of your soldering iron or just before beginning to solder, it is helpful to tin the tip soldering iron tip again.



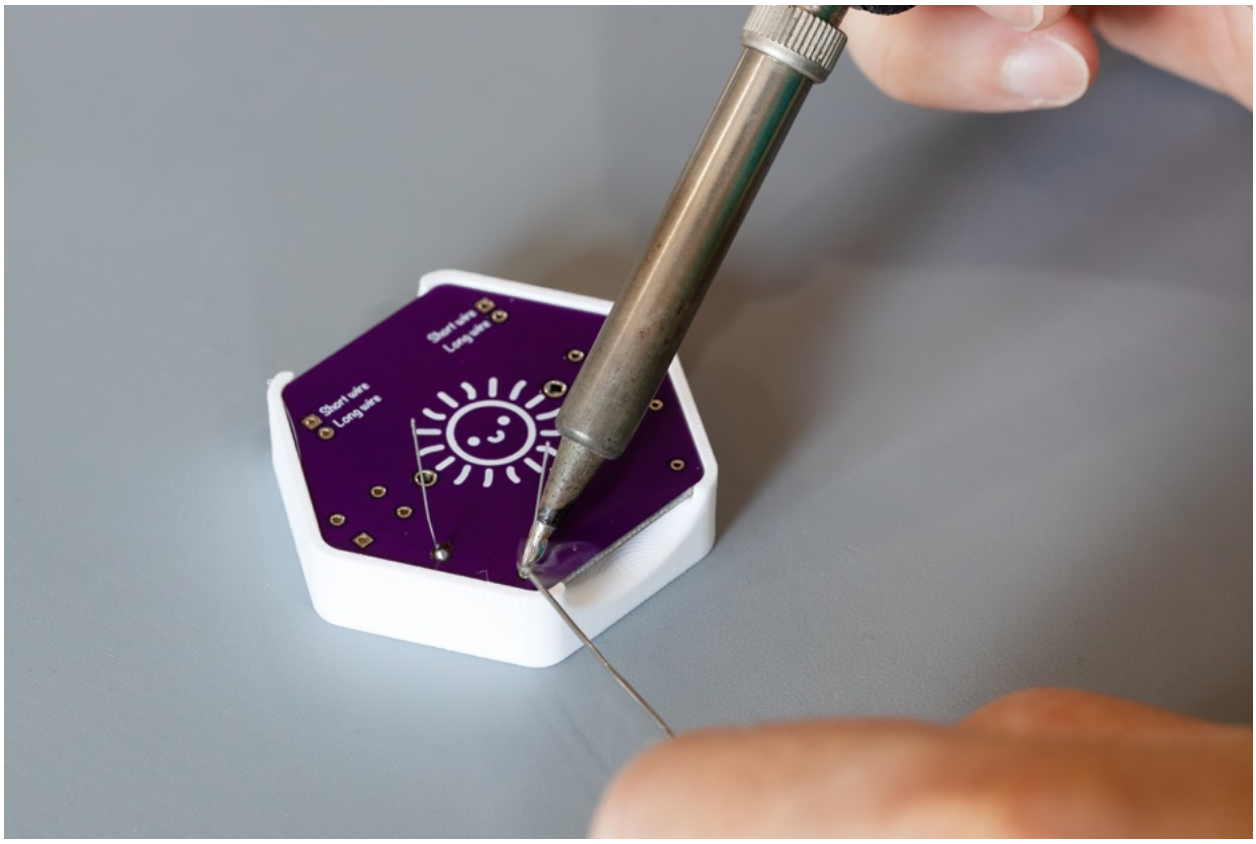
Next place the tip of your soldering iron so that it touches both the circuit board and one of the resistor wires at the same time. After about one second, touch the end of the solder to the wire, circuit board and tip of the soldering iron. As the solder melts, gently push in a small amount of solder into the wire & circuit board joint.

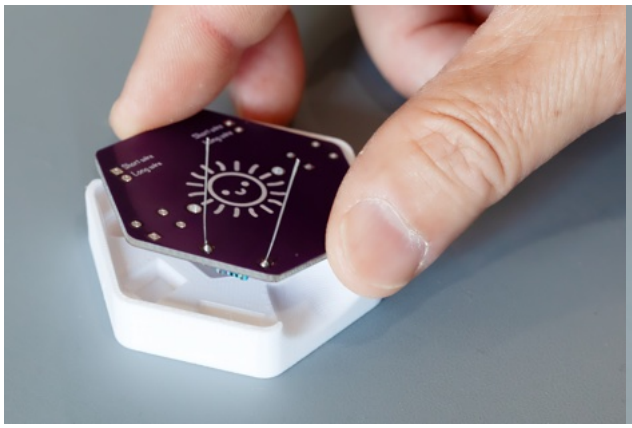
It doesn't take much solder and it should happen fairly quickly. Depending on your type and size of solder, it should only take about 1/4" of solder for each joint. Once the solder flows into the joint, remove the solder then remove the soldering iron. A great solder joint will look like a small, shiny metal cone that neatly covers the small, circular metallic pad on the circuit board. The solder on each joint should not touch any other wires or circuit board pads.



If the solder joint has gaps or doesn't cover the metallic pad on the circuit board, you can try again and add more solder. If the solder is dull looking, you can just heat it up again with the soldering iron. If there is too much solder on the joint, you can heat it up then use a solder sucker to remove some of the solder.

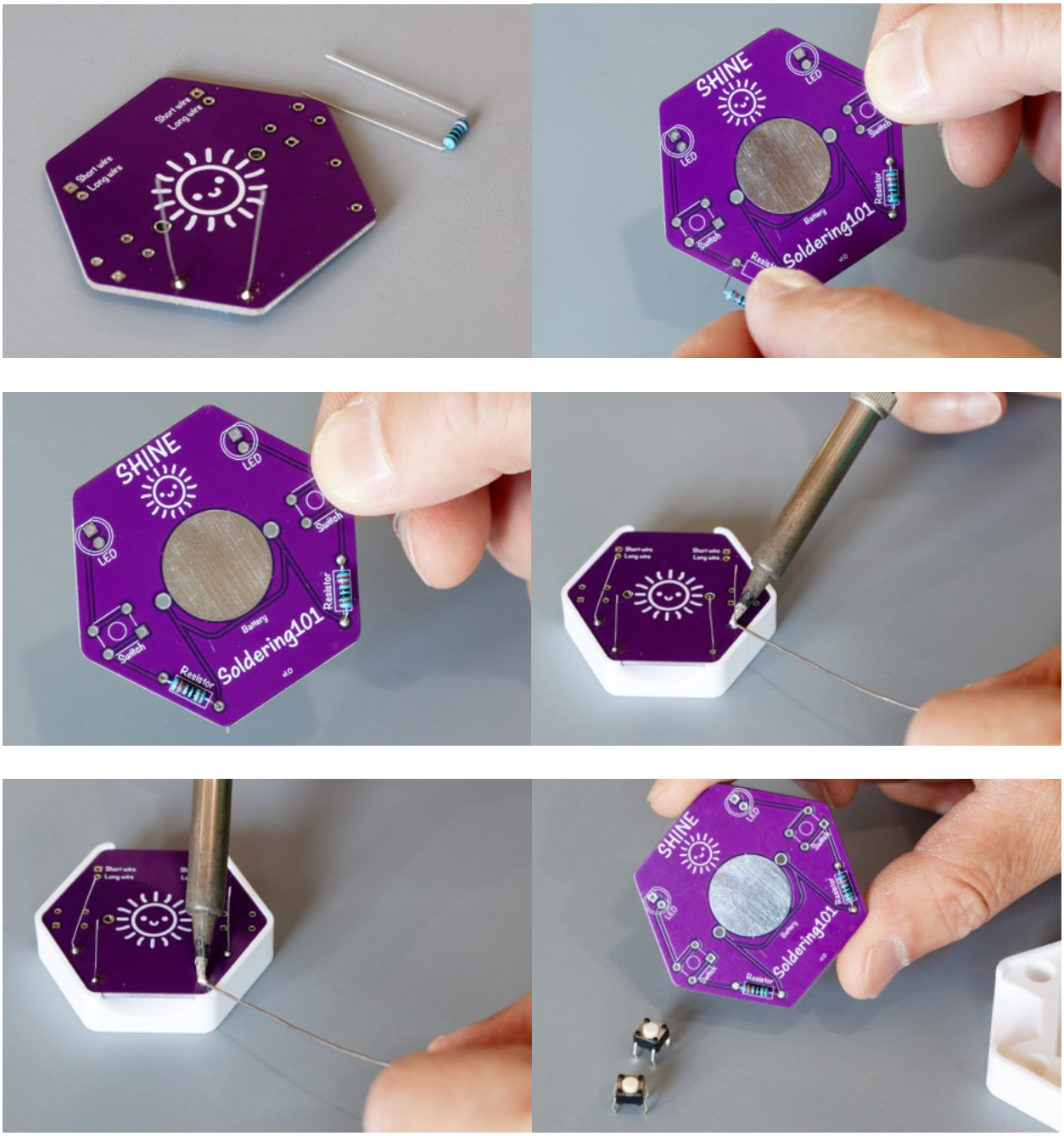
Solder the other wire on that resistor just like you did the first wire. Admire your handiwork!





Step 3: Solder the second resistor

Repeat Steps 1 and 2 to solder the other resistor.



Step 4: Solder the pushbutton switches

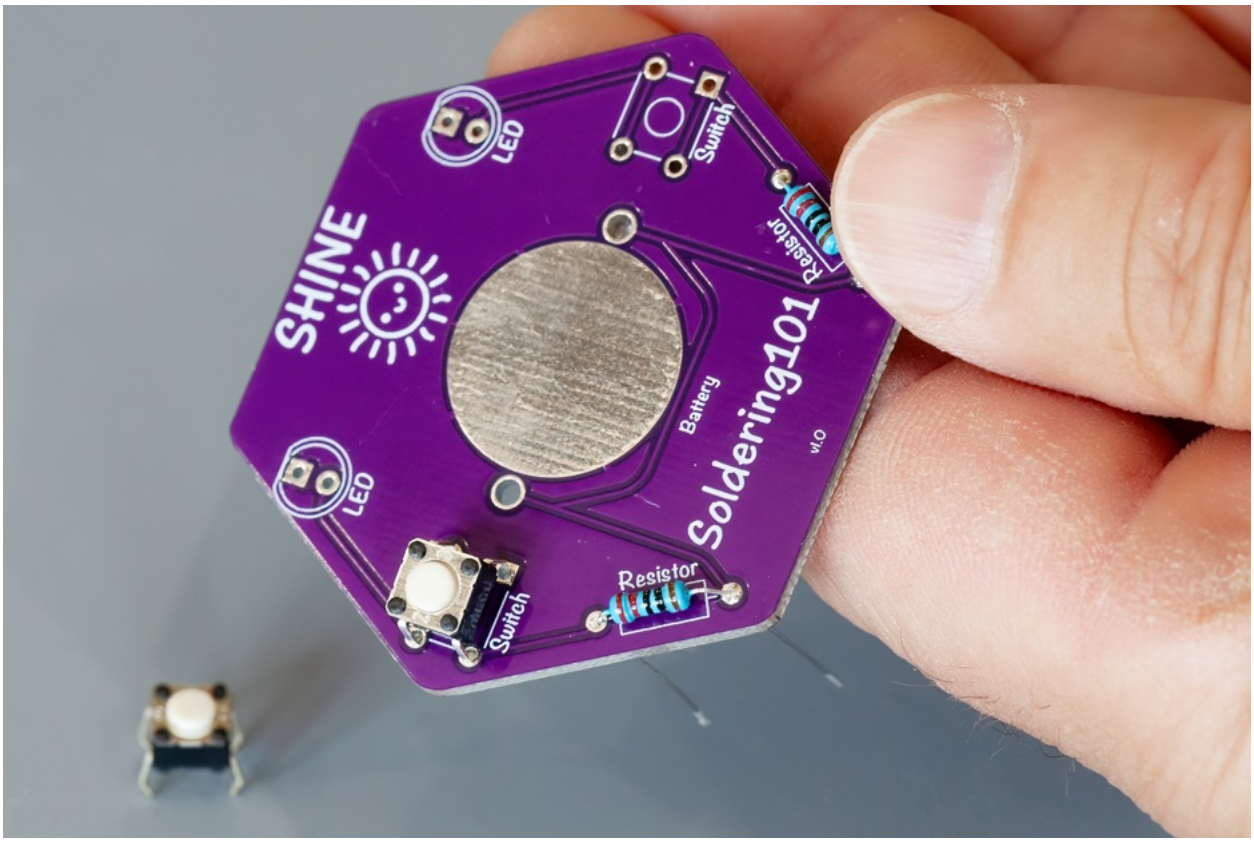
This step is a little more tricky because there are more pins to solder. The pins are also closer together.

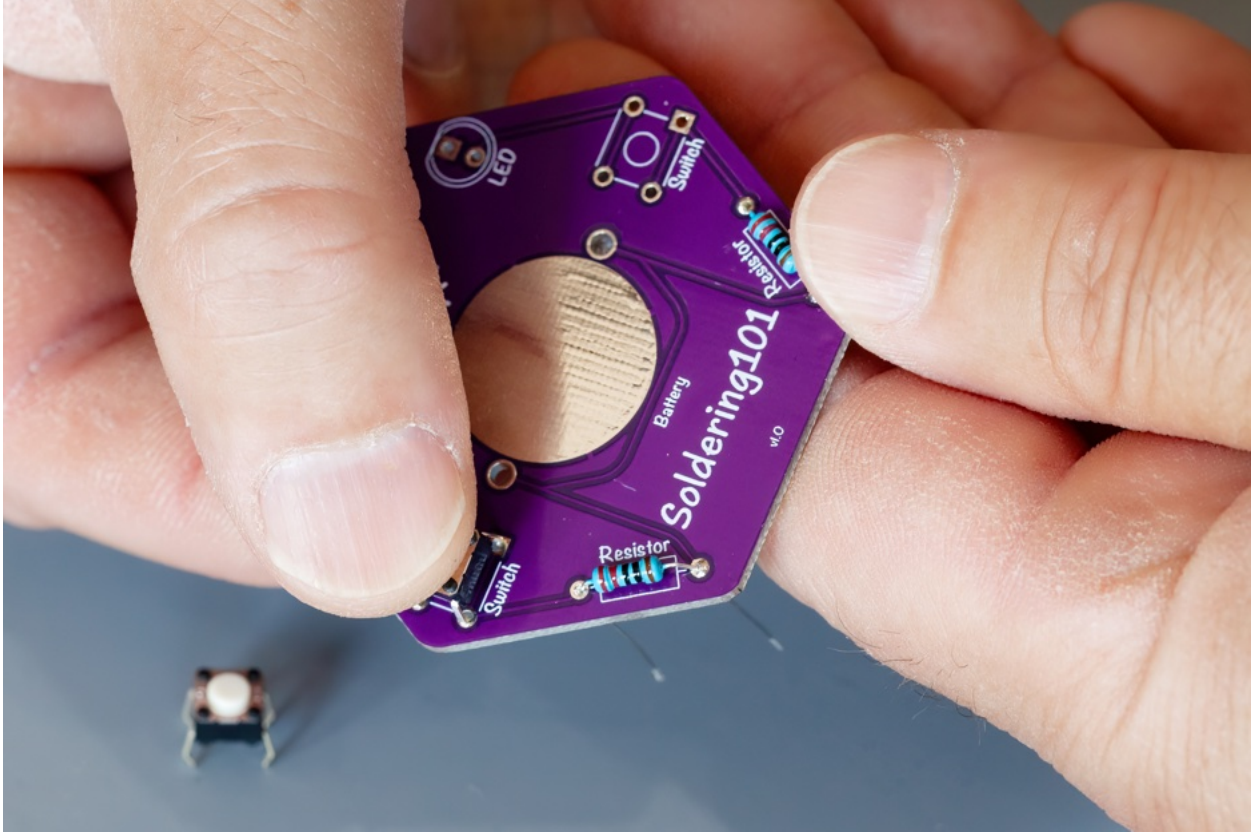
Align each pushbutton switch with the 4 holes near the switch labels. The switches are wider in one direction, so look at them closely to make sure the pins line up with the holes.

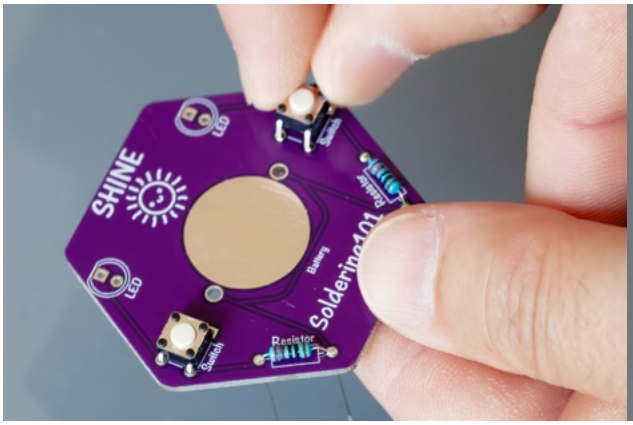
<u>Be careful!! Don't put your fingers behind the switches!</u> When you push the switches, they will pop into place. If your fingers are directly behind the switches, the pins can poke your fingers and hurt you.

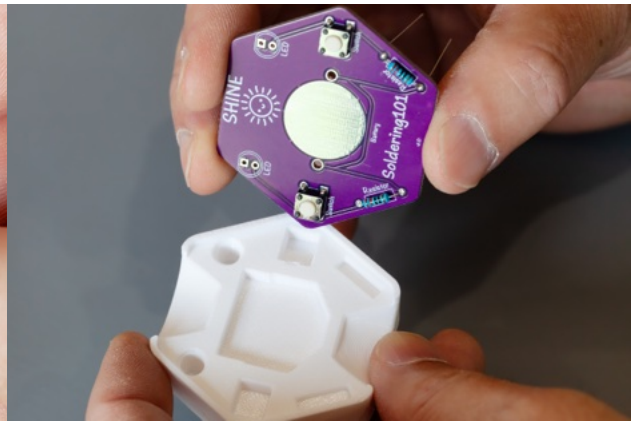
Push the pushbutton switches into place. They should sit flush with the circuit board when they are in the correct place. You may need to pinch the pins in slightly to help the switch pop into place.

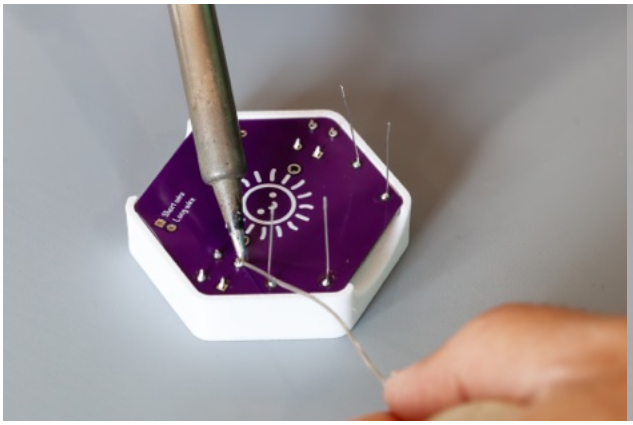
Put the circuit board back in the cradle and solder all 4 pins on each switch.

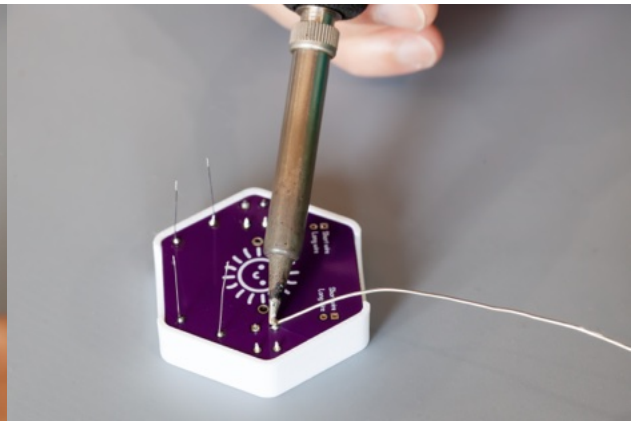



LED
Switch
Resistor
Battery
Soldering101
v1.0
Switch
Resistor


LED
SHINE
Battery
Soldering101
LED
Resistor
Switch


SHINE
Soldering101





Step 5: Solder the LEDs

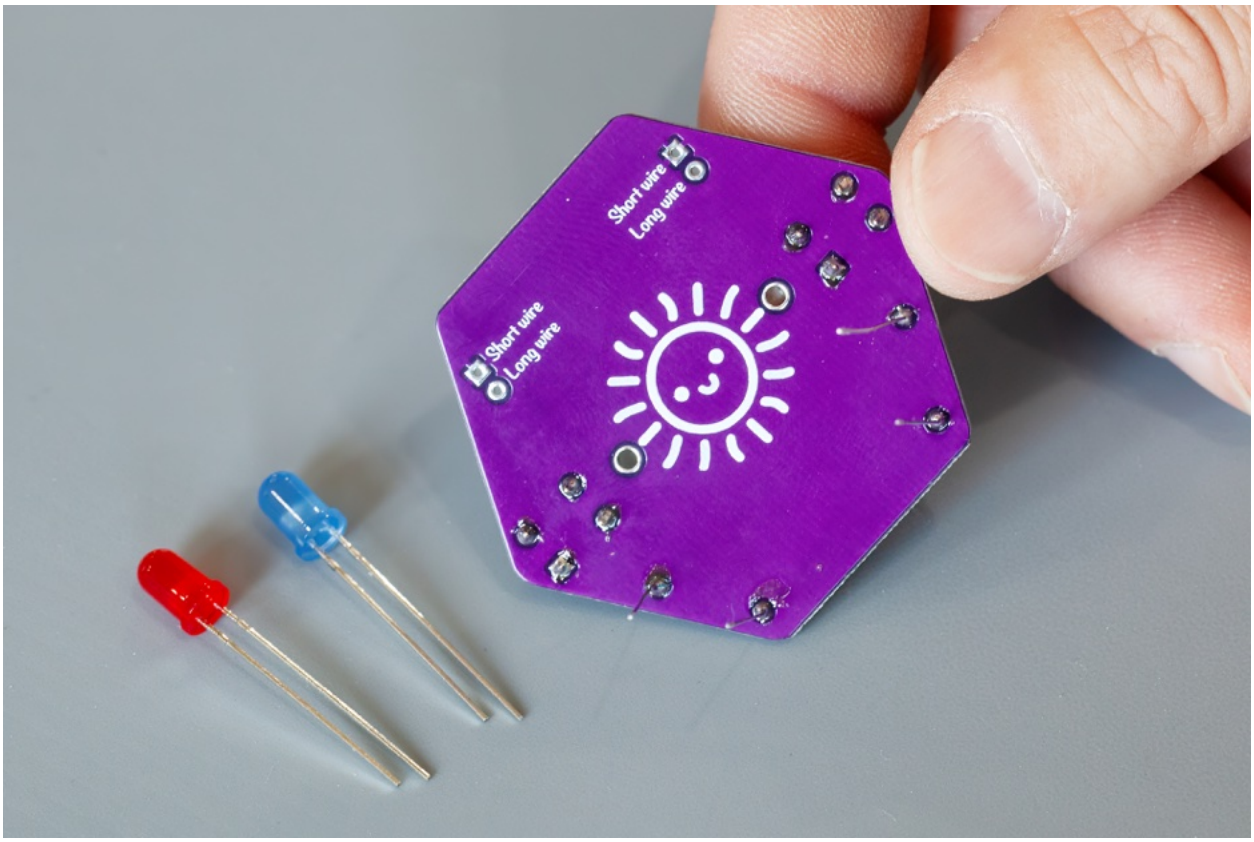
Let's take our time on the next step. The gotcha here is that the LEDs have to be oriented correctly for the circuit to work.

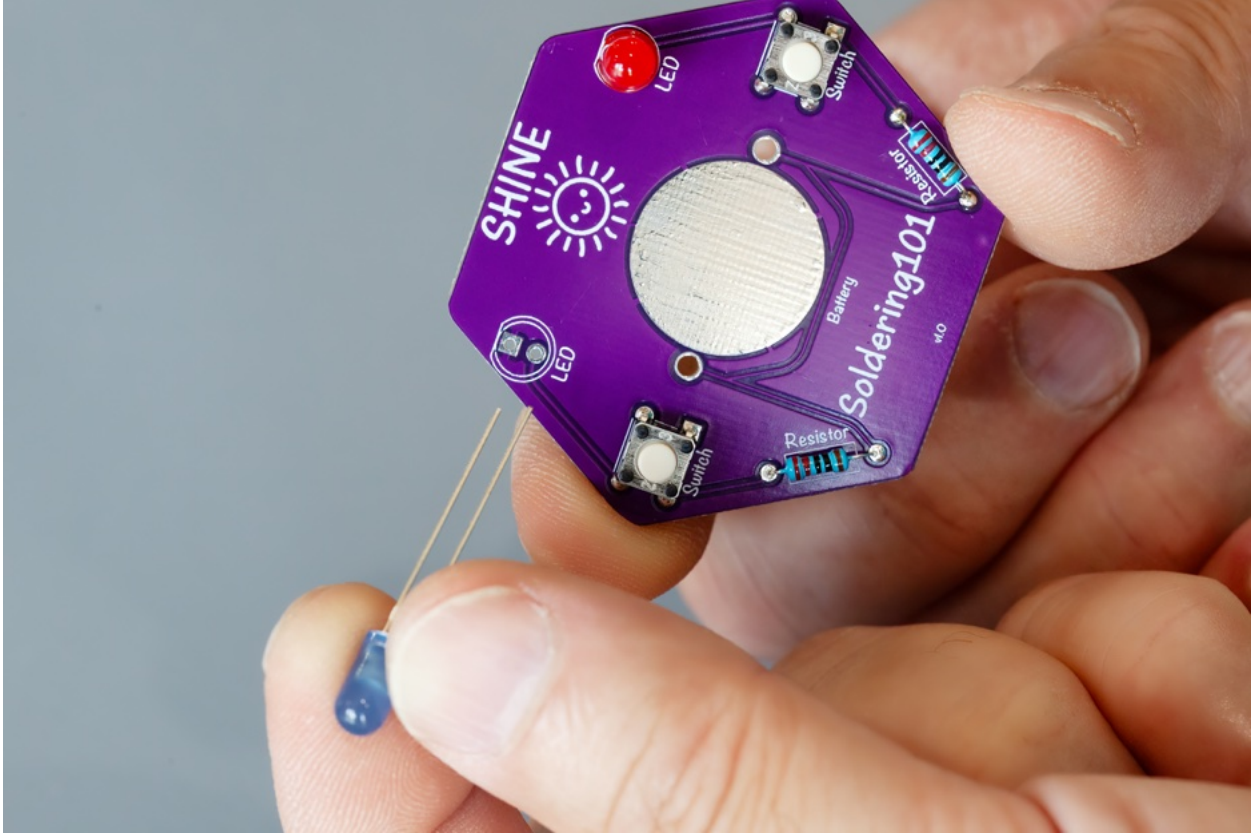
LEDs are designed to help you align them the right way. LEDs have a long wire and short wire. They also have a flat spot on the side of the short wire. On the back of the circuit board, you'll see text that shows you which hole is for the short wire and which is for the long wire. On the front of the circuit board, you can see the flat spot on the LED marked in the part's outline.

Insert each LED into the circuit board with the short wire closest to the top of the circuit board. The flat spot on the LED is also toward the top of the circuit board. The LED colors may be different than you see in the pictures. You can pick which color LED you put in each LED spot.

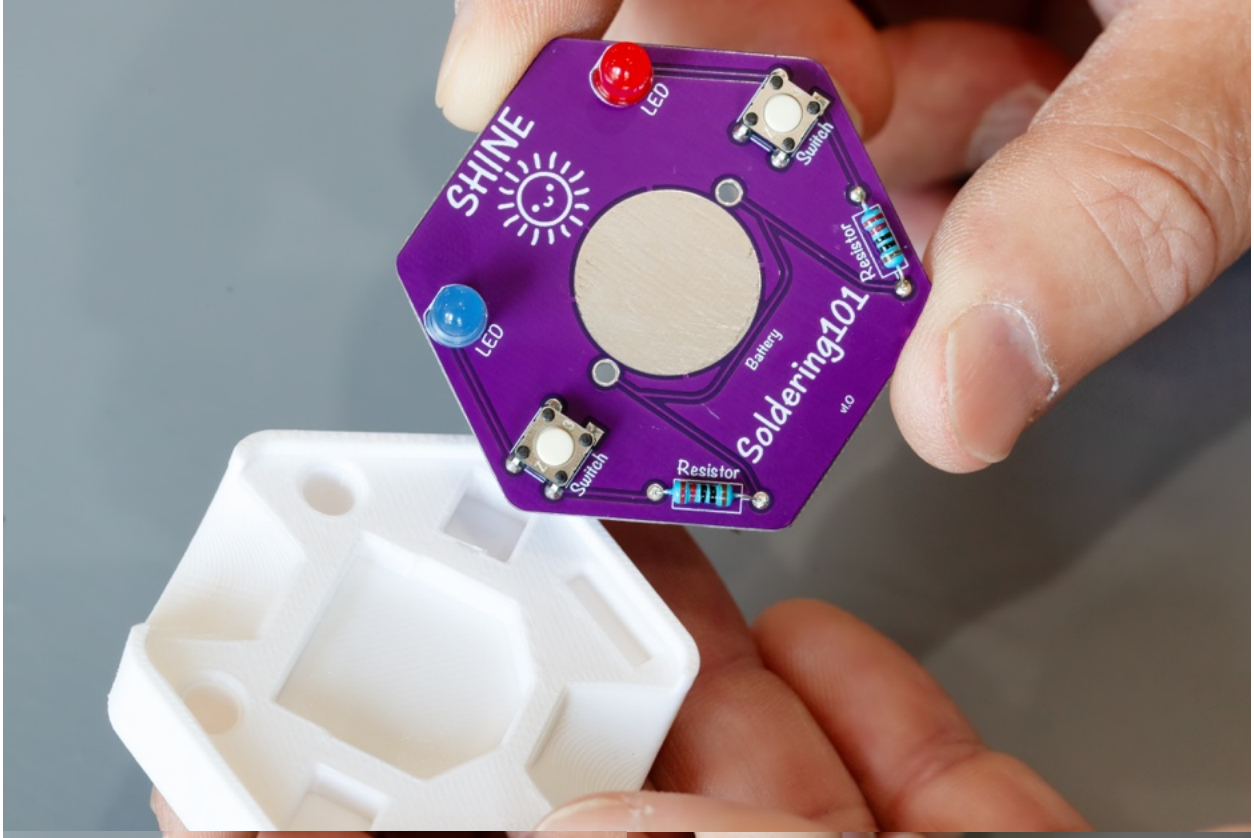
<u>Double check! Please double check that the LEDs are oriented correctly.</u>

Put the circuit board in the cradle and solder both wires on each LED.

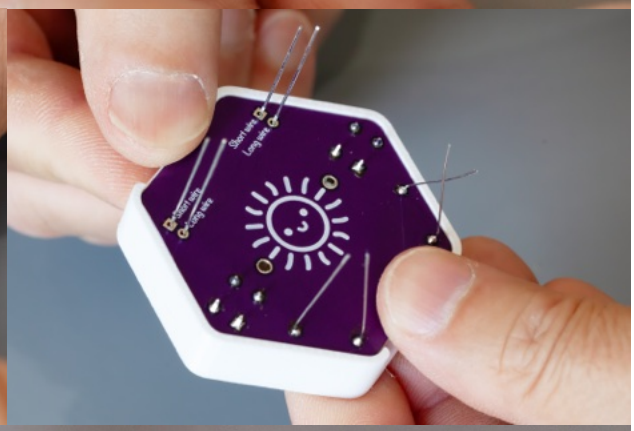


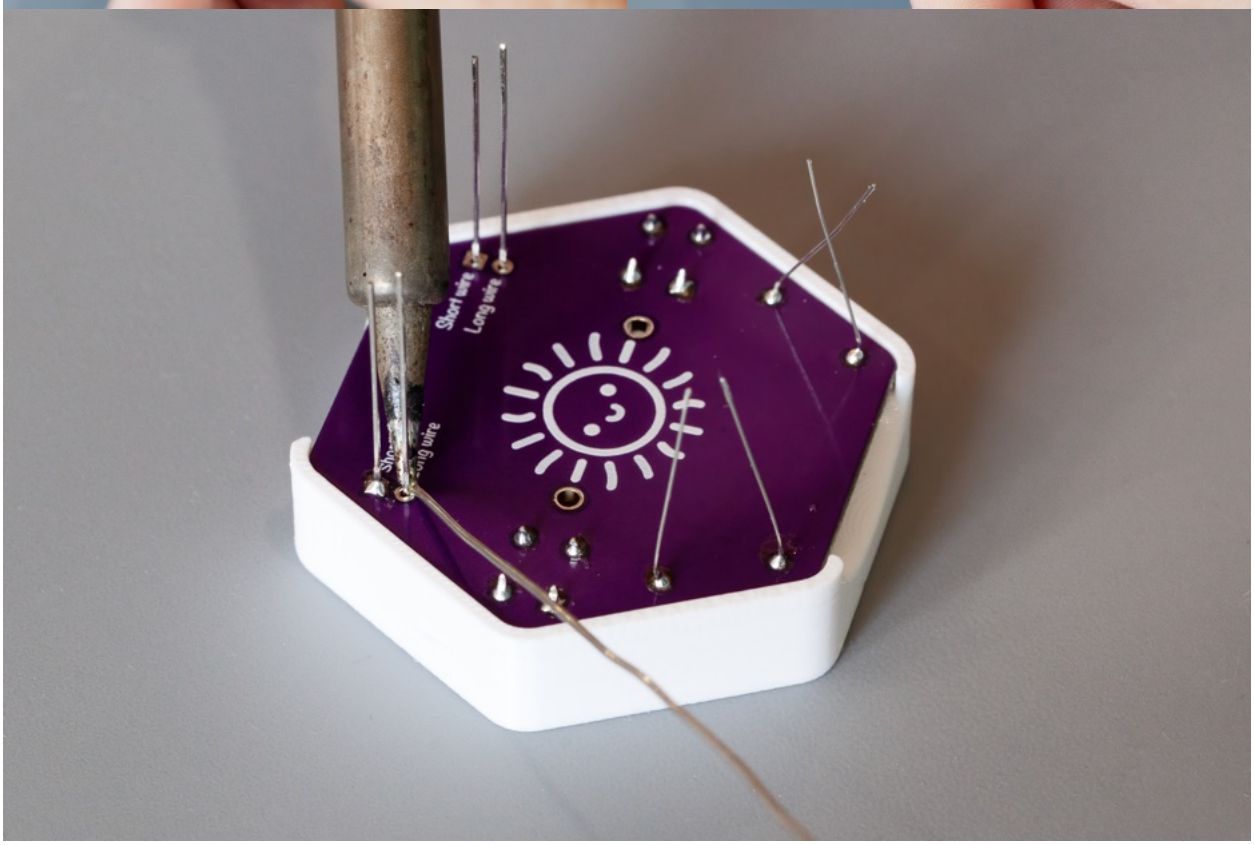


The next photo shows the flat spots on the LEDs and their proper orientation.


SHINE
LED
Switch
Resistor
LED
Battery
Soldering101
v1.0
Switch
Resistor

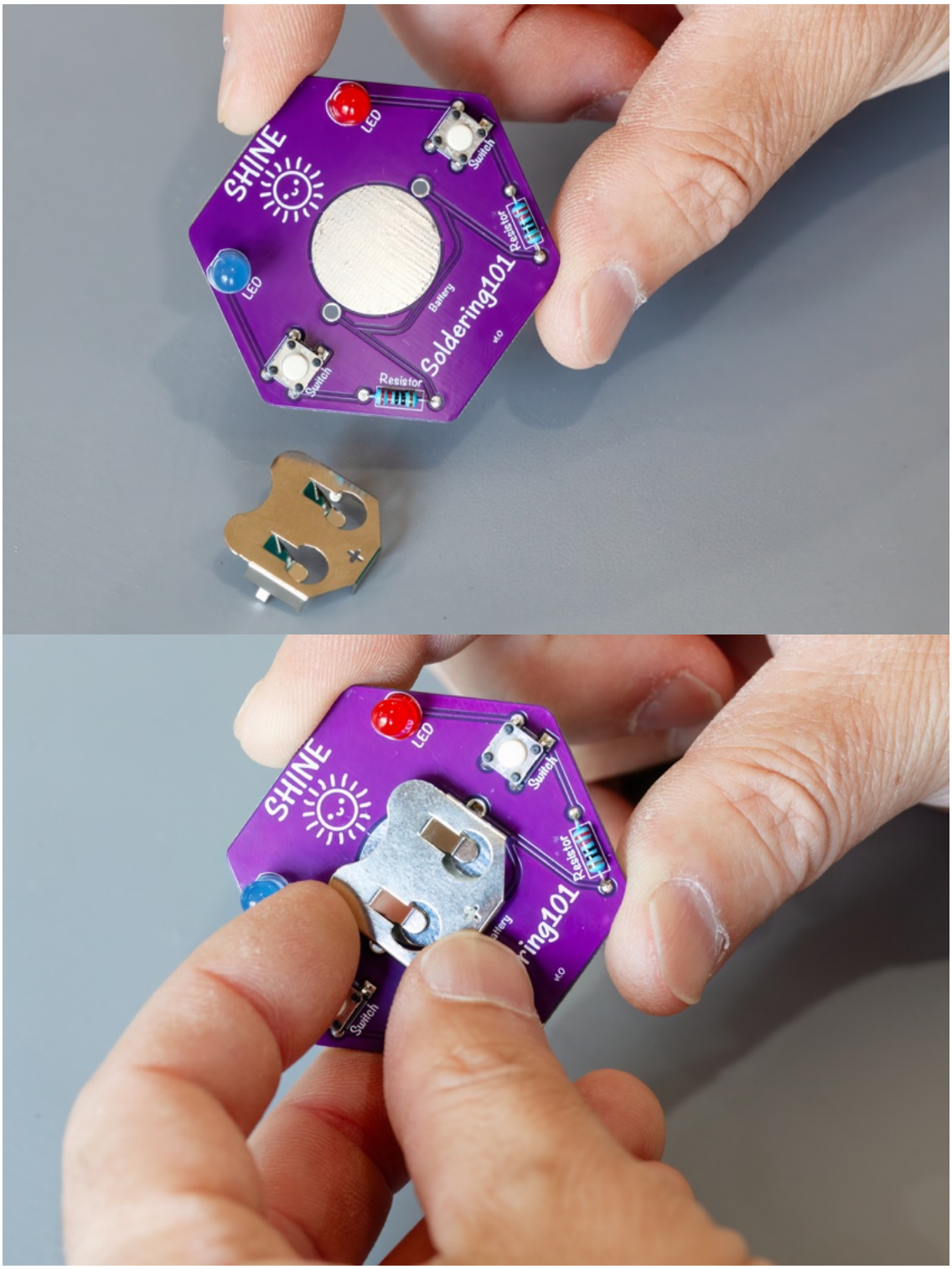

SHINE
LED


Short wire
Long wire
Resistor
Long wire

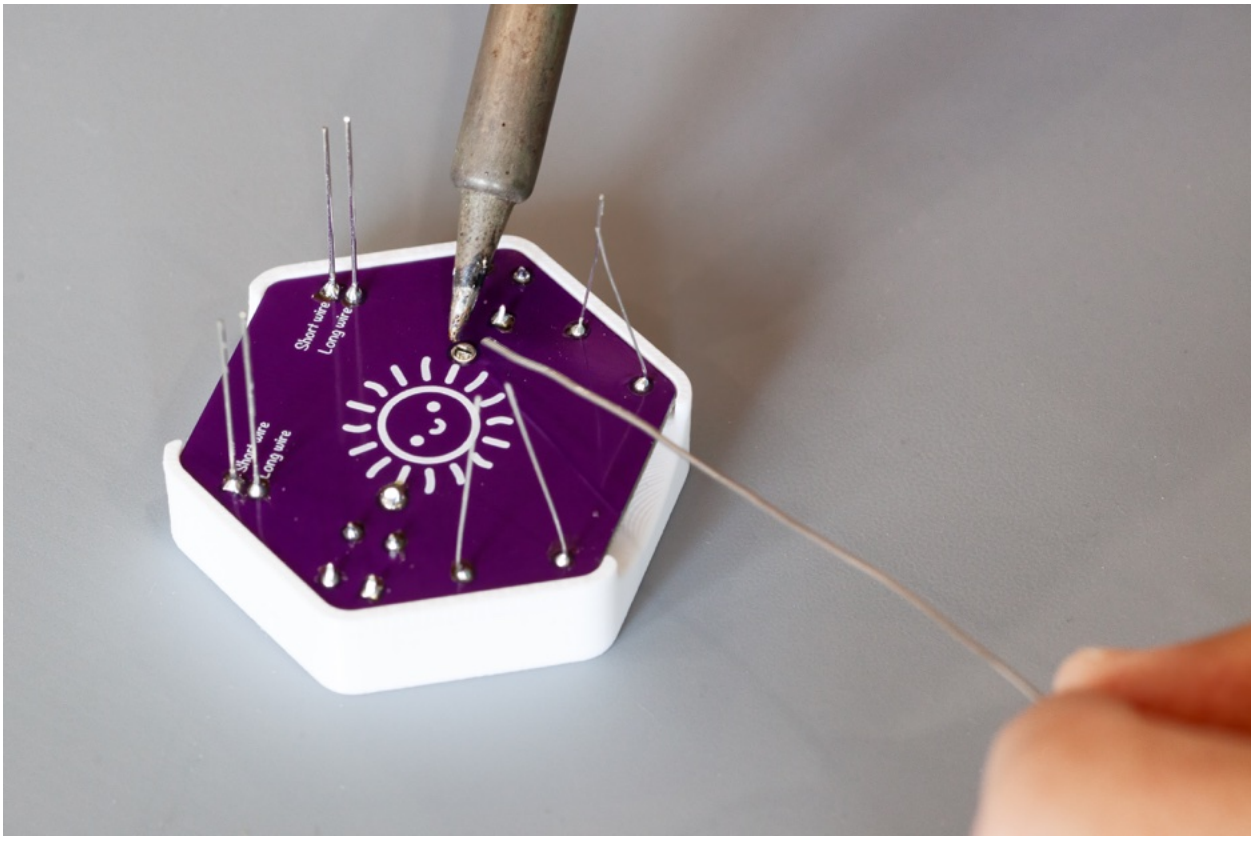

Short wire
Long wire

Step 6: Install the battery holder

The last part to solder is the battery holder. Align it with the two holes near the middle of the circuit board. Orient the battery holder so that the + is toward the bottom of the circuit board and the battery opening is toward the top.



Put the circuit board in the cradle and solder the two pins for the battery holder. The battery holder pins are a lot bigger than the other wires and pins you have soldered so far, so it's ok if it takes a little longer for your soldering iron to heat it up and melt the solder.

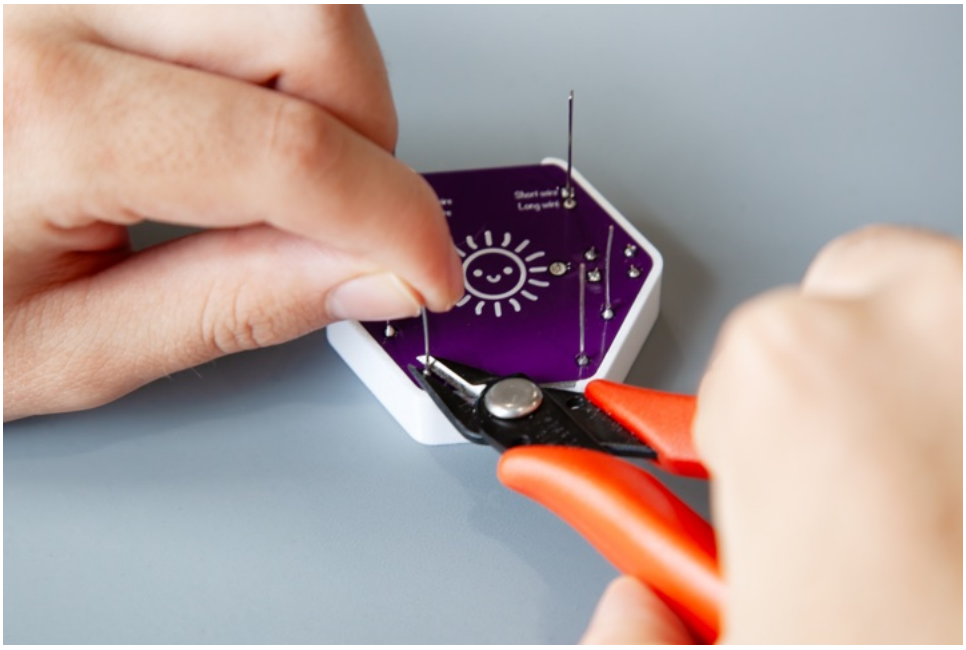


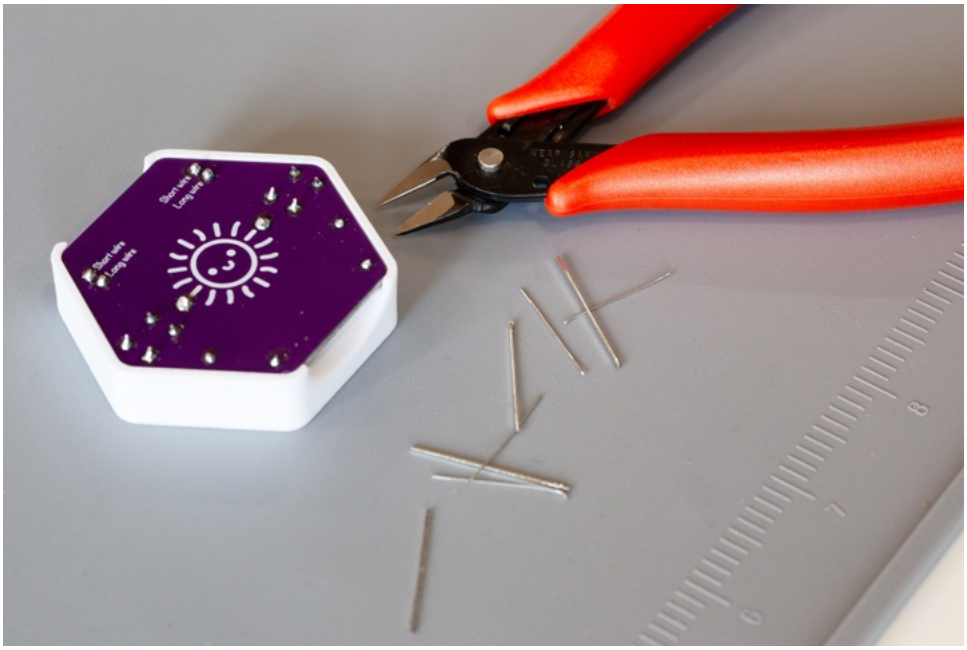
Congratulations! That's all the soldering!

Step 7: Trim the LED and resistor wires

While carefully holding each long wire that sticks out of the back of the circuit board, use your flat cutters to trim each wire. You should trim each wire as close as you can to the the solder joint, but you do not need to cut into the solder. You do not need to trim the pins on the switches or battery holder.

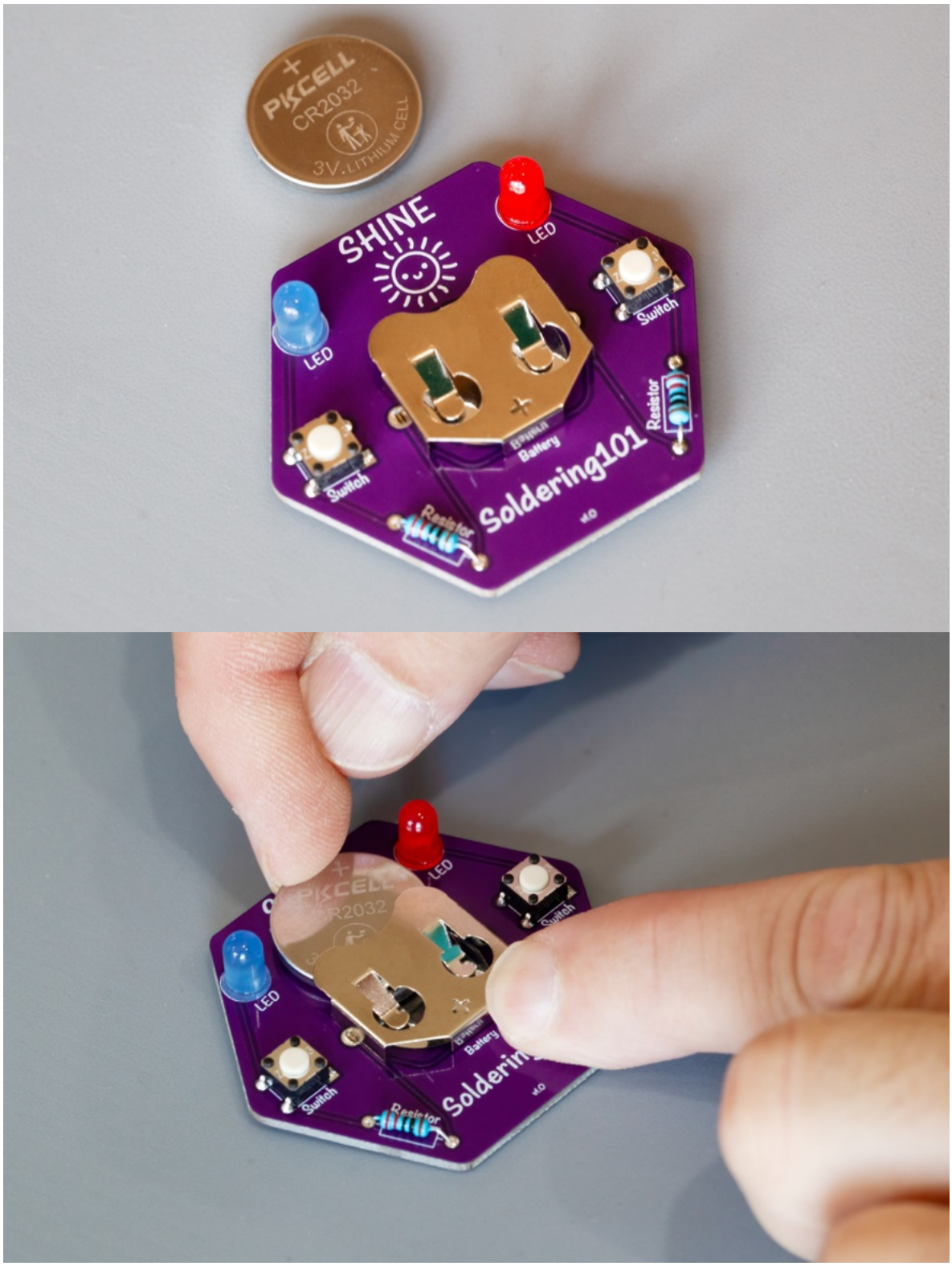
Be careful! Make sure you hold each wire as you trim it to keep it from flying off!





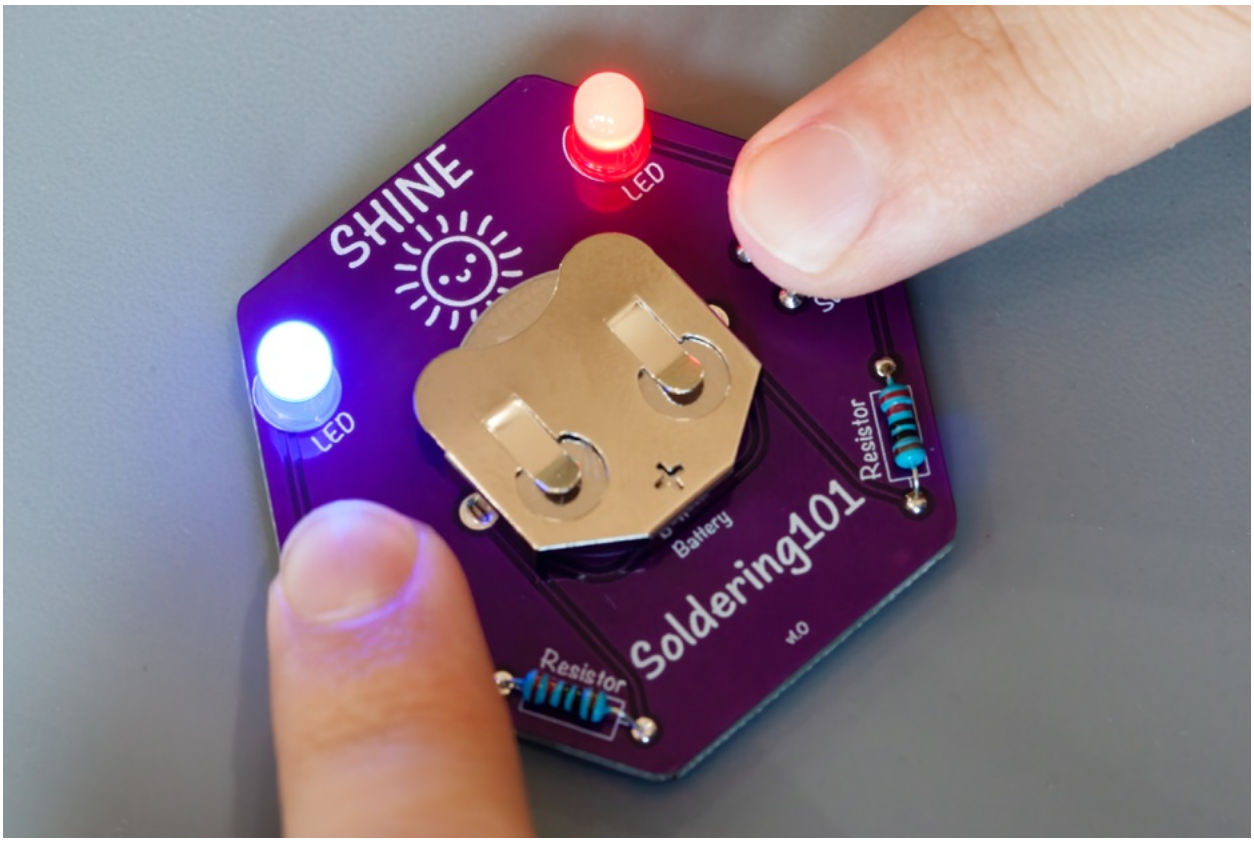
Step 8: Install the battery

Slide the battery in place with the + on the battery facing up.



Step 9: Test your Shine!

Now push the buttons to make it Shine!



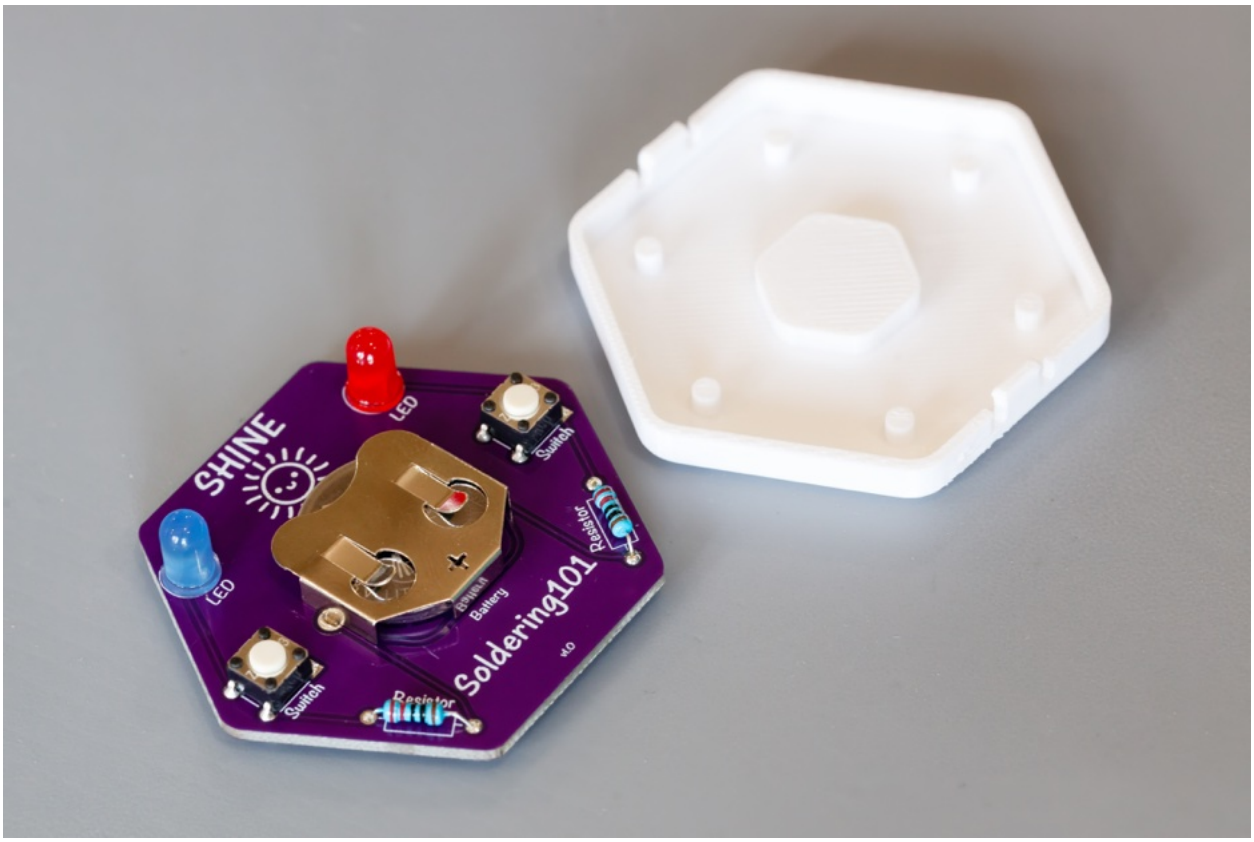
Each pushbutton switch should light up the LED next to it. If either LED doesn't work, please check out the troubleshooting section before moving on.

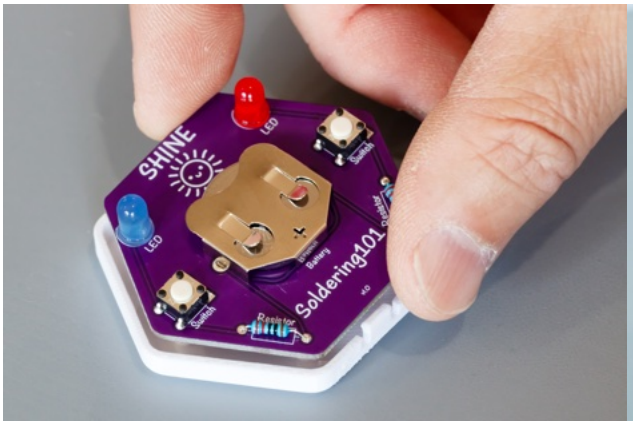
If everything works (yay!!), move on to Step 10.

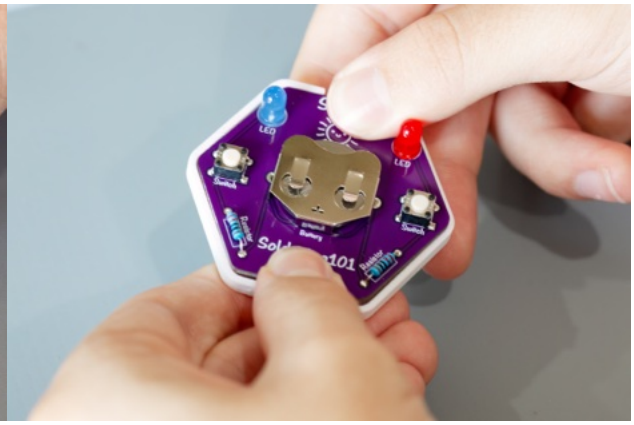
Step 10: Installing the case

We also designed a custom 3D printed case for your finished Shine. It makes the Shine nice to hold and will protect the sharp wires on the back of the circuit board. The case is the other 3D printed part included with your Shine kit.

The case has little clips to hold the circuit board. Align the clips toward the top and bottom of your Shine circuit board and push it gently into place.







Step 11: Enjoy!

Woohoo! Huge congratulations! You finished your Soldering101 Shine kit.

Thank you for learning with the Soldering101 Shine. We're super happy you learned with us.

Show it off to your friends, your teacher, your parents - show it off to the world!

Troubleshooting

Sometimes things don't go perfectly when you build stuff. Here's some help if your Shine kit isn't working correctly.

- Things to check first:
  - Did you remember the battery? We know it's exciting when you finish soldering your Shine. Please double check that you pushed the battery in all the way.
  - Look at all your solder joints. The solder should form a little shiny metal cone between the silver circuit board pad and each part's wire. That solder shouldn't touch any other pads or wires. If a solder joint doesn't look good, use your soldering iron and solder to try again (maybe a solder sucker too if there's too much solder on a joint).
- One LED doesn't light up when you push the buttons:
  - The usual cause of this is one LED getting installed backwards. Look at the flat spot on the LED. That should be toward the top of the circuit board. If you found an LED that's backwards, You can heat that LED's solder joints to remove the LED. This is a more advanced soldering technique, so be careful or ask for help. Then solder the LED in the correct orientation.
- Both LEDs don't light up when you push the buttons:
  - Check the battery orientation. The + should be facing up on the battery. If neither LED work, it's possible you installed your LEDs backwards. Try installing the battery the other way to see if that gets the LEDs working.
- If you have more questions, please send us an email at shine@soldering101.com