

3D Print

Our instructions are intended to be used with our **YouTube videos** that illustrate the different steps. For the 3D Print watch: [“How to build the SensorBox – 3D Print”](#).

We used the [Original Prusa I3 MK3 Kit](#) from [PRUSA RESEARCH by Josef Prusa](#) as our 3D printer, [blue](#) and [grey PETG](#) filaments from [MatterHackers](#), and [PrusaSlicer](#) to slice the **.stl** files from the folder **STL_Files** in the CAD section to **.gcode files** into the folder **GCODE-files** for 3D printing.

PrusaSlicer

Download PrusaSlicer

Firefox: <https://www.prusa3d.com/prusaslicer/>

> Click Linux (Drivers & Apps)

~/Downloads/prusa3d_linux_2_2_9_1.zip

Ubuntu: Open ~/Downloads

Ubuntu: Right-Click prusa3d_linux_2_2_9_1.zip and select Extract Here

Ubuntu: Right-Click on PrusaSlicer-2.2.0+linux-x64-202003211856.AppImage and select Properties

> Select Permissions

> Check Allow executing file as program

An already downloaded copy can be found here:

sw/[PrusaSlicer-2.2.0+linux-x64-202003211856.AppImage](#)

Run PrusaSlicer

Ubuntu: Double-Click on sw/PrusaSlicer-2.2.0+linux-x64-202003211856.AppImage

3D Printing

If you have the **Original Prusa I3 MK3**, you can go ahead and directly print the **.gcode files** from the folder **GCODE-files**. If you have a different 3D printer, use the stl files from the folder STL-files in the CAD section and create the gcode files appropriate for your 3D printer.

We printed the sensors & processing board with blue PETG and the cover with grey PETG.

With the Original Prusa I3 MK3, use the Generic PETG setting, with the following modifications:

a) Print Settings: Infill: Fill density: 20% and b) Print Settings: Layers and perimeters: Perimeters: 3.

When sanding a print with only 20% fill density, the internal structure can get exposed quickly. Use a fill density of 100% when there is text or when the last layer is exposed to the outside.

When printing large and deep objects with only 20% fill density, the internal structure might not be sufficient, which can also show in a not so nice last layer. Use a fill density of 40% and Print Settings: Infill: Solid infill every 19 layers (at 3mm) or a fill density of 100%.

PrusaSlicer

	Filament	Fill Density	Perimeters	Solid Infill Layers
Bottom Plate	Generic PETG	40%	3	every 19 layers (3mm)
Vision Board	Generic PETG	100%	3	-
IntelRS Support	Generic PETG	20%	3	-
Battery Stand	Generic PETG	20%	3	-
Power Board	Generic PETG	20%	3	-
Sensor Board	Generic PETG	20%	3	-
Processing Board	Generic PETG	20%	3	-
Back Wall	Generic PETG	100%	3	-
Display Wall	Generic PETG	20%	3	-
Side Wall Left*	Generic PETG	20%	3	-
Side Wall Right	Generic PETG	20%	3	-
Top Wall	Generic PETG	100%	3	-

* Use "Place on Face" to flip print over!

- > Press f key
- > Click on top surface
- > Press f key

If the first layer has trouble to stick to the print-bed, wash the print-bed with soap and warm water. You will get perfect prints, (almost) every time.

If your 3D printer is in an enclosure, leave the door open.

As there are some large prints, you may want to check (unroll the filament and roll it back on) that the filament will unroll nicely.

If the print sticks too hard to the print-bed, the coating may chip out from the print-bed if you try hard enough. Put the print in the freezer before trying to pull it off with too much force.

Original Prusa I3 MK3

	Filament	Est. Print Time / Length / Weight				Act. Weight
Bottom Plate	blue PETG	16h 4min	55m	168g		148g
Vision Board*	blue PETG	11h 37min	43m	133g		122g
IntelRS Support	blue PETG	52min	3m	10g		10g
Battery Stand	blue PETG	10h 35min	32m	98g		90g
Power Board	blue PETG	2h 11min	7m	22g		20g
Sensor Board	blue PETG	4h 56min	17m	52g		46g
Processing Board	blue PETG	4h 33min	17m	51g		44g
Back Wall	grey PETG	2h 33min	12m	36g		28g
Display Wall	grey PETG	3h 6min	10m	32g		28g
Side Wall Left	grey PETG	6h 12min	23m	71g		62g
Side Wall Right	grey PETG	5h 48min	23m	69g		64g
Top Wall	grey PETG	7h 44min	45m	138g		128g

* Put the print of the Vision Board in the freezer before pulling the print off the print bed. It helps with not breaking the delicate thin layers around the camera lenses.

We printed in an enclosure with a door open, in a room with temperatures down to 17°C and humidity up to 52%. During printing the temperature increased up to 26°C and humidity went down to 36%.

The estimated print times were pretty accurate and it should be possible to do all prints in one (1) week.

The total weight of the 3D prints is 790g. No attempts to optimize for weight have been made.

Clean up your 3D prints with [P150 sandpaper](#). Use a [heat gun](#) and/or [carving craft knife](#) to get rid of filament strings (happens with PETG). Retrace the text with a nail. Retrace the air holes with a small [screw driver](#). A [needle file set](#) can come handy for difficult pieces (optional).

Post-Processing

PETG supports higher temperatures, which allows for carefully sanding with a [sander](#) (optional).

When painting your 3D prints, consider automotive and matt (vs glossy) spray paint to create professional looking and robust surfaces (scratches, fingerprints).

When using the same spray paint as we do, consider two (2) weeks for the post-processing. When using non-automotive or glossy spray paint, consider a very long time (weeks) to curate to avoid scratches and fingerprints.

Sensors & Processing Board

Sand the underside of the bottom plate and the outside of the vision board with [P150 sandpaper](#), and then spray 3-5 coats of [automotive clear matt finish](#). Use it like a filler to cover any holes if there are any. Coats can be relatively thick if necessary. After sanding always clean up the pieces with water and a paper towel and let them dry. Let each coat dry for at least 1/2 hour, and then let the finish dry over night.

Sand the underside of the bottom plate and the outside of the vision board again, now with [P400 sandpaper](#), and then spray another 3-5 thin coats of the finish. Let each coat dry for at least 1/2 hour. Repeat until perfect! Let the final finish dry for a few days.

Cover

Make sure that all pieces slide into each other, including the sensors & processing board (or at least the bottom plate). Make sure that the [push button](#) and the direct-through Keystone jacks for [USB 3.0](#), [HDMI](#) and [USB-C](#) can be inserted properly into the cover. Insert four (4) [M3x4x5 threaded heat inserts](#) using a [soldering iron](#) into the display wall and make sure that the [display](#) will fit in properly.

Assemble the cover by sliding the pieces into each other, which should already hold everything nicely in place, and glue them together with [super glue](#), which is good enough. Spread the liquid glue on both

sides, in the grooves on one piece and the section that touches the wall on the other piece. As you assemble and glue the cover together in the following order: 1) back wall to one of the side walls, 2) the other side wall, 3) the display wall, and then 4) the top wall, allow 1 hour in between the steps. Let the glue cure for two (2) days.

Sand the entire cover with [P150 sandpaper](#) and then fill any open joints where the surfaces slide into each other, any areas where the line pattern of the print can still be seen (e.g. top wall) and basically any holes with [body filler](#). Work with small quantities of the body filler at a time as it dries very fast. It can look a little bit messy, but you can sand that off. Let the body filler dry overnight.

Sand the areas where you applied the body filler first with P150 then [P400 sandpaper](#), and then spray 3 thin coats of [primer](#). Let each coat dry for at least 1 hour. When spray painting the cover, put it on a cardboard box (tissue boxes have the right size) that partially fits inside the cover. Let the primer dry overnight, then repeat, starting with the body filler, where necessary.

Sand the entire cover, now with P400 sandpaper, and then spray 3 thin coats of primer. Let each coat dry for at least 1 hour. Let the primer dry overnight.

Wet sand the entire cover, now with [P1500 sandpaper](#), and then spray 6+ very thin coats of your [automotive matt color](#) until perfect. Let each coat dry for at least 1 hour. Start with a coat at the more difficult places, like the text, the open sides of the walls and where the walls are joint. Let the color dry for a few days.

The total weight of the 3D prints after post-processing is 812g.