Z-Arm 2140 PC Software

Instructions

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PC Software Instructions of Z-Arm 2140

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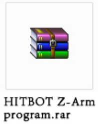
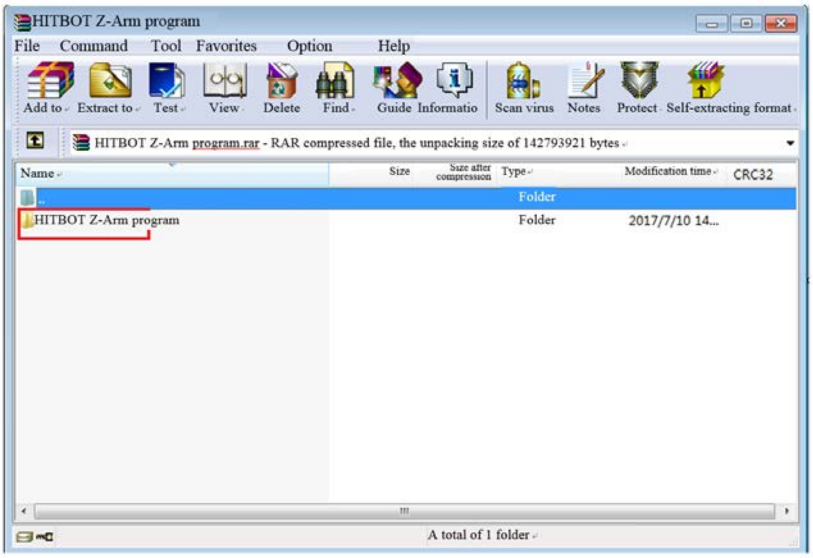
1. Software specifications

1.1 Software installation

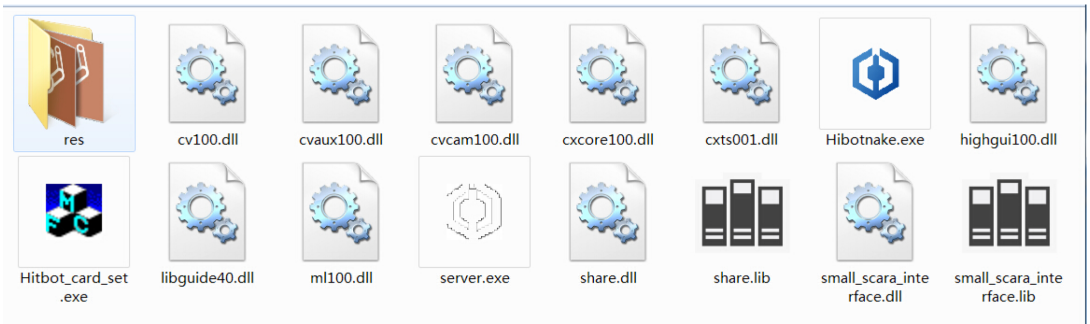
Get the software compressed package we provide 

, and then open the compressed package and unzip the " HITBOT Z-Arm program " folder to the local.



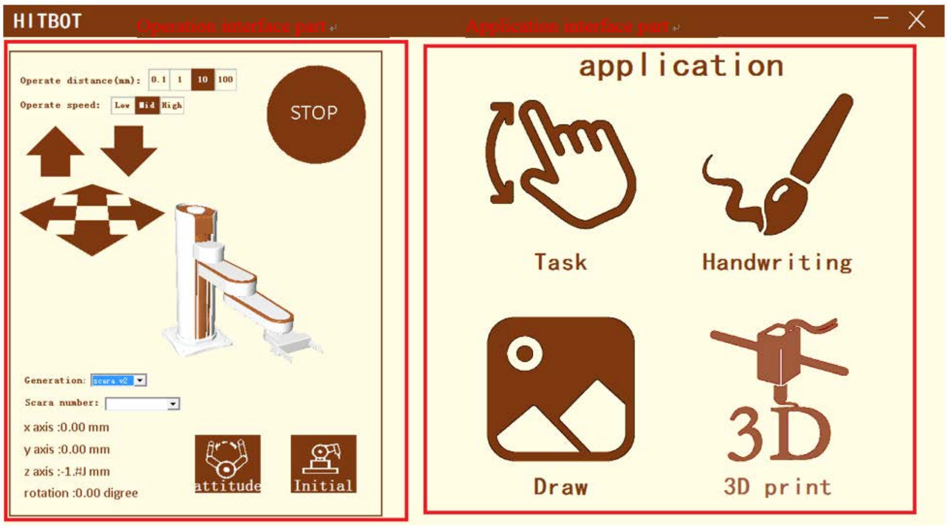
After decompression, open "HITBOT &Z-Arm program" folder, and find the

Hibotsnake.exe file to open it directly, without the need of installation.



1.2 Software interface specifications

After opening the Hibotsnake.exe file, the present interface is the main interface of our program, which are divided into two parts: the robotic arm operation interface and the application interface.



Operation interface part: In this part, we can complete the operations of the robotic arm initialization, robotic arm emergency stop, robotic arm inching, robotic arm mouse dragging, robotic arm end coordinate display.

Application interface part: In this part, some commonly used robotic arm applications are provided, such as teaching playback, robotic arm handwriting, robotic arm sketching, 3D printing and so on.

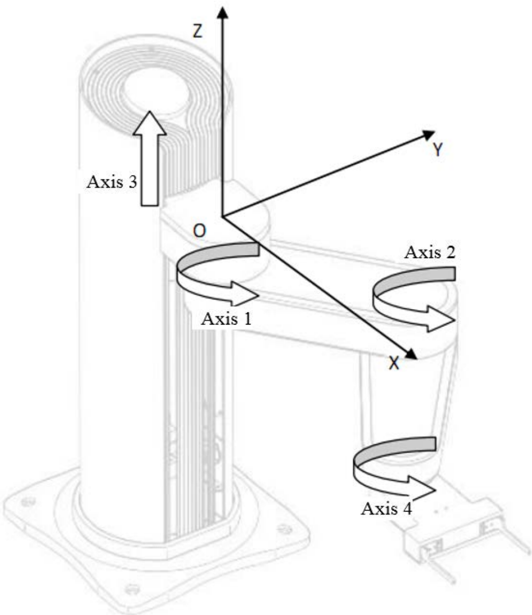
2. Description of robotic arm operation interface

When we open the program, we need to click the initialization button to initialize the robotic arm before we can operate the robotic arm. Then, when the robotic arm model in the interface is the same as the actual robotic arm's attitude, we can operate the robotic arm for inching or mouse dragging operation. When an accident occurs, we can click the stop button, and the robotic arm will stop moving and release the torque. The coordinates of the center point of the robotic arm end are also displayed at the lower left corner of the interface in real time.

2.1 Definitions of Z-Arm coordinate system

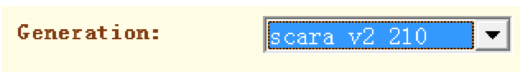
Axis 1 of Z-Arm is defined as robot arm joint 1, and positive direction is counterclockwise looking from the top downward, as shown in the figure; axis 2 is defined as joint 2, and positive direction is counterclockwise looking from the top downward; axis 3 is defined as the robot arm up and down movement, and the positive direction is vertically upward; the distance from joint 1 to joint 2 is 200mm, the distance from joint 2 to the end axis is 200mm, and the upper and lower stroke of axis 3 is 210/310mm.

The X axis positive direction of robotic arm is defined as the direction of the robotic arm body to the front, as shown in the figure; the Y axis positive direction is defined as facing the robotic arm body, towards the right direction from the body, as shown in the figure; the Z axis positive direction is vertically upward of the joint 1 axis direction, as shown in the figure; the Z axis zero point is defined at the position that the robotic arm runs to the highest position, namely the position after initialization. (If it is the first initialization of the robotic arm after being electrified exactly, the robotic arm axis 1 and axis 2 are zero, and the arm is stretched, so the coordinates of the arm end is (400,0,0)



2.2 Initialization of the robotic arm

After the program is opened, it needs to be initialized before operate robotic arm. Before initialization, high version or low version will need to be selected for the Z-Arm controlled;



scara v2 here is high configuration version and scara v1 is low configuration version, and rear number represents up and down stroke. (You can't make mistakes here)

You also need to choose which robotic arm to control here.

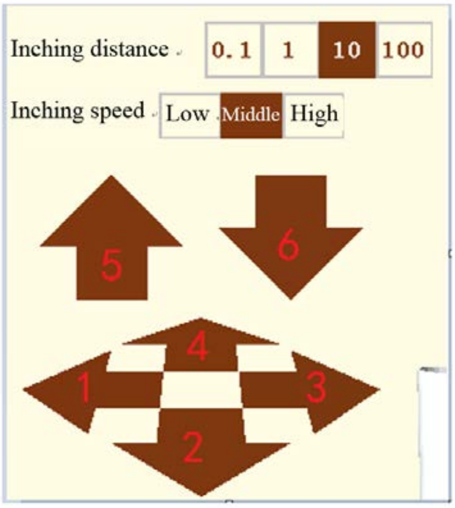
When the robotic arm is connected, the drop-down list here will automatically detect the list of optional robotic arms, and then the robotic arms can be selected here.

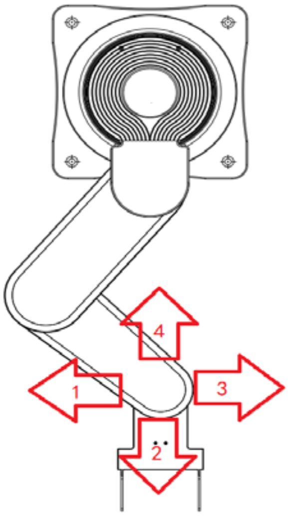
After the above two options have been determined, you can click the initialization button on the operation interface 

, and then the robotic arm can be initialized. The function of initialization is to give torque to each joint of the robotic arm, and synchronize the attitude of the robotic arm to the 3D model of the program.

2.3 Inching operation of the robotic arm

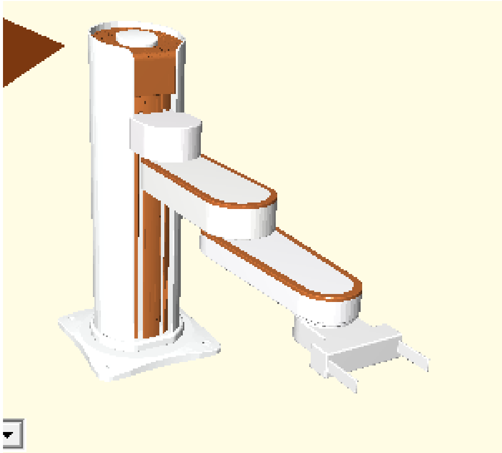
The inching operation part of the robotic arm is as shown in the figure, of which there are 4 distances optional for the inching distance, namely 0.1mm, 1mm, 10mm and 100mm respectively. There are also three speeds optional for the inching running speed, which are low, medium and high respectively. The lower 1 to 6 are buttons for moving in different directions, of which 5 for moving upward of Z axis, 6 for moving downward of Z axis, and 1 to 4 for moving of XY plane, corresponding to moving in 1 to 4 directions respectively on the right figure.

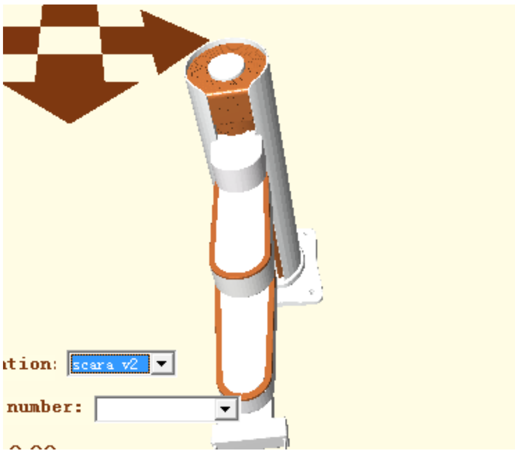




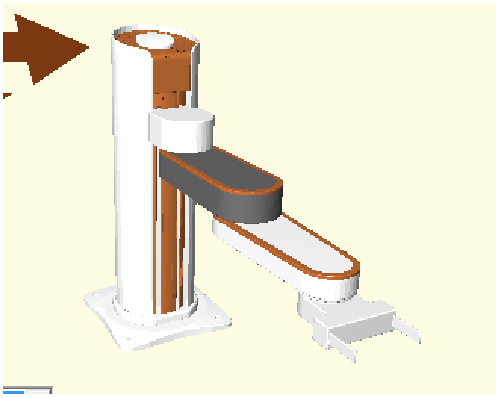
2.4 Mouse dragging of the robotic arm

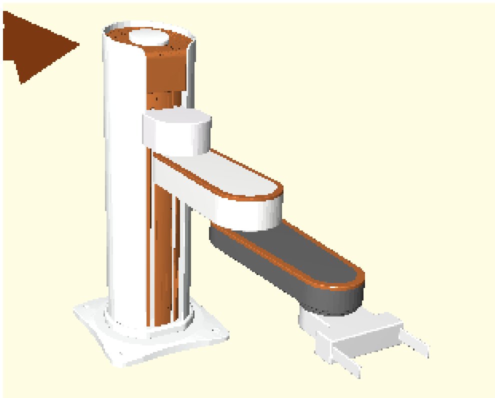
There is a 3D model in the middle of the interface displaying the real-time attitude of the robotic arm, and we can use the right mouse button clicking and dragging to turn over the model (right mouse button clicking and dragging will only turn over the model, and the robotic arm will not move), to realize the observation from different angles. For example, the initial model is as shown in the below left figure, we can use the right mouse button to drag the model to the angle on the right.



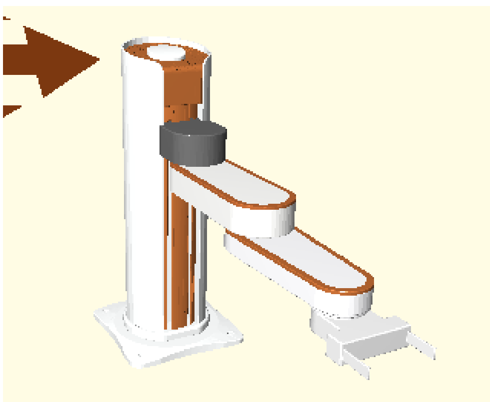


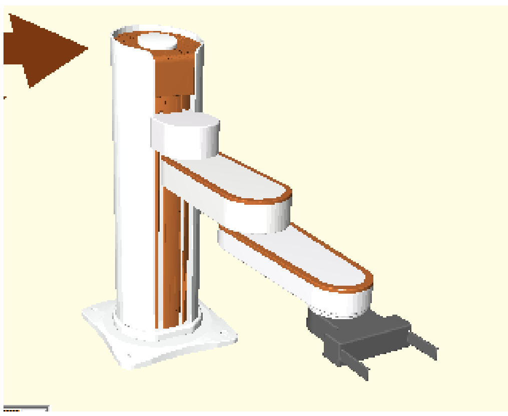
We can also manipulate the movement of corresponding joints by the left mouse button dragging. For example, when we need to drag arm 1 to rotate, we first click arm 1 with the left mouse button, and then arm 1 will darken, as shown in the following picture. Then we can drag arm 1. It is the same when we need to drag arm 2.





When we need to drag Z axis for up and down movement, we need to use the left mouse button to click on the upper component of joint 1; after the component darkens, we can drag Z axis for up and down movement. The end rotation axis is the same.





2.5 Emergency stop of the robotic arm

When the robotic arm accident occurs, we click the STOP emergency stop button, the robotic arm will stop moving, and unload the torque. After the accident releases, we need to re initialize to continue to operate the robotic arm.

2.6 Attitude conversion of the robotic arm

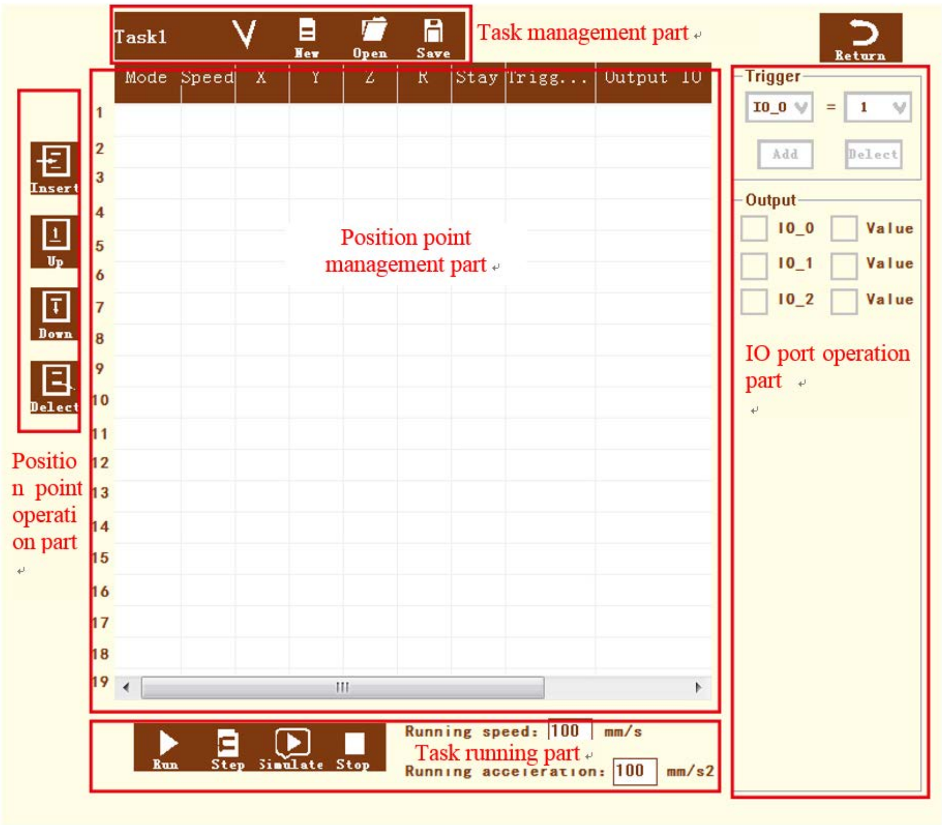
Usually, when the robotic arm end is in the same coordinate position, the robotic arm can have two kinds of attitudes, like the left-hand attitude and the right-hand attitude respectively. But in some limit position conditions, maybe it can reach by only one attitude; and it cannot reach due to the restrictions of a joint movement angle by the other attitude, so it needs to change the attitude to reach. Click the attitude button here to change the attitude.

3. Application interface description

There are 4 buttons on the main application interface, which are teaching playback, handwriting, sketching and 3D printing. Click the button, you can enter the corresponding application interface.

3.1 Instruction of teaching playback interface

The teaching playback interface is mainly divided into 5 parts, which are task management part, position point management part, position point operation part, IO port operation part and task operation part, as shown in the following picture:



Each part is explained as follows:

3.1.1 Task management part

The task management part consists of a drop-down list and three buttons. You may add a new task by the New button, where the task can add a number of position points, and it will run to each position point in turn. You may save all the tasks in the current task list to the file by the Save button. The suffix of the file is .taskdat. Click the Open button and open the file with the suffix of .taskdat in the folder to open the originally saved tasks. Drop down the list to select tasks that need to be edited or run.

3.1.2 Position point operation part

In this part, you can insert a position point to the current task. The x, y, and z coordinates of the default inserted position point are the end coordinates of the current robotic arm, and can also be modified directly in the position point management part. Click Up button to move the position point up and to move it down in the same way. You can click Delete key to delete the unnecessary position point.

3.1.3 Position point management part

In this part, we can clearly see the number of position points, x, y, and z coordinates in the current task. In this part, we can double-click some cells to edit the attributes of the position points directly.

The detailed explanation of the table is as follows:

- Running mode: There are two choices for the running mode, MOVEJ and MOVEL. MOVEJ means that regardless of the trajectory of the robotic arm end, we only need the coordinates of the position to reach at last. And MOVEL means that the process of moving from the last point to the next point is moving along the straight line formed by two points.
- Naming: The user can name the position points for identification.
- X, Y, Z, R: X, Y, Z represent X, Y, Z coordinates of the robotic arm end, R represents the end rotation angle of the robotic arm end.
- Residence time: The time required for residence of the robotic arm to run to this point.
- Triggering: When the robotic arm runs to the position, it needs to wait for the corresponding IO input signal as the setting signal to move to the next position.
- Output IO: When the robotic arm runs to the position, it outputs the corresponding IO port state.

	Operation mode	Naming	X	Y	Z	R	Residence time	Trigger	
1	MOVEJ		290.00	200.00	-125.80	0	0		
2	MOVEJ		-109.99	-219.99	-185.80	0	0	IO_5=1	
3	MOVEJ		331.53	57.04	-125.80	0	0	IO_4=1	IO0=0,IO1
4	MOVEJ		-10.00	200.00	-125.80	0	0		
5	MOVEJ		190.01	-219.99	-185.80	0	0		
6	MOVEJ		290.00	0.00	-25.80	0	0		
7									

3.1.4 IO port operation part

This part also consists of two parts, IO trigger and IO output; IO trigger can be added to the attribute of a position; after selecting the required trigger IO port condition by the two drop-down lists, select the corresponding position point, and then click Add button here to add the trigger condition for the position point. Click Delete button to delete the corresponding trigger conditions.

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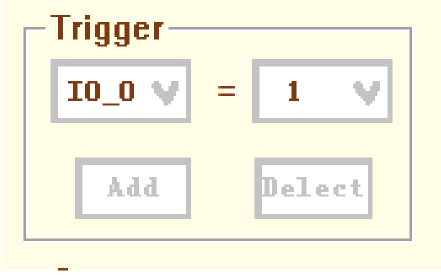
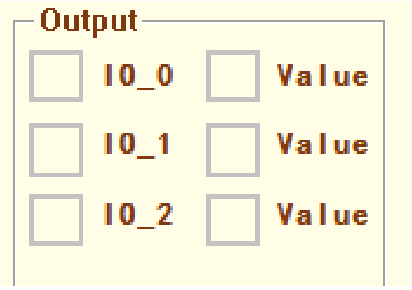


IO output part means that after it runs to a certain position point, the corresponding IO port should output the corresponding high and low level. After the change, it will be appended to the next insertion position point. The checked value indicates high output level, and unchecked is low output level.



3.1.5 Task running part

In this part, click Run button, the robotic arm will run the current task, cycle from the first point to the last point, and then go back to the first point. If you click One-Step, the robotic arm will move from the current position to the next point of the selected positions in the table. If you click Stop, the robotic arm will stop moving, but it will not unload the torque.

3.2 Handwriting interface description

The handwriting interface is as shown below. The height setting button is used to set the height of the current Z axis as the height of Z axis of the robotic arm freehand sketching. Clear the canvas is used to erase all the strokes on the canvas. When the handwriting is finished, click the Send drawing button, and the robotic arm will perform the handwriting task.

Save handwriting is used to save the current handwritten strokes to the file with the suffix of .drawdat, and Open handwriting is used to choose the handwriting saved before.

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3.1.6 Operation of motor-driven gripper (some models support)

Can control EFG-8 and EFG-20 motor-driven grippers

The stroke of EFG-8 is unadjustable and only has two states: stretch and clamp.

Dis_set=0 stretch; Dis_set=1 clamp

The stroke of EFG-20 is adjustable, range is 0-20mm, minimum unit is 0.1mm. In most time, the stroke when stretching is 0mm and of clamping is 20mm.

3.17 Coordination function (some models support)

If the coordination function is checked, when the mechanical arm bumps into objects, it will stop at once. At the same time, the software will alarm accordingly, whose default is on.

3.3 Sketching interface description

The sketching interface is shown in the figure below, and the interface is basically the same as the handwriting interface, but there are two differences. The first is that you need to click on the Open image button here, and then select the picture that needs sketching in the pop-up dialog box. The second difference is that there are four sliders at the bottom of the canvas used to adjust the effect of the contour recognition. The Zoom slider is used to adjust the contour size, and the Binaryzation threshold slider is used to adjust the binaryzation threshold of image recognition. The Minimum contour limit slider adjustment can filter out too small contours. The Maximum contour limit can filter out too large contours.

After you get the desired contour by adjusting, and set the height of the sketch, you can click Send Sketch to draw.

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