

Multimedia Appendix 3: Source Code of Auscul Pi Console

Available on GitHub: <https://github.com/YangChuan80/AusculPi-Console/blob/master/AusculPiConsole.py>

--- Code begins here: -----

```
import pyaudio

import numpy as np

import wave

import os

import datetime

import tkinter as tk

from tkinter import messagebox

chunk = 512

samp_rate = 44100

form_1 = pyaudio.paInt16

chans = 1
```

```
record_secs = 30      #record time

dev_index = 2

def about():

    about_root=tk.Tk()

    w = 370 # width for the Tk root

    h = 230 # height for the Tk root

    # get screen width and height

    ws = about_root.winfo_screenwidth() # width of the screen

    hs = about_root.winfo_screenheight() # height of the screen

    # calculate x and y coordinates for the Tk root window

    x = (ws/2) - (w/2)

    y = (hs/2) - (h/2)

    # set the dimensions of the screen

    # and where it is placed
```

```
about_root.geometry('%dx%d+%d+%d' % (w, h, x, y))

about_root.title('About Auscul Pi Console')

label_version=tk.Label(about_root,text='Auscul Pi Console Version
1.0', font=('tahoma', 9))

label_version.place(x=90,y=20)

label_copyright=tk.Label(about_root,text='Copyright (C) 2020',
font=('tahoma', 9))

label_copyright.place(x=125,y=50)

label_author=tk.Label(about_root,text='Author: Chuan Yang',
font=('tahoma', 9))

label_author.place(x=125,y=80)

label_institution=tk.Label(about_root,text='Shengjing Hospital of
China Medical University', font=('tahoma', 9))

label_institution.place(x=45,y=110)

label_author=tk.Label(about_root,text='License: The MIT License
(MIT)', font=('tahoma', 9))
```

```
label_author.place(x=90,y=140)

button_OK=tk.Button(about_root, width=15, text='OK',
command=about_root.destroy)

button_OK.place(x=105, y=180)

about_root.mainloop()

def replay():

    #plays the audio file

    os.system("aplay " + wav_output_filename)

def button_callback():

    global frames, frames_numpy, wav_output_filename,
np_output_filename

    pathBase = '//home//pi//Desktop//AudioData//'

    now = datetime.datetime.now()

    wav_output_filename = pathBase + 'Wave_File_' + str(now)[:10] +
now.strftime("_%H_%M_%S.wav")
```

```
np_output_filename = pathBase + 'Numpy_Array_File_' +  
str(now)[:10] + now.strftime("_%H_%M_%S")
```

```
p = pyaudio.PyAudio()
```

```
#setup audio input stream
```

```
stream = p.open(format = form_1,  
                rate=samp_rate,  
                channels=chans,  
                input_device_index = dev_index,  
                input=True,  
                frames_per_buffer=chunk)
```

```
# the code below is from the pyAudio library documentation  
referenced below
```

```
#output stream setup
```

```
player = p.open(format = form_1,  
                rate=samp_rate,  
                channels=chans,  
                output=True,
```

```
frames_per_buffer=chunk)

text_status.delete('1.0', tk.END)

text_status.insert('1.0', "Broadcasting & Recording")

print("Broadcasting & Recording")

frames = []

frames_numpy = []

for ii in range(0,int((samp_rate/chunk)*record_secs)):

    data = stream.read(chunk,exception_on_overflow = False)

    frames.append(data)

    data_numpy = np.fromstring(data, dtype=np.int16)

    player.write(data_numpy, chunk)

    frames_numpy.append(data_numpy)

text_status.delete('1.0', tk.END)

text_status.insert('1.0', "Finished recording")

print("Finished recording")
```

```
stream.stop_stream()

stream.close()

p.terminate()

#creates wave file with audio read in

#Code is from the wave file audio tutorial as referenced below

wavefile = wave.open(wav_output_filename, 'wb')

wavefile.setnchannels(chans)

wavefile.setsampwidth(p.get_sample_size(form_1))

wavefile.setframerate(samp_rate)

wavefile.writeframes(b''.join(frames))

wavefile.close()

np.save(np_output_filename, frames_numpy)

root = tk.Tk()

root.geometry("{0}x{1}+0+0".format(root.winfo_screenwidth(),
root.winfo_screenheight()))

#root.attributes('-fullscreen', True)
```

```
root.title('Auscult Pi Console')

# Text Editor

text_status = tk.Text(root, width=20, height=1, font=('tahoma', 26),
bd=2, wrap='none')

text_status.place(x=10, y=20)

# Buttons

button_auscultate = tk.Button(root, text="Auscultate", width=10,
font=('tahoma', 30), command=button_callback)

button_auscultate.place(x=10, y=100)

button_replay = tk.Button(root, text="Replay", width=10,
font=('tahoma', 30), command=replay)

button_replay.place(x=10, y=180)

button_about = tk.Button(root, text="About...", width=6,
font=('tahoma', 20), command=about)

button_about.place(x=300, y=100)
```



```
button_exit = tk.Button(root, text="Exit", width=6, font=('tahoma',  
20), command=root.destroy)
```

```
button_exit.place(x=300, y=180)
```

```
root.mainloop()
```

```
--- Code ends -----
```