



# SIBOOR 0.1 Supplementary Instruction

We build space shuttles with gardening tools  
so anyone can have a space shuttle of their own.

SIBOOR 2022-11-25

## INTRODUCTION

### 如何获得帮助

如何找到我们SIBOOR的社区，在这里你可以遇到很多和你一样拥有SIBOOR 0.1的用户



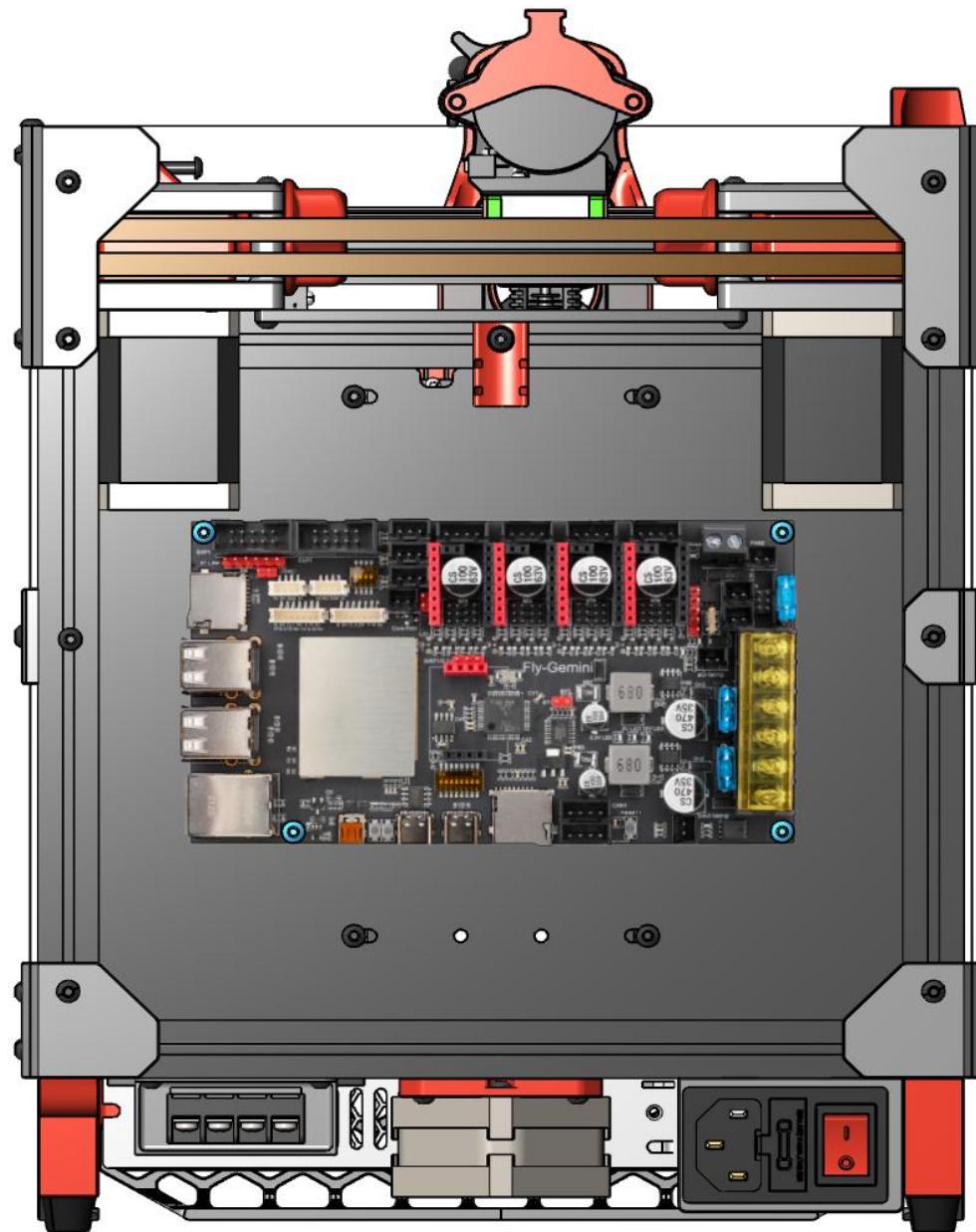
<https://discord.gg/hpF4bBbrht>

在这里可以查看我们在GITHUB的资料库



<https://github.com/Lzhikai/siboor-voron>

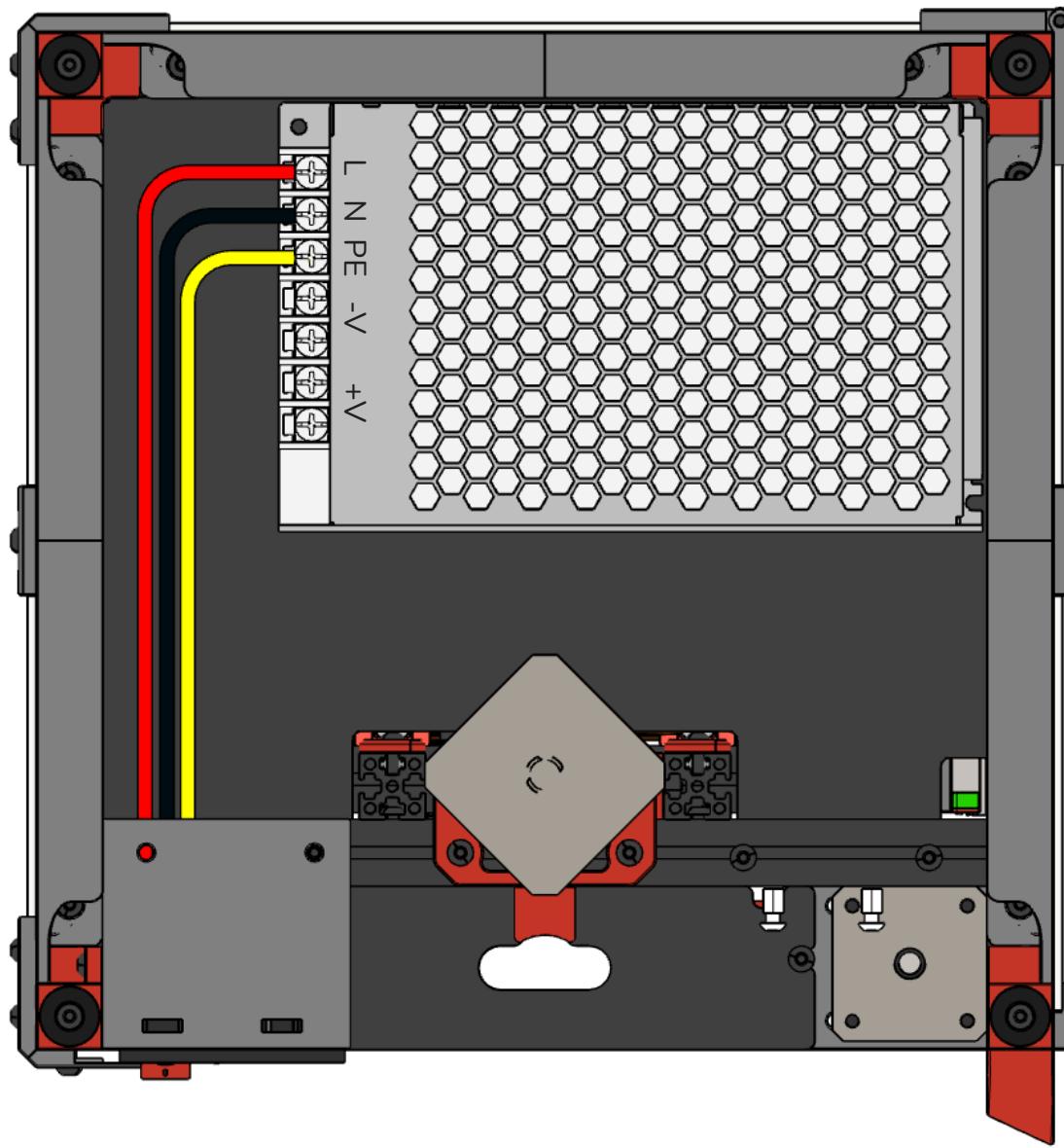
## Motherboard installation



### Motherboard installation

The above is our suggested location. Use four m3 White Nylon columns as gaskets, and fix the nylon columns with screws on the front first. Then place the motherboard on the back and fix it with screws.

## Electronics and wiring



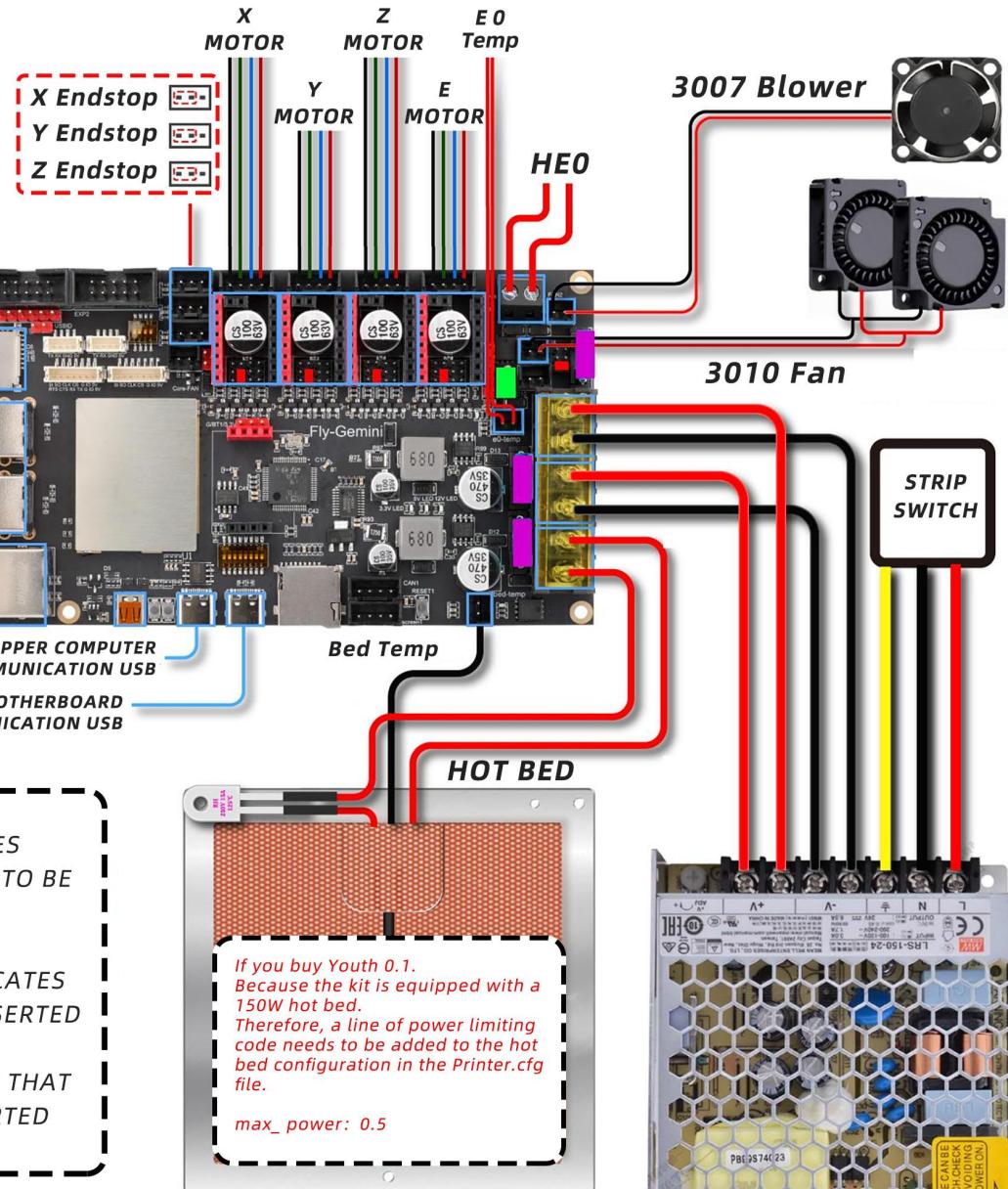
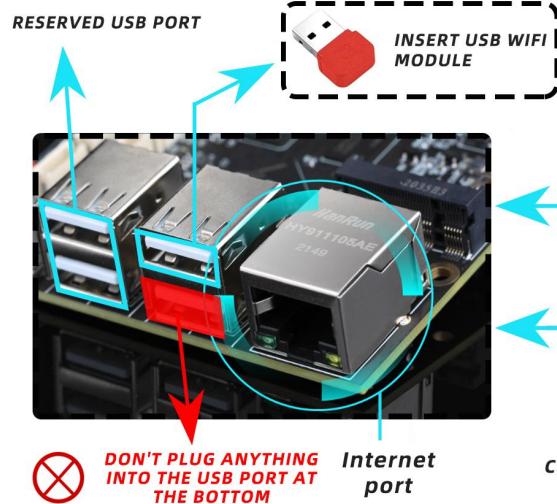
## Mainboard wiring

<https://github.com/Lzhikai/siboor-voron>

### Voron0.1&Gemini 2.0 Wiring diagram



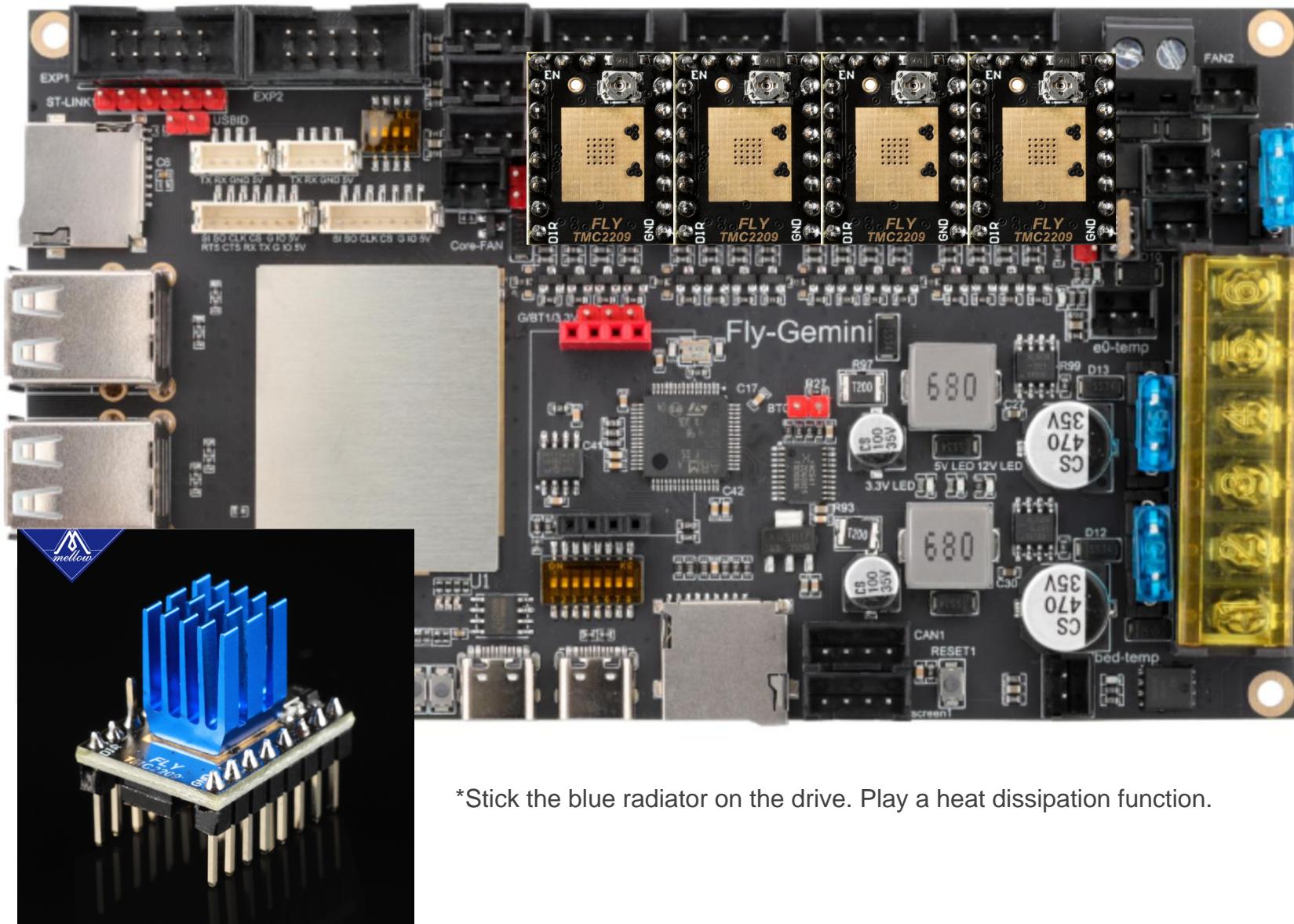
IT IS STRICTLY FORBIDDEN TO PLUG OR TOUCH THE MOTHERBOARD WITH POWER, WHICH IS VERY LIKELY TO CAUSE SHORT CIRCUIT DAMAGE TO THE MOTHERBOARD



For machines that leave the factory after April 2022, the fans in the kit are 24V, so the step-down module is cancelled. Pay attention to distinguish the positive and negative poles when wiring. Pay attention to the identification in the lower left corner of the figure below, and do not omit jumper caps, fuses, MOS tubes, WiFi modules and the like that need to be inserted.

## Installing the drive

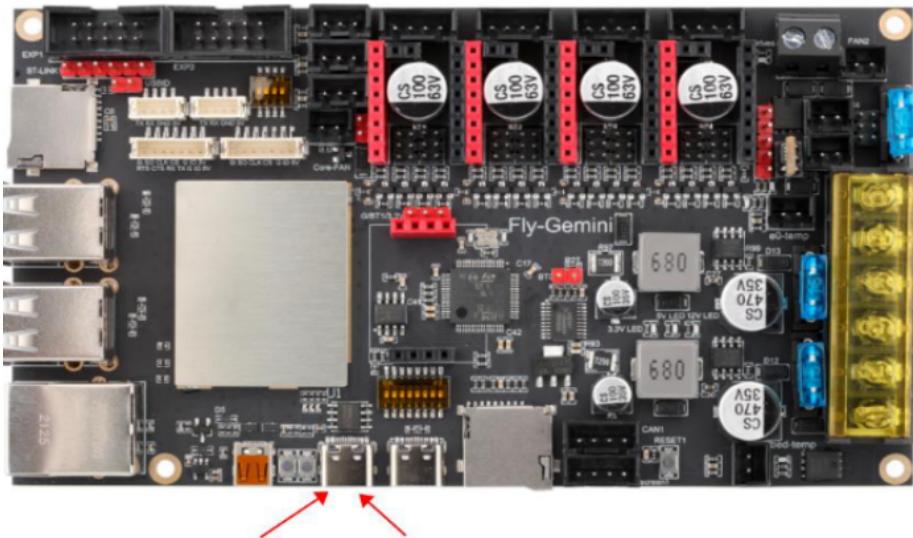
After installing the jumper cap, install four 2209 drives. Refer to the following figure for the direction. Remember that nothing on the motherboard can be plugged in or out when it is powered on, otherwise it will easily cause damage.



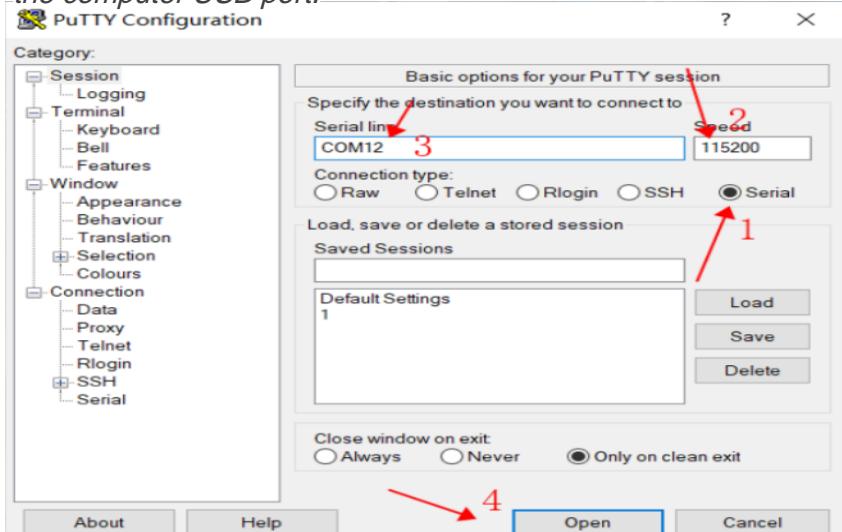
\*Stick the blue radiator on the drive. Play a heat dissipation function.

## Link WiFi with SSH software

After the mainboard is wired, we need to use some methods to connect the mainboard and configure WiFi information for it. Before doing this step. We need to download the [putty software] online disk in advance or download it directly from Baidu.



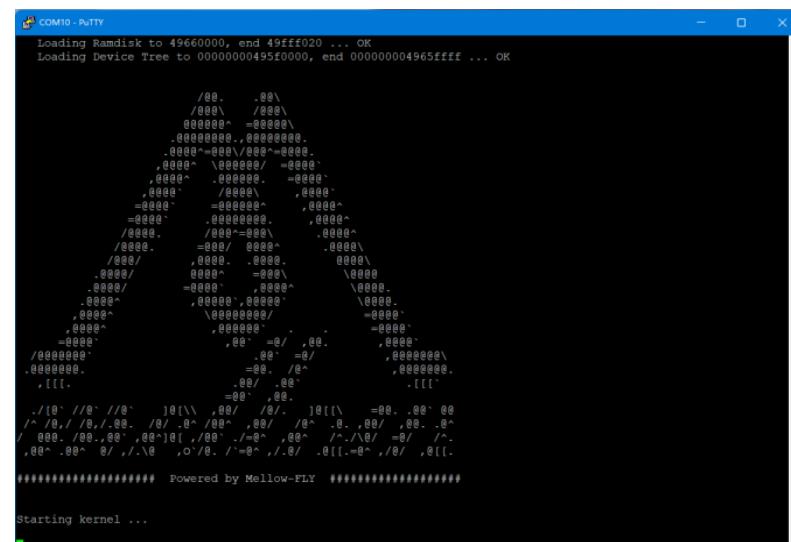
Use the USB type-C data cable provided in the kit to connect the Gemini motherboard (upper computer communication port) with the computer USB port.



Open putty software, select [serial], enter [115200], and enter the port [com12] displayed behind ch340. Note that everyone's may be different, and input according to the actual situation.



Open the device manager on the computer and find the port of CH340.



Wait for a moment, and the screen will start. (if the display is blank, you can press the space or enter key. If not, plug and unplug the connection again)

```

COM3 - PuTTY
flygemini login: root (automatic login)

Welcome to Armbian 21.11.0-trunk Bullseye with Linux 5.10.85-sunxi64

No end-user support: built from trunk

System load: 40% Up time: 0 min
Memory usage: 18% of 984M IP:
CPU temp: 34°C Usage of /: 13% of 30G

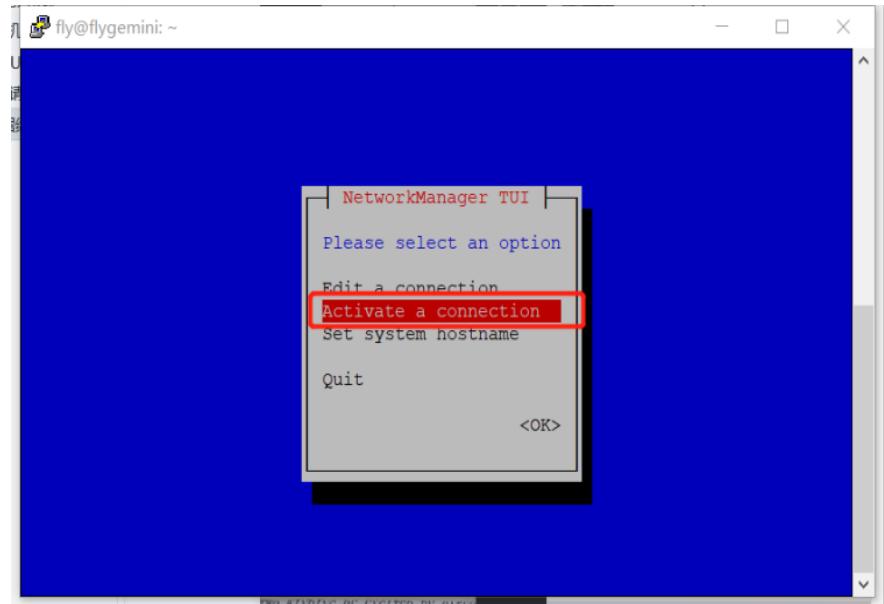
[ 0 security updates available, 4 updates total: apt upgrade ]
Last check: 2022-10-05 09:56

[ General system configuration (beta): armbian-config ]

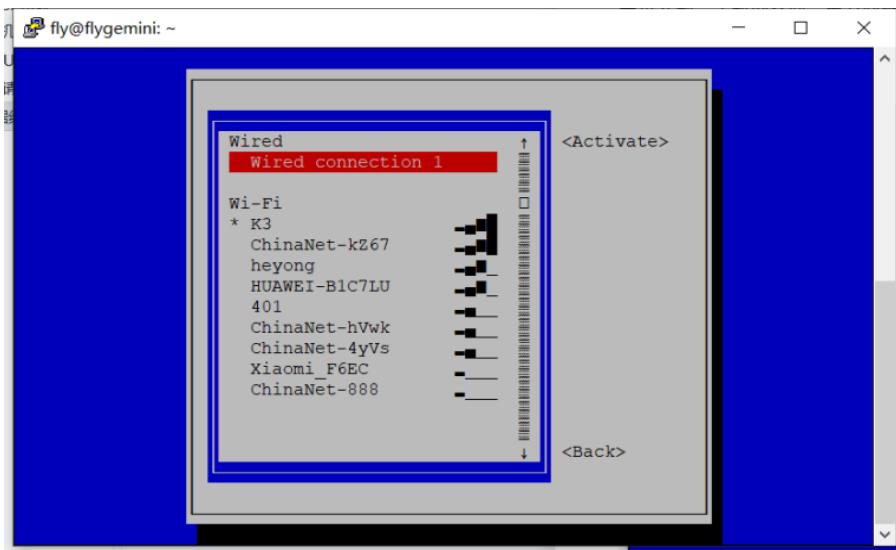
Last login: Mon May 23 11:02:17 UTC 2022 on ttys000
root@flygemini:~#

```

5 After waiting for a few moments, it will look like the picture above. This is when the login is successful.



6 enter `[nmtui]` and press enter to enter the above page. Select the second line and press enter through the direction key on the keyboard.



7. Also select WiFi through the direction key, and then enter the password. Enter to exit. Then WiFi will be connected. (a \* key in front of the WiFi name means that it is connected) press ESC to exit. If WIFI information does not appear, check if the WIFI module is not inserted or inserted in the wrong location.

```

fly@flygemini:~$ ip a|grep inet
    inet 127.0.0.1/8 scope host lo
        inet6 ::1/128 scope host
            inet 192.168.50.226/24 brd 192.168.50.255 scope global dynamic noprefixroute
wlan0
    inet6 fe80::7c67:41d9:18d4:a0b5/64 scope link noprefixroute
fly@flygemini:~$

```

Enter the command `[ip a|grep inet]` and enter. Then a message will be returned. The network IP of the motherboard is in the red box. Record this IP. In the future, whether we use mobile phones or computers, we need this IP to log in to the console.

## Login console

Enter the IP address obtained in the previous step in the computer or mobile browser.

You can enter the web console of fluidd

(the premise is that the computer and mobile phone are connected to the same network as your printer) it is recommended to use microsoft edge/ Google Browser / Firefox, etc. there will be many problems using QQ or 360 browser!

The screenshot shows the VORON o.1 web console interface with several panels highlighted by red boxes:

- IDLE**: A tab at the top left of the main control area.
- Tool**: A section containing movement controls (Home, X, Y, Z), coordinate inputs (X: 60.00, Y: 120.00, Z: 98.00), and extrusion parameters (Extrude Length: 10 mm, Extrude Speed: 5 mm/s).
- Macros**: A section for managing macros, currently showing an "Uncategorized" category with 5 items.
- Thermals**: A panel showing the status of various thermal components: Extruder (off, 28.2°C), Heater Bed (off, 28.3°C), FLY Gemini (50.2°C), and FLY MCU (48.3°C). It includes a temperature graph from 14:58 to 15:16.
- Console**: A log window displaying Klipper state events and G-code commands. Some entries are in red, indicating errors or warnings.

At the bottom, there are buttons for printing operations: CANCEL\_PRINT, PAUSE, PRINT\_END, PRINT\_START, and RESUME.

```

15:38:17 // Klipper state: Ready
15:38:46 $ SDCARD_PRINT_FILE FILENAME="V0_Baby_Dragon_Hatching.gcode"
15:38:46 File opened:V0_Baby_Dragon_Hatching.gcode Size:35189638
15:38:46 File selected
15:38:46 // Unknown command:"T0"
15:40:14 // Unknown command:"SKEW_PROFILE"
15:52:57 $ M220 S151
16:28:09 $ M220 S200
16:28:28 $ M220 S149
21:35:10 // Unknown command:"SET_SKew"
21:35:10 Done printing file
15:15:55 $ SDCARD_RESET_FILE
  
```

## Common error reporting problems

TMC UART error: this happens when the communication between the TMC driver and the motherboard fails. The above fault may be caused by the failure to provide 24V power to the mainboard (TMC driver is not started), or the TMC stepping driver module is not inserted in the correct position, or the jumper of the driver is set incorrectly. Please recheck the above problem points.



**Unable to read tmc uart 'stepper\_z' register IFCNT**

Once the underlying issue is corrected, use the "FIRMWARE\_RESTART" command to reset the firmware, reload the config, and restart the host software.

Printer is shutdown

ADC error: ADC is the abbreviation of "analog-to-digital converter", which is used to convert the reading of thermistor into the temperature of extrusion head and hot bed. As a safety precaution, once klipper detects that the temperature exceeds the maximum or minimum threshold (thermistor may be open or short circuited), the system will enter the off protection mode. Please check carefully to ensure that the thermistor is inserted into the correct socket.



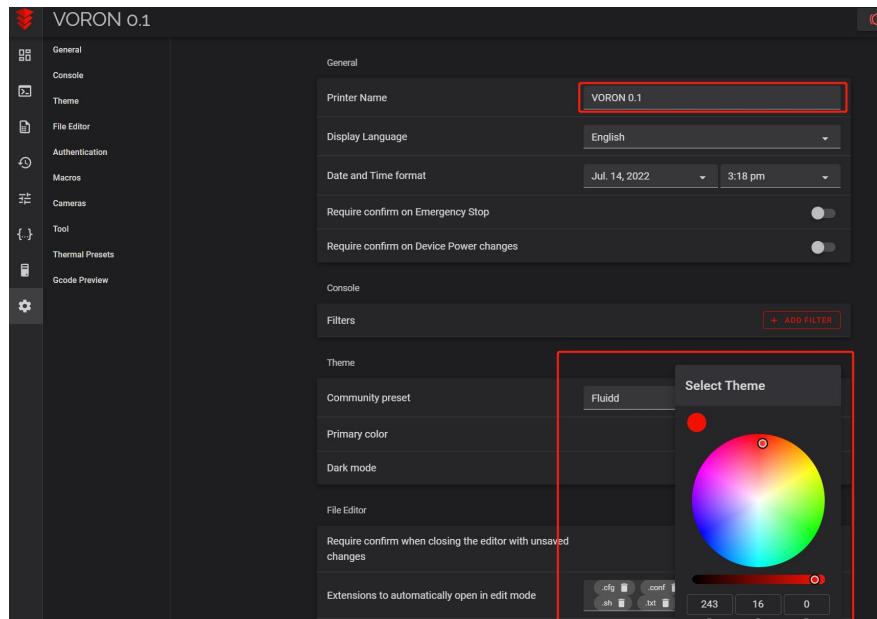
**MCU 'mcu' shutdown: ADC out of range**

This generally occurs when a heater temperature exceeds its configured min\_temp or max\_temp.

Once the underlying issue is corrected, use the "FIRMWARE\_RESTART" command to reset the firmware, reload the config, and restart the host software.

Printer is shutdown

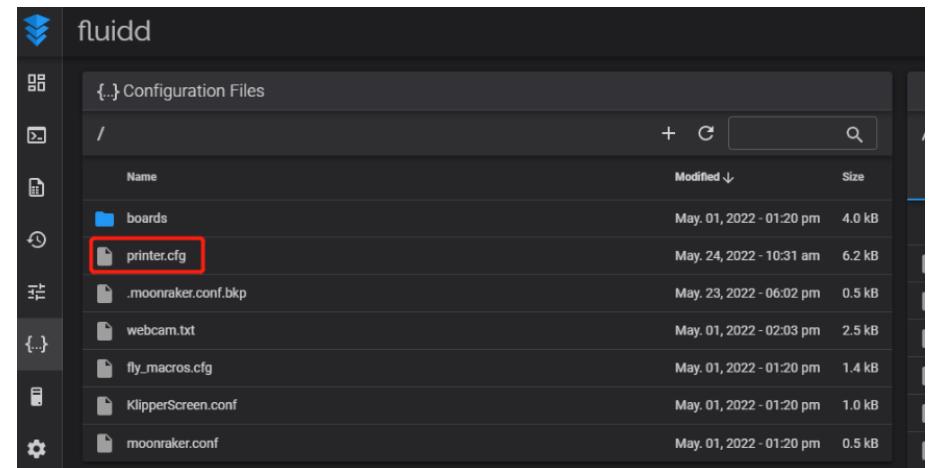
## Modify CFG configuration



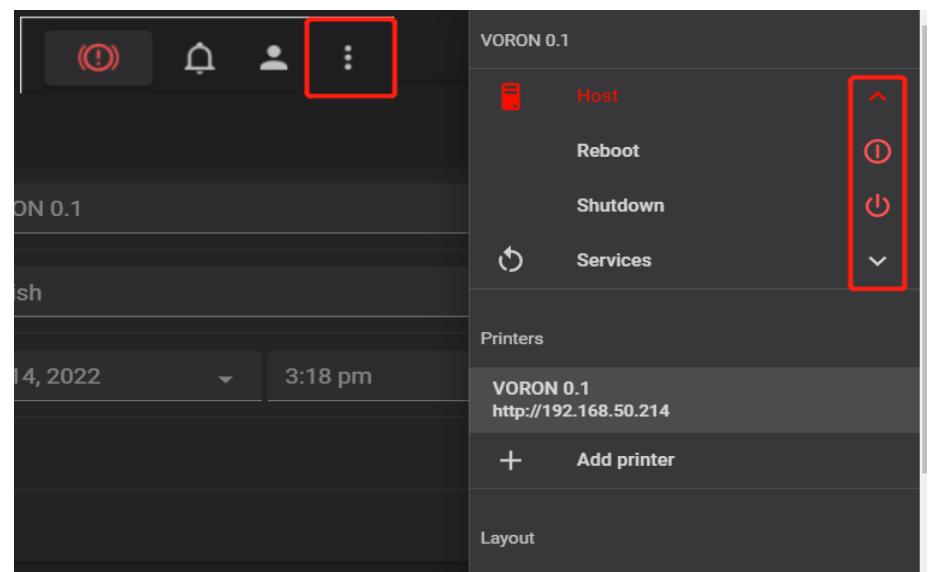
1、 Before we start, we can first enter the settings, select the language we are familiar with, and then give the device a favorite name.  
You can also adjust the theme and color of the interface according to your preferences.

```
X  printer.cfg
1 [include fly_macros.cfg]
2
3 #####
4 # Motherboard model
5 # Please modify it based on your motherboard model
6 # 请根据您的主板型号修改
7 #####
8 #[include boards/FLY_GEMINI_V1.cfg]
9 #[include boards/FLY_GEMINI_V1_1.cfg]
10 [include boards/FLY_GEMINI_V2.cfg]
11
```

3、 Set the motherboard model to V2 as shown in the above figure



2、 Find printer cfg。 Double click to enter. printer. CFG is an important configuration file of klipper. All parameters about the printer need to be configured in this file.



*Note: if the situation permits, do not directly power off the printer, because the upper computer on the motherboard is also similar to a microcomputer. If the power is cut off and shut down frequently, the system may be damaged. The main machine should be turned off at the upper right corner of the motor first. Power off again. Remember!!*

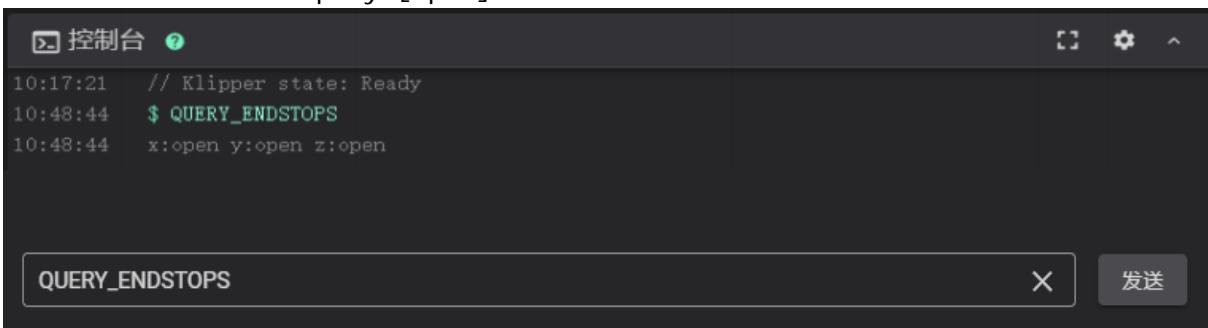
## Check the limit switch

Make sure that the limit switches of X, y and Z axes are not pressed, and then send the command through the terminal console:

QUERY\_ENDSTOPS

The terminal window should have the following return values.

All axes should display [open] status.



```
10:17:21 // Klipper state: Ready
10:48:44 $ QUERY_ENDSTOPS
10:48:44 x:open y:open z:open
```

QUERY\_ENDSTOPS 发送

If the return status of an axis is: triggered

Open print cfg。Find the limit switch setting of the corresponding axis. At ENDSTOP \_ In pin, Add or delete the exclamation mark to reverse the limit signal. For example:

step\_pin: PD8

endstop\_pin: PB12 #Before

endstop\_pin: !PB12 #After

....

Next, press and hold the x-axis limit switch manually, and send the [query\_endstops] command again. The following return values should be displayed. And continue to test the limit switches of Y-axis and Z-axis in the same way.

Send: QUERY\_ENDSTOPS

Recv: x:triggered y:open z:open

Remember to save and close in the upper right corner after modification. "Triggered" will be displayed until the three limit positions are pressed, and "open" will be displayed if not on time.)

The pin positions of XYZ limit in CFG configuration are shown in the figure below for reference. Adding or deleting an exclamation mark can reverse the signal (exclamation mark of English input method)

```
[stepper_x]
step_pin: X_STEP
dir_pin: X_DIR
enable_pin: !X_EN
microsteps: 16
rotation_distance: 40
endstop_pin: X_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

```
[stepper_y]
step_pin: Y_STEP
dir_pin: !Y_DIR
enable_pin: !Y_EN
microsteps: 16
rotation_distance: 40
endstop_pin: Y_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

```
[stepper_z]
step_pin: Z_STEP
dir_pin: !Z_DIR
enable_pin: !Z_EN
microsteps: 16
rotation_distance: 8
endstop_pin: Z_STOP
position_endstop: 0.5
position_max: 120
```

## Machine commissioning - Test Motor

To verify whether each stepping motor operates correctly, please send the following commands separately and observe whether the corresponding motor rotates forward and backward with a small amplitude.

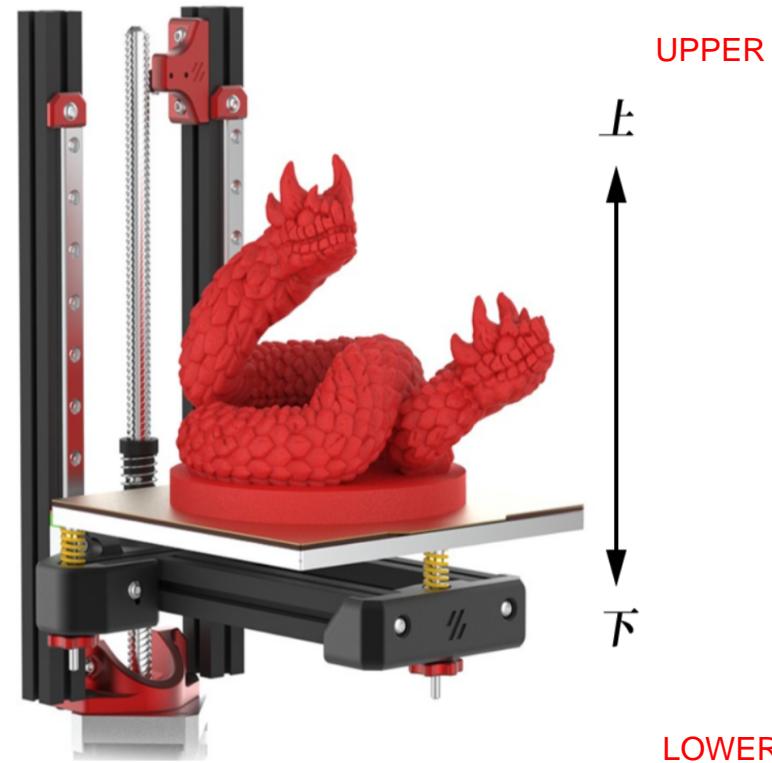
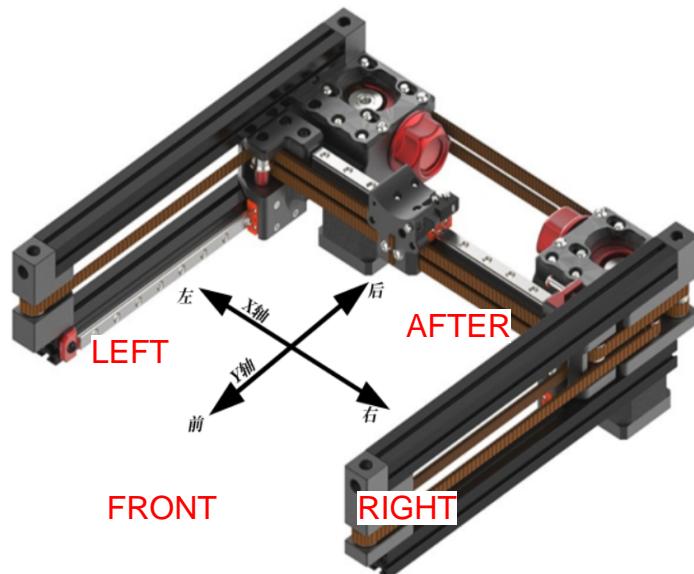
STEPPER\_BUZZ STEPPER=stepper\_X # test the x-axis motor, and the motor should rotate slightly left and right

STEPPER\_BUZZ STEPPER=stepper\_Y # test the y-axis motor, and the motor should rotate slightly left and right

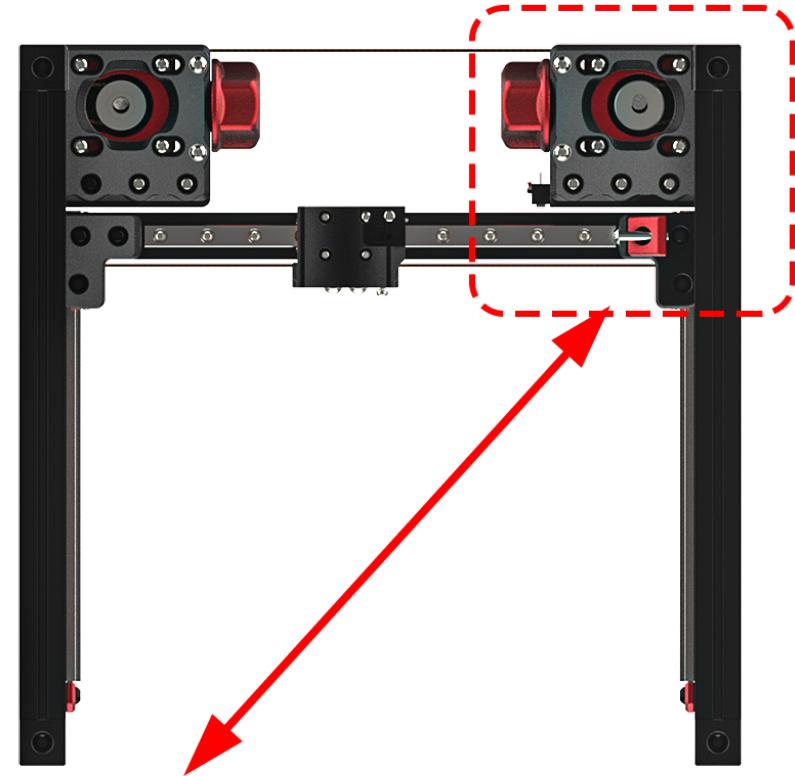
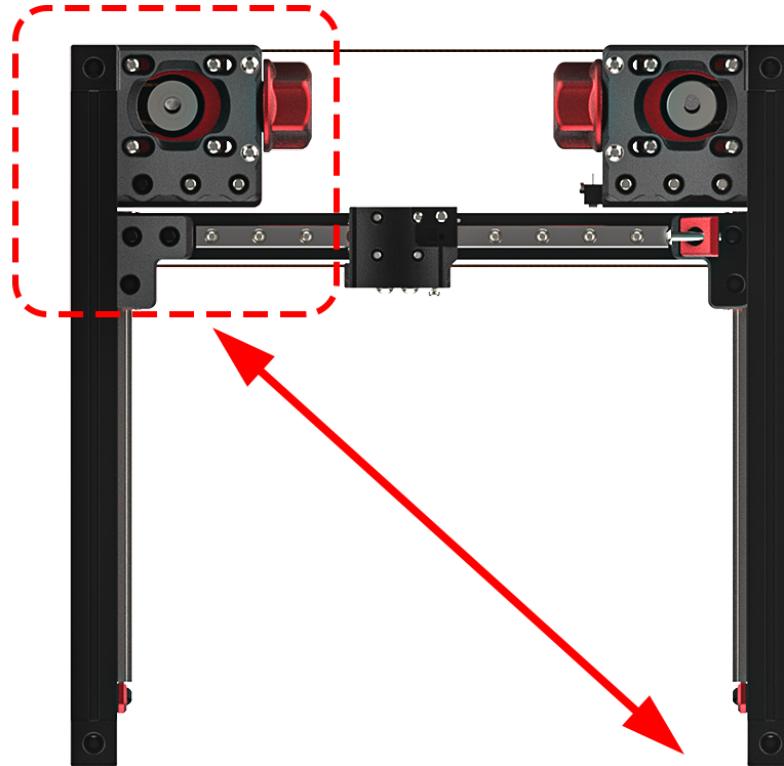
STEPPER\_BUZZ STEPPER=stepper\_Z 35; test the z-axis motor, and the gantry of this axis should be lowered first and then raised for reciprocating motion

During the test, there is no requirement for the direction of the X-Y axis motor. When testing the z-axis, the hot bed should be lowered first and then raised, otherwise, please modify the motor direction parameters. If the stepping motor does not rotate, please check whether the wiring is wrong or loose. If it is necessary to change the running direction of the motor, find the configuration of the corresponding shaft in the CFG, and click dir\_Add or remove "!" before the setting value of pin;. To achieve the reverse purpose.

Because of the motor line batch, if the Z-axis screw motor jitter occurs, replace the middle two leads of the Z-axis motor line.



As mentioned earlier, since V0.1 is the design of corexy structure, AB Motors should move together no matter in X or y-axis operation. If only one motor is rotating, the machine can only move sideways.



When the left motor does not rotate, the machine can only move obliquely from the rear left to the front right. At this time, check whether the left B motor (x) rotates normally. The following are common problems:

The synchronous wheel on the motor is not locked, causing the motor to rotate, but the synchronous wheel does not rotate.

CFG configuration is not set to V2 version, resulting in pin mismatch.

There is no jumper cap or driver installed on the drive port.

The motor pressure line is not pressed well or the drive or drive port is damaged.

When the motor on the right does not rotate, the machine can only move diagonally from the rear right to the front left. At this time, check whether the motor a (y) on the left rotates normally. The following are common problems:

The synchronous wheel on the motor is not locked, causing the motor to rotate, but the synchronous wheel does not rotate.

CFG configuration is not set to V2 version, resulting in pin mismatch.

There is no jumper cap or driver installed on the drive port.

The motor pressure line is not pressed well or the drive or drive port is damaged.

## Machine commissioning - homing direction

After XY homing check that the motor can work normally, you can start to test the homing of X and Y! During the test, in order to prevent the collision caused by the wrong direction of the motor, it may be necessary to use the emergency stop function. The following methods can make the printer stop in an emergency.

1. Press the red emergency stop button in the upper right corner of klipper to stop the printer.
2. Keep your laptop next to the printer. When you find that the homing direction is reversed, manually and quickly press the limit switch on the machine twice.

When you start to test the printer homing function, if it goes in the wrong direction, use the above appropriate methods to stop the current action of the printer immediately.

Send the homing command of X in the terminal console window: G28 x  
Face the printer squarely, and the print head should move to the right of the printer until the x-axis limit sensor is triggered, and then it returns to its position accurately.

Send the homing command of Y in the terminal console window: G28 y  
Face the printer squarely, and the print head should move towards the rear of the printer until the y-axis limit sensor is triggered and then it returns to its position accurately.

If the homing direction does not move in the expected direction. Please follow me further.

1. If the XY axis homing direction is reversed -> reverse the X axis in the configuration
2. If only the x-axis return direction is reversed -> reverse the XY axis motor in the configuration
3. If only the y-axis return direction is reversed -> shut down, exchange the XY motor wires on the motherboard.

Follow the above steps, which may need to be performed many times. Until the XY homing direction is correct.

Method of reversing motor steering

Also in printer CFG, find the setting of the corresponding axis,  
In dir\_ Add or remove "!" before the setting value of pin:, To achieve the reverse purpose.

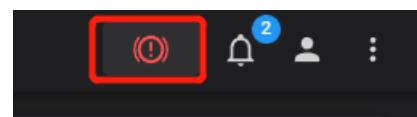
such as :

```
[stepper_y]
step_pin: PD8
dir_pin: !PB12 #before
dir_pin: PB12 #after
```

```
[stepper_x]
step_pin: X_STEP
dir_pin: X_DIR
enable_pin: !X_EN
microsteps: 16
rotation_distance: 40
endstop_pin: X_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

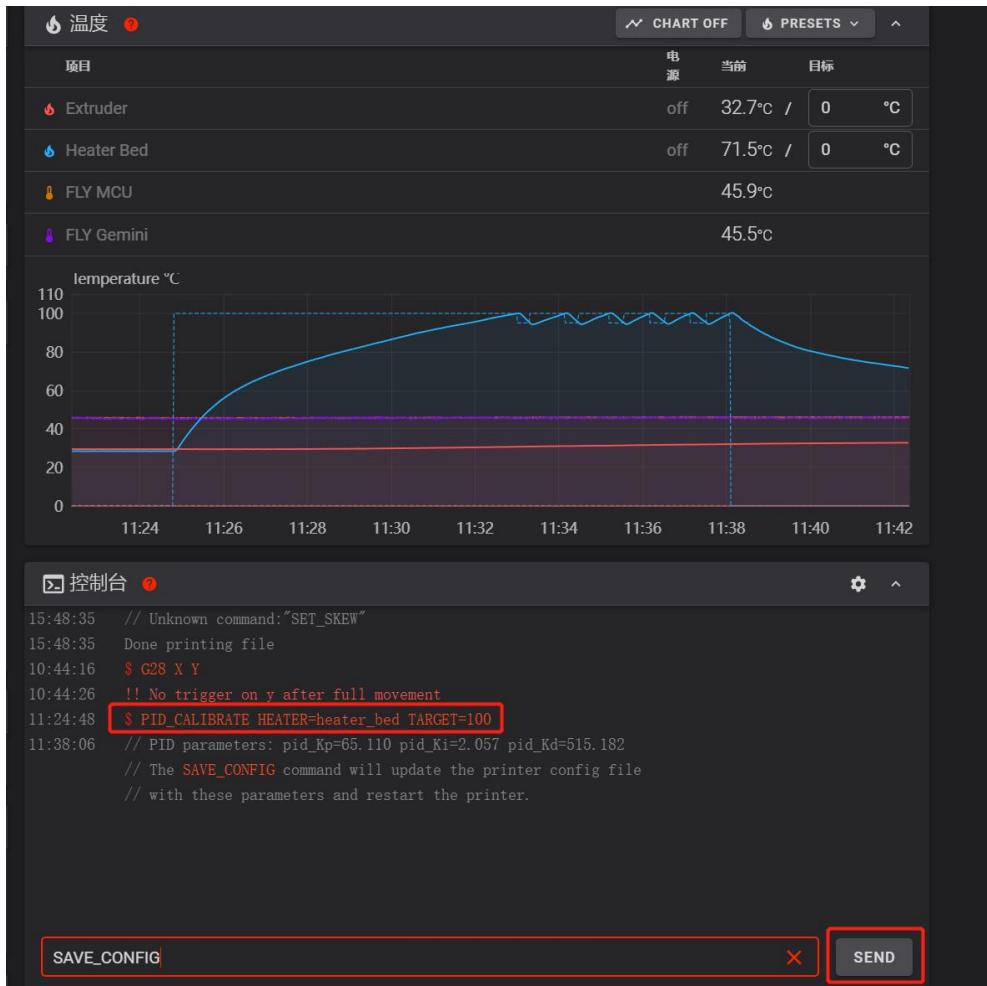
```
[stepper_y]
step_pin: Y_STEP
dir_pin: !Y_DIR
enable_pin: !Y_EN
microsteps: 16
rotation_distance: 40
endstop_pin: Y_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

```
[stepper_z]
step_pin: Z_STEP
dir_pin: !Z_DIR
enable_pin: !Z_EN
microsteps: 16
rotation_distance: 8
endstop_pin: Z_STOP
position_endstop: 0.5
position_max: 120
```



## Machine commissioning - nozzle / hot bed heating test

*PID regulation is to calibrate the stability of temperature fluctuation at the hot end of the hot bed. It can make the temperature measured by the system closer to the actual temperature and reduce the temperature fluctuation.*



### PID correction of hot bed

After G28 returns, move the nozzle to the center of the hot bed, about 5-10mm higher than the bed surface, and then send the command

**PID\_CALIBRATE HEATER=heater\_bed TARGET=85**

It will perform a PID calibration procedure that will last approximately 10 minutes. Send Save command after completion

**SAVE\_CONFIG**

Parameters will be automatically saved to the configuration file.

### PID correction of extrusion head

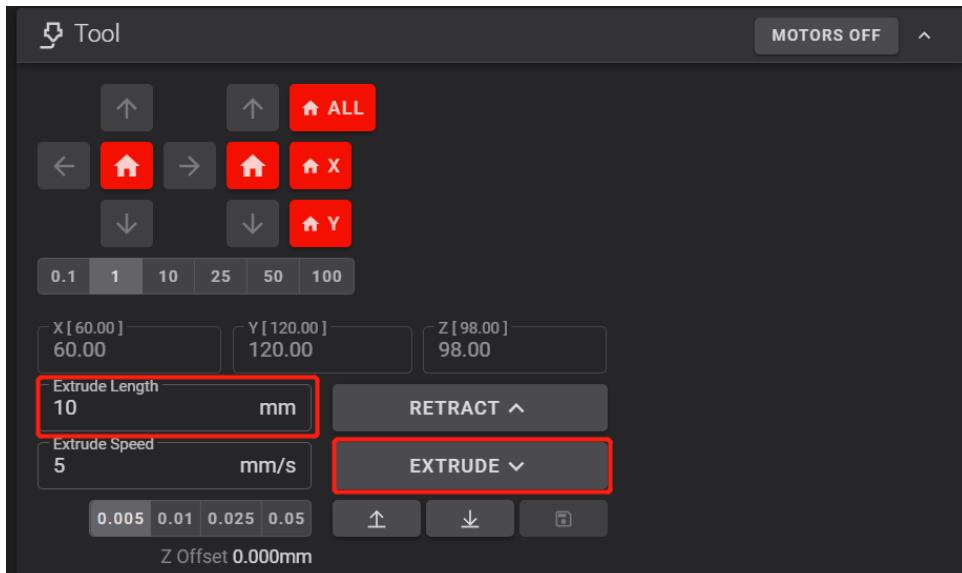
First set the model cooling fan to 25% speed (M106 S64), and then send the command

**PID\_CALIBRATE HEATER=extruder TARGET=210**

It will perform a PID calibration procedure that will last approximately 5 minutes. Once completed, send the Save command save\_CONFIG

## Extruder calibration

Before the first printing, it is necessary to ensure that the extruder extrudes the correct length of material. According to the temperature required by the printing material, heat the extrusion head, measure the 120mm feed wire from the Teflon nozzle of the extruder feed port, and make a mark at 120mm with a art knife. In fluid, manually extrude 50mm<sup>2</sup> times, a total of 100mm (the single extrusion amount of klipper shall not exceed 50mm).



After the extruder stops, measure the length x from the extruder feed port to the mark. If the extrusion amount is correct, X should be 20mm (120mm - 100mm =20mm). But there will be deviation in practice. Find the existing extrusion value in the configuration file and update it with the following method.

[extruder]

...  
rotation\_distance: 25.12 #The higher the value, the less material  
#extruded...

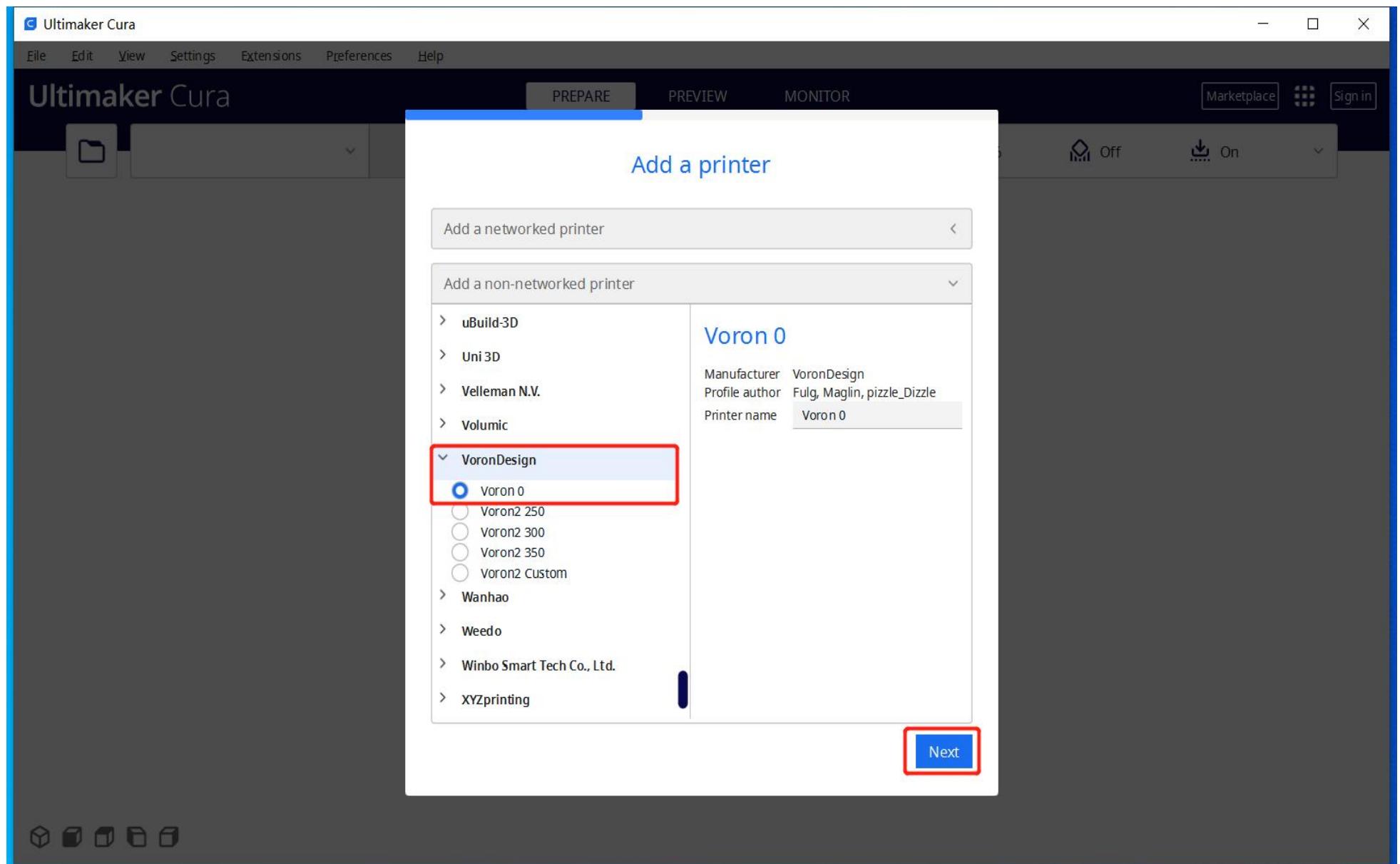
```
[extruder]  
step_pin: E_STEP  
dir_pin: !E_DIR  
enable_pin: !E_EN  
microsteps: 16  
rotation_distance: 23  
gear_ratio: 50:10  
nozzle_diameter: 0.400  
filament_diameter: 1.750  
heater_pin: HEAT  
sensor_pin: HEAT_TEMP
```

New shrinkage value = old shrinkage value \* (actual extrusion volume / target extrusion volume)

Replace the new value in the configuration file, save and restart klipper. Then verify again according to the above method. If the extrusion amount is within ± 0.5% of the target value (that is, the target value is 99.5-100.5mm, and the target extrusion length is 100mm), the extruder is calibrated.

Download and install Cura software

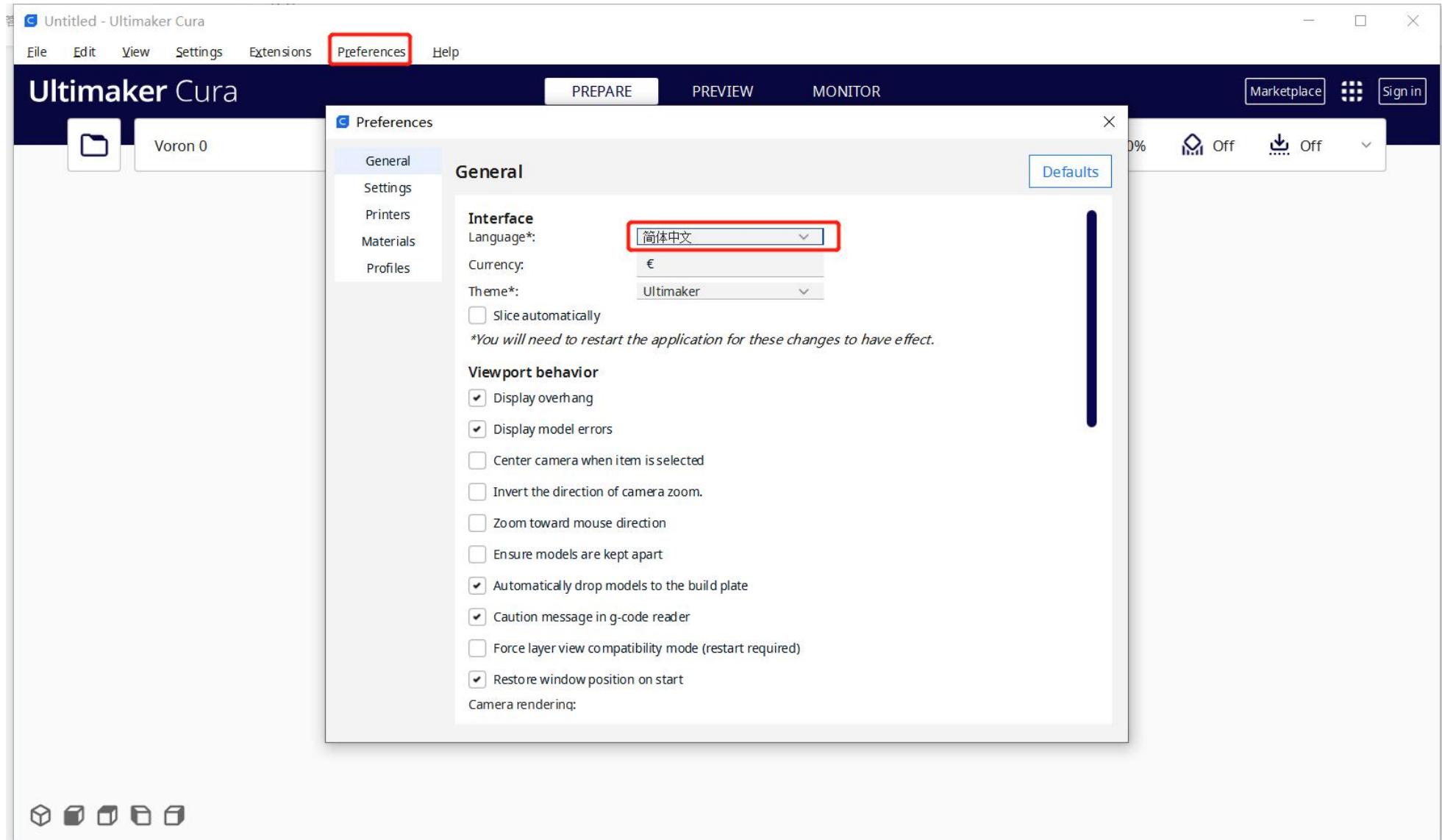
Link: <https://ultimaker.com/software/ultimaker-cura>  
Add a printer, select Voron 0, and then click next.



## Set language

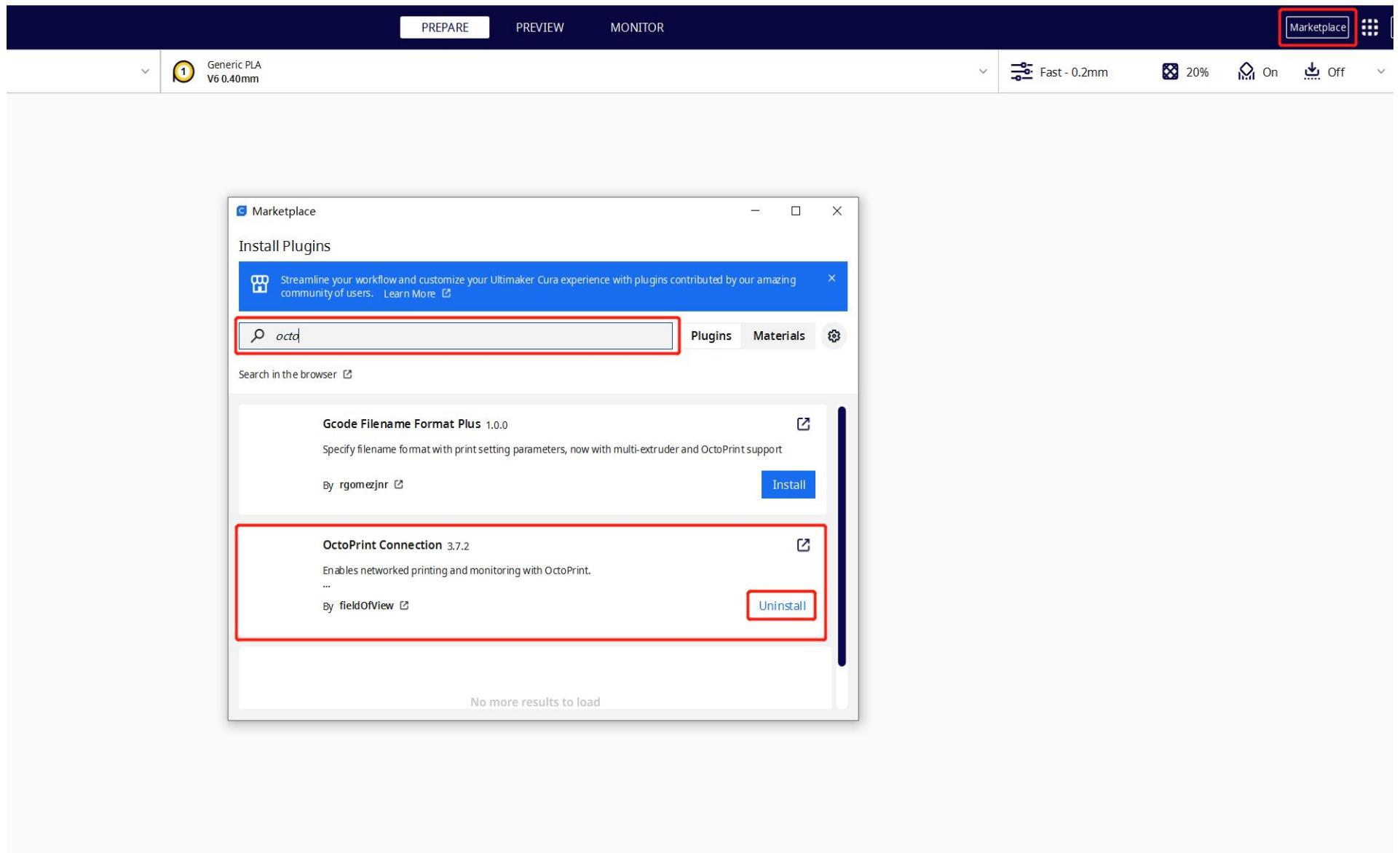
19

Follow the instructions in the figure below. It can be set to the language version required by the whole machine



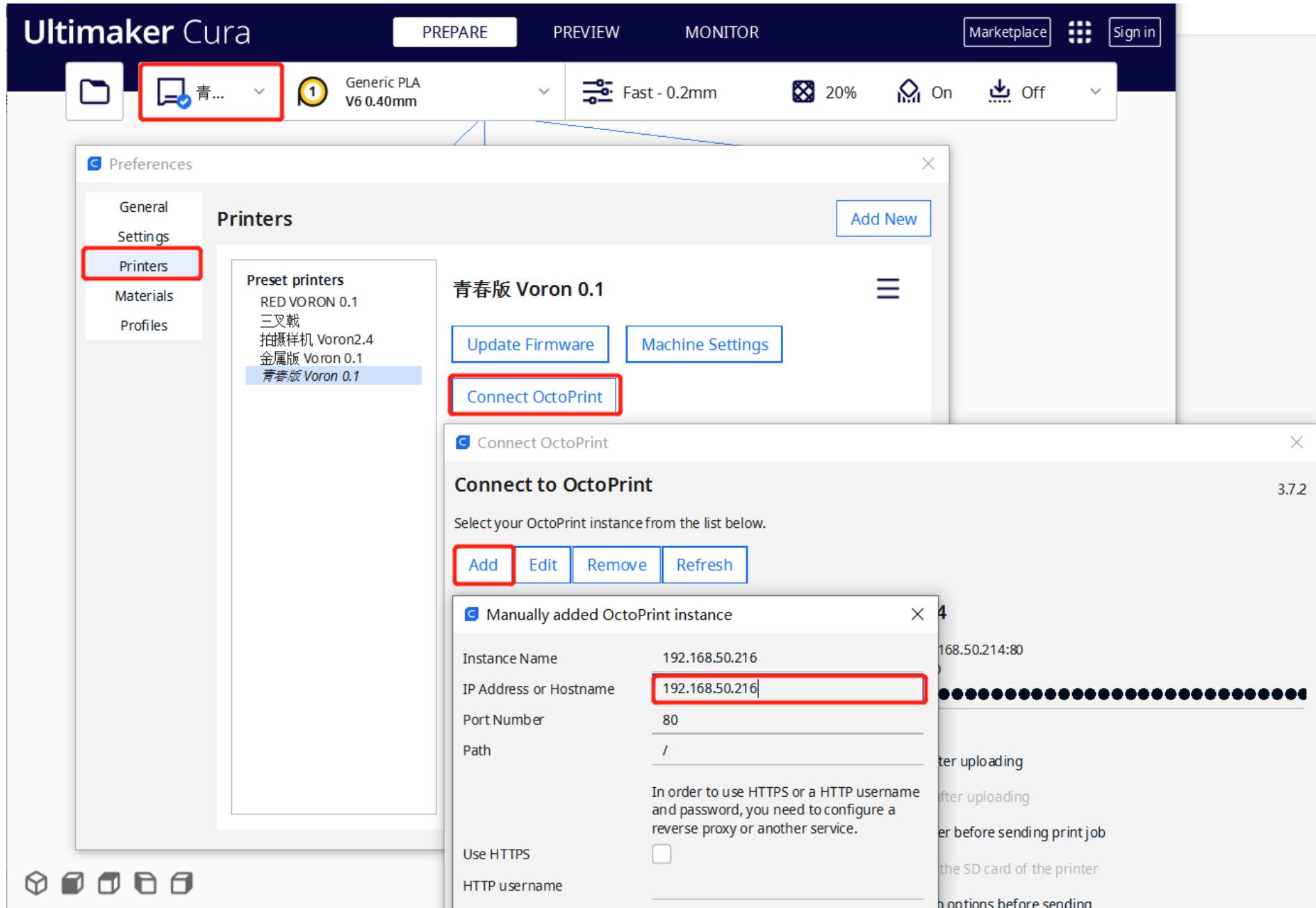
## Install remote plug-in

Follow the instructions in the figure below. Search and install the 'octoprint' plug-in in the market. It can upload files directly to the printer after slicing in the slicing software.



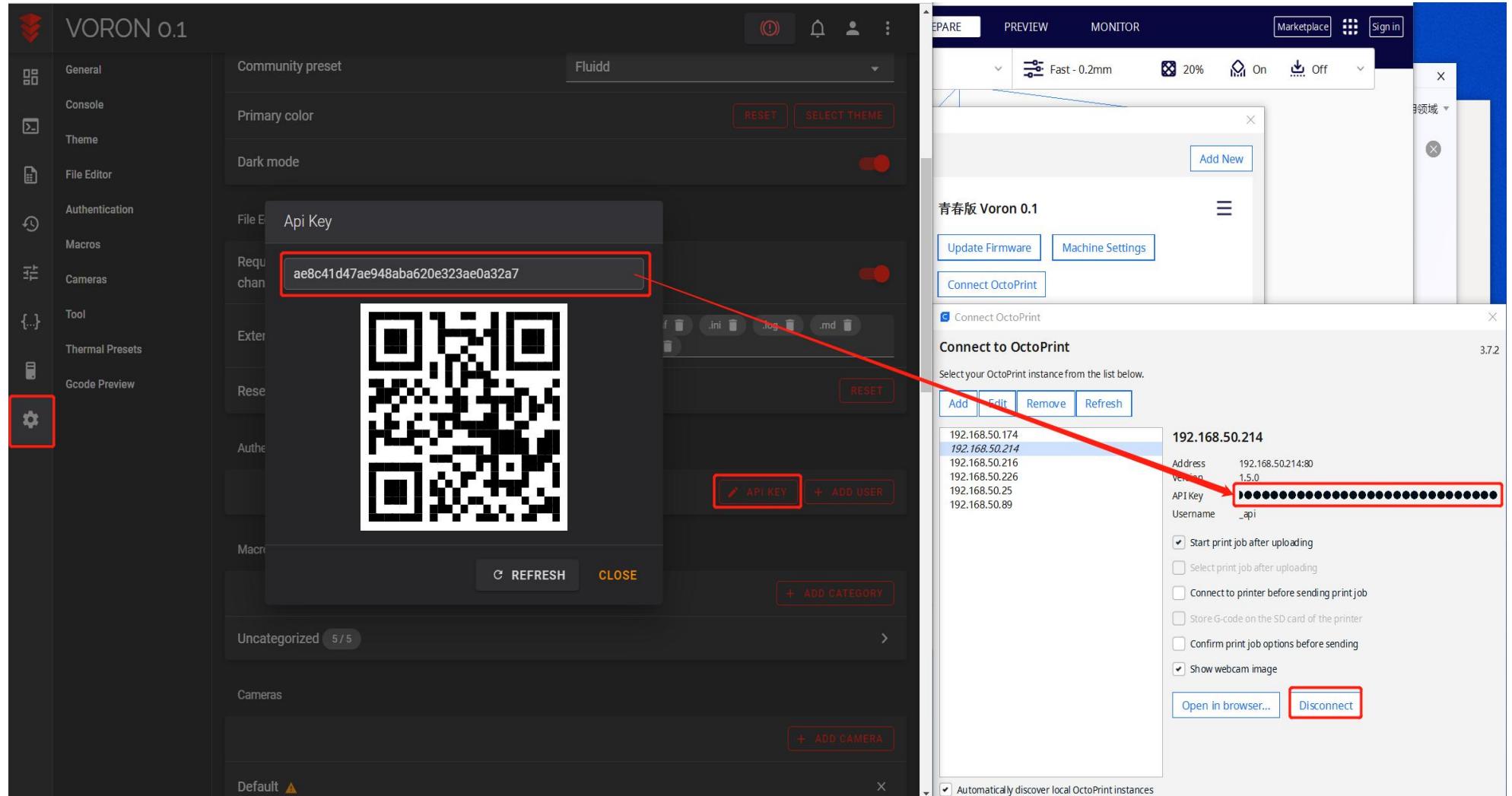
## Set IP

In the model setting, add the IP address of the printer.



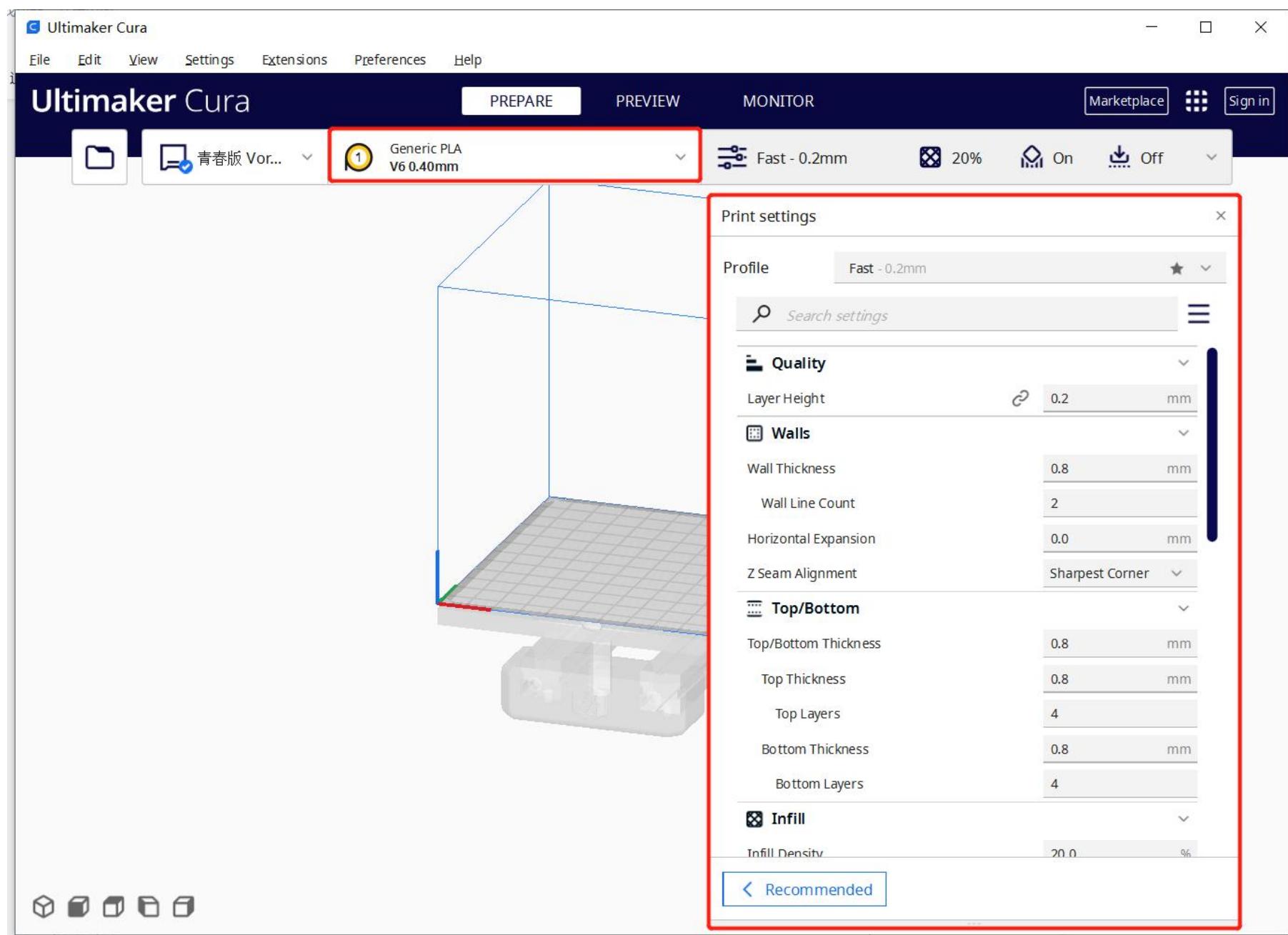
## Set IP

In the setting of the web console, find the API of the machine, copy it, fill in the API in Cura software, and finally save the motor connect.



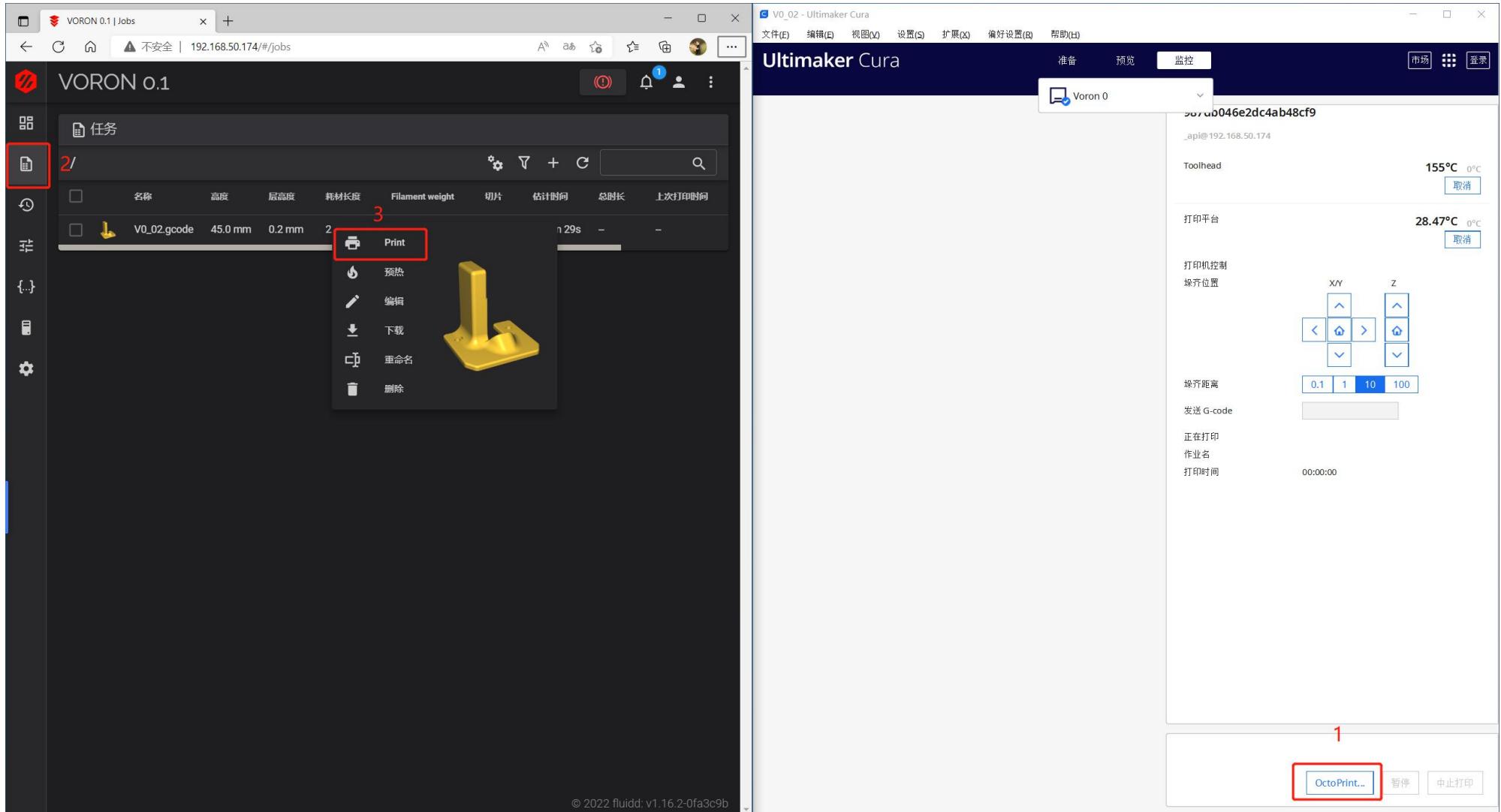
## Slice settings

Select the consumables to be used in the drop-down list, such as pla/abs, which must be set, because different consumables vary from day to day. The printing temperature is also different. In addition, you can also set the layer height, filling density, etc. in the print settings on the right. After setting, click [print with octoprint]

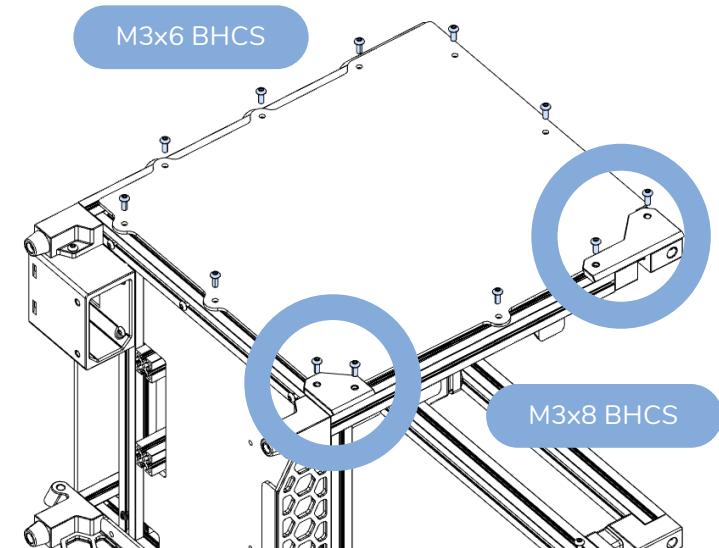
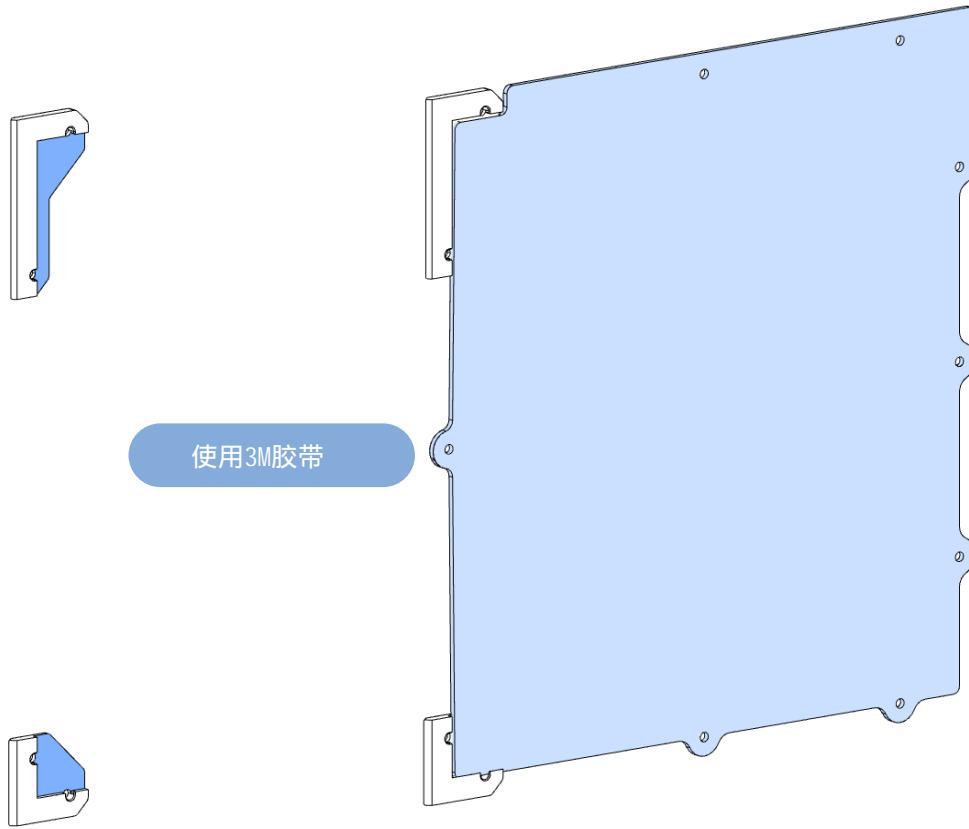


## Start printing

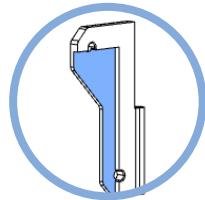
Click [octoprint] and it will automatically jump to the web console interface. In the task list, find the code just uploaded automatically by Cura, right-click [print] and start printing.



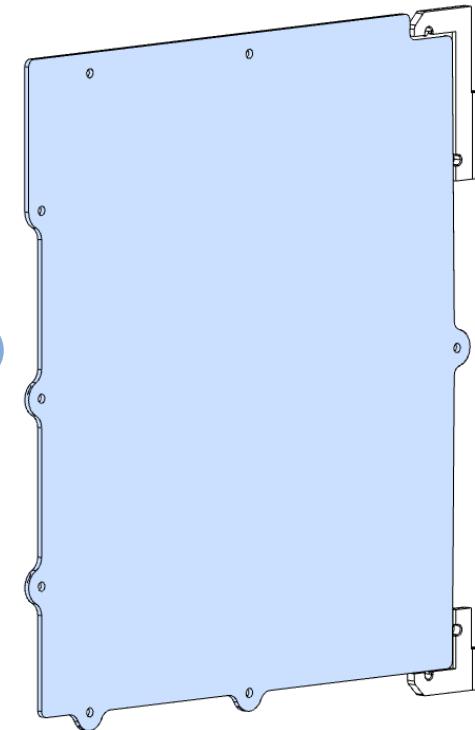
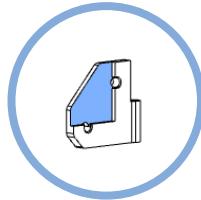
## PANELS



## PANELS

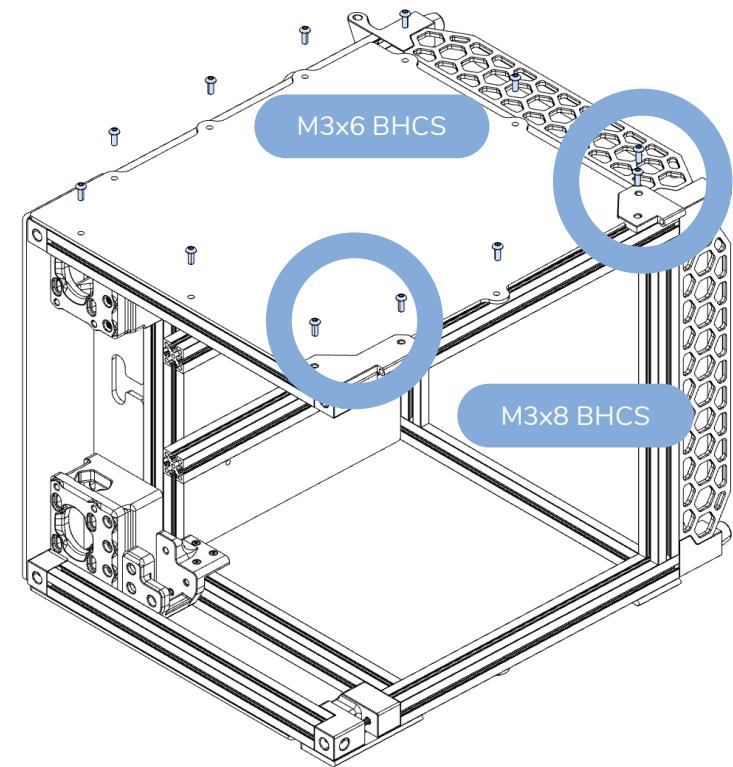


Apply VHB Tape

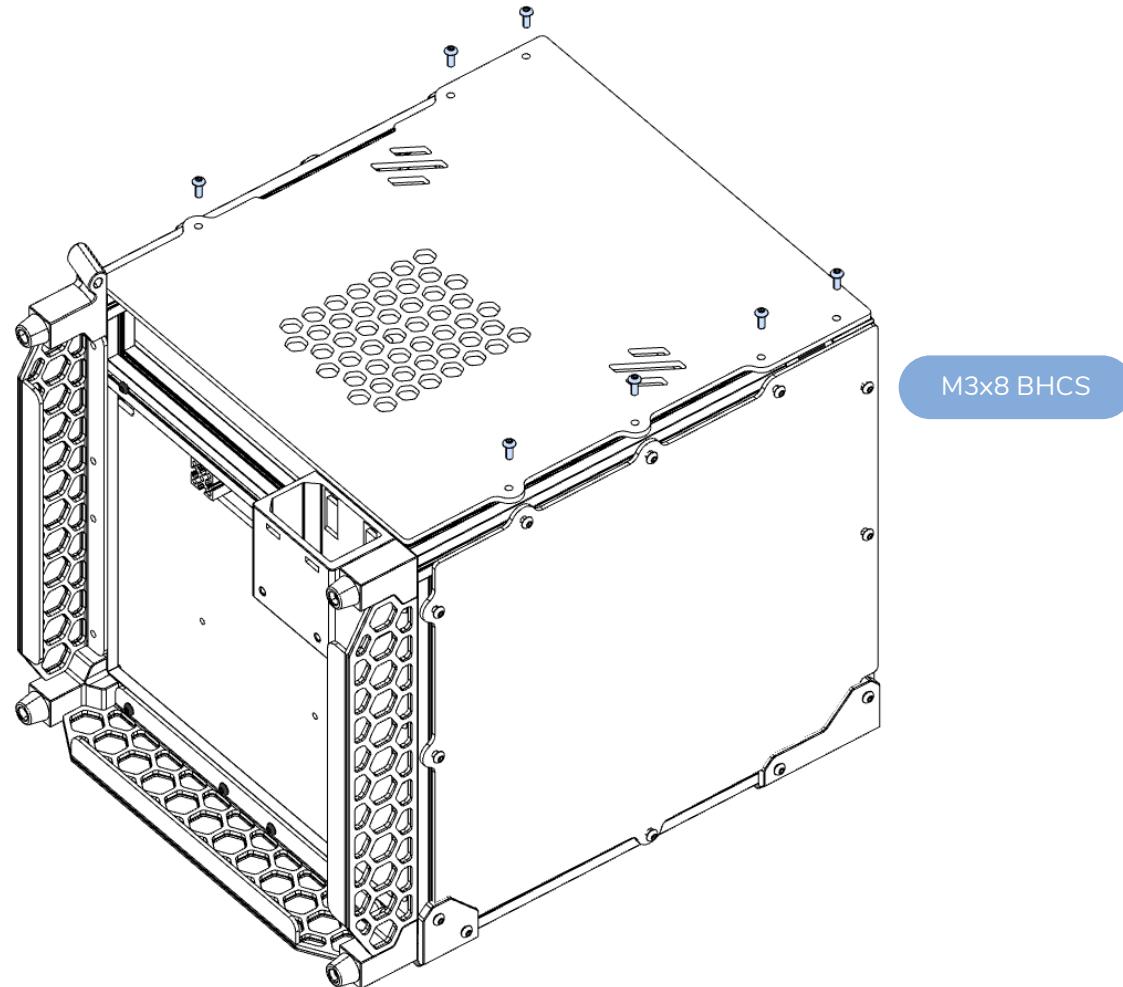


### 铰链

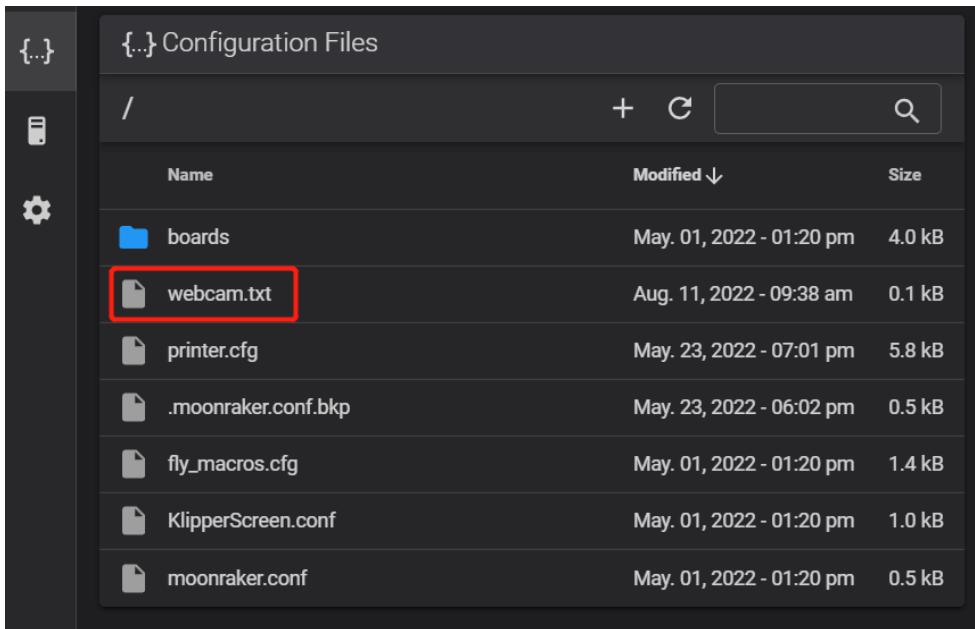
使用右侧面板的铰链部件。



## PANELS



## Appendix 1: add USB camera



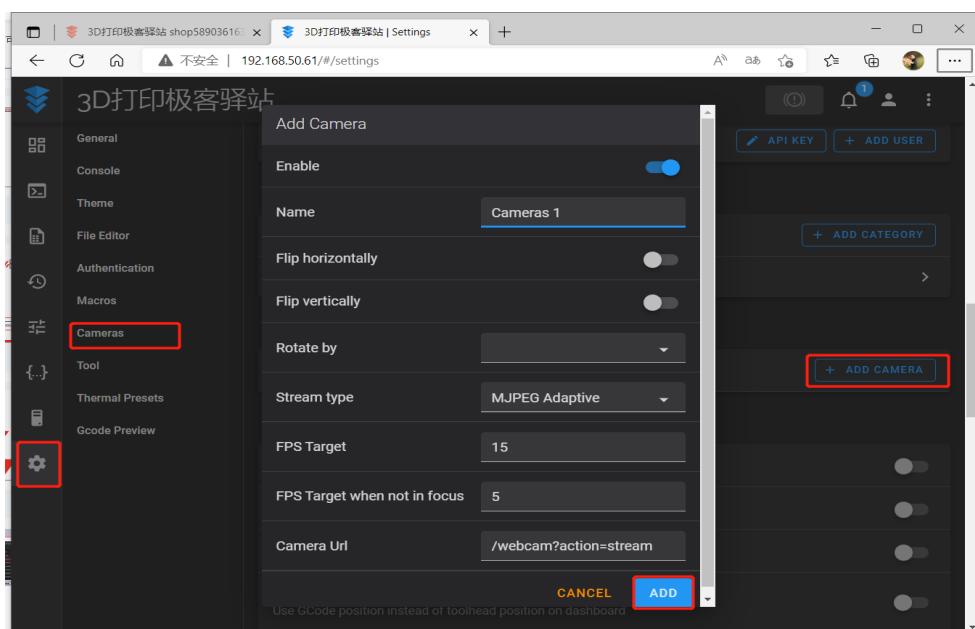
Plug the USB camera into the port of the motherboard  
Find [webcam. TXT] in the configuration file and open it.

```
camera="usb"
camera_usb_options="-r 640x480 -f 10 -d /dev/video0"
camera_http_options="-n -p 8080"
```

Delete all the contents first.  
Then add the contents in the red box above,  
Save and restart in the upper right corner

```
camera="usb"
camera_usb_options="-r 640x480 -f 10 -d /dev/video0"
camera_http_options="-n -p 8080"
```

Note: if the fourth step is completed and the screen  
is not displayed, please try to change the digital  
part of [video0] in the above code to 1 / 2 / 3.



Add a camera to the settings. Set a name  
For the rest, keep the default configuration and  
click [add]



When you return to the console, the monitoring  
screen of the camera will be displayed.