PS-Micro
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Started guide - PROBOT Anno Robot Arm

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Applicable to PROBOT Anno Robot Arm

（hardware version number V2.1.0）

PS-Micro co. LTD, Wuhan

www.ps-micro.com

Attention

Thank you for purchasing and using PROBOT Anno products.For your security and interests, please read user manual and all the data included carefully before using the product. PS-Micro co. LTD shall not be liable for any personal injury, property damage or other losses caused by your failure to operate and use the product in accordance with the user manual.

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PS-Micro co. LTD, Wuhan

Address：1 r&d building, HUST science park, east lake high-tech zone, wuhan city

Sales E-mail：sales@ps-micro.com

After-sales E-mail:support@ps-micro.com

Official E-mail：www.ps-micro.com

ENFORCE

- This manual only gives a brief description of the use of PROBOT Anno robot arm. Please read carefully and fully understand <User Manual of PROBOT Anno Robot Arm> before use. Use robot arm safely according to the instructions.
- Before robot arm is powered on, make sure the arm is in its **initial state** and the operator is in a safe position outside the workspace of the arm.
- In case of emergency, press the **emergency stop button** immediately. If you cannot brake robot arm in time, it may cause personal injury or equipment damage accident.
- Due to the loss of force at each link of the robot arm after emergency stop, it will move naturally due to gravity. Please pay attention to the safety of human and related equipment.

ATTENTION

- The drawings and photographs in the guide are examples and may differ from the products purchased.
- Guidebook will be modified appropriatly due to product improvements, specification changes, and ease of use, etc. The revised guidebook will be updated with the version number below the cover and issued as a revised version.
- Please contact our sales department if you need to order the guidebook due to damage, loss, etc., Order according to the version number of the cover.
- The company will not be responsible for the customer's unauthorized product modification, which is not within the scope of the company's warranty .

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Document Version

日期	版本	作者	概要
2019-4-13	1.0	PS-Micro	Initial version
2019-10-8	2.0	PS-Micro	Add teaching point functions
2019-12-15	2.1	PS-Micro	Add IO introduction

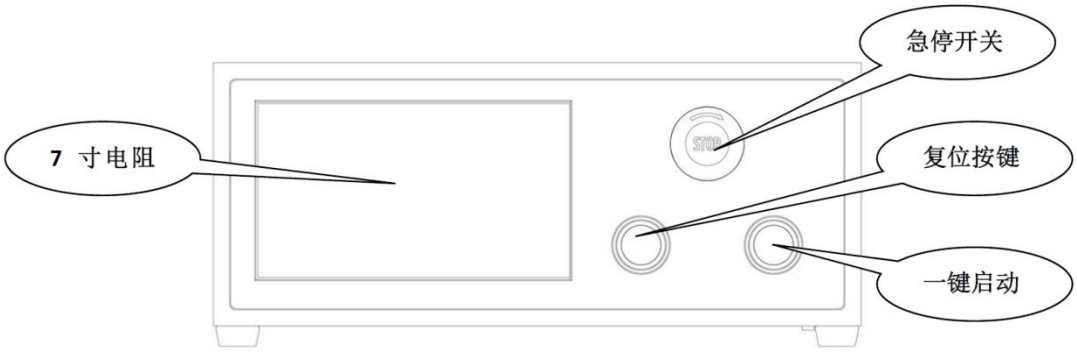
Table 1: document version

1 Hardware Configuration

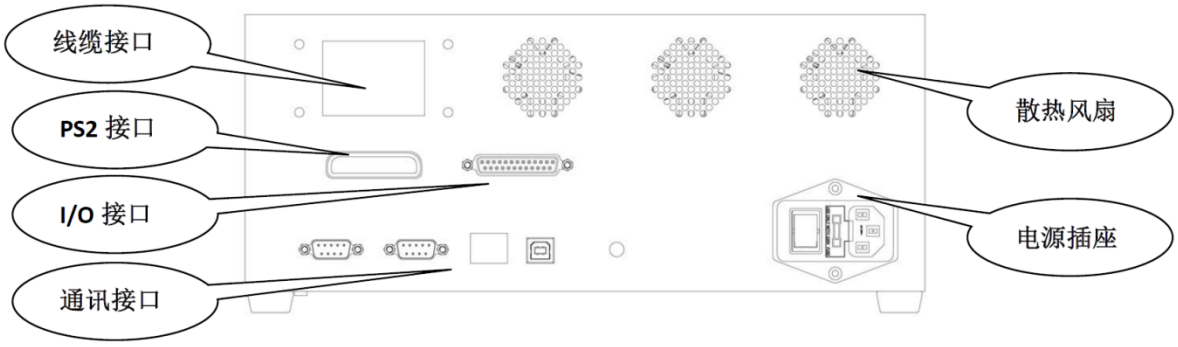
1.1 Hardware interface and connection

Please read the following instruction to understand the functions of the keys and do the connection before use.

1. Control box interface and key description



Control box front-end introduction



Control box back-end introduction

On the front of the control box from top to buttom, from left to right, are: STOP BUTTON(STOP), RESET BUTTON(RESET), one-click start BUTTON(BUTTON);There is a red power switch behind the control box.

（1） STOP BUTTON（STOP）： In case of emergency, pressing the emergency STOP BUTTON downward can stop the operation of the robot arm in time;When starting the manipulator again,

the button should be rotated clockwise to remove the emergency stop state.

（2） RESET BUTTON（RESET）、one-click start BUTTON（BUTTON）： have been connected to the robot digital input port (7 and 8) for user programming.

（3） Power switch :I for on,O for off.

2. Hardware interface and connection

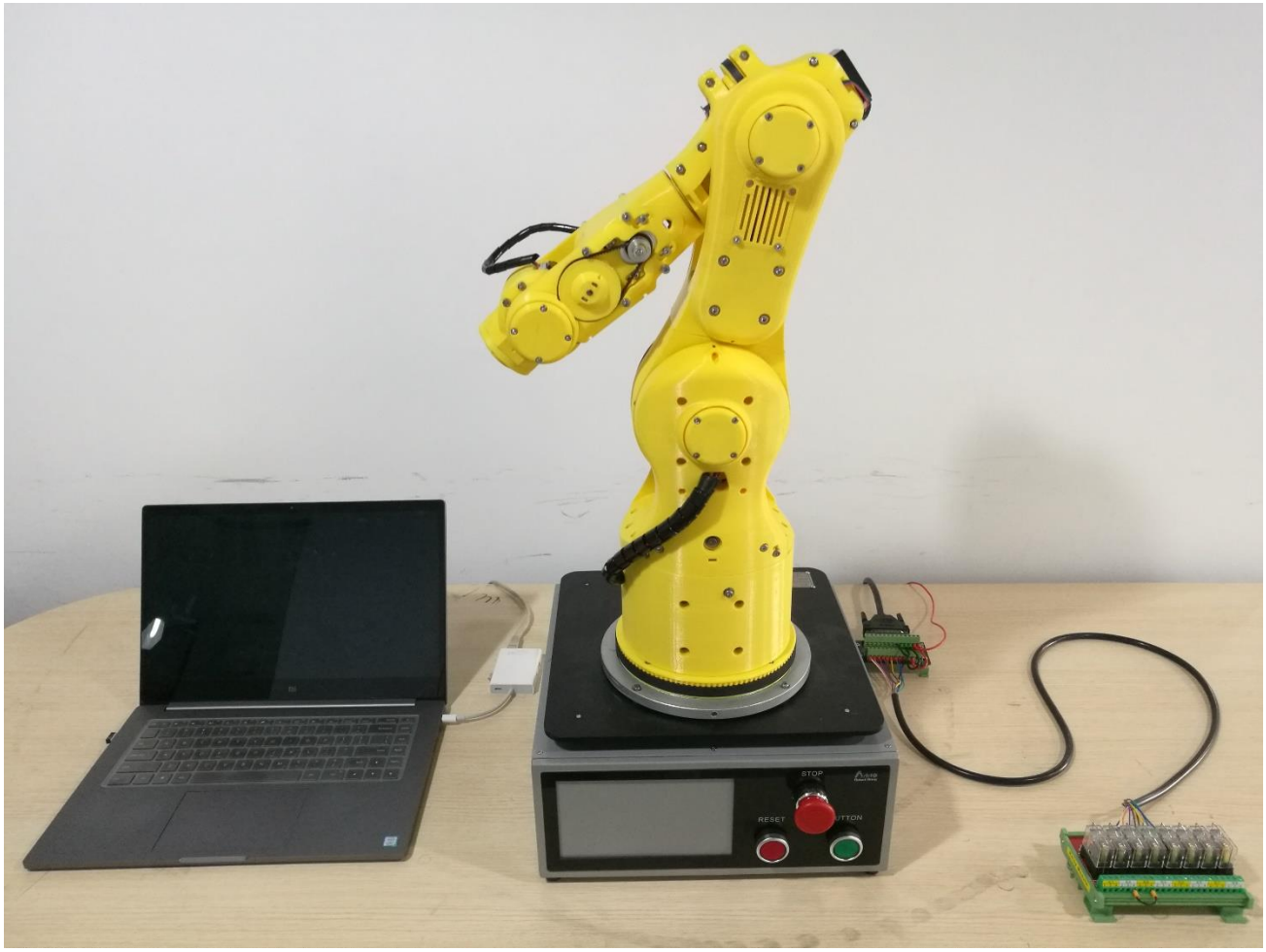
Please complete the connection between the control box and the digital IO interface ,network cable and the robot arm as shown below：

（1）Connect the heavy-duty connector (male head) of the manipulator end to the corresponding connector end (female head) of the control box ;

（2）Connect the power cord of the manipulator control box to 220V mains ;

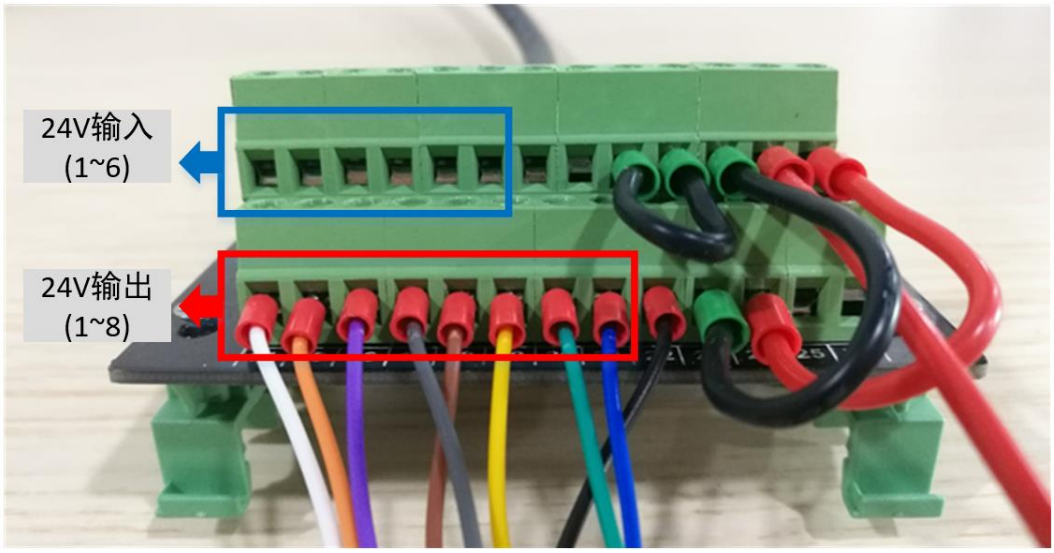
（3）Use the network cable to connect the PC network port and the robot arm control box network port ;

（4）Connect one end of the DB25 cable to the IO port of the control box of the robot arm, and the other end to the DB25 relay station. The relay station leads to the relay module, which can connect the external 24V output device, and the external 24V input device can be directly connected to the input port of DB25 relay station .



Physical system connection diagram

connection of control box diagram

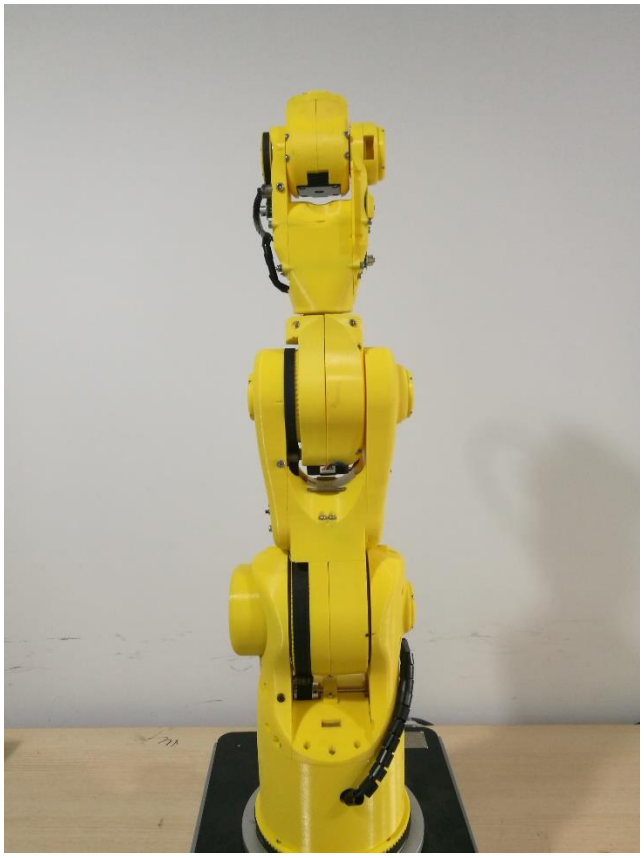


DB25 relay station connection

1.2 Adjust the initial pose of the robot arm

ATTENTION

Before the control box can be started electrically, the arm must be returned to its original position! The starting position of each axis of the robot arm should be reset to zero, otherwise the manipulator is likely to run out of order, causing damage to the arm and causing danger.



Physical picture of the initial position of the robot arm

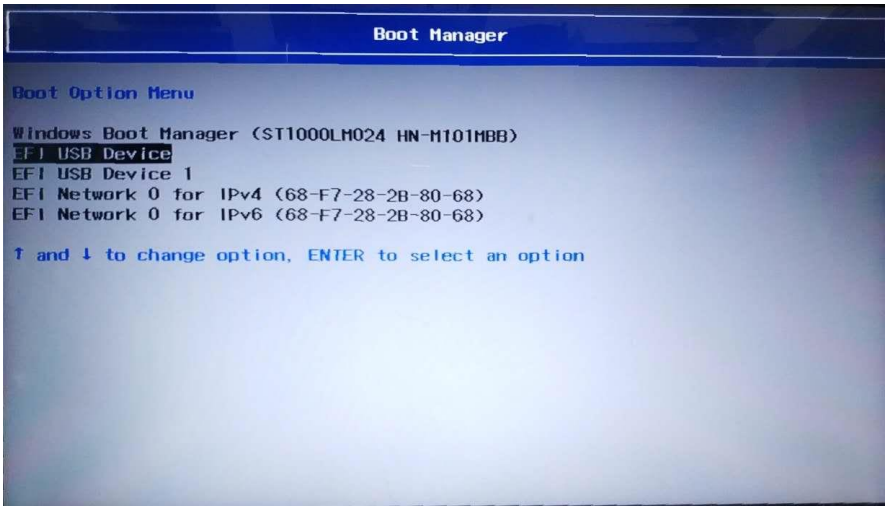
2 ROS Environment Setup

PS-Micro has provided ROS2GO mini usb drive 'plug and play' for the majority of users, and installed and deployed a complete set of ROS environment and host computer required by this product in ROS2GO, so that users can directly use ROS2GO to start the experience journey !

2.1 Start ROS2GO

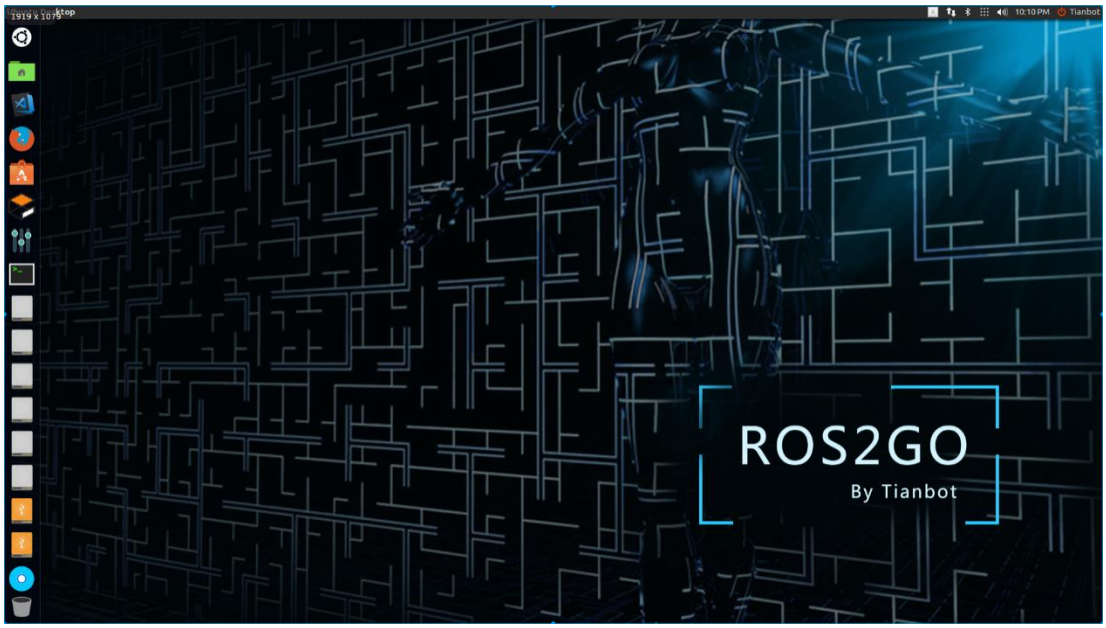
ROS2GO mini USB

（1）Plug ROS2GO to PC ,start/restart PC ,and Enter the BIOS Settings and boot the usb drive using **UEFI mode**,(Different PC have different way into the BIOS system, please refer to guide of PC boot).



BIOS set the usb flash drive start diagram

（2）After the setup is completed, wait for ROS2GO to complete startup. After successful startup, you can see the following system desktop.



ROS2GO desktop

Note: the use of PROBOT Anno is based on the ROS environment. If you need to install Ubuntu system and ros-related software on your PC, please refer to the user manual of PROBOT Anno -- ROS environment construction of host computer, and also refer to the README document of GitHub open source project https://github.com/ps-micro/PROBOT_Anno

3 Operate Robot Arm

3.1 Electrically starting up robot arm

（1）Check the hardware connection again to make sure the connection is correct.

（2）Connect the power outlet at the back-end of the control box to the external power supply and press the power switch to power the control box.

Control box power connection and switch diagram

（3）A buzzer will be heard when starting up, lasting about 1-2s.

（4）Wait for about 20 seconds after power on.When you hear two continuous buzzers, which will last for a shorter time, you know that PROBOT Anno software and hardware system has been started successfully.

（5）Release the emergency stop button.

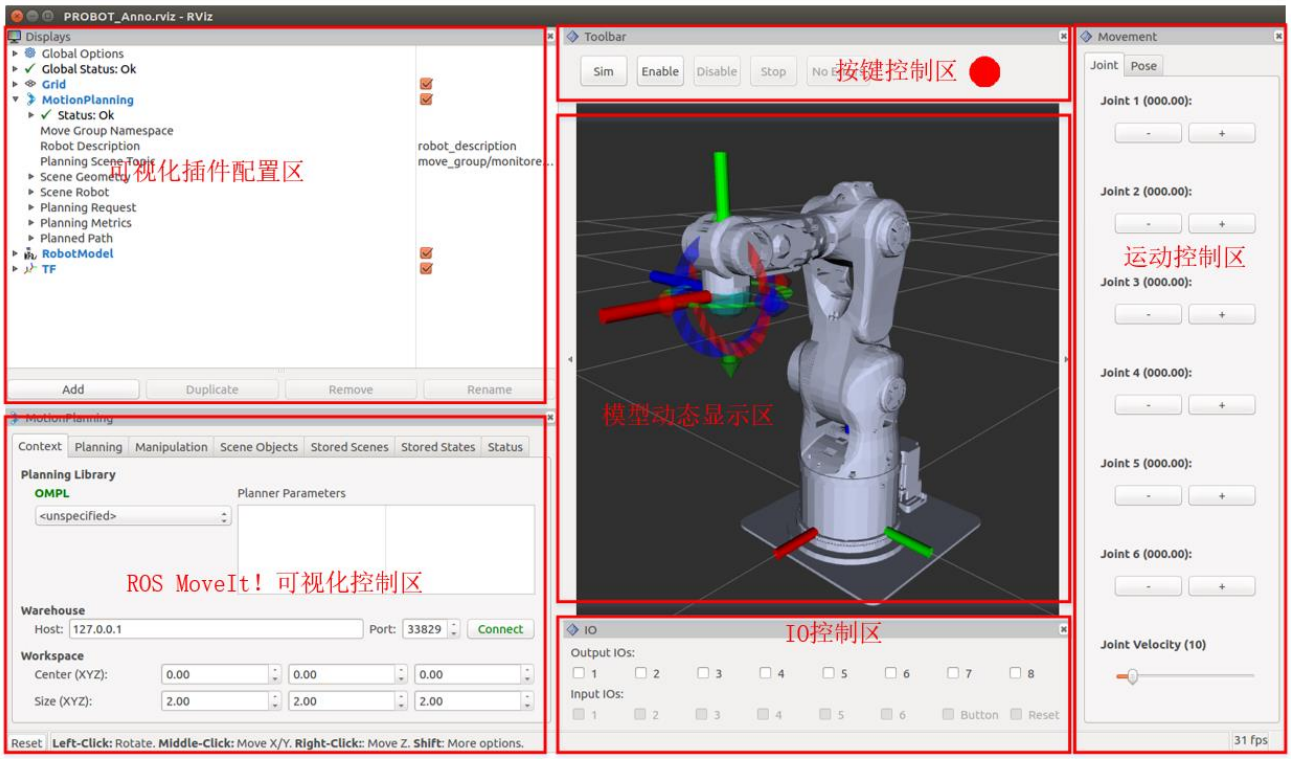
⚠ ATTENTION

You must wait for the buzzer to sound twice before you can continue operating! Otherwise, PROBOT Anno hardware and software system has not been started yet, and the ROS host computer will not be able to establish a connection with the control box.

3.2 Start ROS host computer

After the system start, use the following command to start the ROS host computer :

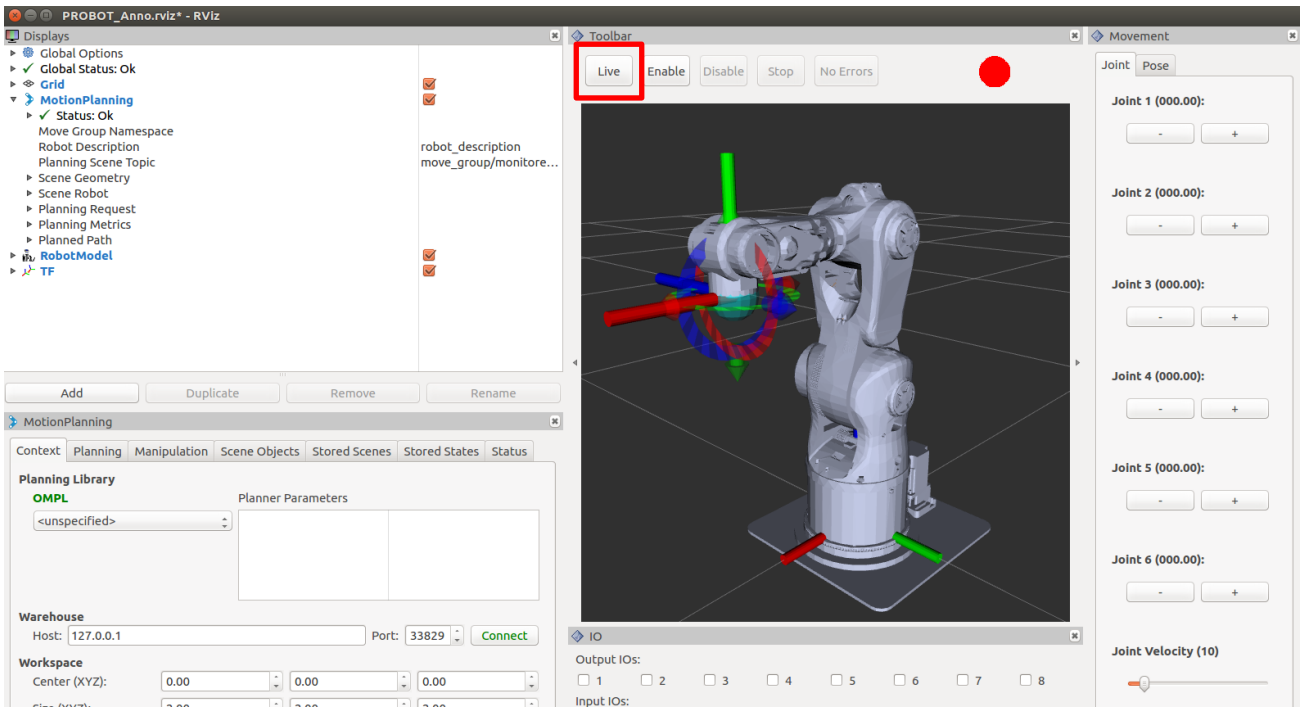
```
$ roslaunch probot_bringup probot_anno_bringup.launch robot_ip:=192.168.2.123
```



ROS host computer interface

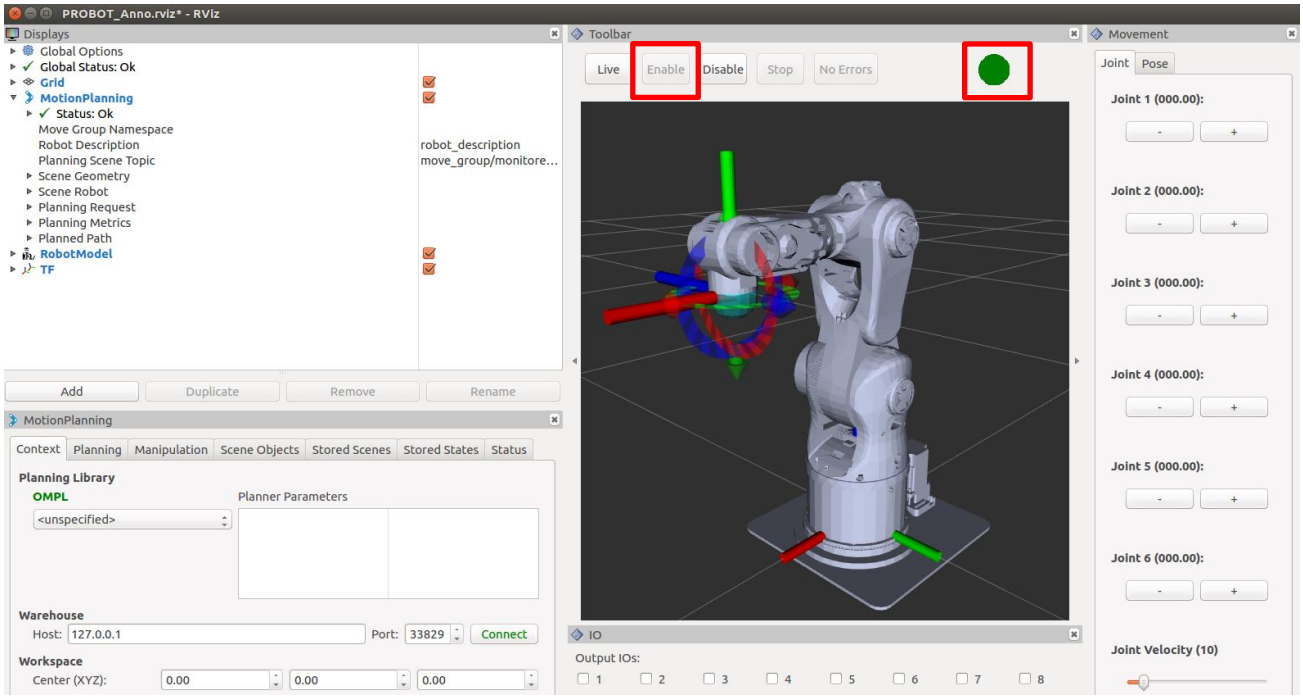
3.3 Simulation/Online switching

ROS host computer starts up and runs in the simulation environment by default. Click the **Sim/Live** switch button in the control bar to switch to the real machine control environment, and the key will display Live



3.4 Enable robot arm

Click the **Enable** button in the control bar to enable robot arm, and the red indicator light turns green :



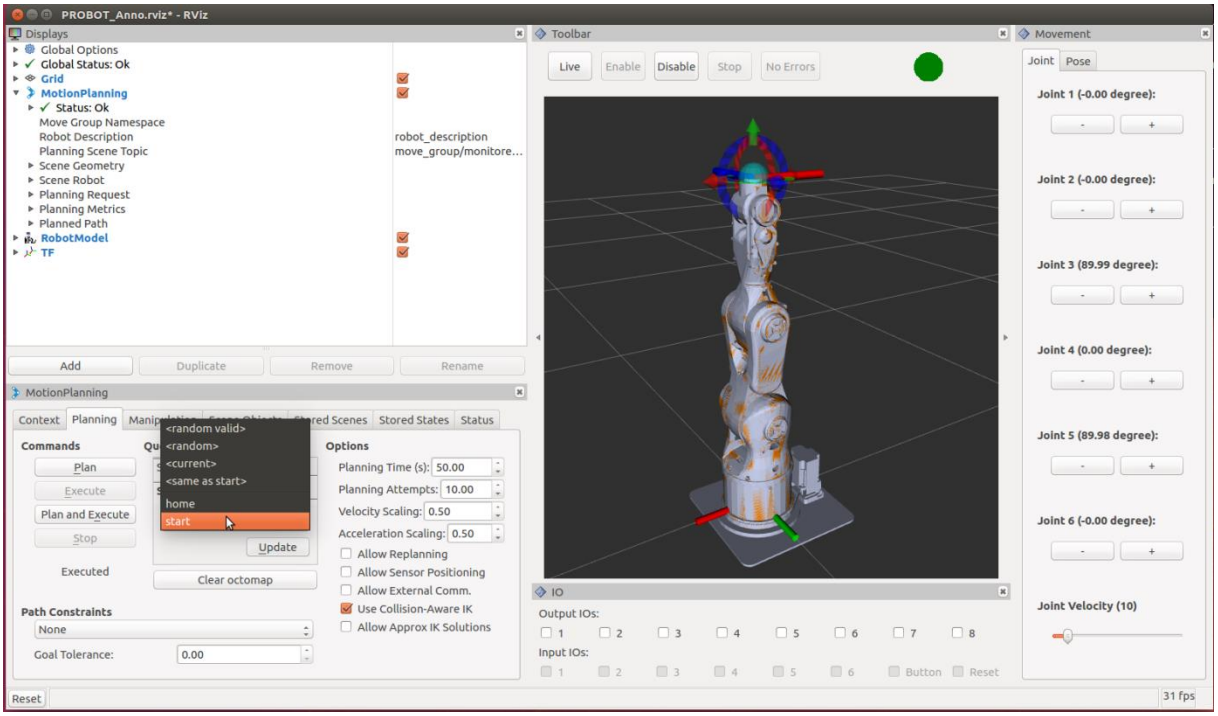
3.5 Run demo

Open a terminal in PC and enter the following command to run the demo：

```
$ rosrun probot_demo probot_demo.py
```

3.6 Shutdown and emergency stop

After the operation, please follow the instructions shown below to control the robot arm returning to the initial position, then click **Disable**, press the emergency stop button of the control box, finally close the power supply of the control box.



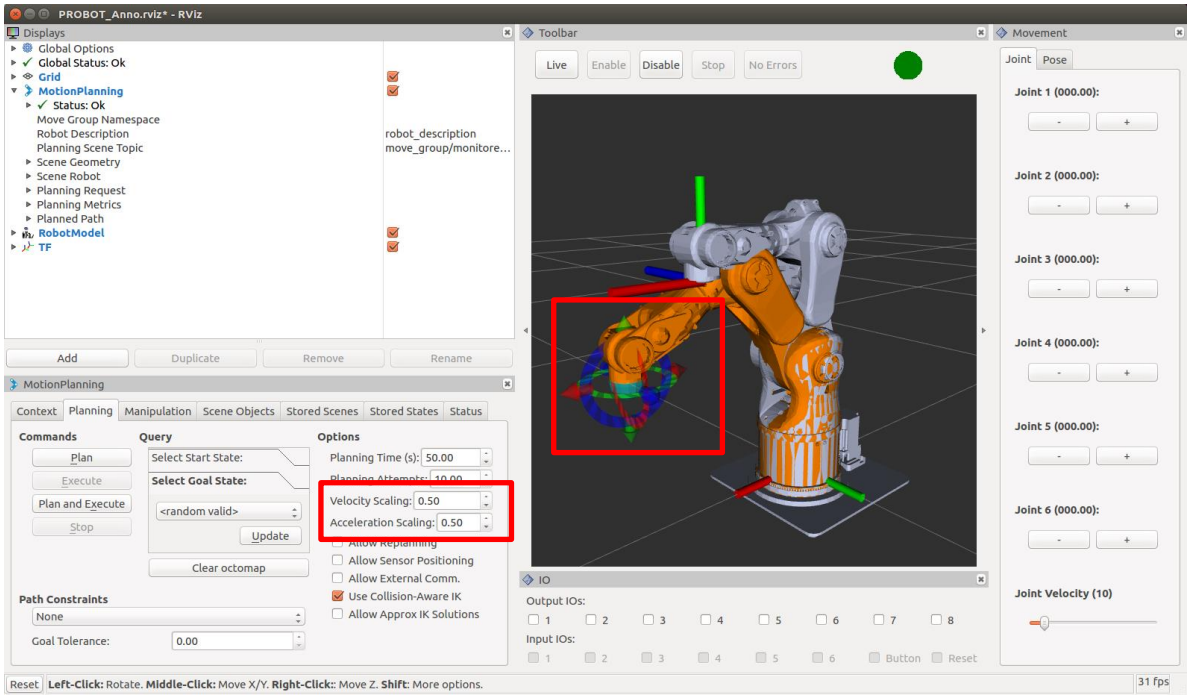
ATTENTION

If there is unexpected movement during the movement, please press the emergency stop button immediately. Due to the loss of force at each link of the robot arm after emergency stop, it will move naturally due to gravity. Please pay attention to the safety of human and related equipment.

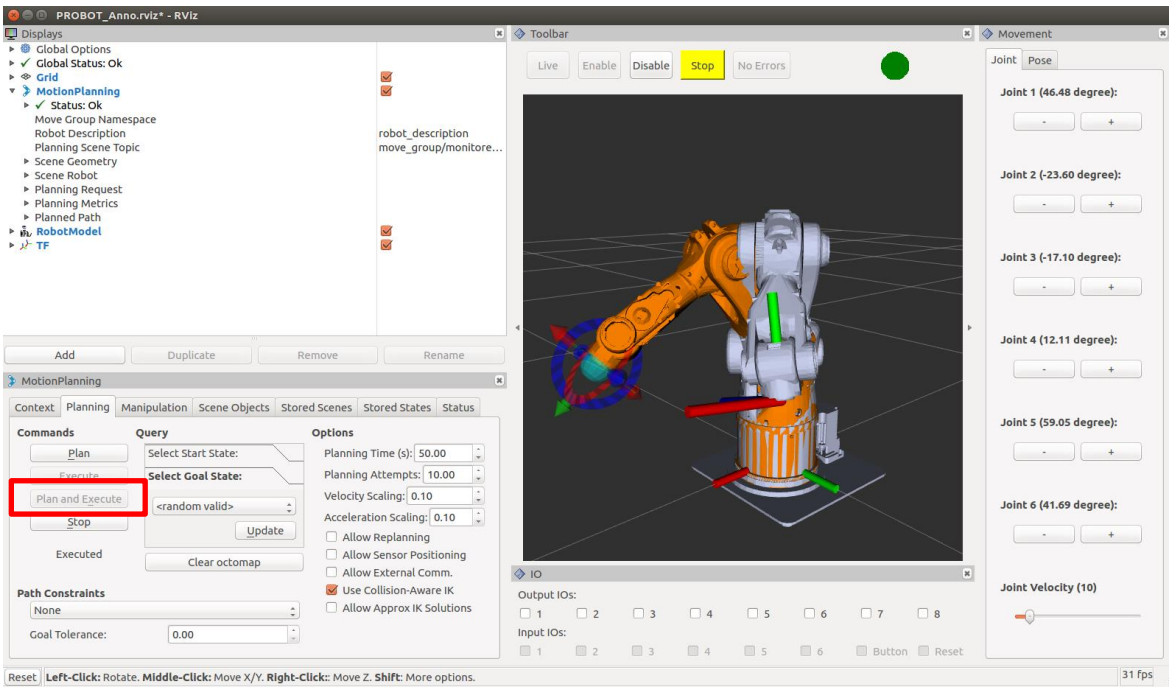
3.7 Dragging teach

（1）Position the mouse on the control ball of the robot model terminal, long press the left button of the mouse to drag the robot. When the mouse is released, the yellow robot model is the target posture, while the silver-white robot model is the current actual posture.

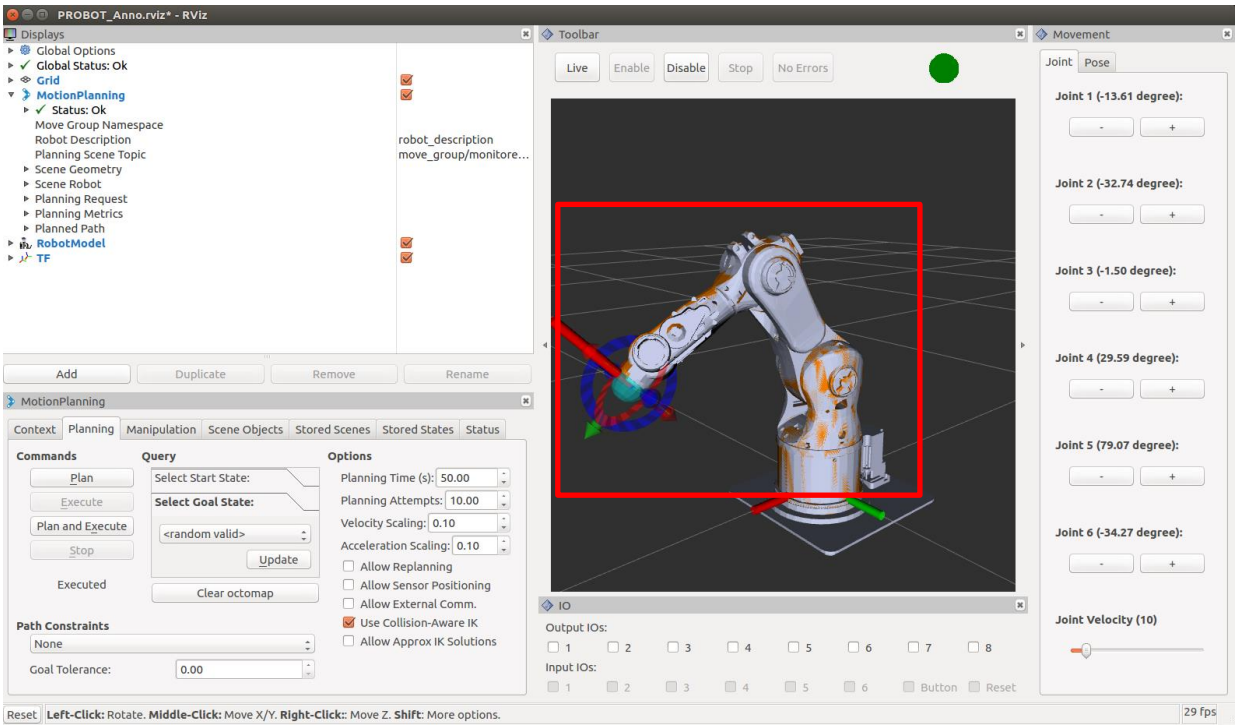
（2）Set the maximum time limit of the plan and the speed and acceleration rate of the robot movement (1 represents 100%, that is, set to the maximum).



（3）Click on **Plan and Execute** key in the **Planning** tab of the visual control area will enable the robot model to start the movement (during the movement, the Plan and Execute keys become gray and unoperable, so we need to wait for the completion of the current action).



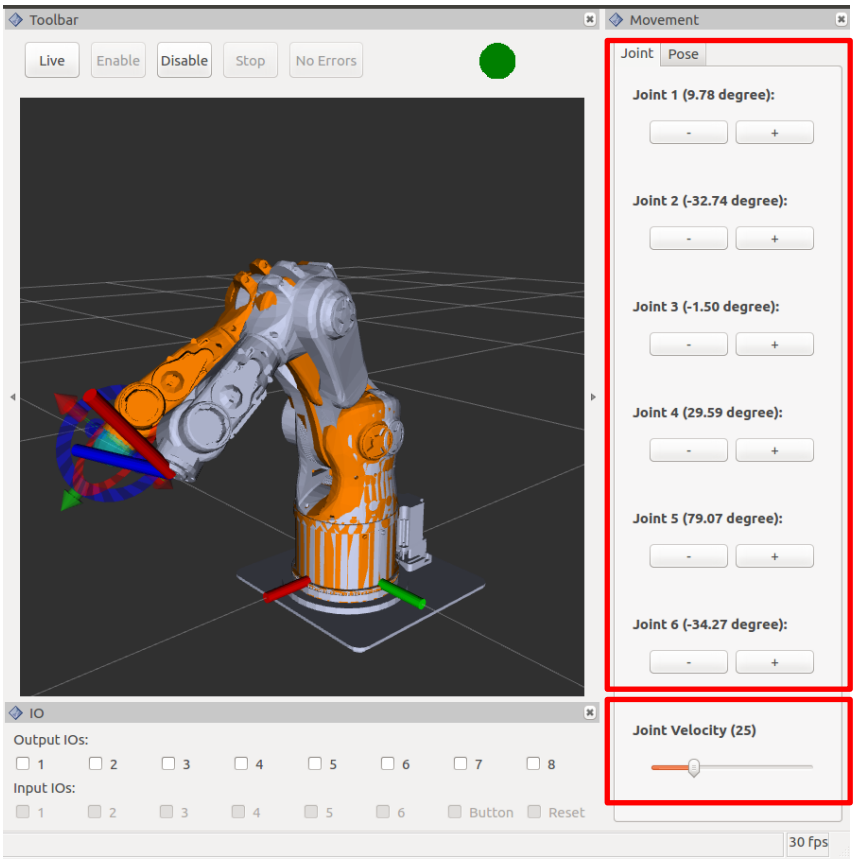
（4）The robot moves from the current pose to the target pose until the interface shows that the two models coincide completely and the robot moves end.



3.8 Joint space inching control

（1）All functions of the joint inching are in the Joint tab of the motion control area

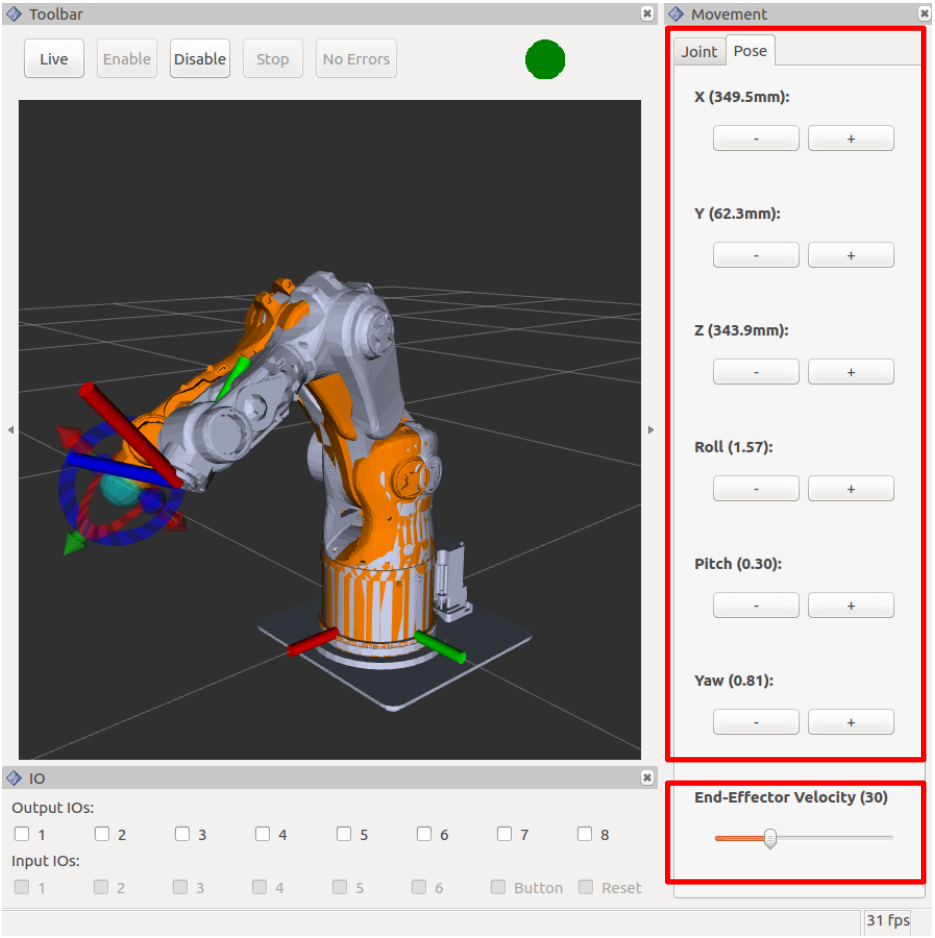
（2）Joint motion can be controlled by long press **+ , -** and the Joint Velocity slider on the lower side can be adjusted



3.9 Workspace inching control

（1）All functions of spatial inching are in the Pose tab in the motion control area.

（2）The robot manipulator workspace inching can be controlled by long press **+ , -** and the End-Effector Velocity slider on the lower side can be adjusted.

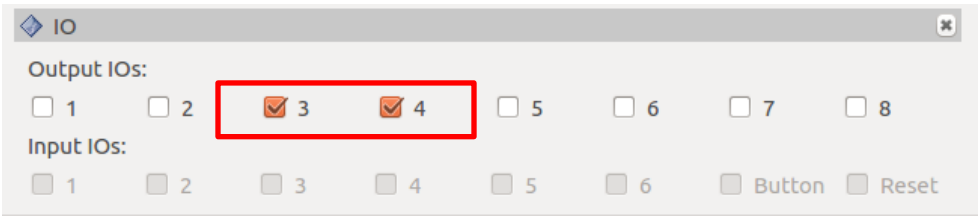


3.10 IO Control

IO control function is in the IO control area.

（1）Left-click the output port you want to control（Output IOs）,will change its output（0/1）, The tick in the box before the port number represents enable high level output ;

（2）In the **Input IOs** column, you can see the level signal of the Input port (0/1). The tick in the box before the port number indicates that the Input is high level, otherwise it is low level/dangling.



4 Appendix

4.1 Video Tutorial

This document is accompanied by a detailed video tutorial. Please refer to the following links :

《PROBOT_Anno 上手指南》：https://www.bilibili.com/video/av53771128

4.2 References

1. 《PROBOT Anno 机械臂用户手册》，精锋微控

2. ROS Wiki - PROBOT：http://wiki.ros.org/Robots/PROBOT_Anno

3. Github - PROBOT：https://github.com/ps-micro/PROBOT_Anno

4. MoveIt! Tutorials： http://docs.ros.org/kinetic/api/moveit_tutorials/html/index.html

5. 《ROS 机器人开发实践》，胡春旭编著，机械工业出版社

4.3 Contact

E-mail：support@ps-micro.com

Website：www.ps-micro.com

www.gyh.ai

PS-Micro 精 锋 微 控

古月居 GYH.AI