Demo 52: Plotting Audio
Exercises

DSP Lab (ECE 4163 / ECE 6183)

Fall 2023

These demo programs use the Python library `matplotlib`. See the tutorial at

`http://matplotlib.org/users/pyplot_tutorial.html`

Exercises

1. **Bandpass filter.** Read a signal from a wave file in blocks, implement a bandpass filter as a recursive difference equation, plot the input and output signals using the animation function, and play the output signal using pyaudio. The input and output signals should be plotted in two different subplots. Run the process in a continuous loop. Do not use Numpy. SUBMIT

   Submit your Python program, a PDF file of your comments, and a screen recording (a few seconds in duration). Submit all files necessary for your program to run. Your screen recording should include the audio produced by your program.

2. Repeat the previous exercise, but take the input audio from the microphone instead of a wave file.

3. **Vibrato effect.** Read a signal from a wave file in blocks, implement the vibrato effect using a circular buffer, plot the input and output signals using the animation function, and play the output signal using pyaudio. The input and output signals should be plotted in two different subplots. Run the process in a continuous loop.

   Write a version that acquires the input signal from the microphone.

4. **Stereo.** Write a program that plots in real time the left and right channels of a stereo wave file.

5. **Screen recording.** Make your own screen recording (video recording) using the AM demo program `prog_07.py`. In your screen recording, introduce yourself by name. The audio track of your video should have only the output audio of your audio effect, not the input audio signal. As an example, see the provided screen recording for this demo program. Your video recording should be a few seconds in duration. Pay attention to the sound quality (try to avoid clipping, high noise, etc.) There are various utilities to create screen recordings. SUBMIT

   Share your screen recording with the class via the shared Google sheet (link to be provided).