Robot development environment setup in docker

6.1. Use jupyter lab to access docker

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

Note: When using jupyter lab in a docker container, the docker container must be run in the host networking mode: 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
................
```
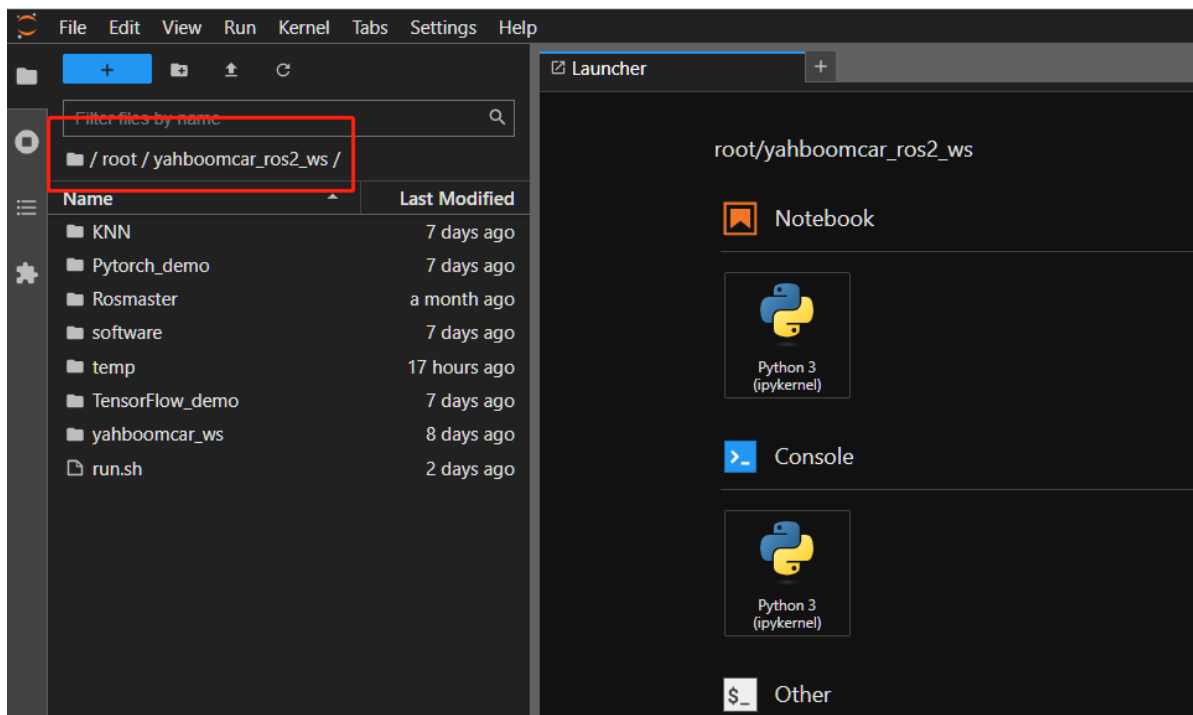
2. View on other devices, open in windows or ubuntu browser (must be in the same LAN, 192.168.2.102 is the IP address in the docker container)

```
http://192.168.2.102:8888/lab # Enter the jupyter lab of the host
http://192.168.2.102:8889/lab # Enter the jupyter lab in the container

Enter the password: yahboom to enter jupyter lab
```
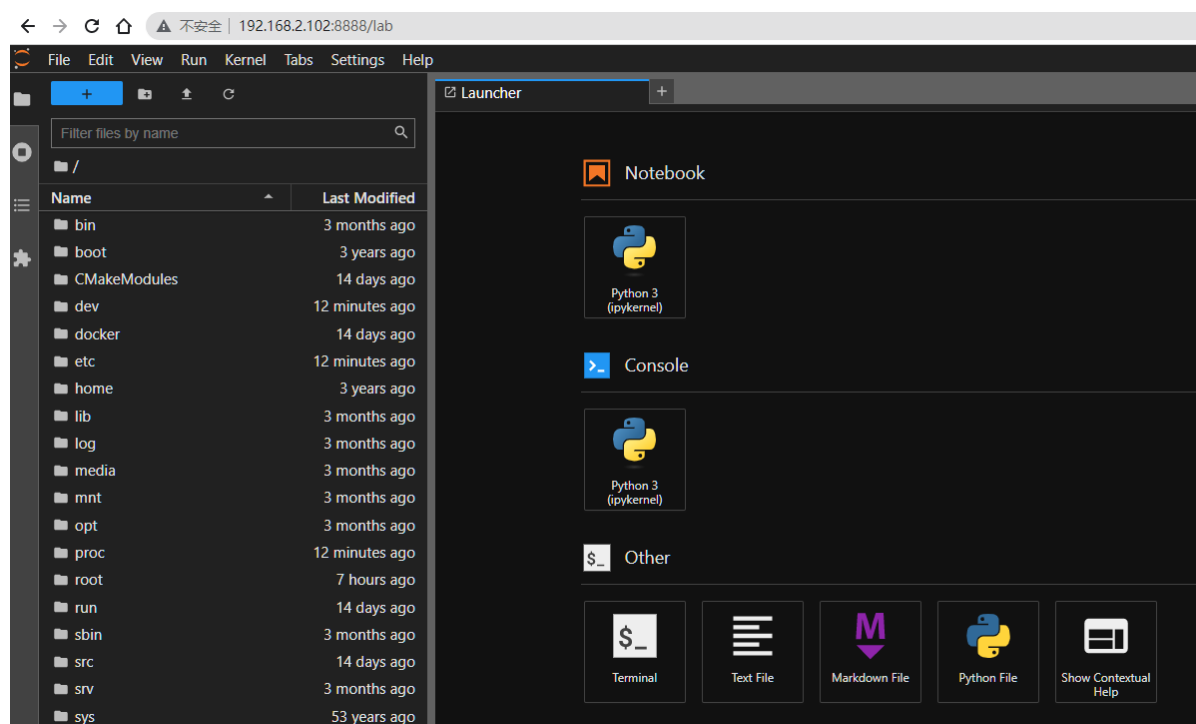

The following directory is the project path of the robot:

6.2, Use vscode to access docker

Here we take the example of configuring vscode to access the docker container in windows, and the steps to access docker in ubuntu are basically the same.

6.2.1, Remote Configuration

See [IV. Linux Operating System ---- 7.SSH Remote Control] section

Make sure Windows can remotely log in to the Docker host [car]:

```
Open cmd in Windows and enter the ssh command test: ssh jetson@192.168.2.102
(change the username and IP to your own)

Or use remote tools: putty, xshell, securecrt, winscp, mobaxterm, finalshell,
etc., mobaxterm is recommended.
```

6.2.2, Configure password-free login

Some of the above steps may require the host password, so optimize it here and configure password-free login.

1. First, test by opening the cmd command on Windows and using ssh to log in to the host machine [Xiaoche]. The command is as follows:

```
ssh jetson@192.168.2.102 (change the user name and IP to your own)
```

At this time, you will find that you need to enter the host machine password

2. Next, configure password-free login

(1) Add environment variables

Take Windows 10 as an example, open: This computer---Properties---Advanced system settings---Environment variables, open the environment variable properties page. Click New in the user variable section, the variable is HOME, the value is C:\Users\name, where name is the user name. You can check the user name of your computer by yourself. The key pair generated later is saved in this directory by default.
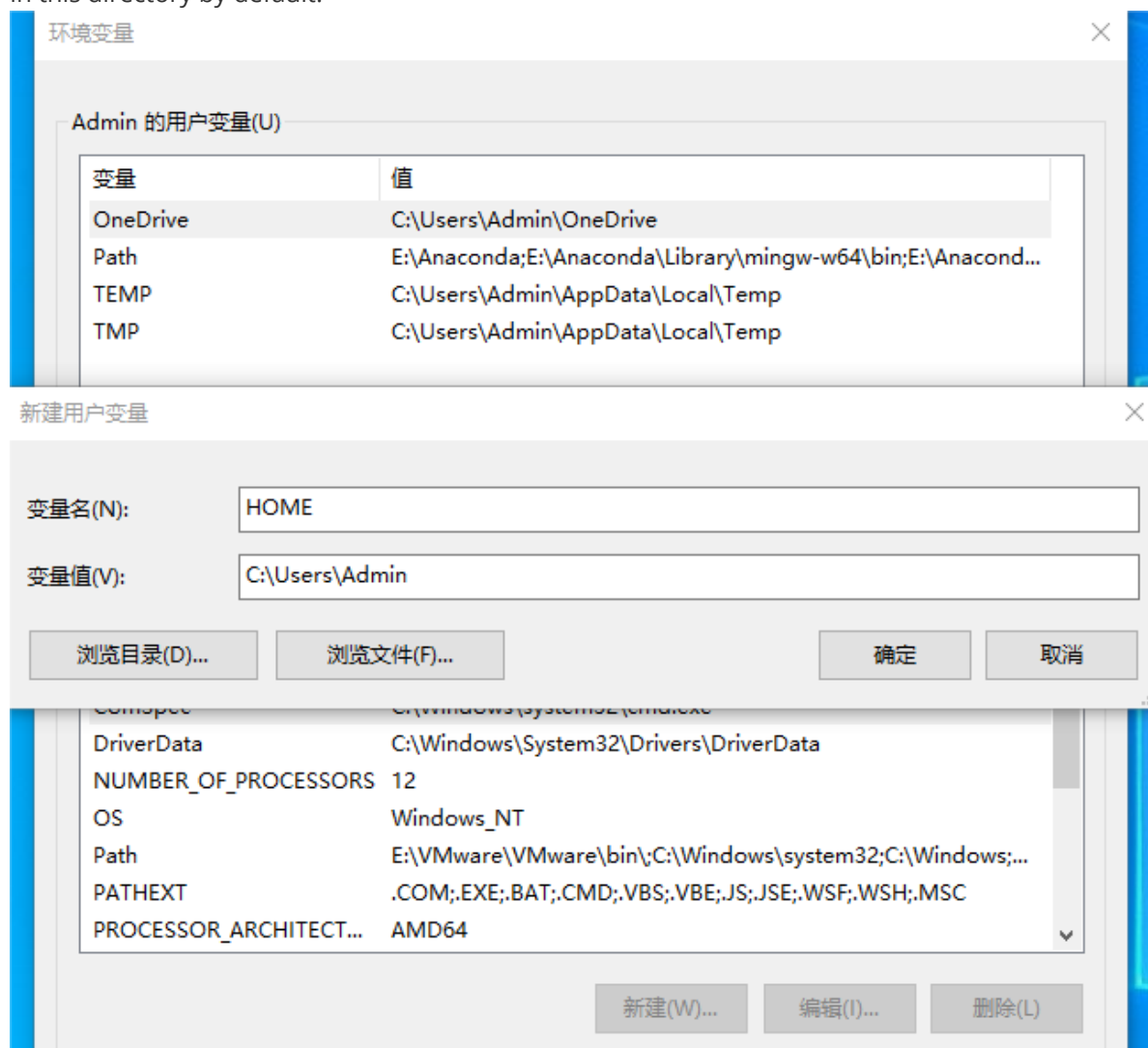
(2) Generate a key pair

Open the cmd command line and run it in the directory where the ssh program is located, or run the [ssh-keygen -t rsa] command anywhere after adding the system environment to generate the key. Then press Enter all the way. When you see a rectangular image generated, the key generation is successful. At this time, there will be two more files in the .ssh folder of the user directory, namely id_rsa (private key) and id_rsa.pub (public key)
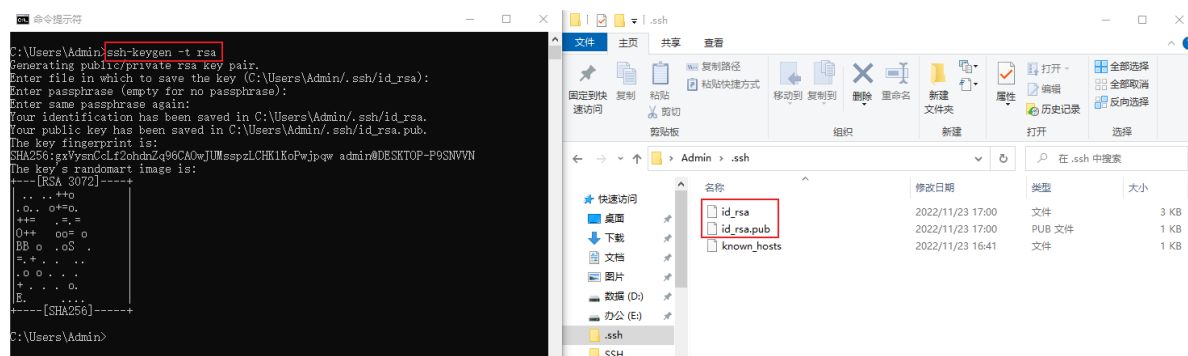
(3) Add the public key to the host machine

First, check whether the .ssh directory already exists in the user root directory of the host machine. If not, execute the above "(2) Generate a key pair" step to add the .ssh directory.

Secondly, check whether there is an authorized_keys file in the .ssh directory. If not, execute the following two commands to add it:

```
touch ~/.ssh/authorized_keys
chmod 600 ~/.ssh/authorized_keys
```

Then, open the Windows cmd command line and enter

```
ssh username@host "cat >> ~/.ssh/authorized_keys" <
C:\Users\name\.ssh\id_rsa.pub
Note: The above "C:\Users\name\.ssh\id_rsa.pub" path is modified according to
your own Windows computer path

#For example: modify according to your own situation
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 local public key under Windows to the personal directory of the host account, thereby achieving password-free login. Note that you need to enter the password of the host account in this step.

(4) Verification

Test again by opening the cmd command on Windows and using ssh to log in to the host [car]. The command is as follows:

```
ssh jetson@192.168.2.102 (change the username and IP to your own)
```

You will find that you no longer need to enter a password.

6.2.3, vscode configuration

6.2.3.1, download and install vscode

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

### 6.2.3.2, vscode configuration ssh remote login to the host machine

1. Open vscode, click the arrow icon on the left bottom, then enter remote in the search box, select Remote Development plug-in, click Install to install the plug-in
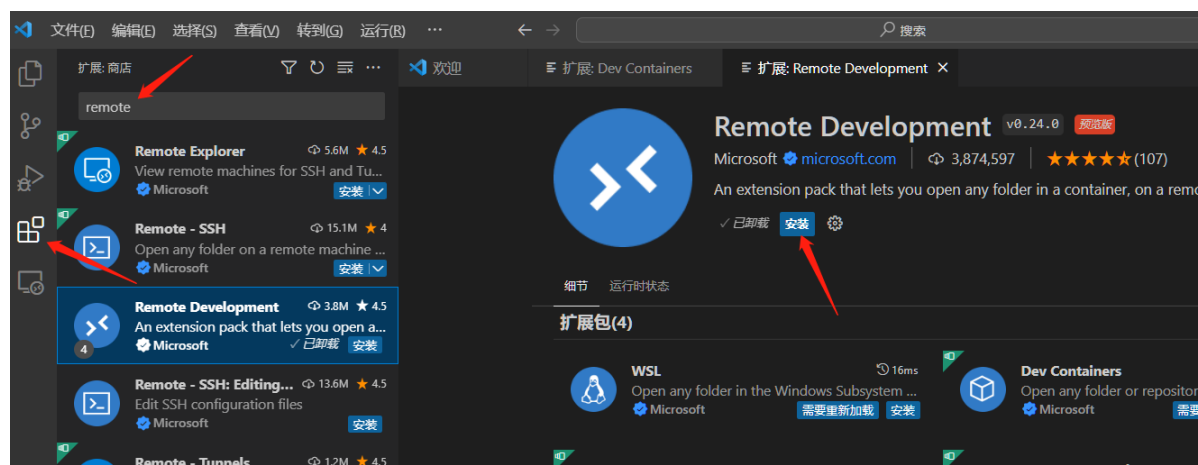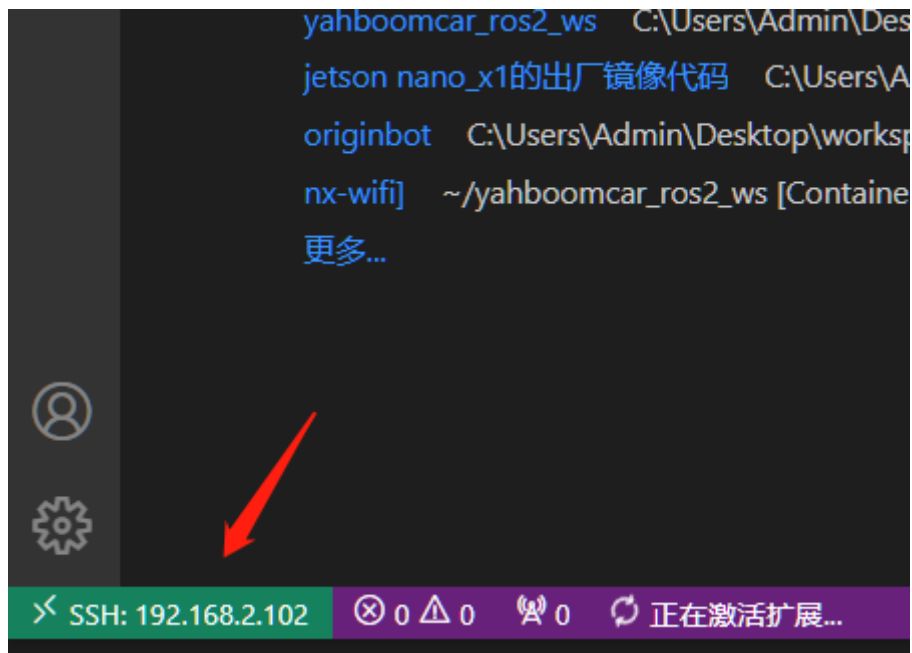
vscode is installed in English by default, you can install the Chinese plug-in to localize it:

2. In vscode, press the shortcut key [ctrl + shift + p] to open the command input window, enter: remote, and then log in to the remote host [car] according to the instructions in the figure below.
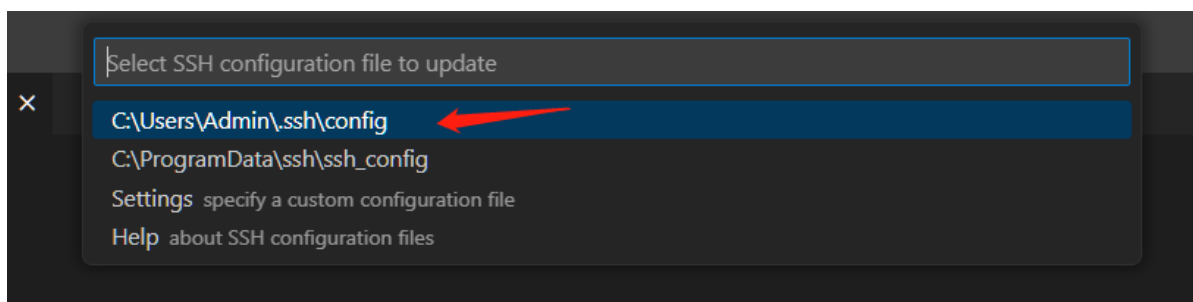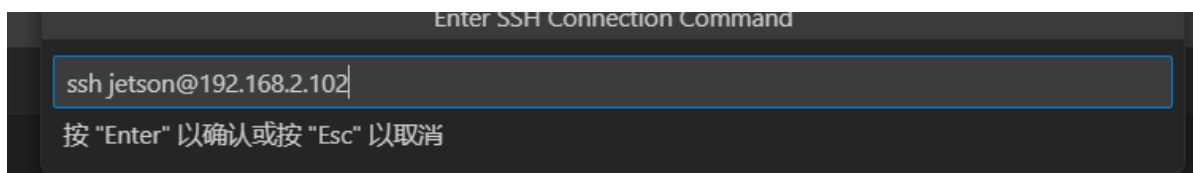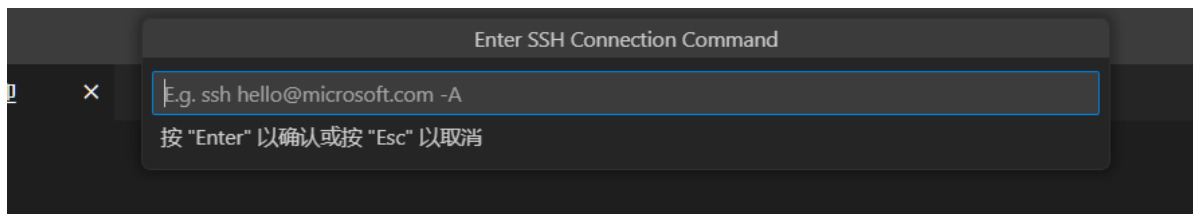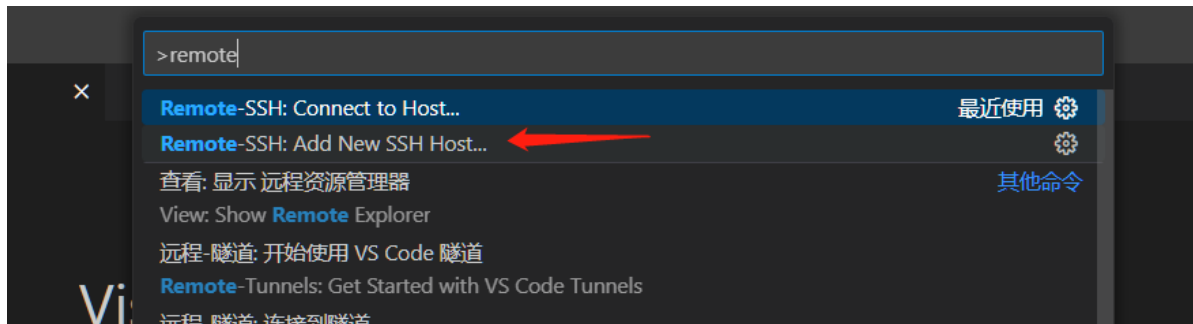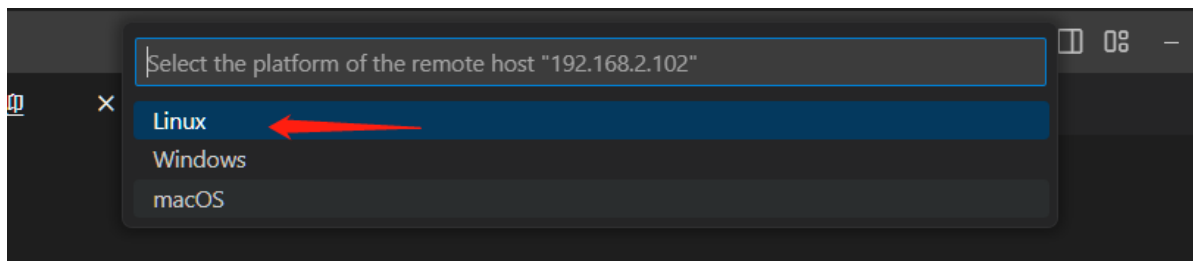
If you see the above picture, it means that you have successfully logged in to the host remotely.

6.2.3.3, Enter the robot container

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

6.2.3.4, vscode remote host configures docker environment

1. Install the docker plug-in on the remote host [car]
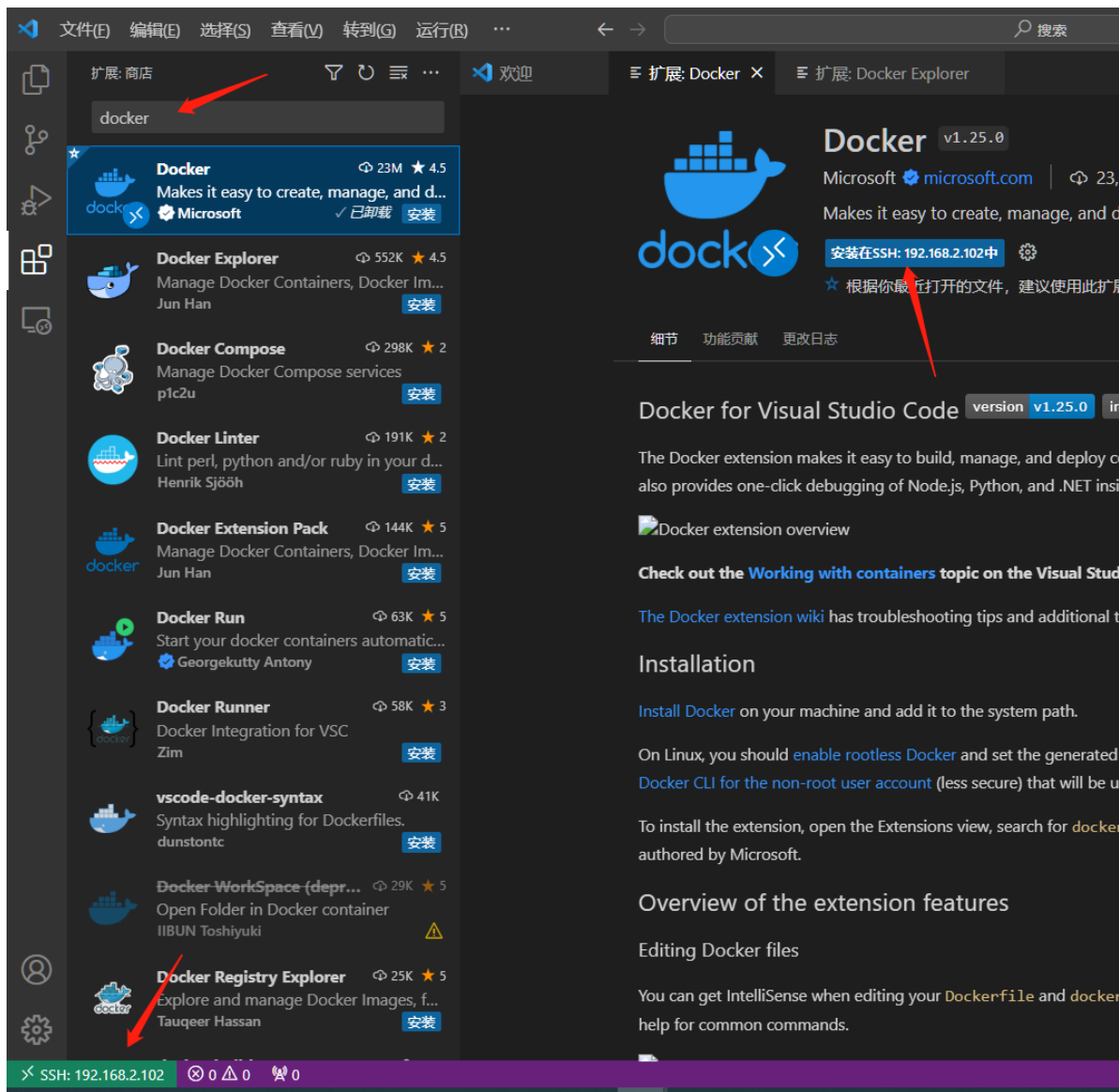
2. After the installation is complete, a docker icon will appear in the navigation bar on the left
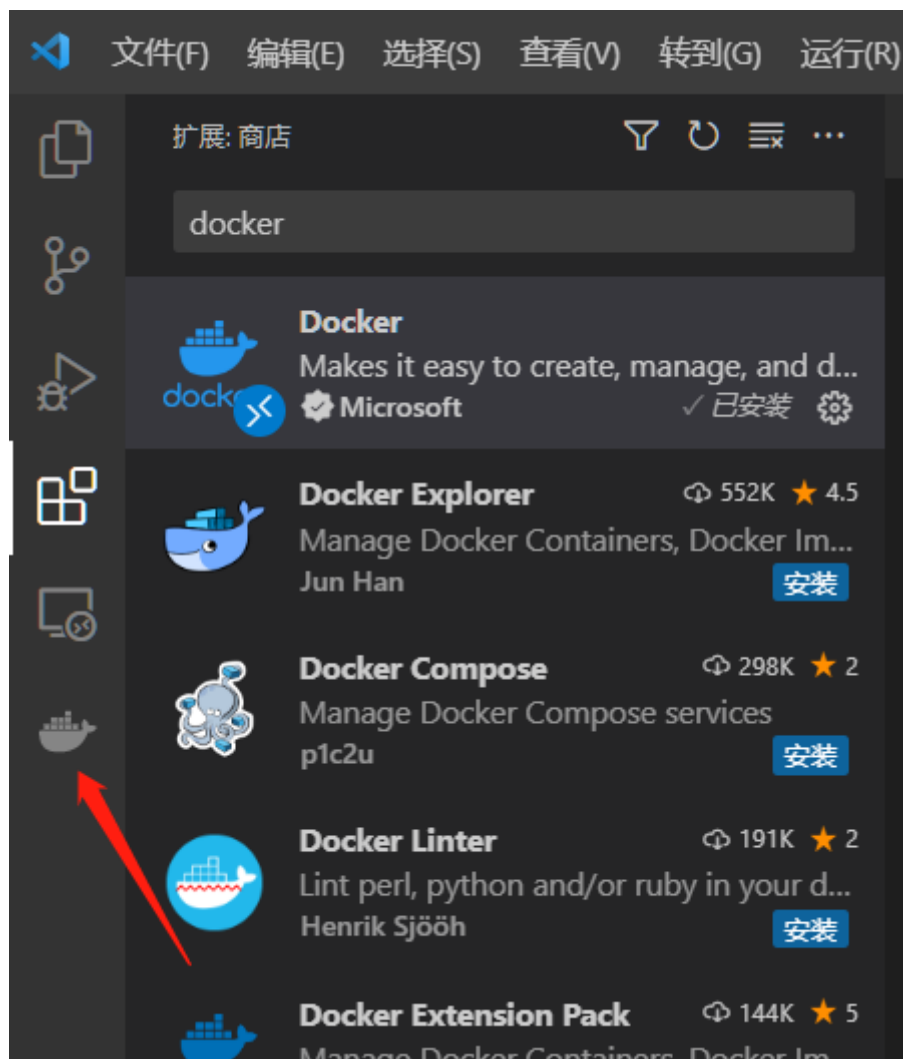
3. Click the docker icon
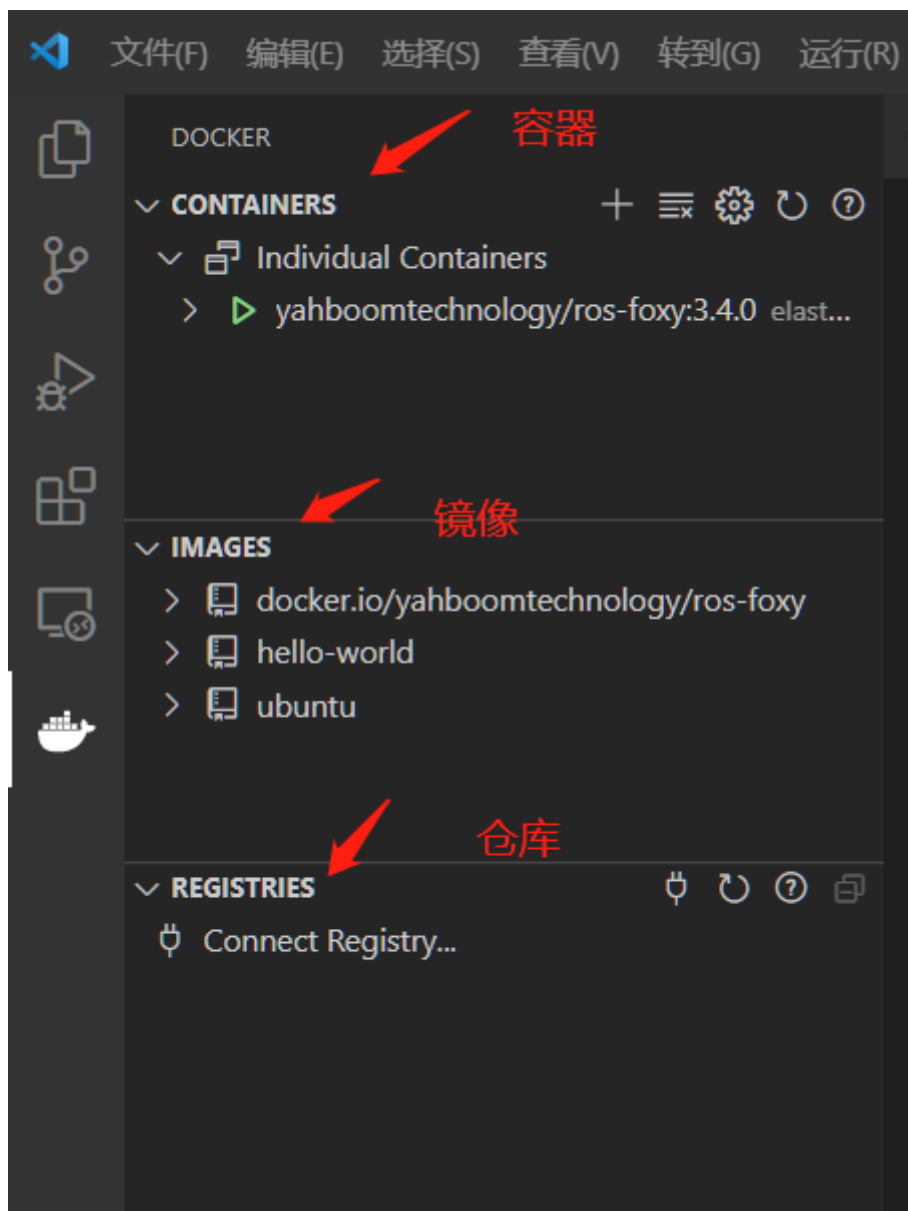
4. Right-click the running container and follow the steps below:
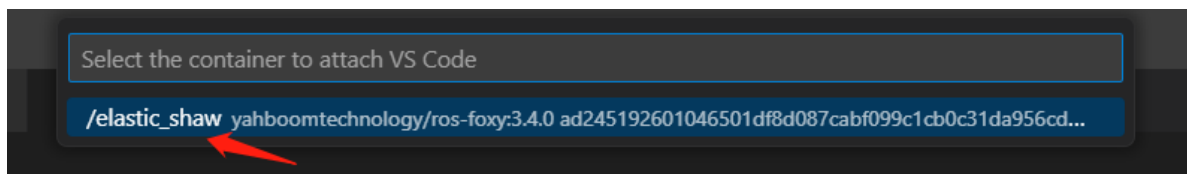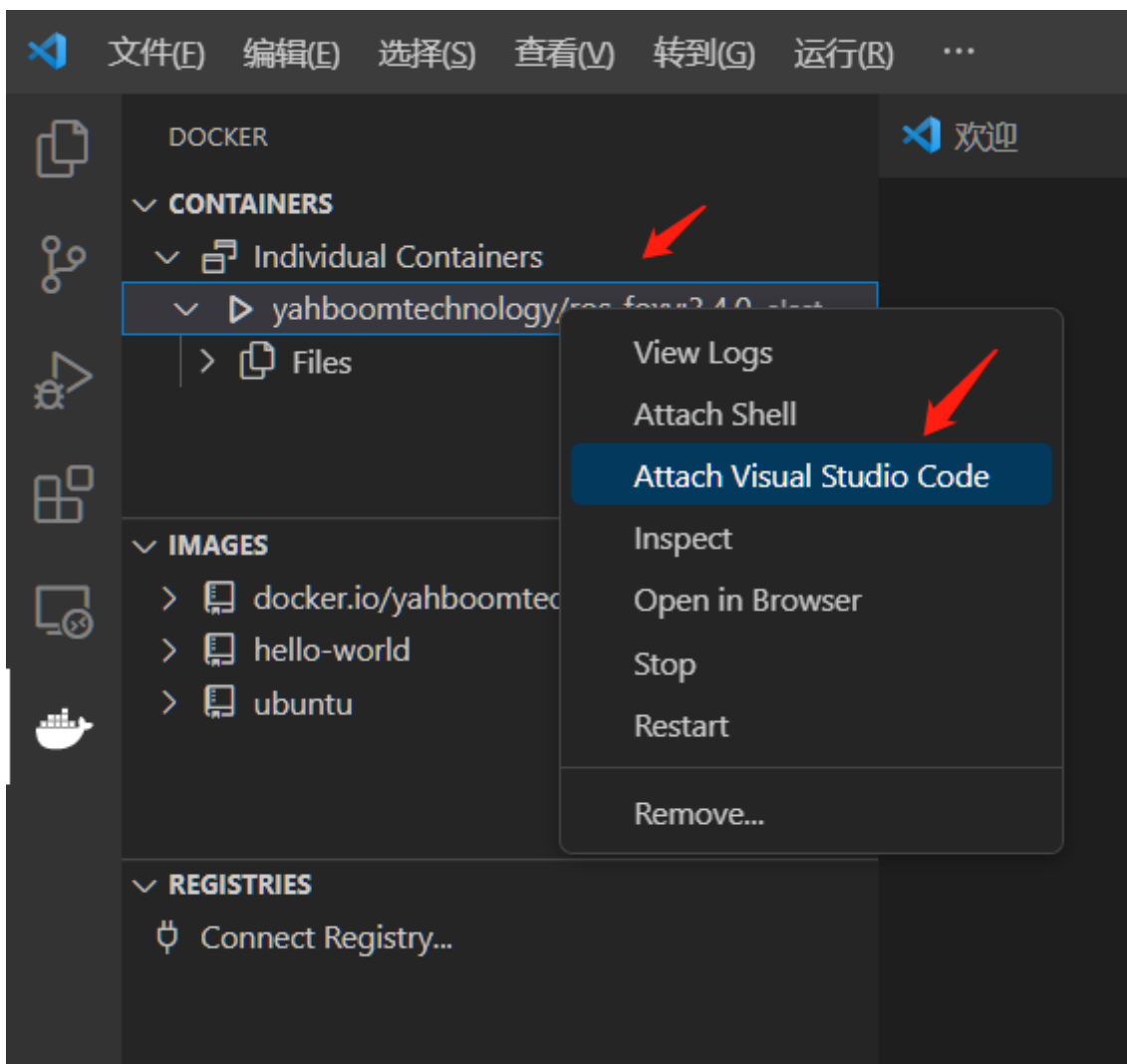
5. A new window will open and you will see the following message indicating that you have entered the container

6. Open the folder

```
/root/yahboomcar_ros2_ws # This is the project path of the robot
```

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...

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

文件(F) 编辑(E) 选择(S) 查看(V) 转到(G) 运行(R) ··· ← → yahboomcar_ros2

资源管理器 ··· 欢迎 ×

∨ 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
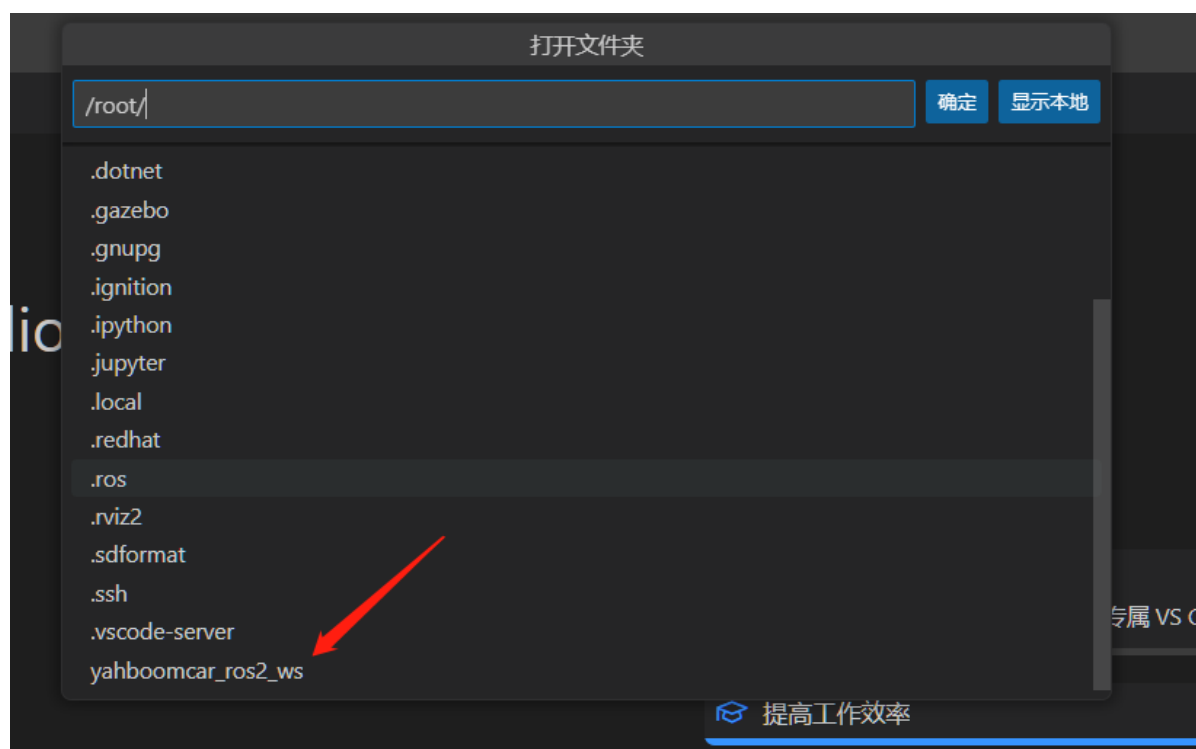 ◇ .gitignore
  $ run.sh

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
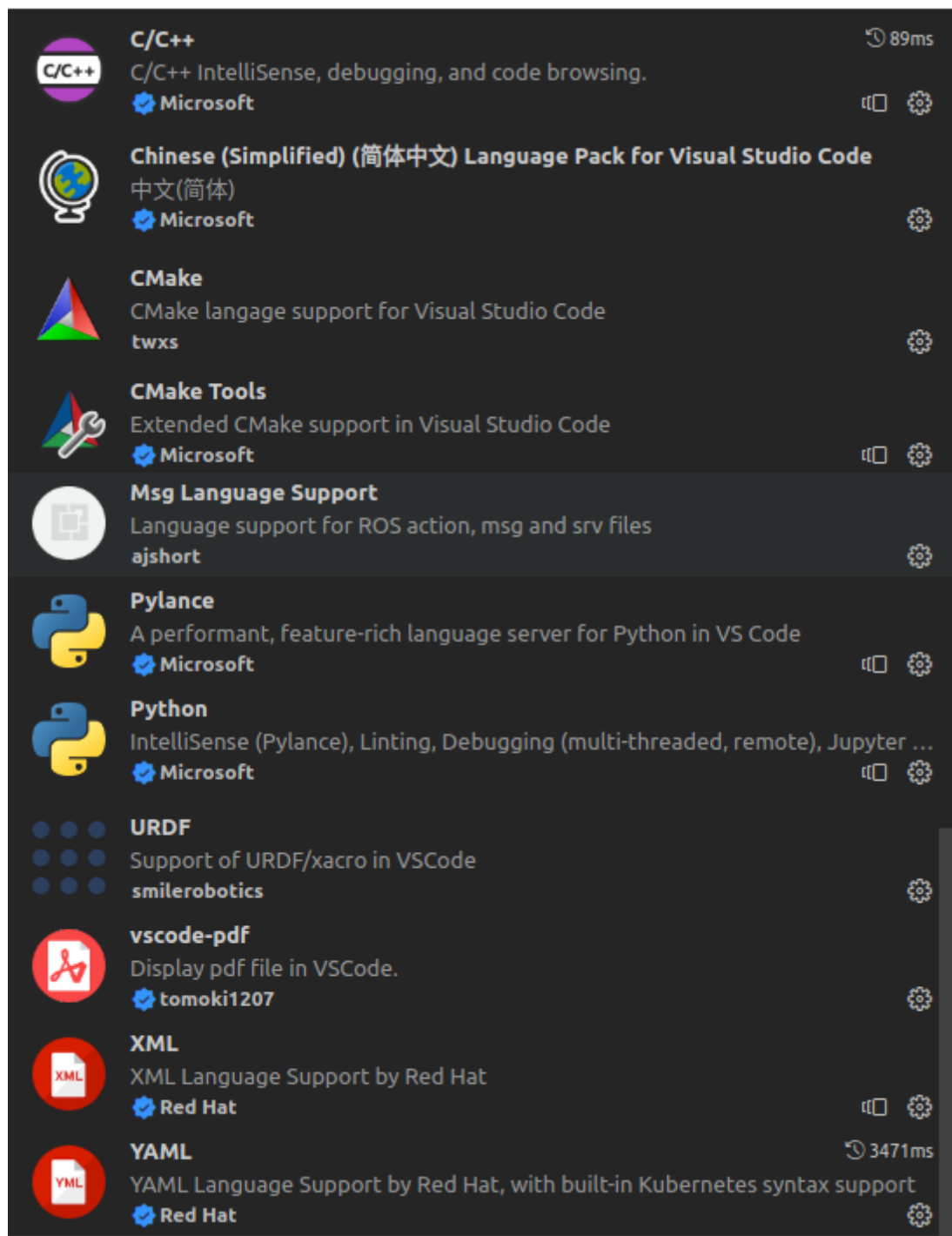nx-wifi] ~/yahboomcar_ros2_v
更多...

7. Similarly, we can also install the plug-ins we need in the container to facilitate our development
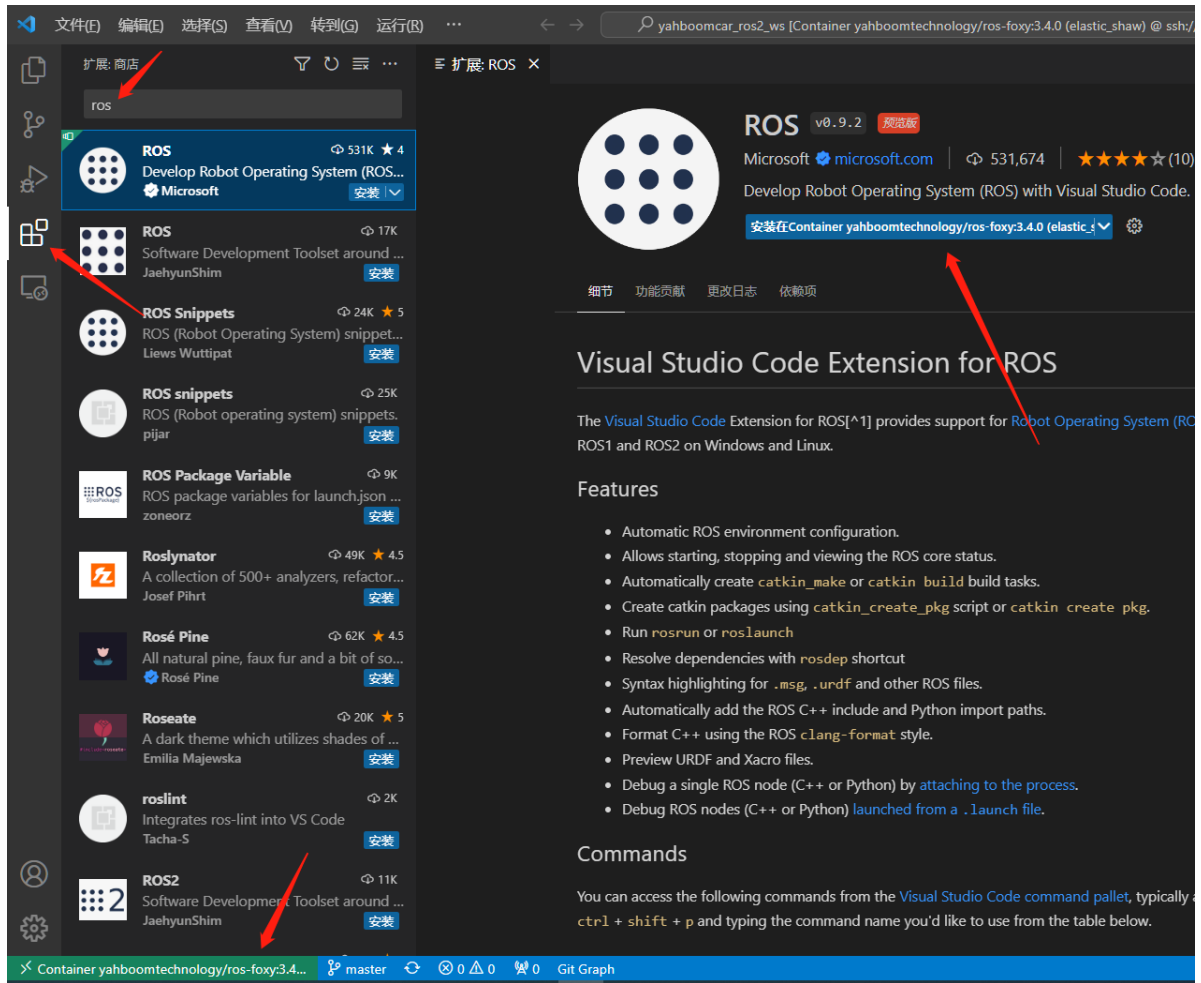
In addition to ros, the plug-ins recommended for installation are:

C/C++		⏱ 89ms
C/C++ IntelliSense, debugging, and code browsing.		
✓ Microsoft		

Chinese (Simplified) (简体中文) Language Pack for Visual Studio Code
中文(简体)
✓ Microsoft

CMake
CMake langage support for Visual Studio Code
twxs

CMake Tools
Extended CMake support in Visual Studio Code
✓ Microsoft

Msg Language Support
Language support for ROS action, msg and srv files
ajshort

Pylance
A performant, feature-rich language server for Python in VS Code
✓ Microsoft

Python
IntelliSense (Pylance), Linting, Debugging (multi-threaded, remote), Jupyter ...
✓ Microsoft

URDF
Support of URDF/xacro in VSCode
smilerobotics

vscode-pdf
Display pdf file in VSCode.
✓ tomoki1207

XML
XML Language Support by Red Hat
✓ Red Hat

YAML   ⏱ 3471ms
YAML Language Support by Red Hat, with built-in Kubernetes syntax support
✓ Red Hat

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