

Chapter8: Voice broadcast using Raspberry Pi

1.1 Configure the Raspberry Pi voice development environment

Preparation: The BST-AI expansion board is equipped with a 3.5mm headphone holder and a xh2p connector that can be equipped with a speaker. The aux dual-head 3.5 audio cable is used to connect the expansion board and the Raspberry Pi, and the speaker is need to be inserted into the expansion board 2pin connector correctly.

Our goal is to use the Raspberry Pi for speech synthesis and broadcast. After the connection is completed, we can test the hardware function.

We need to input this command at the terminal:

```
aplay /usr/share/sounds/alsa/*
```

As shown figure1-1 below.

```
pi@raspberrypi:~ $ aplay /usr/share/sounds/alsa/*
Playing WAVE '/usr/share/sounds/alsa/Front_Center.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Front_Left.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Front_Right.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Noise.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Rear_Center.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Rear_Left.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Rear_Right.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Side_Left.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
Playing WAVE '/usr/share/sounds/alsa/Side_Right.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
pi@raspberrypi:~ $
```

Figure 1-1

If there is no sound, check if the audio driver is turned on.

We need to input this command at the terminal:

```
sudo raspi-config
```

Select "Advanced Options"->"Audio"->"1 Force 3.5mm ('headphone') jack"

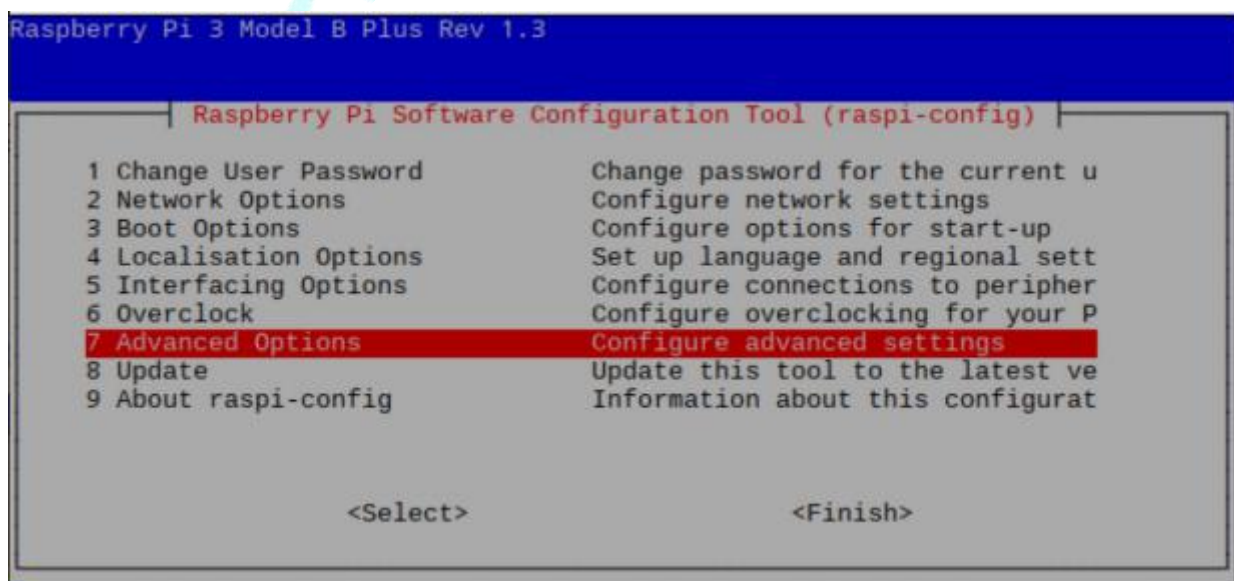


Figure 1-2 step1: Advance Option

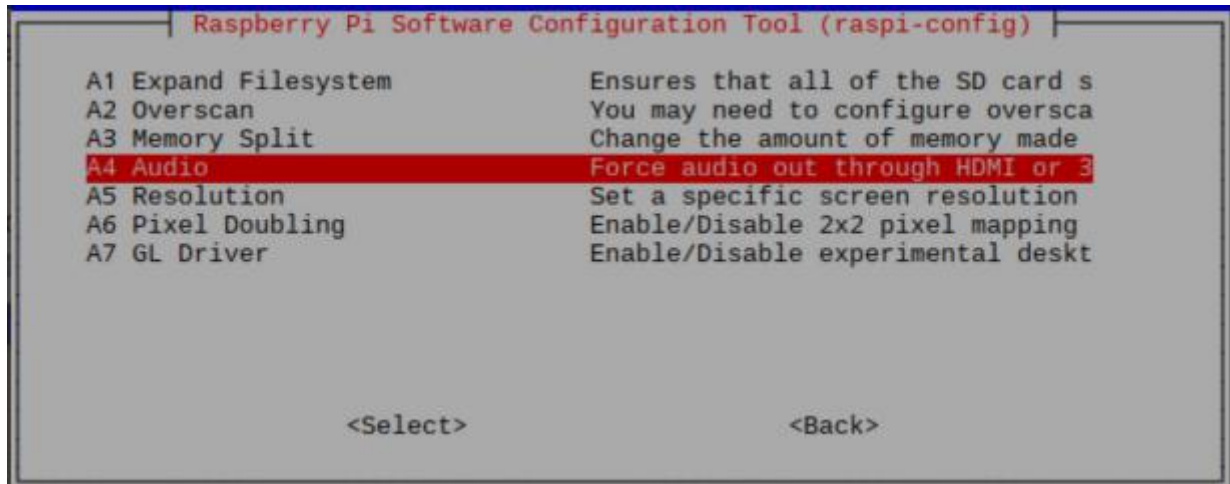


Figure1-3 step2: Audio

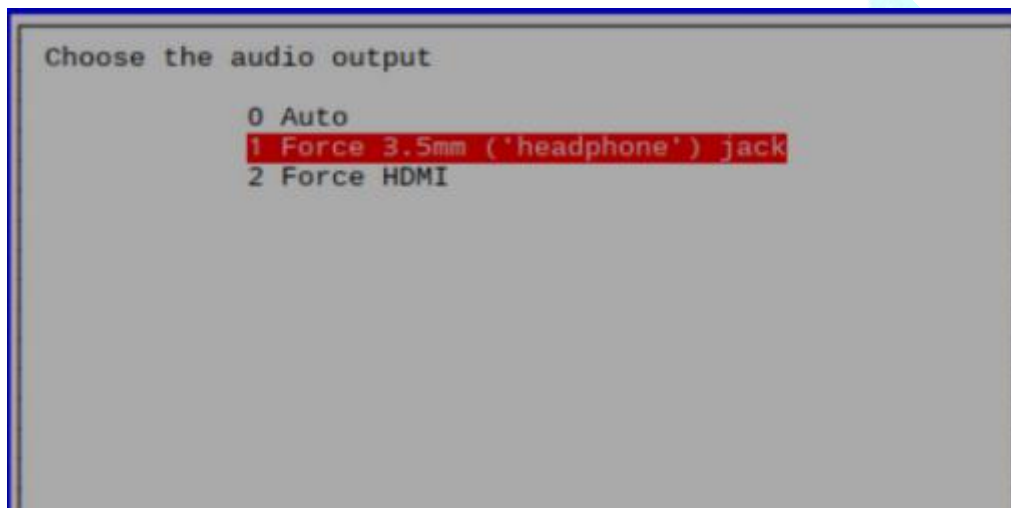


Figure 1-4 step3: Force 3.5mm ('headphone') jack

The simplest way to handle the Raspberry Pi is espeak. We need to input this command at the terminal:

sudo apt-get install espeak

As shown figure1-5 below.

```
File Edit Tabs Help
pi@raspberrypi:~ $ sudo apt-get install espeak
Reading package lists... Done
Building dependency tree
Reading state information... Done
espeak is already the newest version (1.48.04+dfsg-5).
The following packages were automatically installed and are no longer required:
  libavcodec-dev libavformat-dev libavutil-dev libdc1394-22-dev libilmbase-dev
  libjbig-dev liblzma-dev libopencv-calib3d-dev libopencv-core-dev
  libopencv-features2d-dev libopencv-flann-dev libopencv-gpu-dev
  libopencv-gpu2.4v5 libopencv-imgproc-dev libopencv-ml-dev libopencv-ocl2.4v5
  libopencv-photo-dev libopencv-stitching-dev libopencv-stitching2.4v5
  libopencv-superres2.4v5 libopencv-ts-dev libopencv-ts2.4v5
  libopencv-video-dev libopencv-videostab2.4v5 libopencv2.4-java
  libopencv2.4-jni libopenexr-dev libraw1394-dev libraw1394-tools
  libswresample-dev libswscale-dev libtiffxx5 opencv-data
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 16 not upgraded.
pi@raspberrypi:~ $
```

Figure 1-5 Install espeak

After the download is complete, it can be used in the terminal. The infrastructure is:

```
espeak "What the Raspberry Pi wants to say"
```

Paramant :

-ven+m1/f1: Change the voice, the parameter 'm' is the male voice, 'f' is the female voice, and the two voices possess the four tones of 1, 2, 3, 4.

-g10/-s250: These two methods can change the speech rate, '-g' stands for pause between words, '10' stands for 10ms, and '-s' stands for the average number of times per minute.

For example :

```
espeak -ven+f1 -g180 "hello raspberry pi"
```

The meaning of this command is: broadcast "hello raspberry pi" in the English pronunciation of the girl, each word is 180ms.

1.2 Using the Baidu Voice API

First, you need to apply for your own Baidu AI developer account, install the SDK (Software Development Kit, Software Development Kit).

We should input this link on the browser of the Raspberry Pi : <http://ai.baidu.com/tech/speech>,

click **【Console】** . As shown figure1-6 below.

!!!Note: The operations are done by opening the browser on the Raspberry Pi.

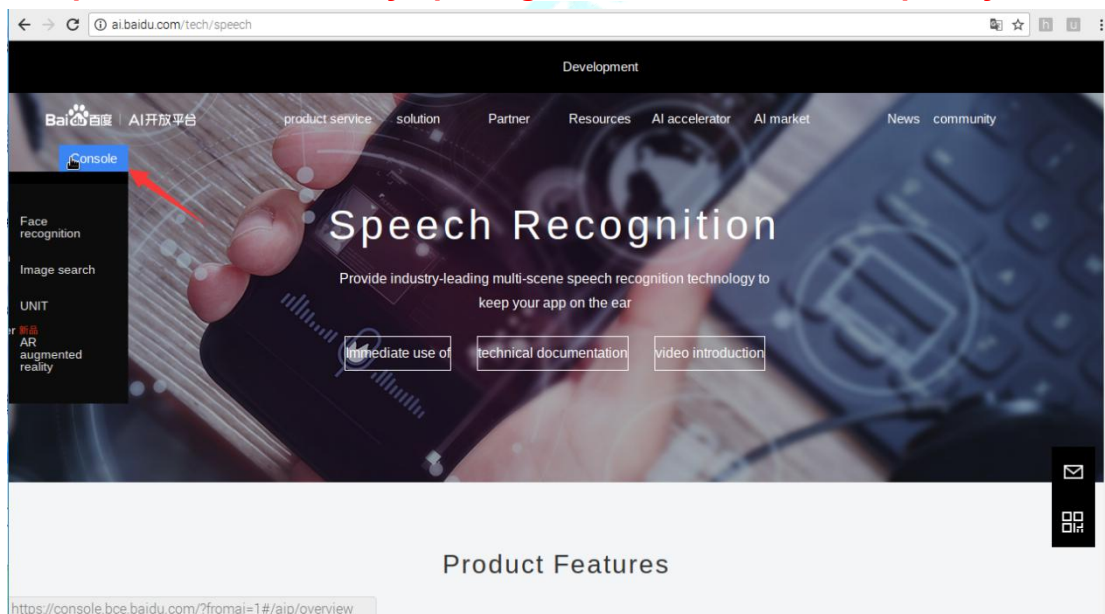


Figure1-6

Enter the login page, user who do not have a Baidu cloud account need to complete the registration. After completing the login, you may be fill out a form. As shown figure1-7 and 1-8 below.



SMS Login
Verify for login. It will create a Baidu account automatically if you haven't registered.

+86 phone number

dynamic password

Read and accept [Baidu User Protocol](#)

Figure1-7

* Contact:

Properties: ☐ 企业 ☒ 个人

* Email: [Modify](#)

* Mobile: [Modify](#)

1st level category:

2nd level category: ☐ 社交网站 ☐ 论坛 ☐ 博客
☐ 企业官网 ☐ 行业门户 ☐ 其他

*服务协议: ☐ Agree 《百度云用户服务协议》 《百度云服务协议》 隐私政策

您填写并提交上述信息视为您同意百度云及百度云授权的合作伙伴通过电话方式联系您完善信息，以便能够为您提供更贴心的云服务

Figure1-8 Fill your message

After submitting, enter Baidu Cloud Product Overview, and find "Baidu Voice" and enter.

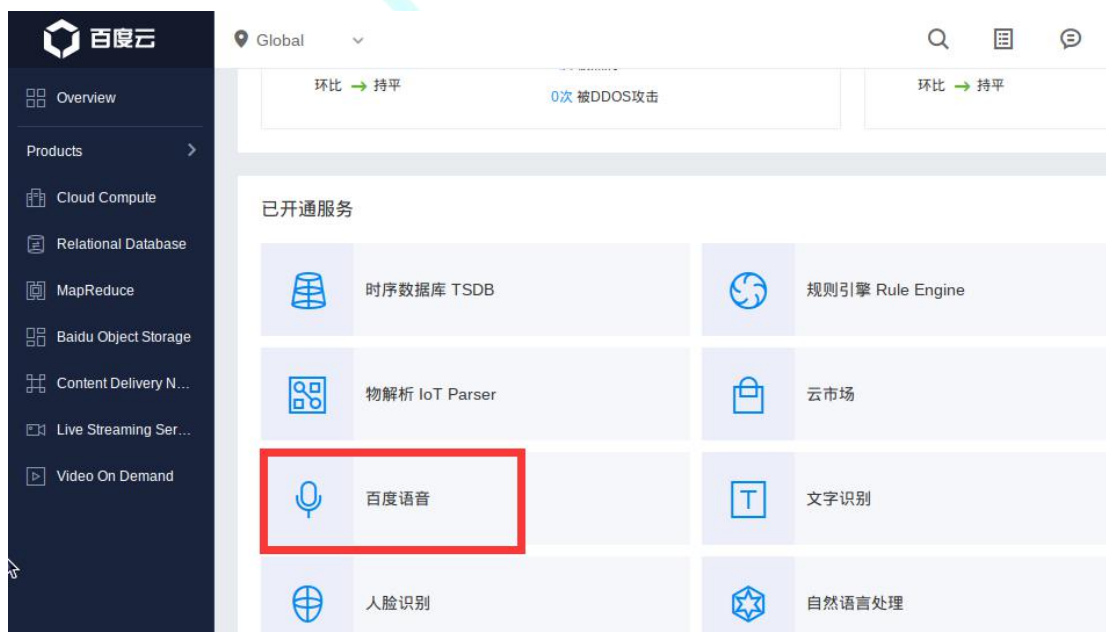


Figure1-9 find "Baidu Voice"

You can see that the current number of our application is 0, click "create application".



Figure1-10 "create application"

We create an application, the type can be filled in "learning office". As shown figure1-11 below.



Figure1-11

After the creation is completed, return to the previous "Baidu Voice" interface, you can see that the application has been generated, and at the same time generate an appId, and two key values, these will be used in later development. As shown figure1-12 below.

应用列表						
+ 创建应用						
	应用名称	AppID	API Key	Secret Key	创建时间	操作
1	test01	14845046	3nHYTeTyfRlaBEKzRBW5XCwY	***** 显示	2018-11-17 14:29:48	报表 管理 删除

Figure1-12

Next, we need to download Baidu Voice's python-SDK. The browser goes to <https://ai.baidu.com/sdk#asr> or finds the "SDK Download" button on the page. Because the software development language of our suite is python, we need to found and downloaded python-SDK.

!!!Note: The above operations are all done by opening the browser on the Raspberry Pi.

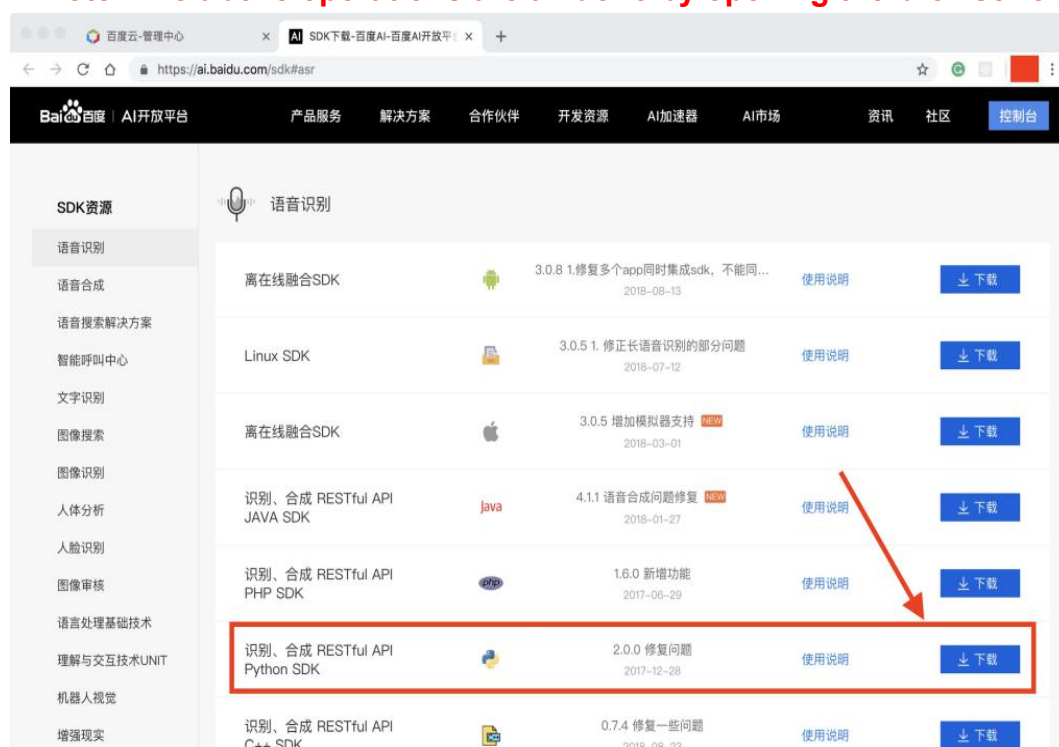


Figure1-13

We need to put this soft package into /home/pi, and input this command at the terminal:

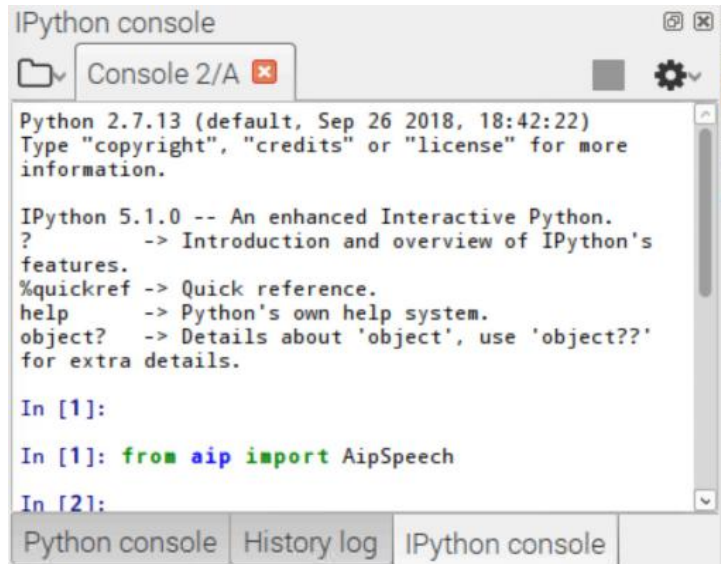
```
unzip aip-python-sdk-2.0.0.zip
```

The meaning of this command is: extract [aip-python-sdk-2.0.0.zip](#), After the decompression is completed, a folder named "aip" is automatically generated in the current directory.

Next, we need to input this command at the terminal:

```
sudo pip install baidu-aip
```

Before experimenting we need to test, input `from aip import AipSpeech` in the spyder console, if there is no abnormality, the download is successful. As shown in the figure below. As shown figure1-14 below.



```

IPython console
Console 2/A

Python 2.7.13 (default, Sep 26 2018, 18:42:22)
Type "copyright", "credits" or "license" for more
information.

IPython 5.1.0 -- An enhanced Interactive Python.
?      -> Introduction and overview of IPython's
features.
%quickref -> Quick reference.
help    -> Python's own help system.
object? -> Details about 'object', use 'object??'
for extra details.

In [1]:

In [1]: from aip import AipSpeech

In [2]:

```

Figure1-14

The code of the program is as follows:

```

1  #!/usr/bin/env python2
2  # -*- coding: utf-8 -*-
3
4  """
5      Created on Tue Nov  6 01:18:45 2018
6      * @par Copyright (C): 2010-2019, Shenzhen Yahboom Tech
7      * @file      speech compound
8      * @version    V1.0
9      * @details
10     * @par History
11
12     @author: longfuSun
13 """
14 from aip import AipSpeech
15 import pygame
16 from time import time
17 #You need to input your APPid and APPkey
18 APP_ID='14842692'
19 API_KEY='d06L3VtQCXr0qyL9PWGySGf0'
20 SECRET_KEY='ScxR7ObkPQ1blfGzZGDGkBe5oobf0lDc'
21 aipSpeech=AipSpeech(APP_ID,API_KEY,SECRET_KEY)
22
23 t=time()
24 result = aipSpeech.synthesis(text = 'Yahboom technology apply speech API to process spe
25                               options={'spd':5,'vol':9,'per':1,})
26 #Wirte synthesized speech to a file
27 if not isinstance(result,dict):
28     with open('audio.mp3','wb') as f:
29         f.write(result)
30
31 else:print(result)
32 #We use pygame of Raspberry Pi
33 pygame.mixer.init()
34 pygame.mixer.music.load('/home/pi/yahboom/speech/audio.mp3')
35 pygame.mixer.music.play()
36 t2=time()
37 print(t2-t)

```