6. Bind device ID

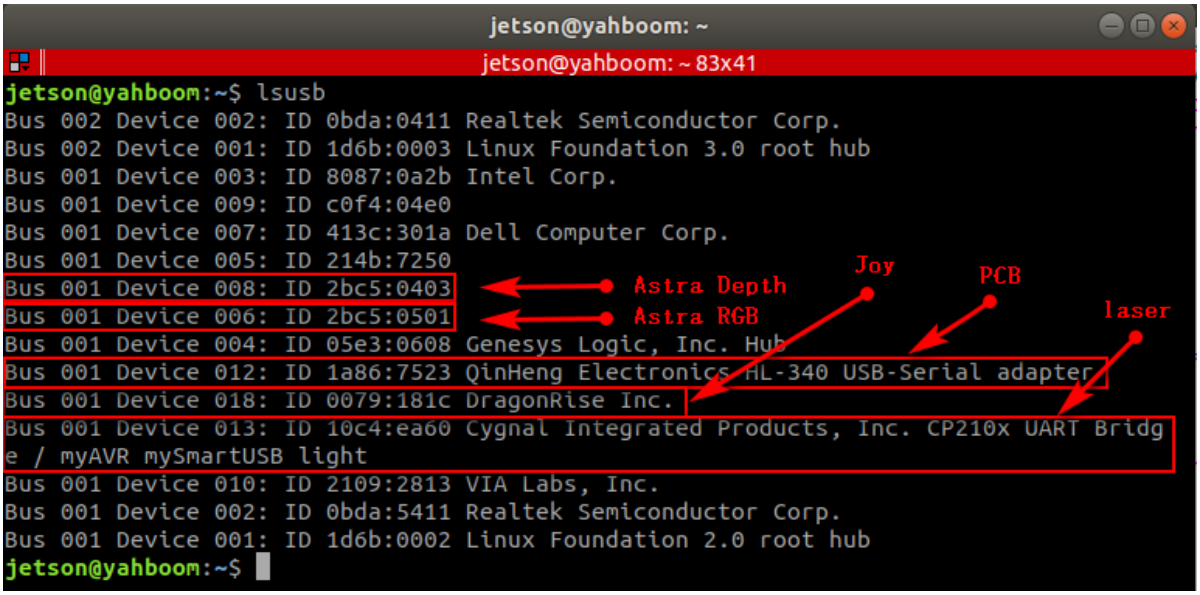
When the robot uses two or more USB serial devices, the corresponding relationship between the device name and the device is not fixed, but is assigned in sequence according to the order in which the devices are connected to the system. Inserting one device first and then another device can determine 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

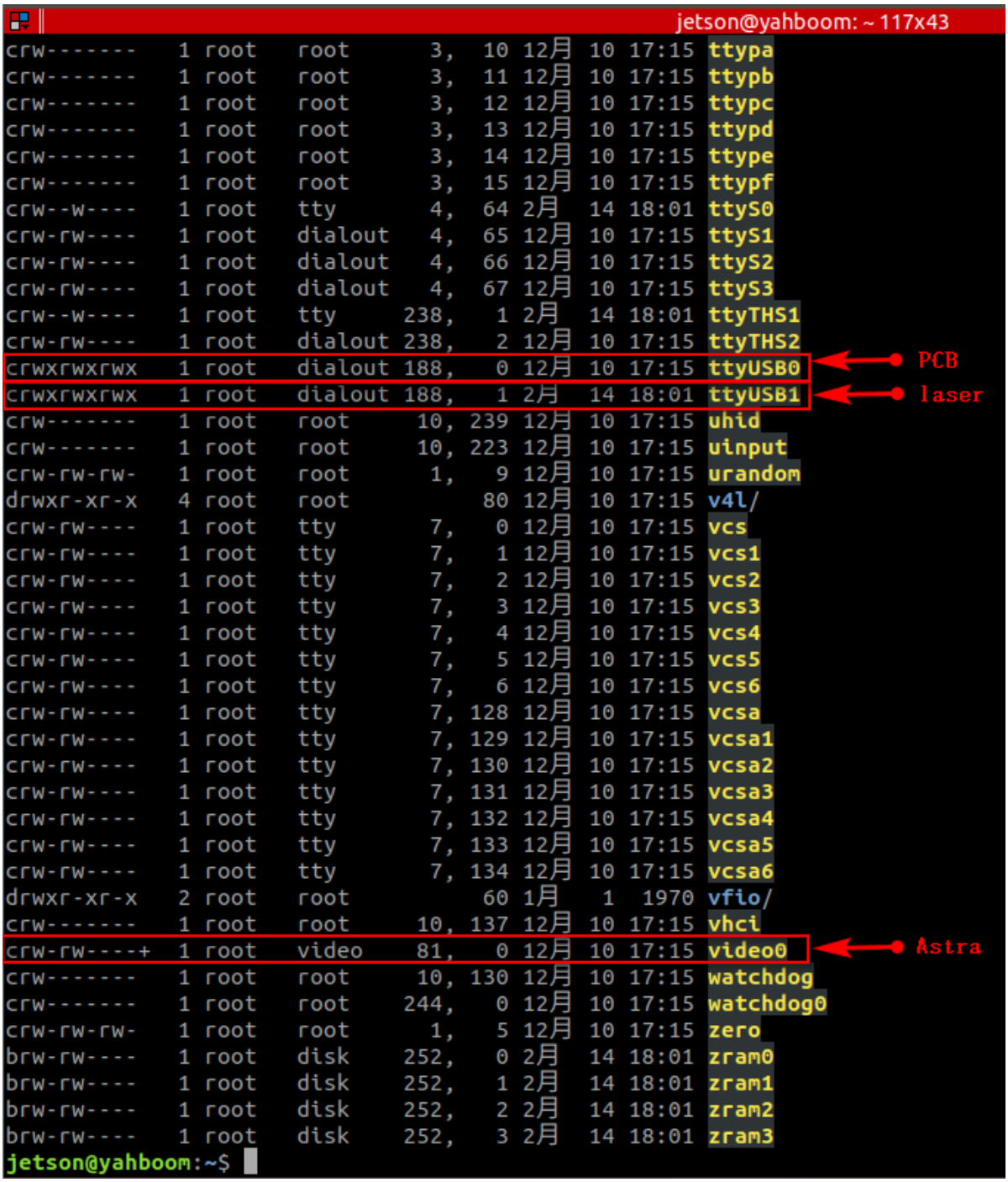
```
lsusb
```

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.



View device number

```
ll /dev/
```



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

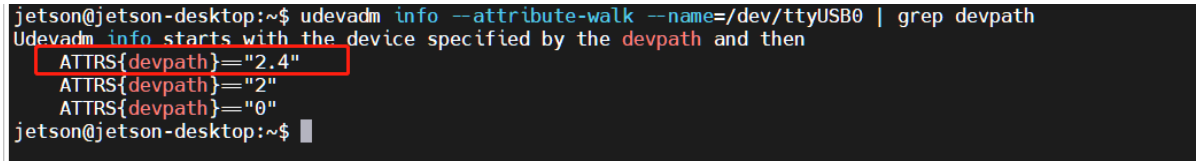
First check the device corresponding to ttyUSB0:

```
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
```



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.