

SPATIALIZED POLYPHONIC GRANULAR

Emmanouil Dimogerontakis

Aalborg University
edimog21@student.aau.dk

ABSTRACT

This paper aims to present a novel interface for composing and performing with granular synthesis. The described system allows handling individual spatialization for independent groups of voices and controlling various parameters of the granular synthesis in real-time. The DMI tries to create a new interaction, outside of the norms of traditional controllers, giving the user the freedom to move the groups of grains over the space and at the same time curate the sound on a fundamental level. This paper describes the sound synthesis and the interface design as well as its various functions.

1. INTRODUCTION

Granular synthesis is a relatively new composition tool, with the rise of computer power software-based synthesis became accessible to artists and composers, and GS is used extensively nowadays. Besides, electroacoustic music introduced us to new terms and ideas about how the composer faces the sound. Musical parameters such as density of sound, timbre, space, etc. became a reality for composition and expressiveness. This created the need to find new interfaces for musical expression for this type of synthesis.

2. INSTRUMENT DESCRIPTION

2.1 Polyphonic Granular synthesis in space

The concept of granulation of sound was firstly proposed by Gabor as ‘acoustical quanta’ and later on by Xenakis as ‘grains of sounds’. In the ’80s the first software for granular was made by Roads[1][2][3]. Early experimentation formed different techniques such as asynchronous GS, synchronous GS, FOG synthesis, etc. And today, there are programs and software written in various musical and programming languages. Most of them are VSTs or standalone programs and the UIs are based on knobs, sliders, XY controllers, etc. The user controls them with the mouse and the keyboard in most cases. Other interfaces for HCI can be found in GS like GR-1 or Collidoscope[4].

The presented DMI is written in the musical programming language MAX/MSP[5]. The main goal for this DMI is to deliver a qualitative granular engine with minimal and straightforward controls. Previous works for controlling the GS in space and creating grain clouds can be found here[6].

The engine behind it consists of a polyphonic grain generator. Grains are defined as small-windowed portions of sound with a duration from 10ms to 100ms. Except for

the grain size, other parameters of GS are the position in the audio buffer, this can be imaged as the pointer of the audio buffer, the playback speed of the grains, the pitch, the position in the space(if we are choosing the stereo format this parameter is the panning) the amplitude of the grains and the window type. With polyphony we mean the instances of the same grain, we will refer to them as grain voices, these grain voices are forming the grain clouds. In MAX/MSP the polyphony can be created easily with the [poly~] object.

2.2 Users Interface

The main goal of this project was the creation of a new interface for polyphonic GS with direct controls both in spatialization and in the parameters of GS. With a minimal interface, the artist can expand his creativity without spending time understanding the controls and the mappings.

The instrument consists of two trackpads. With the left hand, the artist controls the position of the grains in the space and with the right hand, the artist controls the grain size, the location in the buffer, the playback speed, and the pitch.

On the left, for the spatialization of the grains, it is used the Sensel Morph[7]. With the specific trackpad, it is possible to have 3-dimensional controls with one touch, it tracks the position of the finger (in XY axis) and the pressure of the touch. Additionally, Sensel Morph detects multiple contacts and tracks the pressure sensitivity and position for each contact. In this case, each finger can control several grains in space, thus you can think of the Sensel Morph as a map with coordinates that you can arrange objects in a room.

On the right hand, another simple trackpad is used to control the mentioned parameters of the GS synthesis. Here, the trackpad is divided into 4 smaller horizontal areas and four different vectors are created. With this, fader-like controls are formed for manipulating the four parameters of the GS synthesis (Grain size, Location, Playback speed, Pitch). The difference between the created controller and faders is that the user can ‘jump’ from one value to another without interpolation. For example, if the system has values from 0 to 10 with the presented control the user could choose any value directly, on the other hand with a fader the system would need to read all the previous values to select the requested value. Additionally, the tangible medium to control the trackpad is a pen.

