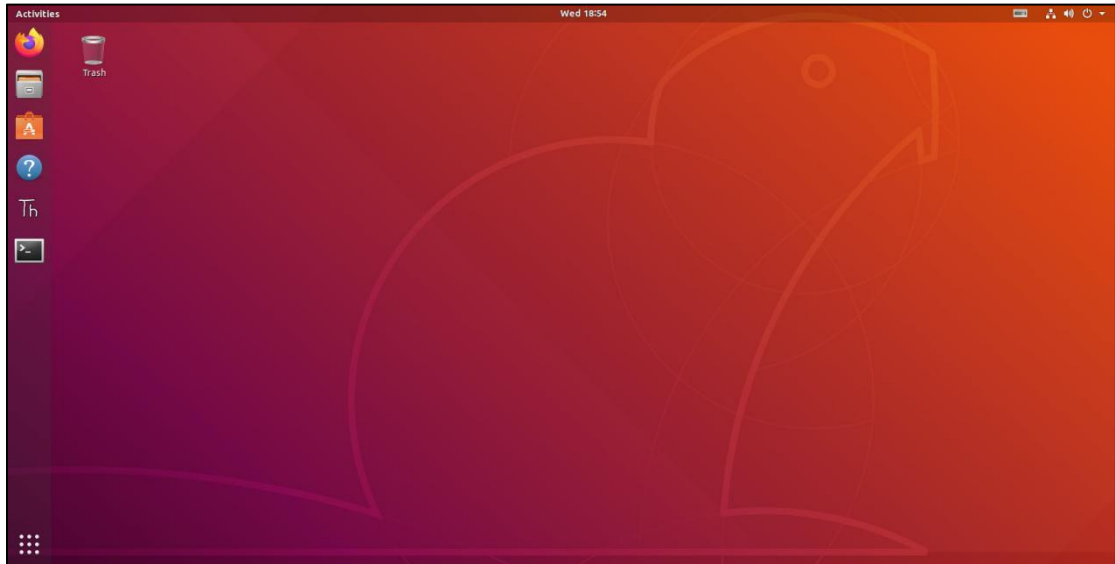


第 5 课 开启节点

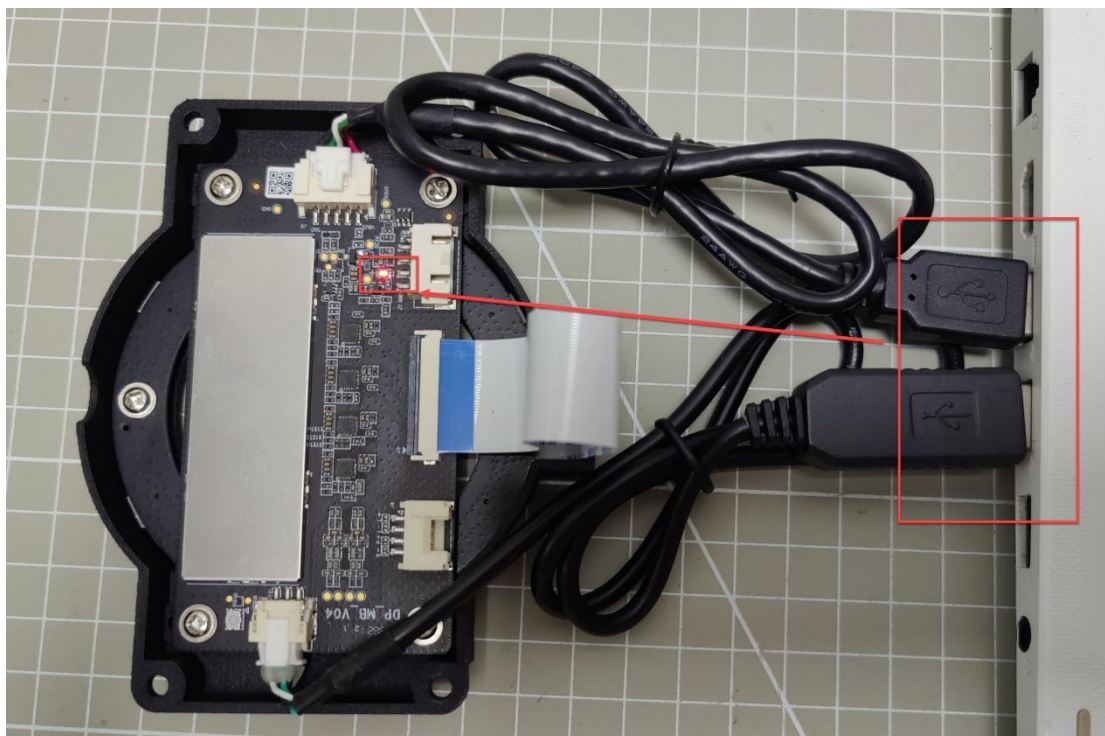
下面我们需要开启麦克风的初始化节点，来测试麦克风在虚拟机上是否能正常工作。

1) 开启虚拟机。

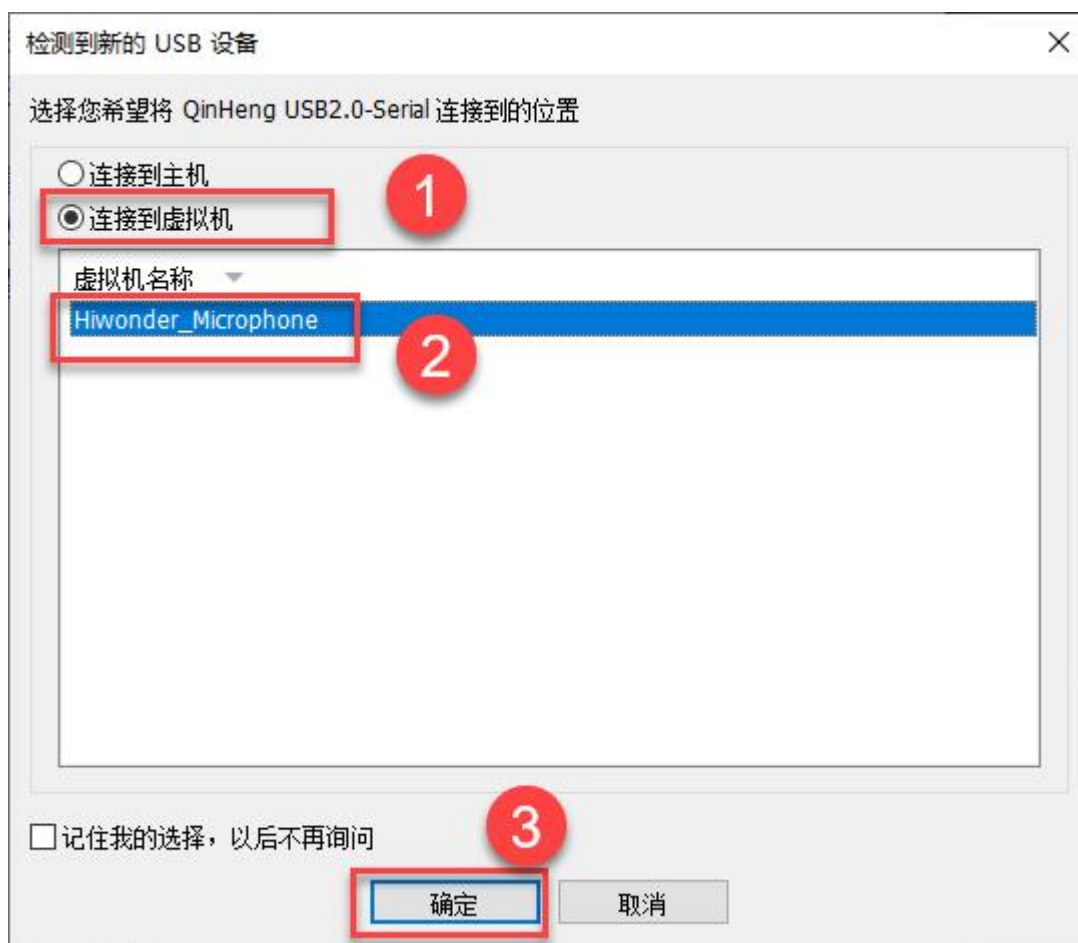


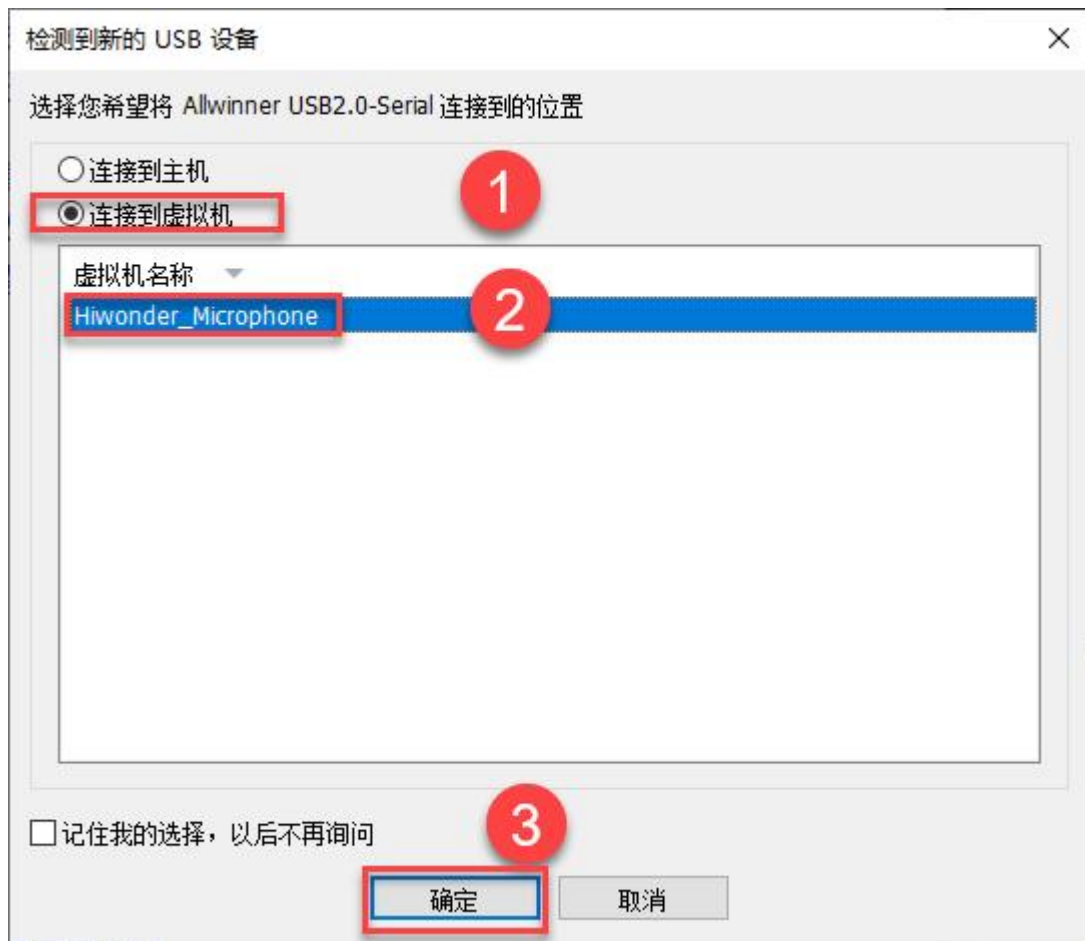
2) 参照本文档同路径下的“**第 4 课 环形六路麦克风阵列的配置**”将申请及替换离线语音资源。

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。

```
ubuntu@ubuntu-virtual-machine:~$ ls /dev/tty*
/dev/tty /dev/tty0 /dev/tty1 /dev/tty10 /dev/tty11 /dev/tty12 /dev/tty13 /dev/tty14 /dev/tty15 /dev/tty16 /dev/tty17 /dev/tty18 /dev/tty19 /dev/tty2 /dev/tty20 /dev/tty21 /dev/tty22 /dev/tty23 /dev/tty24 /dev/tty25 /dev/tty26 /dev/tty27 /dev/tty28 /dev/tty29 /dev/tty3 /dev/tty30 /dev/tty31 /dev/tty32 /dev/tty33 /dev/tty34 /dev/tty35 /dev/tty36 /dev/tty37 /dev/tty38 /dev/tty39 /dev/tty4 /dev/tty40 /dev/tty41 /dev/tty42 /dev/tty43 /dev/tty44 /dev/tty45 /dev/tty46 /dev/tty47 /dev/tty48 /dev/tty49 /dev/tty5 /dev/tty50 /dev/tty51 /dev/tty52 /dev/tty53 /dev/tty54 /dev/tty55 /dev/tty56 /dev/tty57 /dev/tty58 /dev/tty59 /dev/tty60 /dev/tty61 /dev/tty62 /dev/tty63 /dev/tty64 /dev/tty65 /dev/tty66 /dev/tty67 /dev/tty68 /dev/tty69 /dev/tty70 /dev/tty71 /dev/tty72 /dev/tty73 /dev/tty74 /dev/tty75 /dev/tty76 /dev/tty77 /dev/tty78 /dev/tty79 /dev/tty80 /dev/tty81 /dev/tty82 /dev/tty83 /dev/tty84 /dev/tty85 /dev/tty86 /dev/tty87 /dev/tty88 /dev/tty89 /dev/tty90 /dev/tty91 /dev/tty92 /dev/tty93 /dev/tty94 /dev/tty95 /dev/tty96 /dev/tty97 /dev/tty98 /dev/tty99 /dev/ttyCH341USB0
```

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

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

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="xiaox3 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>
</launch>
```

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 install
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：

```
>>>>>Wake up word: xiao3 huan4 xiao3 huan4
>>>>>唤醒角度为: 259

>>>>>开始一次语音识别!(start first voice recognition!)
已初始化录音参数

>>>>>正在录音.....
█
```

13) 若要关闭此节点，在终端页面按下“Ctrl+C”即可。

```
^C[xf_asr_offline_node-3] killing on exit
[mic-2] killing on exit
[rosout-1] killing on exit
[master] killing on exit
shutting down processing monitor...
... shutting down processing monitor complete
done
ubuntu@ubuntu-virtual-machine:~$
```