~moduLaRe~

Alberto Zin, 2011-2012, V0.1
alberto.zin AT google.com

Description

Modulare: italian verb that means "to modulate", but also indicates the adjective "modular".

~**moduLaRe**~ is mainly a personal tool for processing live flute sound in a creative way, but at the end it became something larger that I think is worth sharing. The tool is based on work done by other people, in particular on a patch by Stephen Christopher Stamper (and other, please see the acknowledgements at the end). I'm mostly interested to the flute, but in principle it should work with any input provided. ~moduLaRe~ is conceived as a "live performance" tool: my set-up is composed by a laptop, a midi keyboard, a microphone and a Korg NanoKontrol. The NanoKontrol allows the player to interact with the instrument easily and minimizes the use of mouse, giving much more freedom when interacting with a musical instrument. The computer keyboard is used for controlling the patch parameters as well. The patch is composed by small independent "modules" described hereafter.

Installation

Uncompress the zip archive into a directory.
Open Main.pd patch.
Set the MIDI input in Media ->Midi Settings… in order to be sure that midi input (and NanoKontrol if you have it) are properly working as midi input devices. To do so "Select multiple devices" in the midi panel.
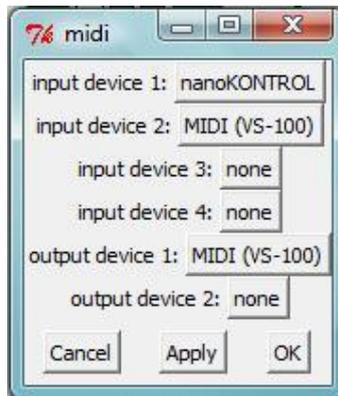
The patch works also without the Nanokontrol. The following libraries are used:

- ggee
- zexy

plus the freeverb~ external. This patch eats CPU for breakfast (i.e. it "lacks optimization" :-), so you need to run it on a powerful computer. Tested on pd-extended 0.42.5.

First steps

1. Raise the slider on the "channel~" module (numbered as "9", master volume)
2. Press the on/off button on top right on the "sine guitar~" module (6)
3. Press the PC keyboard keys "QWERTYU", now you should hear notes at the output. The keys QWERTYU act as a diatonic harp. Otherwise use the midi keyboard.
4. Add the "plucked string~" by pressing on/off on top right of the module (7)
5. Activate the "time-lag" module: simply raise the "level" slider to the right. You will hear a lot of "echoes".
6. Activate the first "shuffler~" module by pressing the metro button. Now change the pitch of the incoming sounds by moving the "pitch" slider.
7. At this point we can activate the granular module (Grannie basher) by pressing the "On (BT8)" button.
8. Enjoy exploring it.

Controls

The following is the full setup for ~**moduLaRe** ~:
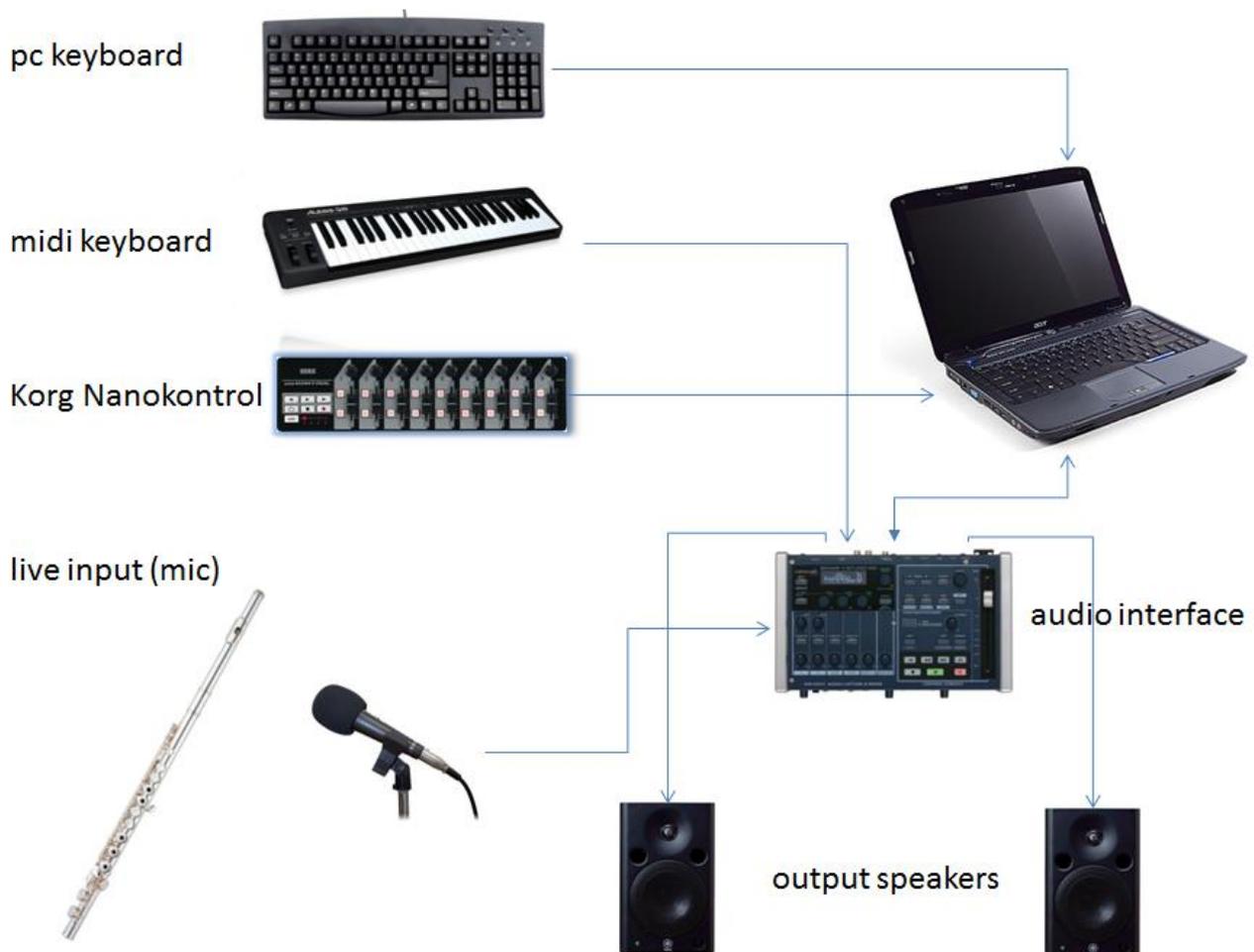
Figure 1 Complete ~modulare~ setup

The user has 4 possible inputs/controls: pc keyboard, MIDI keyboard, Korg NanoKontrol and microphone. Controllers are connected on the audio board and to the PC. Note that even without the Nanocontrol and midi keyboard still microphone and pc keyboard provide useful inputs.

Short description of the modules
Modulare modules are of two basic kinds: sound generators and effects. The routing (buses) are explained later.

adc_in~ : it is a mono source associated to a microphone. The slider controls the level of the input.

sine_guit~: Sound generator, sine sound. Controls are attack, decay, volume and octave. An on/off control switches the audio associated to this module.

plucked-string~: Sound generator, guitar-like sound. Controls are the low-pass filter cutoff, a feedback, volume and octave. An on/off control switches the audio associated to this module.

audio-player2~ : audio player / slicer 2. Sound generator . Plays an audio file (wav or aiff) preloaded.   A new file can be loaded (but doing this causes a short interruptions in the audio, at least on windows). The start/stop is associated to the button "play". Two separated volume controls are associated to the player and to the audio slicer. The slicer is activated by setting a number of parts in which the audio is divided (the small number box). Good values are 32, 64. Audio can be played in reversed mode by pressing the "reverse" button. Loop button loops the file if pressed ☺. "Resynch" re-synchronizes the audio file from the beginning.

wnbpf~: white noise band-pass filtered. Sound generator . This is a reduced version of my "Outerspace" patch. It is useful for producing pads. f0: base frequency [Hz]. All the band pass flters are tuned on multiple frequencies of f0 ; Q: resonance control of the band-pass filter. Low values produce large bandwidths higher values means narrow (tuned) filter frequencies;
f_sp: Frequency spacing (Δf). The multiplier of the fundamental frequency. At the end the central frequency of each bp fiter will be tuned on $fN = f0 +n\Delta f +detune$, where n is the voice number (1 to 128) (detune control is not available). Att: attack of each voice (filter). Dec: decay of each voice (filter). Vol: master volume. Oct: octave control. There are 6 available preset on the Hradio buttons on top of the module. The base frequency (f0) can be set by pressing the key associated with the keyboard (Z=C, S=C# and so on). Rnd randomizes the controls.

audio-player1~ : audio player 1. Sound generator . Plays 3 preloaded audio files (wav or aiff). They can be selected with the 3 small vertical buttons. A new file can be loaded (but doing this causes a short interruptions in the audio, at least on windows). The start/stop is associated to the button "play". Audio can be played in reversed mode by pressing the "reverse" button. Loop button loops the file if pressed ☺. "Resynch" re-synchronizes the audio file from the beginning. Typically a stereo file is expected, but if a mono file is loaded the mn/st button set to mn splits the output on the left and right channels.
There are 3 sound files preloaded. If you want to preload different files they are hardcoded within the audio-player abstraction.

Grannie-basher~ : sound granulator. Effect. This is a reduced version of the original grannie basher (prevent cpu overloading on old computers). The effect is activated by the on(BT8) button. The controls are

not explained here, but there are 10 presets activated by the PC keyboard 0-9 keys. One note about presets: they are stored in a text file called grannie.txt. If you modify a present and you want to permanently write it into the text file first press "store", then press "save". Otherwise store button stores the current modified preset without writing it into file (i.e. not available for the next sessions).

time-lag~ : effect. This is a set (8+8) of delay lines in series, with tap times set in the "MaEstro" module. "Feedback" controls the feedback in the delay lines, cutoff sets the low-pass filter cutoff frequency of the delay lines, "level" controls the amount of effect and "through" lets or not the incoming signal pass through the effect.

shuffler~ : effect. Three shufflers are placed in parallel to process the incoming sound. They are pitch-shifters with controls on retrigger (metro, random, preiod), envelope. Pitch shift is controlled by the pitch slider. Regen controls the density, level the amount of effect and through lets or not the incoming signal pass through the shuffler.

band-pass~ : effect. A band pass filter centered on the "centre" frequency. Q sets the BPF resonance and boost is the "volume control". The effect can be tempo synched ("metro") and "random" on the frequency.

REV-MIX : effect. Sets the amount of reverberation (kind of dry/wet control)

channel~ : Output control. Sets the output volume.

13bands-EQ: 13 bands stereo equalizer with reset control and global gain.

recorder~ : very simple recorder of the session. First select "save as" to open a wav file (call the file with the wav extension), then start/stop to start and stop writing on file.

MaEstro: holds the present control for the delays within time-lag~ (can be tempo-synched), the overall scale selection (acts on sine-guitar and plucked if played with the QWERTY keyboard) .

PC keyboard mapping

Q-W-E-R-T-Y-U:	plays "sine-guitar" and "plucked-strings" according to a scale defined into the "MaEstro" module.
0-1-2-3-4-5-6-7-8-9:	recall the Grannie Basher presets 1 to 10
Z-S-X-D-C-V-G-B-H-N-J-M:	sets the "overall" key to C-C#-D-D#-E-F-F#-G-G#-A-A#-H. Applies to "sine-guitar", "plucked-strings", and "wnbpf" modules.

Korg NanoKontrol mapping

Nanokontrol works on Scene 1 only. The "channel strips" numbers are referred in the user interface to the numbers associated near the modules: for example, shuffler-1 (yellow module) parameters are controlled by the channel strip #1 and so on.

Nanokontrol Strips 1-2-3: Control the shuffler modules 1,2,3
- Rotary   controls the pitch [semitones]

- Slider   controls the shuffler level [0-1]
- Button1   toggles random
- Button2   toggles metro

Nanokontrol Strip 4: controls the band-pass filter (bpf) module
- Rotary   controls the boost parameter
- Slider   controls the center frequency parameter [Hz]
- Button1   toggles random
- Button2   toggles metro

Nanokontrol Strip 5: controls the wn-bpf (white-noise band-pass filter) module and time-lag level
- Rotary   controls the wn-bpf volume
- Slider   time-lag level
- Button1   toggles wn-bpf on-off (i.e. switch~ inside)
- Button2   time-lag pass/no-pass

Nanokontrol Strip 6: controls the sine-guitar module
- Rotary   controls the octave
- Slider   controls the volume
- Button1   toggles on-off (i.e. switch~ inside)
- Button2   -

Nanokontrol Strip 7: controls the plucked module
- Rotary   controls the octave
- Slider   controls the volume
- Button1   toggles on-off (i.e. switch~ inside)
- Button2   -

Nanokontrol Strip 8: controls the adc~ (microphone) level
- Rotary   controls the Grannie volume
- Slider   controls the channel slider (Master volume)
- Button1   toggles Grannie on-off
- Button2   -

Nanokontrol Strip 9: controls the channel module
- Rotary   -
- Slider   controls the channel
- Button1   toggles audio player 1 (green) on-off
- Button2   toggles audio player 2 (pink) on-off

In synthesis:
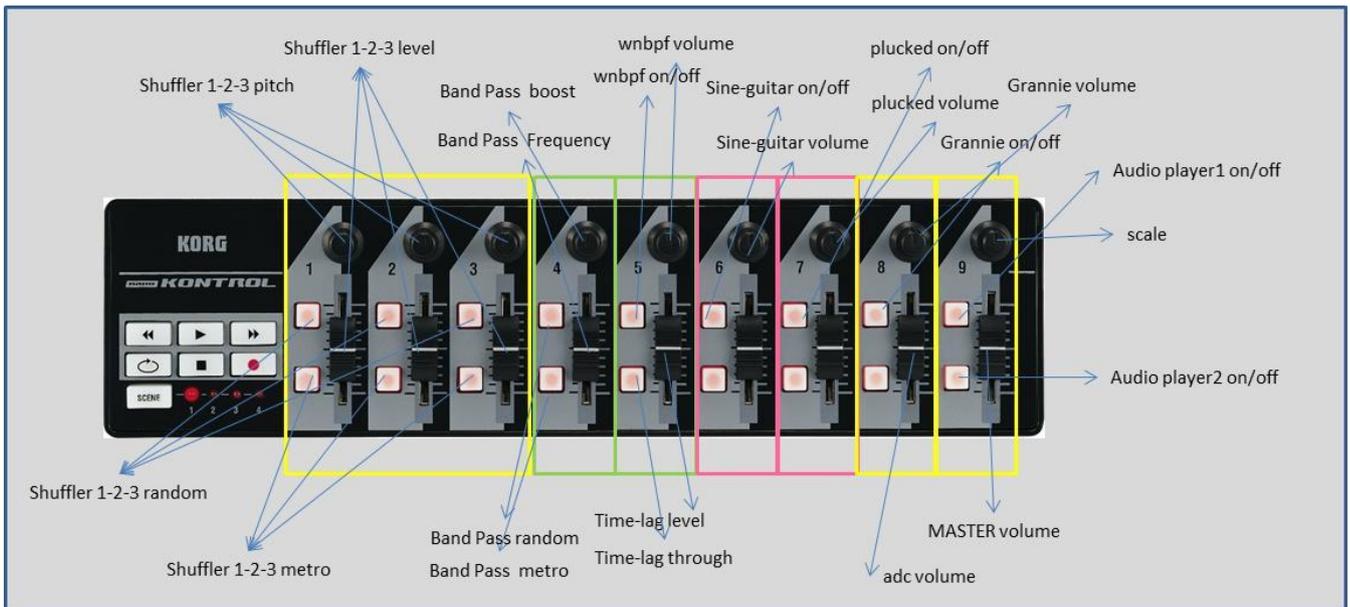
Audio Flow

The following is a block diagram of audio flow within ~**moduLaRe~** :
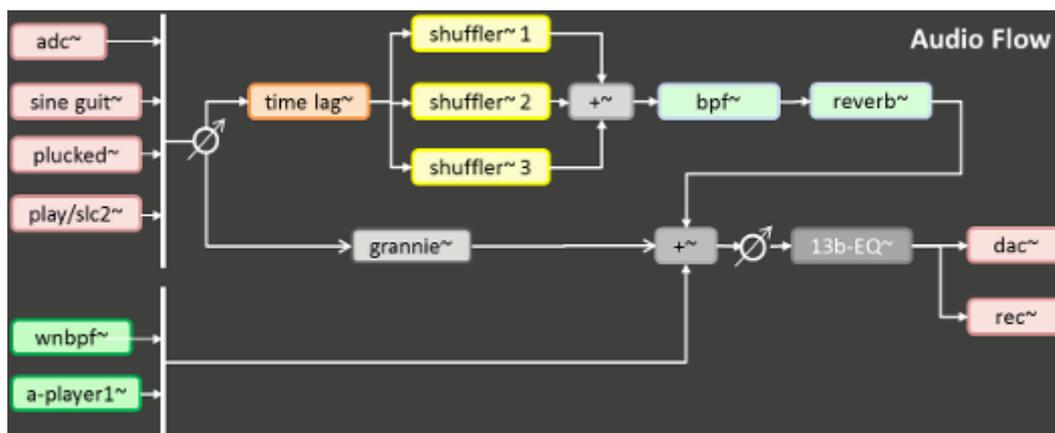
Figure 2: audio flow – block diagram. Two audio buses are used.

In total, there are 6 sound generators, that go into two different summing buses, Bus 1 and Bus 2:

adc~ (MONO)	– microphone –	Bus 1
sine_guit~	– sine sound –	Bus 1
plucked~	– plucked string –	Bus 1
play/slc2~	– audio player / slicer 2–	Bus 1
wnbpf~	– white noise band-pass filtered –	Bus 2
a-player1~	– audio player 1 –	Bus 2

Bus1 is divided into two different paths, that can be mixed. The upper path goes into a time delay module, then into 3 parallel shufflers modules. This output is band-pass filtered and reverberated. Lower path is a granular delay module (grannie~). Bus2 takes inputs from wnbpf~ and a-player1~.

They are then mixed (i.e. summed) and a volume control is added at this level ("channel" module). At the end of the chain there is the dac~ and a simple wav recorder to possibly save the performance.

User Interface

The following picture show the ~**moduLaRe** ~user interface. Each module is differentiated from the other by color codes, which also identify the Bus to which they go. The small numbers near the modules are a visual way to associate the NanoKontrol strips (1 to 9, Scene 1 only).
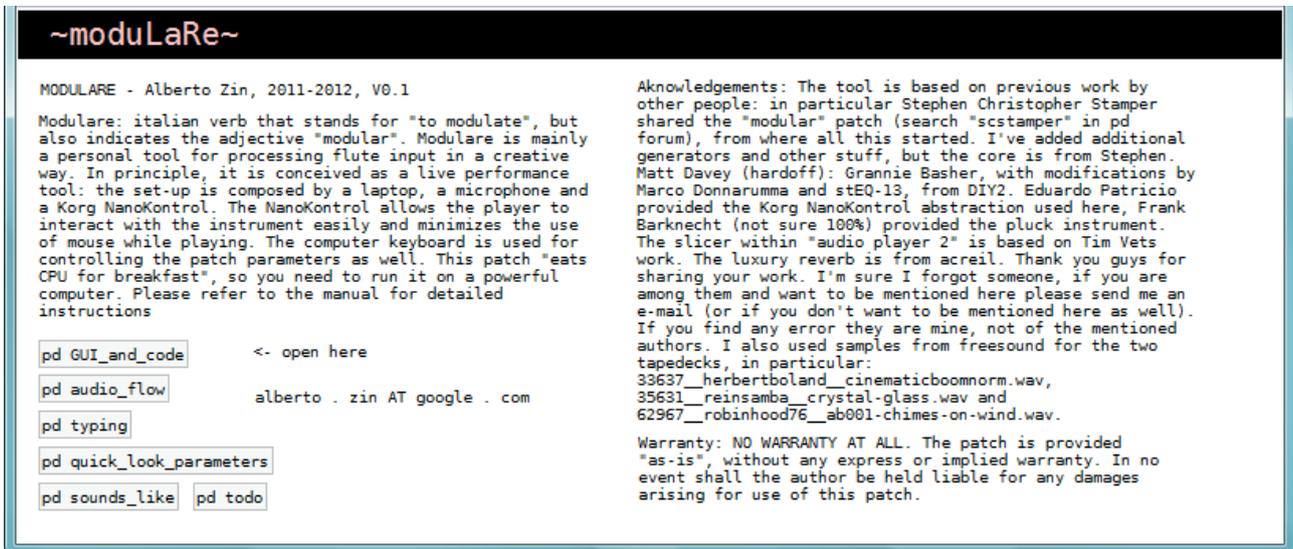

Figure 3: ~moduLaRe~ welcome screen
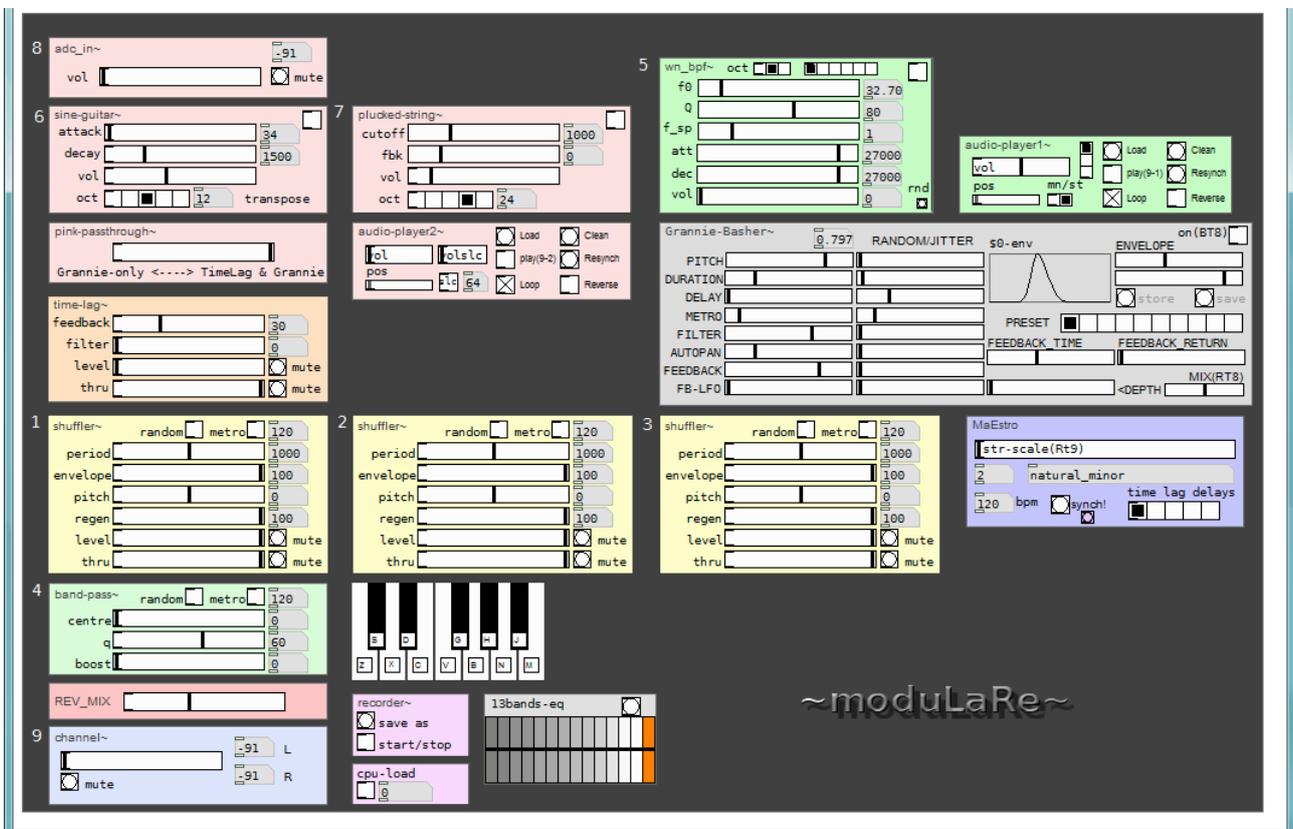
Figure 4: ~moduLaRe~ user interface

Tips

1. Explore the various possibilities given by the flow of the program by activating and deactivating modules
2. Use wnbpf module to make "textures" in background while you play
3. activate "sine strings" and "plucked" and type some random text on the keyboard: this has usually nice results (switching base key, melody etc.).
4. Use a drum loop on audio player 1, set the BPM on the preset module and synch everything. Then play on it. If you have a low-latency setup you can enjoy playing live on it. This is a lot of fun…

Acknowledgements:

This is a derivative work. The tool is based on previous work by other people: in particular Stephen Christopher Stamper shared the "modular" patch (search for "scstamper" in pd forum), from where all this started. I've added additional generators and other stuff, but the core is from Stephen. Matt Davey (hardoff): Grannie Basher, with modifications by Marco Donnarumma. Eduardo Patricio provided the Korg NanoKontrol abstraction used here, Frank Barknecht (not sure 100%) provided the pluck instrument. The slicer within "audio player 2" is based on Tim Vets work. The luxury reverb is from acreil. **Thank you guys for sharing your work**. I'm sure I forgot someone, if you are among them and want to be mentioned here please send me an e-mail (or if you don't want to be mentioned here as well). If you find any error they are mine, not of the mentioned authors. I also used samples from freesound for the two tapedecks, in particular: 33637__herbertboland__cinematicboomnorm.wav, 35631__reinsamba__crystal-glass.wav and 62967__robinhood76__ab001-chimes-on-wind.wav..

Warranty

No warranty at all. The patch is provided "as-is", without any express or implied warranty. In no event shall the author be held liable for any damages arising for use of this patch.

License

This is a derivative work. The majority of the tool is based on S.C. Stamper "modular" that doesn't have any license associated. I'd associate a GNU GPL licence v3.0.