PROJECT 2 PRESENTATION

VINSYNTH

A Monophonic Synth

DSP3/ Synths/ Audio Signal Processing 3/
Audio Software Dev 2/ MMI 604

Ashay Dave

Area of Exploration

Digital Synthesizers.

They are great.

Great for generating sounds using oscillators, that aim to recreate the sounds of an analog synthesizer.

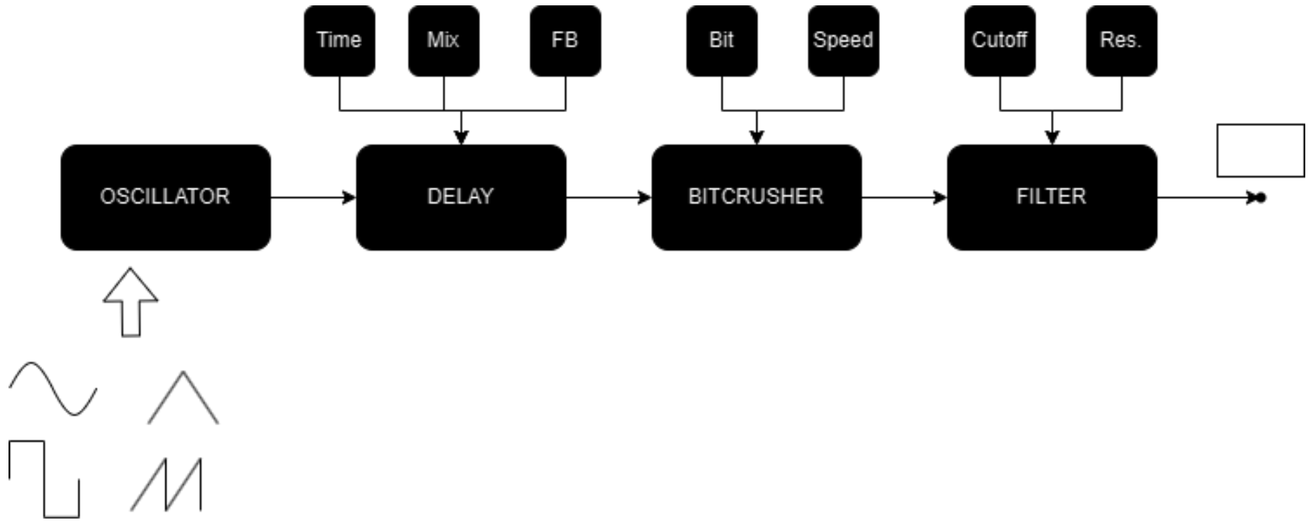
VinSynth originally was thought of as a Polyphonic synth with multiple oscillators.
With an experimental yet versatile set of effects that can give a more modern 90's vibe to the sound.

But I ended up with a Monophonic synth, with a single oscillator that kinda does the job.

Solution

The solution is a monophonic synthesizer with the following components:

- A single oscillator with multiple waveform options (sine, square, triangle, saw).
- Effects:
  - A delay effect with adjustable parameters for delay length, feedback, and dry/wet mix.
  - A bit crusher effect that can degrade the audio quality with adjustable bit depth and sample rate reduction.
- A filter that allows users to sculpt the sound by applying low-pass or high-pass filtering with parameters like cutoff frequency, and resonance (Q).



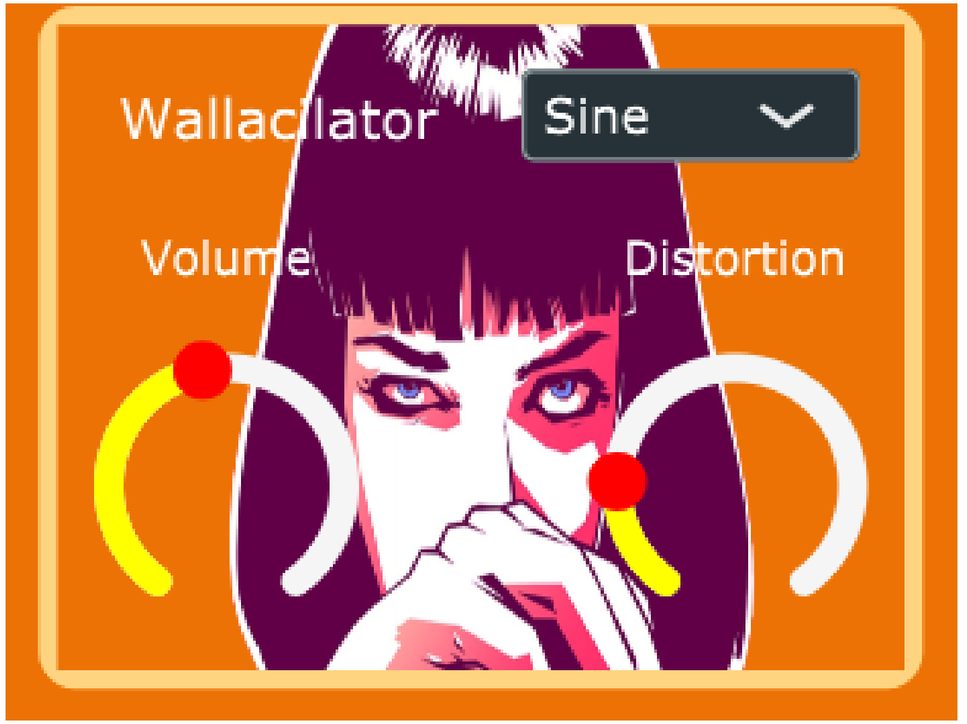
Solution

Oscillator:

- Sine Wave (sin(2 * pi * f * t))
- Square Wave -> 1 if sine is positive, -1 if negative
- Sawtooth - 2 * phase (or mod) - 1 (phase = freq/sampleRate)
- Triangle - 2 * saw - 1

Distortion:

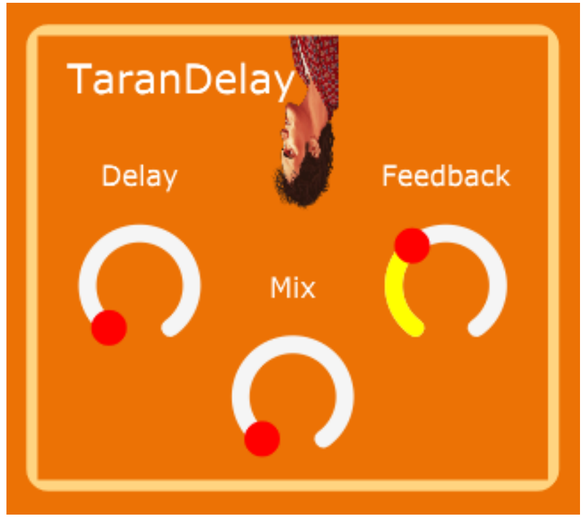
- Eh, just a tanh.



Solution

Delay:

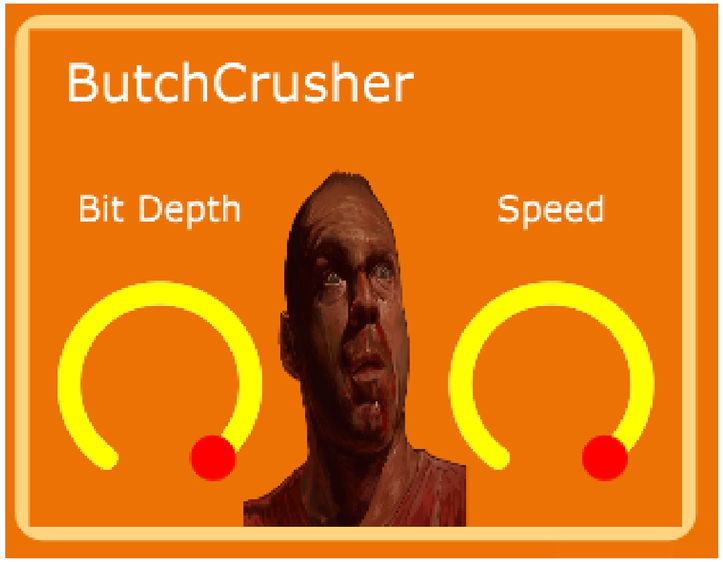
- Loops through audio channels and samples in the buffer.
- For each sample, calculates a new read index based on the current delay length and other factors.
- Performs interpolation to obtain the delayed sample from the delay buffer.
- Applies the delay effect by mixing the original and delayed samples based on the dryWet and feedback parameters.
- Updates the delay buffer with the new input and delayed samples.



Solution

Bitcrusher:

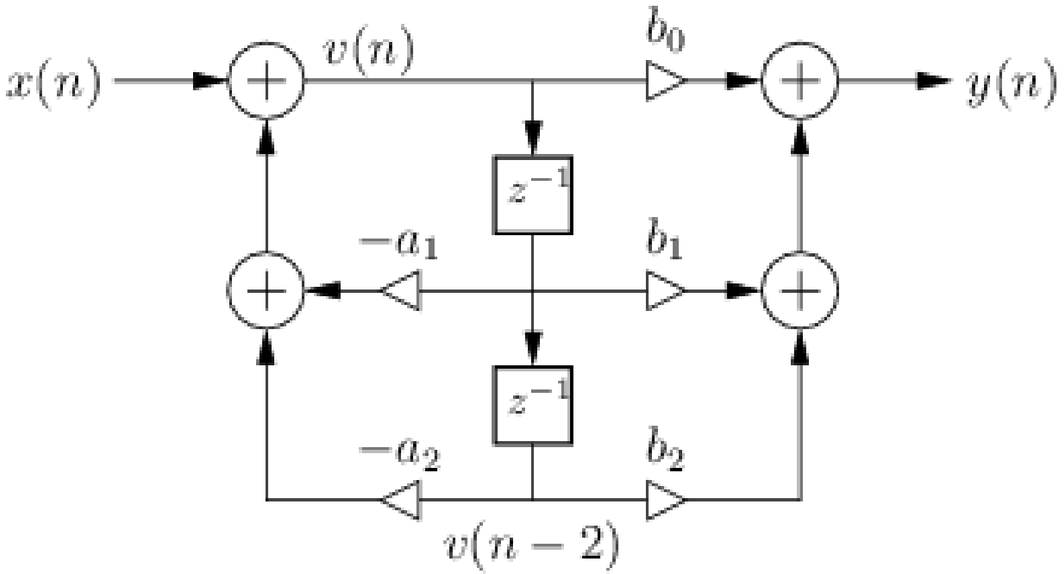
- QUANTIZE THAT, BUTCH!
- What does the Speed variable do? It basically determines how “fast” quantization is happening. The phasor variable (in code) keeps track of the current phase position. The phasor is incremented by the speed variable. If the phasor exceeds or equals 1.0, the phasor is reset back to zero and quantizes the input sample.

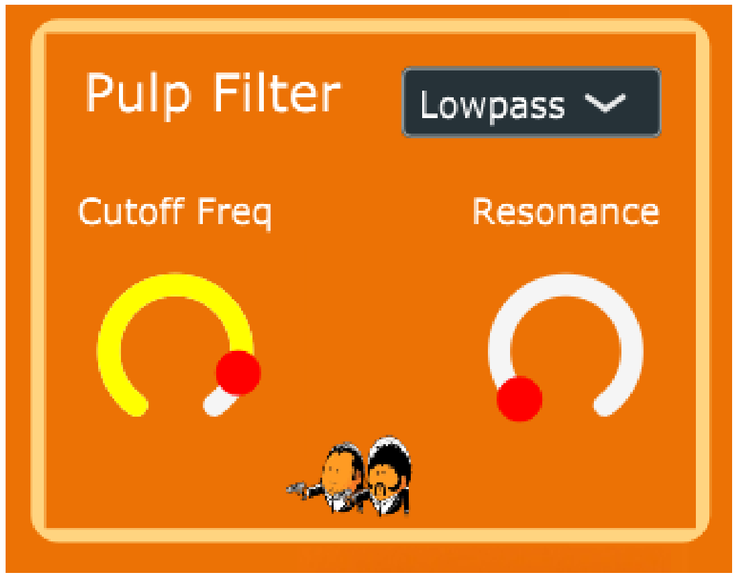


Solution

Filter

- Direct Form 2 Biquad, using Robert Bristow Johnson's equations.
- Could've used a better filter.
- Makes it sort of "pulp-y".





Why would anybody use it?

1. If you like Big Kahuna Burger.
2. A straightforward GUI, with limited information about parameters and easier to just start tweakin' and pulpin' those sliders for sound design.
3. Monophonic synth leaves the door open for the user to experiment with just one sound, and works nicely on leads or single note melodies.

Feedback

1. Navaneeth:

- Cool GUI!
- Polyphony would be nice, with more filter options.

2. Sourav:

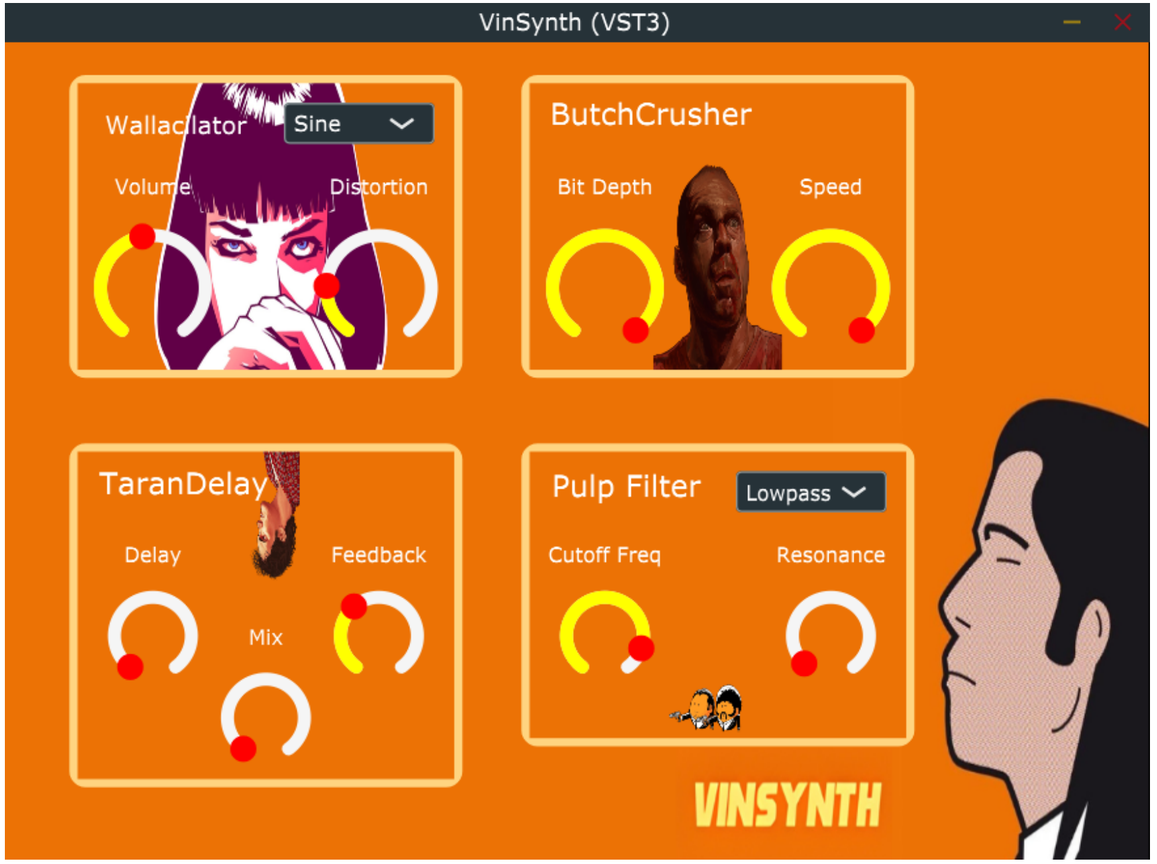
- Having the Distortion with the Synth is great for low frequencies because it would work great for low-end playback devices and for sub harmonics also.
- Have more information about the knobs, like labels of the range to signify how much of the effect is happening.
- Delay gives a space-y reverb sound.

Feedback

3. Dr. Arora:

- UI is bellisimo.
- It is a Royale with Cheese.
- Delay sounds like a reverb (take it as a compliment).
- Missing polyphony and ADSR.
- Filters are weak.
- Butch crushed it.

THANK YOU!


VinSynth (VST3)
Wallaclator
Sine
Volume
Distortion
ButchCrusher
Bit Depth
Speed
TaranDelay
Delay
Feedback
Mix
Pulp Filter
Lowpass
Cutoff Freq
Resonance
VINSYNTH