6. docker in the robot development environment build

The operating environment and hardware and software reference configuration are as follows:

- Reference model: ROSMASTER X3
- Robot hardware configuration: Arm series main control, Silan A1 LiDAR, AstraPro Plus depth camera.
- Robot system: Ubuntu (version not required) + docker (version 20.10.21 and above)
- PC virtual machine: Ubuntu (20.04) + ROS2 (Foxy)
- Usage scenario: use on a relatively clean 2D plane

6.1. Using jupyter lab to access docker

1. Enter the container, see [5. Enter the docker container of the robot], and execute the following command:

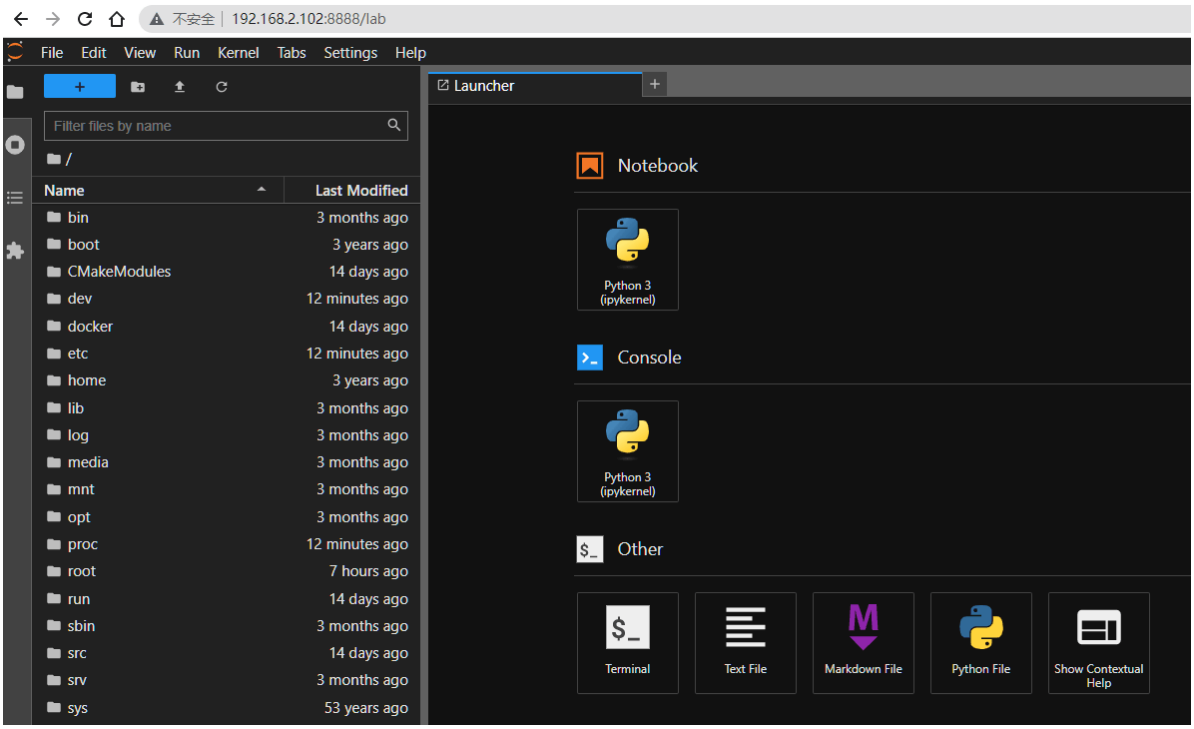
Note: When using jupyter lab in a docker container, you must run the docker container with host networking: add the "--net=host" parameter when running the container.

```
root@ubuntu:/# jupyter lab --allow-root
[I 2023-04-24 09:27:45.265 ServerApp] Package jupyterlab took 0.0001s to import
[I 2023-04-24 09:27:45.277 ServerApp] Package jupyter_server_fileid took 0.0096s
to import
[I 2023-04-24 09:27:45.297 ServerApp] Package jupyter_server_terminals took
0.0190s to import
[I 2023-04-24 09:27:45.429 ServerApp] Package jupyter_server_ydoc took 0.1301s to
import
[I 2023-04-24 09:27:45.431 ServerApp] Package nbclassic took 0.0001s to import
...................
```

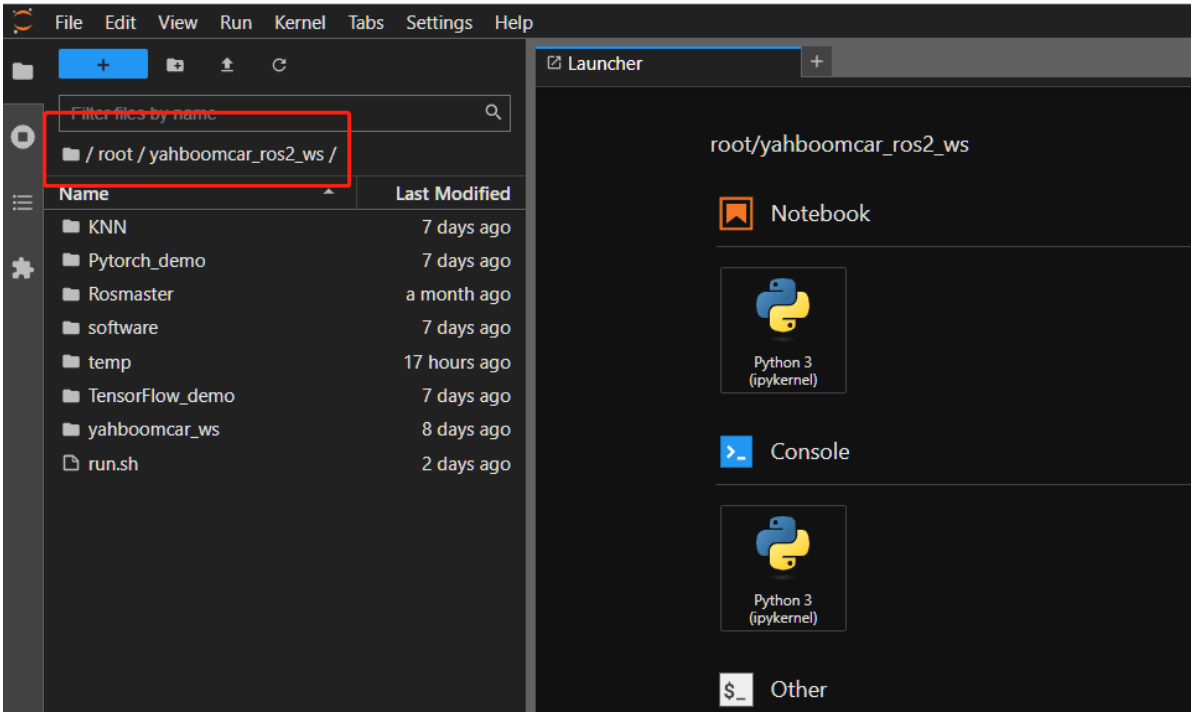
2. other device view, open in windows or ubuntu browser (must be on the same LAN, 192.168.2.102 is the IP address inside the docker container)

```
http://192.168.2.102:8888/lab

输入密码：yahboom，即可进入jupyter lab
Enter the password: yahboom to access jupyter lab
```



The following directory is the project path for the robot:



6.2 Using vscode to access docker

Here is an example of how to configure vscode to access docker containers in windows, and the steps to access docker in ubuntu are basically the same.

6.2.1. Remote Configuration

See section [VI. Linux operating systems ---- 3. Remote control].

Make sure windows can log in remotely to docker's host [cart]:

```
在windows中打开cmd输入ssh命令测试：ssh jetson@192.168.2.102    （用户名和ip修改为自己的）

或者使用远程工具：putty、xshell、securecrt、winscp、mobaxterm、finalshell等都可以
Open cmd in windows and enter ssh command to test: ssh jetson@192.168.2.102
(username and ip changed to your own)

Or use remote tools: putty, xshell, securecrt, winscp, mobaxterm, finalshell,
etc. can be used
```

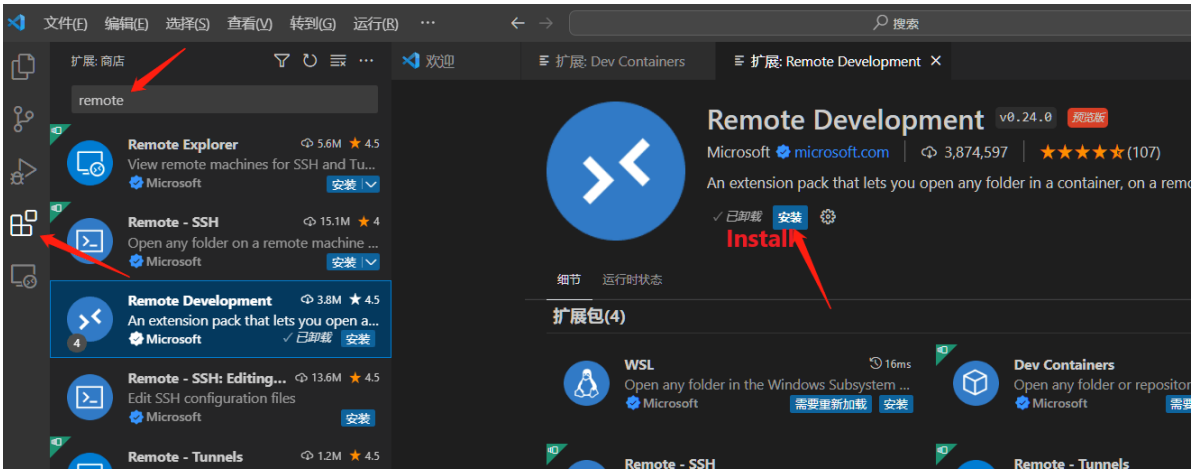
6.2.2. vscode configuration

6.2.2.1. Download and install vscode

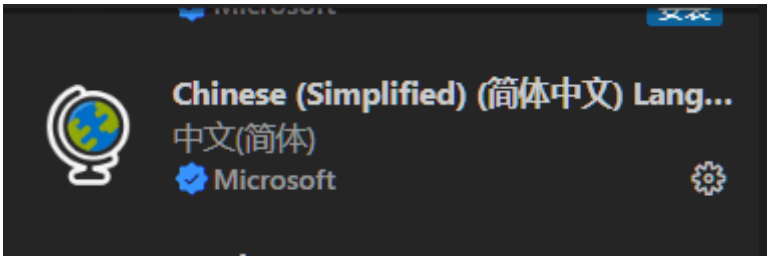
vscode official website: https://code.visualstudio.com/, download the windows version of the installation can be

6.2.2.2. vscode configuration ssh remote login to the host computer

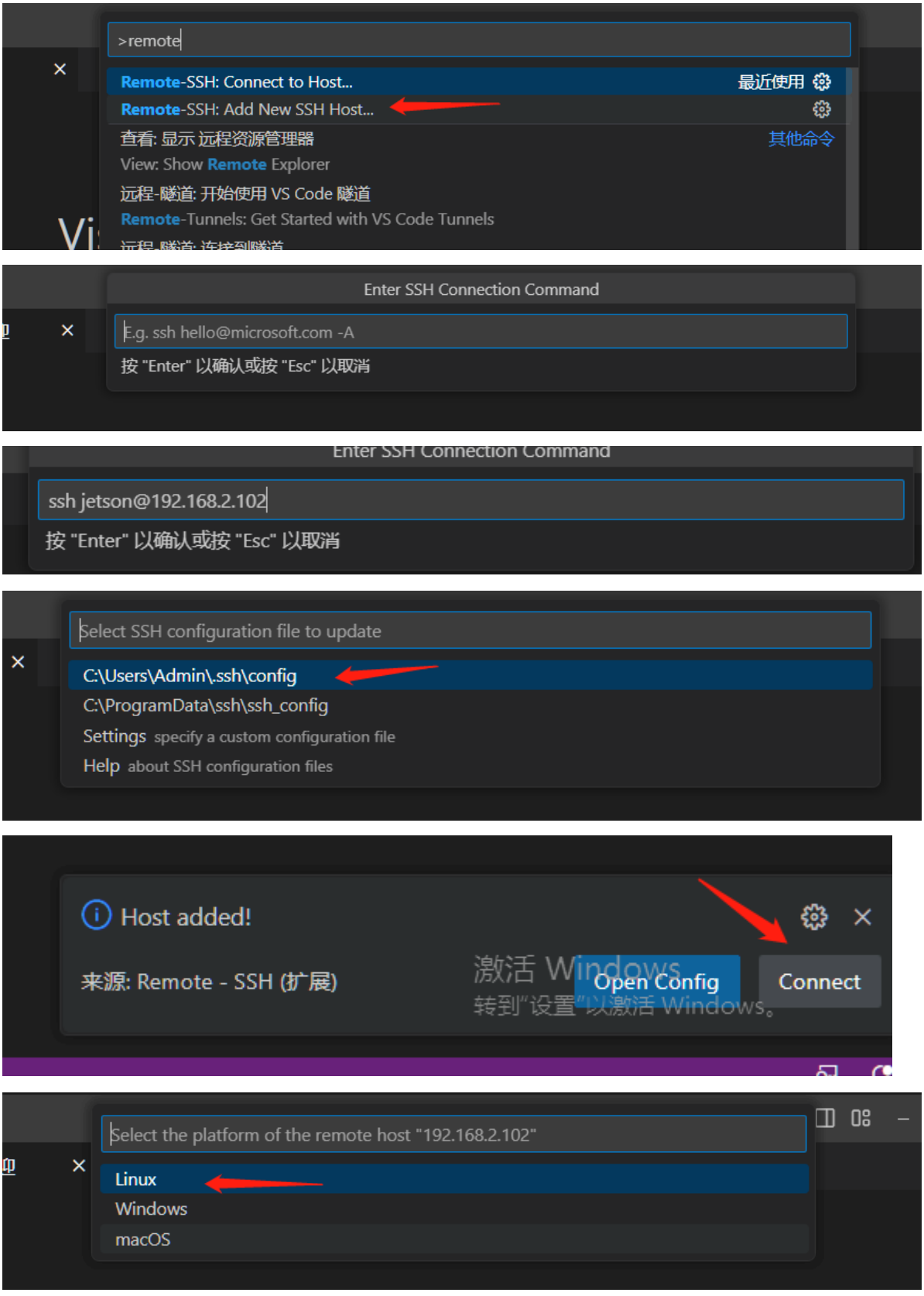
1, open vscode, click on the left below the arrow icon, and then in the search box, type remote, select Remote Development plug-in, click Install to install the plug-in.

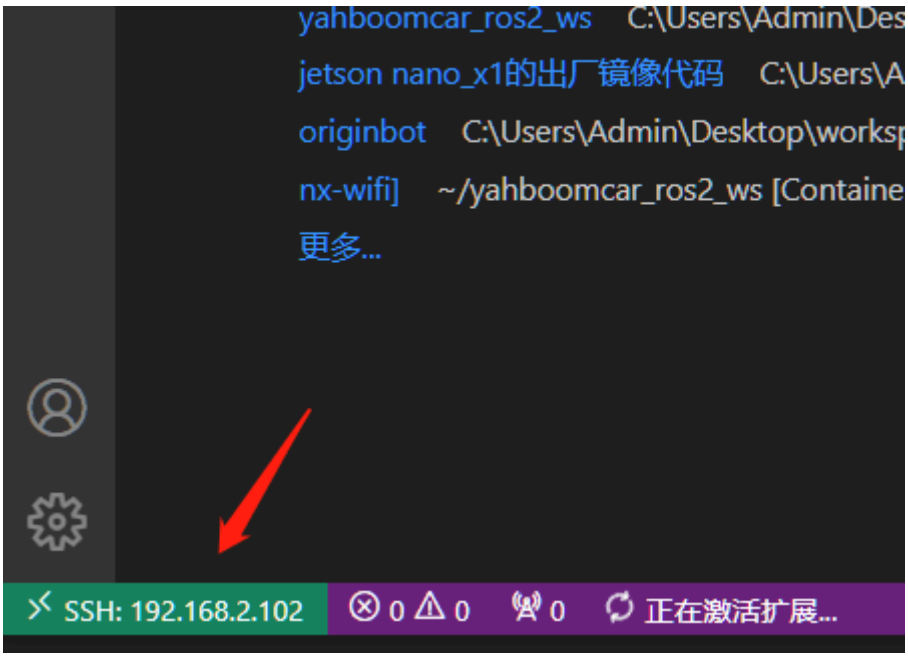


vscode default installation after the English version, you can install Chinese plug-ins to Chinese:



2. In vscode, press the shortcut key [ctrl + shift + p] to open the command input window, type: remote, and then follow the guidelines in the figure below to log in to the remote host [cart].





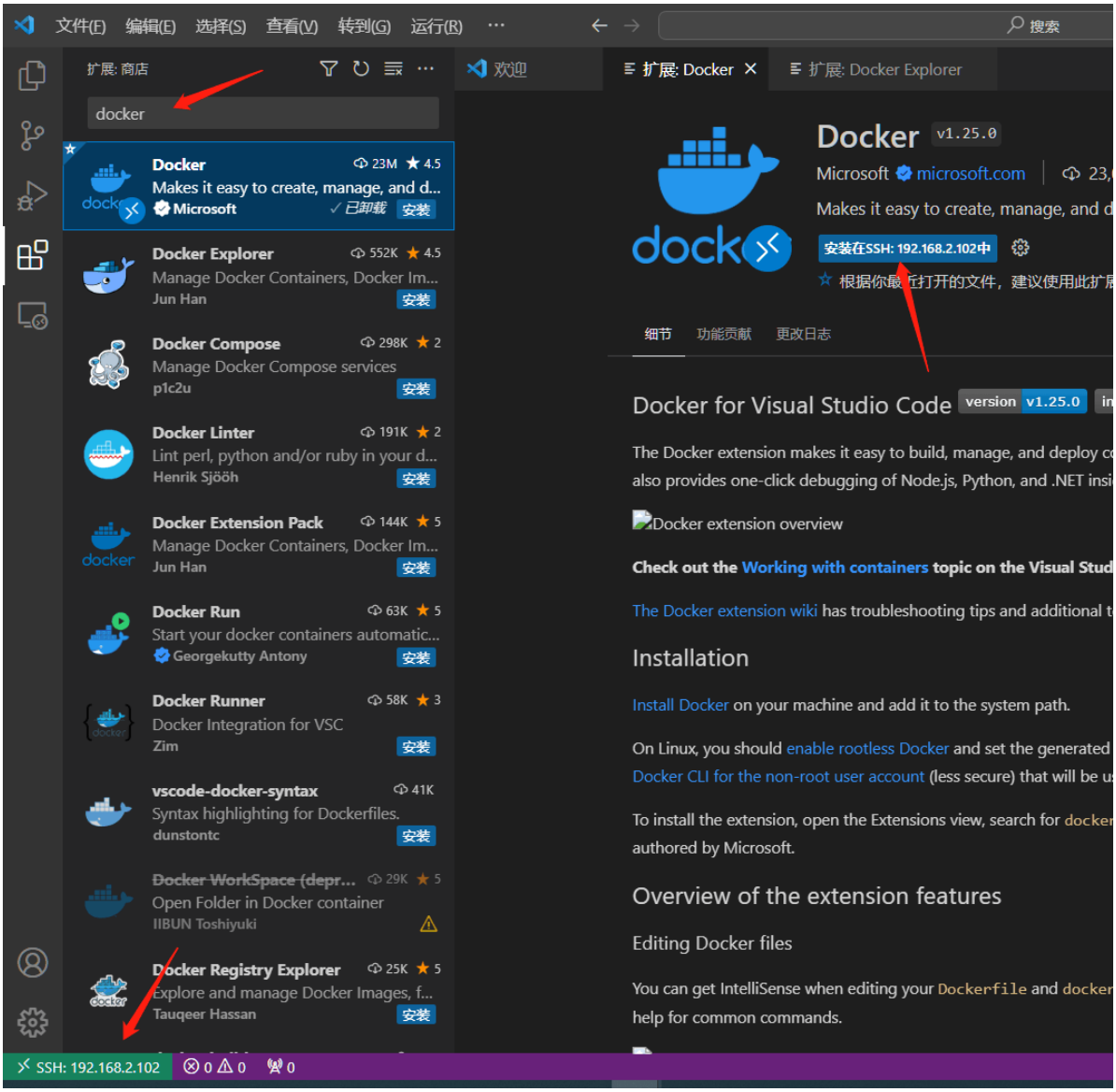
How to see the screen above, indicating that you have successfully logged in remotely to the host computer.

6.2.2.3. Entering the robot container

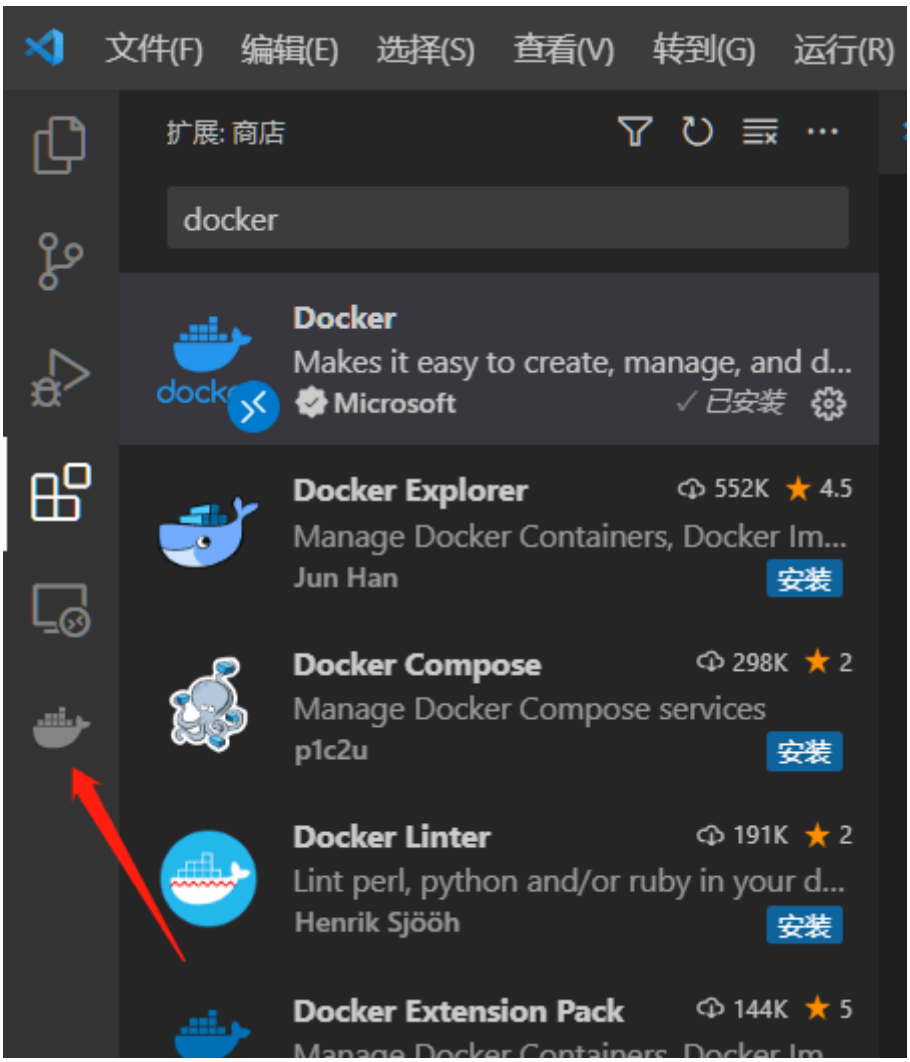
See the tutorial in section [5. Entering the robot's docker container] to enter.

6.2.2.4, vscode remote host configuration docker environment

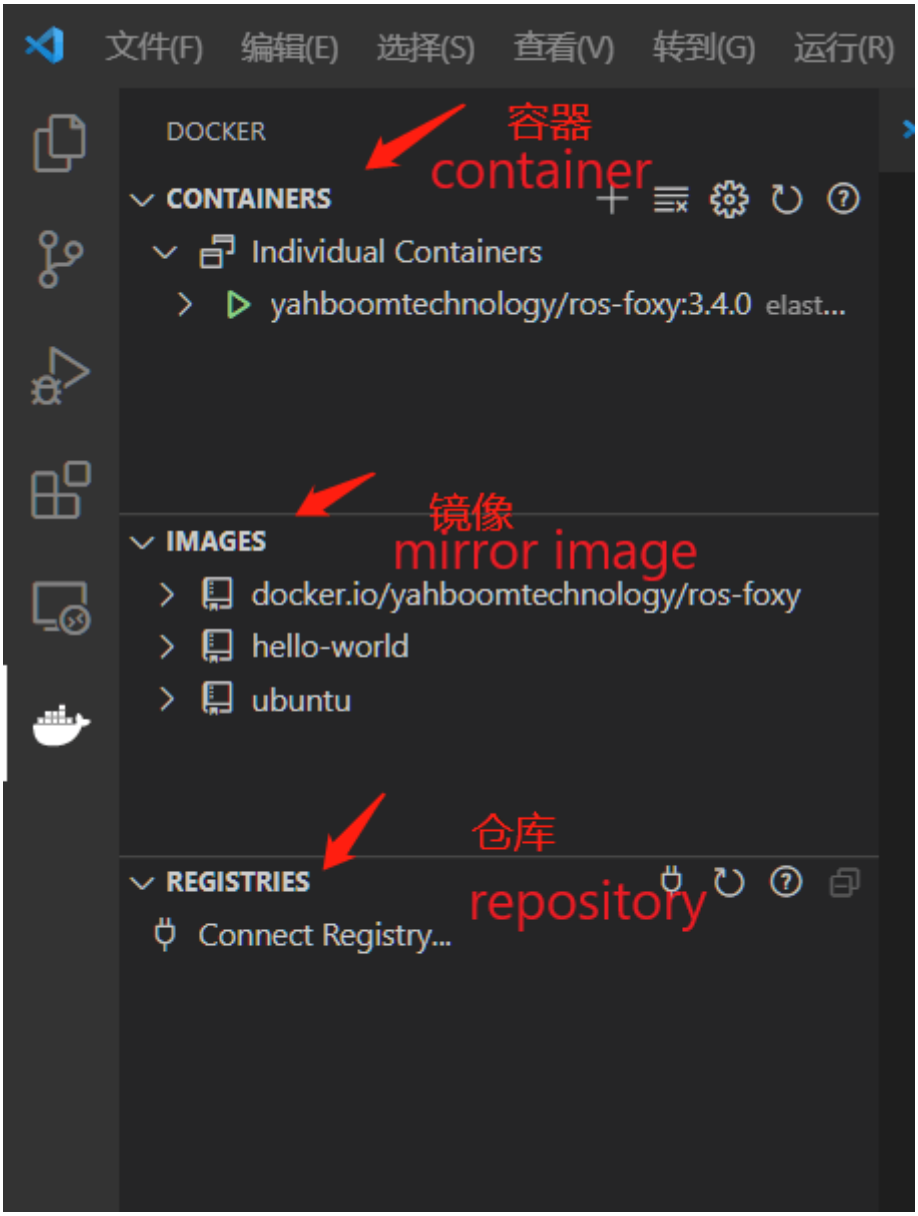
1.Install the docker plugin on the remote host [cart].



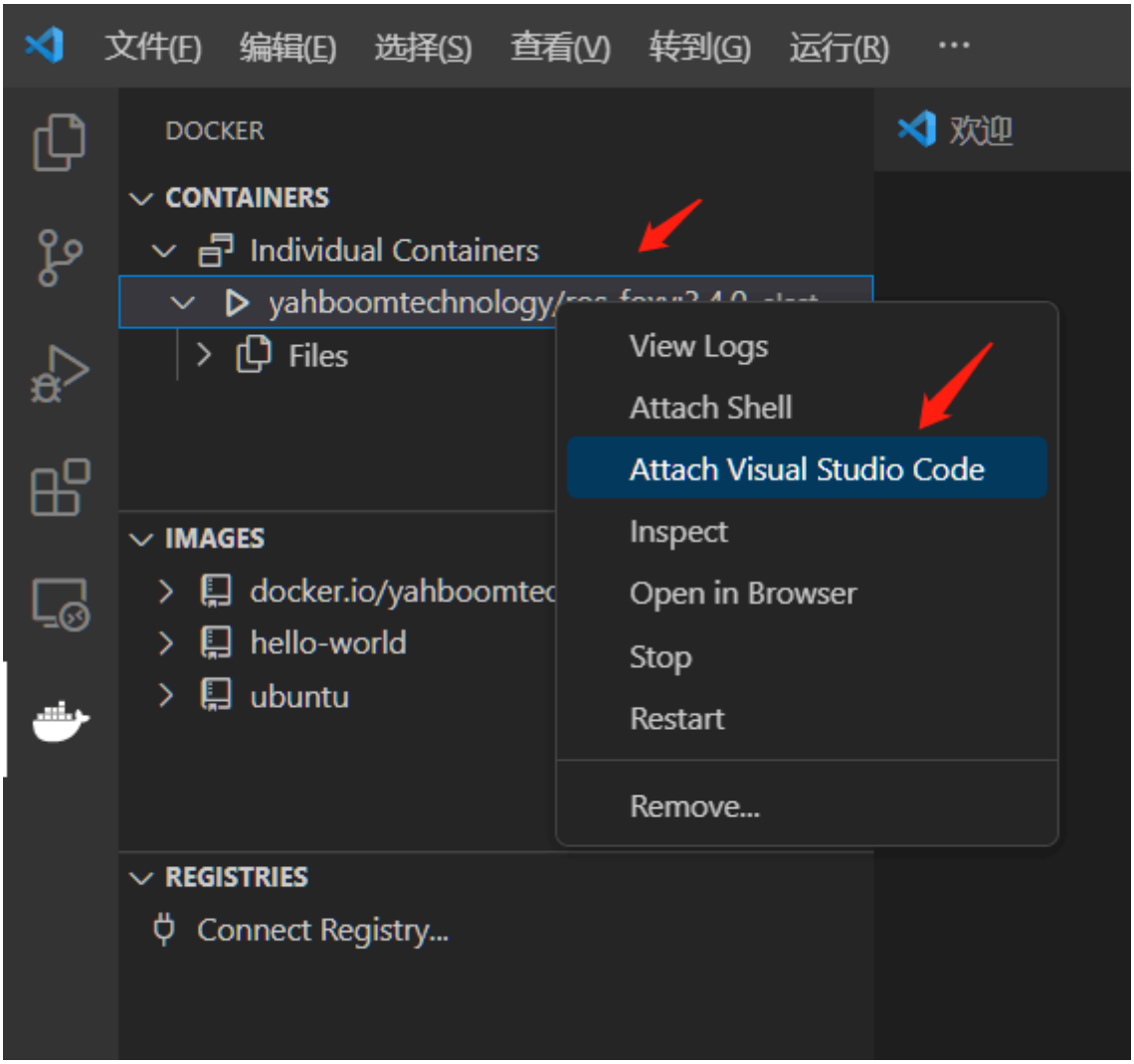
2. After the installation is complete, a docker icon will appear in the left navigation bar

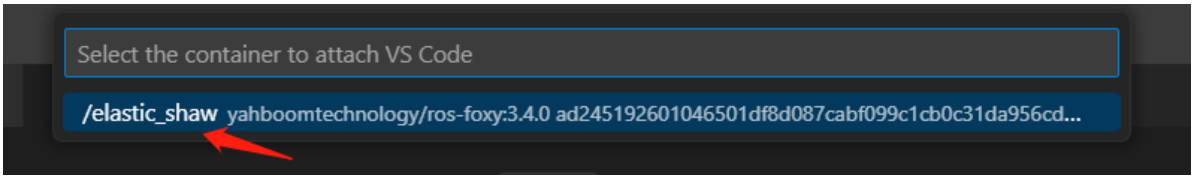


3. Click the docker icon

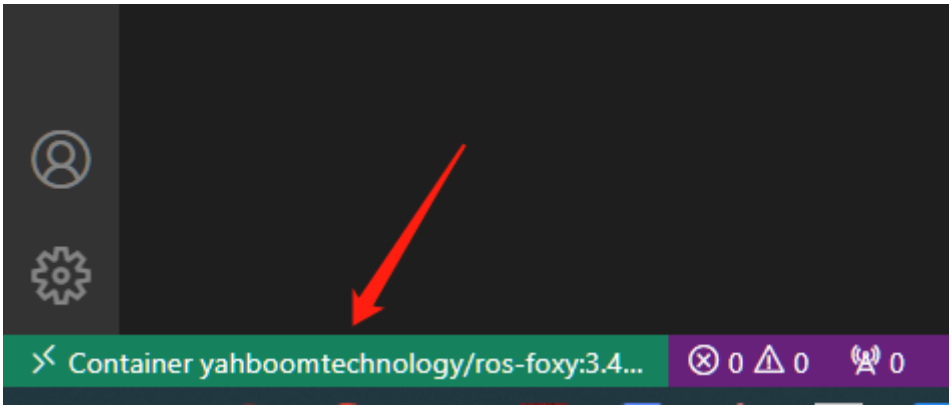


4. Right-click on the running container and follow the figure below:





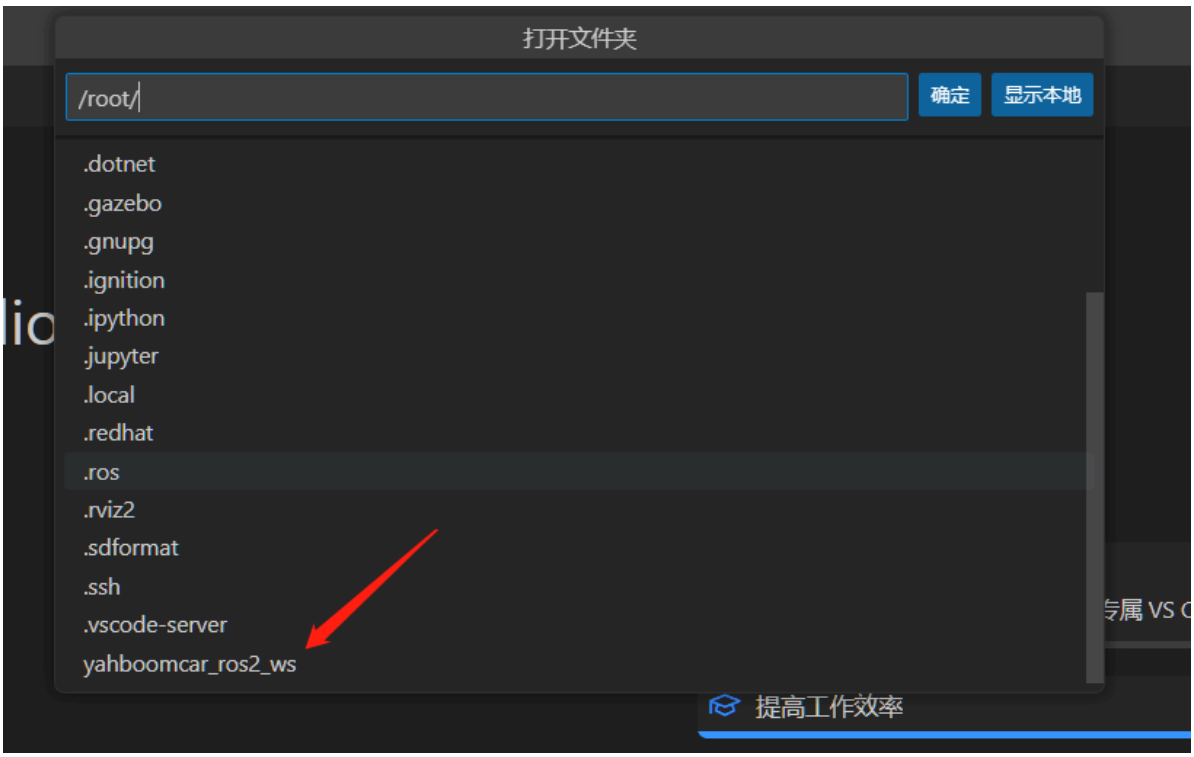
5. A new window will open, see the following indicates that you have entered the container

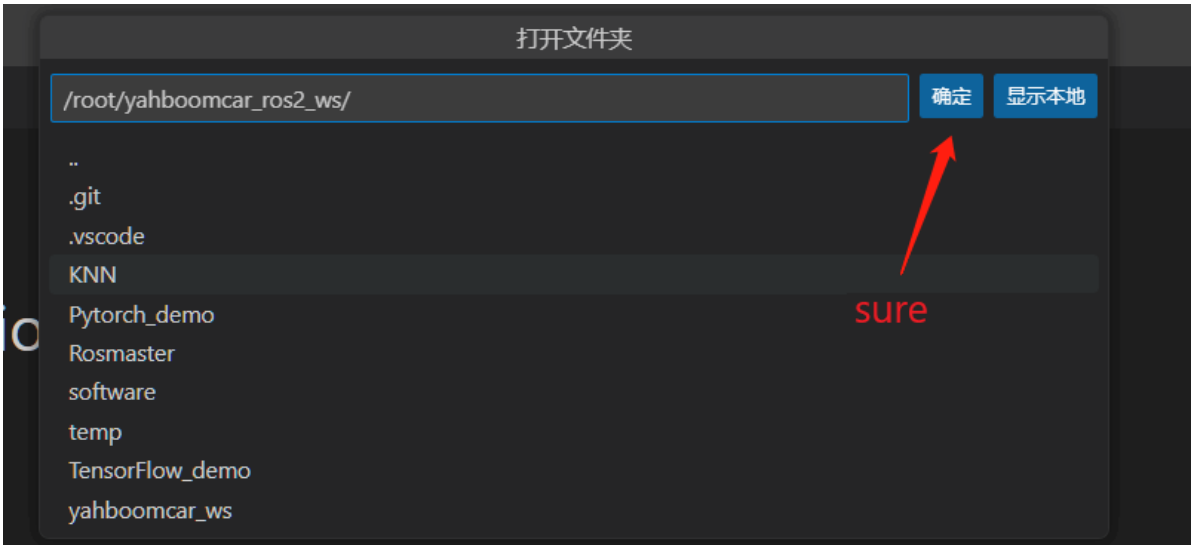


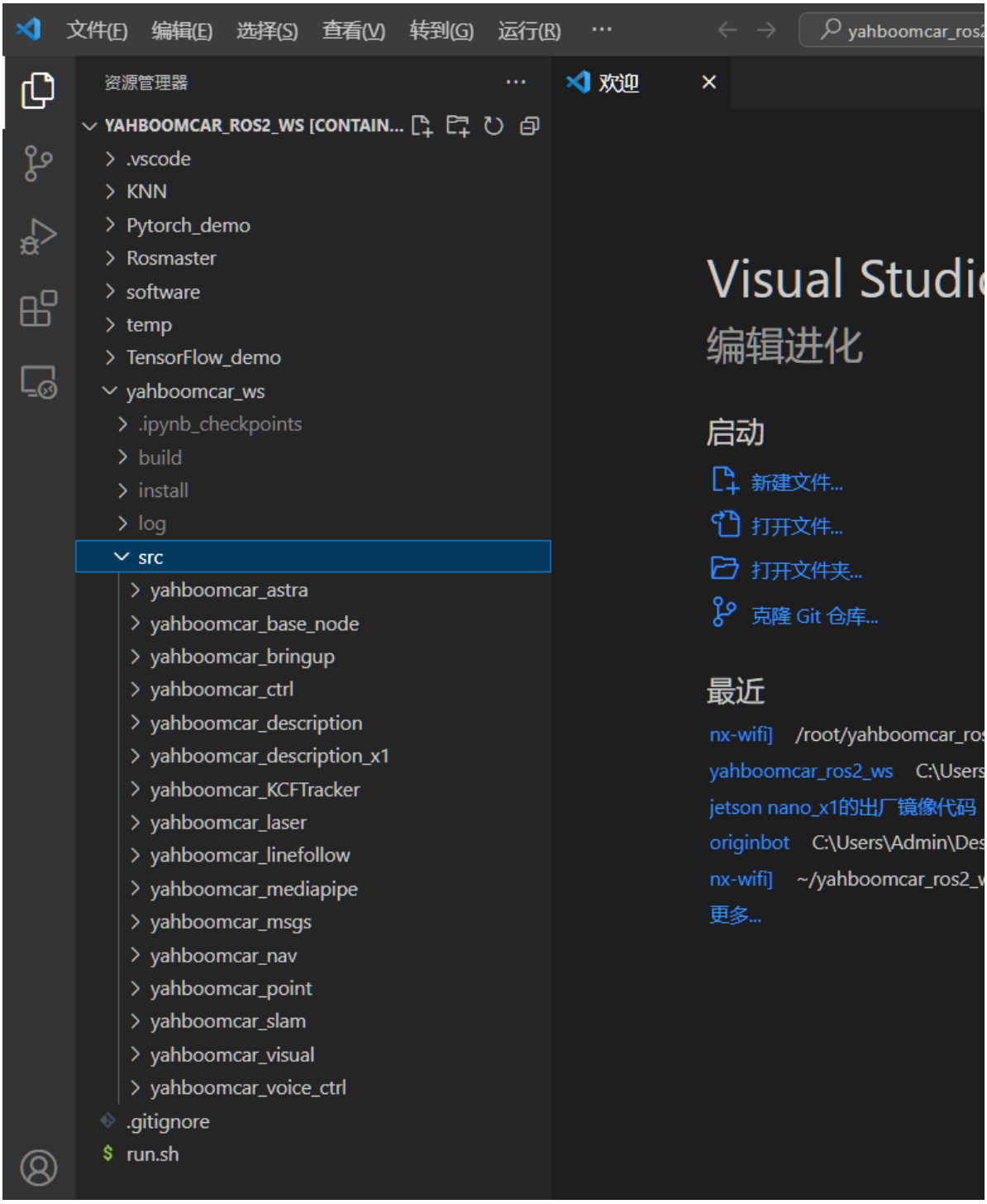
6. Open the folder

```
/root/yahboomcar_ros2_ws  # 这是机器人的项目路径
 # This is the robot's project path
```

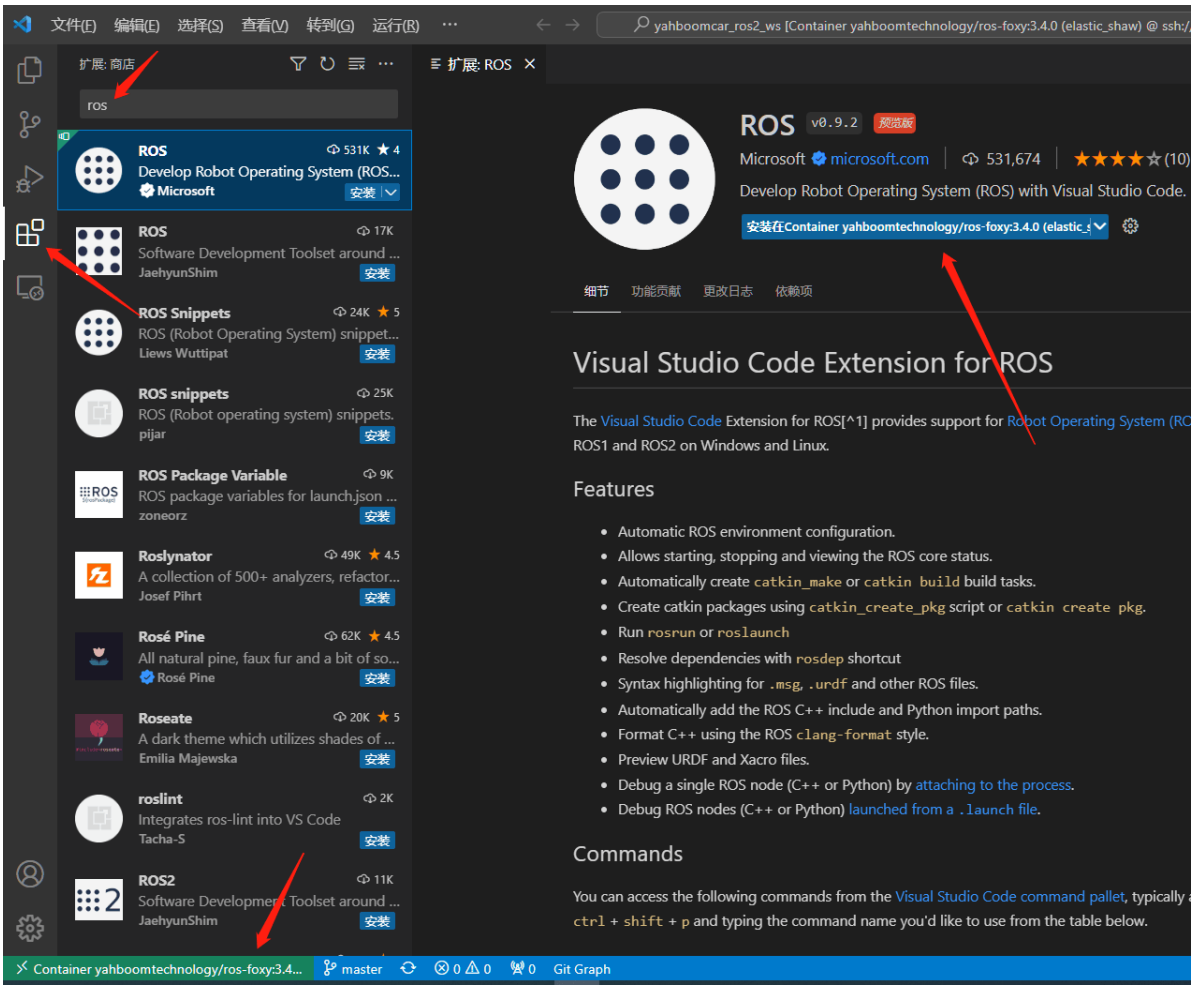

Visual Studio Code
编辑进化
启动
新建文件...
打开文件...
打开文件夹...
克隆 Git 仓库...
Open the folder
最近
nx-wifi] /root/yahboomcar_ros2_ws [Container yahboomtechnology/ros-foxy:3....
yahboomcar_ros2_ws C:\Users\Admin\Desktop\nx-ros2
jetson nano_x1的出厂镜像代码 C:\Users\Admin\Desktop
originbot C:\Users\Admin\Desktop\workspace
nx-wifi] ~/yahboomcar_ros2_ws [Container yahboomtechnology/ros-foxy:3.3.7 (...
更多...


打开文件夹
/root/
确定
显示本地
.dotnet
.gazebo
.gnupg
.ignition
.ipython
.jupyter
.local
.redhat
.ros
.rviz2
.sdformat
.ssh
.vscode-server
yahboomcar_ros2_ws
提高工作效率

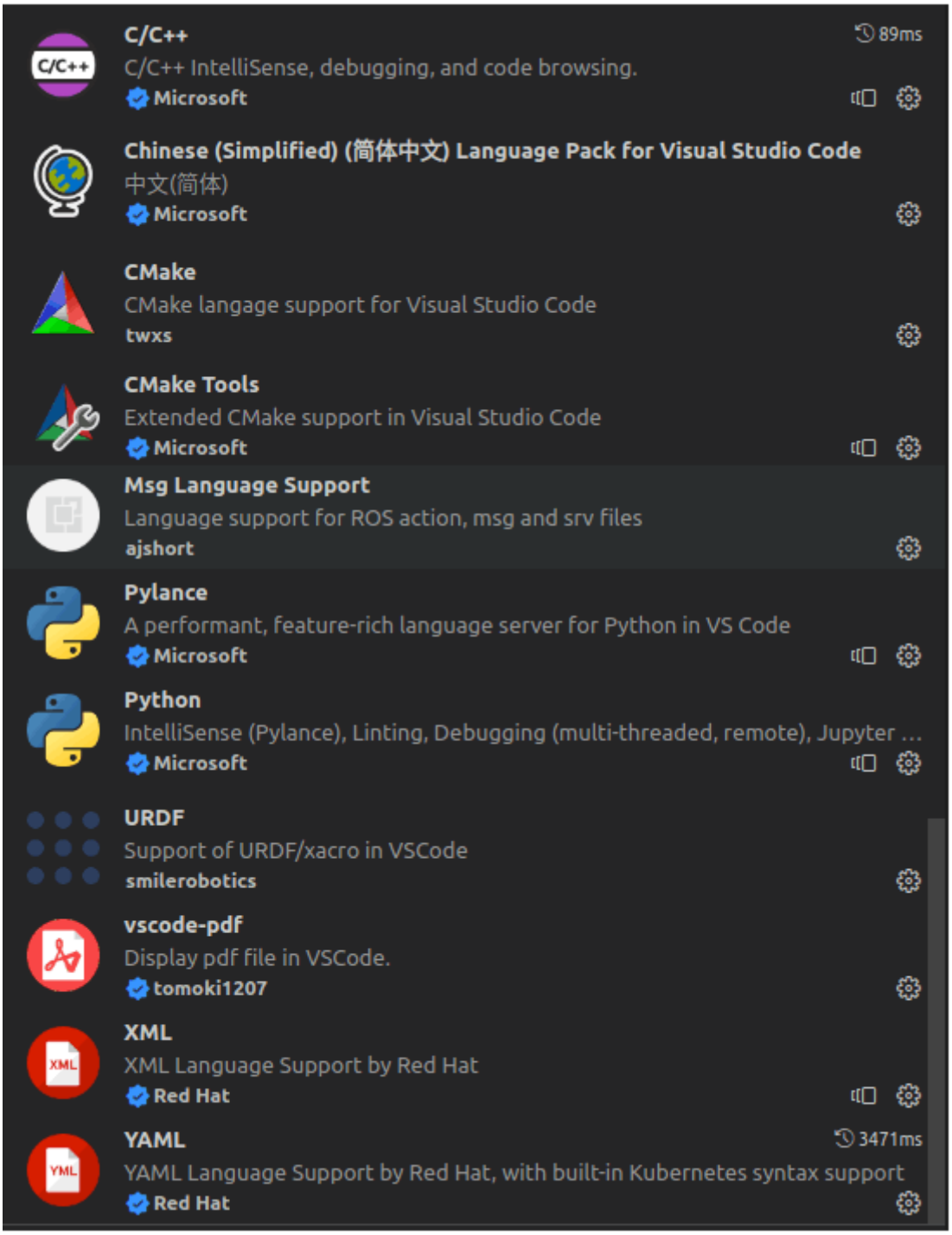

打开文件夹
/root/yahboomcar_ros2_ws/
确定
显示本地
..
.git
.vscode
KNN
Pytorch_demo
Rosmaster
software
temp
TensorFlow_demo
yahboomcar_ws
sure


文件(F)
编辑(E)
选择(S)
查看(V)
转到(G)
运行(R)
资源管理器
YAHBOOMCAR_ROS2_WS [CONTAIN...
.vscode
KNN
Pytorch_demo
Rosmaster
software
temp
TensorFlow_demo
yahboomcar_ws
.ipynb_checkpoints
build
install
log
src
yahboomcar_astra
yahboomcar_base_node
yahboomcar_bringup
yahboomcar_ctrl
yahboomcar_description
yahboomcar_description_x1
yahboomcar_KCFTracker
yahboomcar_laser
yahboomcar_linefollow
yahboomcar_mediapipe
yahboomcar_msgs
yahboomcar_nav
yahboomcar_point
yahboomcar_slam
yahboomcar_visual
yahboomcar_voice_ctrl
.gitignore
run.sh
欢迎
Visual Studi
编辑进化
启动
新建文件...
打开文件...
打开文件夹...
克隆 Git 仓库...
最近
nx-wifi] /root/yahboomcar_ros
yahboomcar_ros2_ws C:\Users
jetson nano_x1的出厂镜像代码
originbot C:\Users\Admin\Des
nx-wifi] ~/yahboomcar_ros2_v
更多...

7. Similarly, in the container can also install the plug-ins we need to facilitate the development of our



In addition to ros, the recommended plugins to install here are:



After completing the above steps, you can manipulate the code files in the container to develop and learn.

6.2.2.5 Configuring Confidential Login

In the above steps, some steps may need to enter the host's password, here again to optimize the configuration of the password-free login.

1. first test in windows using ssh login to the host [cart], the command is as follows:

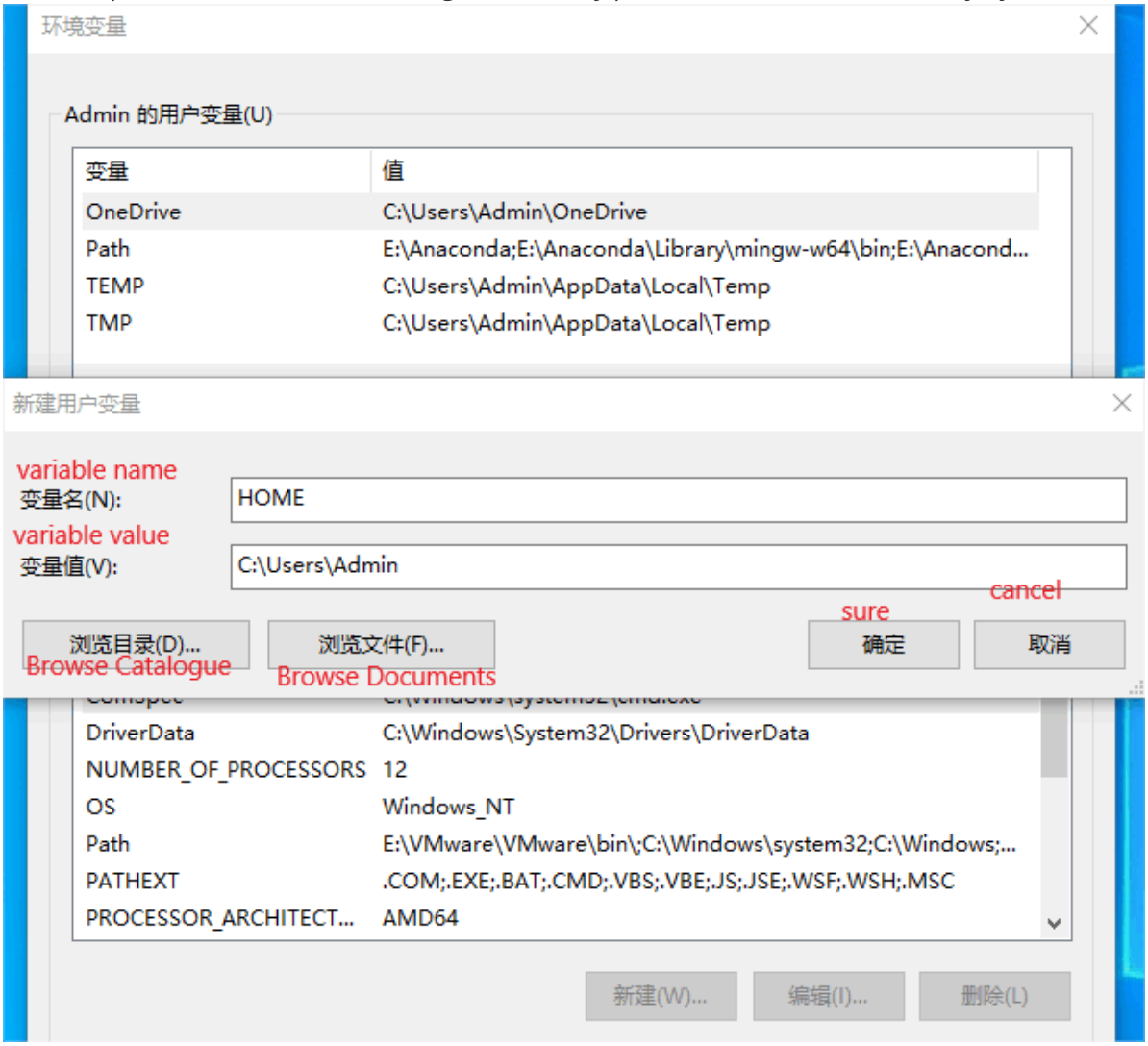
```
ssh jetson@192.168.2.102    （用户名和ip修改为自己的）
(Username and ip changed to your own)
```

This time you will find that you need to enter the host password

2. Next, configure password-free login

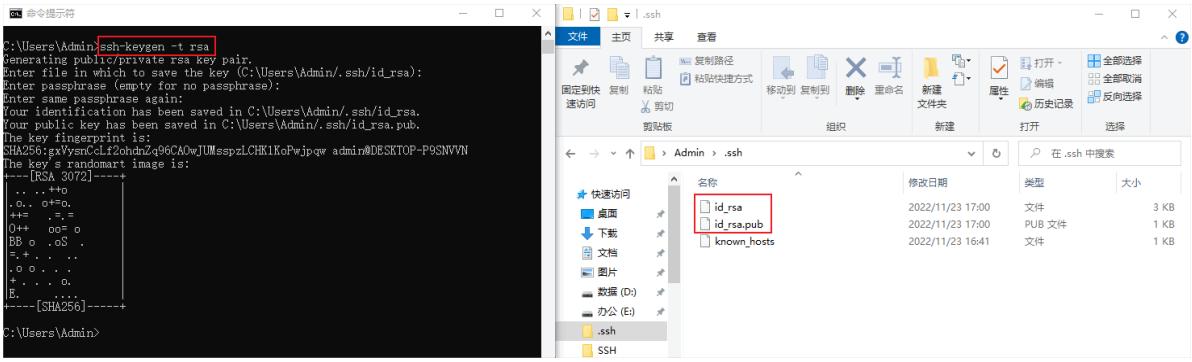
(1) Add environment variables

Open the environment variable properties page, click New in the user variables section, the variable HOME, the value of C:\Users\name, where name is the user name, you can check your own computer's user name, after the generated key pairs are saved in this directory by default.



(2) Generate key pairs

Open the cmd command line, run in the directory where the ssh program is located, or after adding the system environment, run the command [ssh-keygen -t rsa] used to generate the key, and then all the way back to the car, when you see a rectangle generated, then the key generation is successful. At this point in the user directory of the .ssh folder will be two more files that is id_rsa (private key), id_rsa.pub (public key)



(3) Add the public key to the host machine

Again open the cmd command line and type

```
ssh username@host "cat >> ~/.ssh/authorized_keys" <
C:\Users\name\.ssh\id_rsa.pub

#例如：根据自己的情况修改# e.g. Modify as you see fit
ssh jetson@192.168.2.102 "cat >> ~/.ssh/authorized_keys" <
C:\Users\Admin\.ssh\id_rsa.pub
```

This command first logs in to the host machine and then adds the public key from the local machine, Win, to the personal directory of the host account, thus enabling password-free login. Note that you need to enter the host account's password for this step.

(4) Authentication

Test again using ssh login on windows to the host [cart] with the following command:

```
ssh jetson@192.168.2.102    （用户名和ip修改为自己的）
(Username and ip changed to your own)
```

At this point you will realize that you no longer need to enter a password.

Restart vscode and you will no longer need to enter passwords where they are required.