

# Realtime Interactive Multimedia Performance

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## 1 Introduction

A multimedia composition can be regarded as tracing a path through a very high-dimensional parameter space. Hepting and Gerhard [Hepting and Gerhard 2004] described an approach for managing parameter spaces for multimedia composition that allows an artist to explore both individual compositional elements, like music and animation, and integrated compositions in a more efficient manner than was previously possible. The approach makes use of a central parameter variation that is independently mapped onto generators for the compositional elements. This central parameter variation (CPV) ensures that the individual elements are integrated with one another. At present, this approach allows the artist to globally explore all possible media ‘fragments’, which are generated as required. This poster describes an extension to this approach that gives the artist the ability to interactively conduct local explorations of the parameter space in real-time. By analogy, the global exploration defines an instrument and the local exploration is concerned with playing that instrument.

## 2 Concepts

An essential characteristic of multimedia is the programmability of its elements, which may be accessed through parameters. An artist will first define these parameters based on his or her conceptual model of each element and the interface to that element. For example, in *Triangle a la Moog*, the interface to the animation is based on controlling the rotation and scaling of each of three transformations (which makes for a total of six parameters). The artist provides a central parameter variation via some input device. The values from this central parameter are then passed, possibly through some mapping function, to the parameters which define the interface to each of the multimedia elements. This mapping is similar in spirit to the process described by Ng [Ng 2002]. The intent of this real-time multimedia performance instrument is to create works in which the sonic and visual elements are very tightly integrated. At the same time, the artist playing the “instrument” in a real-time performance might well desire more control than simply providing the central parameter variation. To this end, the design incorporates some additional artist controls over how the inputs are mapped to the media parameters. Complete control over the parameter mappings could lead to a combinatorial explosion of choice and possibly undermine the original instrument selection.

## 3 Triangle a la Moog

The design of *Triangle a la Moog* consists of a parameterized visual animation and sound generator. The animation is based on Sierpiński’s Gasket, defined as a linear fractal with three transformations. Four parameters control the animation: the rotation angle for each of the three transformations and a uniform scale parameter that is applied globally. The drawing code is implemented in C using OpenGL and GLUT libraries. Every frame, 2187 points are

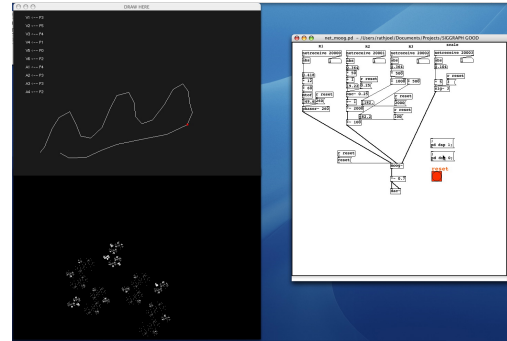


Figure 1: A typical screenshot of the interface during a performance. Top left shows the CPV, bottom left the resulting animation, and right shows the *pd* patch used to generate the sounds.

drawn and over 3000 matrix manipulations are performed. However, the system is capable of producing interactive frame rates on a dual 2.0 Ghz G5 Mac.

The sound generator consists of a signal controlled ‘moog’ resonant lowpass filter also controlled by four parameters. Three parameters are related to the filter: the frequency of the input sawtooth wave, the resonance frequency modulation, and the Q value. The last parameter controls the volume of the output signal. The generator is implemented in Pure Data [Puckette 1996].

Input values to the system are generated by tracking the movement of a stylus on a tablet input device. Sockets are used to pass parameters between processes. The mapping of inputs to media parameters is controlled by keypresses on the keyboard. Each parameter is associated with a function key, and each keypress is used to affect the mapping of an input value to that parameter.

## 4 Discussion

The goal of this approach is to provide a system for artists and performers to explore a parameter space in a controlled and personalized manner. This freedom of expression provides the artist with a way to ‘perform’ a multimedia composition; to improvise and interpret it to suit a desired objective. The computer is the multimedia instrument with which the artist can, over time, achieve virtuoso performances.

## References

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