Granular synthesizer

Made in the Web with the help of the Web Audio API

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Table of contents

1. Introduction
2. Effects
3. Architecture and Development
4. Demo !!
5. Second thoughts and conclusion

    Resources

Introduction

What is it ?

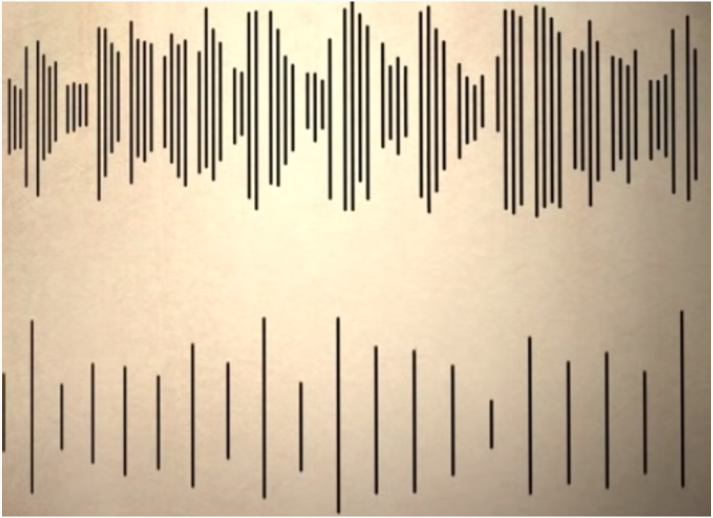
the Granular Synthesizer its an experimental way of making music.
it is mainly used in electronic music
it provides limitless possibilities
it is a way to push the limits of sound

What does it do ?

the **process** goes something like this.

- The user enters the audio of his choice.
- the audio is deconstructed into grains
- and reconstructed again in a random order

Decomposition



Recomposition

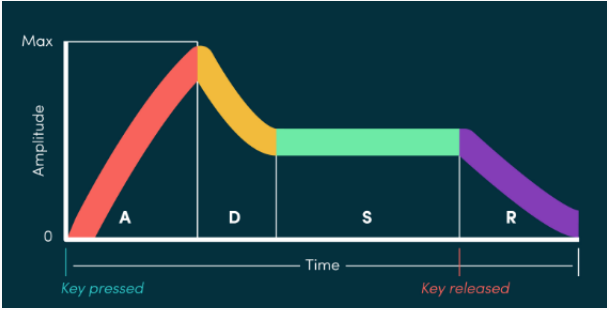
Effects

Why effects?

Effects are the most crucial part in the sound design process

- they shape the sound
- Unwanted clipping and annoying frequencies
- Achieving more coherent and concrete sound
- Adding creativity

ADSR envelope



Envelopes help us shape the time programming of a sound

- in my app it only makes sense to use attack and release
- attack : how much time does it take to reach the maximum volume
- release : how much time does it take to reach the 0 volume

Reverb & Delay

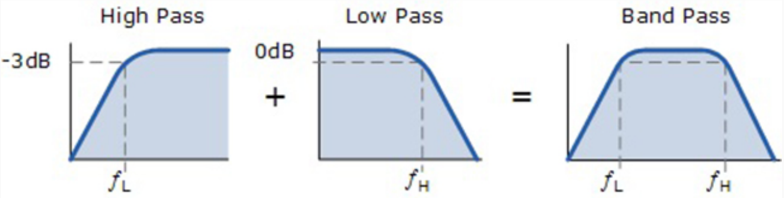
Reverb gives space to our sound

- we can specify a lot of parameters!
- Wet: how much percentage of the signal gets processed
- Decay: how much time the tail takes

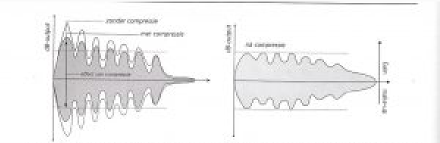
Delay repeats a part of the signal in specific time intervals

- similar to an echo
- ping pong delay
- Wet: again!
- DelayTime: duration of each delay
- feedback : how much of the signal is fed back

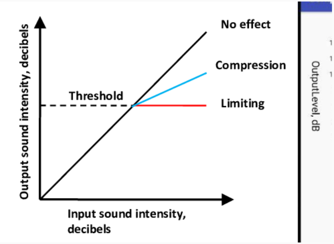
Filter



compressor



Figuur 6.11. Voorstelling van compressie op een audiosignaal. Links: het signaal vóór de bewerking; rechts: signaal ná de compressor-bewerking is gelijkmatiger en harder uit te sturen met de Gain make-up structuur



the **compressor** squashes the audio signal and gets rid of volume peaks.

- knee : percentage of compression
- db : in which volume the effect is being applyed

Phaser

the **phaser** is an experimental effect

- creates noches typicaly on the lowest of frequencies
- modulates them with an LFO
- phaserFrequency the frequency the noches are centered around
- octaves the range of the effect
- GIF

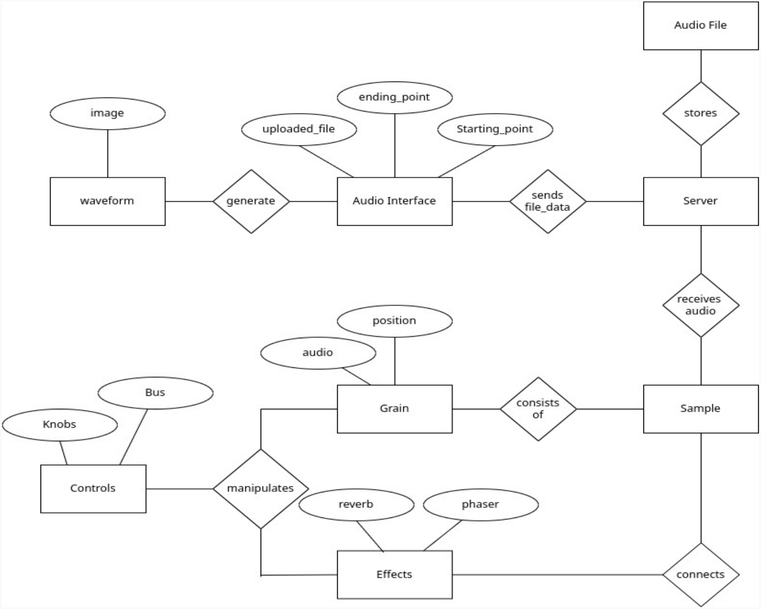
Architecture and Development

General

The **architecture** is mainly client server.

- the frontend has been build with React
- the audio processing has been done with tonejs
- the server side has been developed with nodejs and express

Overview


Audio File
stores
image
ending_point
uploaded_file
Starting_point
waveform
generate
Audio Interface
sends file_data
Server
receives audio
position
audio
Bus
Knobs
Grain
consists of
Sample
Controls
manipulates
reverb
phaser
Effects
connects

Demo !!

Second thoughts and conclusion

Problems, problems, problems

I found this project to be more demanding and I encountered a lot of problemsjk

- nodejs does not support the web audio api
- very little amount of examples of similar projects
- tonejs has very limiting documentation
- React is awesome but it has its limitations

Lessons

this was by far the **longest** and **hardest** project I made so far, so I learned a lot.

- learned how to structure a big project from the start
- keeping my code clean
- learning frameworks better
- learned how to be more resourceful

Links

- UI : React
- API : nodejs
- audio processing : tonejs
- waveform creation : waveform-generator-web
- drag and drop list: React DnD
- animation : React spring
- mp3 cropping : mp3 cutter
- knobs: jQuery knob
- bootstrap : react bootstrap
- LaTeX Beamer Theme: METROPOLIS