

## Analog Synthesizer Simulation

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I really enjoy the sound of analog synthesizers and I wanted to simulate that sound as close as reasonably possible within Python. Traditionally, analog synthesizers generate sound through circuits and voltage-controlled oscillators. From a little research these sounds can be mimicked digitally depending on how you filter, amplify, and modulate your sound. The difficult part is that analog synthesizers are supposed to sound a bit imperfect, so I'm not sure exactly how this is to be done digitally. If this is too basic of a project, I was also interested in granular synthesizers and FM synthesizers while looking at different sounds. Most of these synthesizers seem to follow the basic outline:

- Generate sound either with waveform oscillations or source it from recordings,
- Add an envelope to control the amplitude, create a filter (seemingly, they often use low-pass filters which I like and is often in the electronic music I listen to),
- Add a component to change things like pitch, timbre, and volume (I thought the envelope would affect volume).
- Create an interface. I would like to create a GUI if I have the time to figure that out, else I will have it be run through the command-line.
- Output with sounddevice.

This is about as much detail as I have and I believe this could be roughly 500 lines of code up to many, many more depending on how many things are implemented. If none of these three synthesizers are interesting enough for a project, I just want to make any sort of synthesizer, I don't care too much about which type.

My primary concern is, with the little research that I've done, is that this project is too simple and not unique enough.