ShoeBot

Quick-Start Excerpt: Printing Guide

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Downloading Files

These instructions are written for a Windows 10 computer, though the basic principles should transfer reasonably well to other platforms like Mac and Linux operating systems.

Installing Git

Open a web browser and navigate to https://git-scm.com/ and go to the downloads page. Follow their posted directions, and once installation is complete you will be ready to get started.

Cloning the Repository

Once git is installed, open a terminal and navigate to the directory where you would like to save the project files. If you know how to do this already, you can skip the steps detailing this process.

Navigating to Desired Directory using Command Prompt

You do this on Windows by going to the search bar and typing "cmd", you should see something like the following come up, though the specifics will depend on the software you have installed on your device.

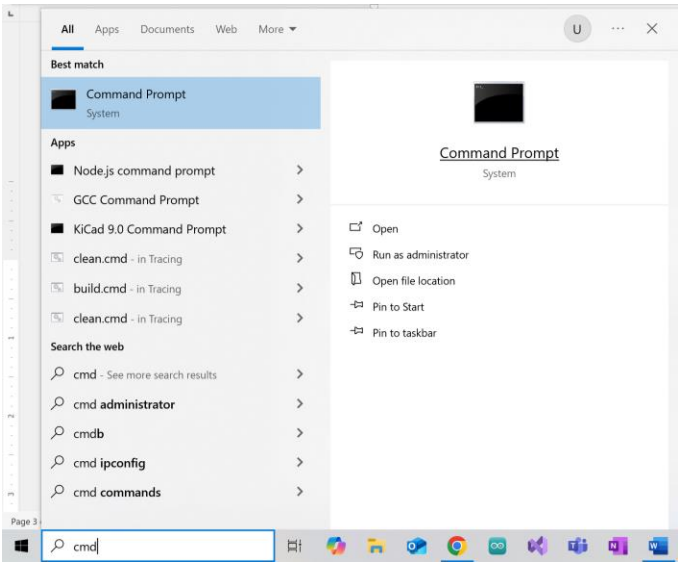

Figure 1. This screenshot illustrates opening the Command Prompt terminal from the Windows search bar.

1. Open Command Prompt and you should see a terminal window open. Odds are good that your desired location is going to be somewhere off the user directory, which is what Command Prompt opens to by default. In this example, the desired directory is a desktop folder created specifically for the user's GitHub repositories.

2. Type `cd ./<name of target directory>` In the example provided in Figure 2, the full command is `cd ./Desktop/My Stuffs/Git Repos/`

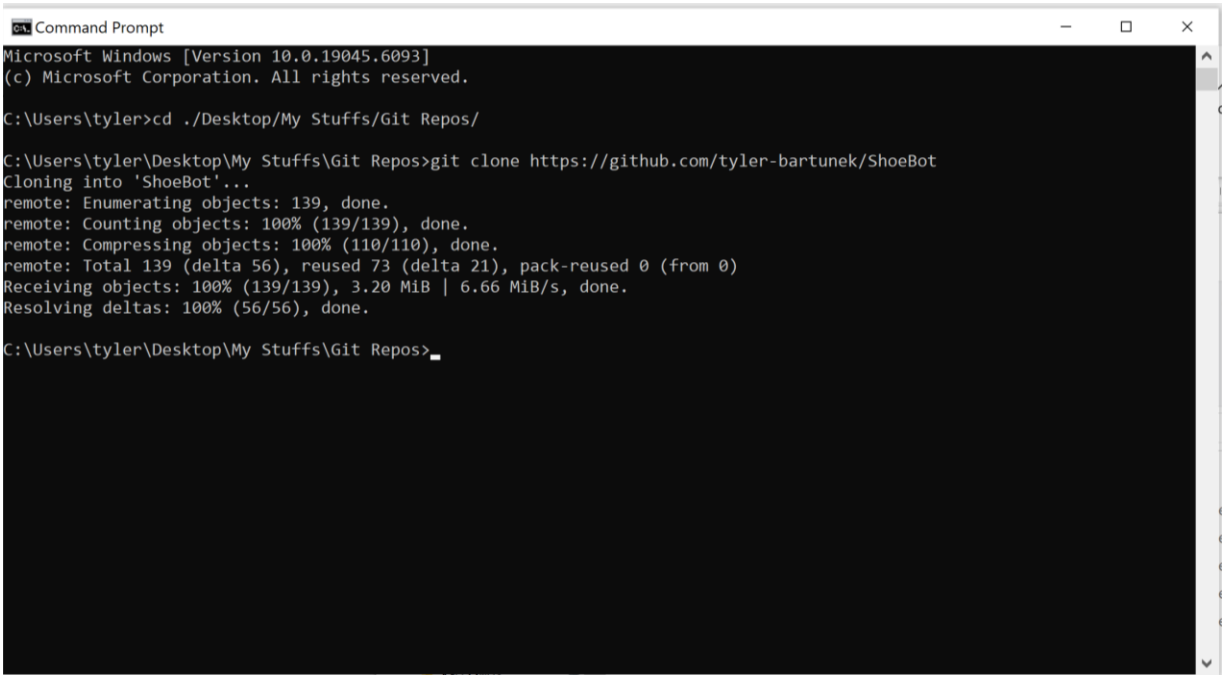

Figure 2. The complete set of commands necessary to get a clone of the repository onto your local device.

Finally Cloning the Repository

Now that you are set up with git and are have navigated to the location you want the files to download, it is time to download a copy of the files into this location. Type or copy-paste

```
git clone https://github.com/tyler-bartunek/ShoeBot
```

into your terminal. The download process should run automatically and once finished you should have a new folder in that location named ShoeBot. Note that it may prompt you to sign in to github, which may entail setting up an account.

If this step has finished successfully, then you can now close the Command Prompt and continue navigation through the File Explorer like usual.

Printing Instructions for Hardware

Navigate to the Hardware directory of the repository. In it, you will find folders for

- Attachment Points
- Central Electronic Mounts

- SPI Hub PCB KiCad files
- Wheel Module.

This section will concern all of these folders except the SPI Hub folder, as that information is for an optional component that is not 3D-printed. Every folder that has parts to be 3D-printed will contain folders for STEP and STL files, with the former provided in the event that you need to modify the base design of any of the components.

All parts were printed using PLA+ during the design process with:

- 0.4 mm nozzle and line width
- 20% infill (cubic)
- Tree supports as applicable
- 2 wall lines
- 50 mm/s print speed

To maximize print time efficiency, it is strongly recommended to print multiple components at once. For example, printing half of the rail pieces in a batch and all of the motor mount attachments in another batch instead of each rail and motor mount attachment piece individually. With these print settings it was not uncommon to encounter 2+ day prints on an Ender 3V2 running Marlin. So again, the recommendation is to print as many things simultaneously as possible.

In total, you will need to print the following to match the development setup:

- 6 Base Mount Clips
- 4 Base Mounts
- 4 Internal Corner Plates
- 2 Internal Middle Plates
- 4 External Corner Plates
- 2 External Middle Plates
- 4 Motor Mount Attachments
- 4 Motor Mount Side Bottoms
- 4 Handles
- 4 Pico Shields
- 1 Central Electronics Mount
- 1 Buck Converter Mount
- 1 Raspberry Pi 3b+ Mount
- 4 Spacers (print last)

For best results, print at a 0.1 mm layer height as this will allow in Cura for steeper overhangs and fewer supports.

Attachment Points

The attachment points folder contains files for rails (2 configurations), plates (4 configurations), and spacers. Figures 3-6 illustrate proper print orientation in Cura for each of these files, with configurations grouped together on the print bed.

Rails (Base Mounts)

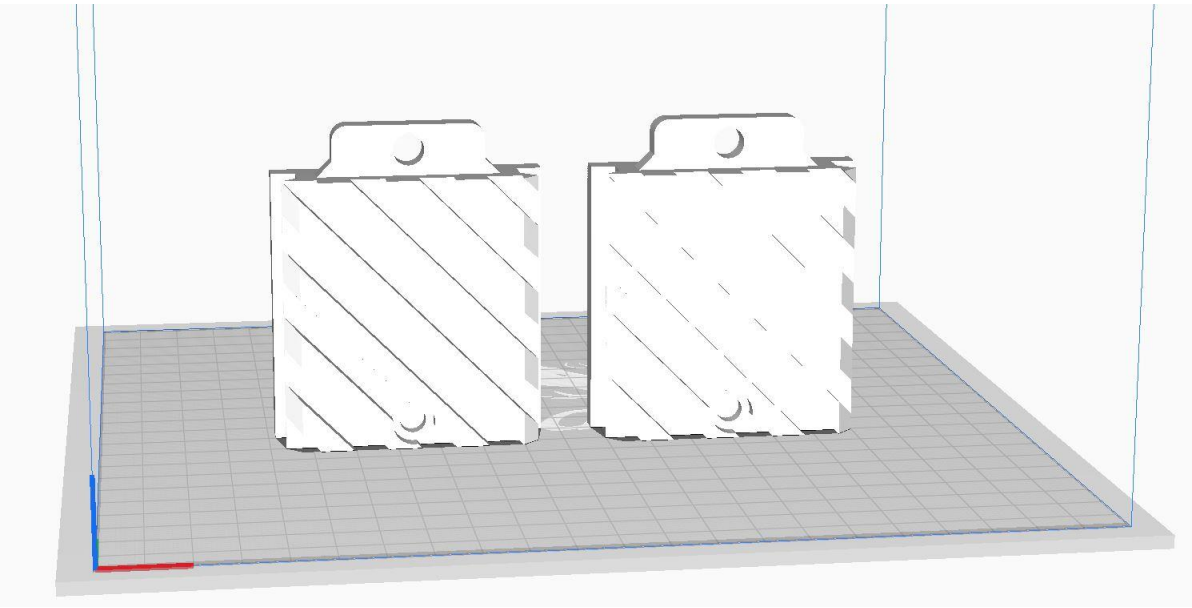

Figure 3. Print orientation for the rail pieces, front view.

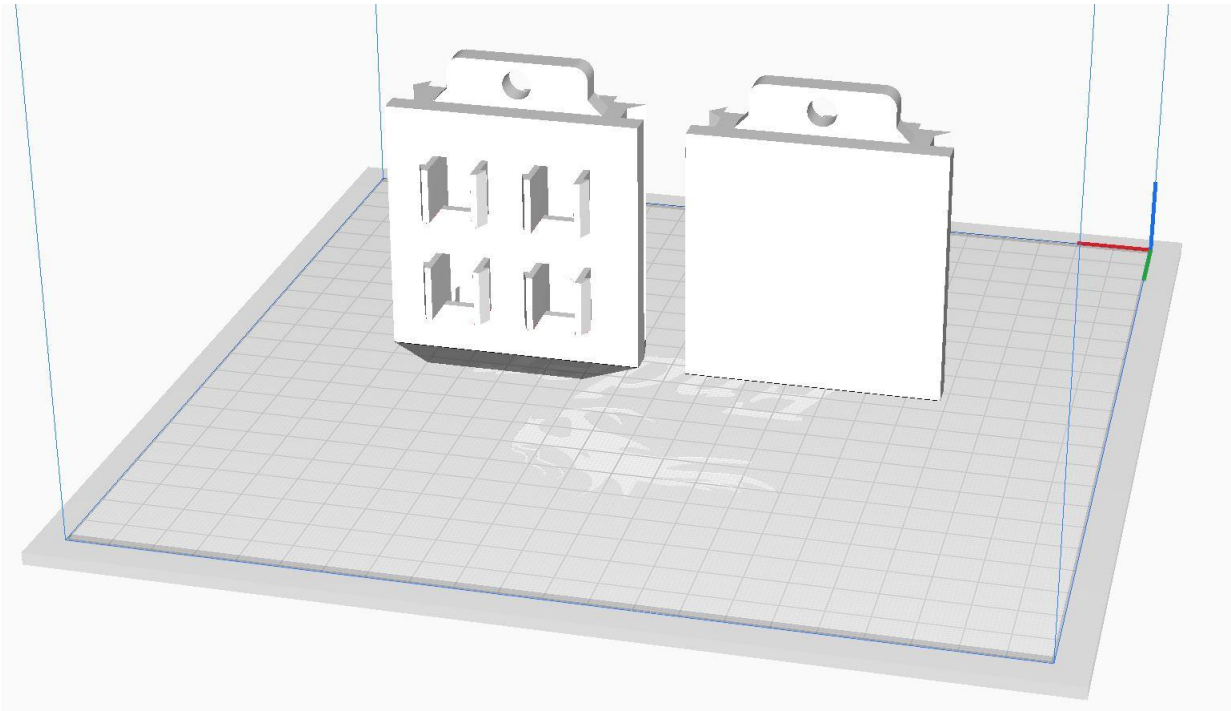

Figure 4. Print orientation for the rail pieces, rear view.

Plates

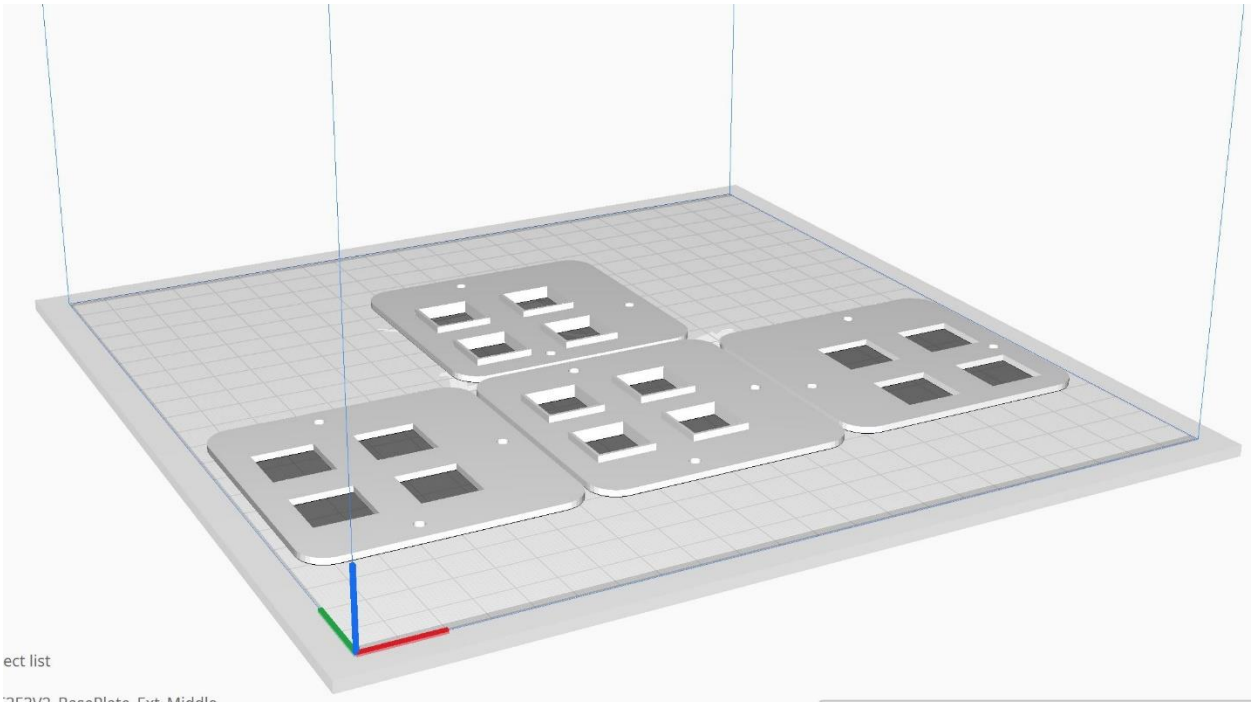

Figure 5. Print orientation for the plates needed to prevent tear-through of the mounting points. Note how the insertion ridges are face-up for the external configurations.

Spacers

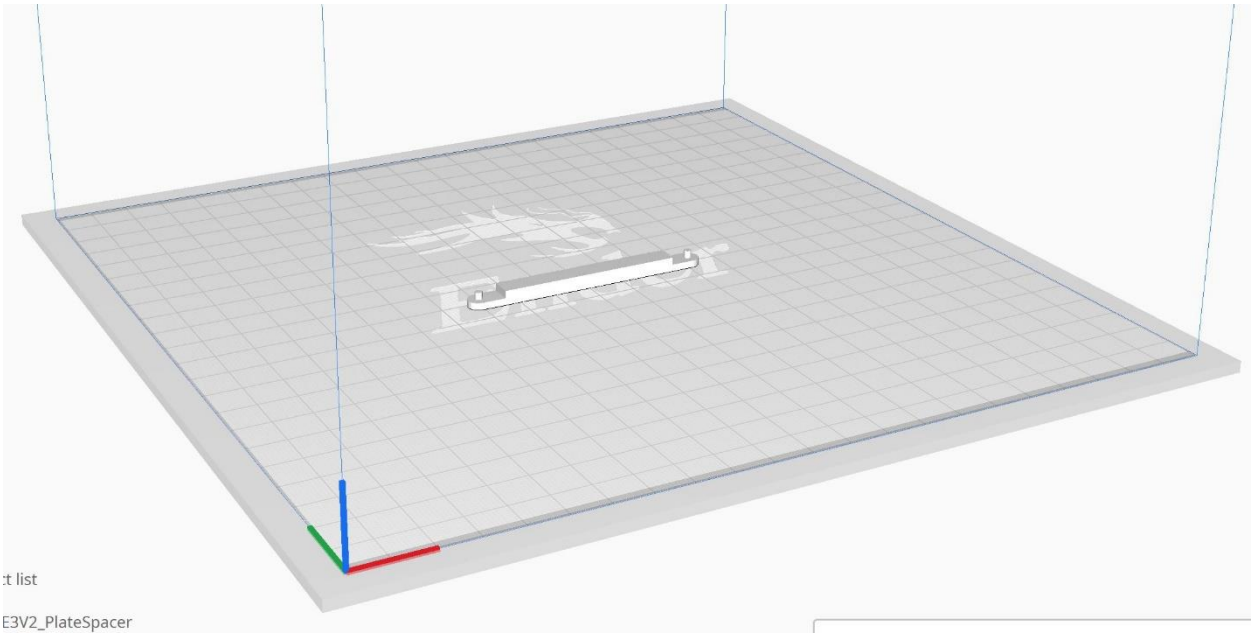

Figure 6. Print orientation for the spacers used primarily during assembly for alignment purposes. Print these last to save on filament, exact length may need to be adjusted to account for dimensional deviations in other components.

Central Electronics Mounts

Raspberry Pi 3B+ Mount

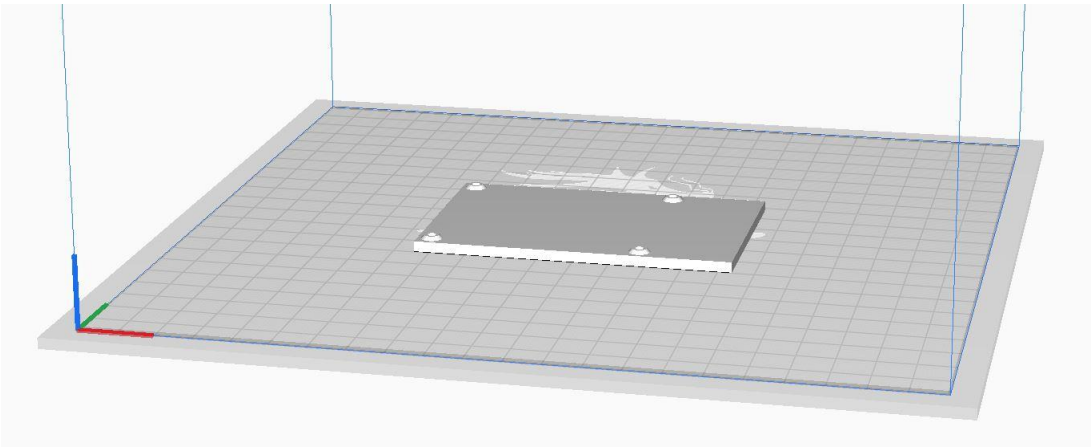

Figure 7. Print orientation for the plate that the raspberry pi sits upon, with screws going through the pi and this plate into standoffs.

Central Mount

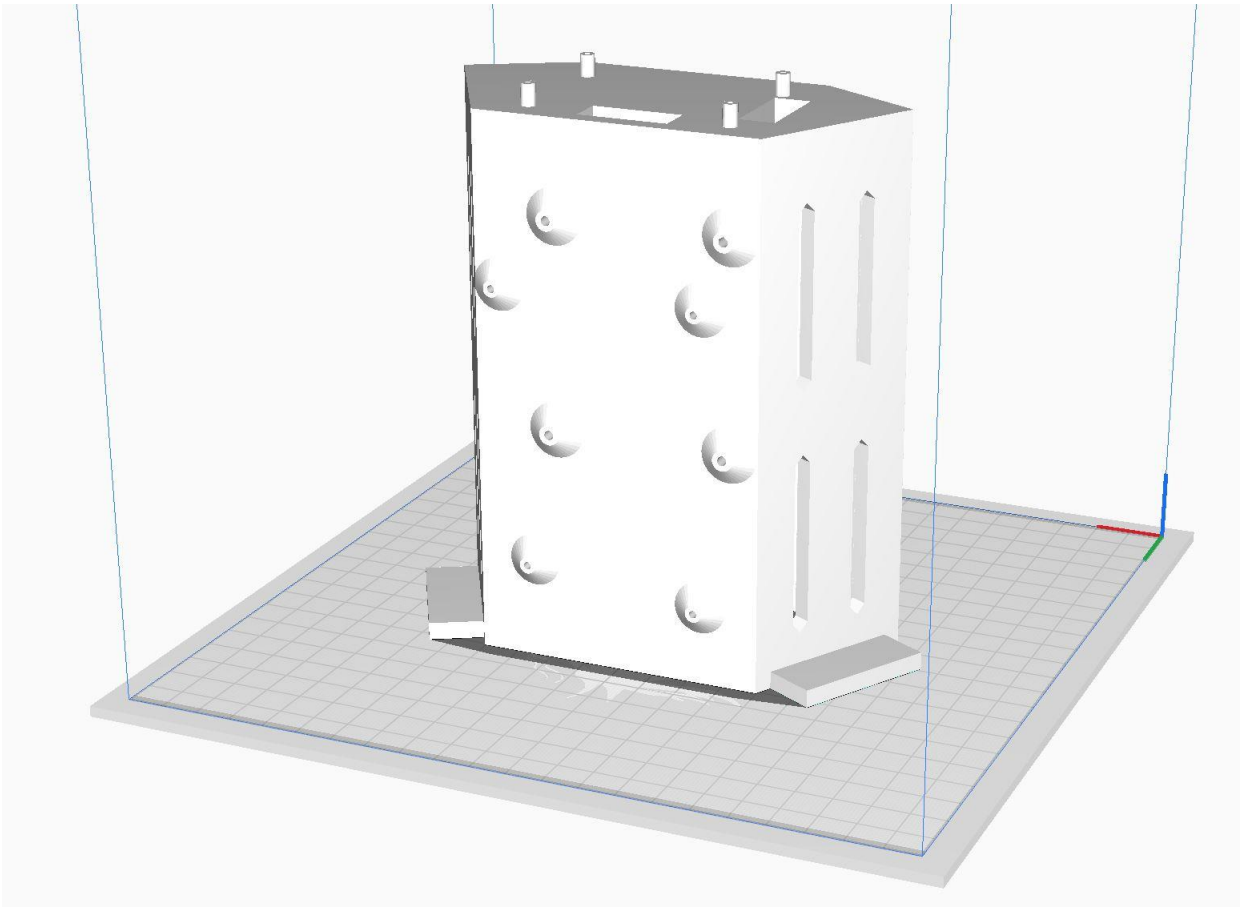

Figure 8. Print orientation for the central electronics mount. Note that the center of this will be hollow, and you may have to disable supports through part of it in order to improve print times. Small cuts were made in the top of the hollowed out portion to decrease the bridging distance to always be less than 50 mm.

Buck Attachment Point

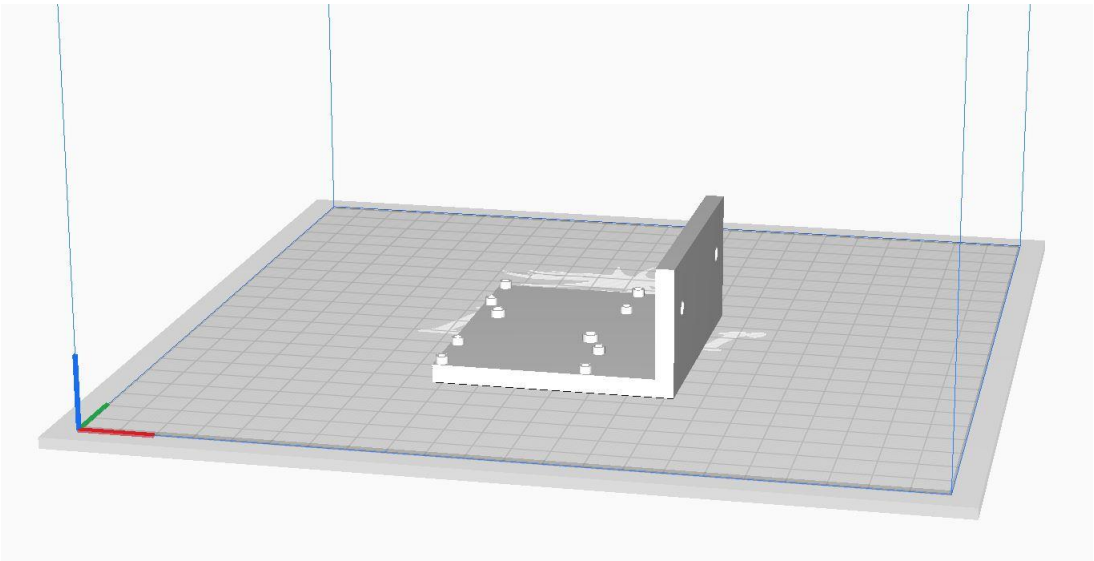

Figure 9. Print orientation for the buck converter mounting point, with the raised portions oriented upwards.

Wheels Module Hardware

Motor Mount Attachment

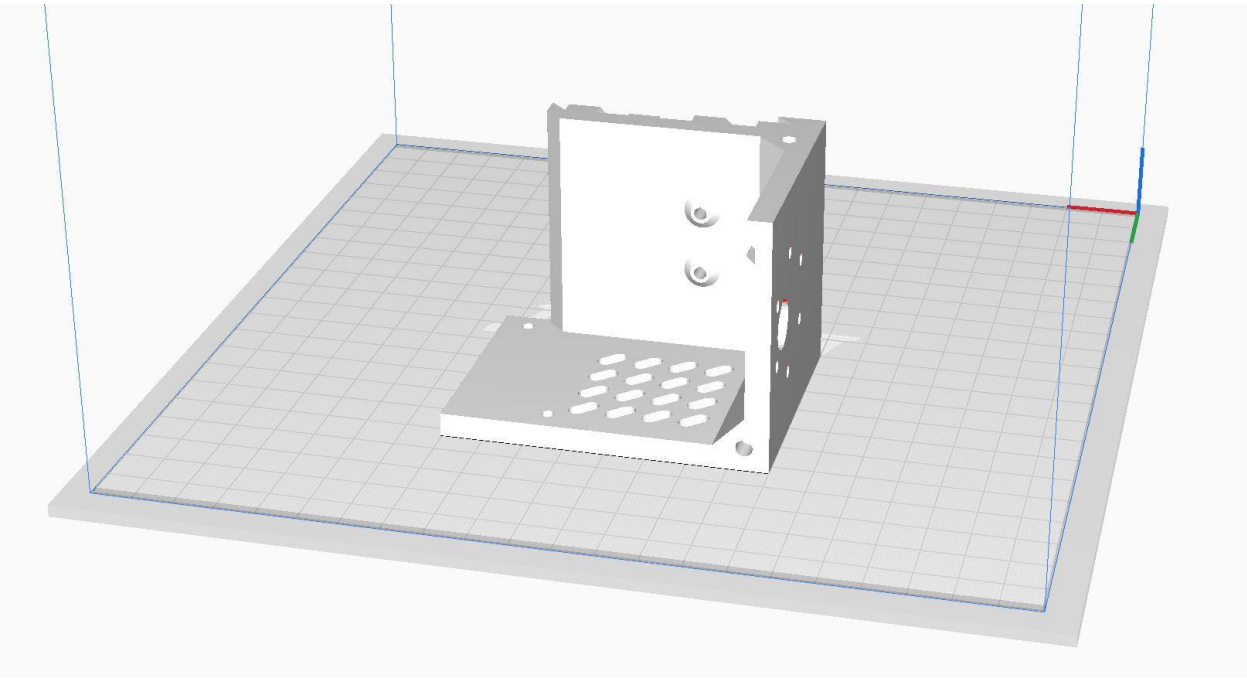

Figure 10. Print orientation for the motor mount attachment piece, illustrating that ventilation slots print on the bottom face.

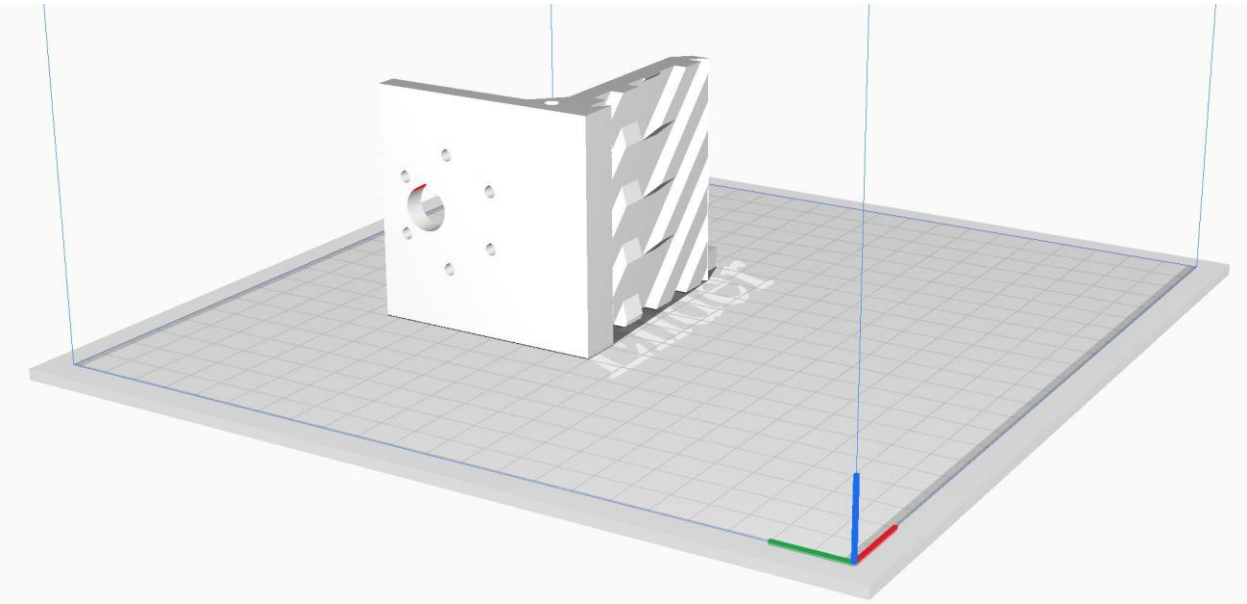

Figure 11. Secondary view of the print orientation for the motor mount attachment piece, showing that the teardrop shape for the motor attachment holes point upward and the way that the channels should appear in the correct print orientation.

Motor Mount Side Bottom

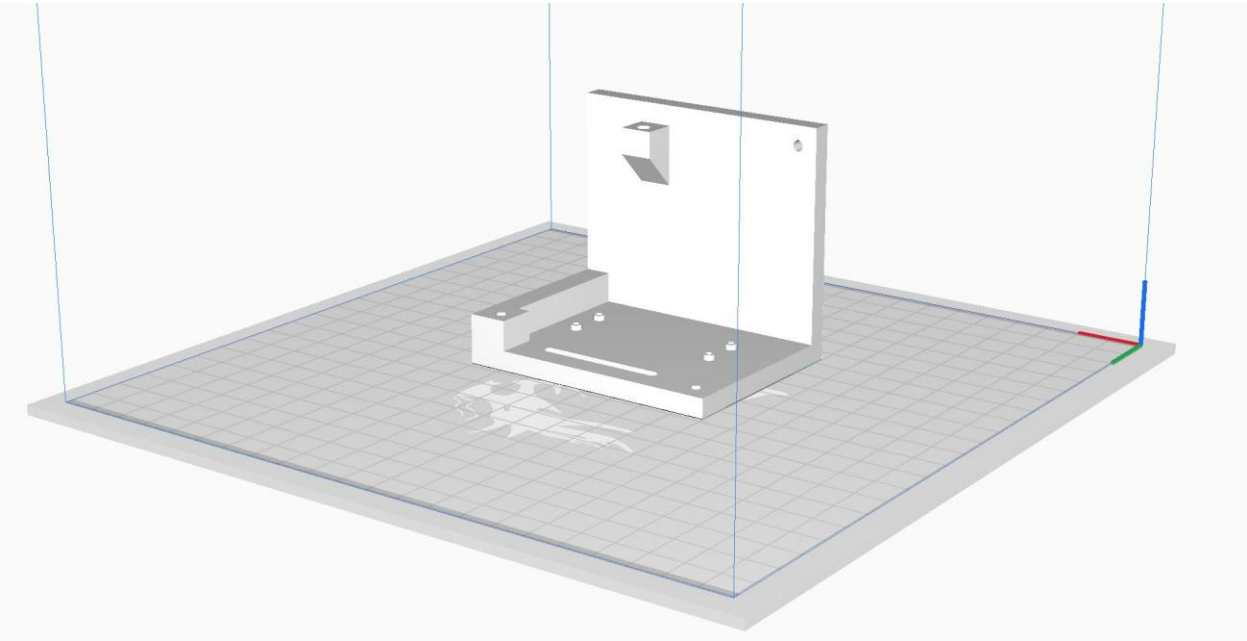

Figure 12. Print orientation for the bottom (and side) piece of the Wheels module enclosure. Note the direction of the teardrop shape for the hole in the top right corner, as well as how the chamfer plays a supporting role for another hole.

Handle

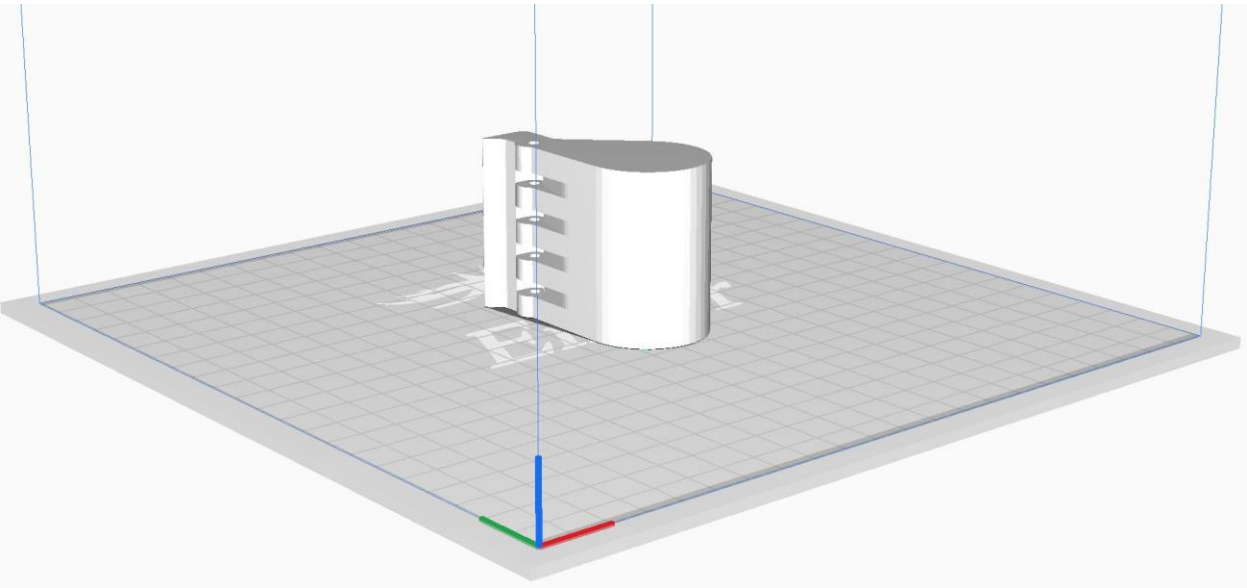

Figure 13. Print orientation for the handle of the wheels module. Note that care should be taken to ensure that the gaps for the springs are cleaned out well enough for the springs to fit, as supports will want to fill this space.

Pico Shielding

Special consideration: this part is much taller than it is wide, and as such it is recommended to enable z-hop when printing this piece because there is a risk of the print failing due to the nozzle knocking it over.

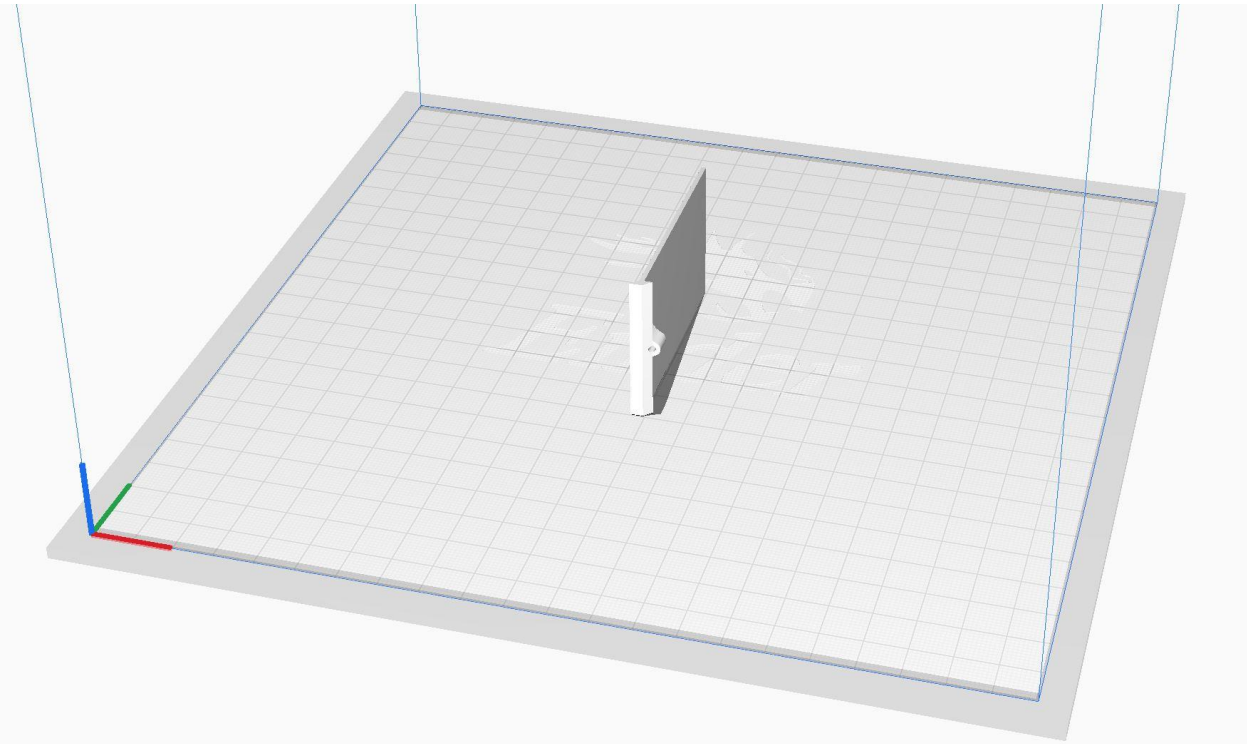

Figure 14. Print orientation for the Pico shielding piece. Note that, aside from fitting into the attachment piece (including the M1.6 screw hole) though, not a lot of dimensional accuracy is strictly necessary for this piece as it will just be backing for EMI shielding.