

1T2: Introduction to Audio Signal Processing

Xavier Serra

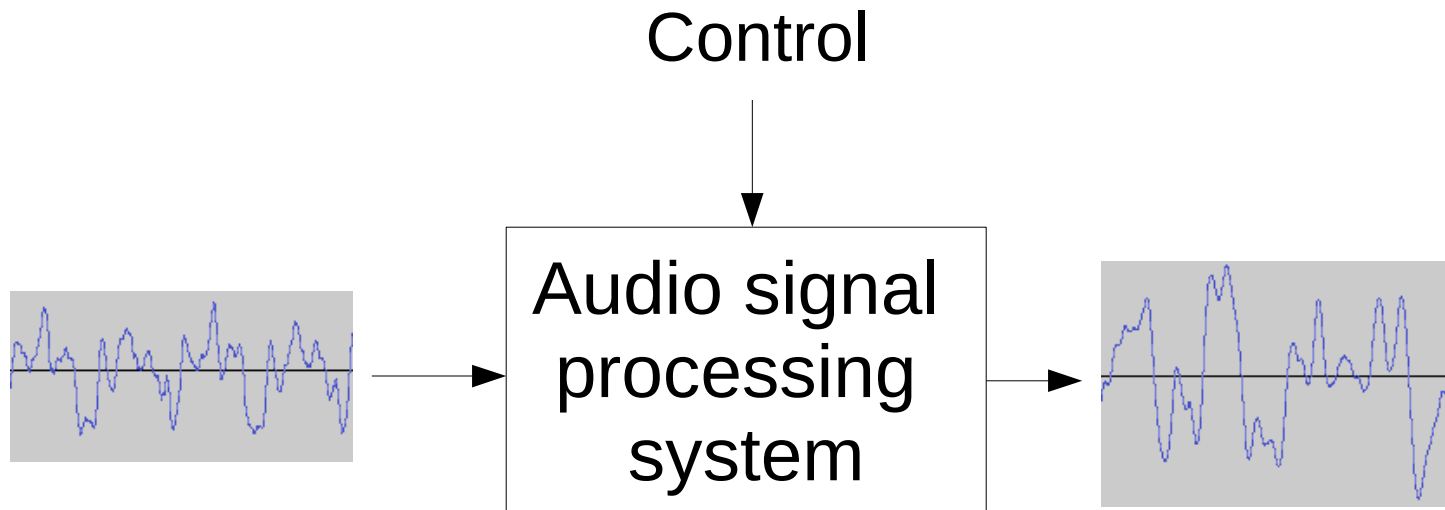
Universitat Pompeu Fabra, Barcelona

Index

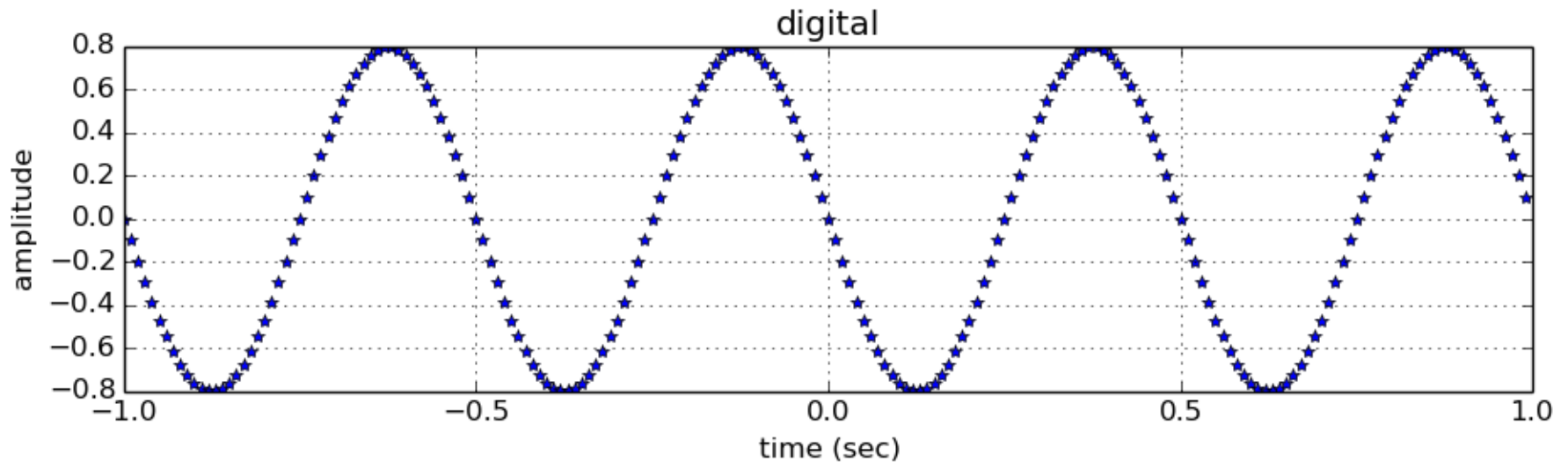
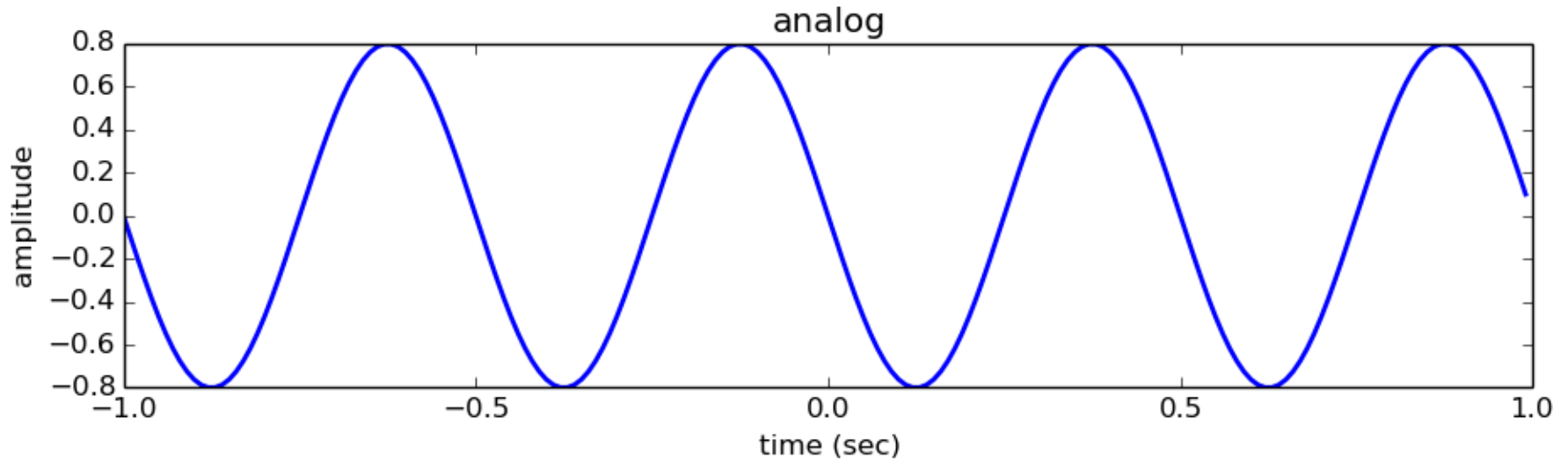
- What is audio signal processing?
- Applications:
 - storage, data compression, effects and transformations, synthesis, description.

What is audio signal processing?

- Intentional alteration of sound



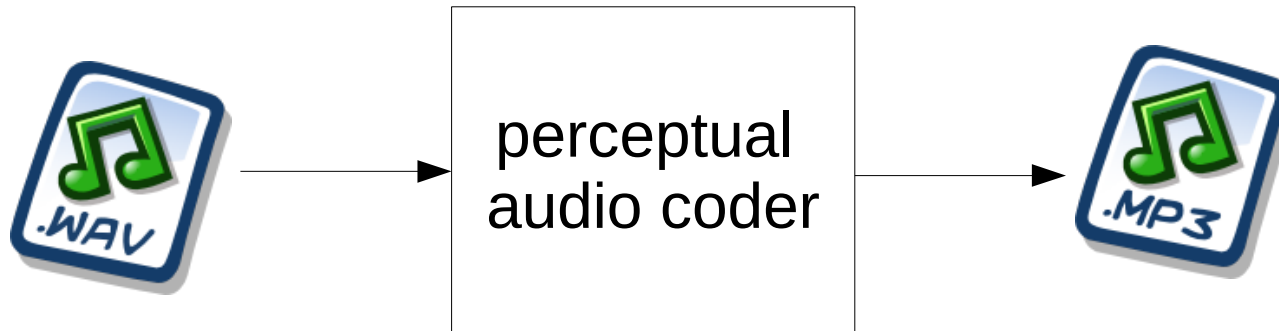
Analog versus digital signals



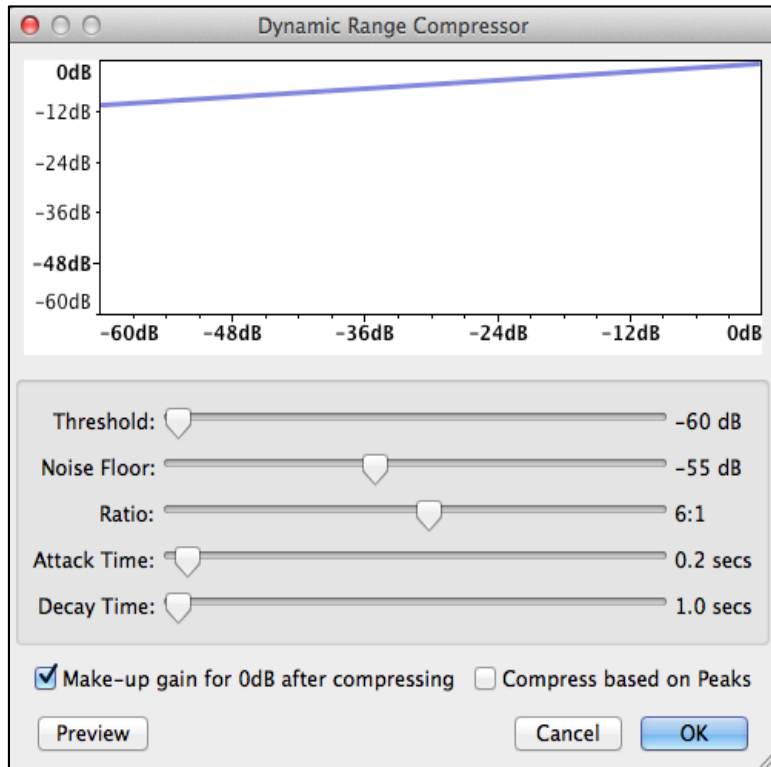
Applications: Storage



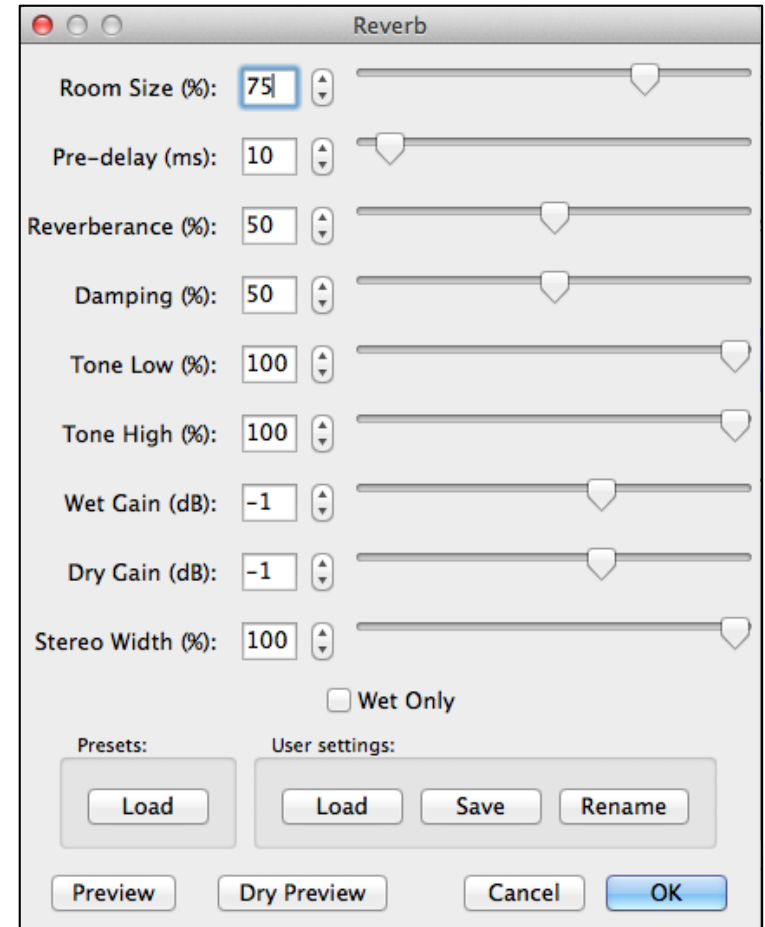
Applications: Data compression



Applications: Transformations

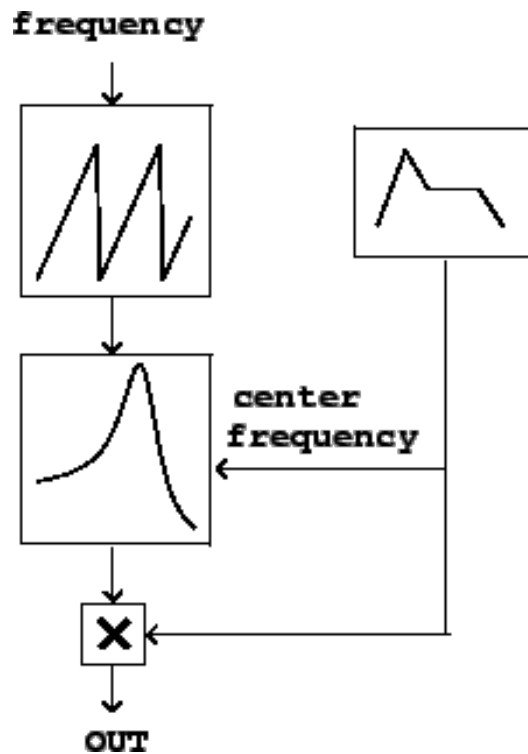


[from
Audacity]



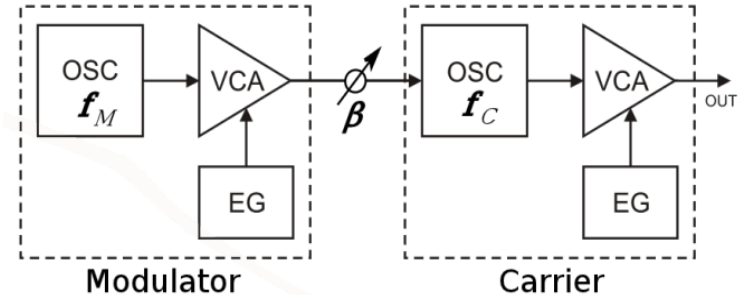
Others: echo, equalizer, flanger, phaser, chorus, pitch shift, time stretching, voice effects, 3D audio effects, morphing,

Applications: Synthesis

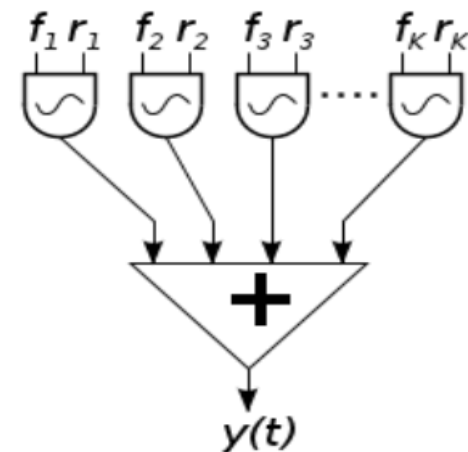


Subtractive synthesis

Others: granular synthesis, physical modeling, waveshaping, sampling, spectral synthesis, ...



FM synthesis



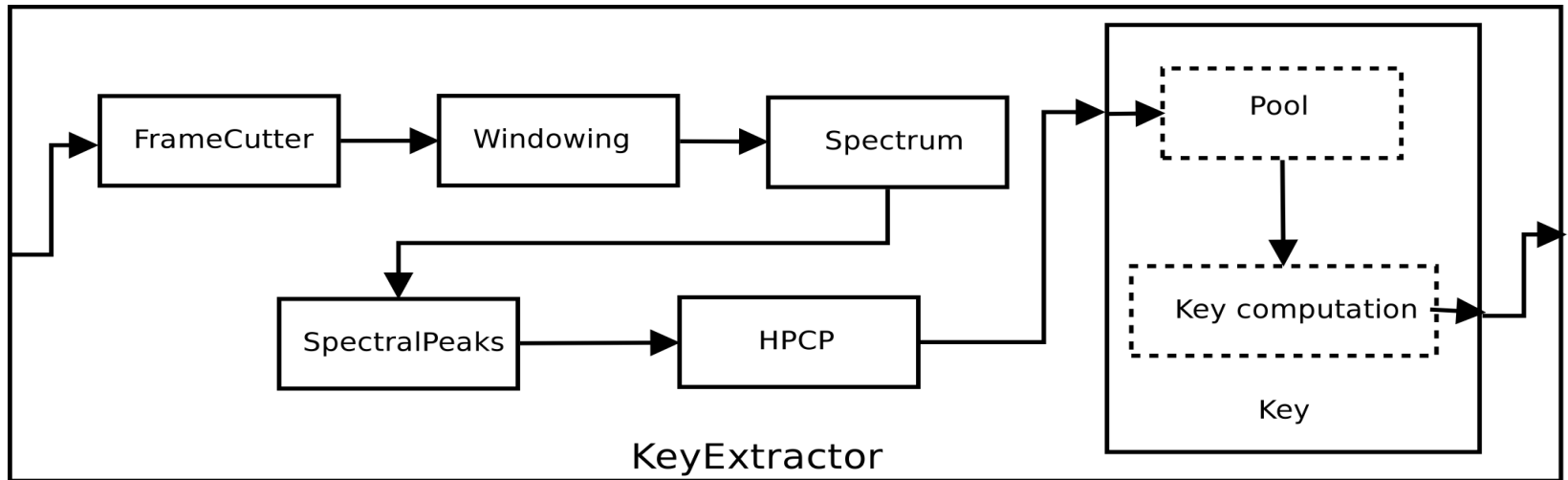
Additive synthesis

<http://msp.ucsd.edu/techniques/v0.11/book-html/node152.html>

http://commons.wikimedia.org/wiki/File:2op_FM.svg

http://commons.wikimedia.org/wiki/File:Additive_synthesis.svg

Applications: Description



Low-level: loudness, timbre, pitch, ..

Mid-level: rhythm, harmony, melody, ...

High-level: genre, emotions, similarity, ...

References and credits

- More information in:
https://en.wikipedia.org/wiki/Audio_signal_processing
- Audacity: <https://www.audacityteam.org/download/>
- Slides released under *CC Attribution-Noncommercial-Share Alike* license and code under *Affero GPL* license; available from <https://github.com/MTG/sms-tools>

1T2: Introduction to Audio Signal Processing

Xavier Serra

Universitat Pompeu Fabra, Barcelona