## **3D PRINTING WORKSHOP**

SLQ Wiki Fabrication Lab 2025/11/23 17:19

## **3D PRINTING WORKSHOP**

In this space you will find the instructions to install Cura, the software used in the 3D printing workshop currently touring the Isaac Region.

For more information on 3D printing on the SLQ Wiki click here.

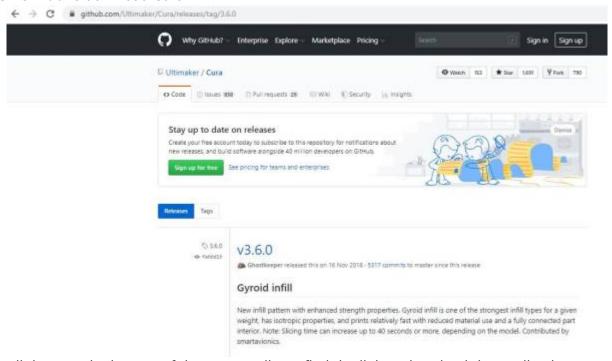
#### **Downloading & Installing CURA 3.6.0**

You can print the

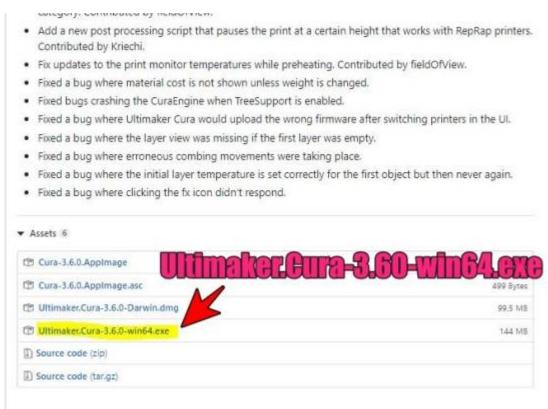
Cura Installation Instructions

as PDF here.

1. Visit Github to download Cura.

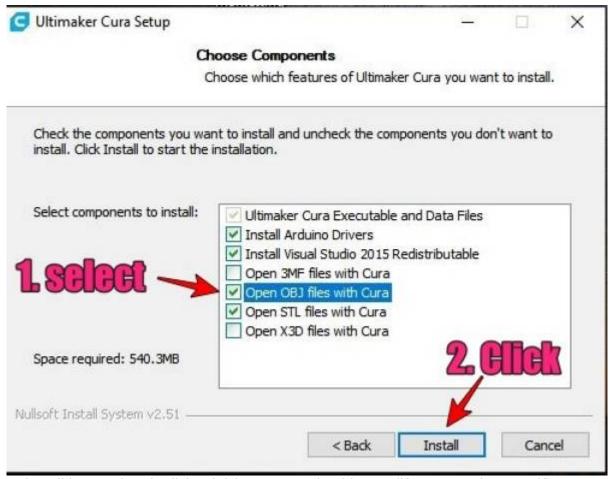


- 2. Scroll down to the bottom of the page until you find the link to download the application (highlighted file in below picture).
- 3. Download the highlighted file & install onto your computer.

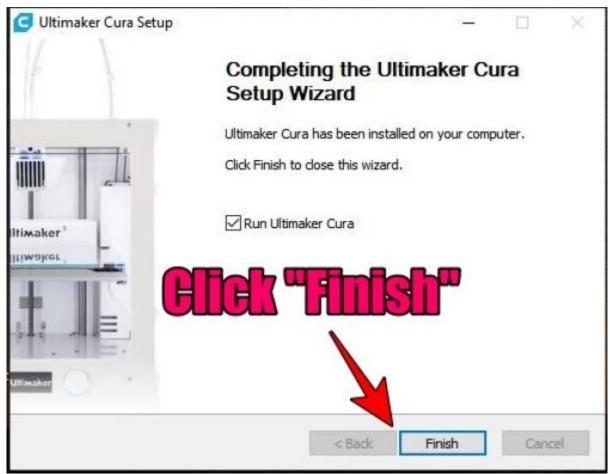


#### Install will be as per a standard program installation for Windows, until the steps below:

1. During the install, a message box will pop up & ask you to "choose Components". Select the options shown in the picture below & click "Install".



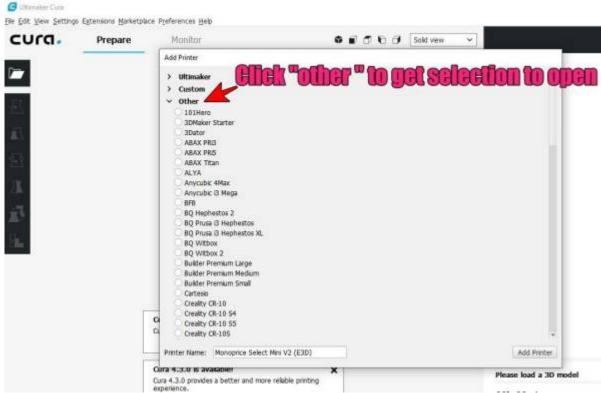
2. Once install is completed, Click "Finish" & CURA should open (if not, open it yourself).



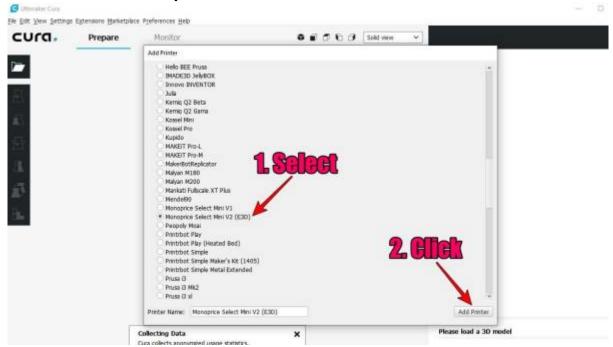
3. When CURA opens, a window will ask you to read & agree to the terms of use. Read the terms in the pop-up window & click only if you agree.



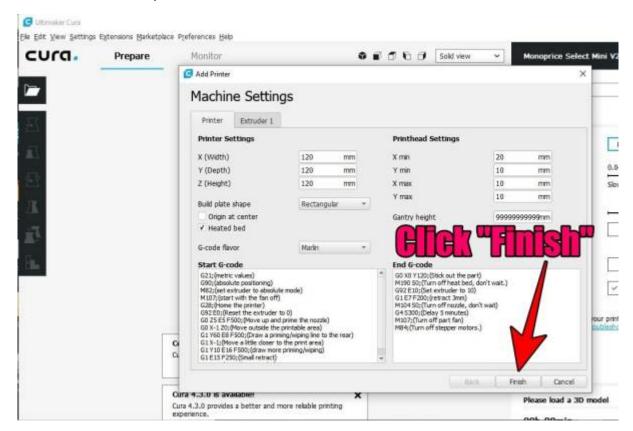
4. If you agree to the terms, another window will open & ask you to select your printer. We'll be selecting a printer from "other". Click "other" & a drop down selection list will appear.



5. Scroll down & select "Monoprice Mini V2 (E3D)". Once selected, click "Add Printer".

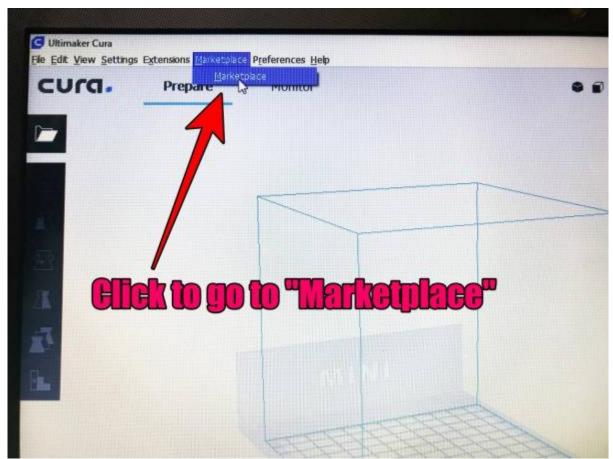


6. A new window will open, called "Machine Settings". **Do not alter any text, simply click** "Finish".



In the next step, we'll be downloading & installing a "plugin" from the CURA marketplace (free).

- 1. Open CURA, if it isn't already.
- 2. Click on "Marketplace", as shown in the pic below:

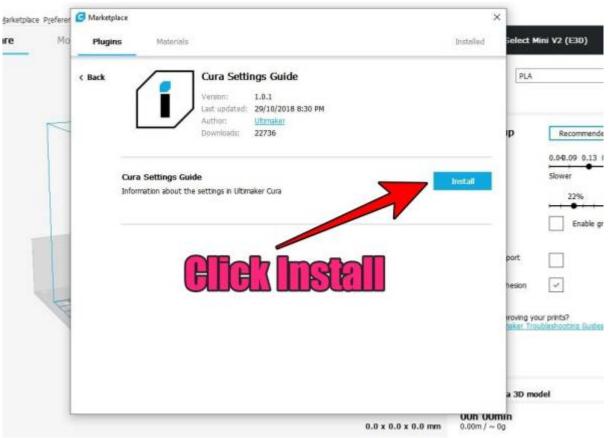


3. Double click on "Cura Settings Guide" to open it.

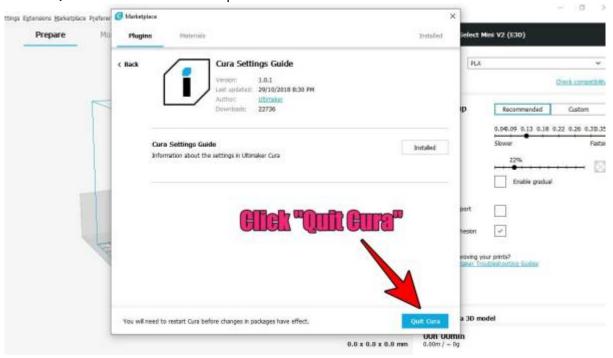


4. Click "install" to start the installation.



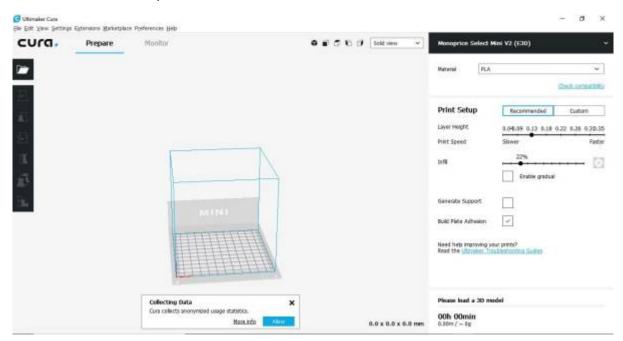


5. Click the "Quit CURA" button to complete the install.



#### Cura will close & when re-started, the plugin will be installed.

6. Re-start CURA to make sure all is working. You should get a window like that in the picture below.



If CURA looks as it does in the above picture, all has gone well. You are now ready to attend the "Basic 3D Printing" Course.

### **Workshops in Isaac**

- 22/08/2020 | 9.30am 2.30pm | Carmila
- 23/08/2020 | 9.30am 2.30pm | Dysart
- 05/09/2020 | 9.30am 2.30pm | Clermont
- 06/09/2020 | 9.30am 2.30pm | Middlemount
- 19/09/2020 | 9.30am 2.30pm | Glenden
- 20/09/2020 | 9.30am 2.30pm | Nebo
- 17/10/2020 | 9.30am 2.30pm | Moranbah

#### **Workshop Facilitator**

Royce from 3D Print CQ will facilitate the workshops.



I'm Royce, a trade qualified autoelectrician with over 30 years experience & a passion for electronics & design. This experience coupled with a passion for excellence is clearly evident when I design and print my products.

I first became interested in 3D printing when I found a website called "Thingiverse". I found a really unique design to print, but had no way to do so....

#### So I bought a 3D printer.

My love of 3D printing grew from then on. I've always liked to make things on my lathe or mill, but it's slow work. With a 3D printer, I can create complex designs & print them in far less time.

I found that there was always a product I needed, but couldn't find anything on the market, so began designing my own products.

#### **Workshop Material**

Workshop Notes provided by 3D Print CQ

## **BED LEVELING**

#### BY BILLIE RUBEN

order to avoid the dreaded plastic spaghetti. But never fear! I've put together this handy guide to help you! 💙

#### **INCORRECT BED LEVELING CAN CAUSE:**

POOR ADHESION

**FAILED PRINTS** Resulting in

**UGLY FIRST LAYERS** That have gaps or

WARPING

Ruining the accuracy

(as nothing is being leveled to the ground), but 'leveling' is the common verbiage.

As beds are usually leveled at 3 or 4 points, you may see any combination of the below in your first layer.

MUCH TOO CLOSE

Filament extrudes thin or not at all in some places, often bulging out in others. Extruder motor might slip/click.







Filament bulges out of the sides of the nozzle which squishes into other lines, sometimes causing a pattern.







Filament is flattened. adheres well to nearby lines, no gaps or peaks between lines.





## A LITTLE TOO FAR

Filament appears rounded, connection between lines is loose, gaps may appear.





## MUCH TOO FAR

Filament is totally rounded, little to no connection between lines, doesn't stick to bed.





#### HOW TO FIX IT: LIVE LEVELING

corner of bed, adjust leveling knobs until nozzle back just a bit little until a gap barely appears. Repeat for each knob on your bed



1 ROUGH LEVEL, VISUALLY 2 SLICE A LEVELING HELPER

rectangular prism so the base is almost as large as your print pattern to concentric. First layer should look like a



#### 3 LIVE LEVEL

down the first layer adjust the leveling knobs extruding look like the perfect example above,



#### 4 MAINTAIN IT

maintain the level, print all future models with a skirt the brim down, adjusting leveling as required as it



#### **FURTHER HELP:**

If the above instructions aren't working for you, it could be one of these issues;

- If the above instructions aren't working for you, it could be one of these issues;

  If the middle of your bed is too high or low; your bed is warped, seek a replacement or add borosilicate atop it.

  Your speed may be too high. Seek a slicer settings profile from a trusted source (or use the slicer defaults).

  Your bed surface may need to be cleaned, or you may need to add some glue to the surface (esp. if cold).

  Your temperature may be wrong (bed usually should be around 60°C and nozzle 200 °C for PLA).

  Your z (up/down) axis end stop may be too high or low, try to move it, or print an adapter.

  The axis your nozzle travels on may not be level, seek instructions specific to your machine.

  To solve these issues you might need some further help from other printer folk. I help run the largest 3D printing communities on **Discord (discord.gg/B4tp8MH)** and **reddit (reddit.com/r/3Dprinting).** We'd be happy to help you there!

I release full-resolution copies of these guides for free so you can print your own, but if you'd like to support me making more, consider purchasing a print from my store on **RedBubble (redbubble.com/people/BillieRuben/shop)**If you'd like more of these guides, I'll be posting them to my **Twitter @BillieRubenMake.** Happy Printing! **Billie** 

## MODEL-MAKING PROGRAMS FOR 3D PRINTING BY BILLIE RUBEN

but the real power of 3D printing comes in making your own designs, tailored exactly to your needs and desires. This guide will help you choose the best software for you to use in making 3D models for your printed projects! •

#### WHAT DO YOU WANT TO MAKE?

## **ACCURATE OBJECTS** tools, products.





PARAMETRIC

**DESIGN** 

Which uses measurements,

calculations, drawings, etc,

to build an object that is

easy to iterate upon.

Start with...

Various tools suited

to iterative design

✓ Free and Open Source

✓ Huge community

✓ Free for hobbyists

FreeCAD

✓ Python scripting

Or try...











You want..



SCULPTING

**ORGANIC SHAPES** 

animals, characters,

Which emulates a digital block of clay that you can push, pull, smooth, inflate, pinch, etc.



- Kid/school-Friendly
- Uncomplicated UI
- Great model repair Free and Open Source

Advance to... Blender

- Specialised tools
- ✓ Free and Open Source

### **INORGANIC SHAPES**

hard/ flat surfaces, controlled curves, nonvehicles, buildings,







HARD-SURFACE **MODELLING** 



Where you add and remove simple shapes (such as cubes, spheres, cylinders), to form complex objects.



- √ Kid/school-friendly
- Intuitive UI
- Editing existing STLs, Good model repair
- Advance to...

Blender

- Specialised tools
- Free and Open Source

## **COPY OF A REAL THING** would be hard to model.





**PHOTOGRAMMETRY** OR SCANNING



Where you take many photographs or scans and combine them through software to form a model.



Start with... AliceVision

- √ No extra equipment
- ✓ Works using photos
- Simple interface
- ✓ Free and Open Source



- Much greater detail
- ✓ High upfront costs

#### **TUTORIALS and MORE OPTIONS**

The above list just contains the more popular choices and the ones I find newbies learn quickest and easiest. There are, however, many options and it's important to find the program that suits you. To that end, a comprehensive, community-curated list of programs can be found on the /r/3DPrinting Subreddit wiki:

#### reddit.com/r/3Dprinting/wiki/MakingModels

It also includes links to tutorials for each of the programs spoken about here (and others!).

#### **FURTHER HELP:**

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Happy Printing! 

Billie



# CAD DESIGN TIPS FOR 3D PRINTING

## BY BILLIE RUBEN

Like all production processes, 3D printing has constraints which are to be considered during the design phase in order to make high-quality, functional, and beautiful objects. I love seeing people make their own designs to fulfil their specific needs and desires, so I've collected many of these considerations to help you hit the ground running!



Make walls a multiple of your extrusion line width for a smooth slice. If it was 0.4mm



Filament must be laid upon existing material, so avoid steep overhangs to reduce the need for support.



Vertical holes are fine, but horizontal ones should be tear-drop shaped to mitigate steep overhangs.



Pointed arches are better than round ones as they eliminate steen overhands



Vertical edge fillets increase quality by reducing inertia during harsh directional changes.



Roughly 0.3mm clearance should be added between fitted parts using offset face at end of modelling process.



Adding a fillet or chamfe between a wall and base strengthens the join by adding more interface.



Fillets don't work well from below, due to harsh overhangs. But they can loo great in other areas.



(even from below) as their overhang remains at a



Combining fillets and chamfers mitigates the issues of fillets alone and smooths



Using parameters and constraints allows you to easily edit and iterate upon your designs.



Printers can bridge gaps between bodies quite easily Distance varies, but most can easily handle 2cm+.



A thin, sacrificial bridging layer can reduce the need for support material. It is cut



Triangles can be staggered under a large roof, to enable larger distances to be bridged.



Sacrificial, perpendicular ribs can be added to support overhangs during printing.



Curves look good with an axis in the Z direction, but due to the layering process can look very poor in the X/Y



A slit, bolt and trapped nut can be added to holes to allow them to be tightened



Compliance can be added to parts to enable flex, which enables push-fitting parts.



Reduce the risk of a print warping up from the bed by rounding out or adding mouse ears to corners.



Concentric slits can be cut from the base of a model to about 10mm up to prevent warping.



Use software that makes manifold objects (without tiny gaps or reversed faces),



Complicated or fitted parts an overall print can be isolated and printed to test for fit.



Diagonal ribs can be added to support/enable a roof to bridge between them. Can be beneficial inside a model.



Text looks best when indented into a vertical surface. It reduces overhang and has better resolution



Due to the planar layering of most 3D printers, print orientation has a significant

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