EmissionControl quick start manual

Curtis Roads and David Thall
16 April 2008

Version 0.8.1

Update 2018

The documentation talks about granulating 128 sound files. The actual number is 2. This software never made it to version 1.0. It is still quite useful, however.

2008 Notes

EmissionControl (EC) is a new interactive real-time program for granular synthesis and sound file granulation, with many novel features, including

• multiple sound file input: granulation of up to 128 sound files simultaneously
• matrix modulation control regime for modulation of synthesis parameters
• variable-Q filtering on a grain-by-grain basis

EC was originally written in 2004 and has been updated several times since then. The current version dates to April 2008. Written by David Thall (MS, Media Arts and Technology, UCSB 2005) in consultation with Prof. Curtis Roads, the program code runs within the SuperCollider 3 regime using a special library written in the C++ language.

For information about granular synthesis, see the references below, specifically the book *Microsound* (2002) by Curtis Roads, MIT Press.

Before you begin

Put one or more **mono** .aif or .wav files (up to 128 in number) in the sounds folder under the Emission Control 0.8.1 folder.

Set the Sound preferences under System Preferences to:
Headphones, Built-in out and Line-in, Audio line-in port.

To start EmissionControl

Start SuperCollider. It does nothing until it is given a script.

In SuperCollider, open EmissionControl_0.8.1.rtf, which is in the SuperCollider folder. (Alternately, you can drag and drop the EmissionControl_0.8.1.rtf file over the SuperCollider application)

Read the instructions of EmissionControl_0.8.1.rtf in red.

In the line where a sound file is named, replace the name shown with the name of your sound file. Up to 128 sound files can be named. They are selectable with the fader labeled "soundfile" on the EC console.
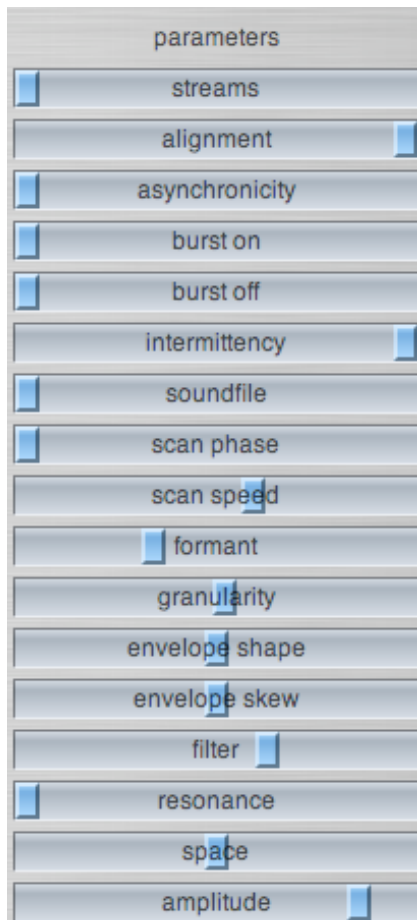
When EC starts, there may be no sound.

The main EC console is shown below. The right half is devoted to granular synthesis parameters. The left half is devoted to modulation of these parameters.
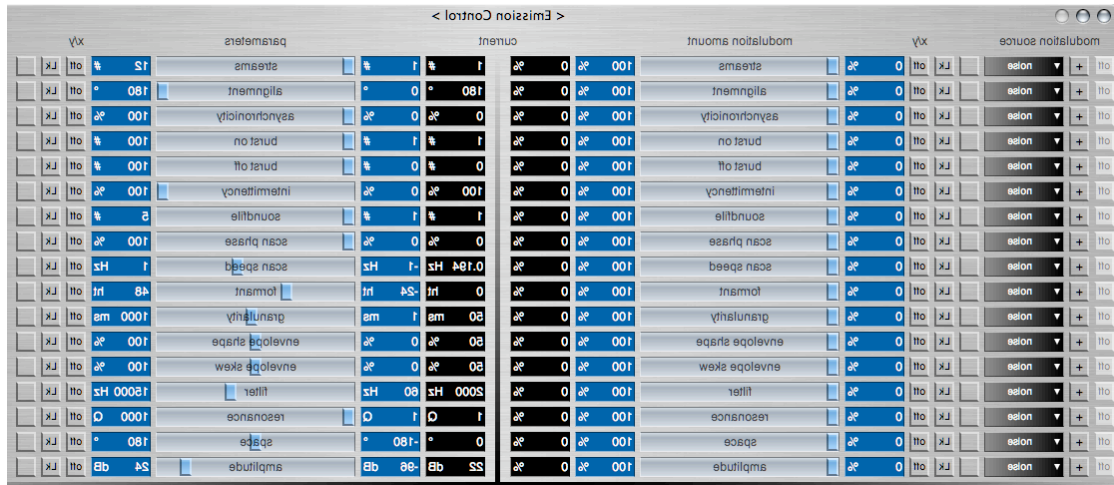
Nudge the scan speed fader under "parameters" to the right and increase the amplitude. You should hear sound.

Explanation of the parameters

The parameter control faders are on the right side of the console:

parameters
streams
alignment
asynchronicity
burst on
burst off
intermittency
soundfile
scan phase
scan speed
formant
granularity
envelope shape
envelope skew
filter
resonance
space
amplitude

streams – number of parallel streams of grains

alignment – not implemented

asynchronicity – controls the degree of synchronicity (fader left) versus asynchrony (fader right) of grain emission without affecting grain density

burst on – not implemented

burst off – not implemented

intermittency – controls the degree of intermittency of the grain stream

soundfile – selects the sound file to granulate. In the current implementation, up to five soundfiles can be granulated.

scan phase – controls where in the sound file to start granulating

scan speed – controls the rate at which the read pointer scans through the sound file. When this value is negative, it scans backwards.

formant – controls pitch of the granulated sample

granularity – controls the grain duration

envelope shape – controls the grain envelope shape (left = rectangular, middle = bell-shaped with sustain, right = bell-shaped)

envelope skew – additional envelope shaper. Left emphasizes attack, Right emphasizes release.

filter – filter center frequency

resonance – adjusts the Q or sharpness of the filter

space – spatial position of the grains.

amplitude – adjusts the amplitude

Modulation section

The modulation section is on the left side of the console. By default, the modulation levels are at zero for no modulation. When you increase the modulation fader by dragging it right, it begins to have an effect on the corresponding parameter on the right. The source of modulation is indicated by the black menu: noise, sine a, sine b, sawtooth, square. You can control the waveform modulation sources in a separate window that appears above the console window.

The modulation window contains the controls for the periodic modulation sources: two sines (a and b) with shared frequency but with relative (different) phase, variable-width square, and variable-width saw.

The + and - switches are supposed to flip the polarity on the signal routed to each modulation destination (similar to the polarity switches on channel strips). However they are not yet implemented.

Other features

- high quality sample interpolation: kicks in with larger frequency shifts

- soft clipping distortion: modulating the amplitude of a grain beyond +6dB introduces saturation (quality based on grain envelope shape and skew)

- auxiliary bus reverberation : internally modulated by grain parameters, with controls for decay time (in milliseconds) and amount

- master gain fader: pre-reverb send to allow you to hear the reverb tail

- selectable periodic modulation sources: 2 sines with frequency and phase, variable-width square, and variable-width saw

Tip

For pure Gabor/Xenakis granular synthesis, granulate a sine wave sample.

References

Gabor, D. 1946. "Theory of communication." Journal of the Institute of Electrical Engineers Part III, 93: 429-457.

Gabor, D. 1947. "Acoustical quanta and the theory of hearing." Nature 159 (4044): 591-594.

Gabor, D. 1952. "Lectures on communication theory." Technical Report 238, Research Laboratory of Electronics. Cambridge, Massachusetts: Massachusetts Institute of Technology.

Roads, C. 1975. "Computer music studies 1974-1975." Unpublished manuscript. 44 pages.

Roads, C. 1978a. "Automated granular synthesis of sound." Computer Music Journal 2(2): 61-62. Revised and updated version printed as "Granular synthesis of sound" in C. Roads and J. Strawn, eds. 1985. Foundations of Computer Music. Cambridge, Massachusetts: MIT Press. pp. 145-159.

Roads, C. 1985. "Granular synthesis of sound." In C. Roads and J. Strawn, eds. 1985. Foundations of Computer Music. Cambridge, Massachusetts: MIT Press. pp. 145-159.

Roads, C. 1991. "Asynchronous granular synthesis." In G. De Poli, A. Piccialli, and C. Roads, eds. 1991. Representations of Musical Signals. Cambridge, Massachusetts: MIT Press. pp. 143-185.

Roads, C. 1996. The Computer Music Tutorial. Cambridge, Massachusetts: MIT Press.

Roads, C. 1998. "The Creatovox synthesizer project." Unpublished manuscript.

Roads, C. 2001. "Sound composition with pulsars." Journal of the Audio Engineering Society 49(3).

Roads, C. 2002. Microsound. Cambridge, Massachusetts: MIT Press.

Roads, C., and J. Alexander. 1995. Cloud Generator Manual. Distributed with the program Cloud Generator. Internet: www.create.ucsb.edu.

Xenakis, I. 1960. "Elements of stochastic music." Gravensaner Blätter 18: 84-105.

Xenakis, I. 1971. Formalized Music. Bloomington: Indiana University Press.

Xenakis, I. 1992. Formalized Music. Revised edition. New York: Pendragon Press.

Disclaimer

Software downloaded from the CREATE web site is provided "as is" without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of fitness for a purpose, or the warranty of non-infringement. Without limiting the foregoing, CREATE makes no warranty that the software will meet your requirements.

CREATE assumes no responsibility for errors or omissions in the software or documentation available from its web site and makes no promises to correct errors or provide updates.

In no event shall the CREATE be liable to you or any third parties for any special, punitive, incidental, indirect or consequential damages of any kind, or any damages whatsoever, including, without limitation, those resulting from loss of use, data or profits, whether or not the CREATE has been advised of the possibility of such damages, and on any theory of liability, arising out of or in connection with the use of this software.

The use of the software downloaded through the CREATE site is done at your own discretion and risk and with agreement that you will be solely responsible for any damage to your computer system or loss of data that results from such activities. No advice or information, whether oral or written, obtained by you from the program developers or from the CREATE web site shall create any warranty for the software.