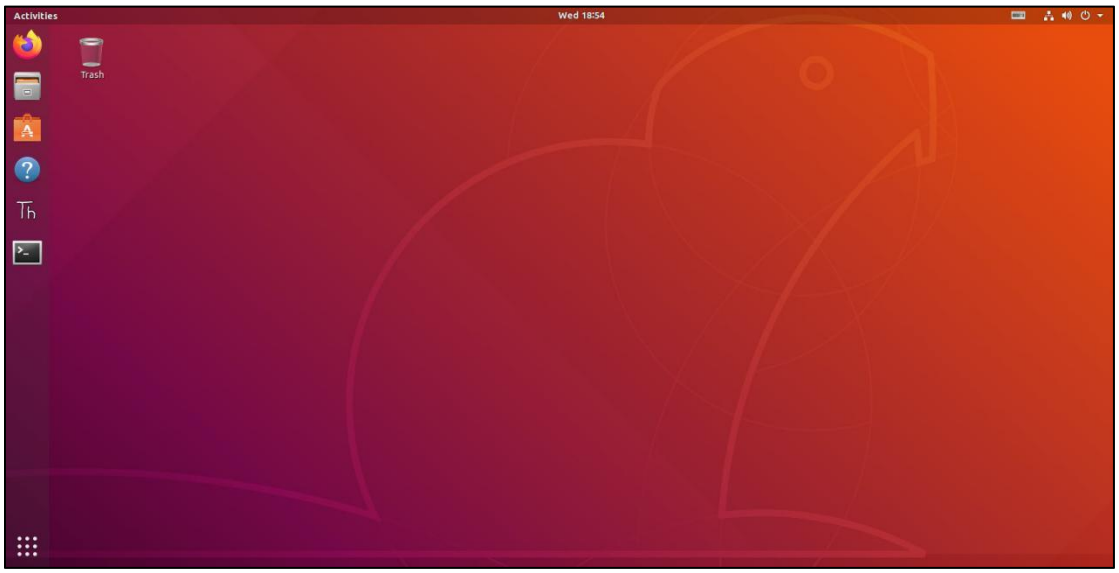
第 5 课 开启节点

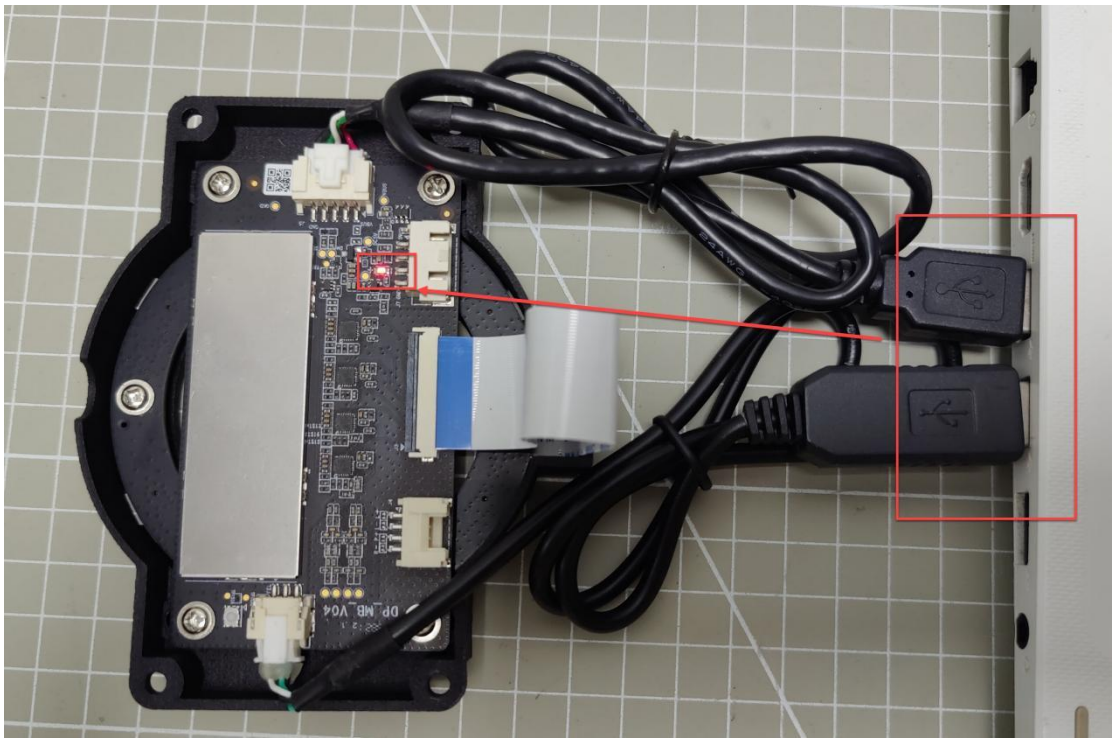
下面我们需要开启麦克风的初始化节点，来测试麦克风在虚拟机上是否能正常工作。

1）开启虚拟机。

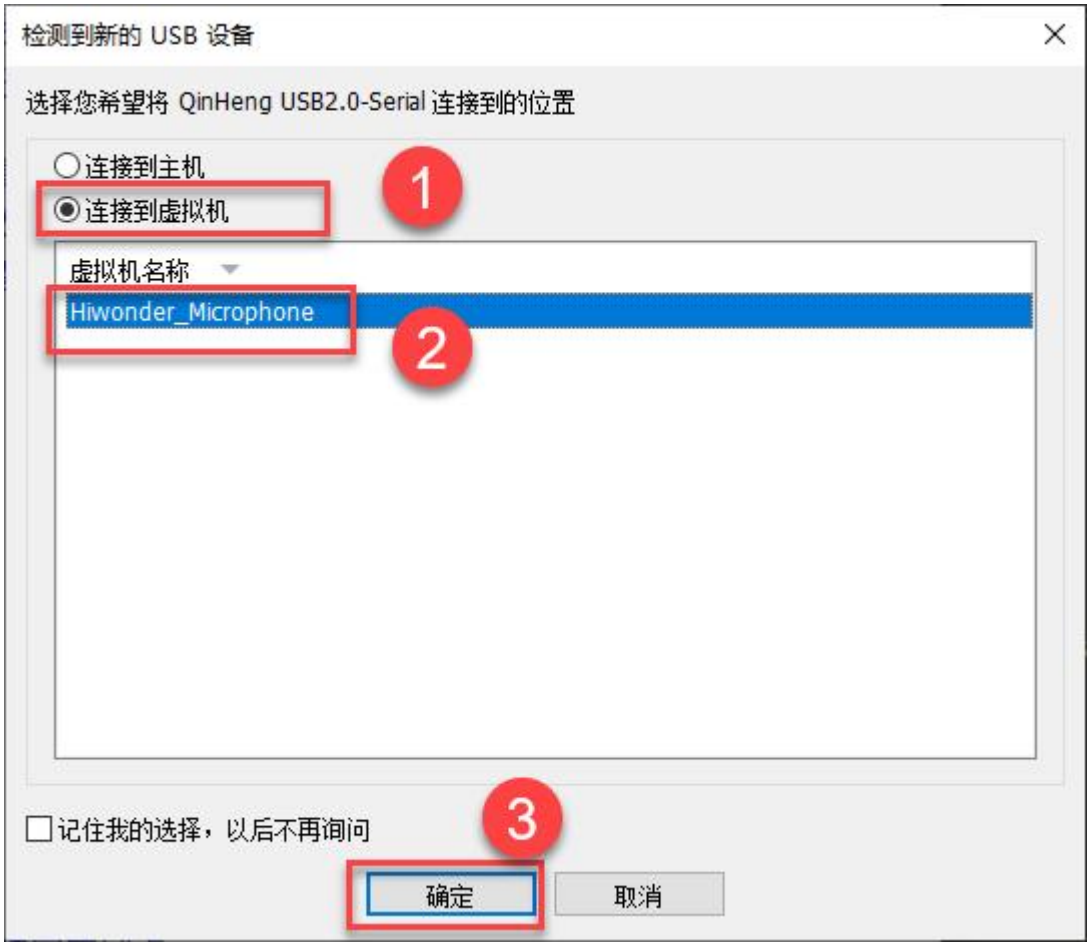


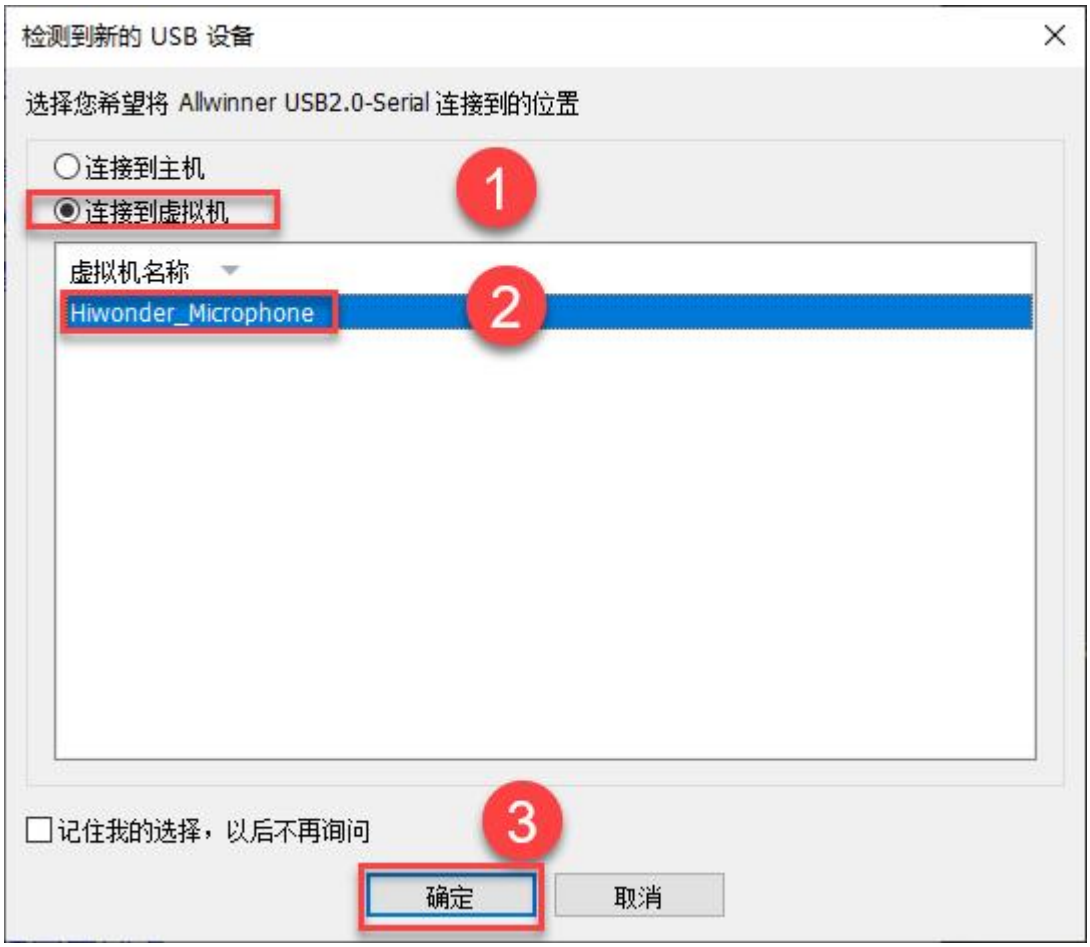
2）参照本文档同路径下的“**第 4 课 环形六路麦克风阵列的配置**”将申请及替换离线语音资源。

3）将麦克风阵列接入电脑中，具体连接方法，可参照“**第 2 课 接线与串口调试**”。

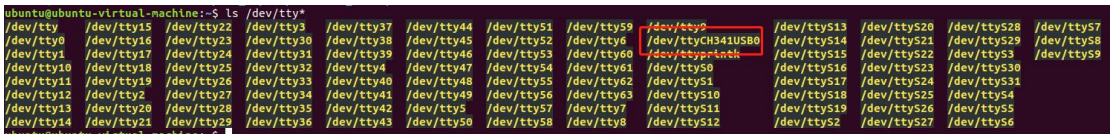


4）在弹出的窗口中，选择将设备连接到虚拟机。





5）连接完成后，按下快捷键“**Ctrl+Alt+T**”打开命令行终端，输入指令“**ls /dev/tty***”，可以查看到麦克风的串口端号，如下图红框内容。



6）输入指令“**cd ros_ws/src/xf_mic_asr_offline/launch/**”进入文件目录，输入指令“**vim mic_init.launch**”打开文件

7）将红框内的串口端号改为刚才 5）获取到的“**/dev/ttyCH341USB0**”，保存退出。

```
<?xml version="1.0"?>
<launch>
    <arg name="appid"               default="b35f28f8"/>
    <arg name="confidence"          default="18"/> <!--语音识别结果自信度阈值，取值：0-100(voice recognition re
    <arg name="seconds_per_order"   default="15"/> <!--每次语音指令录音长度，单位：秒(recording length of each
    <arg name="chinese_awake_words" default="xiao3 huan4 xiao3 huan4"/>
    <arg name="english_awake_words" default="hello hi wonder"/>
    <arg name="language"            default="Chinese"/>

    <node pkg="xf_mic_asr_offline" type="awake_node.py" name="awake_node" output="screen">
        <param name="port"      value="/dev/ttyUSB0"/>
        <param name="mic_type"  value="mic6_circle"/>
        <param if="$(eval language == 'Chinese')" name="awake_word"    value="$(arg chinese_awake_words)"/>
        <param if="$(eval language == 'English')" name="awake_word"    value="$(arg english_awake_words)"/>
    </node>
```

8）输入指令“**sudo vim /etc/udev/rules.d/xf_mic.rules**”，按下回车并输入密码，打开规则文件。

```
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/xf_mic_asr_offline/launch$ sudo vim /
etc/udev/rules.d/xf_mic.rules
```

9）输入代码

“**ATTRS{idVendor}=="1a86", ATTRS{idProduct}=="7523", MODE="0666"**”给麦克风串口使用权限，保存退出。

```
ubuntu@ubuntu-virtual-machine: ~/ros_ws/src/xf_mic_asr_offline/launch
File  Edit  View  Search  Terminal  Help
ATTRS{idVendor}=="10d6", ATTRS{idProduct}=="b003", MODE="0666"
ATTRS{idVendor}=="1a86", ATTRS{idProduct}=="7523", MODE="0666"
~
~
-- INSERT --                                              1,1           All
```

10）输入指令

“**roslaunch xf_mic_asr_offline mic_init.launch**”，开启六路麦克风阵列初始化节点。

```
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/xf_mic_asr_offline/launch$ roslaunch
xf_mic_asr_offline mic_init.launch
```

11）初始化完成后，出现下图内容，首次启动会稍慢，启动完成如下图。

```
setting /run_id to eb4ab48c-7dc1-11ed-993b-0800279a5a91
process[rosout-1]: started with pid [8242]
started core service [/rosout]
process[awake_node-2]: started with pid [8249]
process[call_recognition-3]: started with pid [8250]
process[xf_asr_offline_node-4]: started with pid [8252]
>>>>>confidence = 18
>>>>>time_per_order = 15
>>>>>source_path = /home/ubuntu/xf_mic/src/xf_mic_asr_offline
>>>>>appid = b35f28f8
>>>>>Wake up word: xiao3 huan4 xiao3 huan4
```

注意：若是出现“**找不到麦克风设备**”的提示，参照下方所示方法安装麦克风的驱动。

1) 输入指令“**cd ros_ws/src/CH341SER_LINUX/driver/**”按下回车，切换到驱动程序所在目录。

```
ubuntu@ubuntu-virtual-machine:~$ cd ros_ws/src/CH341SER_LINUX/driver/
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/CH341SER_LINUX/driver$
```

2) 接着再输入“**make**”指令进行编译。

```
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/CH341SER_LINUX/driver$ make
```

3) 输入“**sudo make load**”加载驱动程序。

```
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/CH341SER_LINUX/driver$ sudo make load
insmod ch341.ko
```

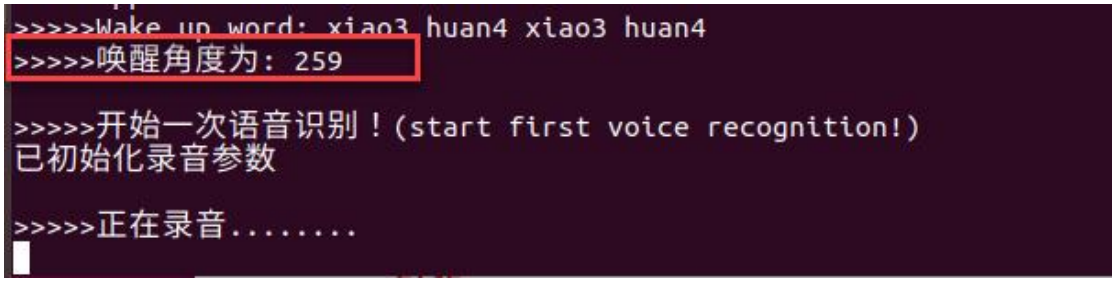
4) 输入“**sudo make install**”将程序安装至系统中。

```
ubuntu@ubuntu-virtual-machine:~/ros_ws/src/CH341SER_LINUX/driver$ sudo make inst
all
make -C /lib/modules/5.4.0-150-generic/build  M=/home/ubuntu/ros_ws/src/CH341SER
_LINUX/driver
make[1]: Entering directory '/usr/src/linux-headers-5.4.0-150-generic'
  Building modules, stage 2.
  MODPOST 1 modules
make[1]: Leaving directory '/usr/src/linux-headers-5.4.0-150-generic'
mkdir -p /lib/modules/5.4.0-150-generic/kernel/drivers/usb/serial/
cp -f ./ch341.ko /lib/modules/5.4.0-150-generic/kernel/drivers/usb/serial/
depmod -a
```

5) 驱动安装完成后，重新输入“**roslaunch xf_mic_asr_offline mic_init.launch**”指令启动麦克风节点即可。

```
ubuntu@ubuntu-virtual-machine:~$ roslaunch xf_mic_asr_offline mic_init.launch
```

12）接着我们对着麦克风说“**小幻小幻**”就可以将它唤醒，唤醒后终端会打印它的唤醒角度，如下图所示：



13）若要关闭此节点，在终端页面按下“**Ctrl+C**”即可。