import numpy as np

import matplotlib.pyplot as plt

from numpy.fft import fft

from scipy.io.wavfile import write

from playsound import playsound

fs = 48000

T = 30

t = np.arange(0, T, 1/fs)

A = 0.1

choice = input("Enter 'busy' or 'dial' or 'ringing' to generate the desired tone: ").lower()

if choice == 'busy':

    print("Generating busy tone...")

    f1 = 480

    f2 = 620

    on\_time = 0.5

    off\_time = 0.5

    filename = 'busy\_tone.wav'

elif choice == 'dial':

    print("Generating dial tone...")

    f1 = 350

    f2 = 440

    on\_time = 1

    off\_time = 0

    filename = 'dial\_tone.wav'

elif choice == 'ringing':

    print("Generating dial tone...")

    f1 = 440

    f2 = 480

    on\_time = 2

    off\_time = 4

    filename = 'dial\_tone.wav'

else:

    print("Invalid choice. Please run the script again and enter 'busy' or 'dial'.")

    exit()

cadence\_period = on\_time + off\_time

continue\_tone = A \* (np.sin(2 \* np.pi \* f1 \* t) + np.sin(2 \* np.pi \* f2 \* t))

time\_in\_cadence = t % cadence\_period

envelope = time\_in\_cadence < on\_time

generated\_signal = continue\_tone \* envelope

print("plotting signals...")

plt.figure(figsize=(12, 5))

plt.plot(t, generated\_signal)

plt.title('Time-Domain Signal')

plt.xlabel('Time (s)')

plt.ylabel('Amplitude (V)')

plt.grid(True)

plt.xlim(0, 6)

plt.ylim(-0.25, 0.25)

plt.savefig('time.svg')

mf = fft(generated\_signal) / fs

N = len(mf)

mf\_abs\_sorted = np.fft.fftshift(abs(mf))

freq\_axis = np.linspace(-fs/2, fs/2, N)

plt.figure(figsize=(12, 5))

plt.plot(freq\_axis, mf\_abs\_sorted)

plt.title('Frequency-Domain Signal (Spectrum)')

plt.xlabel('Frequency (Hz)')

plt.ylabel('Magnitude')

plt.grid(True)

plt.xlim(0, 1000)

plt.savefig('freq.svg')

plt.show

print("Plotting Complete")

# Saving file using scipy

print(f"Saving audio to {filename}...")

scaled\_signal = np.int16(generated\_signal / np.max(np.abs(generated\_signal)) \* 32767)

write(filename, int(fs), scaled\_signal)

# Playing the sound using playsound

try:

    print(f"Playing '{filename}'...")

    playsound(filename)

    print("Playback finished.")

except Exception as e:

    print(f"Error playing sound: {e}")

