MUSIC THAT LISTENS TO WHAT'S GOING TO HAPPEN: INTERNET-ENHANCED, SELF-ADAPTING SOUNDSCAPES

Andrea Cera
Composer
Conservatorio "C. Pollini",
Padova
Accademia di Belle Arti di
Brera, Milano

ABSTRACT
In this text, I will describe a project which brings together three elements:
1) real-time soundscape analysis and imitation;
3) the Internet as a way to find and analyze sounds that will be heard in the immediate future (from a static point, or from a moving point).

1. SELF-ADAPTING SOUNDSCAPES
The starting point of this project is to develop technologies to create (in real time) an intelligent audio counterpoint to noise pollution (one of the pioneers in this field is Achim Wollscheid; another source of inspiration is the work of Tristan Jehan). The resulting soundscape is a mixture of real and artificial sounds, the latter carefully hidden, in order to simulate the presence of some sort of order in the chaotic turbulence of a given state of noise pollution.
The system is composed by:
- a "center" (where we are living)
- a "computing engine" (the computer for analysis and sound production)
- a "speaker system" (the way we diffuse the sounds produced by the "computing engine")
- one or more "listening points" (the devices that record sound and transfer it to the "computing engine" - they have to be placed far from the "center").

Figure 1. The house with one ear.

First example: a house is the "center". A "computing engine" (a computer with a maxMSP [or other software] patch), linked to several "speaker systems", analyzes sounds coming from a "listening point" (a microphone in the roof).

Second example: my head is the "center". A "computing engine" (a maxMSP [or other software] patch running on a PDA or laptop), linked to a "speaker system" (headphones) analyzes sounds coming from a "listening point" (an external microphone clipped to the headphones).

2. STRATEGIES
Up to now, I programmed two kinds of "computing engines":
1) COUNTERPOINT
- time counterpoint: the computer fills the gaps between two occurring sound events.
- frequency counterpoint: the computer fills the frequency zones which are not present in the occurring sound event.
2) AUGMENTATION
- the computer "augments" an occurring sound event with another sound event.
I am working on a third strategy:
3) MORPHING
- the computer creates rhythmical "holes" in the frequency content of some music being played, according to the sound events occurring outside. The music we want to listen to, will be slightly morphed with the sounds of outside.

3. INTERNET ENHANCEMENT
The use of the Internet could enhance this technology. For me an audio stream is interesting to use if it allows to:
- [SPACE] link places / people that are impossible to physically link (ex. linking people that cannot move; using triangulations to determine the location of specific
sounds in a city; linking places that are acoustically or visually interesting to compare, but physically too far, like three caves in three parts of the world.)

- [TIME]: move sounds or images faster than possible physically (ex. anticipating the traffic noise that will arrive in a specific area; ignoring the local time around the world...)

In my project, audio streams from places relatively far from the "center" would allow the computer(s) to know what kind of sound will be heard in the "center" in the near future.

**Figure 3.** The house with many ears.

Third Example: if the "center" is a house, a few "listening points" could be placed 1 km. away, in different locations. The sound of cars they record could be sent to the Internet, and then back to the "computing engine" before the cars actually come near to the house. In that way, the "computing engine" will anticipate the nature of the sounds to be counteracted, providing a more intelligent reaction. The "listening points" could be used to calculate triangulations, giving information about the precise location and speed of the sounds to be counteracted.

**Figure 4.** The pre-cog.

Fourth example: the Internet could be used to determine the position and the trajectory of someone carrying a wearable system, and walking towards a jammed intersection. The information gathered by GPS would allow the "computing engine" to be prepared for an increasing amount of overall noise to counterbalance.

4. CONCLUSION

Many projects of Augmented Reality explored the fuzzy space between the categories of "natural" / "artificial", "real" / "virtual". Their existence reminds us that what we call "reality" is a construction: our mind creates the forms, the objects, and the reality that we actually experience.

Following this suggestion, we can probably find more interesting to associate the notions of "quietness" and "noise pollution" with conditions of our attention system, rather than with external states of things (natural environments vs. artificial environments).

This project deals with a slightly paradoxical architecture of time, space and memory. Its aim is to generate a "counter audio reality", where artificial sounds help us to find the natural qualities (and even the beauty?) hidden behind our everyday experience of deteriorated soundscapes.

5. REFERENCES


