

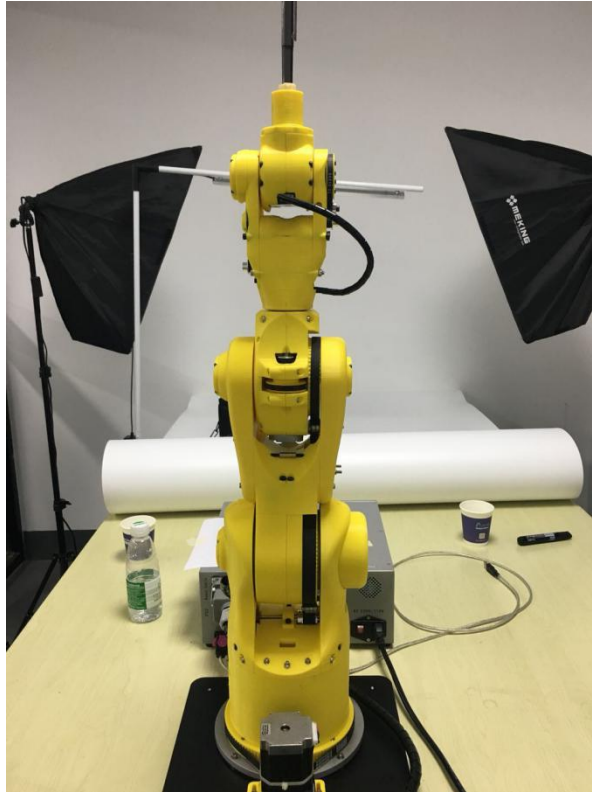
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Prepare

1) Positioning before power-on

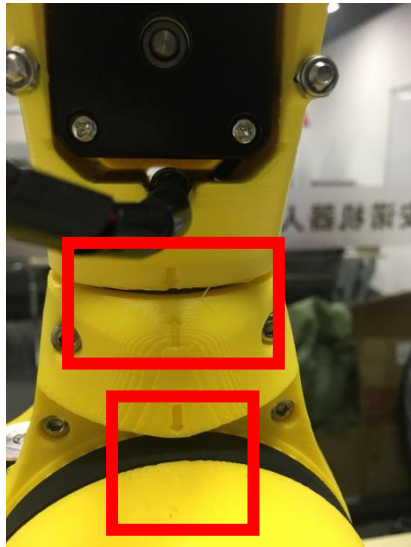
Manually place the machine in the vertical position as follows before turning the power on:



2) Joint position confirmation

After the placement is completed, pay attention to the alignment of the second joint and the third joint arrow, and try to ensure that the machine is in the vertical state, as shown in the following figure:

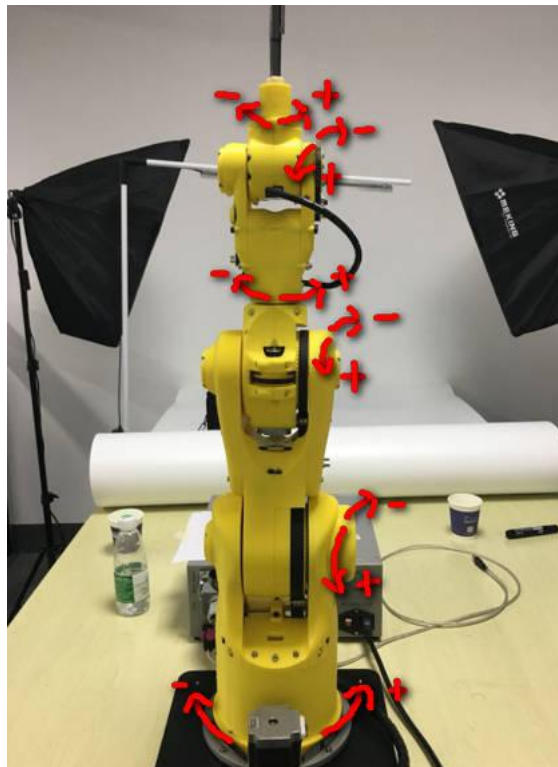




3) Direction confirmation

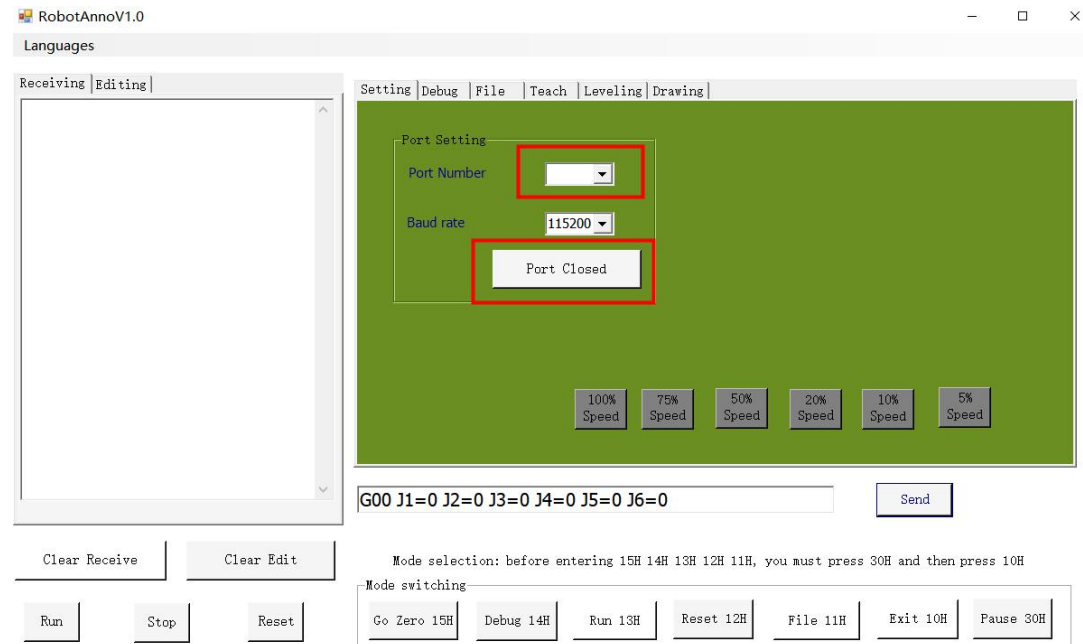
As shown in the figure below, first confirm whether the direction of each joint movement is consistent with the direction shown in the figure below.

Before the machine is shipped from the factory, the direction parameter has been set to OK. If the direction is inconsistent with the direction shown in the figure during the test, please reset the position of the robot after power off, and then test again. The direction of each joint of the robot must be ensured. Consistent.



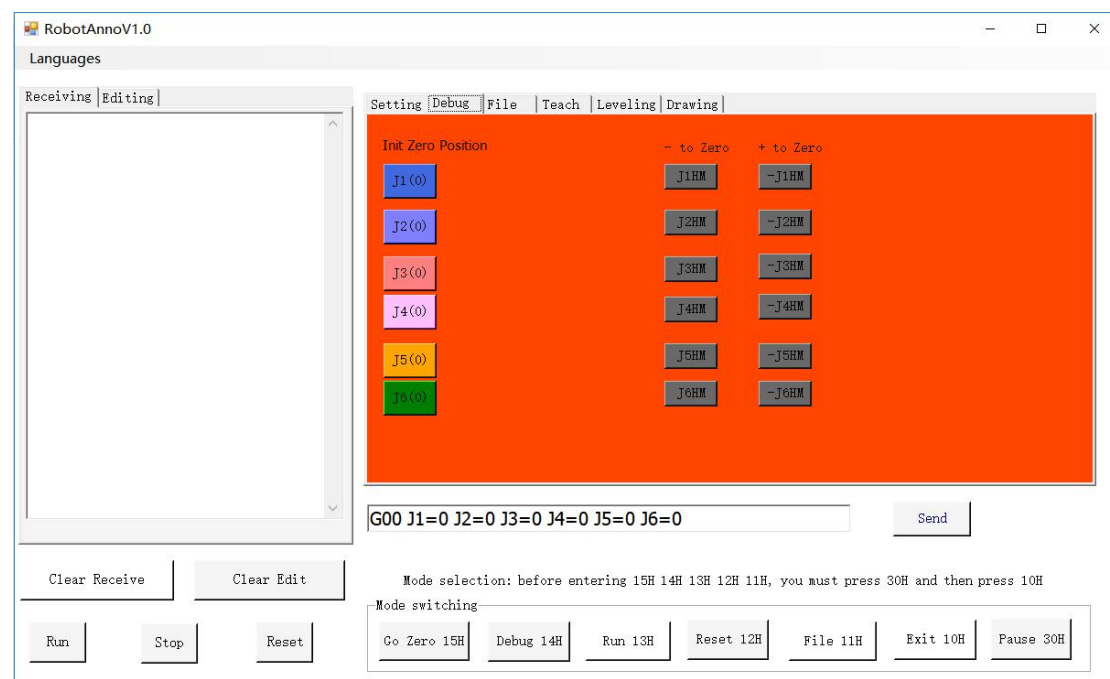
1. Establish a connection

Select the correct serial port number, and then click the [Port Closed] button as shown below.



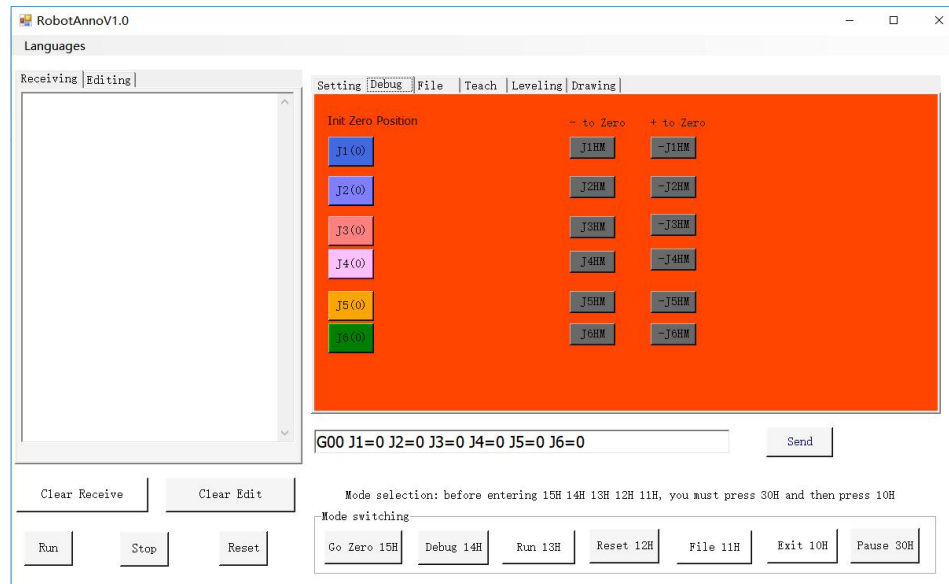
2. Single axis to control robotic arm

1) Enter Debug mode



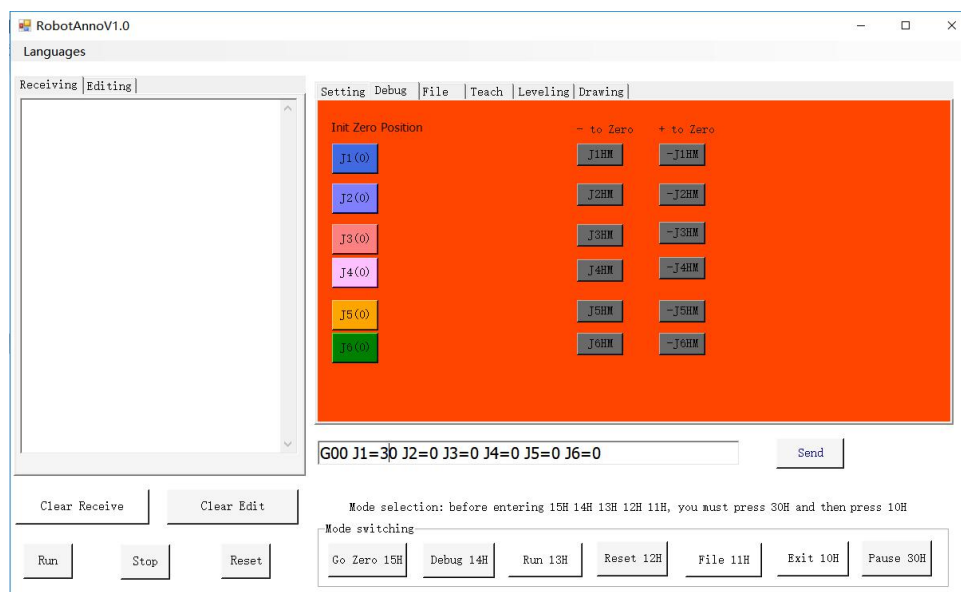
Click the button shown above, [Pause 30H], [Exit 10H], [Debug 14H]

2) Initialize the position of each joint



Click each button as shown above, **【J1(0)】**, **【J2(0)】**, **【J3(0)】**, **【J4(0)】**, **【J5(0)】**, **【J6(0)】**

3) Joint angle controls each axis motion



As shown in the figure above, at the input G00 J1=30 J2=0 J3=0 J4=0 J5=0 J6=0, click the [Send] button, you can see that the first joint rotation angle of the arm is 30 degrees.

note:

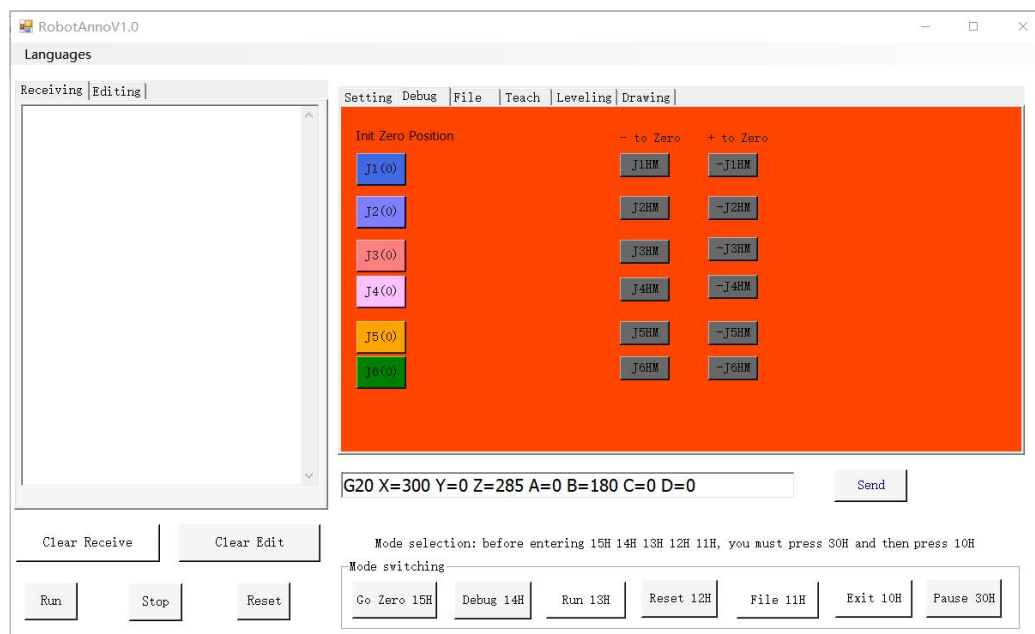
- 1) If only one joint rotation is required, the command `G00 J2=20.6` can also be sent. This command indicates that the second axis rotation angle is 20.6 degrees, and the other joints do not move.
- 2) If you need more than one joint movement, you can send the command `G00 J1=20 J2=20 J3=20 J4=20 J5=20 J6=20`, this instruction indicates that each joint rotates to 20 degrees.
- 3) All angle values are absolute angles. The so-called absolute angle, that is, if you send the command `G00 J1=30` and then send `G00 J1=30` again, then the second time will not see any action of the arm, because the first command has moved the arm It is 30 degrees.

3. Space coordinate system control arm

premise:

Because our robotic arm is an open-loop solution, it does not have the same amount of feedback as the servo motor, so we need to pay attention to the following points:

1. Before starting the machine, make sure that the arm is in the vertical state. By default, the angle of each joint is 0 at this time.
1. To move the machine to the door position, the command to be executed is: `G00 J1=0 J2=0 J3=-90 J4=0 J5=-90 J6=0`, after moving to the door position, the command to be executed is: `G20 X= 217.4 Y=0 Z=431.1 A=0 B=180 C=0 D=0`, the robot will not move at this time. Through this operation, the rotation angles of the respective axes in the controller are matched with the spatial coordinate values.

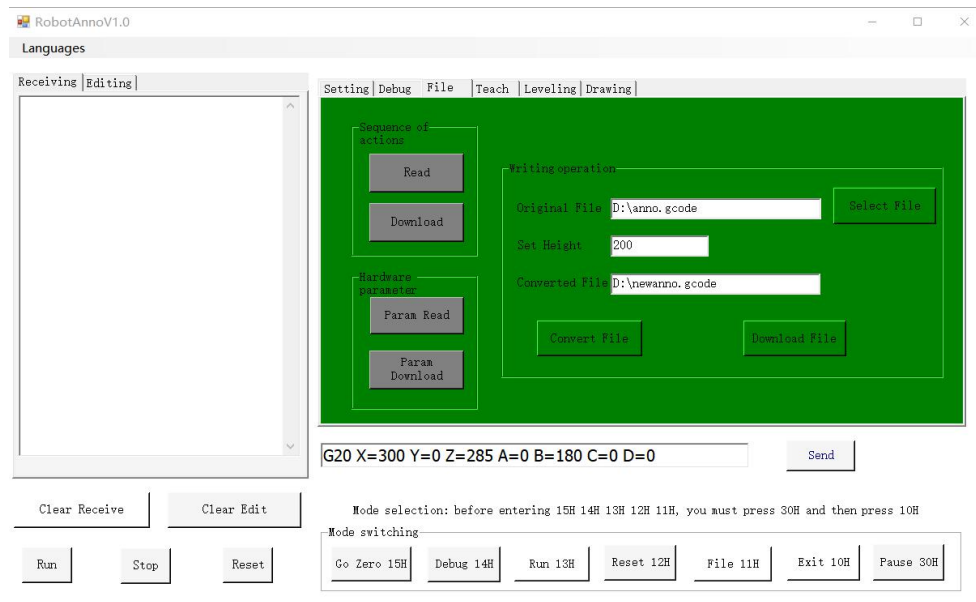


Before doing this, be careful to use debug mode.

As shown above: Input command `G20 X=300 Y=0 Z=285 A=0 B=180 C=0 D=0`, click the [Send] button to move the end of the robot arm to (300, 0, 285) The spatial coordinate position.

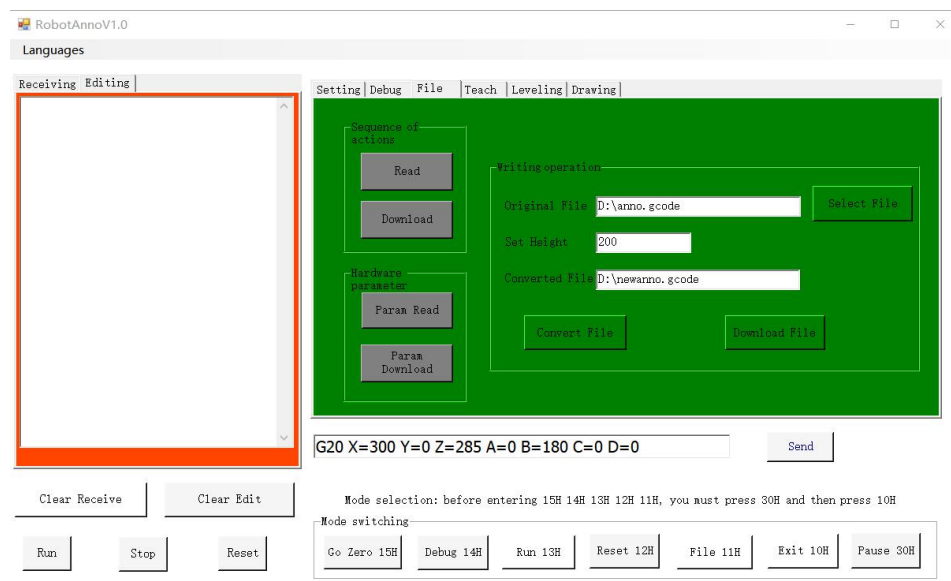
4. Execution file

1) Enter file mode



As shown in the figure above, click the button [Pause 30H], [Exit 10H], [File 11H], and enter the file mode.

2) Read the file



After selecting the tab of [File], click the [Read] button, and then select the tab of [Edit Area] to copy the following contents to the editing area:

```

FILE=ST
AM.ST
216
code:
G00 J1=0 J2=0 J3=-90 J4=0 J5=-90 J6=0
G20 X=217.4 Y=0 Z=431.1 A=0 B=180 C=0 D=0
G20 X=300 Y=0 Z=285 A=0 B=180 C=0 D=0
G20 X=400
G20 Y=100
G20 X=300
G20 Y=0
G20 X=217.4 Y=0 Z=431.1 A=0 B=180 C=0 D=0

```

The contents of the above document achieve a continuous motion of a square track.

FILE=ST indicates the file type

AM.ST indicates the name of the file.

216 indicates the number of bytes of the file

Code: the rest of the code is the run command

“

FILE=ST

AM.ST

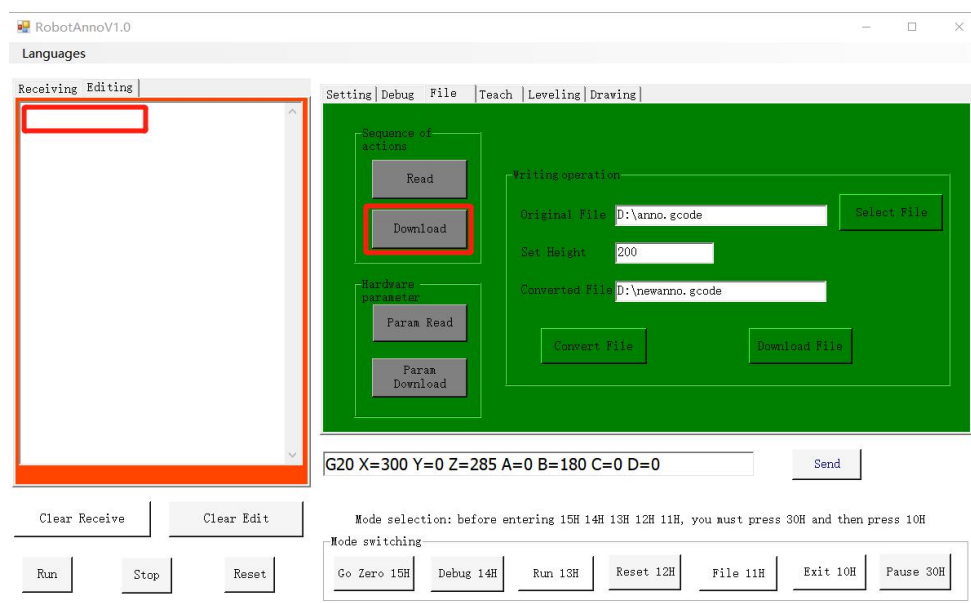
216

code:

“

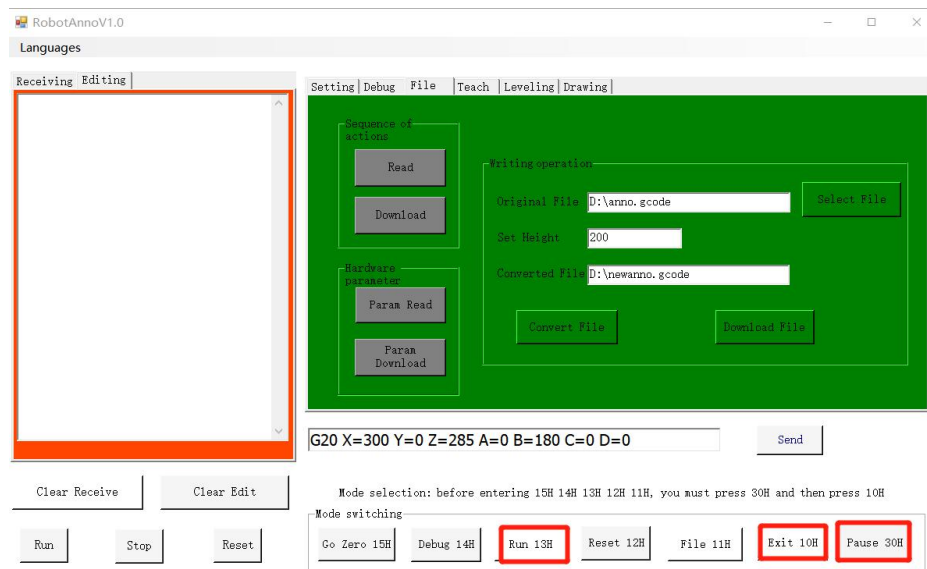
This part is the file header. Every executable file can be run like this. 216 bytes can be filled with a number first. After downloading, the controller will calculate a correct number of bytes to fill.

3) Download file to controller



As shown in the figure above, click the [Download] button and the prompt for download success will be displayed at the location shown in the editing area.

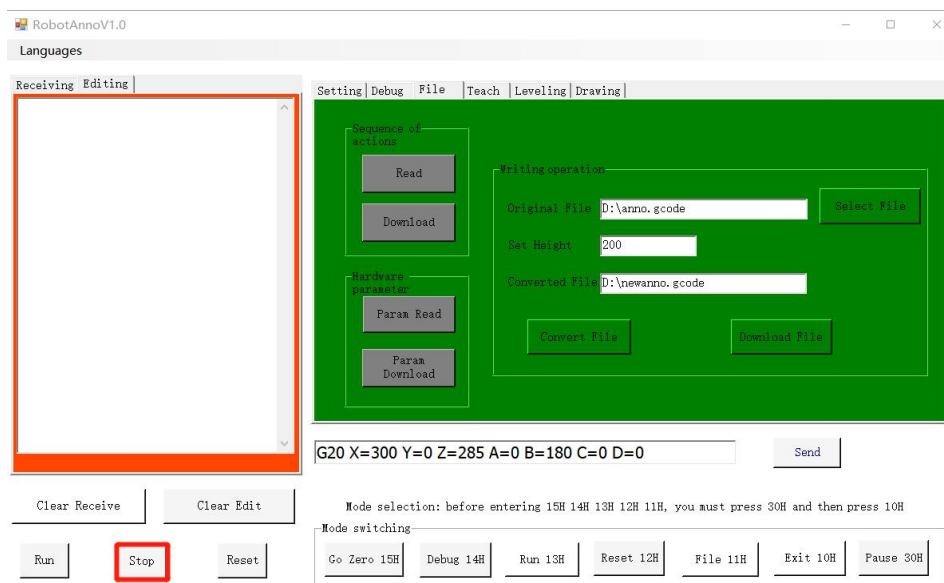
4) Running file



As shown in the figure above, click the button [Pause 30H], [Exit 10H], [Run 13H], and you can see the movement of the arm.

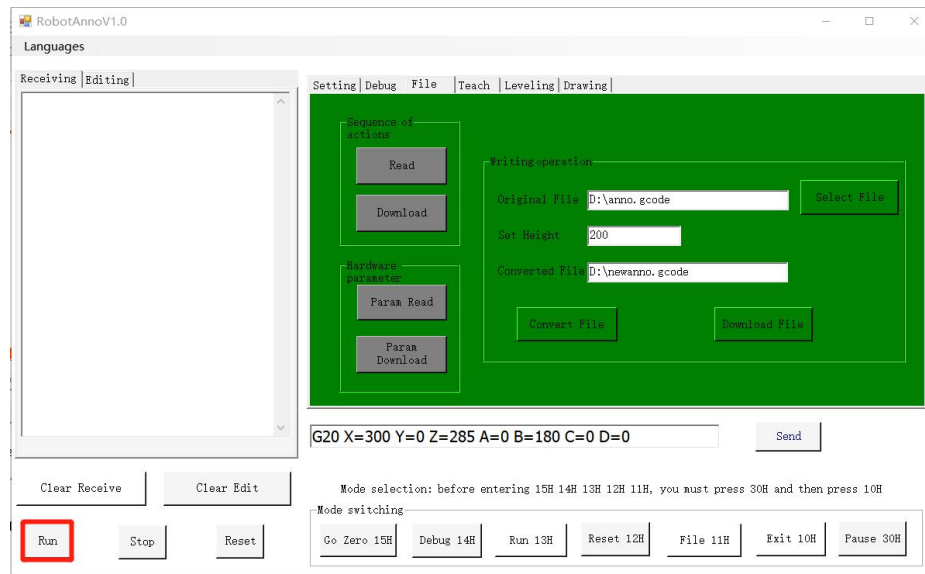
For the file to run, the arm will continue to move and will not stop automatically.

5) Stop file running



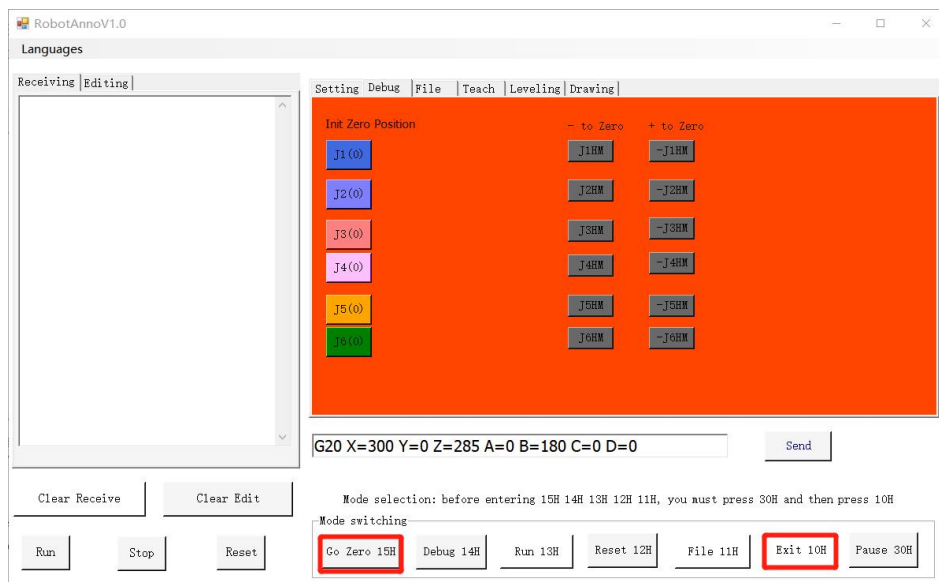
As shown in the figure above, when the file is running, if the arm is always moving and you need to stop the movement, click the [Stop] button and the arm will stop moving.

6) Resume file movement



As shown in the figure above, after stopping the file movement, if you need to continue the movement of the previously stopped file movement, click the [Run] button, you can see that the robot arm continues to move at the position where it stopped before.

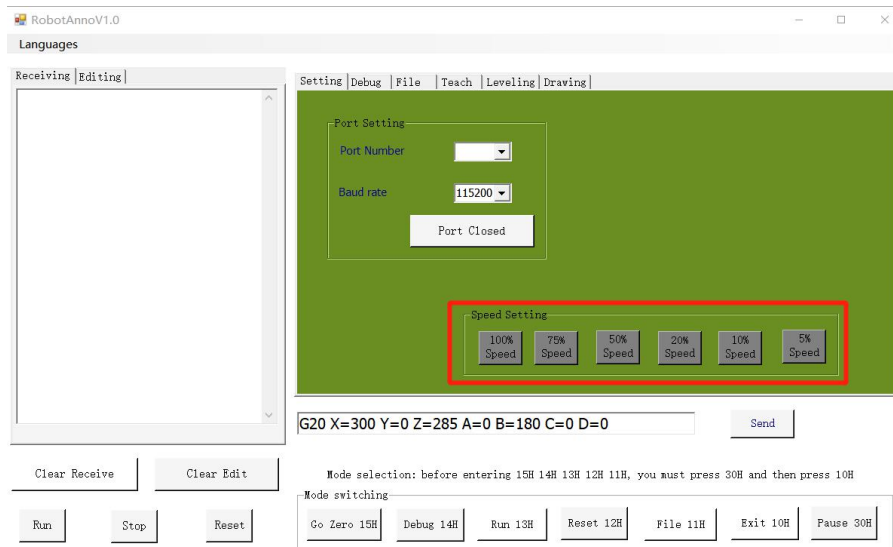
7) The arm returns to the zero position



As shown in the figure above, if you need the arm to return to the zero position (vertical position), click [Pause] -> [Exit] -> [Return to zero], the arm will move to the vertical position.

After clicking the above three buttons, if the arm does not move, click the three buttons in turn.

5. Adjust the speed

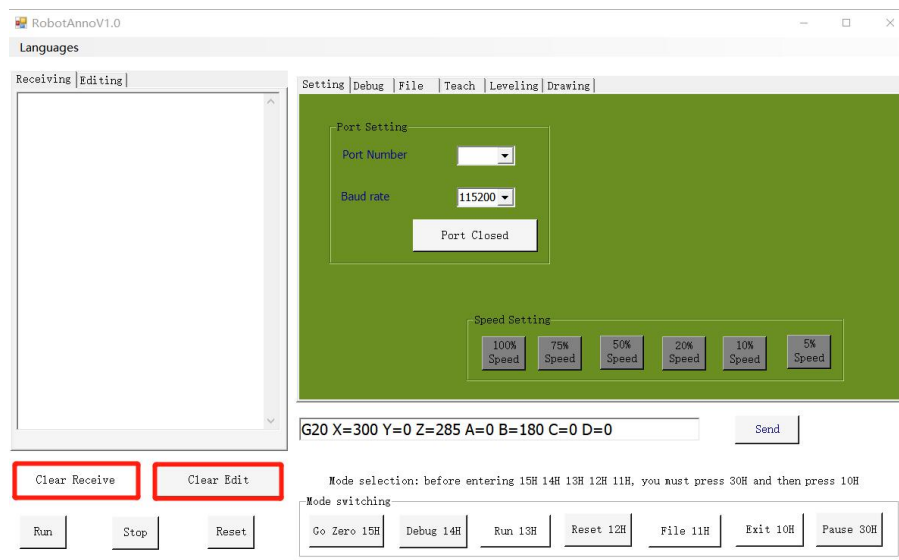


As shown above, the row of buttons adjusts the speed of the arm movement.

note:

- 1) If the button for adjusting the speed is pressed while the file is moving, then in the subsequent movement, it will run at the speed you set.
- 2) If a button for adjusting the speed is pressed before executing a single command, the next motion command will move at the speed you set.

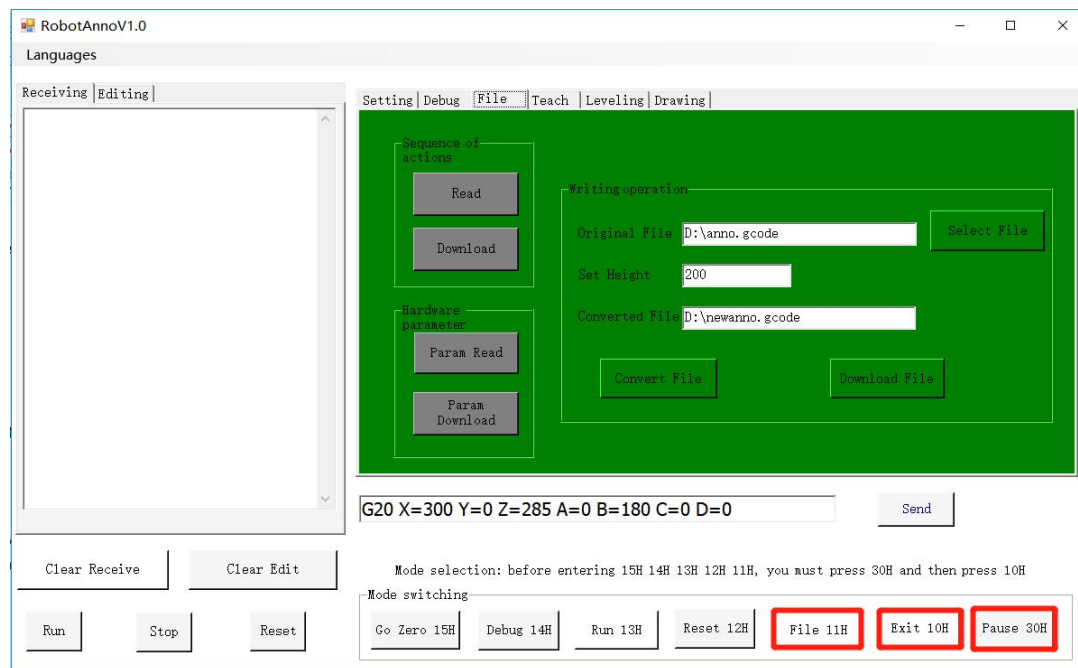
6. Clear operation



As shown in the figure above, if there is more data in the [Receive Area], you can press the [Clear Receive] and [Clear Edit] buttons to clear the data in the receive area.

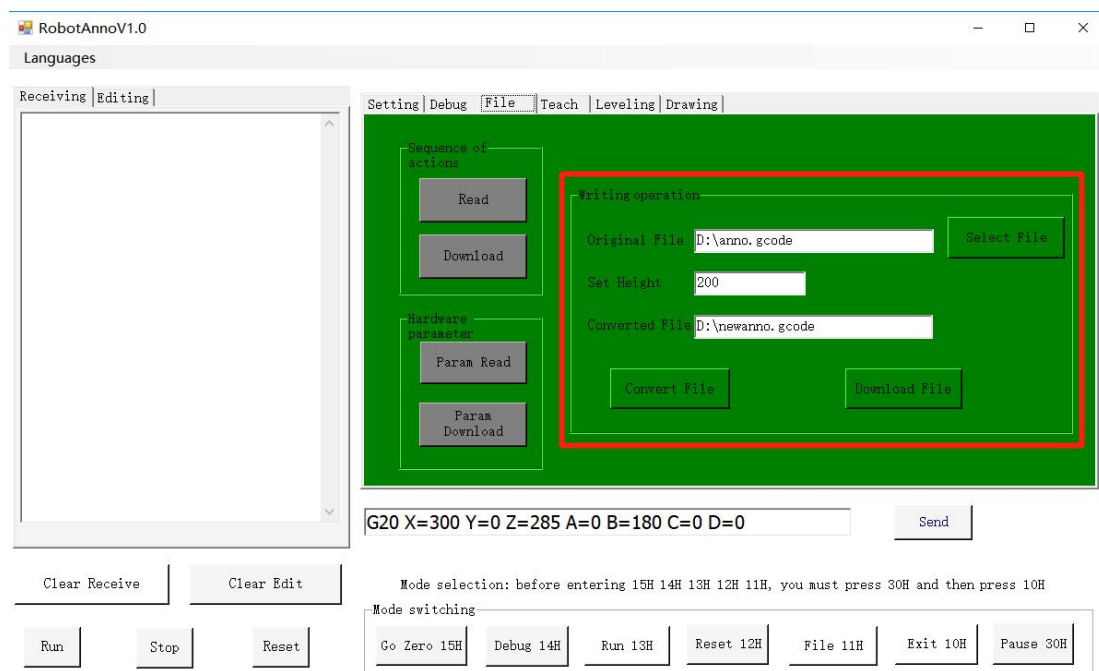
7. Writing

1) Enter file mode



As shown in the above figure, writing is one of the file operations, so you need to switch the controller to file operation, click [Pause] -> [Exit] -> [File]

2) Preparation of word files



As shown in FIG:

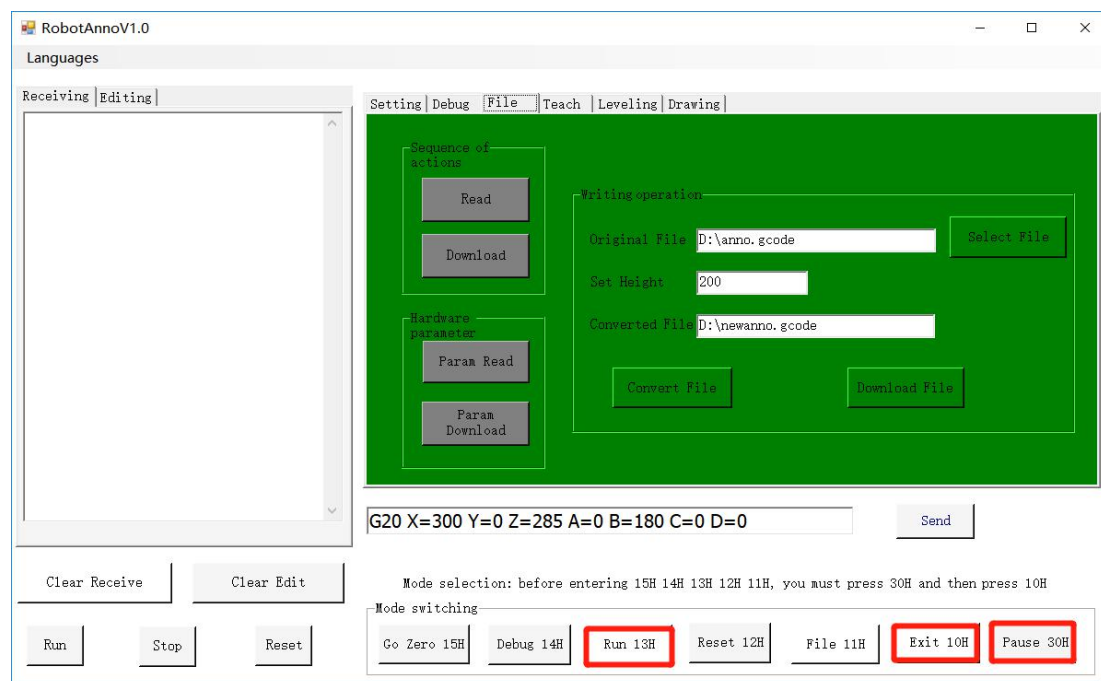
Original file: is a g code file generated using inkscape

Height setting: the height of the writing position

Converted file: is a written file that the robot arm can recognize

First select the original file, then set the height of the writing, click [Convert File], switch the left area to [Edit Area], you can see the converted file content; click [Download Data], if the execution is successful, it will be on the left [Edit Area] displays the prompt "Download Successful".

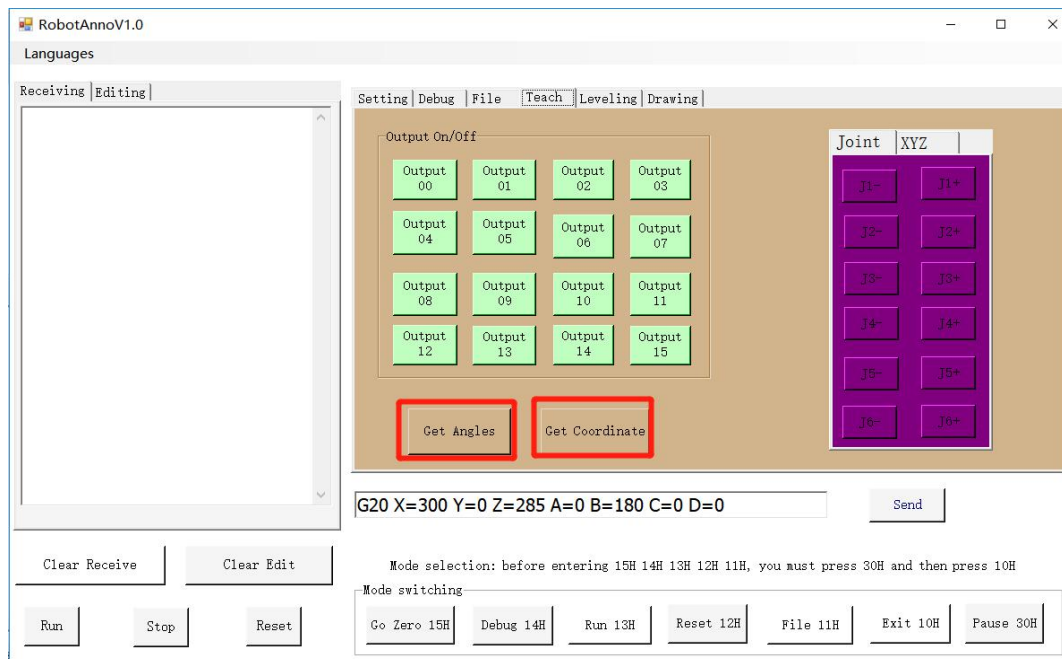
3) Perform writing



As shown in the figure above, click [Pause] -> [Exit] -> [Run], the robot arm will start writing.

Please note: In the process of writing, there may be cases where some words cannot be written and some words are too thick. This situation arises because of the inaccuracy of the zero position of the arm. The zero position of the arm needs to be re-adjusted.

8. Check the current position of the arm



As shown in FIG:

View the joint rotation angle position of the arm, click [Joint Output], and then click [Pause 30H]. In the [Receive Area], you can see the rotation angle of each joint.

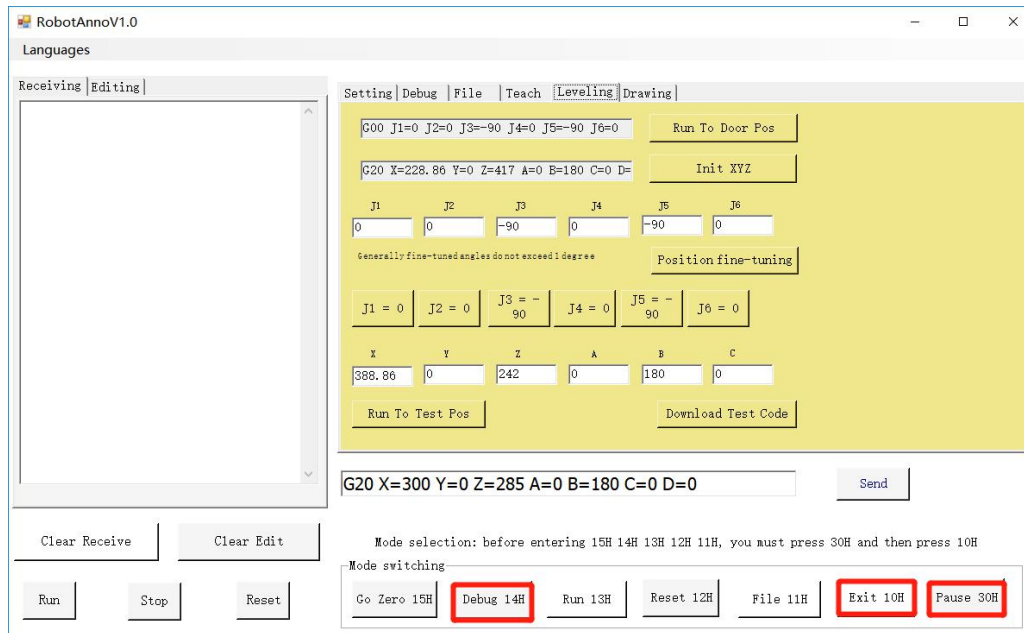
View the spatial coordinate position of the arm, click [Coordinate Output], and then click [Pause 30H]. In the [Receive Area], you can see the position of the space coordinate.

9. Robot arm zero leveling

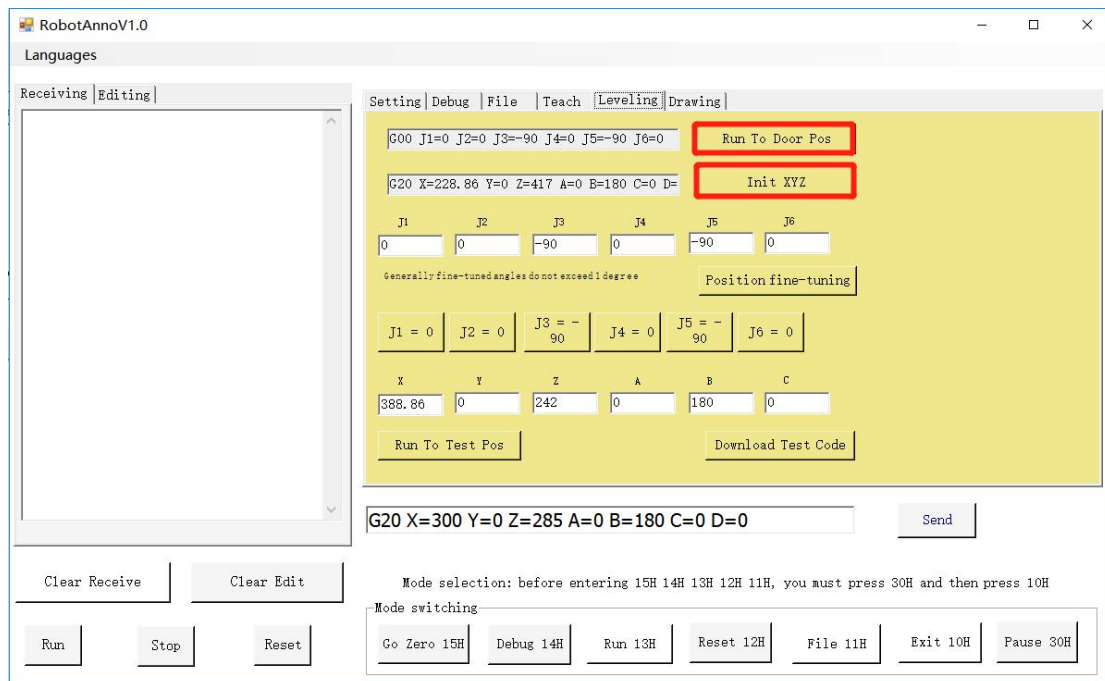
After the robot arm is powered up, before the application action (such as writing, drawing, etc.) is performed, in order to allow the robot arm to reach a relatively accurate absolute position, at this time, the robot arm needs to be zero-leveled.

1) Movement to door position

First set to debug mode, as shown below, click [Pause] -> [Exit] -> [Debug]



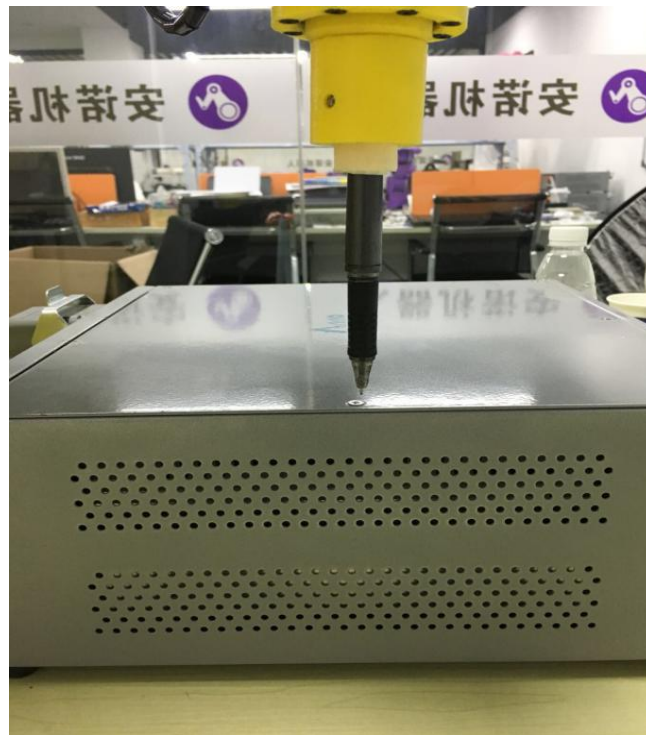
Then, move the arm to the door position, as shown in the figure below, click [Move to door position] -> [Initialize XYZ]



2) Zero leveling

We usually have a sharp-pointed end at the end of the arm, such as a water-based pen. Then let the arm use the controller as a reference and move along one side of the controller, as shown

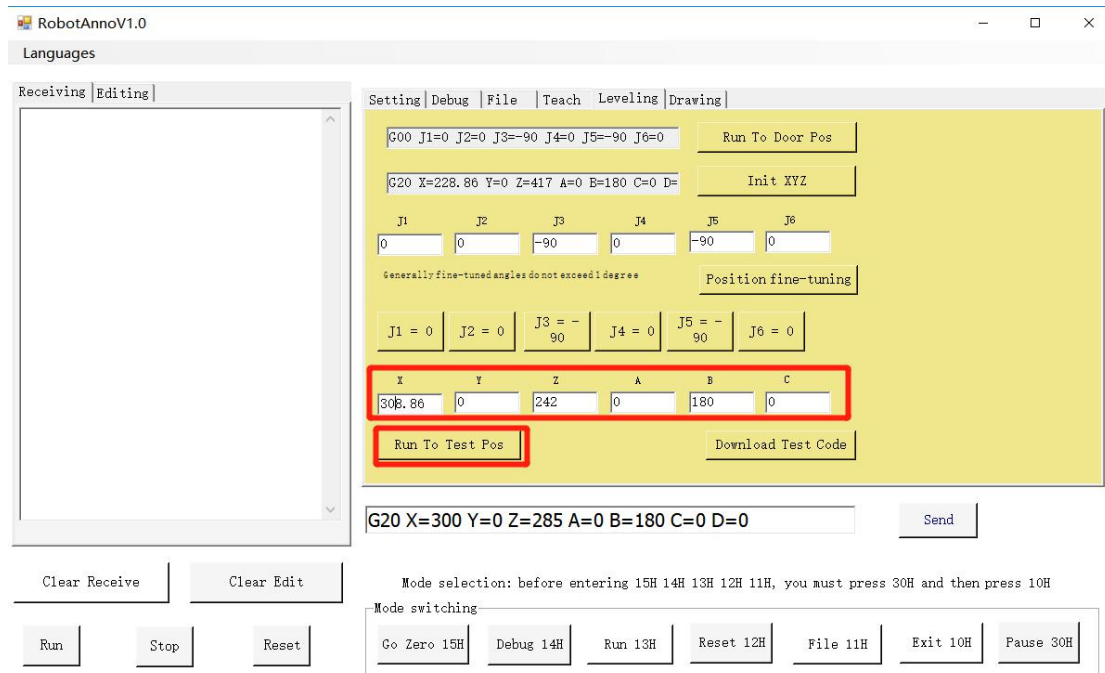
below:



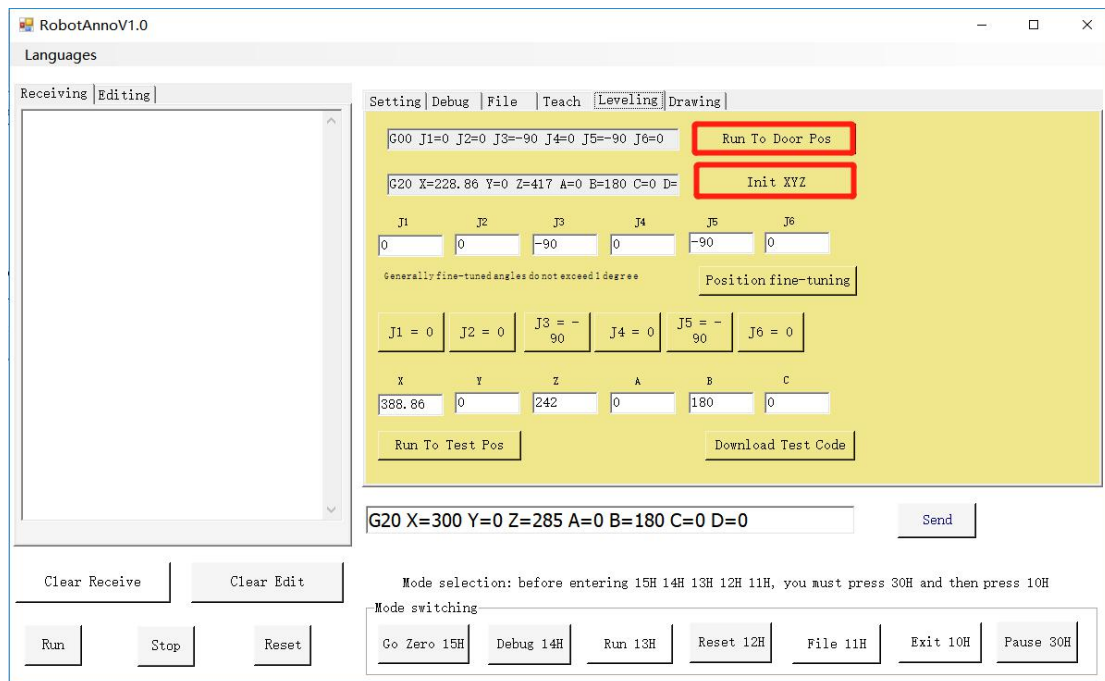
Leveling in the X direction:

1. As shown in the figure below, after adjusting Z and Y to an appropriate value, only change the value of X, increase or decrease by 20 each time, and let the arm move in the X-axis direction.

It is necessary to observe carefully: as X increases or decreases by 20 each time, whether the end will appear downward or upward. If this happens, the zero position needs to be adjusted.



2. When the zero point needs to be adjusted, return the arm to the door position. As shown in the figure below, click [Move to door position] -> [Initialize XYZ]



3. Adjust the zero position

Common situation: When X increases, the end sinks; when X decreases, the end rises.

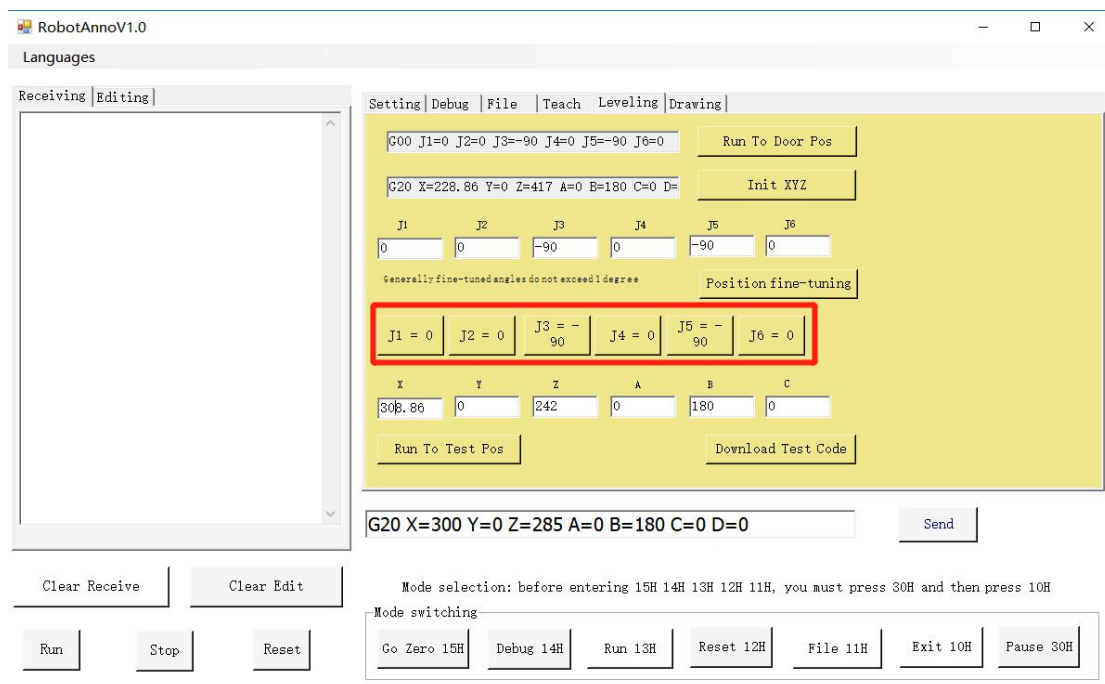
In this case, the joints that need to be adjusted are two, three, and five joints. In the door position, the above common situation occurs. Generally, the second joint or the third joint is required to be lifted up. Generally, the 0 of J2 is changed to 0.5, and the -90 of J3 is modified to -89.5, so that the effect of lifting upward is achieved. In general, fine tuning will not exceed 1

degree.

At the door position, you need to pay attention to whether the arrows of each joint are aligned. If there is no alignment, please adjust accordingly.

As shown in the figure below, modify the corresponding value to fine tune the position. The specific operation is:

Modify the values corresponding to J1, J2, J3, J4, J5, and J6, and click [Location Fine Adjustment] to move the machine to the corresponding position.



After fine tuning, you need to set the machine position to zero position, as shown below, do the following:

Click [J1 = 0], [J2 = 0], [J3 = -90], [J4 = 0], [J5 = -90], [J6 = 0]

Then, the leveling in the X direction is performed, and the above steps are sequentially cycled until the X-axis direction is increased or decreased by 20, and the end of the arm is observed within the range of the mechanical arm reachable [228.86, 388.86]. There will be a situation of sinking or lifting, that is, the leveling in the X-axis direction is completed.

The leveling in the Y-axis direction is the same as the leveling in the X-axis direction, except that when fine-tuning, the first and fourth joints need to be adjusted.