

# 6. Bind device ID

## 6. Bind device ID

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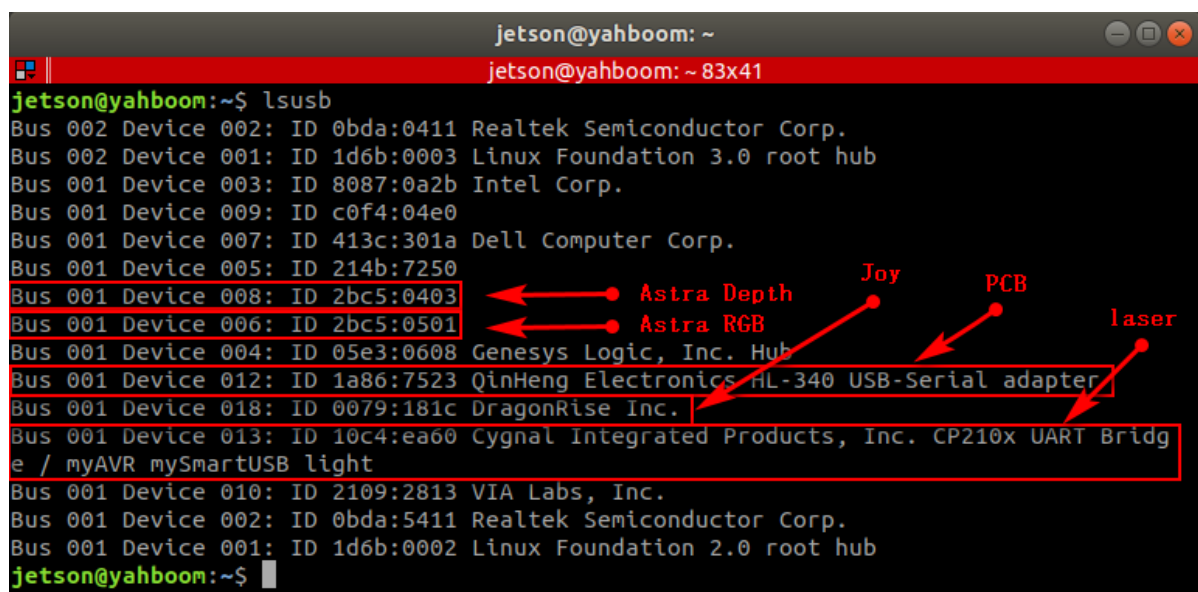
When the robot uses two or more USB serial devices, the corresponding relationship between the device name and the device is not fixed, but is assigned in sequence according to the order in which the devices are connected to the system. Inserting one device first and then another device can determine the relationship between the device and the device name, but it is very troublesome to plug and unplug the device every time the system starts. The serial port can be mapped to a fixed device name. Regardless of the insertion order, the device will be mapped to a new device name. We only need to use the new device name to read and write the device.

## 6.1. Device view command

Device ID view

```
lsusb
```

As can be seen from the picture below, Astra has an official document for binding the device to the ID number of each device. Generally, the controller does not need to be bound, and it can mainly be bound to the PCB and radar.



```
jetson@yahboom: ~  
jetson@yahboom: ~ 83x41  
jetson@yahboom:~$ lsusb  
Bus 002 Device 002: ID 0bda:0411 Realtek Semiconductor Corp.  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 001 Device 003: ID 8087:0a2b Intel Corp.  
Bus 001 Device 009: ID c0f4:04e0  
Bus 001 Device 007: ID 413c:301a Dell Computer Corp.  
Bus 001 Device 005: ID 214b:7250  
Bus 001 Device 008: ID 2bc5:0403  
Bus 001 Device 006: ID 2bc5:0501  
Bus 001 Device 004: ID 05e3:0608 Genesys Logic, Inc. Hub  
Bus 001 Device 012: ID 1a86:7523 QinHeng Electronics HL-340 USB-Serial adapter  
Bus 001 Device 018: ID 0079:181c DragonRise Inc.  
Bus 001 Device 013: ID 10c4:ea60 Cygnal Integrated Products, Inc. CP210x UART Bridge / myAVR mySmartUSB light  
Bus 001 Device 010: ID 2109:2813 VIA Labs, Inc.  
Bus 001 Device 002: ID 0bda:5411 Realtek Semiconductor Corp.  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
jetson@yahboom:~$
```

Diagram annotations in the terminal image:

- Red boxes highlight the following lines:
  - Bus 001 Device 008: ID 2bc5:0403
  - Bus 001 Device 006: ID 2bc5:0501
  - Bus 001 Device 012: ID 1a86:7523 QinHeng Electronics HL-340 USB-Serial adapter
  - Bus 001 Device 013: ID 10c4:ea60 Cygnal Integrated Products, Inc. CP210x UART Bridge / myAVR mySmartUSB light
- Red arrows point from labels to specific device IDs:
  - Astra Depth points to ID 2bc5:0403
  - Astra RGB points to ID 2bc5:0501
  - Joy points to ID 1a86:7523
  - PCB points to ID 10c4:ea60
  - laser points to ID 10c4:ea60

View device number

```
11 /dev/
```

```
jetson@yahboom: ~ 117x43
crw----- 1 root root 3, 10 12月 10 17:15 ttya
crw----- 1 root root 3, 11 12月 10 17:15 ttyb
crw----- 1 root root 3, 12 12月 10 17:15 ttyc
crw----- 1 root root 3, 13 12月 10 17:15 ttyd
crw----- 1 root root 3, 14 12月 10 17:15 ttye
crw----- 1 root root 3, 15 12月 10 17:15 ttyf
crw--w---- 1 root tty 4, 64 2月 14 18:01 ttyS0
crw-rw---- 1 root dialout 4, 65 12月 10 17:15 ttyS1
crw-rw---- 1 root dialout 4, 66 12月 10 17:15 ttyS2
crw-rw---- 1 root dialout 4, 67 12月 10 17:15 ttyS3
crw--w---- 1 root tty 238, 1 2月 14 18:01 ttyTHS1
crw-rw---- 1 root dialout 238, 2 12月 10 17:15 ttyTHS2
crwxrwxrwx 1 root dialout 188, 0 12月 10 17:15 ttyUSB0
crwxrwxrwx 1 root dialout 188, 1 2月 14 18:01 ttyUSB1
crw----- 1 root root 10, 239 12月 10 17:15 uhid
crw----- 1 root root 10, 223 12月 10 17:15 uinput
crw-rw-rw- 1 root root 1, 9 12月 10 17:15 urandom
drwxr-xr-x 4 root root 80 12月 10 17:15 v4l/
crw-rw---- 1 root tty 7, 0 12月 10 17:15 vcs
crw-rw---- 1 root tty 7, 1 12月 10 17:15 vcs1
crw-rw---- 1 root tty 7, 2 12月 10 17:15 vcs2
crw-rw---- 1 root tty 7, 3 12月 10 17:15 vcs3
crw-rw---- 1 root tty 7, 4 12月 10 17:15 vcs4
crw-rw---- 1 root tty 7, 5 12月 10 17:15 vcs5
crw-rw---- 1 root tty 7, 6 12月 10 17:15 vcs6
crw-rw---- 1 root tty 7, 128 12月 10 17:15 vcsa
crw-rw---- 1 root tty 7, 129 12月 10 17:15 vcsa1
crw-rw---- 1 root tty 7, 130 12月 10 17:15 vcsa2
crw-rw---- 1 root tty 7, 131 12月 10 17:15 vcsa3
crw-rw---- 1 root tty 7, 132 12月 10 17:15 vcsa4
crw-rw---- 1 root tty 7, 133 12月 10 17:15 vcsa5
crw-rw---- 1 root tty 7, 134 12月 10 17:15 vcsa6
drwxr-xr-x 2 root root 60 1月 1 1970 vfio/
crw----- 1 root root 10, 137 12月 10 17:15 vhci
crw-rw----+ 1 root video 81, 0 12月 10 17:15 video0
crw----- 1 root root 10, 130 12月 10 17:15 watchdog
crw----- 1 root root 244, 0 12月 10 17:15 watchdog0
crw-rw-rw- 1 root root 1, 5 12月 10 17:15 zero
brw-rw---- 1 root disk 252, 0 2月 14 18:01 zram0
brw-rw---- 1 root disk 252, 1 2月 14 18:01 zram1
brw-rw---- 1 root disk 252, 2 2月 14 18:01 zram2
brw-rw---- 1 root disk 252, 3 2月 14 18:01 zram3
jetson@yahboom:~$
```

PCB  
laser  
Astra

## 6.2. Device binding

### 6.2.1, Astra camera binding

The binding rule file of the Astra camera is [56-orbbec-usb.rules], which is provided by the Astra manufacturer. AstraPro Plus is used for demonstration here.

Place the [56-orbbec-usb.rules] file in the /etc/udev/rules.d directory of the main control

That is, the following location:

```
/etc/udev/rules.d/56-orbbec-usb.rules
```

Then execute the following command to refresh the USB rules to bind the Astra camera to take effect.

```
sudo udevadm control --reload-rules && sudo udevadm trigger
```

Check whether the binding is successful:

```
jetson@ubuntu:~$ ll /dev/astra*
lrwxrwxrwx 1 root root 15 May 5 17:42 /dev/astradepth -> bus/usb/001/007 #Port
representing depth
lrwxrwxrwx 1 root root 15 May 5 17:42 /dev/astrauvc -> bus/usb/001/009
#Represents the RGB port
```

Printing as above indicates that the binding is successful.

## 6.2.2, PCB and radar binding

Enter the rules.d directory

```
cd /etc/udev/rules.d/
```

Create a new [usb.rules] file and edit it

```
sudo vim usb.rules
```

Write the following

```
KERNEL=="ttyUSB*", ATTRS{idVendor}=="1a86", ATTRS{idProduct}=="7523",
MODE=="0777", SYMLINK+="myserial"
KERNEL=="ttyUSB*", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60",
MODE=="0777", SYMLINK+="rplidar"
```

Save and exit, make the rules take effect, and execute on the main control:

```
sudo udevadm control --reload-rules && sudo udevadm trigger
```

Check whether the binding is successful:

```
jetson@jetson-desktop:/etc/udev/rules.d$ ll /dev | grep ttyUSB*
lrwxrwxrwx 1 root root 7 May 18 20:13 gps1 -> ttyUSB1 #This comes with the
system, don't worry about it
lrwxrwxrwx 1 root root 7 May 18 20:13 myserial -> ttyUSB0 #pcb is bound to the
ttyUSB0 port
lrwxrwxrwx 1 root root 7 May 18 20:13 rplidar -> ttyUSB1 #The radar is bound to
the ttyUSB1 port
crwxrwxrwx 1 root dialout 188, 0 May 18 20:13 ttyUSB0
crwxrwxrwx 1 root dialout 188, 1 May 18 20:13 ttyUSB1
```

Printing as above indicates that the binding is successful.

## 6.3. Introduction to rule file syntax

```
KERNEL=="ttyUSB*", ATTRS{idVendor}=="1a86", ATTRS{idProduct}=="7523",  
MODE:="0777", SYMLINK+="myserial"  
KERNEL=="ttyUSB*", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60",  
MODE:="0777", SYMLINK+="rplidar"
```

parse

```
KERNEL          #The device name matching the event  
ATTR{filename}  # Match the sysfs attributes of the event device.  
idVendor        # Manufacturer number  
idProduct       # Product number  
SYMLINK         # Generate symbolic links for device files under /dev/. Just give  
this device an alias.  
MODE           # Set permissions for the device.
```

From [6.1], we can see that the PCB device number is [ttyUSB0] and is easy to change. The ID number is [1a86, 7523] and is fixed. [ttyUSB\*] means that no matter whether the device number becomes [ttyUSB] in the future, it will be followed by [ 0, 1, 2, 3, 4,...] are all bound to [myserial]; the radar device [ttyUSB1] is the same; the same is true for other devices that need to be bound.

**Note: When taking an alias, do not take some device names that already exist in the system, otherwise it will fail.**

## 6.4. Bind USB port

The above situations are all different ID numbers. If the ID numbers of the radar and PCB are the same, or there are two or more PCBs (radars) with the same ID, the above binding will be confusing. For example: **This situation will occur if the radar and PCB have been bound and the voice control board needs to be bound**

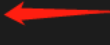
Then, we need to bind the USB port. After binding, the USB port cannot be changed at will. Each device can only be connected to a fixed USB port.

Binding method, take [ttyUSB0] as an example to check the port of the device at this time

First check the device corresponding to ttyUSB0:

```
ll /dev | grep ttyUSB*
```

```
jetson@jetson-desktop:~$ ll /dev | grep ttyUSB*  
lrwxrwxrwx 1 root root          7 5月 18 20:13 gps1 → ttyUSB1  
lrwxrwxrwx 1 root root          7 5月 18 20:13 myserial → ttyUSB0  
lrwxrwxrwx 1 root root          7 5月 18 20:13 rplidar → ttyUSB1  
crwxrwxrwx 1 root dialout 188, 0 5月 18 20:13 ttyUSB0  
crwxrwxrwx 1 root dialout 188, 1 5月 18 20:13 ttyUSB1
```



The device corresponding to ttyUSB0 is: myserial

```
udevadm info --attribute-walk --name=/dev/ttyUSB0 | grep devpath
```

```
jetson@jetson-desktop:~$ udevadm info --attribute-walk --name=/dev/ttyUSB0 | grep devpath
Udevadm info starts with the device specified by the devpath and then
ATTRS{devpath}=="2.4"
ATTRS{devpath}=="2"
ATTRS{devpath}=="0"
jetson@jetson-desktop:~$
```

What we need is to modify the myserial rules in the rules file:

```
# before fixing:
# KERNEL=="ttyUSB*", ATTRS{idVendor}=="1a86", ATTRS{idProduct}=="7523",
# MODE=="0777", SYMLINK+="myserial"
# After modification:
KERNEL=="ttyUSB*", ATTRS{devpath}=="2.4", ATTRS{idVendor}=="1a86",
ATTRS{idProduct}=="7523", MODE=="0777", SYMLINK+="myserial"
```

Save and exit, make the rules take effect, and execute on the main control:

```
sudo udevadm control --reload-rules && sudo udevadm trigger
```

Check whether the binding is successful:

```
jetson@jetson-desktop:/etc/udev/rules.d$ ll /dev | grep ttyUSB*
lrwxrwxrwx 1 root root 7 May 18 20:13 gps1 -> ttyUSB1 #This comes with the
system, don't worry about it
lrwxrwxrwx 1 root root 7 May 18 20:13 myserial -> ttyUSB0 #pcb is bound to the
ttyUSB0 port
lrwxrwxrwx 1 root root 7 May 18 20:13 rplidar -> ttyUSB1 #The radar is bound to
the ttyUSB1 port
lrwxrwxrwx 1 root root 7 May 18 20:13 myspeech -> ttyUSB2 #The voice control
board is bound to the ttyUSB2 port
crwxrwxrwx 1 root dialout 188, 0 May 18 20:13 ttyUSB0
crwxrwxrwx 1 root dialout 188, 1 May 18 20:13 ttyUSB1
crwxrwxrwx 1 root dialout 188, 1 May 18 20:13 ttyUSB2
```

If printed as above, it means that the radar, PCB and voice control board are all bound successfully.

If you don't understand the above binding methods, you can also refer to the content of Chapter 14 of the course document "**15. Voice Control Series Course\2. Voice Control Module Port Binding**" course.