Keystrokes with Tkinter for Adjusting Audio

DSP Lab (ECE 4163 / ECE 6183)

2023

Exercise

1. Modify the given demo to adjust time constant and frequency of notes using keystrokes.

2. Write a program that plays a different note for different keys on the keyboard. The program can be based on `keyboard_demo_06.py`, but instead of just a single note, it should enable a whole octave of notes (12 notes).

   The notes should play overlappingly (if a note is played before the previous notes have become silent, then both notes should be heard at the same time). There should be a difference equation (filter) to implement each note. Each difference equation should have its own input and output signal. The output signals of the separate filters should be added together to give the total output signal. The total output signal should be written to the output audio device (loudspeaker/headphones).

   For a full octave (twelve notes), adjacent notes on a piano keyboard are related via

   $$f_k = 2^{k/12} f_0, \qquad k = 0, 1, 2, \ldots$$

   You can set $f_0 = 440$ Hz which is middle A.

3. Playback of a wave file where keystrokes are used to control parameters of echo effect or vibrato effect.