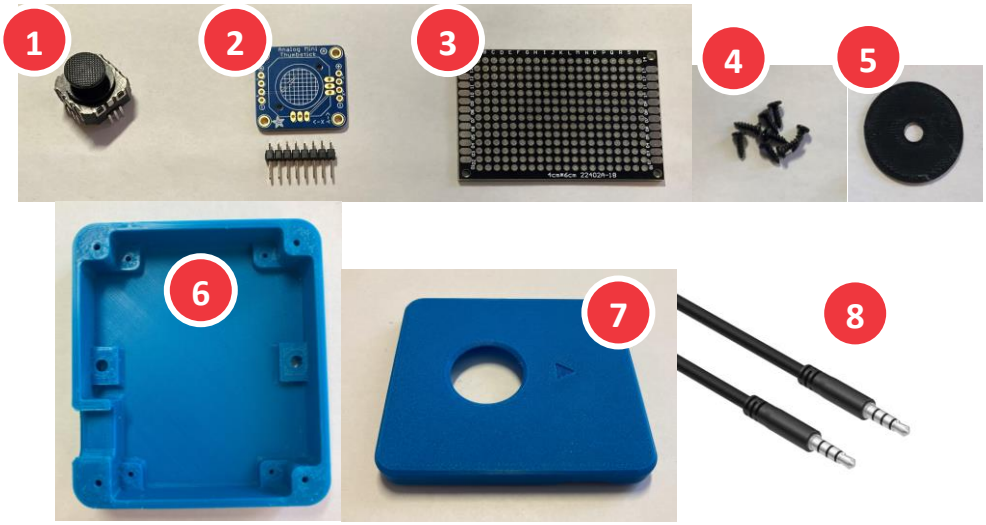
Birch Mini Joystick - A
ASSEMBLY GUIDE

Makers Making Change
A Neil Squire Program

Required Components



BOM

1. Mini 2-Axis Analog Thumbstick
2. Analog Mini Thumbstick Breakout Board with Included Male Headers
3. Universal Proto-Board PCB 4cm x 6 cm
4. 8x M2 x 8 mm Machine Screws
5. 3D Printed Inner Disk
6. 3D Printed Enclosure Bottom
7. 3D Printed Enclosure Top
8. 3.5 mm Male TRRS Cable

Optional parts:

- 3D Printed Joystick Camera Mount Adapter
- ¼-20 Tee Nut
- 2x M3 x 10mm Screws
- 2x M3 Nuts

Required Tools

- Flush Cutters
- Wire Strippers
- Soldering Iron
- Philips Head Screwdriver
- Continuity tester (Such as a multimeter)
- (Optional for mount adapter) ¼-20 Screw or Hex Bolt, at least ½” long

Required Personal Protective Equipment (PPE)

- Safety Goggles

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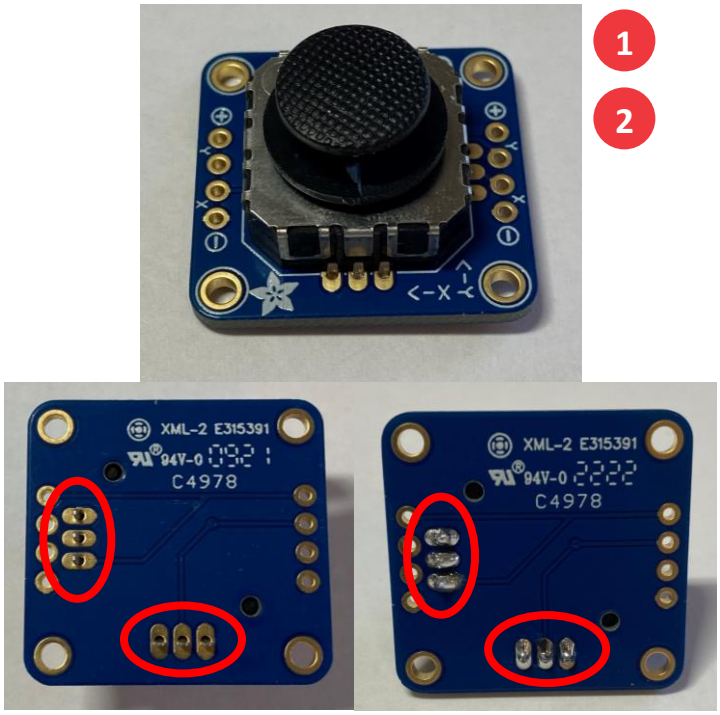
Assembly Instructions

Step 1

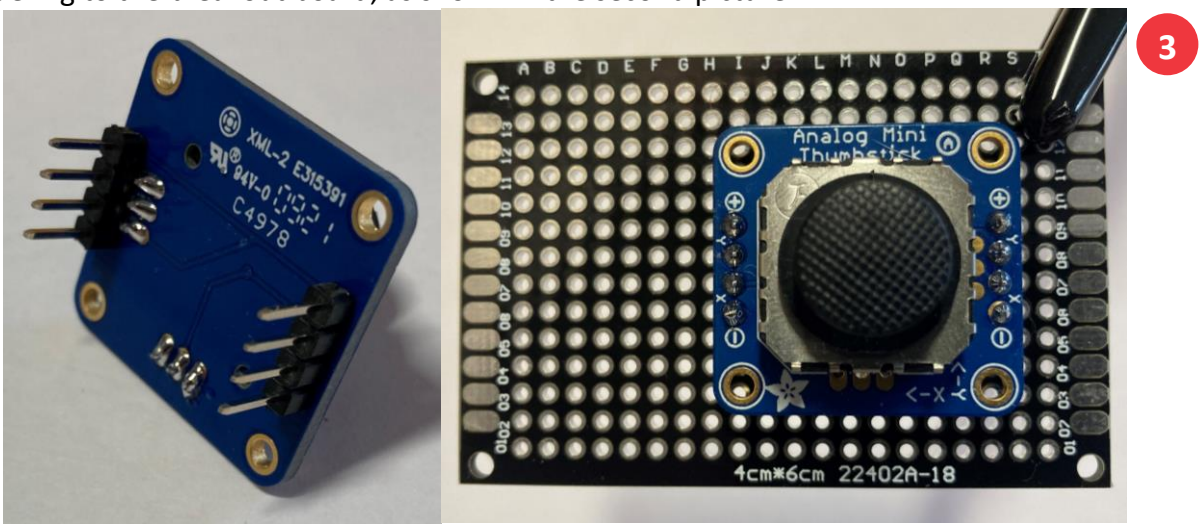
Insert the mini 2-axis analog thumbstick into the breakout board.

Solder the 6 pins, shown circled in red.



Step 2

Solder two 4-pin male headers to the joystick breakout board. Before soldering, make sure the headers are straight. This can be done by inserting the headers into the protoboard while soldering to the breakout board, as shown in the second picture.

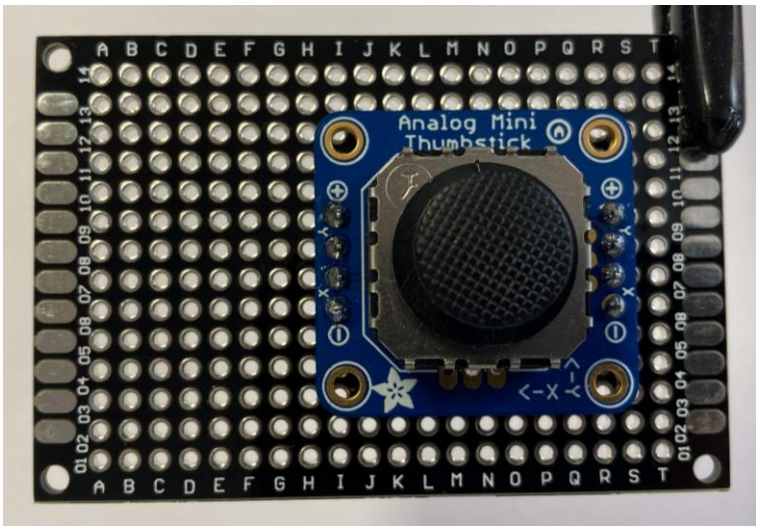


Step 3

Insert the headers of the joystick breakout board into the protoboard. Note the positioning and orientation shown.

Ensure the text on the breakout board and the protoboard are oriented in the same direction as shown.

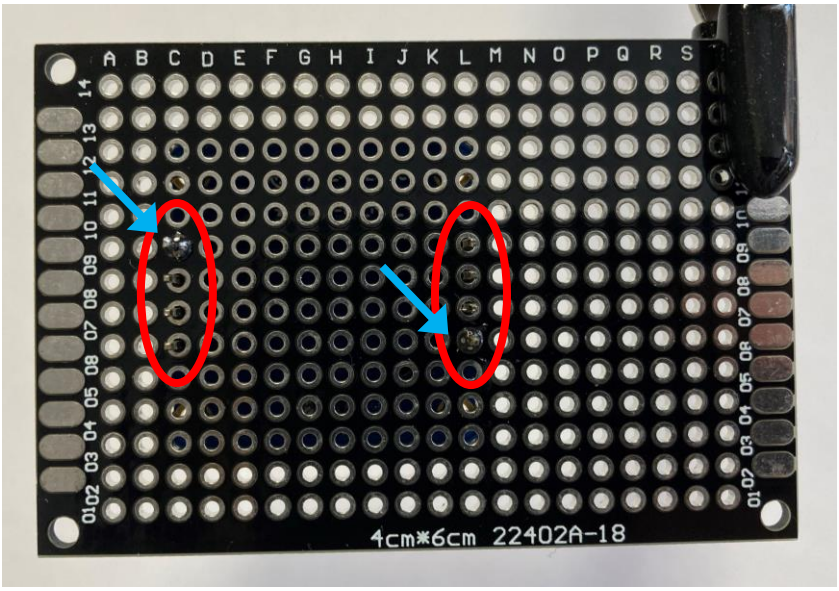
From the top, the joystick breakout board pins should be in positions I06-I09 and R06-R09.



Step 4

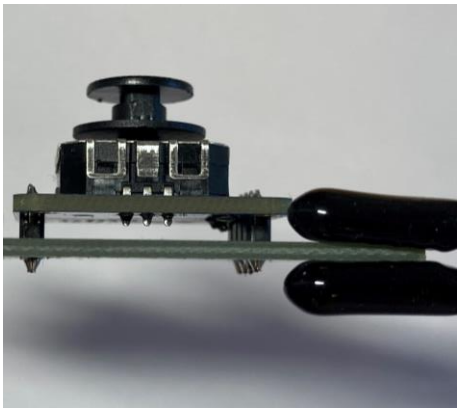
Ensure the header pins from the joystick breakout board are located at positions C06 - C09 and L06 – L09 (from below). The pins are circled in red.

Solder one leg on each header.



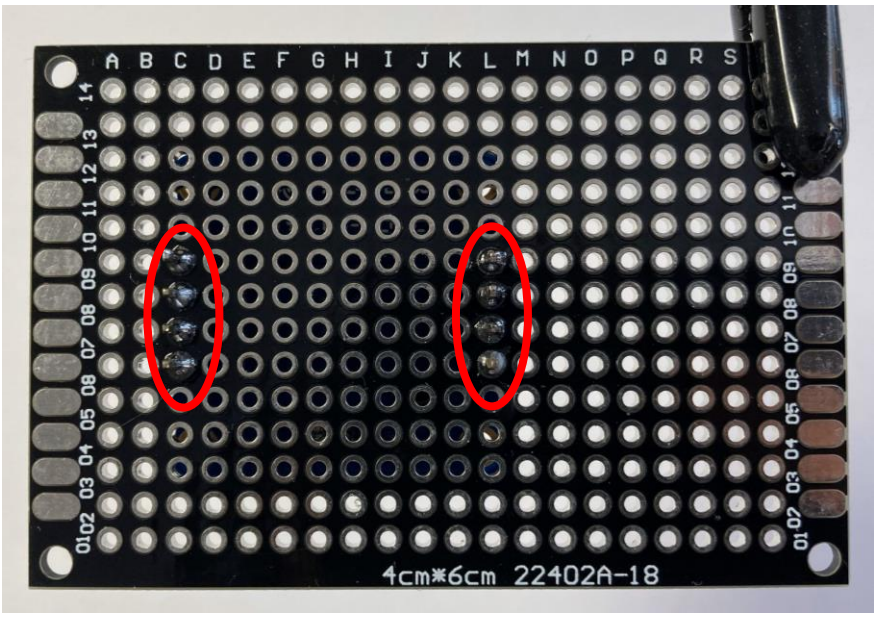
Step 5

Check that the joystick breakout board headers lay flat on the protoboard.



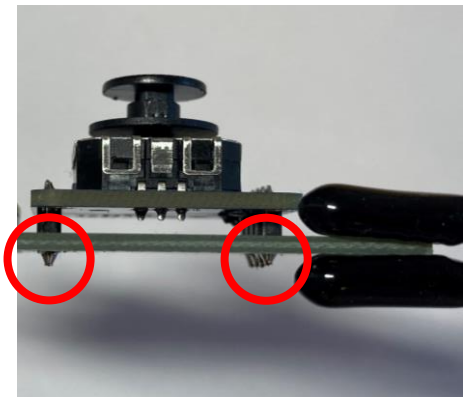
Step 6

Solder the rest of the pins on the joystick breakout board.



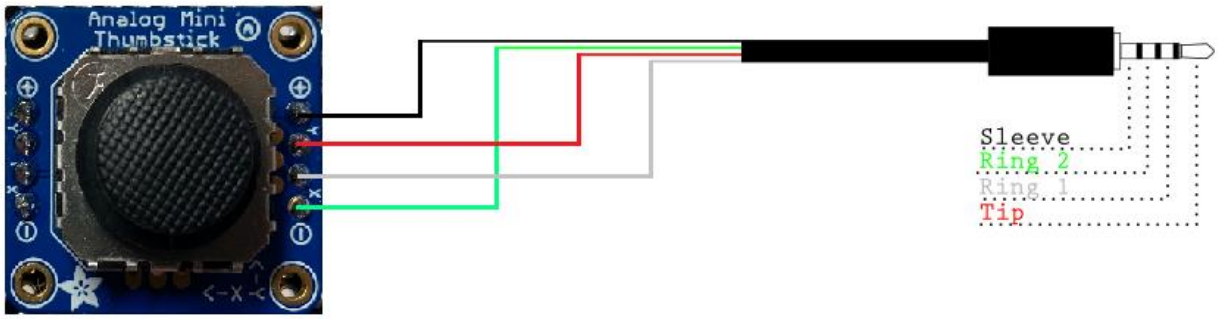
Step 7

Using your flush cutters, trim the header pins for the joystick breakout board, as shown circled in red.



Wiring

For the next steps, the following diagram and table show the wiring. You should use a multimeter or other continutiy tester to test if your TRRS cable matches the following diagram or to match each wire with the corresponding part of the plug.

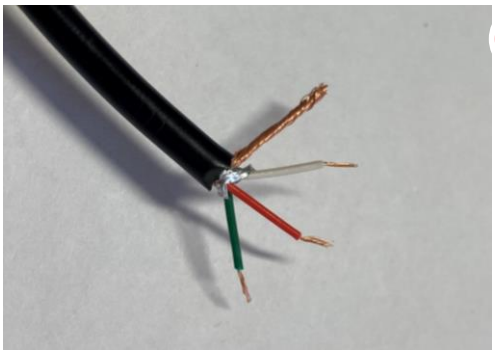


TRRS Cable	Joystick breakout board
Tip (T)	Y
Ring 1 (R1)	X
Ring 2 (R2)	-
Sleeve (S)	+

Step 8

Take the 3.5 mm TRRS cable, cut it in half if it has two male ends, and strip off approxiamtely 2 cm of the outer insulation.

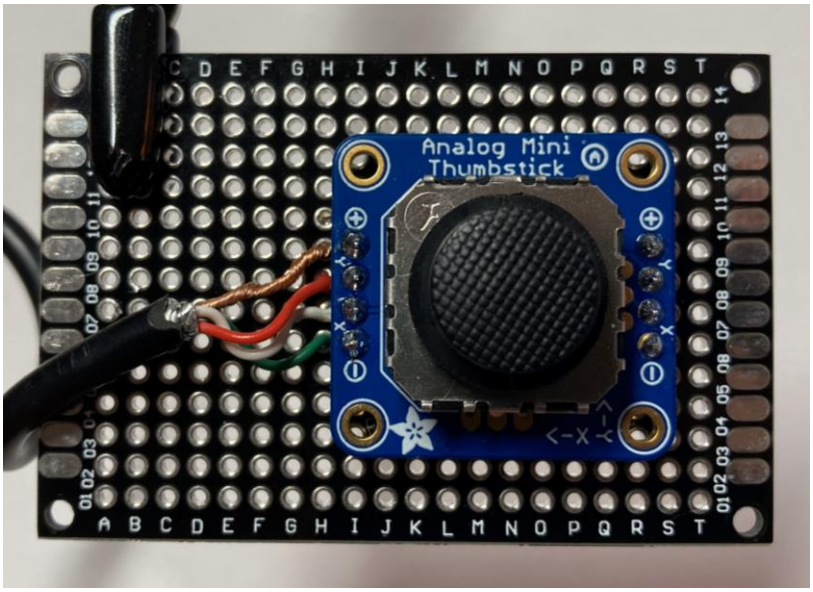
Then separate the individual inner wires and strip off approximately 0.5 cm of insulation.



Step 9

Thread the wires into the holes beside the thumbstick breaklout board headers, in holes H6-HH9 when looking from above. Follow the following table for wiring:

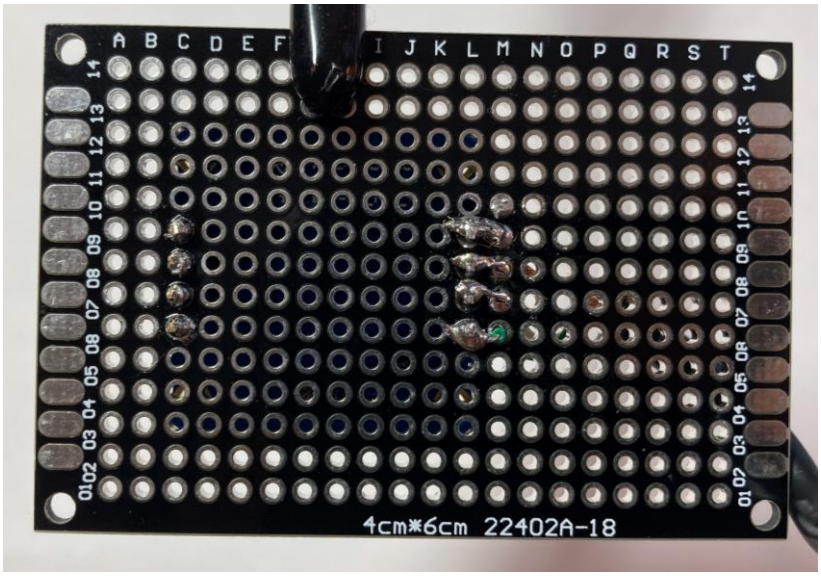
Hole	Pin	TRRS cable
H9	+	Sleeve
H8	Y	Tip
H7	X	Ring 1
H6	-	Ring 2



Step 10

Now bend the wires over and solder each one to the corresponding pin from the thumbstick breakout board.

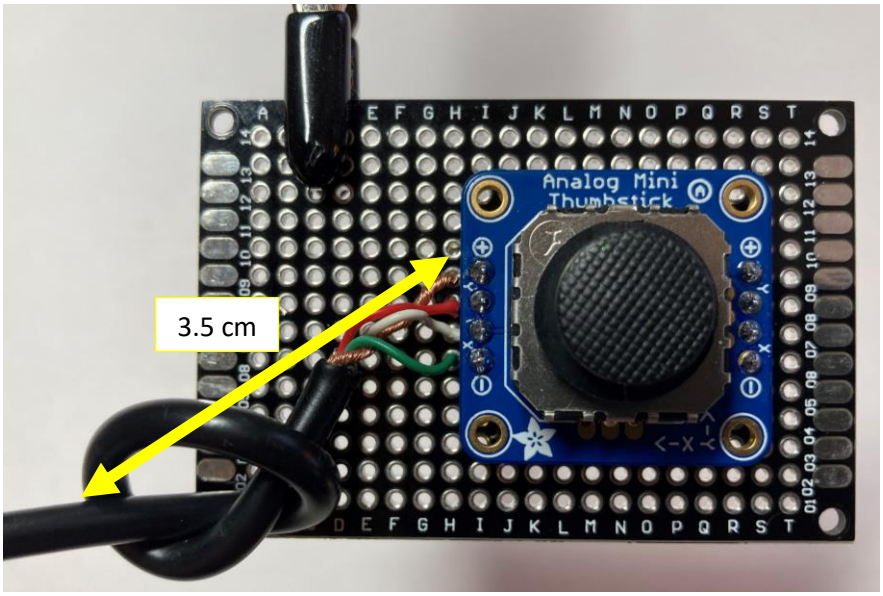
Note: make sure that no solder is connecting the pins to each other, or connecting the wires to each other.



Step 11

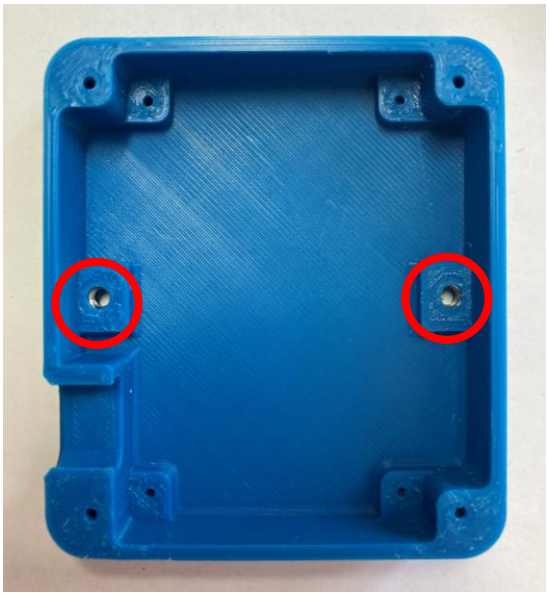
Tie a knot in the 3.5 mm TRRS cable, close to the board and solder connections.

This knot will be used for strain relief on the wire. The end of the knot should be at least 3.5 cm away from the board.



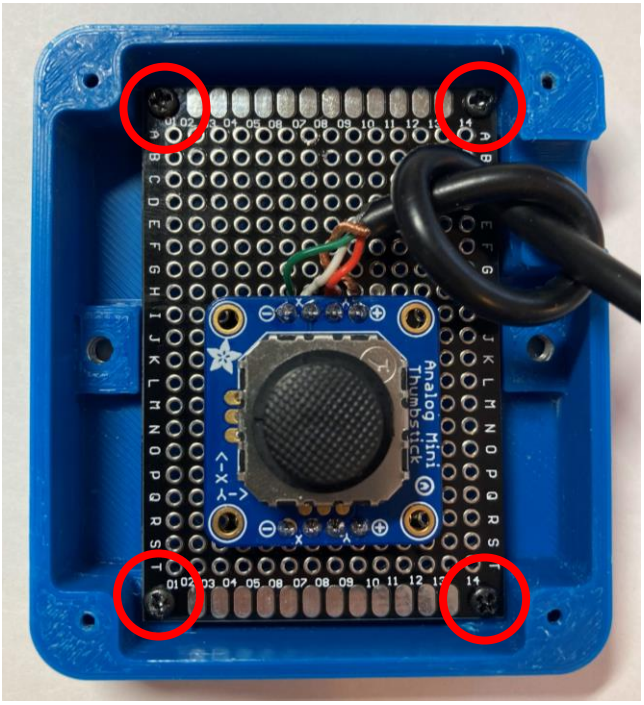
Step 12 – Optional

If mounting the joystick (not using on a tabletop) and using a mount adapter, take the two M3 nuts and slide them into the slots inside the enclosure as shown.



Step 13

Take the protoboard and the bottom of the 3D printed enclosure and insert M2 screws in each of the four corners of the board, as shown circled in red.

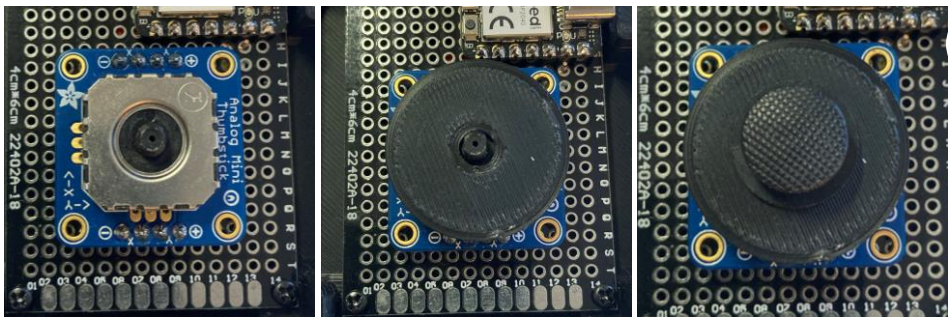


Step 14

Remove the joystick topper.

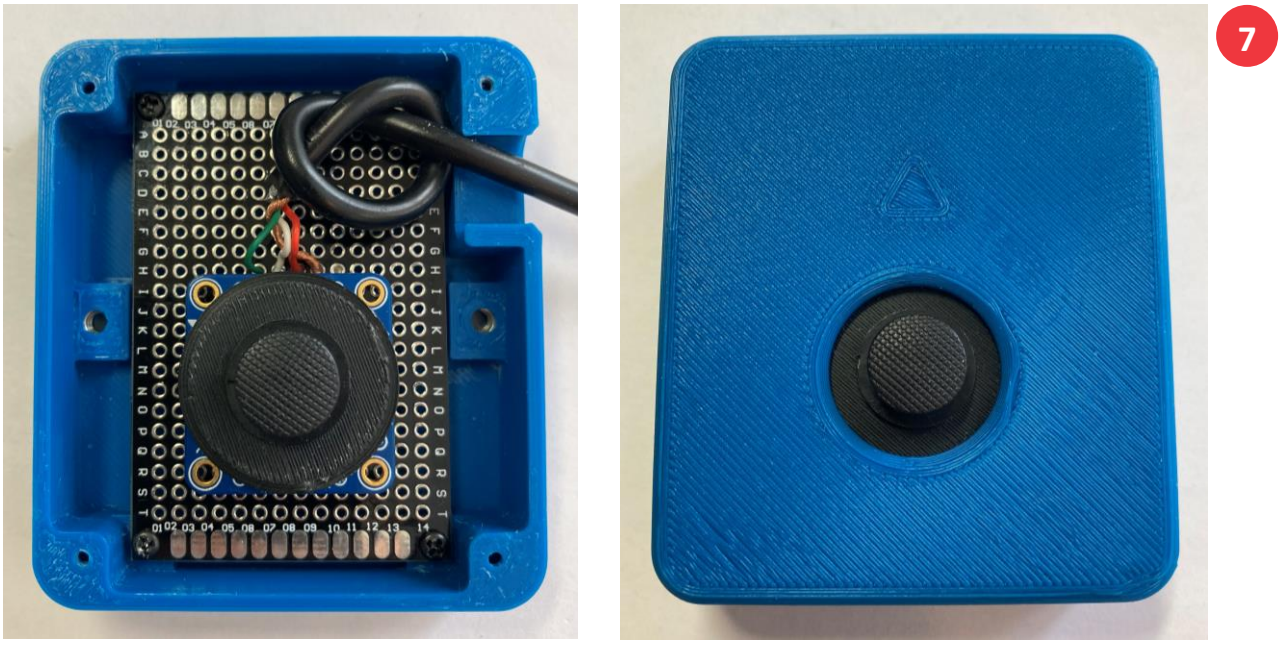
Place the 3D printed inner disk on the joystick, around the joystick post.

Replace joystick topper.



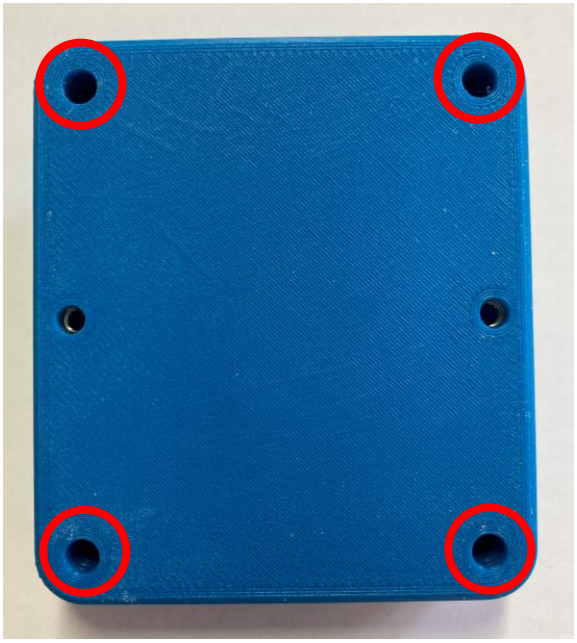
Step 15

Move the knot so it is inside of the enclosure base with the cable threading out through the hole on the side, and place the 3D printed enclosure lid on top of the enclosure base.



Step 16

Flip the joystick around and insert an M2 screw into each of the 4 screw holes circled in red and tighten them.



Step 17

Your joystick is now finished and ready to test.

Testing using an Xbox Adaptive Controller

1. Connect the Xbox Adaptive Controller (XAC) using a USB C cable to the computer.
2. Plug the joystick into either X1 for the left joystick or X2 for the right joystick.
3. If using Windows, open “Set up USB Game Controllers” from the Control Panel. You can find this by searching your computer in the search bar next to the Windows icon.
4. Select the Xbox Adaptive Controller from the list of controllers and go to “Properties”.
5. Move your joystick and observe the movement of the cross hatch in the “Axes” window. Ensure it moves in the proper directions when you move the joystick (the arrow points in the up direction). If not, open up the joystick and check your connections.

Alternatively, you could use the XAC with Steam or an Xbox itself to test that moving the joystick results in the corresponding movements on the controller.

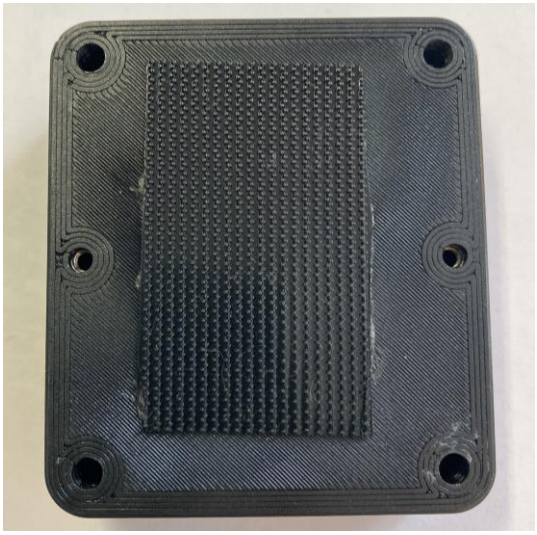
Optional – Mounting

Table Top Mounting – Non-Slip Pads

If using the joystick on a tabletop, and height of the joystick is not a concern, nonslip pads can be added in each of the four corners on the bottom, as shown.

Table Top Mounting – Hook and Loop Fastener

If using the joystick on a tabletop or other surface with hook and loop fasteners, such as Velcro, stick the hook side to the joystick and the loop side to the surface to mount to.



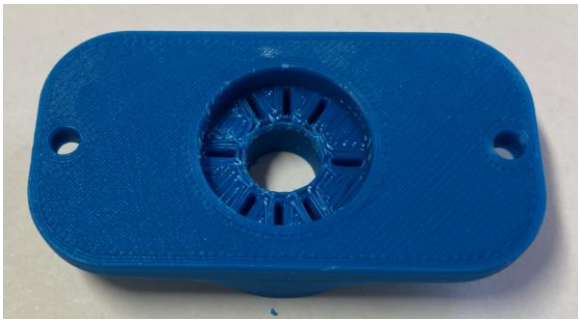
Camera Mount

To mount the joystick on a camera mount, the optional Joystick Camera Mount Adapter can be used.

Step 1

Flip the camera mount adapter around to reveal the recess with small slots.

Ensure all supports are removed from the 3D print.

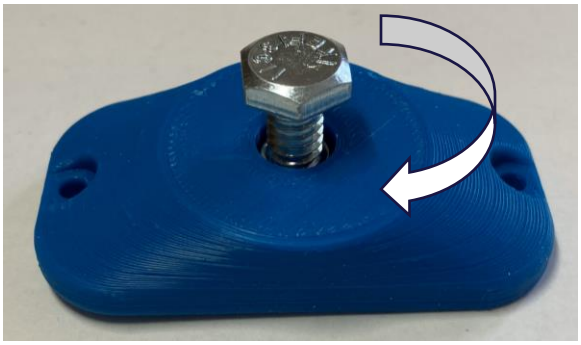


Step 2

Insert the tee nut, lining up the barbs with the small slots in the 3D print.

Step 3

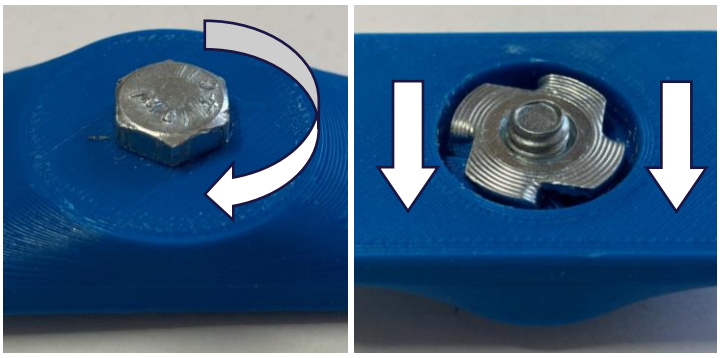
Flip the part around and screw in a ¼-20 hex bolt.



Step 4

Tighten the bolt until the tee nut is seated down as far as possible.

(Alternatively, if you do not have acces to a bolt, the tee nut may be press fit as long as it sits flush with the 3D print.)



Step 5

Using 2 M3 screws, screw the camera mount adapter to the bottom of the Sliding Analog Thumbstick in the two middle holes.