Allevi 3
User Guide – 1.0.3

BUILD WITH LIFE

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This User Manual will help get you started using your Allevi bioprinter.

In the first section of this guide you will learn about the basic components of your Allevi, how to set it up, download the correct software, and load bioinks.

The second section of this guide will provide you with instructions on using the Allevi software to print a single material structure.

The third section will teach you how to print a multimaterial structure.

Finally, the fourth section will teach you how to bioprint for your desired application.

Following this guide will help ensure that you are getting the most out of your machine. We can’t wait to see what you will create!

SPECIFICATIONS

Mechanical
Dimensions: 33 x 33 x 45.7 cm
13 x 13 x 18 inch
Construction: Aluminum Frame
Build Structure: Tissue Culture Plates
XYZ Position Precision: 10 microns

Electrical
Power/Voltage Requirements: 6Amp AC Desktop Adaptor
Connectivity: WiFi

Software
Bundle: Allevi Bioprint (WiFi)
Supported File Types: STL, gcode
Operating System: Windows, MacOSX, Linux

Printing
Print Technology: Fused Deposition Manufacturing
Build Volume: 9 x 9 x 5cm (405 cm^3), 3.5 x 3.5 x 1.97 inch (24.1 in^3)
Layer Resolution: 100 microns
Print File Type: Gcode

Extruder
Max Temp: 160°C
Min Temp: 4°C
Pressure Range: 0-120PSI (0-820kPa)
LED Range: 365 nm or 405 nm

WARNING: The Allevi 3 includes moving parts that can cause injury. Never reach inside the printer while it is in operation.
WARNING: Do not leave the printer unattended while it is in operation.
WARNING: Always wear safety goggles when using the printer.
WARNING: Extruders heat to high temperatures both when heating and cooling. Always allow time for the extruder to cool before handling.

CAUTION: Always power off the printer before reaching inside.

Let’s Get Started!

WHAT'S IN THE BOX

Allevi 3 bioprinter

Power cord

Starter bioink kit

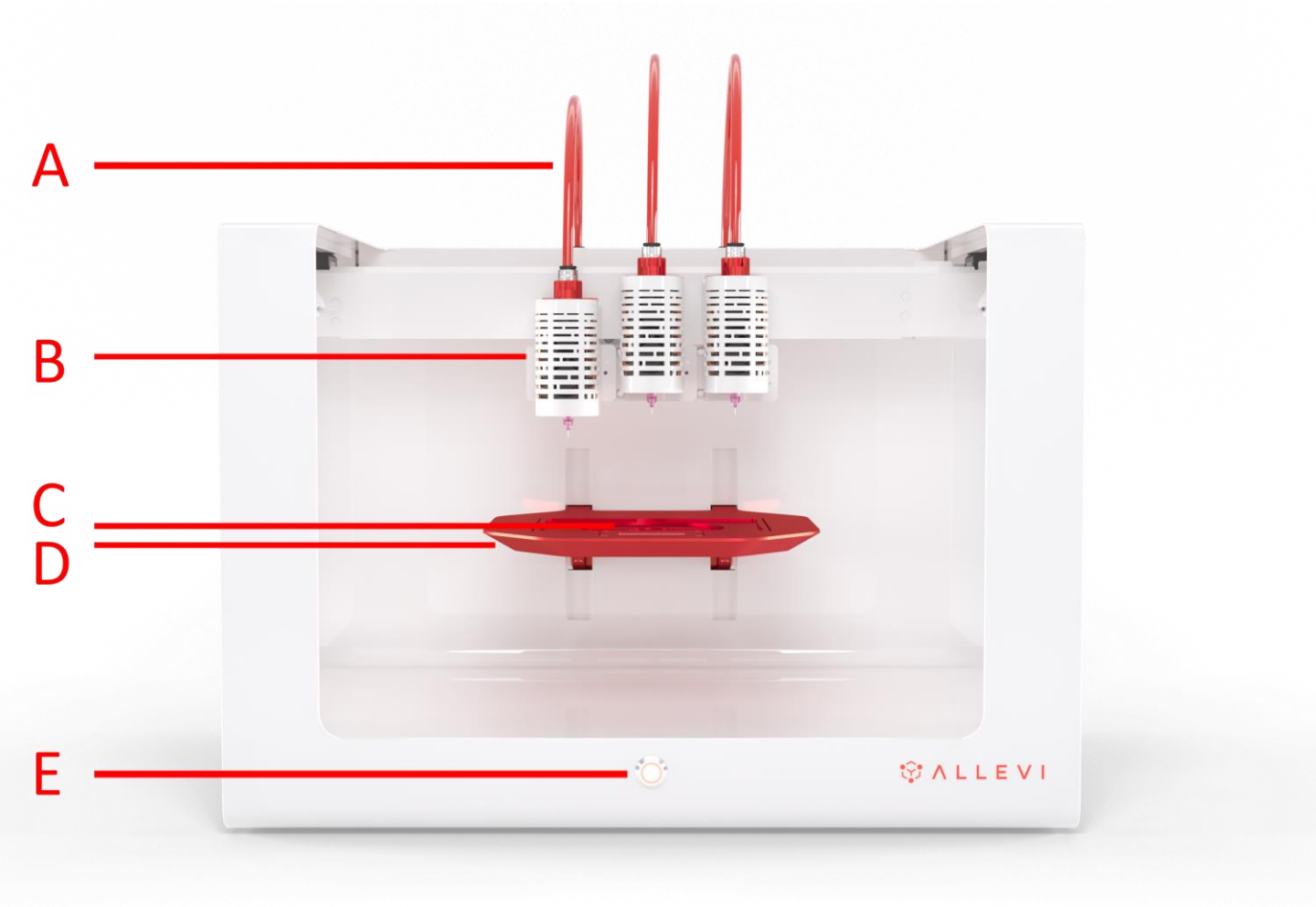
Safety glasses

Air compressor*

Compressor hose

*Air compressor arrives separately

ALLEVI 3 DIAGRAM



A. Air Compressor Line
B. Swappable Extruder (heating and cooling)
C. Autocalibration pad
D. Build Plate
E. Power On/Off

GETTING STARTED

Setting up your printer

1. Carefully remove your printer from the packaging by grasping the printer frame firmly with both hands.

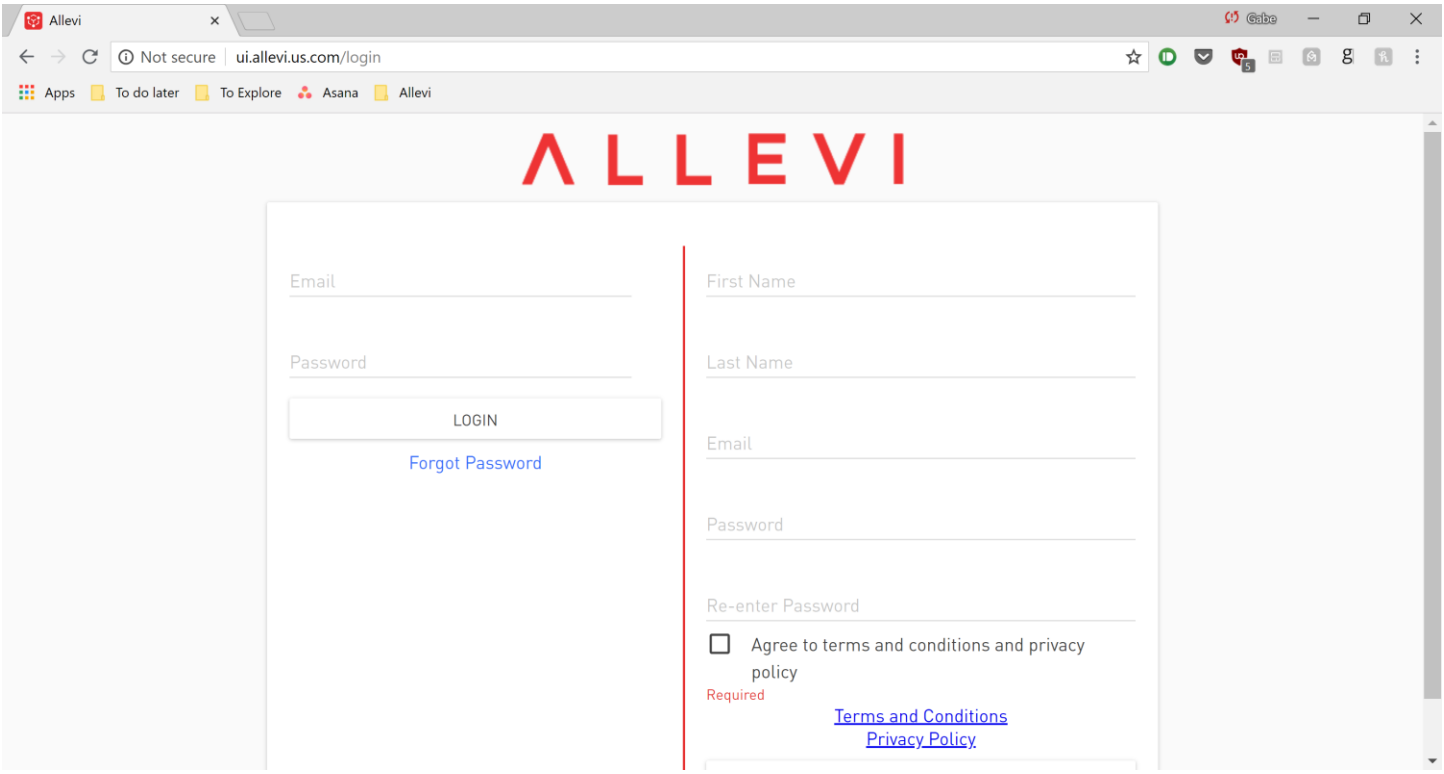
2. Use the power cable to connect the printer to a power supply via the port located on the right side of the printer (labelled Step 2).

3. Power on the printer by pressing the power button located front of the printer.

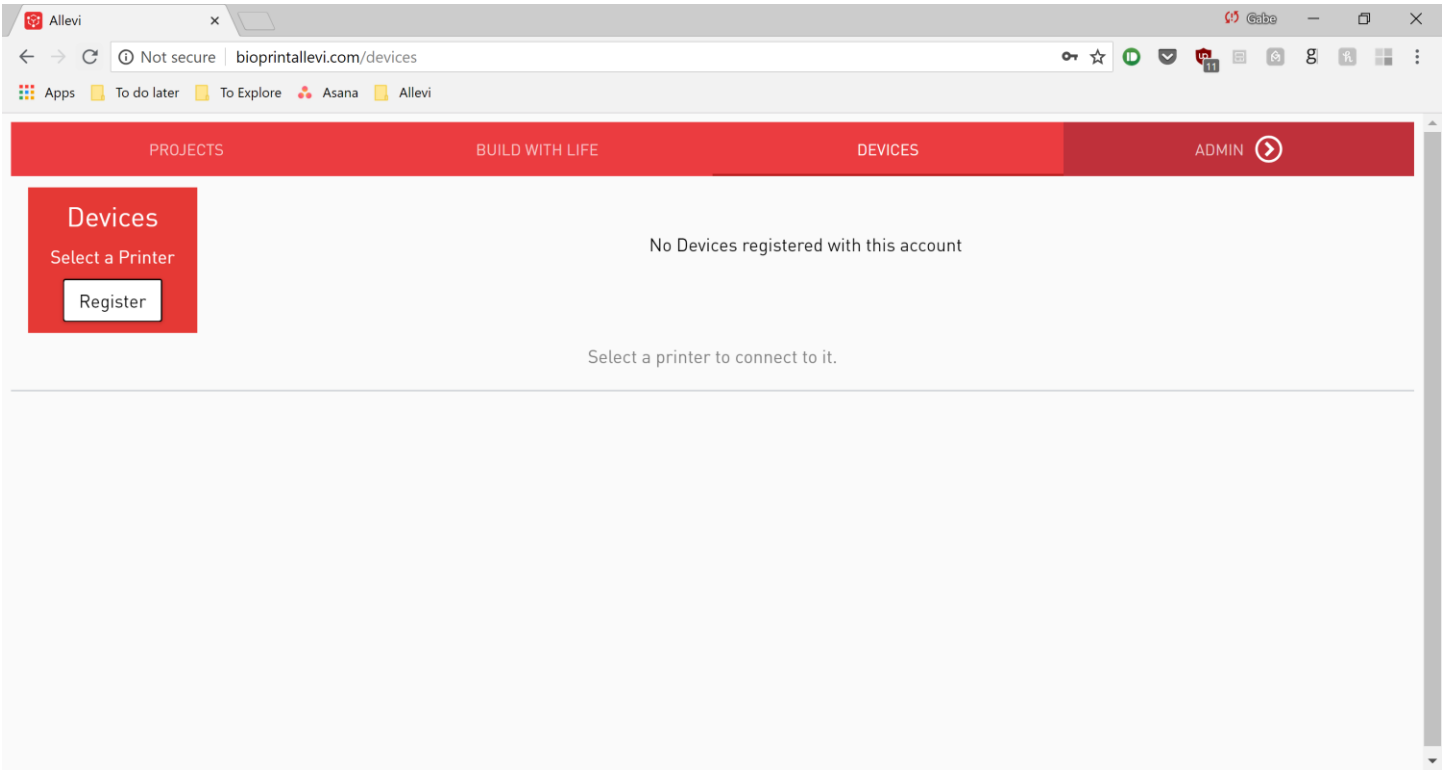
4. Attach the air compressor to the printer by connecting the compressor hose to nozzle on the left side of the printer (labelled Step 4). This can be a tricky maneuver, so for more in depth directions on connecting the air compressor, watch this quick video. **The air compressor must remain turned on for the entirety of the print.** We recommend keeping the air compressor set to a pressure significantly higher than your print pressure. This is so that as the air compressor loses some pressure and refills, your print is not affected. The air compressor's pressure can be adjusted by turning the black knob. It has a max pressure of 120PSI.

Setting up your software

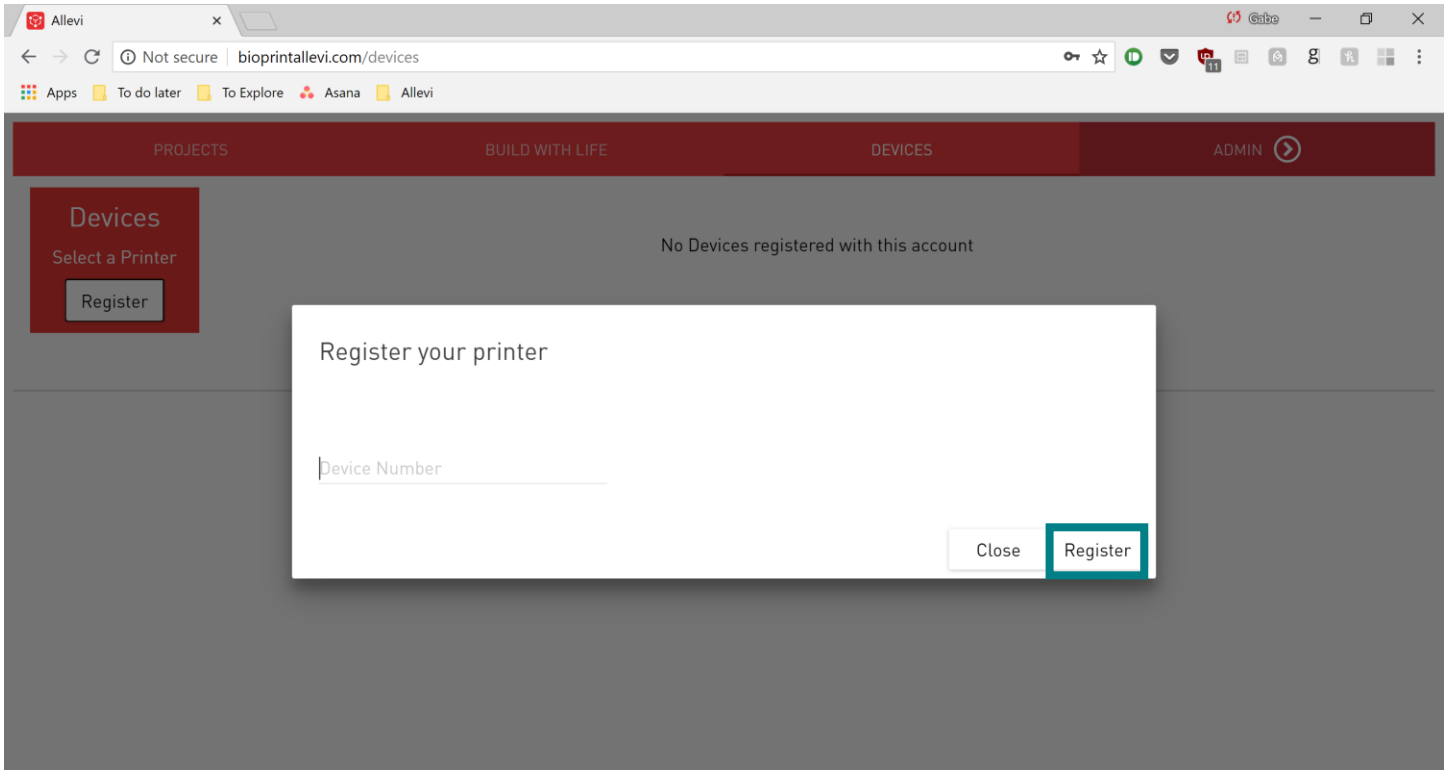
1. Go to bioprintallevi.com. Our software runs out of a browser and requires no downloads! We recommend Google Chrome or Firefox, but any of the following browsers are also acceptable: Safari, Opera, Edge, or Internet Explorer
2. To set up an account, fill out the form and click 'Register.'



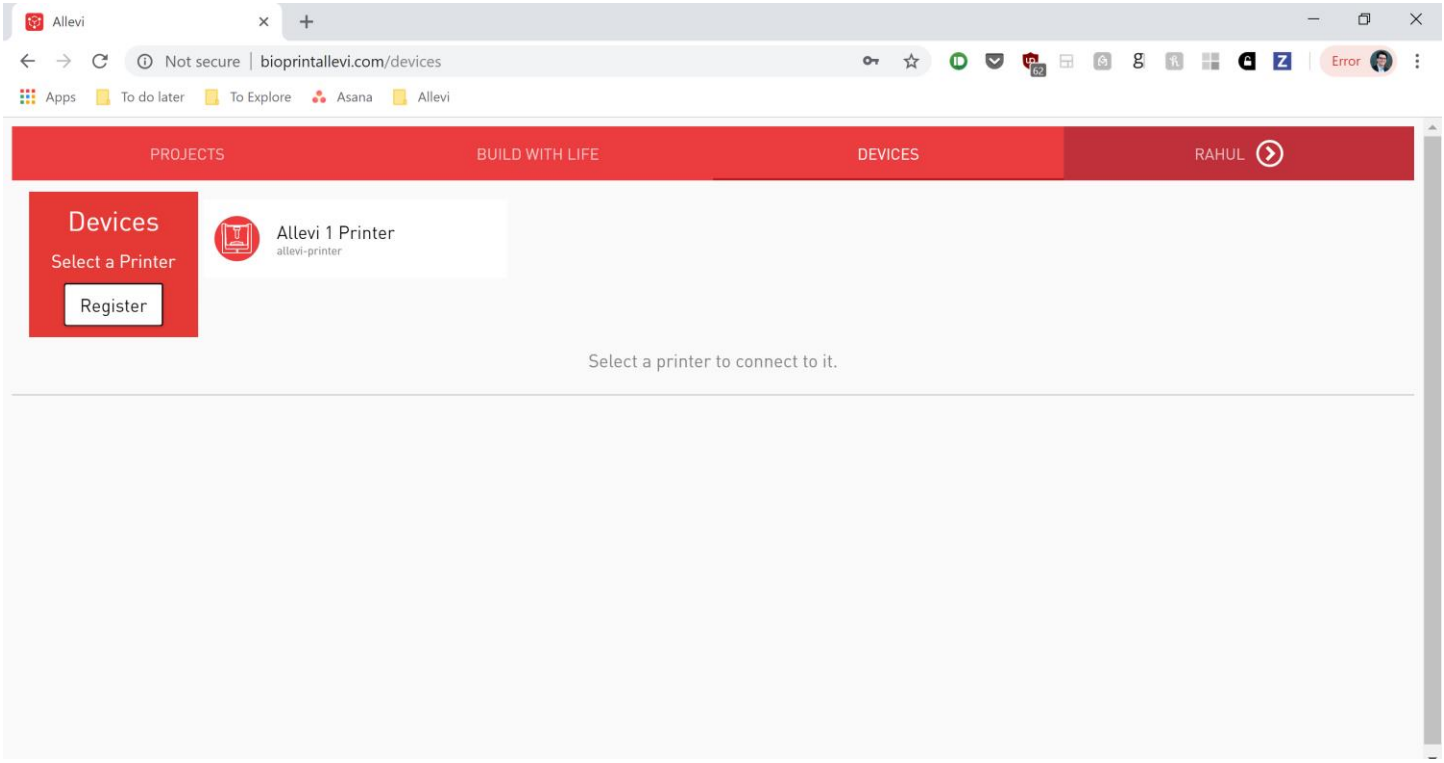
3. To register your printer, go to http://bioprintallevi.com/devices. Click 'Register.'



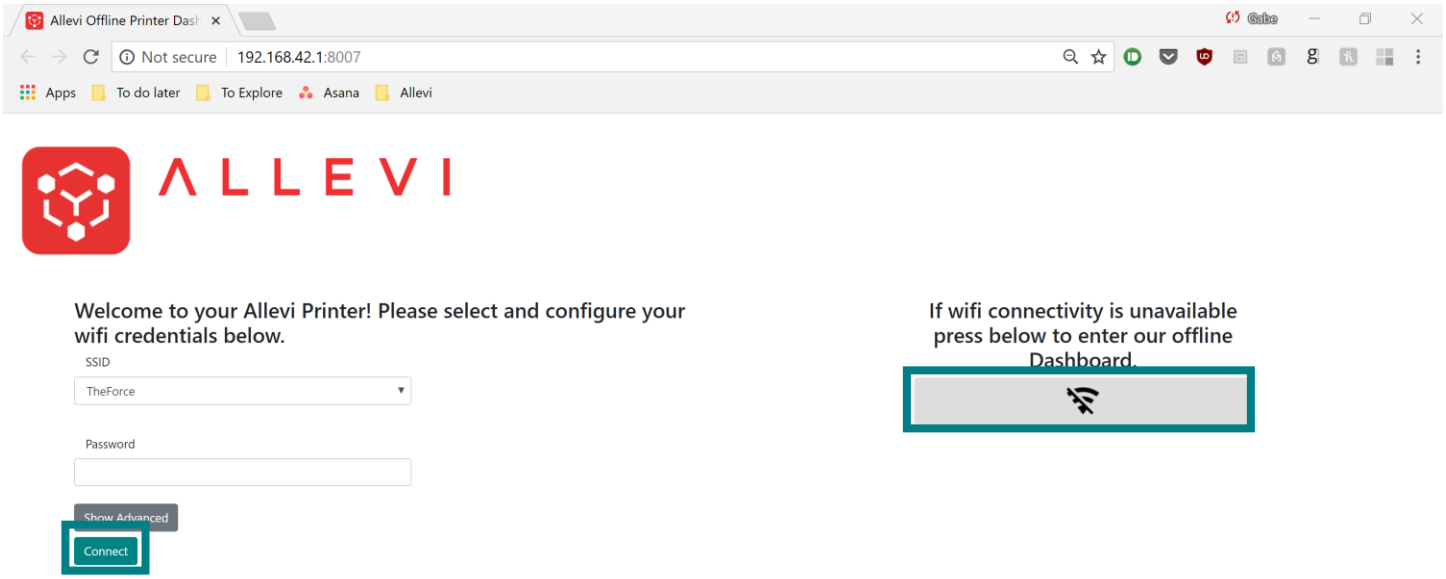
4. Next, type in your device number and click ‘Register’ again. Your device number can be found in your onboarding email sent to you by the Allevi Support Team.



5. Once your printer is registered, it will appear as an available printer.



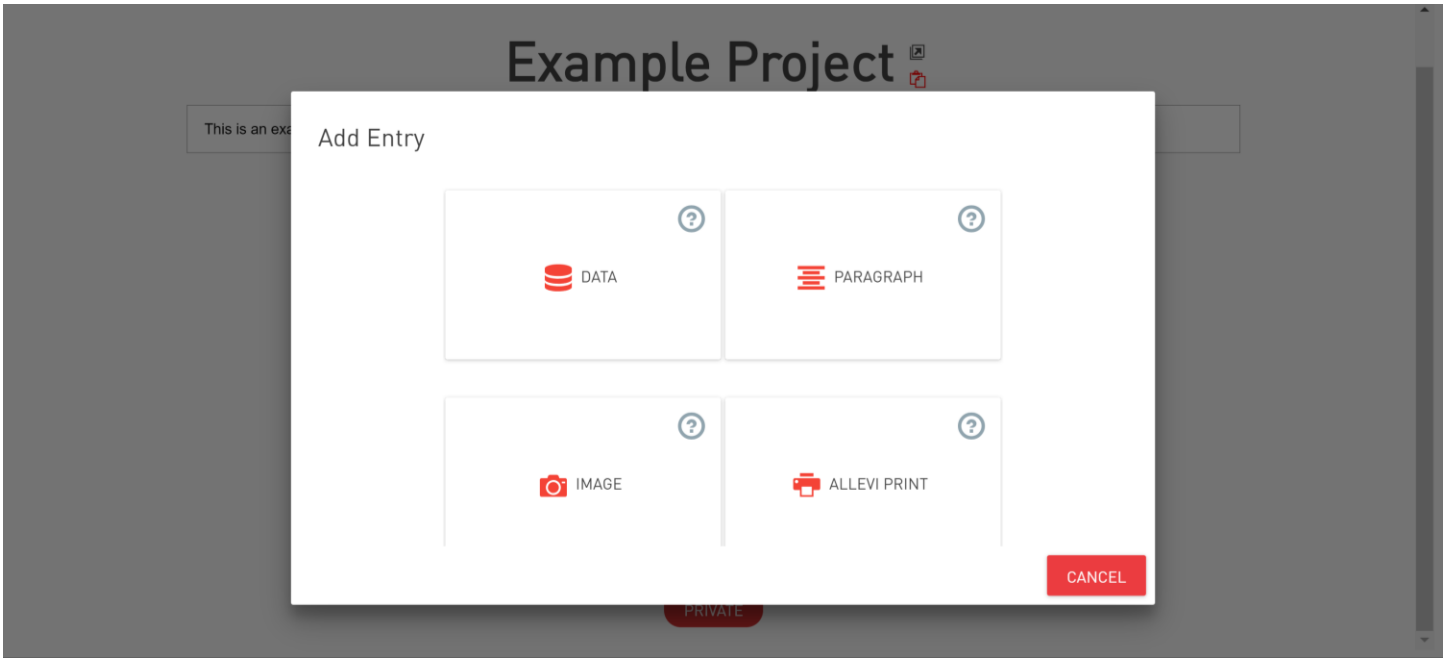
6. To connect your Allevi bioprinter to the Internet, open your WiFi settings, and look for a network called “WiFi Connect.” Connect to it, then go to the Offline Dashboard at http://192.168.42.1:8007. By connecting to this, your computer will briefly lose access to the Internet. Here you can either connect your printer to your WiFi network or connect to the Offline Interface.
    a. To connect to WiFi, choose your WiFi network from the dropdown menu under ‘SSID,’ type in the password, and hit connect. **The chosen WiFi network should be a private network.** Your computer’s WiFi will be restored and your printer will connect to the Internet.
    b. To connect to the Offline Interface, click on the button on the righthand side. Note, you will not have access to the Internet while connected to the Offline Dashboard.



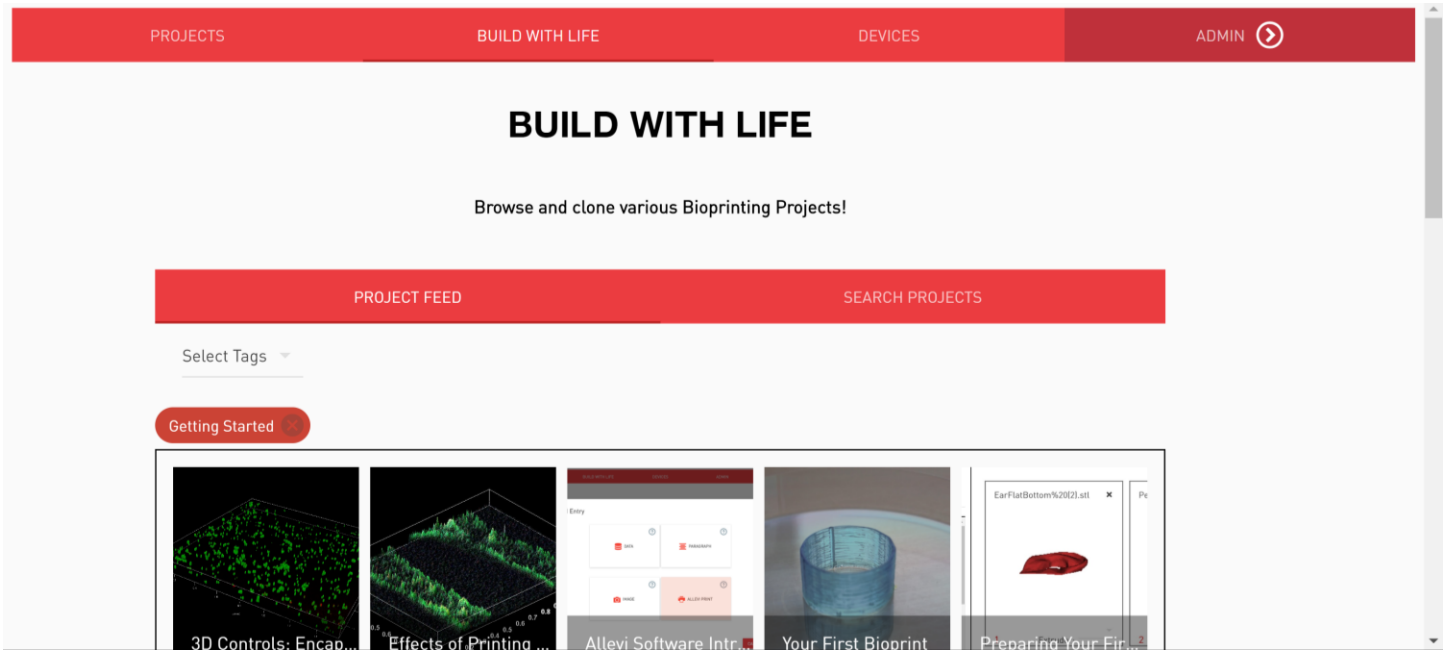
Let’s Start Printing!

INTRODUCTION TO THE ALLEVI SOFTWARE

The Allevi software is designed with the 3D printing scientist in mind. It houses the various projects you're working on and makes them easily accessible. In a project you can store data, notes, pictures, and prints.



The Allevi software also hosts other projects, from Allevi and other community members. You can copy a public project into your explorer, allowing you to replicate and modify others' studies.



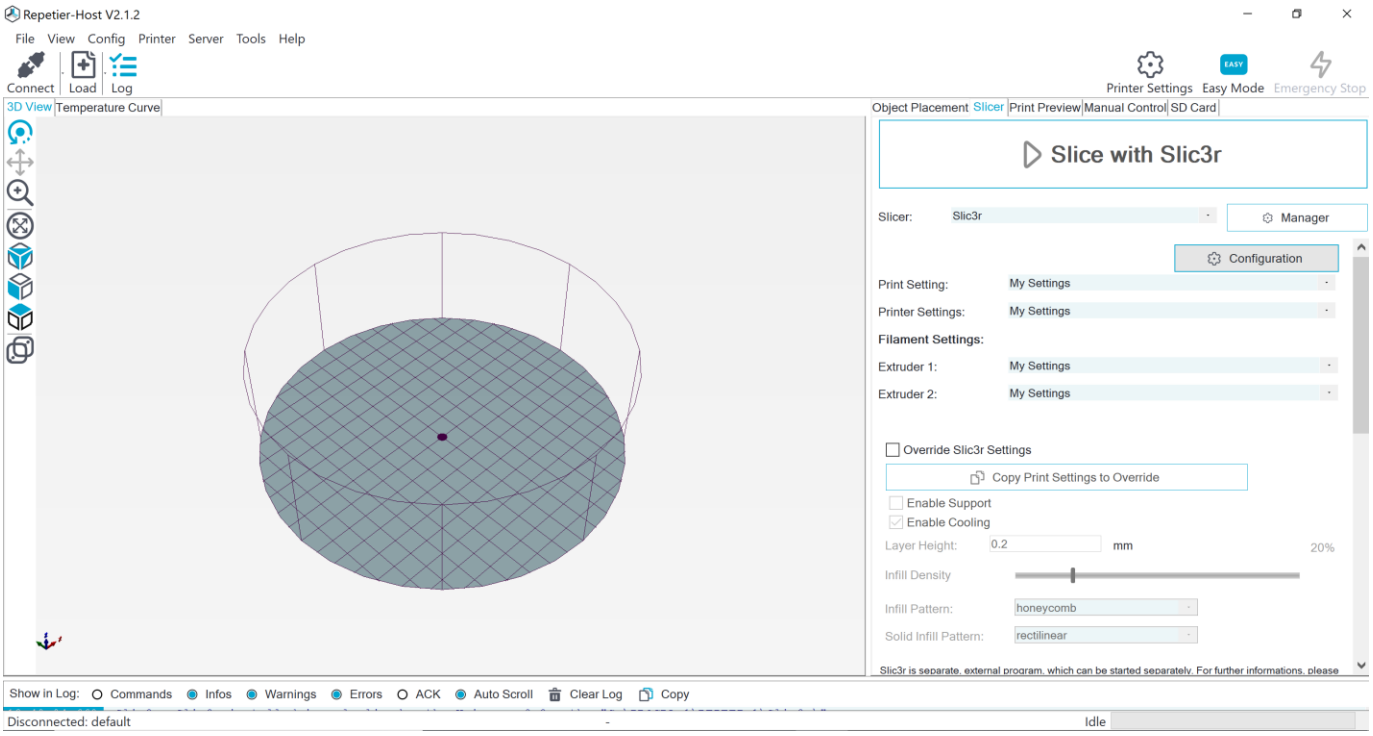
YOUR FIRST BIOPRINT

Preparing your STL

You can design STL files on any CAD software, such as SolidWorks or Autodesk Fusion 360. STL files can also be created using sophisticated programs or 3D scanners. Alternatively, you can find a host of STL files in the "Print files" category of Build With Life. There are also many 3D models available on the internet. To begin, we will use a predesigned STL file.

The Allevi software project workflow incorporates a built-in slicer. However, for now, we will use Repetier-Host as our slicing software. Repetier-Host is a third-party software that converts STL files (3D models) into gcode files (instruction the printer can read).

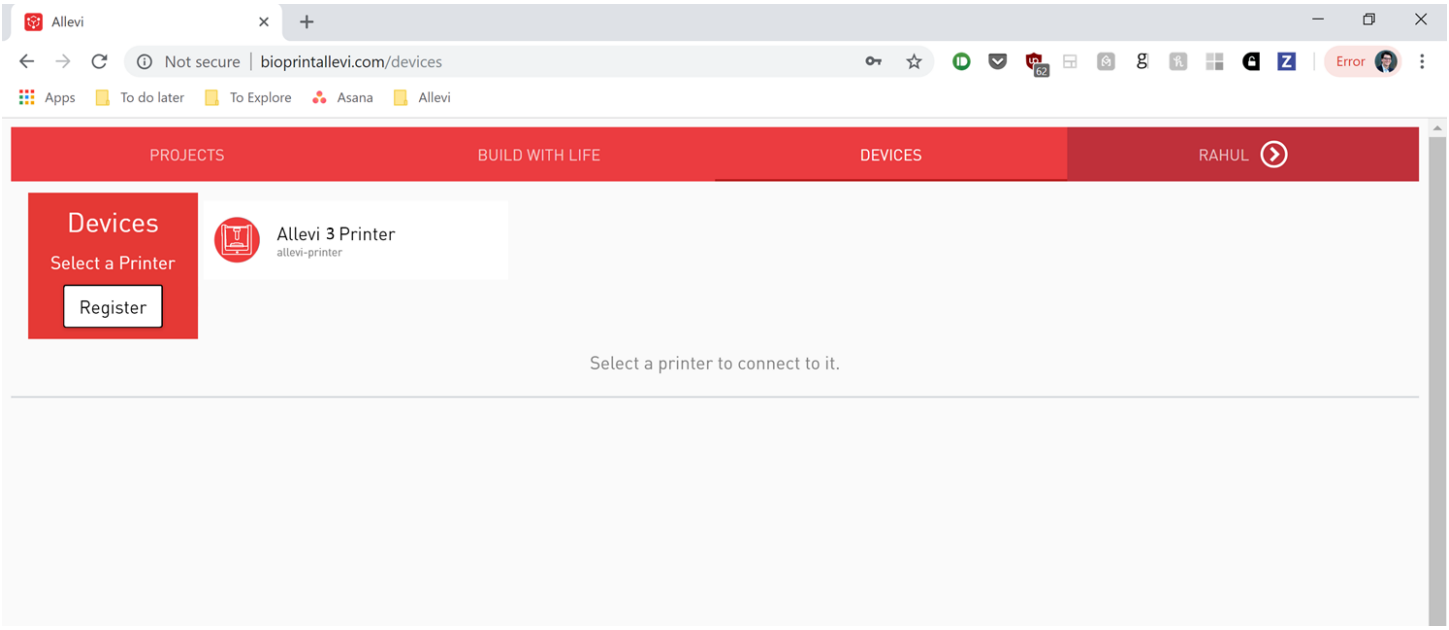
You can find the instructions for using Repetier-Host here or on the Allevi Protocols page.



Printing your STL in the Device tab

In the Allevi software, there are 3 workflows for printing: Project workflow, the Devices tab, and the Offline Interface. In this section, we'll look at printing via the Devices tab.

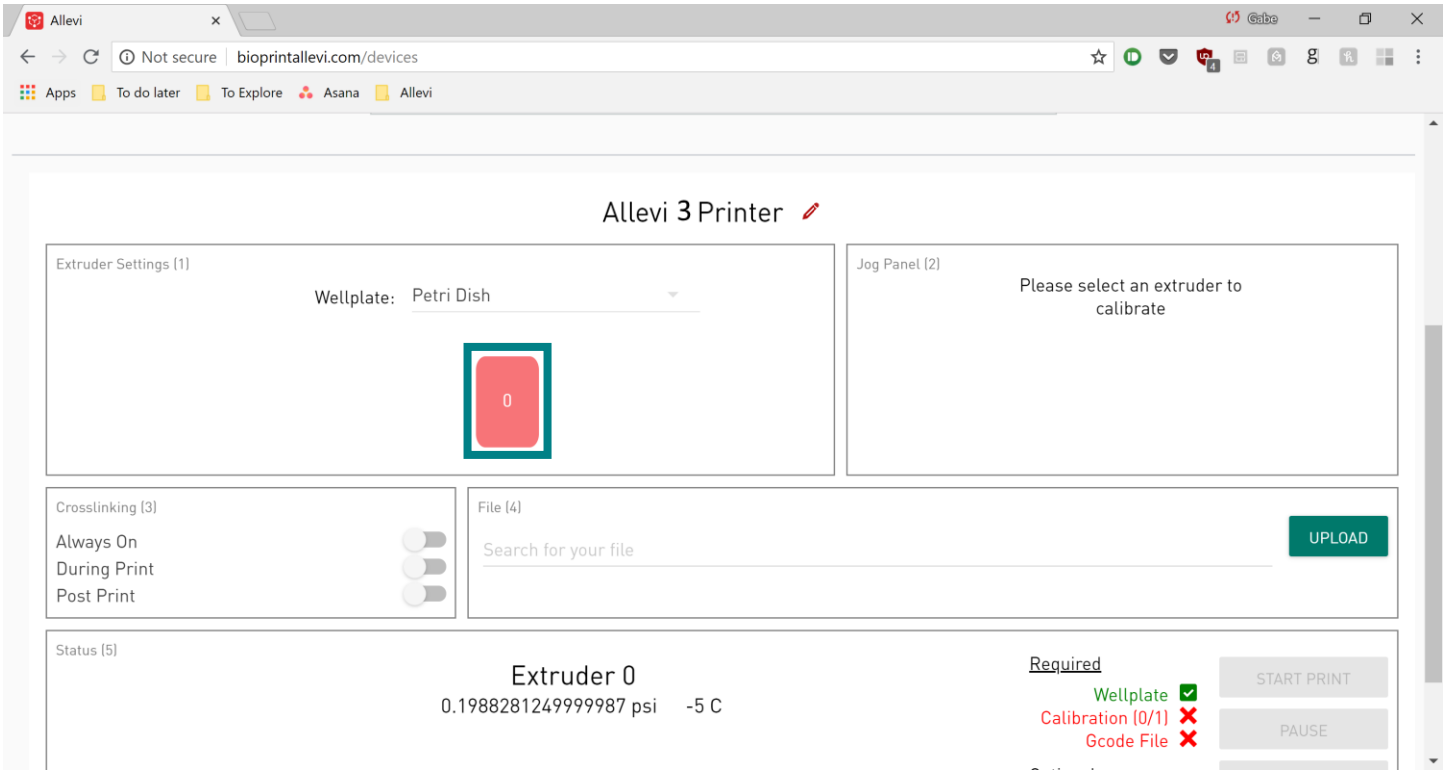
1. Turn on your printer. Yellow lights will stay on while the printer loads its firmware and connects to the Internet. You can connect to your printer once they are off and it's connected.
2. Login to bioprintallevi.com and go to the 'Devices' tab. Select your printer (which should be already registered) and click 'Connect.'



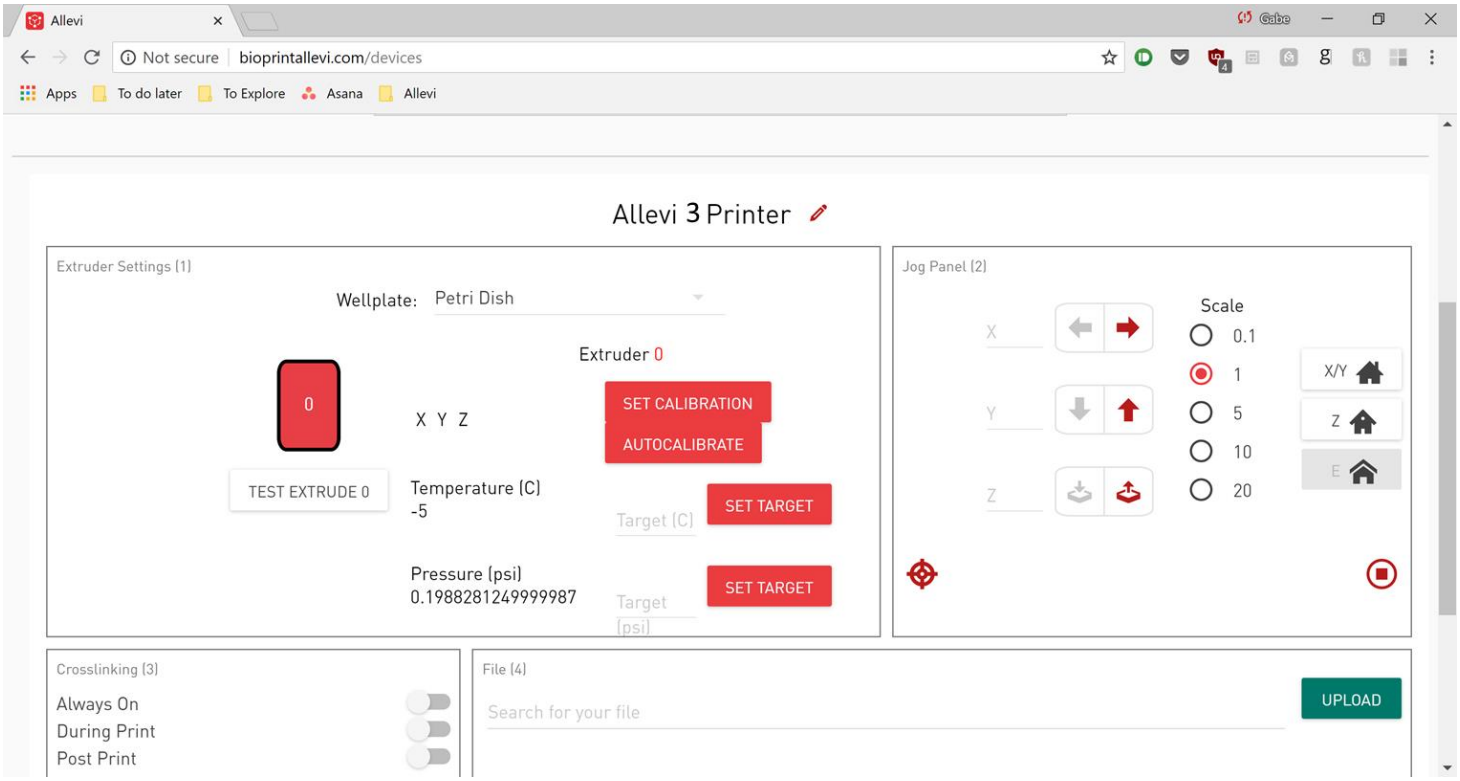
3. Load your syringe with Pluronic F127. Visit the Allevi Protocols page to watch a video on how to load syringes for your Allevi 3. We suggest filling your syringe with about 3 ml of material for your first print:
    a) Attach a 30 gauge 0.25" (pink) needle to the syringe, load syringe into the extruder cannister, and twist the cap to secure.

NOTE: Bioinks will be loaded differently and use different needles depending on the type of material.

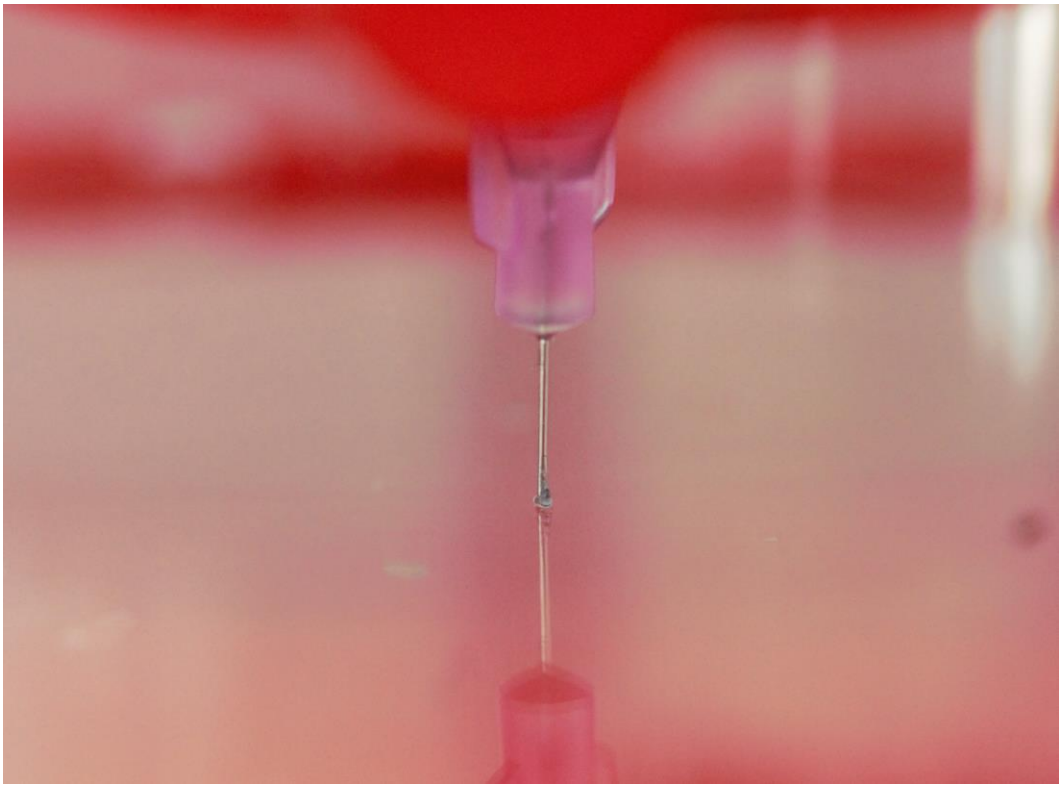
4. Select your wellplate and then activate your extruders by clicking on the red extruder button.



7. Now that you've activated your extruder, you can test its extrusion, move it around (in the 'Jog Panel'), or calibrate it.
    a. For autocalibration, click the 'Autocalibrate' button. (Autocalibration takes ~2 minutes and will avoid the need for the 'Jog Panel'.) **For short needles, only add the wellplate after autocalibration is complete, otherwise the extruder will crash.**

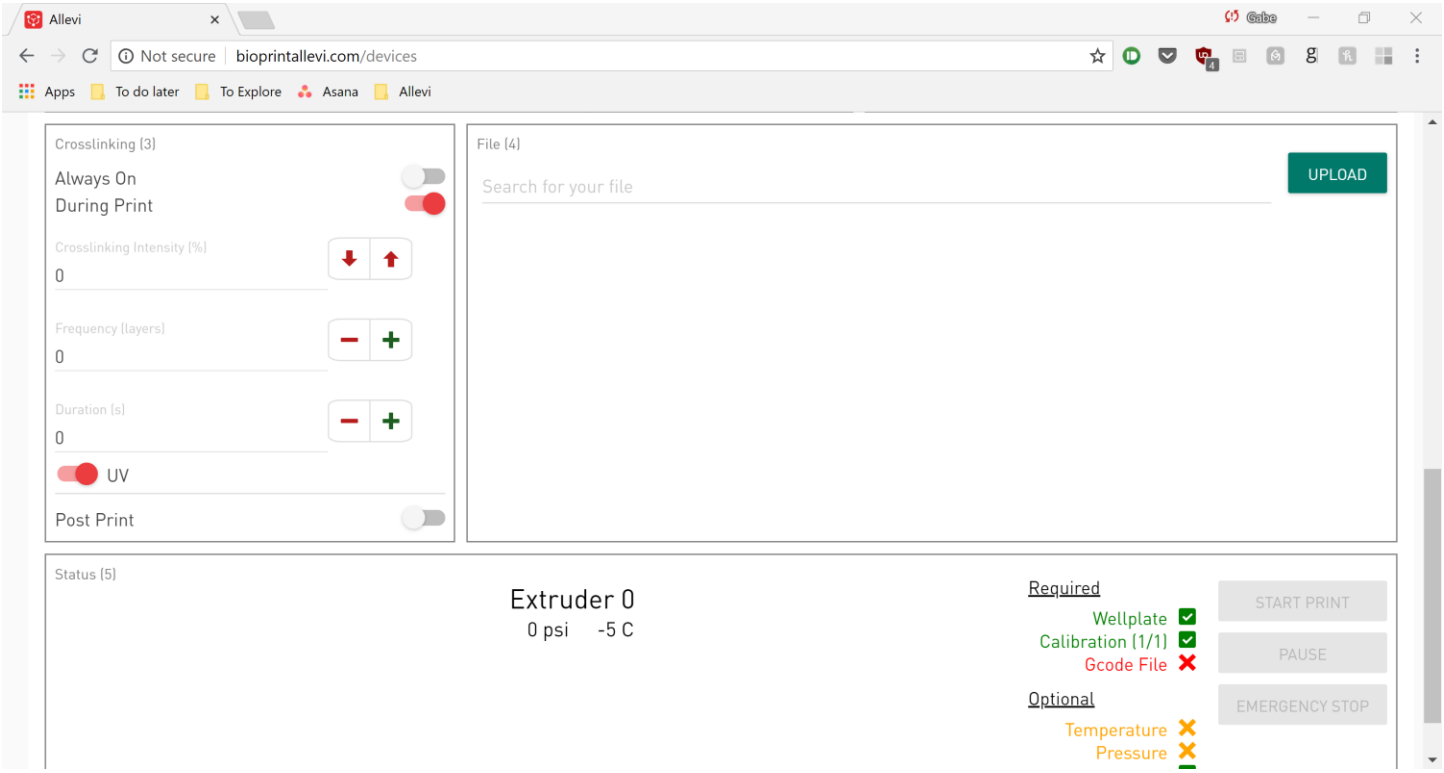


b. To manually calibrate the printer, use the Jog Panel.
    i. First, home the Z axis, followed by the X/Y axis.
    ii. Using the X and Y arrows, move the loaded extruder to over where you want to print. If it's for a wellplate, calibrate in the upper left well. We recommend using the 20mm step size.
    iii. Switch step size from 20mm to a smaller size, depending on the needle length. Then use up and down buttons to move the bed plate (Z) closer to the extruder to the point where the dish is almost touching the needle. **Do not leave a big gap between the needle and dish as the gcode automatically adds the appropriate layer height.** Finer 0.1mm movement can be used when approaching the dish.

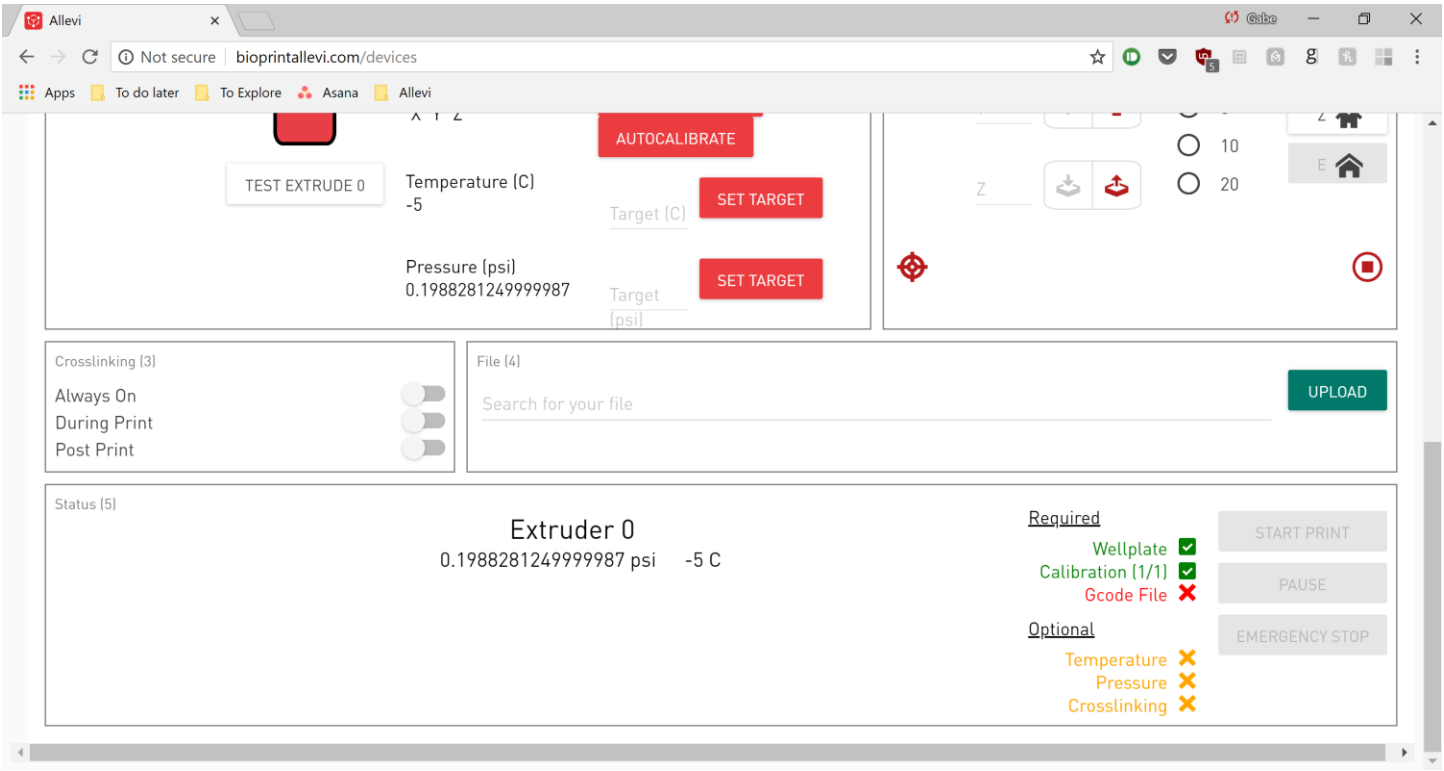


    iv. Click 'Set Calibration.' to calibrate.

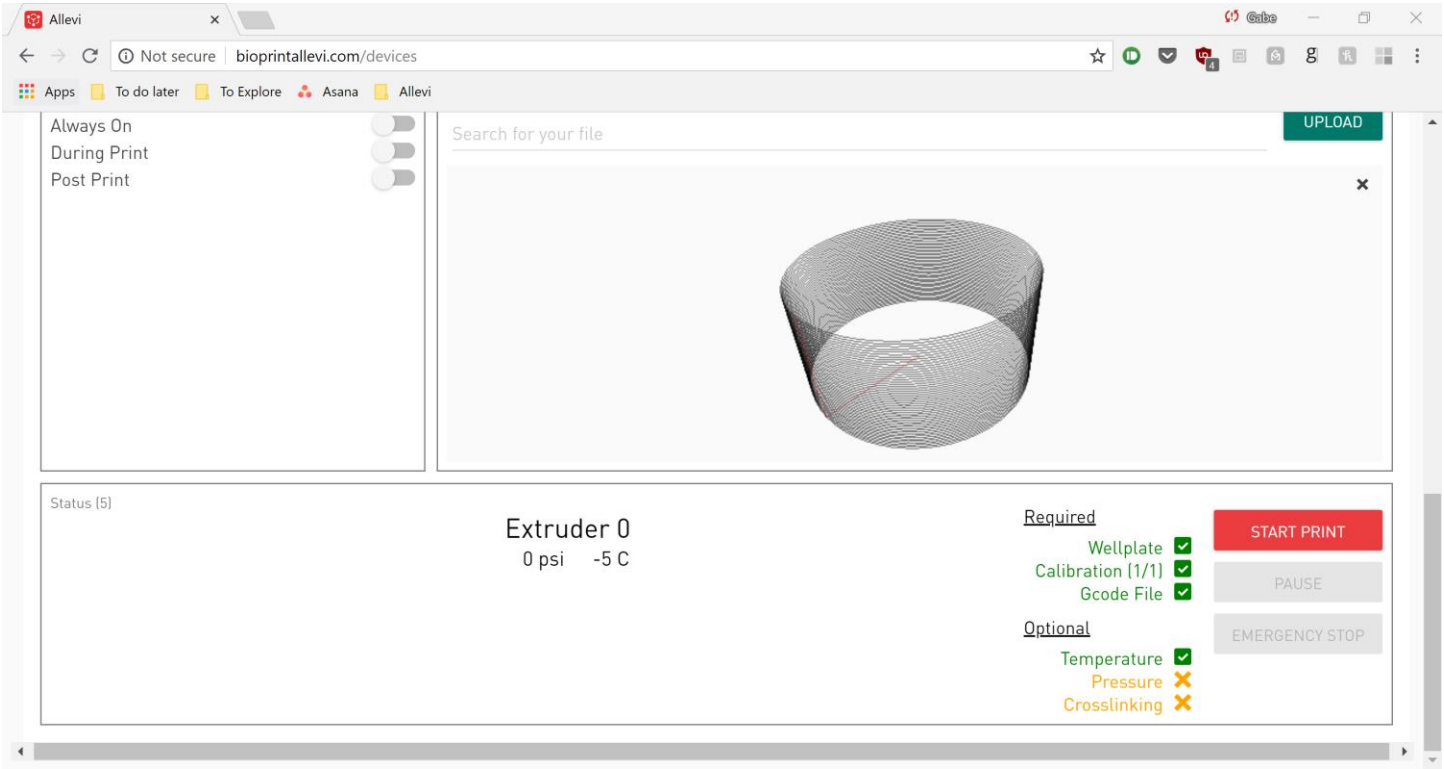
5. For photocurable bioinks, the Allevi 3 offers both UV and visible light crosslinking, which can be changed using the UV/Visible toggle. There are three main settings for crosslinking: Always On, During Print, and Post Print. They use variables such as light intensity, layer frequency, and duration.



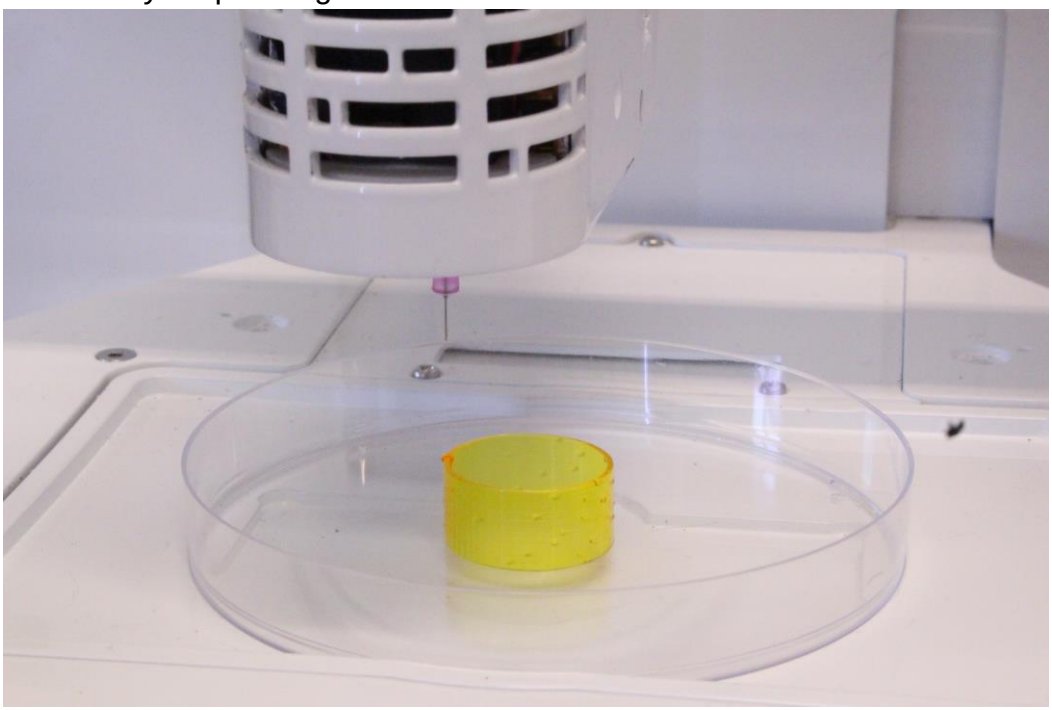
6. Click the ‘Upload’ button to upload a .gcode file from your computer. It will render a rotatable, 3D visualization of the extruder path.



7. Once the wellplate, calibration, and gcode file are all ready, you can press ‘Start Print’ to start building with life!
    a) Note: As the printer loads the gcode, the printer’s yellow lights will turn on.



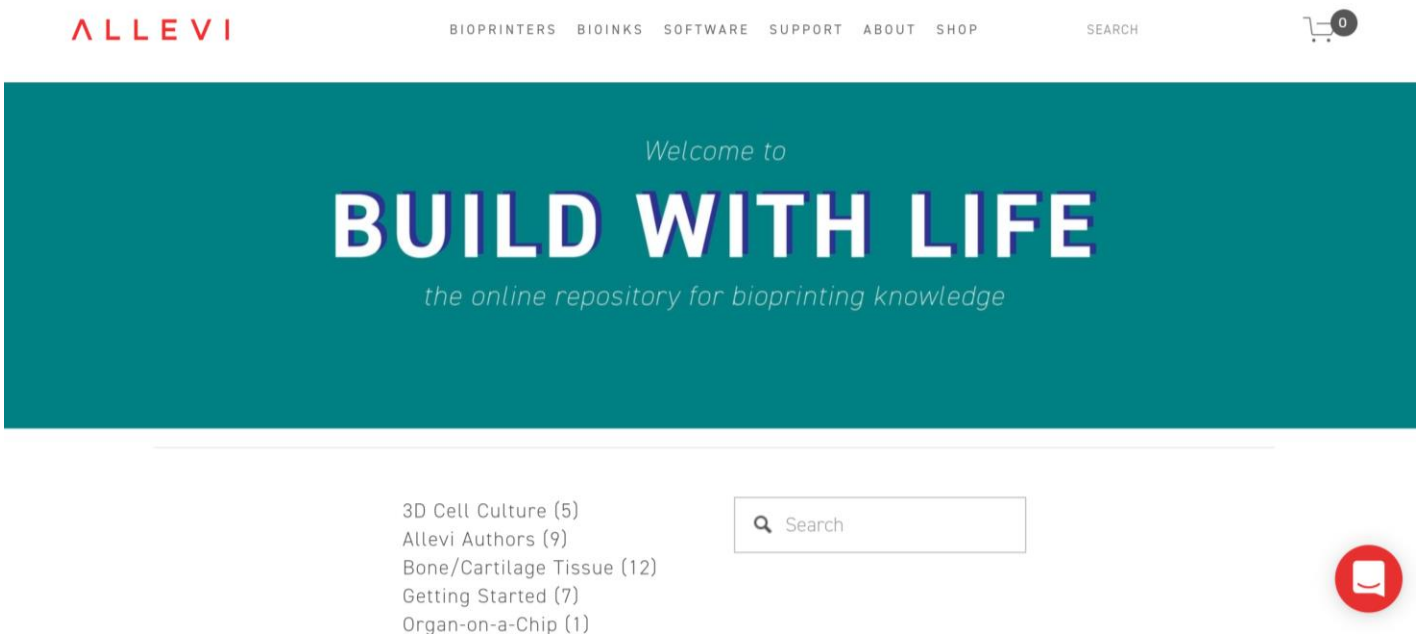
8. Sit back and watch your printer go!



TROUBLESHOOTING AND MORE INFORMATION

When you buy an Allevi bioprinter, you're not just getting a biofabrication platform; you're gaining the Allevi Advantage, which is all the experience and expertise Allevi has to offer.

One very useful resource is Allevi's Build With Life repository. We upload protocols, experiments, and guides to help you be more successful with bioprinting.



You can also visit the Allevi YouTube channel for video instructions.

Have more questions or need help?
Visit us on the Allevi Support page or email us at support@allevi3d.com!

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