Embodied Sound

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Statement

In the origins of ubiquitous computing Mark Weiser spoke about which constrains would stop technology of becoming truly ubiquitous. In one of his writings back to 1999 he claimed that one of the main problems would be to find ways for offering a highly precise positioning system that could allow locating objects in the three dimensions of our physical environment.

Looking in the world of art, since the origins of "musique concrete" composers have been trying to position auditori stimuli in space, creating soundscapes that would take into account not only the sound itself, but its relationship to space, and the embodiment of the audience into the physical room and the virtual but tangible sound.

There is a clear link between Weiser's claims and the aim of soundscape composers, it is within this framework: sound art, ubiquitous computing, and augmentation, where I position my work, and the piece I am submitting to PDC2004.

The idea is that, in the future, virtual events will be easy to program in the space through the embodiment of the space-programmer. That will allow him/her to experience in the first place the physical quality of the work. To be precise what I have been producing over the last two years is not a piece of art in itself, but the virtual canvas of the sound artist. Thanks to the combination of a very precise positioning system that has been created for tracking movements of human beings inside buildings, together with a self developed software package, I want to present a tool for sound artists to fill up rooms with sound structures. What I will bring to PDC2004 will be a collection of sound pieces programmed by several artists especially for the event. The visitor will have the possibility of catching the sound from the air, delete it from the piece, or transport it to a different place within the installation.

Why Sound?

To use sound is just the first step that seems easy to understand and is culturally accepted. With this last sentence I try to address the fact that e.g. virtual reality helmets never succeeded as an everyday tool, but everyone is used to one or many forms of personal sound augmentation: walkmans, cell-phones, walkie-talkies, and others. The VR helmet was non practical, and it provoked a lot of discussion around being a too direct form of alienation from reality, making them socially unacceptable. On the other hand, sound has gained a very important position. There are experiments addressing the importance of music for situated actions, like efficiency at work. We have discovered the relationship between music and the sate of mind. Now it is the time when sound can be attached not only to the individual's activity or state of mind, but to his/hers relationship to space.

Collaborative Process

The production of the software and hardware involved in this construction are examples of collaborative processes of development. The concepts for the software and the so-called SSDK (Space Software Development Kit), and SHDK (Space Hardware Development Kit) are the result of two years of workshops, seminars, meetings and discussions around the topics location aware content and methods for installation of technologies. The software has been programmed by students at K3, as well as the Space Programming Suit, while the hardware infrastructure is the result of several years of research at the University of Zaragoza, Spain.

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From a more theoretical perspective, the influence of location based services (LBS) in the development of collaborative processes seems to be clear according to the contemporary trends in interaction design. There are several approaches to what it means to be talking about LBS, but it is clear that Weiser's original demand about getting to know where people and objects are present in the physical world, is been explored from different points of view, and the one presented here is one more.

Practicalities

The installation is a multi-user experience that allows the visitor to perform actions on the sounds that are virtually paced in the room. For the montage we need an empty room of about 3x3 meters. We need to hang 5 sensors from the walls, and each one of those runs either on batteries or ac/dc adapters. The room does not necessarily need to have walls, but we still need to have a way of hanging the devices somehow (columns, room separators, etc). We should count with two computers and 4 sets of wireless headphones.
The way the system works is as follows:

- each visitor gets a set of wireless headphones, those are having a special tag that can be located through ultrasound, this allows to know exactly where it is in 3D
- the infrastructure on the walls sends tones that allow the tagged headphones to triangulate their positions
- the tags send the information back to the computers that play the sound according the zone and send it via the wireless headphones back to the user
- there is a programming suit that consists of a set of headphones and a glove, this is the tool that allows to reprogram the original soundscape

When it comes to the technical requirements for the computers:

- both computers should be PC minimum 1Ghz, 512MB memory, 40GB HD
- they should be connected through a network, but no connection to the internet is needed
- OS: windows XP professional
- we will need to install the Java framework, and therefore we will need to have administrative access to the computers

About times, the installation of the system is the only thing that takes time. I would say that we could need about 2 hours to set up everything counting on installing the software from scratch in the computers, mounting the positioning system, and checking out the correct functionality of everything. When it comes to for how long the system could be running, so far we manage to have it running for 30 hours without draining the batteries, what means that we could have it installed during the whole duration of the exhibit.

Figures

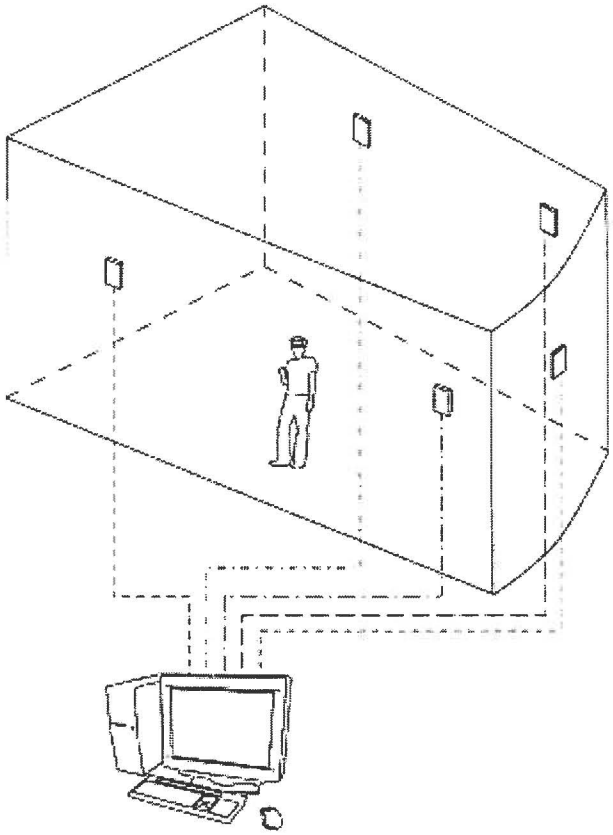

Figure 1: sketch of the installation

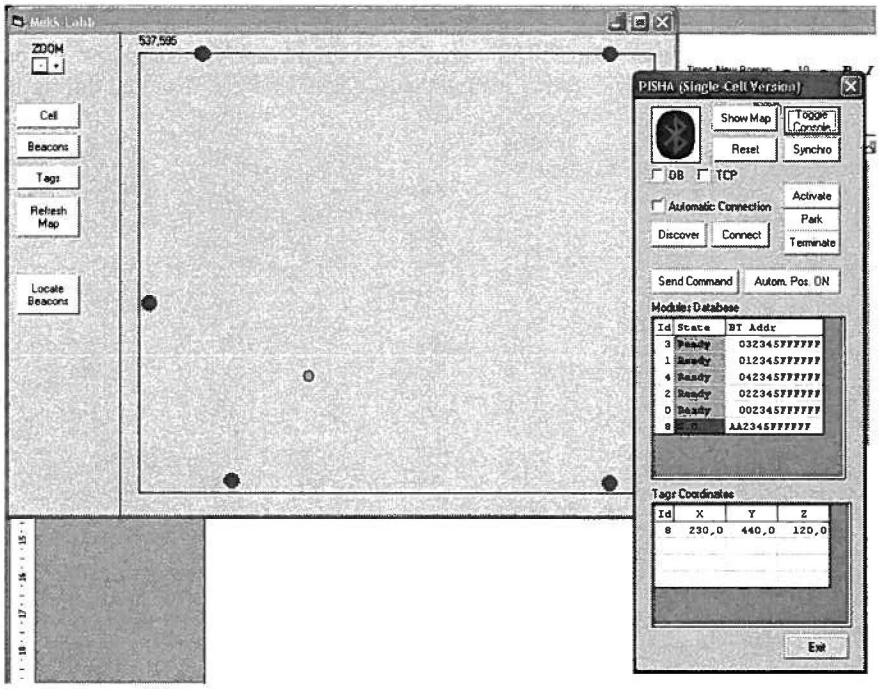

Figure 2: screenshot of the positioning software version 1.0b