PHOTODIODE INSTRUCTION MANUAL

Table of contents:

Tools (from left to right):

- Wet sponge
- Soldering iron
- Wire cutter
- Soldering paste flux
- Electronic silver solder
- Needle nose pliers (optional)
- Screwdriver
- Electrical tape

Parts (from left to right):

- Photodiode case
    - Custom made using a 3D printer
- BNC cable
    - Description: Belkin Thin Coax RG58 50 Ohm Coaxial Cable (10-foot)
    - Part number: F3K101-10-E
    - Link (accessed 08/21/2025): https://www.amazon.com/Belkin-50-Ohm-Ethernet-Coaxial-Connectors/dp/B00004Z5CS?th=1
- Photodiode
    - Description: Photodiode Pin Sealed Short TO-5
    - Part number: 751-10130-ND
    - Link (accessed 08/21/2025): https://www.digikey.com/en/products/filter/photodiodes/543
- Velcro
- Screws (optional; use glue or tape on the case instead)
    - Size: 4.0 mm
    - Design: M4 x 0.7

How-to guide

Step 1:

Option 1 (as shown): Use the wire cutter to snip off the head on one end to get one long photodiode cable.

Option 2: Snip the cable closer to the middle to create two cables that can be used to make two photodiodes.

Step 2:

Use the wire cutter to carefully snip ONLY the outer black tubing to remove the first outer layer. View the cable from a cross-sectional view to see how to snip.

After making the radial snip, cut along the length of the tubing that needs to be removed (see dashed line on the right).

Note: This is the second hardest step after soldering. The tricky part is to only snip the tubing and not cut the loose thin wires that are inside it. If you snipped too many wires, snip off the entire piece and restart step 2.

Then, open the tubing and remove the cut area.

Step 3:

After removing the black tubing without losing too many of the wire strands, do the same to the silver tubing (see left) to expose the second bundle of wires.

If using an adjustable wire cutter, set it to size 14 gauge to limit the length of the cut.

Tip: When cutting the silver bundle, try to leave a bit of the silver insulation bundle extending from the black tubing to minimize the chance of contact between exposed wires (see right).
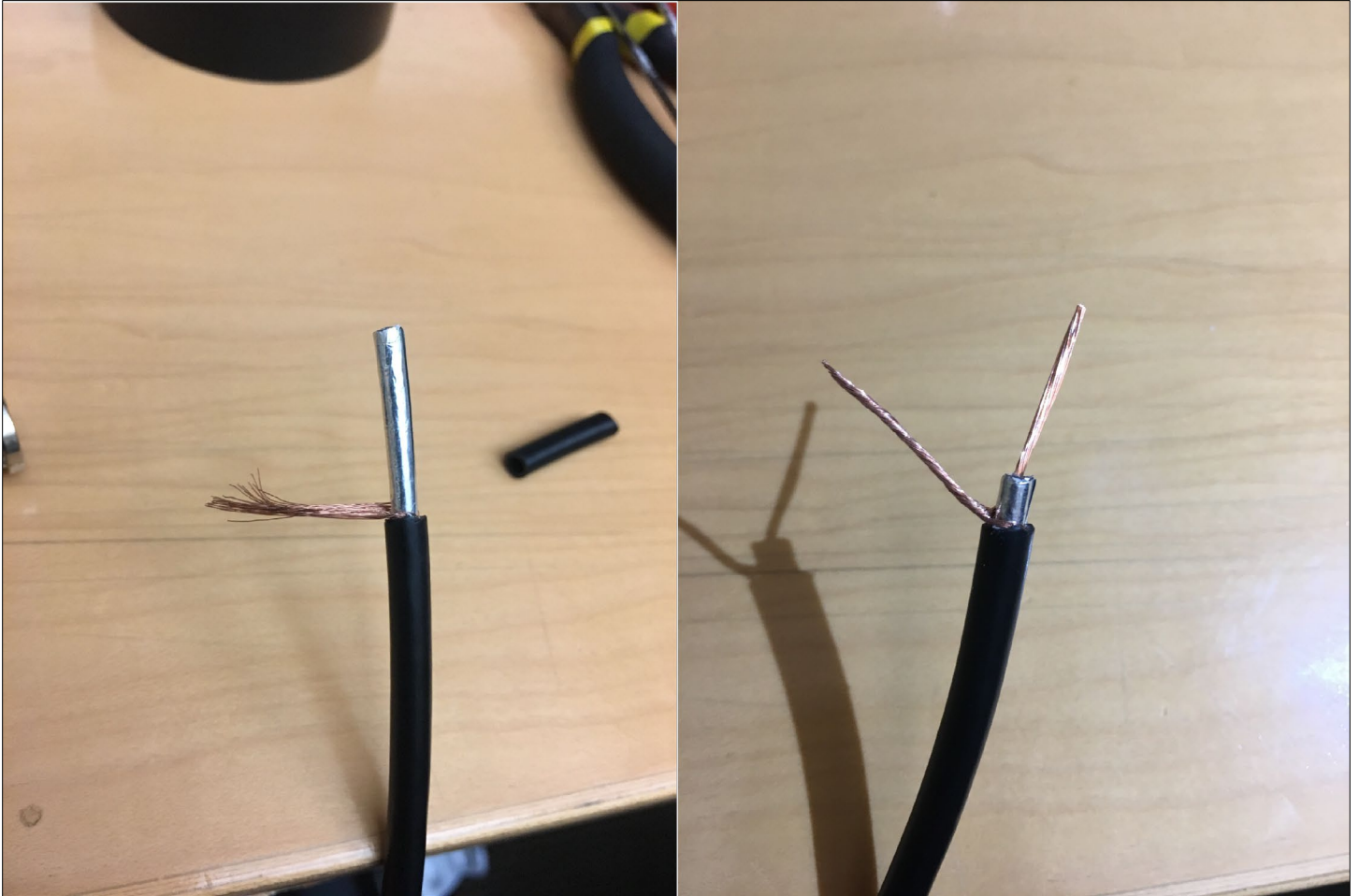
Step 4:

Wrap one side of the wires around one wire from the photodiode.

Tip: Given the limited space and number of wires, it may be easier to use needle nose pliers or tweezers to twist the wires around the photodiode wire. Proceed to the next step and solder one side to secure the photodiode in place before wrapping both wires around.
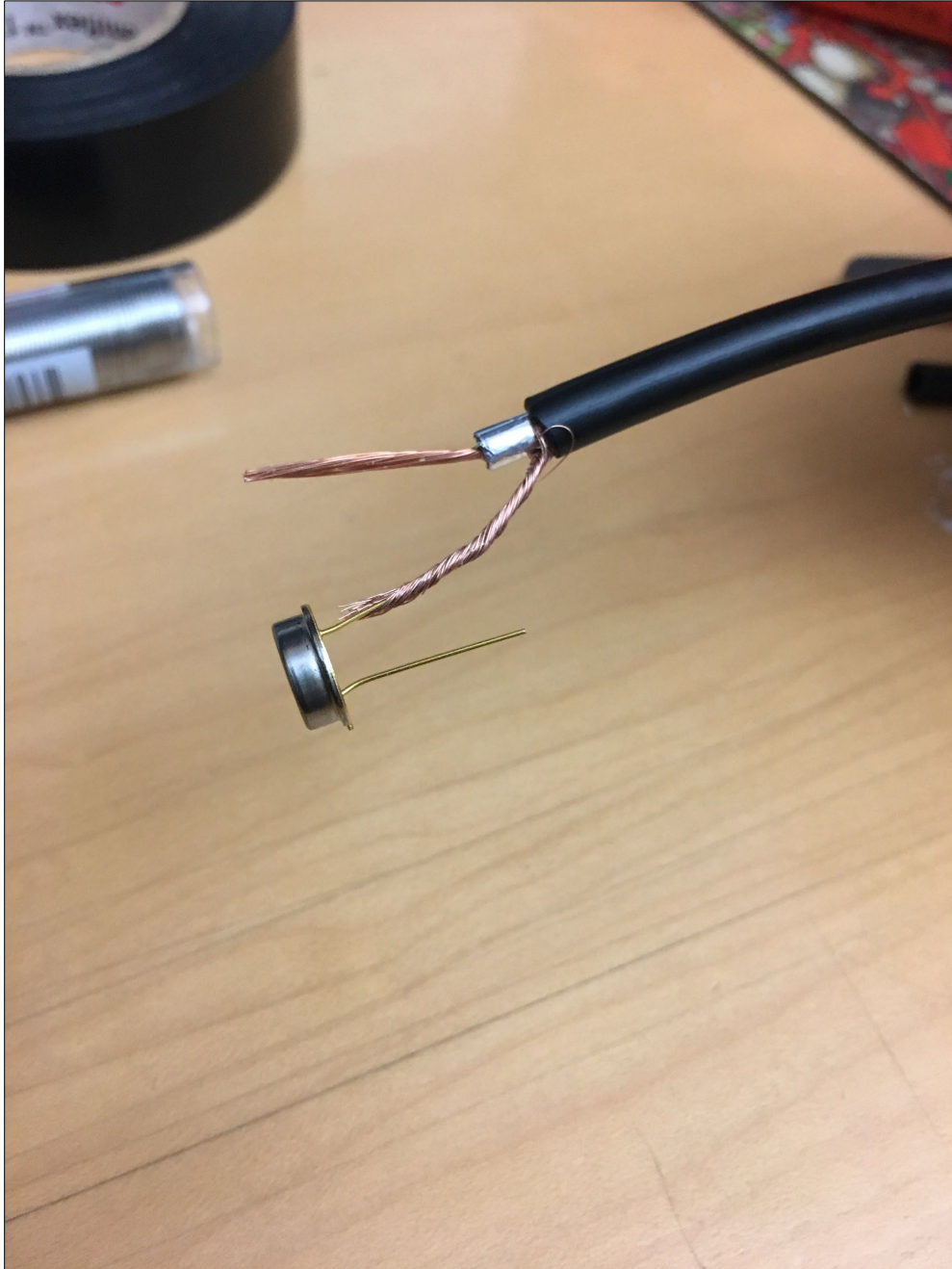
Step 5:

Begin the soldering steps. Watch this to see how to solder (accessed 08/21/2025): https://www.youtube.com/watch?v=Zu3TYBs65FM&feature=youtu.be&t=522

Heat up the soldering iron.

While the soldering iron is heating up (1-3 min), apply some paste flux to the wires. Though not strictly necessary, flux will prevent oxidation and make soldering easier by allowing the solder to permeate through the wires better.

Step 6:

Per the video (see step 4), 'tin the tip' of the soldering iron by applying solder to the tip of the soldering iron. This will increase heat transfer and allow the solder to flow into your wires more easily.

Step 7:

Rest the wires on the hot soldering iron for 10-20 sec to heat them up.

Step 8:

Apply solder to see if the wires are sufficiently hot.

Then, continue feeding in solder to fuse the photodiode to the BNC cable (see next image).

Tip: Once the wire bundle is hot enough to melt the solder, place the soldering iron tip above the wire bundle and feed the solder in between the soldering iron tip and wires, allowing the solder to fall and flow into the wires.
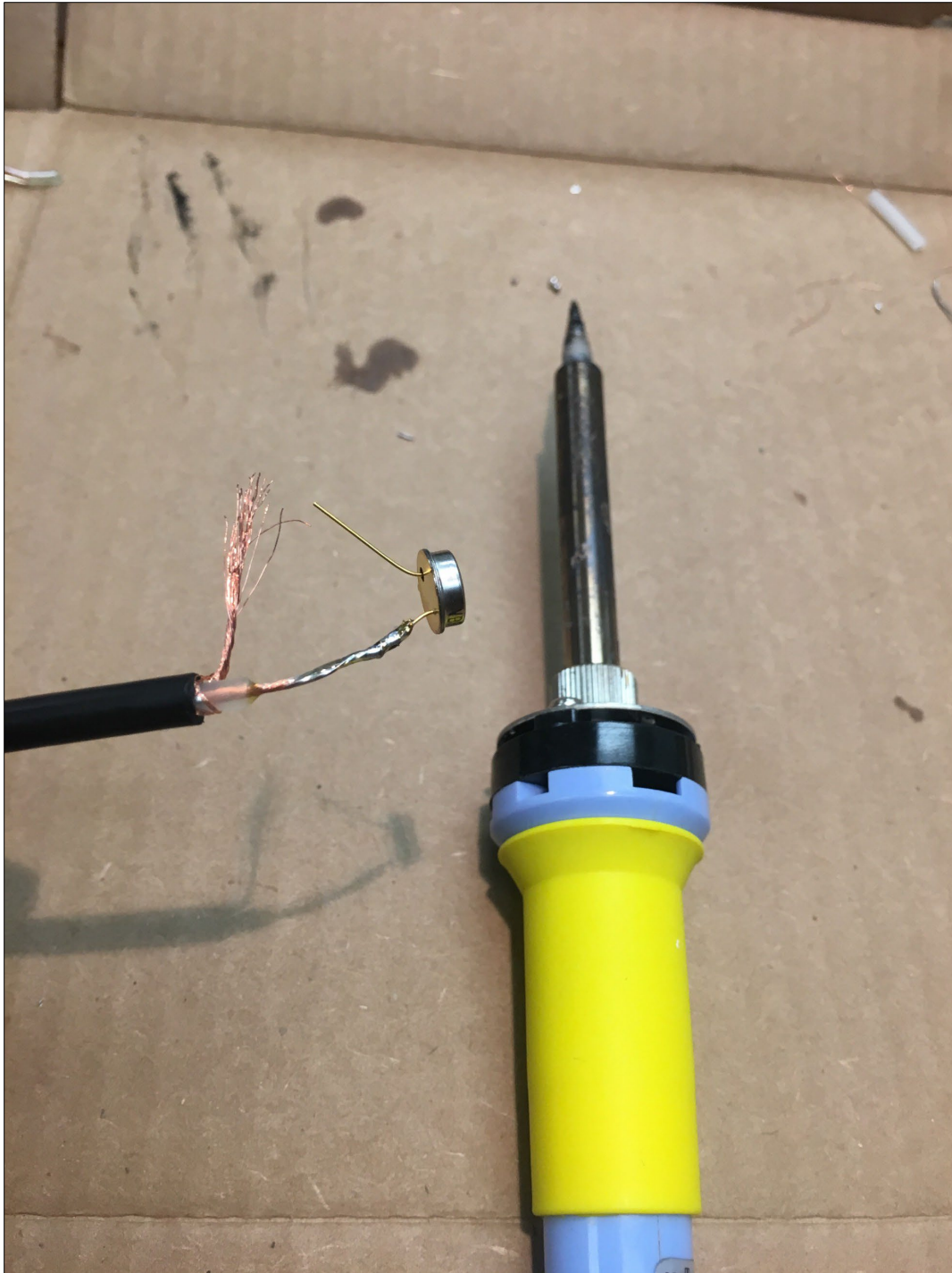
The goal is a shiny finish without any wires exposed. In this image, the arrow shows that it can use more solder because the bare wires are still exposed.

Tip: If the soldering iron accumulates a lot of buildup, use the wet sponge to wipe it off.
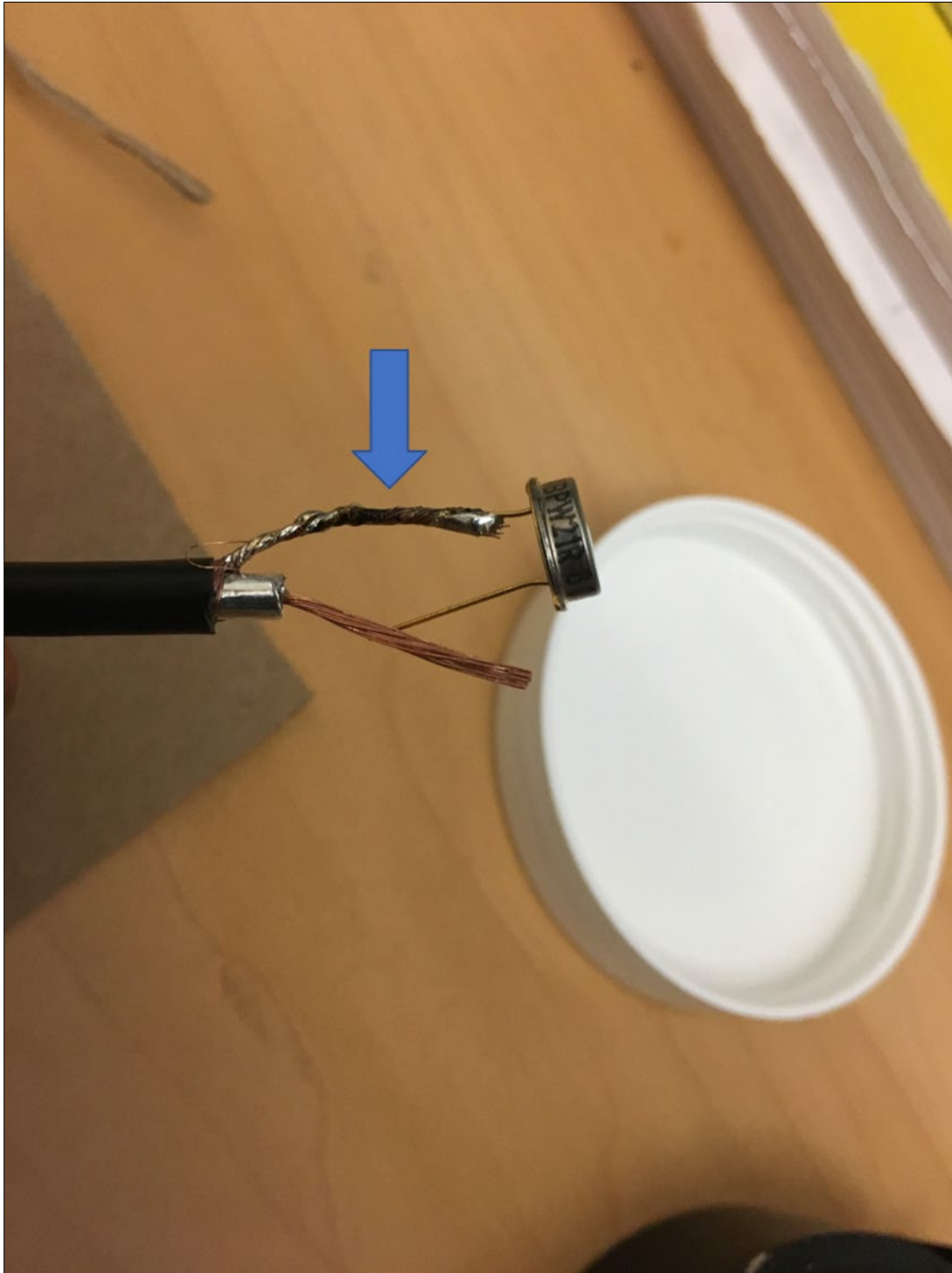
This is what it should look like to ensure a proper connection.

Once achieved, repeat step 8 on the other wire.

Step 9:

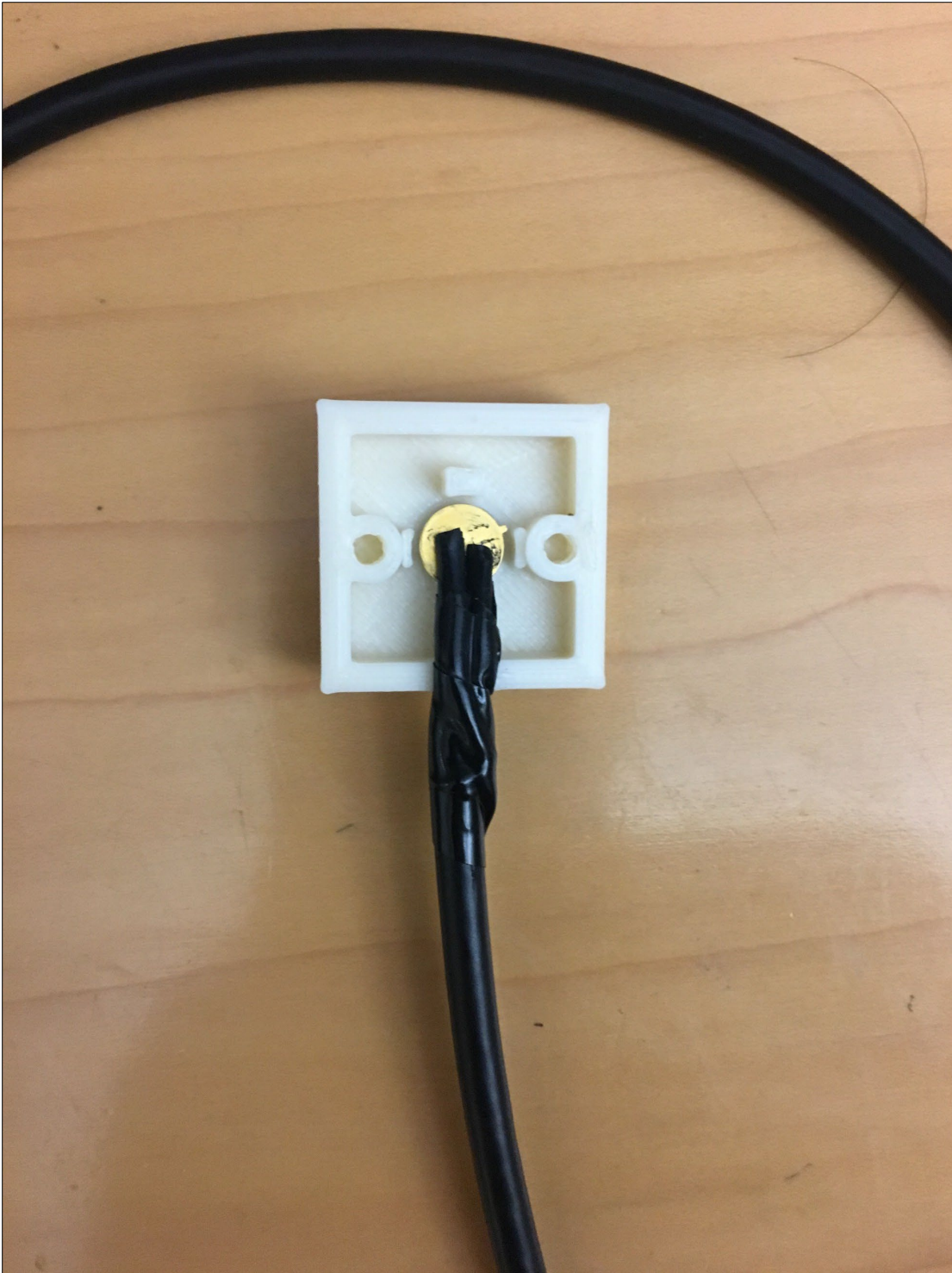Wrap each wire separately in electrical tape so no wires are exposed.

Step 10:

Turn the photodiode head so it is perpendicular to the length of the wire.

Step 11:

Place the photodiode in the case. Screw, glue, or tape on the lid.

Step 12:

Attach Velcro to be able to easily add/remove the photodiode from the computer screen.

Do the same on the computer screen, typically the lower left corner.