

ROS2 小车上手操作

1.虚拟机相关操作

使用虚拟机目的：便于远程登录到小车端运行 ROS

虚拟机使用：下载资料中的虚拟机镜像——进行解压操作——下载 VMware Workstation——选择打开虚拟机——找到对应存放虚拟机镜像路径下的 vmx 文件打开

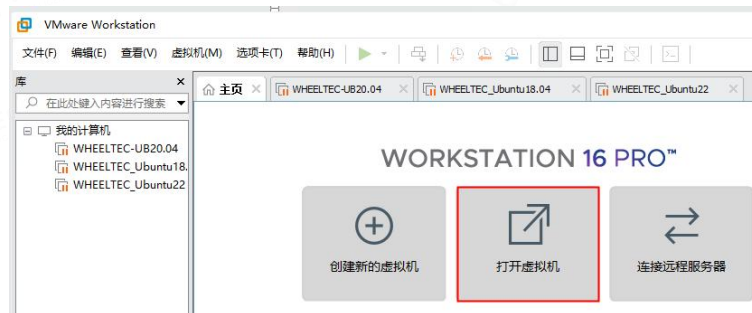


图 1 打开虚拟机

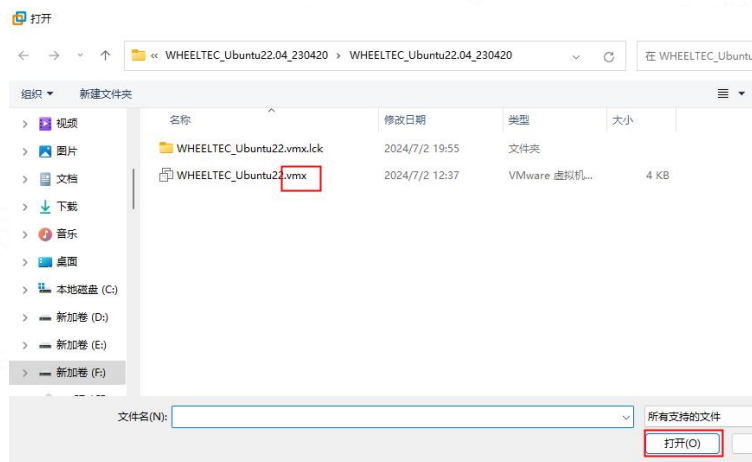


图 2 选择 vmx 文件并打开

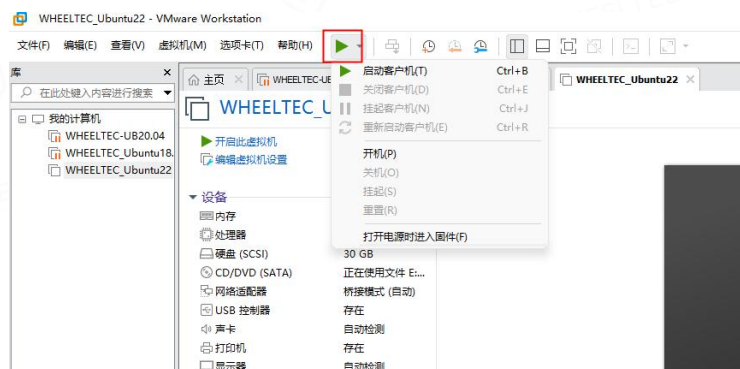


图 3 启动虚拟机

虚拟机操作：主要是开启/挂起/关闭

建议平常使用后进行挂起操作，可以保留之前的操作痕迹

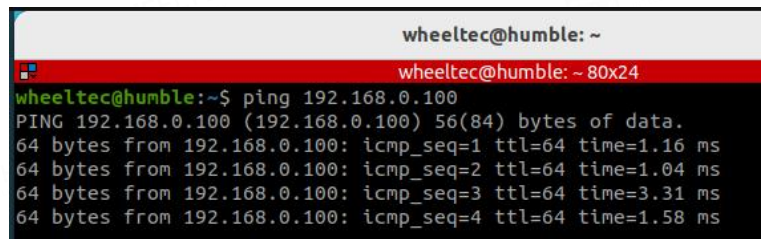
Q:除了虚拟机之外是否可以选择其他设备？

A:只要是版本匹配的 Ubuntu 设备都可以，但，其他设备需要进行各种各样的配置操作，建议使用我们配置好的虚拟机

2.连接小车 wifi

默认设置小车发出的热点都带有 WHEELTEC 字样，密码统一为 dongguan

确认 PC 端的连接: 查看电脑与小车是否正确连接——确认虚拟机端的连接:
查看虚拟机与小车是否正确连接——默认设置 ip 地址均为 192.168.0.100，可通过是否能 ping 通对应 ip 的方式进行确认



```
wheeltec@humble: ~  
wheeltec@humble: ~ 80x24  
wheeltec@humble:~$ ping 192.168.0.100  
PING 192.168.0.100 (192.168.0.100) 56(84) bytes of data.  
64 bytes from 192.168.0.100: icmp_seq=1 ttl=64 time=1.16 ms  
64 bytes from 192.168.0.100: icmp_seq=2 ttl=64 time=1.04 ms  
64 bytes from 192.168.0.100: icmp_seq=3 ttl=64 time=3.31 ms  
64 bytes from 192.168.0.100: icmp_seq=4 ttl=64 time=1.58 ms
```

图 4 测试虚拟机是否可以 ping 通小车

3.打开终端

方式一：直接右键打开终端=在当前位置打开终端

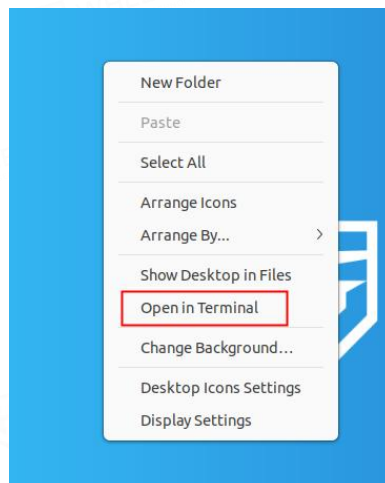


图 5 直接右键打开终端

方式二：Ctrl+Alt+T=在/home/wheeltec 路径下打开终端

确认当前终端路径——pwd

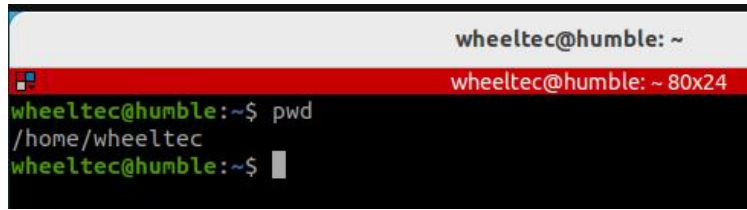


图 6 pwd 查看当前终端所在路径

4.挂载

可挂载内容——工作空间下的文件

挂载指令：

```
sudo mount -t nfs 192.168.0.100:/home/wheeltec/wheeltec_ros2/ /mnt
```

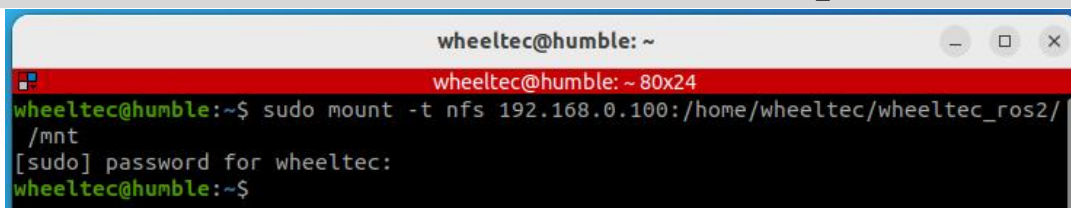


图 7 进行文件挂载操作

挂载文件查看与修改：sublime text

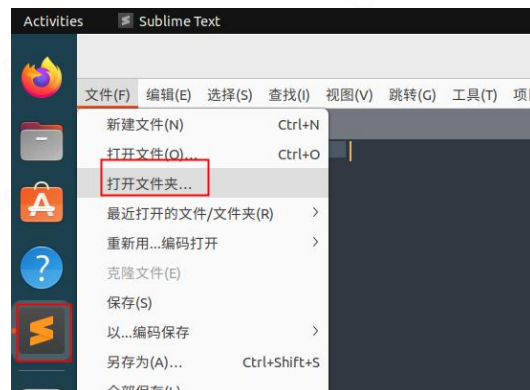


图 8 在 sublime text 中打开文件夹

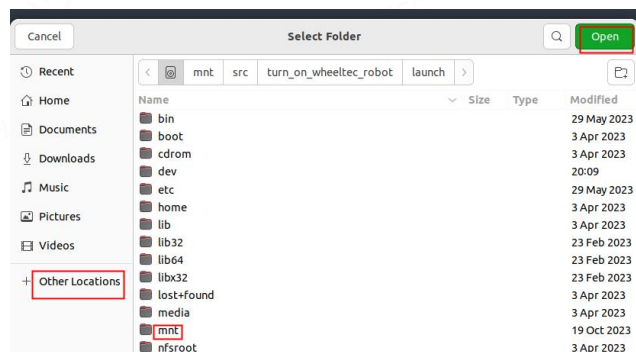
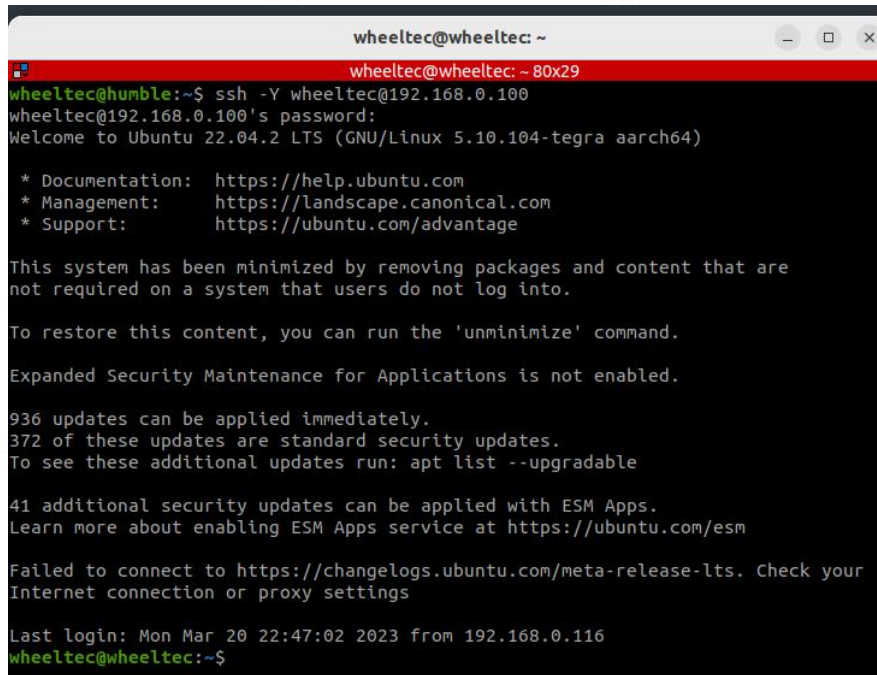


图 9 打开所挂载到的 mnt 文件夹

5.ssh 远程登录

ssh -Y wheeltec@192.168.0.100



```
wheeltec@wheeltec: ~  
wheeltec@wheeltec: ~ 80x29  
wheeltec@humble:~$ ssh -Y wheeltec@192.168.0.100  
wheeltec@192.168.0.100's password:  
Welcome to Ubuntu 22.04.2 LTS (GNU/Linux 5.10.104-tegra aarch64)  
  
* Documentation:  https://help.ubuntu.com  
* Management:    https://landscape.canonical.com  
* Support:        https://ubuntu.com/advantage  
  
This system has been minimized by removing packages and content that are  
not required on a system that users do not log into.  
  
To restore this content, you can run the 'unminimize' command.  
  
Expanded Security Maintenance for Applications is not enabled.  
  
936 updates can be applied immediately.  
372 of these updates are standard security updates.  
To see these additional updates run: apt list --upgradable  
  
41 additional security updates can be applied with ESM Apps.  
Learn more about enabling ESM Apps service at https://ubuntu.com/esm  
  
Failed to connect to https://changelogs.ubuntu.com/meta-release-lts. Check your  
Internet connection or proxy settings  
  
Last login: Mon Mar 20 22:47:02 2023 from 192.168.0.116  
wheeltec@wheeltec:~$
```

图 10 进行 ssh 远程登录

6.车型、相机、雷达选择

车型:

1./turn_on_wheeltec_robot/launch/turn_on_wheeltec_robot.launch.py

如果用户使用的是服务机器人或 mini 版小车, 修改对应的 minibot_type, 启动 ld.add_action(minibot_type)并屏蔽 ld.add_action(flagship_type)

如果用户使用的是非 mini 小车类型如高配阿克曼机器人, 则修改对应的 flagship_type, 启动 ld.add_action(flagship_type)并屏蔽 ld.add_action(minibot_type)

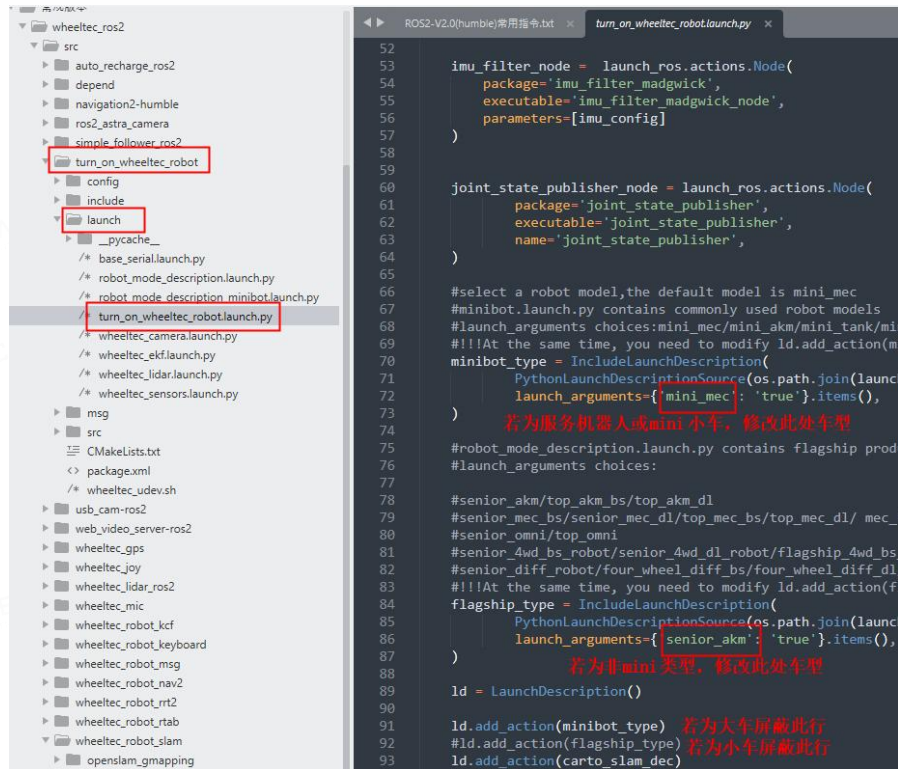


图 11 /turn_on_wheeltec_robot/launch/turn_on_wheeltec_robot.launch.py

修改车型相关参数

2./wheeltec_robot_nav2/launch/ wheeltec_nav2.launch.py

修改文件中的 my_param_file 参数

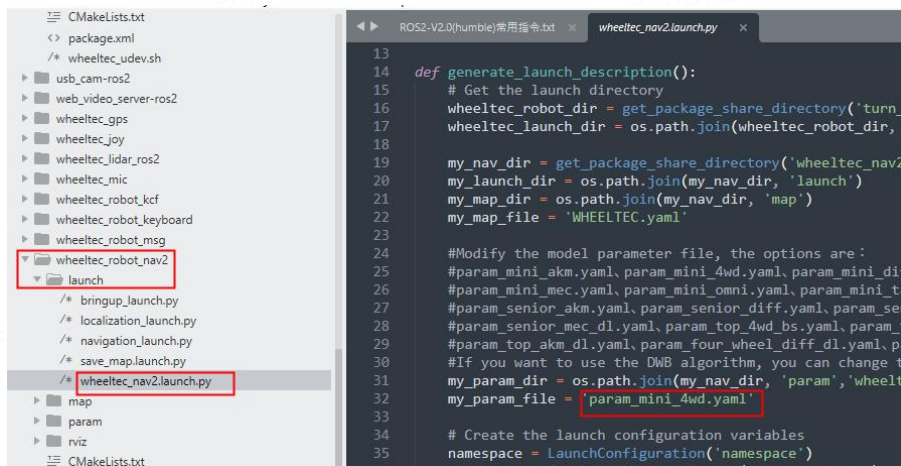


图 12 /wheeltec_robot_nav2/launch/ wheeltec_nav2.launch.py

修改文件中的 my_param_file 参数

雷达:

/turn_on_wheeltec_robot/launch/wheeltec_lidar.launch.py

若使用 LSm10、LSn10 还需修改文件:

/turn_on_wheeltec_robot/launch/robot_mode_description.launch.py

选择对应的车型 GroupAction, 修改 base_to_laser 节点的 x 方向参数, 将 3.14 改为 0

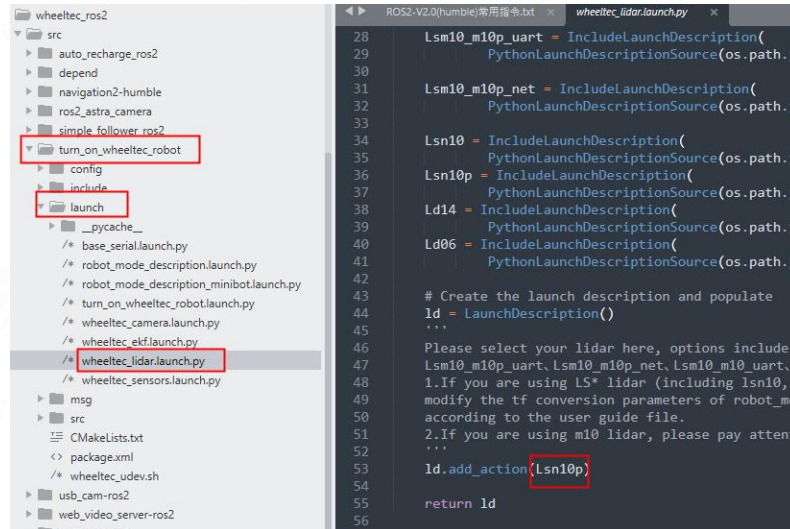


图 13 /turn_on_wheeltec_robot/launch/wheeltec_lidar.launch.py

选择匹配的雷达型号

相机:

/turn_on_wheeltec_robot/launch/wheeltec_camera.launch.py

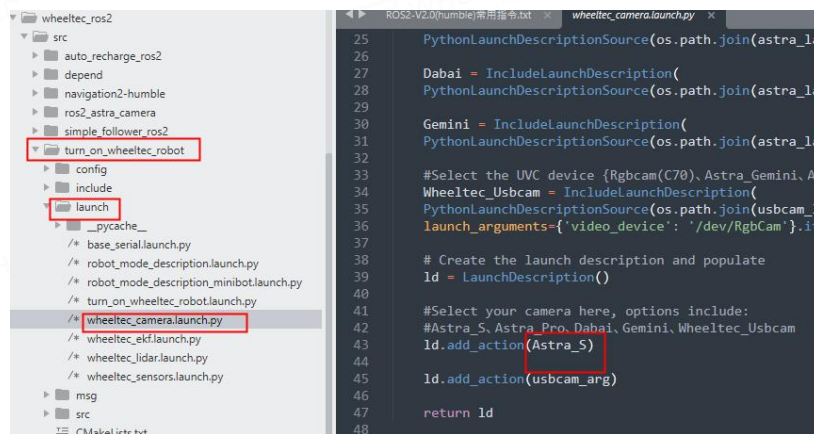


图 14 /turn_on_wheeltec_robot/launch/wheeltec_camera.launch.py

选择匹配的相机型号

7. 功能包编译

ROS2 中所有文件修改后都需要编译才能生效

单独编译: colcon build

指定编译: colcon build --packages-select +功能包名

编译操作需先同步系统时间，并进行工作空间再执行

```
wheeltec@wheeltec:~$ sudo date -s "2024-07-02 20:35:00"
[sudo] password for wheeltec:
Tue Jul 2 08:35:00 PM CST 2024
wheeltec@wheeltec:~$ cd wheeltec_ros2/
wheeltec@wheeltec:~/wheeltec_ros2$ colcon build --packages-select turn_on_wheeltec_robot
[1.620s] WARNING:colcon.colcon_core.package_selection:Some selected packages are already built in one or more underlay workspaces:
'turn_on_wheeltec_robot' is in: /home/wheeltec/wheeltec_ros2/install/turn_on_wheeltec_robot
If a package in a merged underlay workspace is overridden and it installs headers, then all packages in the overlay must sort their include directories by workspace order. Failure to do so may result in build failures or undefined behavior at run time.
If the overridden package is used by another package in any underlay, then the overriding package in the overlay must be API and ABI compatible or undefined behavior at run time may occur.

If you understand the risks and want to override a package anyways, add the following to the command line:
--allow-overriding turn_on_wheeltec_robot

This may be promoted to an error in a future release of colcon-override-check.
Starting >>> turn_on_wheeltec_robot
Finished <<< turn_on_wheeltec_robot [1.77s]

Summary: 1 package finished [2.63s]
wheeltec@wheeltec:~/wheeltec_ros2$
```

图 15 修改系统时间与 colcon build 编译

8. 硬件检查

可以通过开启硬件，确认终端是否有报错的方式简单确认，若硬件问题非终端可以提现，还需要进行深入排查

底层:

```
ros2 launch turn_on_wheeltec_robot turn_on_wheeltec_robot.launch.py
```

雷达:

```
ros2 launch turn_on_wheeltec_robot wheeltec_lidar.launch.py
```

相机:

```
ros2 launch turn_on_wheeltec_robot wheeltec_camera.launch.py
```