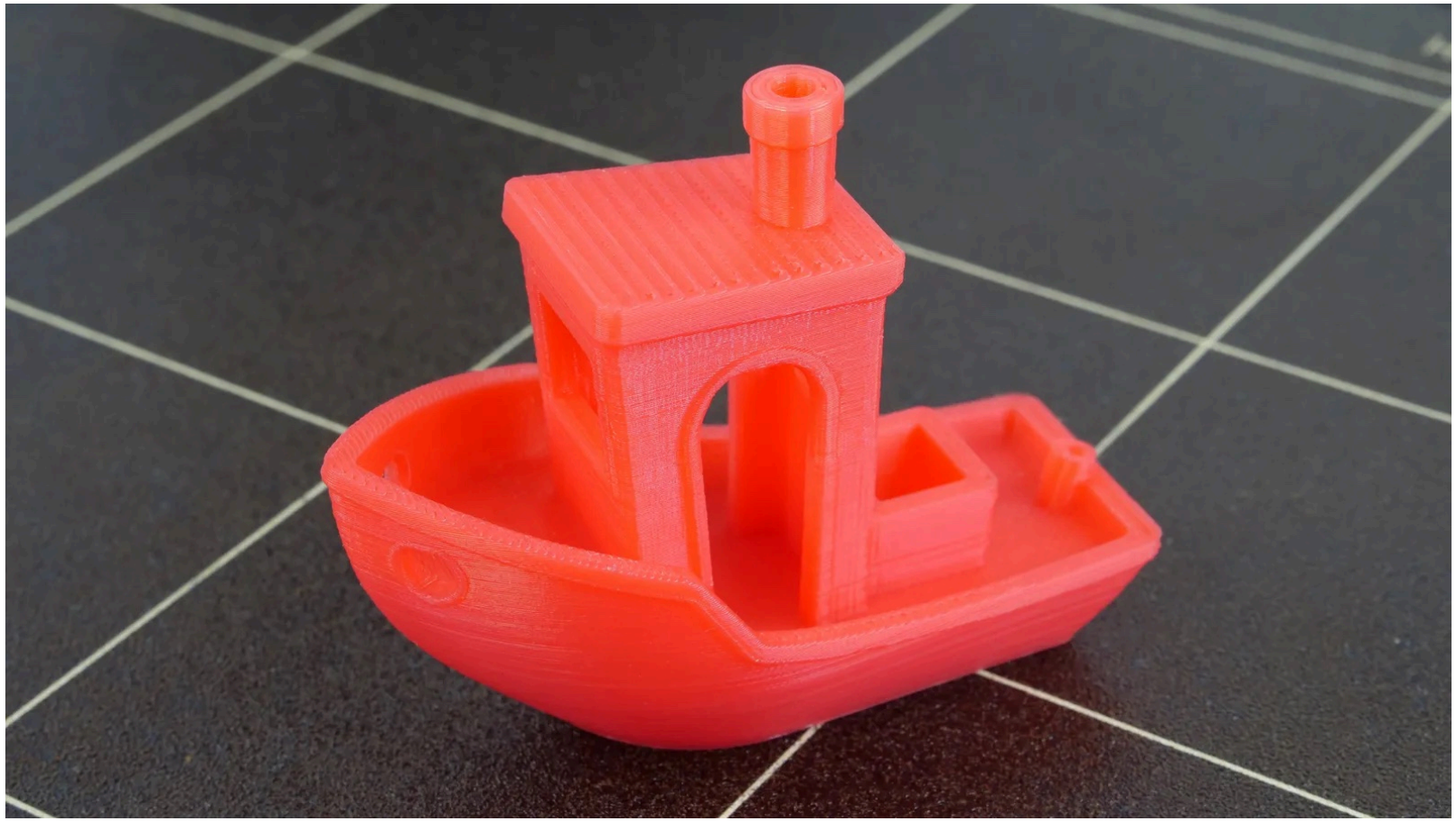
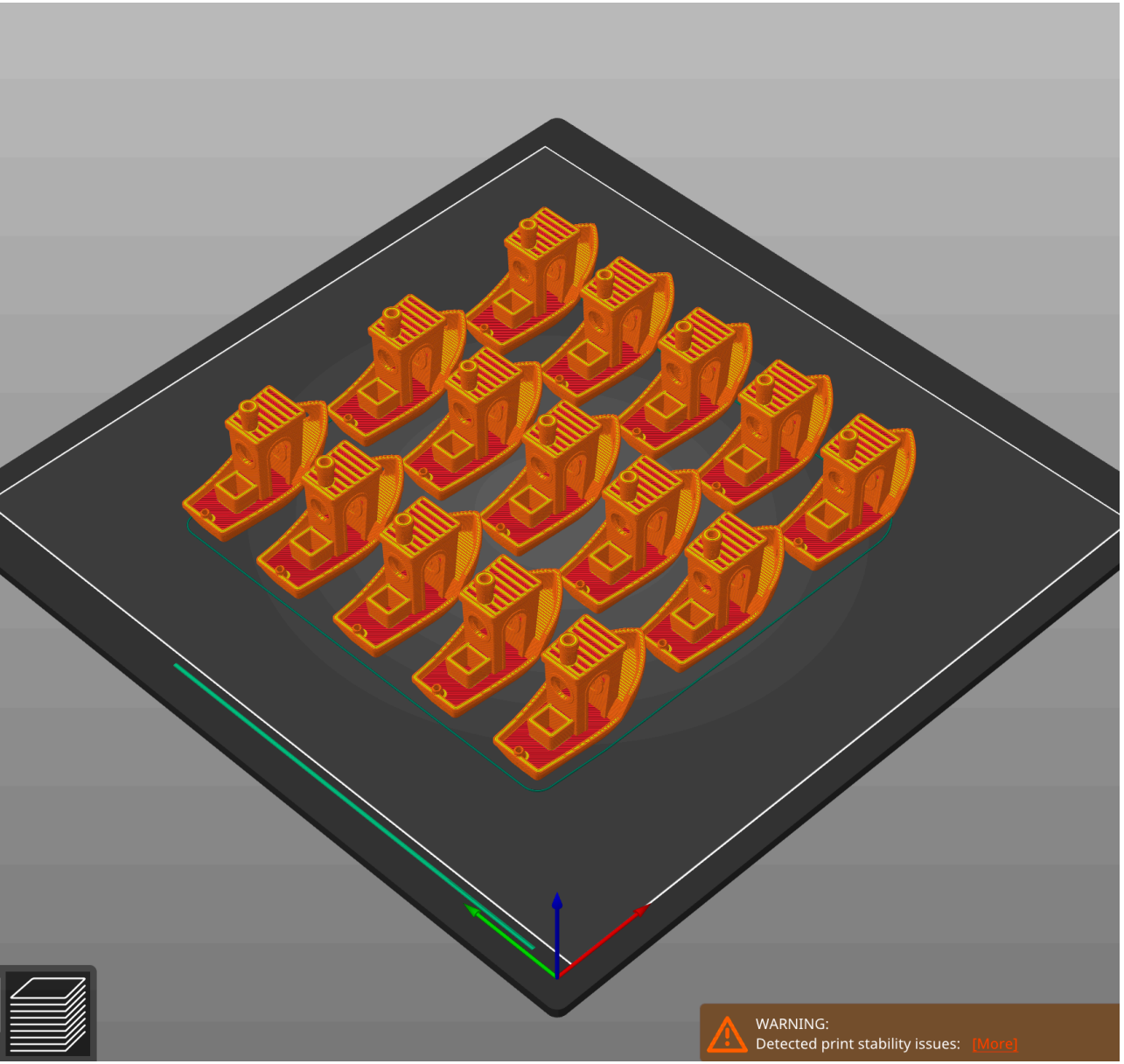
3D Printing

Currently Printing



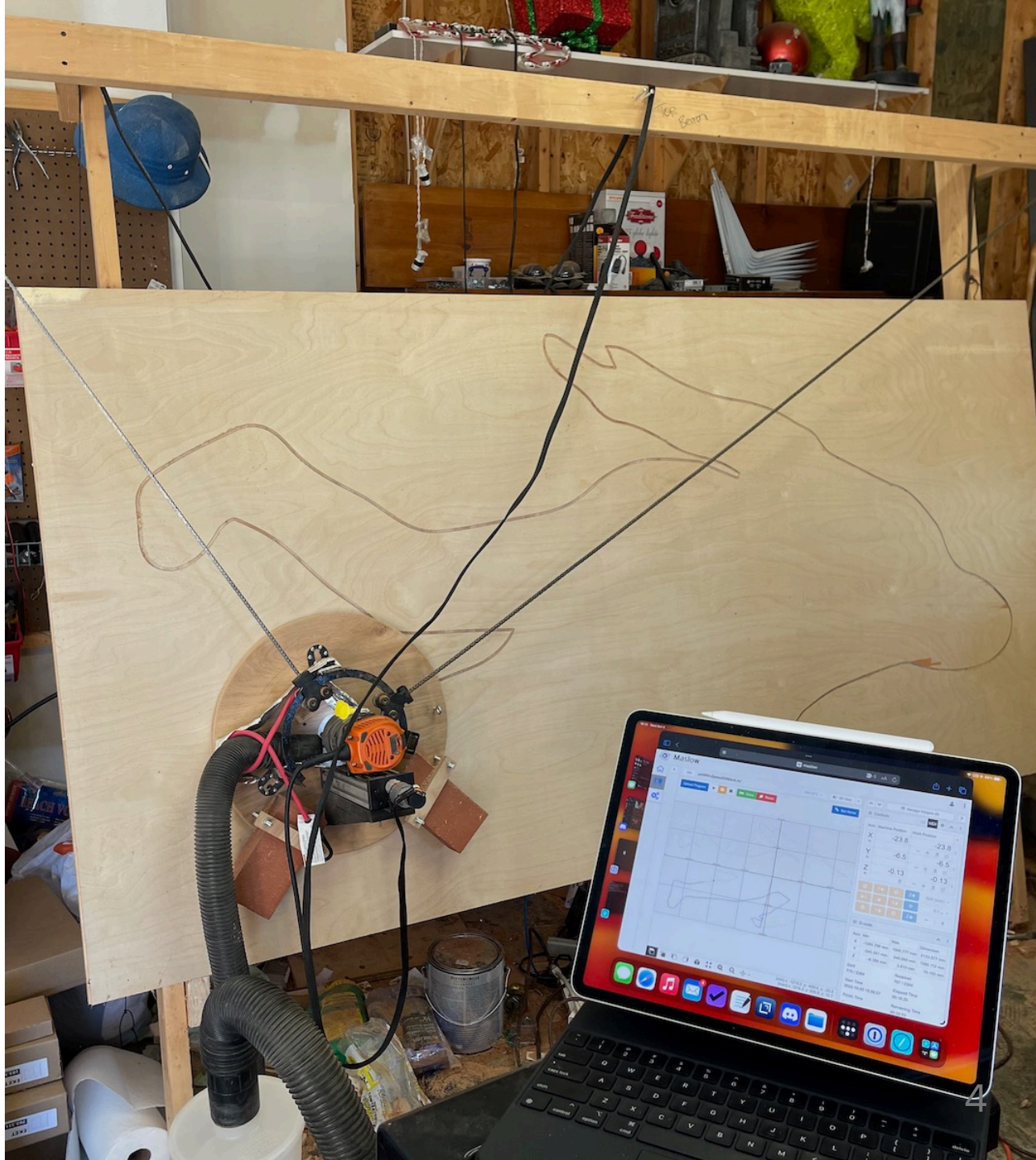
It's Benchy! Benchy is used for "benchmarking" printers.



All the benchys

What is 3D Printing?

- It's CNC, Computer Numeric Control
- CNC speaks "gcode". For example,
  - `G1 X5 Y5 E.05`
  - Move the print head to (5, 5) and extrude 0.5mm of wire
- Physical precision determines how close we get to our model



What's it good for?

- Custom mounts
- Hard to find parts
- Custom games
- Toys/Minifigs
- Prototyping products

What is requried?

- A printer (duh)
  - Anywhere from $250 to $5k+!
  - You get what you pay for, but $300 is ok
- Filament
  - PLA in multiple colors
  - PETG
  - ABS
- Accessories
  - Tools to modify/fix printer
  - 90% isopropyl
  - Filament dryer

Printer models

- Prusa
  - Mini+ is cheap, but quite small ($500ish)
  - Deprtment has a Mk3S+
- Creality
  - Ender-3 is very popular ($250-400, deals possible)
  - Demo printer is an Ender-3 S1, and it's very approachable
- Bambu Labs
  - Good CoreXY printers
  - Limited DIY potential/questionable business practices
- Public printers are often very nice
  - IUS library has one
  - May have issues with print time allotments

Side note

- We are looking at FDM (fillament)
- Resin (SLA) can provide much higher resolution, but is more expensive and *dangerous*
- The Prusa SL1S and Curing chamber kit is $2600 (2023)

Types of filament

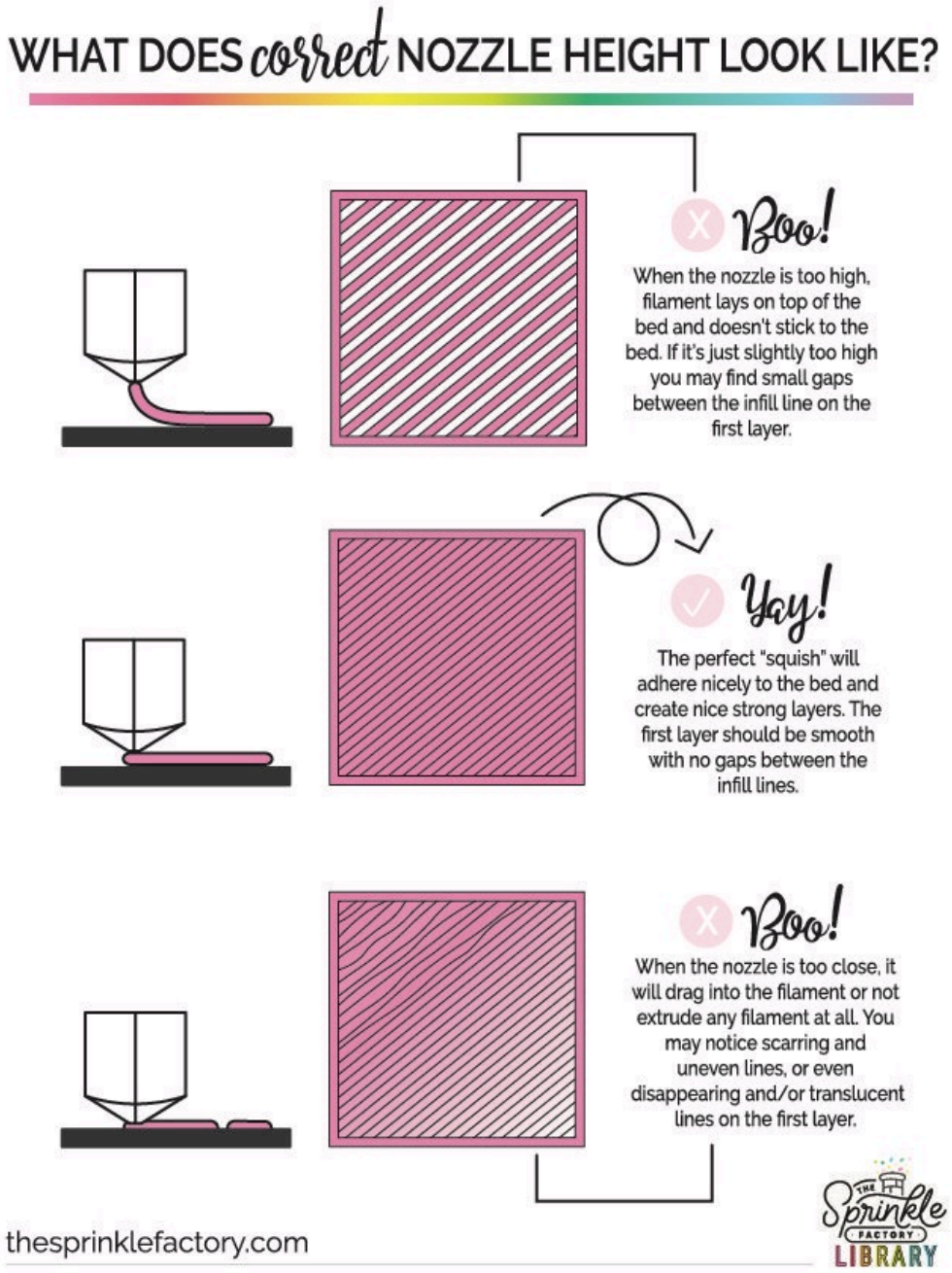
- PLA
  - Cheap & strong
  - Brittle & does not handle temperature swings
  - Bio plastic
- PETG
  - More robust than PLA, a bit harder to use
  - Can leave "strings"

Types of filament

- ABS
  - Flexible, but much harder to print with
  - Needs direct drive printer
  - Fume extraction necessary
- TPU
  - Flexible!
- Many more combinations of food safety, metalics, colors, etc. available.

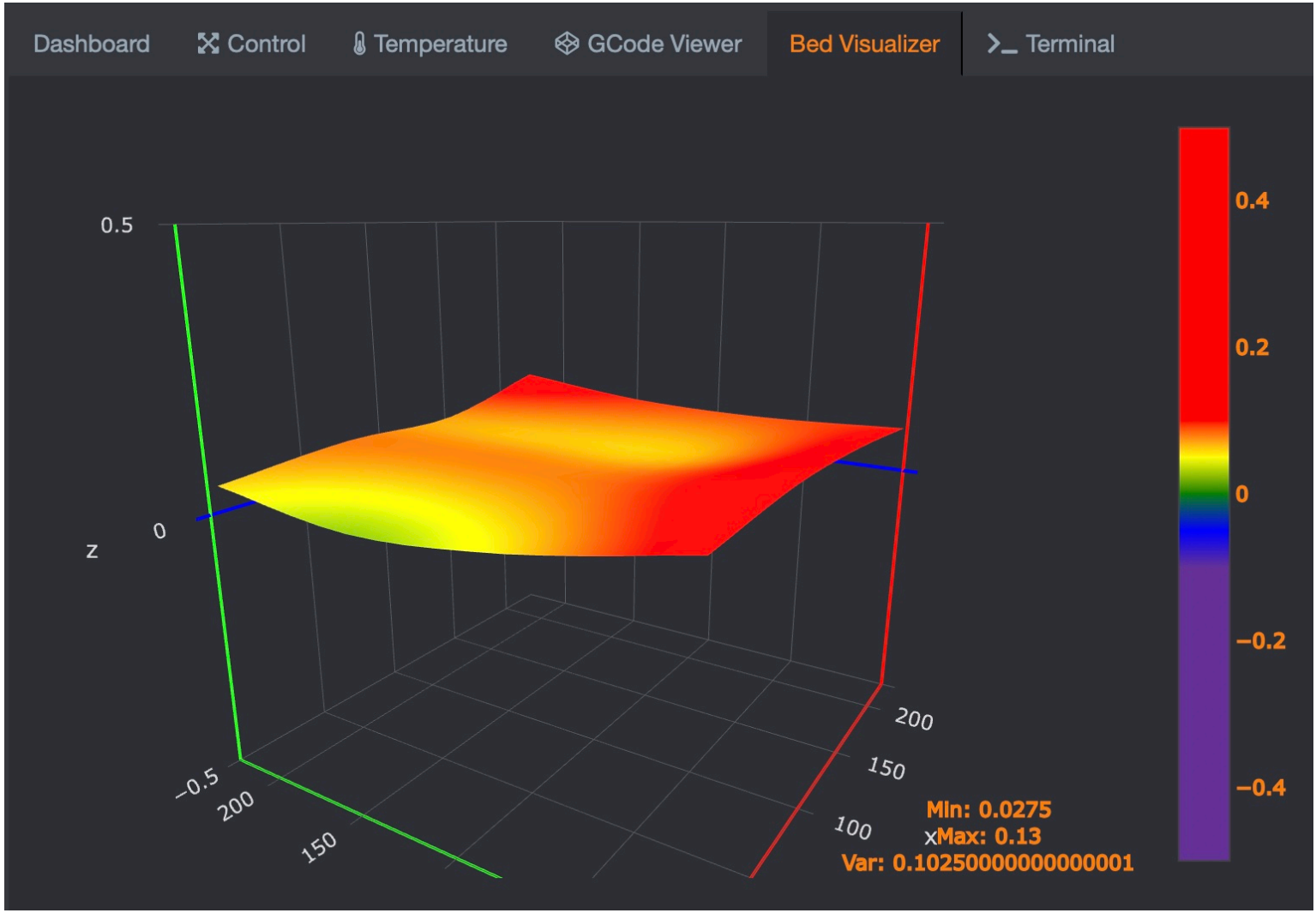
Setup

- Leveling
  - The most important step to good prints
  - More on this later
- Load "dry" filament
- Cleaning with isopropyl



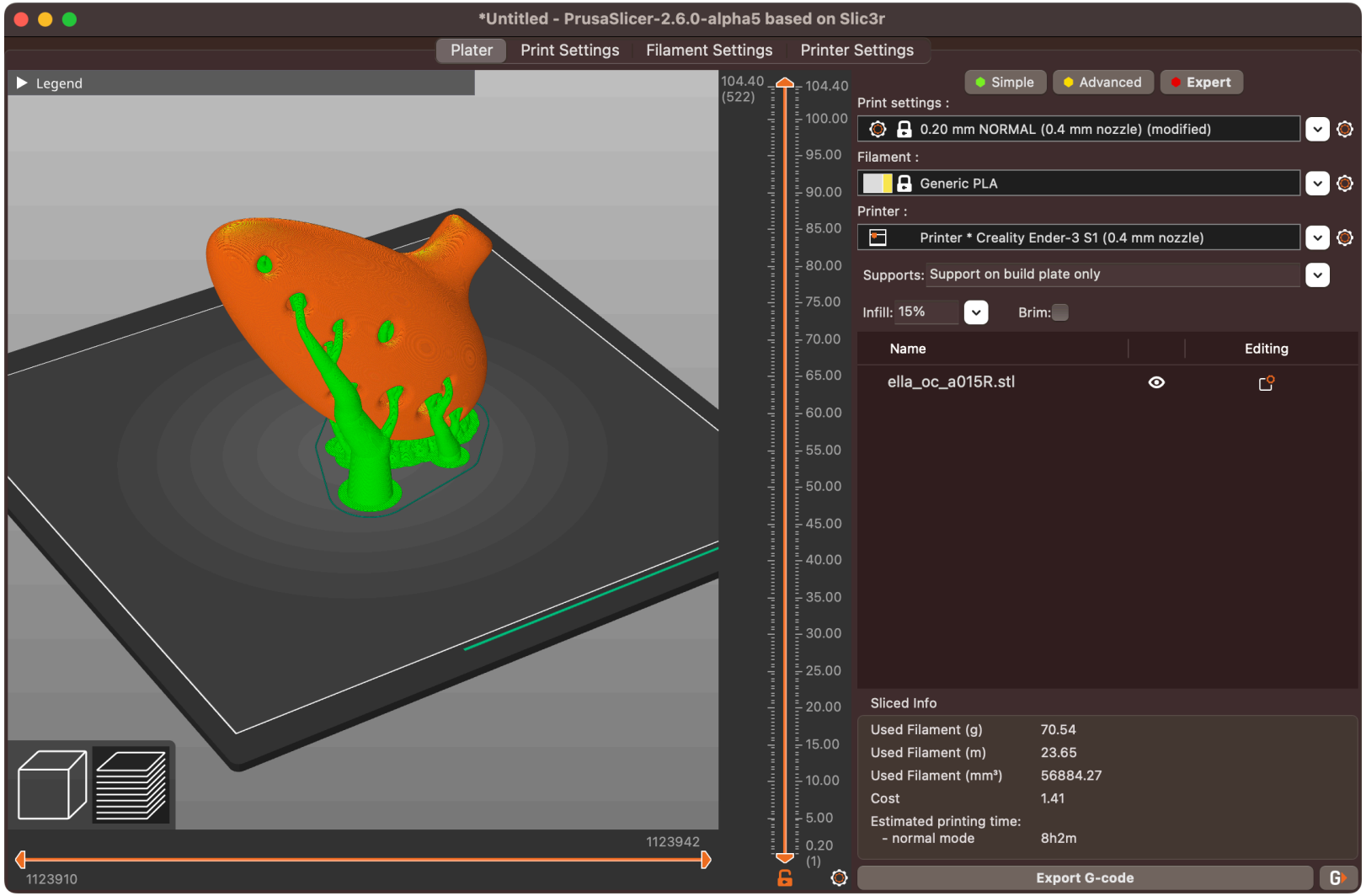
Octoprint leveling visualization

- Note: this height is [-0.5mm, 0.5mm]
- Total variance of ~0.1mm
- While it might look wavy, this bed is "level"



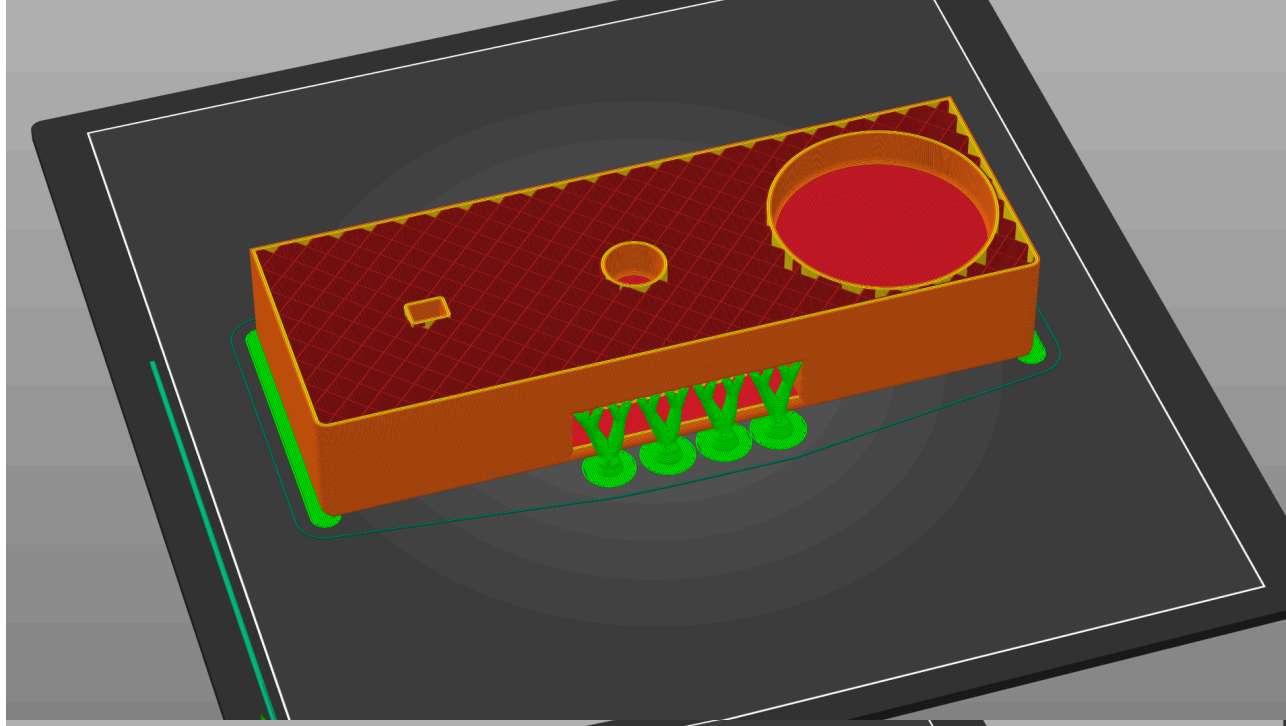
Slicing

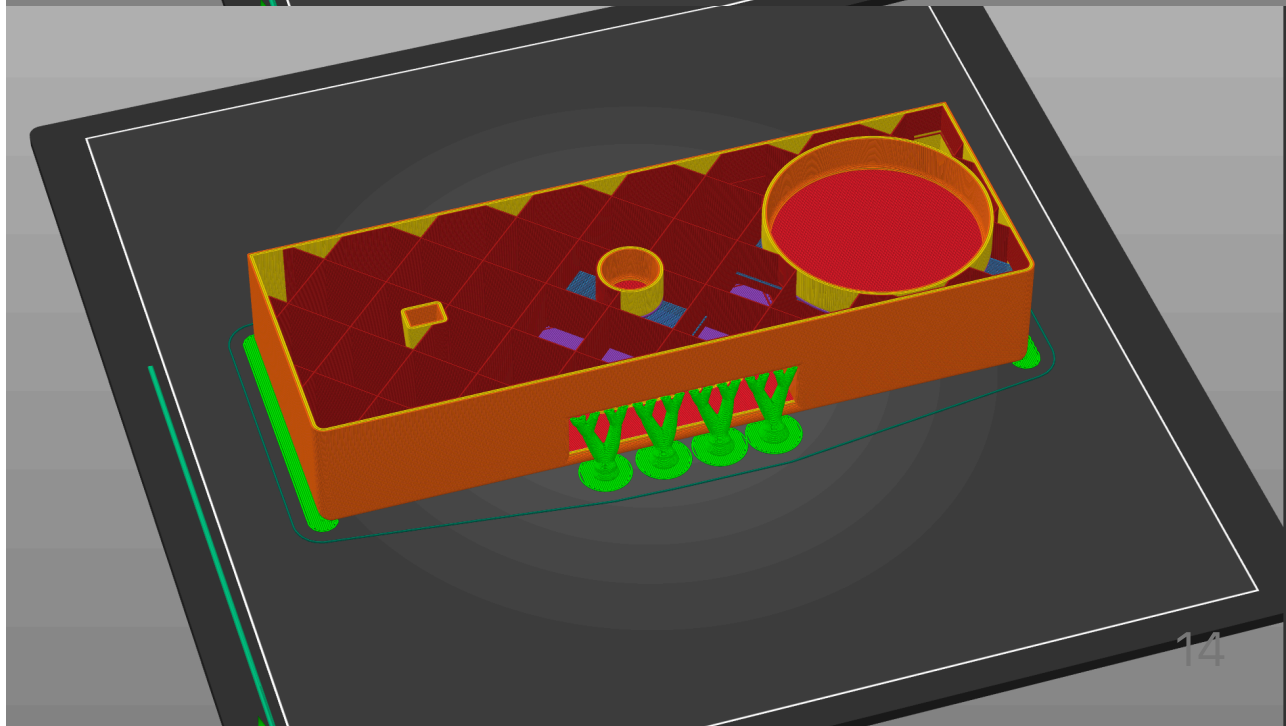
- Software
  - Prusa Slicer
  - Utilimaker Cura
  - Slic3r
  - Many more

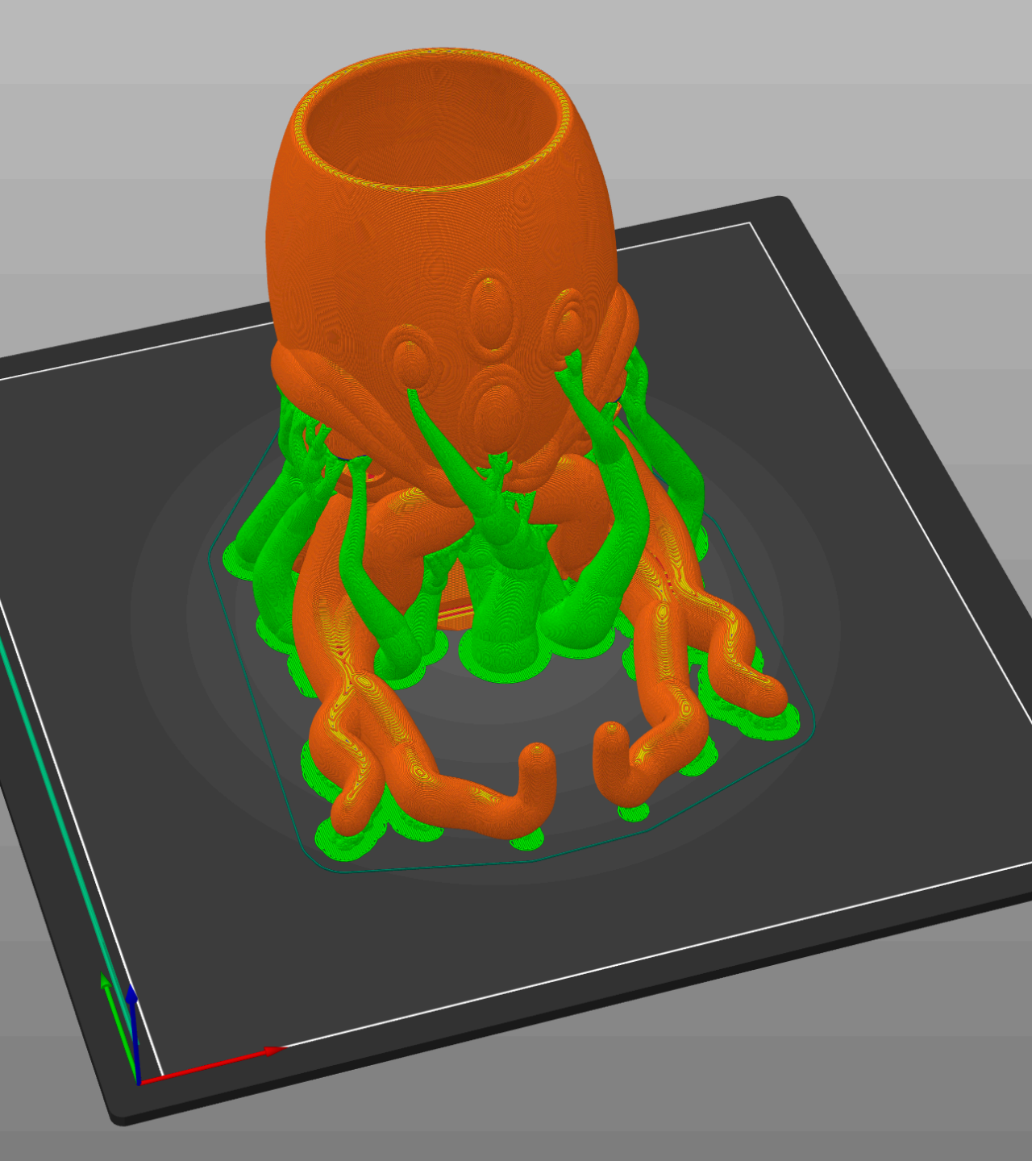


Infill options

- 15-20% is very normal, sometimes 100% needed for small objects
- Many geometries for different strength characteristics





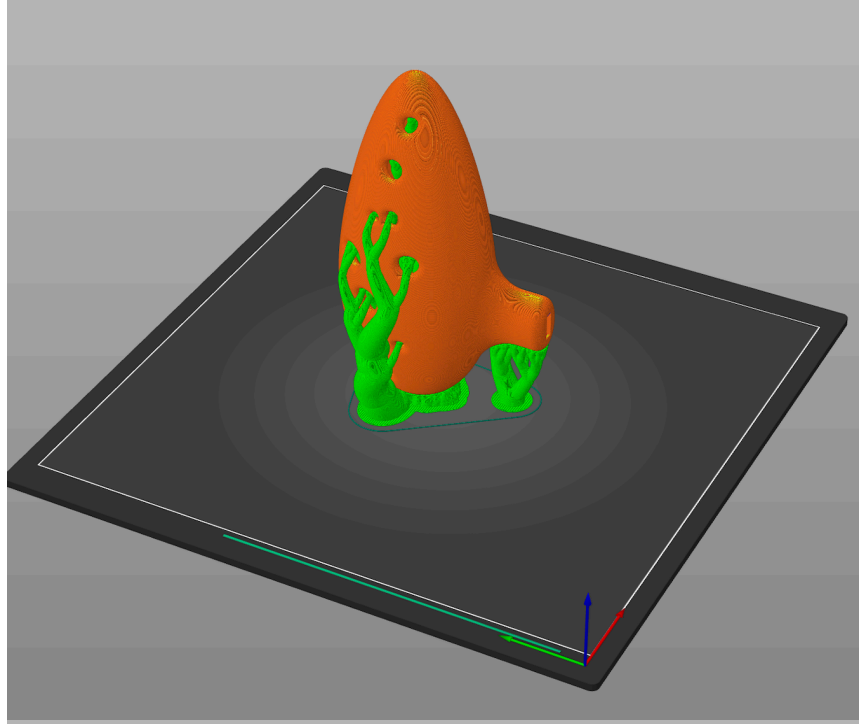


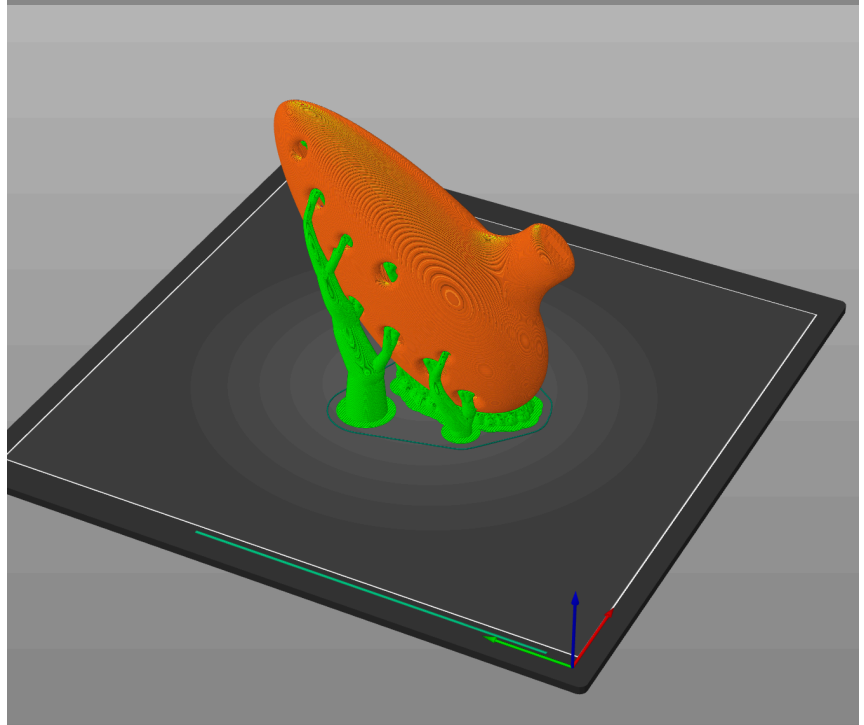
Support options

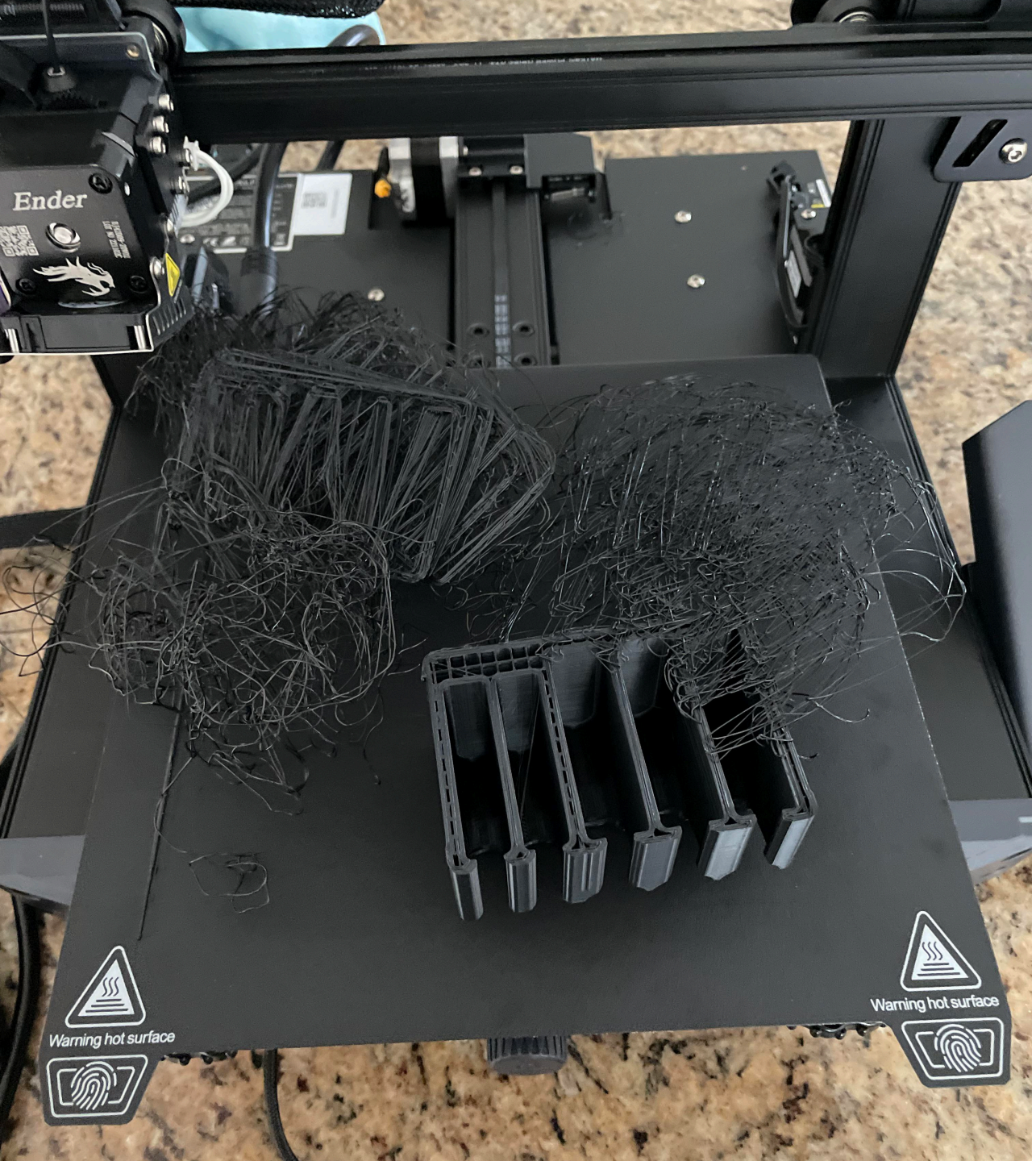
- Anything overhanging likely needs support
- Many support types result in more support or ease of removal
- Can leave unsightly marks

Rotation & positioning

- Fewer supports are better, so orient your print carefully
- Haing a good "base" keeps your print from falling over
- Printers usually print "best" in the center







When things go wrong

And they will.

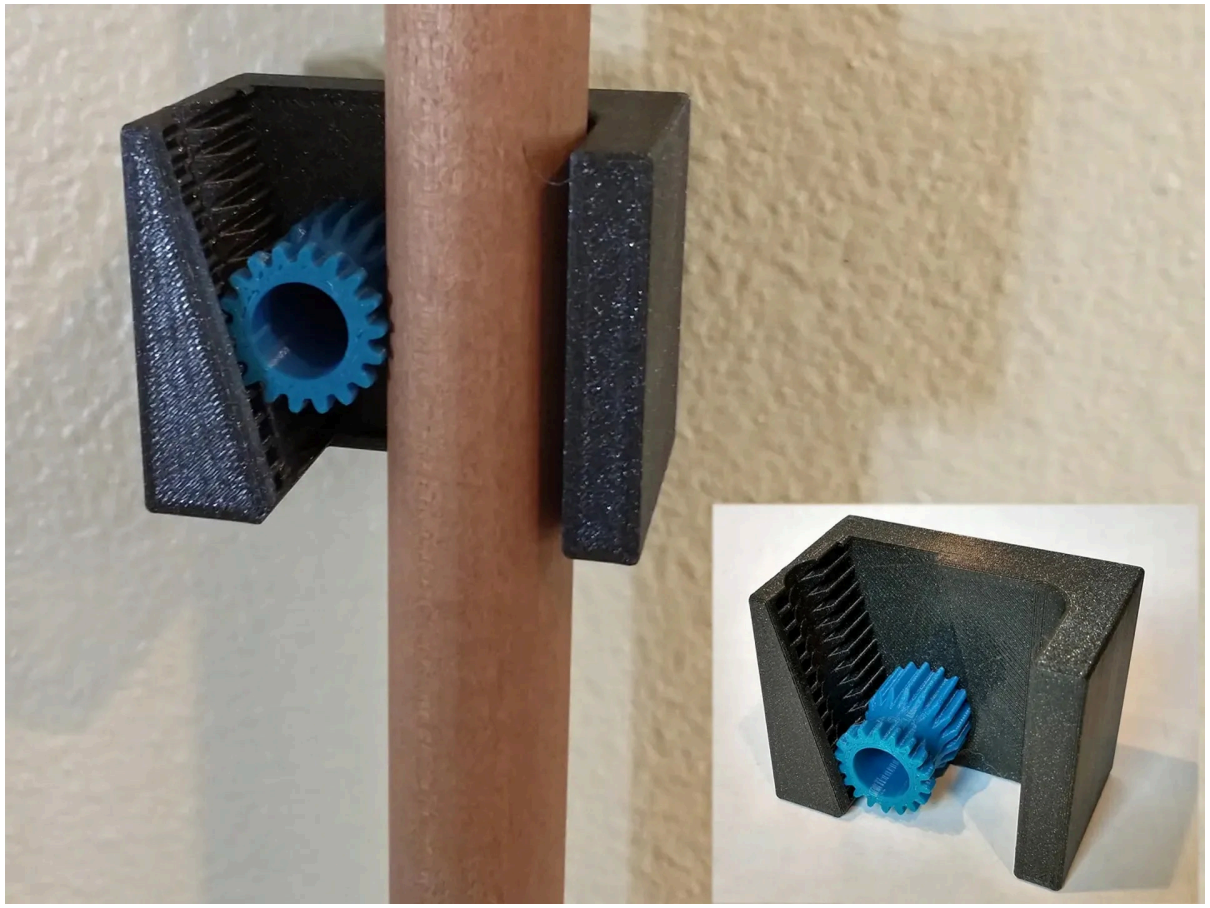
When things go wrong

So very wrong it could cost (some) money!

Free Models

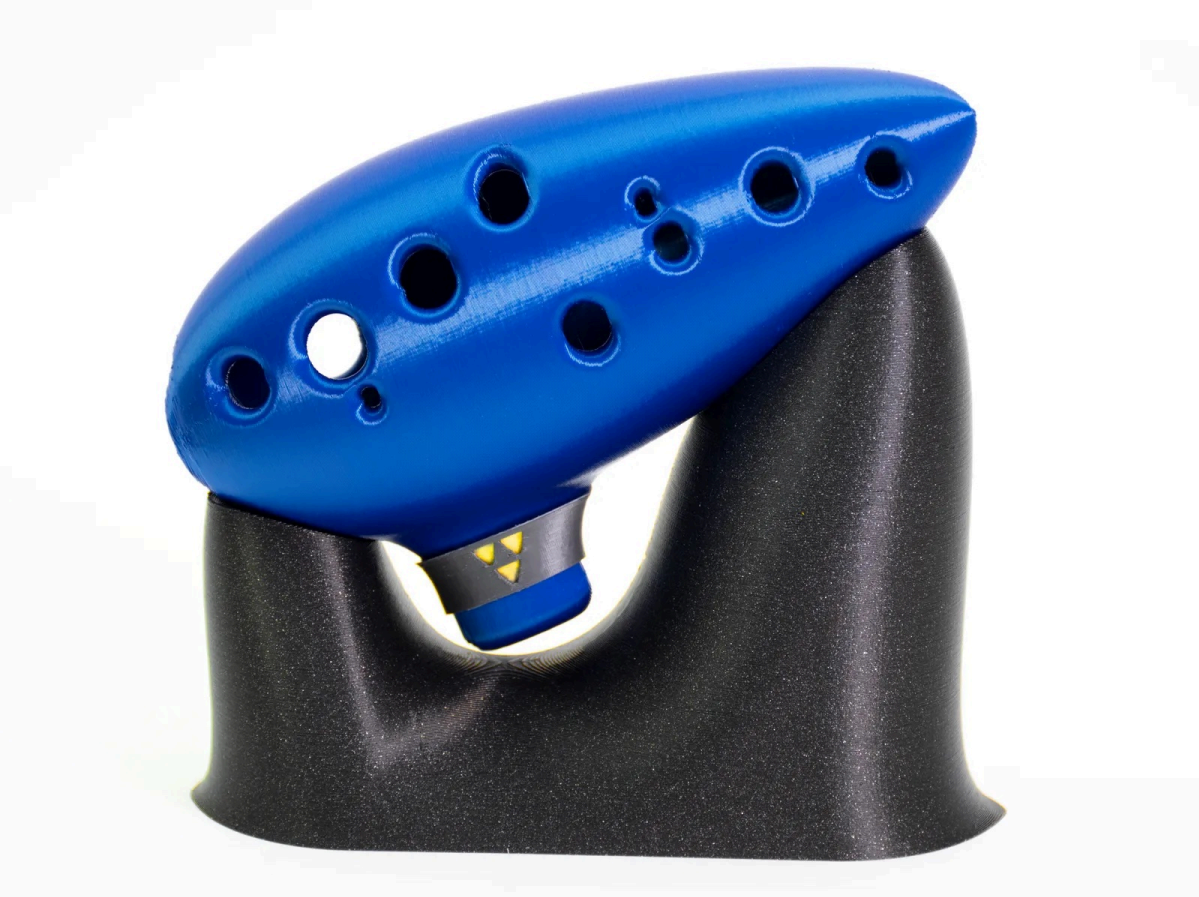
Usually, I like Printables, but Thingiverse is also popular. Never pay for models without checking these sites. Some folks do sell models, but some also just illegally resell open source models.

Examples with QR codes incoming!

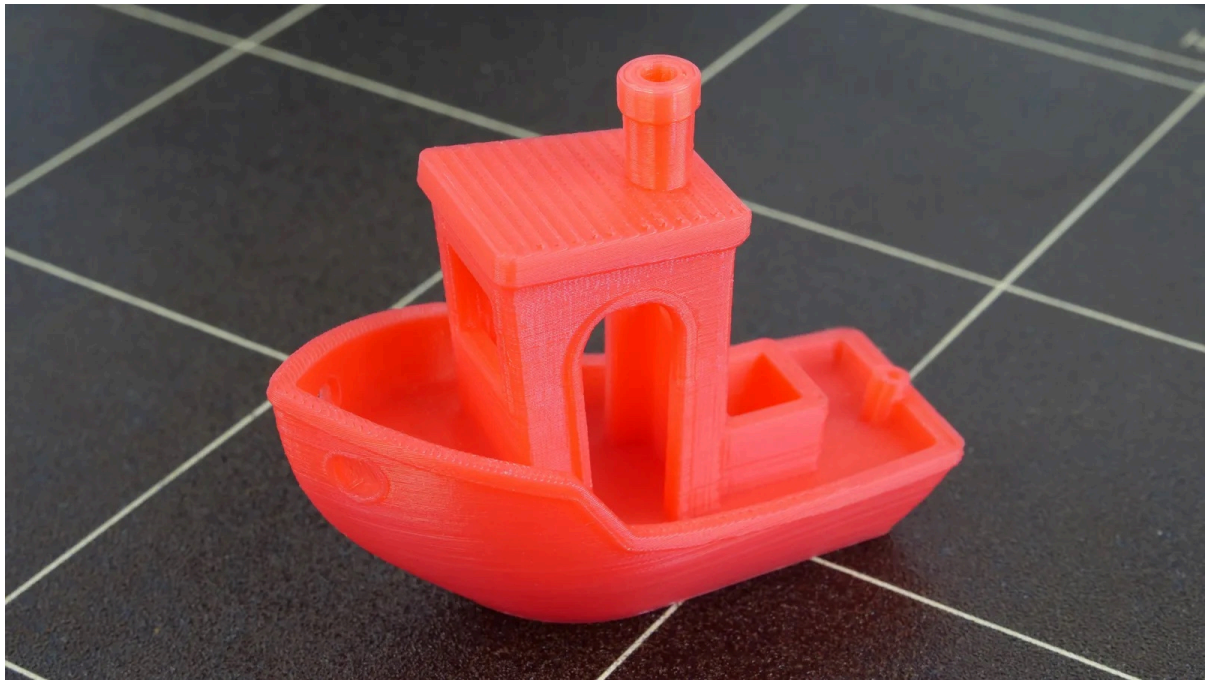


Gravity Broom Holder

Cthulhu Tower

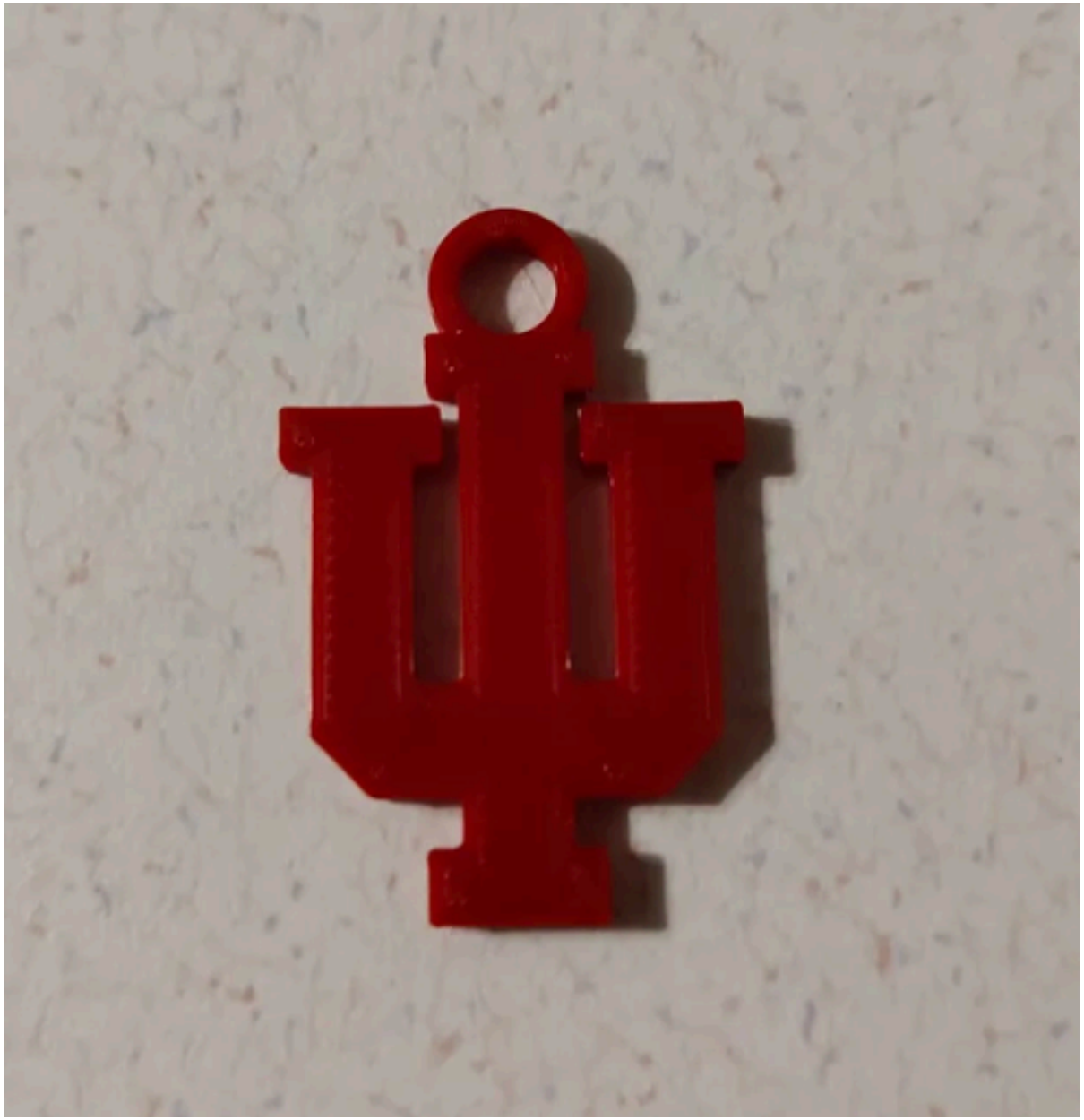


Playable Ocarina

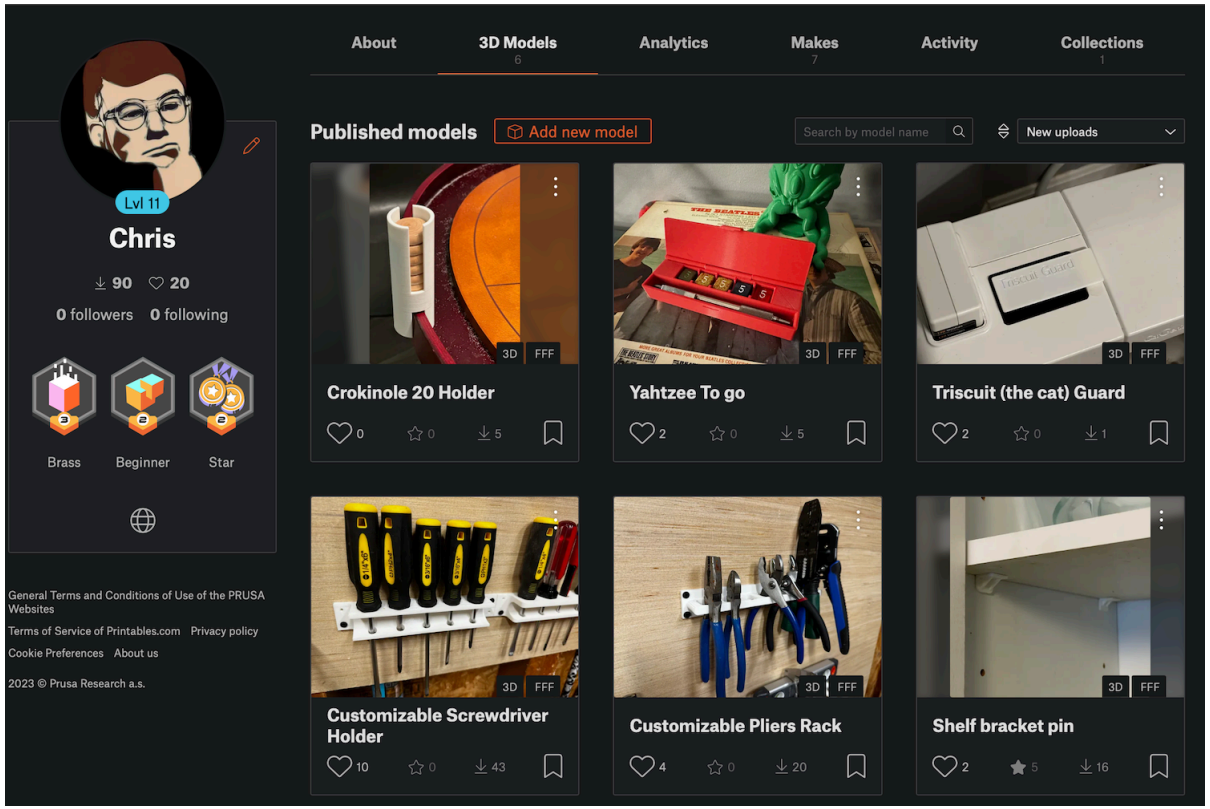


Benchy

Nature's Helicopter



IU Keychains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0 following
Brass
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Star
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Add new model
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New uploads
Crokinole 20 Holder
Yahtzee To go
Triscuit (the cat) Guard
Customizable Screwdriver Holder
Customizable Pliers Rack
Shelf bracket pin
3D
FFF
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My models

ELQ

You can find the ELQ in Canvas.