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# CSD2c

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## Project Goals

#### Minimal
- FM synthesizer (1 carrier, 1 modulator)
- Real-time midi input *(just note-ons)*.
- Envelopes for carrier & modulator *(attack/decay)*
- Commandline control:
  - Master volume
  - Carrier/modulator gain
  - Envelope attack/decay

#### Extra
- Polyphony *(8 voices?)*
- ADSR envelopes *(note-offs)*
- More of everything we already have (carriers, modulators, envelopes)
- Midi CC input
- OSC input

#### Over-the-top
- Multitimbrality (multiple synth patches listening to midikeyboard splits)
- FX (delay, some sort of overdrive)

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## Design

#### Class functionality
- FMSynth:
  - Has 2 oscillators (carrier, modulator)
  - Has 2 envelopes (ampEnv, fmEnv)
  - Has functions called noteOn and noteOff which calls all corresponding envelope functions
  - Variables:
    - amplitude
    - frequency
  - Process function:

    outBuf[i] = modulator.getSample();
    // Apply exponential fm
    carrier.setFrequency(mtof(midi + (outBuf[i] * fmIndex * fmEnv.getSample())));
    outBuf[i] = carrier.getSample() * amplitude;
    modulator.tick();
    fmEnv.tick();
    carrier.tick();

- Envelope
  - Line function as seen in Pd/Max

    line(float destination, float frames);

  - Uses the getSample() and tick() functionality in a similar way as the oscillators
- AD / ADSR
  - Process function calls the line() function for each stage of the envelope
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