



POLITECNICO
MILANO 1863

Homework 2: NEL-19

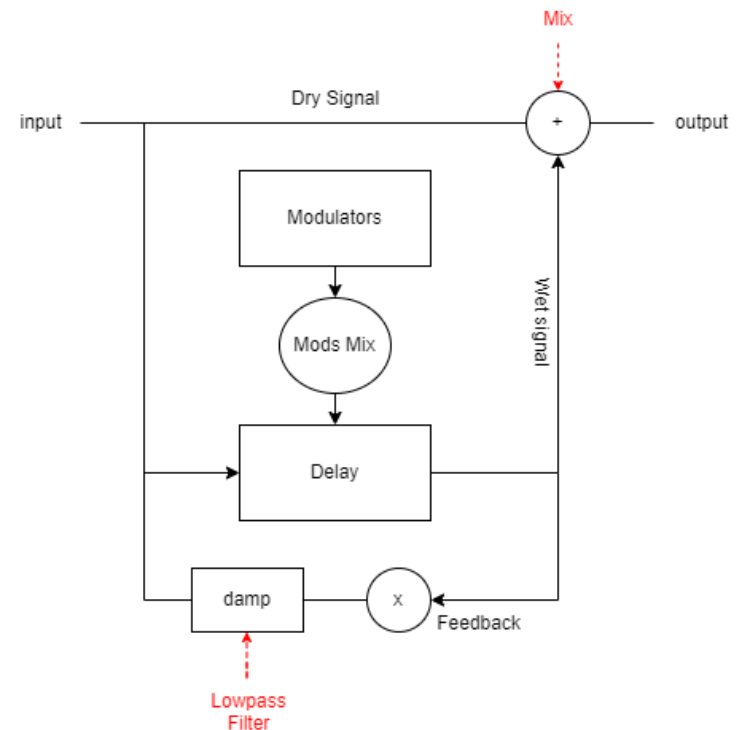
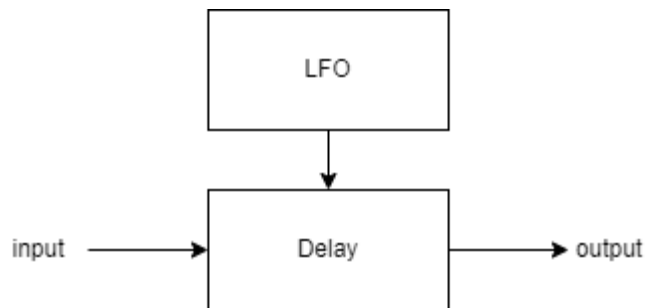
Group: Algorhythmics

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Introduction and Block Diagram

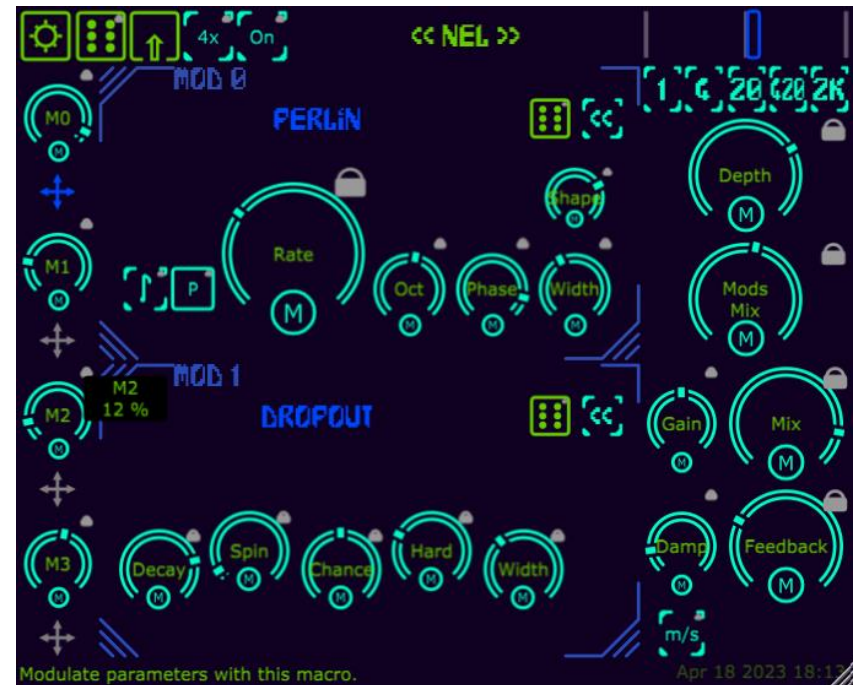
The NEL-19 plugin develops a vibrato effect based on re-sampling. It can be used to modify a recorded input signal or a midi instrument. The NEL-19 vibrato (on the right) is more complicated with respect to the common vibrato (on the left).

There is a feedback filtered by a Lowpass Filter; different modulators can be selected to modify the delay signal; mix between dry and wet signal.



The user interface area is divided into four sections.

- **Macros**, sliders that control creative combination of effects and parameters;
- Main components of **vibrato effect** (Depth, Mods Mix, Gain, Mix, Damp, Feedback, Stereo Configuration)
- Selection of different **vibrato textures**. It is possible to manage two modulators at the same time.
- In the upper part there are settings, random selection of the modulators, preset browser, oversampling and lookahead



GUI

Seven different modulators:

- **Envelope Follower**, modulate the vibrato energy;
- **Dropout**, generates random pitch dropouts;
- **Audio Rate**, midi note controlled oscillator;
- **Macro**, modulates the internal delay;
- **Pitchbend**, modulates the vibrato
- **Perlin**, natural noise to modulate the vibrato;
- **LFO**, modulates the vibrato with a classic LFO shapes.



Implementation

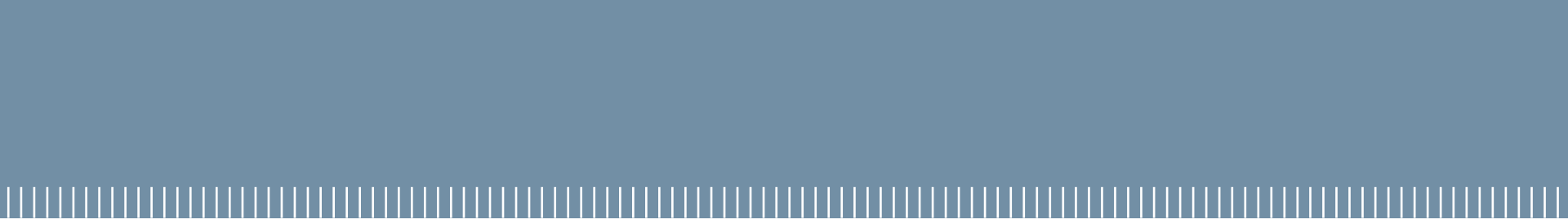
This plugin is written in C++ and JUCE framework. The most important class is `Nel19AudioProcessor`. The components used to implement the effect can be divided in namespaces:

- ***Vibrato***, implements the main effect of the plugin and contains subclasses that implement the modulators;
- ***Smooth***, defines the smoothing using a block-based parameter smoother and a lowpass filter;
- ***DryWet***, creates the delay with a ring buffer and combines dry and wet signals;
- ***ModSys***, defines the parameters of modulation (modulators, macros and vibrato main components);
- ***Oversampling***, applies the process of oversampling on the effect, using Nyquist Theorem, convolution and Chebyshev.
- ***Interpolation***, implements four types of interpolation (Lanczos, Linear, Cubic Hermite spline, Lagrange).

Conclusions

NEL-19 plugin is a *work in progress*, on weekly basis, the creator improves its functioning. Some ideas could be made to improved the code version that we analysed.

- Could be extended to other Operating System
- Select the *presets* during the performance, without changing them programmatically.
- Improve the GUI, a process already started by the creator (*Outtakes.h*)



Thank you for
your attention