

## **RESEARCH PROPOSAL**

### **Research and organization of a group of descriptors/controllers for sound synthesis**

Nowadays, personal computers are able to synthesize high quality sounds, and sound synthesis software has become largely accessible. Yet, the use of these tools can be quite intimidating and even counter intuitive for non-technically oriented users. It is difficult to control sound synthesis algorithms. Well defined and general high-level control parameters are still missing.

A lot of work has been done to study and extract sound descriptors for classification, recognition and retrieval purposes. We aim at extending those results to the domain of synthesis control. What kind of descriptors could be musically interesting controllers? What are the needs of a sound designer? Can we find a small semantic group that allows for the description of any kind of sounds?

An initial approach to defining the group of descriptors would come from previous studies of synthesis methods such as sinusoidal additive + residual method, as well as the general source/filter model. The emphasis would be placed on spectral envelopes, harmonicity, noisiness and modulation (of amplitude, frequency, and phase).

A second approach to defining the group of descriptors would come from psychoacoustics studies. Among the important factors are pitch, brightness, dynamics, noise, etc.

A third approach is inspired by physical models of instruments. Simplified physical models of different kinds of instrument (clarinet, trumpet, violin, flute, etc.) already exist. The sounds produced by these dynamic systems are very similar to the corresponding instruments. The goal is to deduce a relation between the characteristic timbres and the properties of the produced signals. Other important factors would come from resonating properties of instruments, as well as from different ways of exciting the instrument (hitting it, bowing it, breathing into it, etc.)