

Homework 5: Polyphonic FM Synthesizer

Due at 11:59pm ET on November 11

1 Polyphonic FM Synthesizer (10 points)

In this assignment, you will be implementing a polyphonic FM synthesizer. In class, we talked about FM synthesizer and polyphonic synthesizer, and you will combine the two concepts in this assignment. Your synthesizer should do the followings:

- Support polyphony up to ten voices by using a “poly~” object
- Support playing middle C to high C using the computer keyboard with the “key” and “keyup” objects (i.e., like what we did in HW3; feel free to copy-paste from that)
- Support MIDI input with the “notein” object
- Visualize the keyboard input with a “kslider~” object
- Use a “preset” object to store at least two tones that you like

Please record something using your synthesizer with two different tones you like, and please play a chord to show that the polyphony works. You may want to use Zoom for recording. **Please submit both your Max patch and the video recording.** You will receive zero credit if the code is missing.

Hints

- There are several parameters of a FM synthesizer, including the harmonicity, frequency modulation curve and the ADSR curve (for amplitude modulation). Make sure you experiment with all of them to find a tone that you like.
- Remember to set the “Display Mode” to “polyphonic” for the “kslider~” object through the inspector (Ctrl-I).
- You can set the subpatch for the “poly~” object by setting “Patcher File(s)” through the inspector (Ctrl-I). You can then double click the “poly~” object in locked mode to open the subpatch. Note that the patch will be opened in read-only mode by default, and you have to click the pen icon at the bottom left to enable editing.

- For the “preset” object, you can Shift-Click to store and Click to recall a preset.
- You might find the “stripnote” object useful to trigger the frequency modulation only for a note-on message but not for a note-off message.

2 Submission

- All assignments must be completed on your own. You are welcome to exchange ideas with your peers, but this should be in the form of concepts and discussion, not in the form of writing and code.
- Please provide proper citations/references for any external resources you use in your writing and code.
- Please submit your work to [Gradescope](#).
- Late submissions will be deducted by 1 point per day.