Play that funky music - A steering wheel interface for 3D sound compositing

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ABSTRACT

This paper describes the usage of a force feedback steering wheel interface in sound environments focusing on the example of sound.toy. Sound.toy is a student's project for creating and producing electronic music. Well known artists have experimented with sound installations before, e.g. Chris O'Shea developed his Echo Chamber and Golan Levin performed Scribble. The use of an intuitive interface became a crucial point in developing sound.toy. The installation I Am Driving Through Sound Space by Carlos A. Rocha inspired our User Interaction.

Keywords

Haptic Interface, Graphical User Interface, Sound Environment, Audio Visual Installation, 3D Compositing.

1. INTRODUCTION

Since the beginning of the 80ies the personal computer went into the homes of every one. These days not much special knowledge is needed to handle easiest tasks for a large user group like browsing the internet or writing a text file. It was the invention of the Graphical User Interface, short GUI[6], extended with mouse and keyboard that made the desktop metaphor possible. 1981 the Xerox star represented the first WIMP (windows, icons, mouse, property sheets) interface. Apple Macintosh and Microsoft Windows adopted this system and have then worked on the principles *seeing and pointing* and *what you see is what you get*[6].

This system hasn't changed very much during the last 25 years. Working with a personal computer however focuses on cognitive activity and the visual sense. The user is bound to display, mouse and keyboard and their boundaries. The search for new interfaces is heading in the opposite direction.

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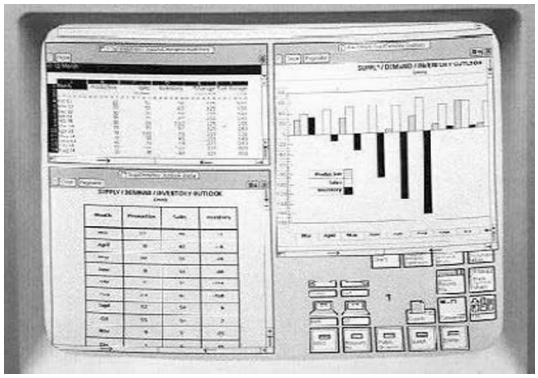

Figure 1: Windows, icons, mouse and property sheets on a Xerox star.

Not the user adapts to the computer, but the computer to the user. New interfaces try to use a broader range of human perceptual-motor skills and senses. Using a physical richness of meaning complex tasks are easier to overcome and interfaces are more self-expressive and fun to use.

2. TRANSITION BETWEEN ART AND TECHNOLOGY

Technology always accompanies art. New technologies provide new fields for artists to work in. Artists use them to express their ideas. The camera became the most powerful way of expression in the 20th century[5]. Now the computer is on the way to become an important medium in art. Electronic art has one big advantage over other art forms - interactivity[1]. The artist has more possibilities to draw the visitor into his artwork. The visitor isn't passive anymore like when he is watching a photograph, a video or a painting. He plays an active role, he has to take part in the installation or influence it.

The relationship of technology and art is bidirectional. While using newest technologies, artists give them conceptual directions. They work on the technologies and find other ways to use or extend them. For example if we look back in history we find many illustrations from Leonardo Da Vinci on biology, anatomy, weapons and architecture.

3. EXAMPLES

To get an idea of possible sound installations and interfaces we took a closer look on three sound environments which influenced our own installation:

Echo Chamber – Chris O'Shea (2005)

Scribble – Golan Levin (2000)

I Am Driving Through Sound Space – Carlos A. Rocha (2004)

3.1 Echo Chamber

Chris O'Shea describes his *Echo Chamber*[1] as an interactive environment for audio visual exploration. A microphone invites the user to produce own sounds and free them in a 3D sound scape. The user takes part in the installation as he leaves a personal sound in the history of the art work. The user is surrounded by the environment which uses a multiple speaker system. The sounds are re-synthesized and visualized as 3D objects. They travel around autonomously but always leave a trace to their creator. The sound scape is an organic structure - moving and pulsating.

Figure 2: *Echo Chamber* by Chris O'Shea.

3.2 Scribble

Golan Levin first performed his live color-music performance *Scribble* in 2000 at the Ars Electronica Festival in Linz. *Scribble* features tightly-coupled sounds and dynamic visuals which are at times carefully scored, and at other times loosely improvised[2].

3.3 I Am Driving Through Sound Space

I Am Driving Through Sound Space[2] is an audio visual environment to browse large digital sound databases. The database is visualized as space in which every sound entry has his particular place. The user navigates through space using a steering wheel and a set of foot pedals. The user wears headphones to locate the position of each sound, heard in stereo. Rocha utilized the ability of the ability of the human ear to distinguish different sounds from different sources even at a high background noise, the so called Cocktail Party Effect.[4]

[1] `www.we-make-money-not-art.com/archives/004775.php`

[2] It is part of the MIT Media Lab project MIT Treehouse Studio directed by Prof. John Maeda.

Figure 3: *Scribble* by Golan Levin.

Figure 4: *I Am Driving Through Sound Space* by Carlos A. Rocha.

4. SOUND.TOY

The idea of *sound.toy*[3] was born, when we, three students of Interface Cultures at the Art University Linz, wanted to create an easy and intuitive way of composing electronic music. The goal was to work on 3D graphic programming and 3D sound manipulation as well as to develop a simple and intuitive interface for User Interaction.

First time viewing the installation, the user may get the impression of a standard car racing game. But *sound.toy* is not a game at all. The user races through a world of cubes, triangles and octahedrons. A steering wheel provides the interface to enter a room of geometrical clearness as shown in figure 4. Each geometrical object is linked to a specific electronic beat. Different sound objects, launched by the user himself, move autonomously through space and surround him with his own composition.

To offer the user an easy way to the complex matters of 3D composing, the interface should be intuitive to a large target group. The user should drive around in a virtual room. Therefore we decided on a steering wheel and a pair of foot pedals. We were aware of the strong connotation to car racing games but like in Rocha's *I Am Driving Through Sound Space* the driving simulation immerses the user into the sound space[4].

The user sets clear geometrical objects in a bright and distant room. The objects are the visual embodiment of electronic beats. Therefore composing in the sound space means to combine and multiply different sound objects and to generate different sound scapes. Each sound has two pa-

[3] First shown at the Ars Electronica Festival 2005, special exhibition *Interface Cultures*, September 2005

Figure 5: Steering wheel and foot pedals.

rameters, volume and pitch, which the user defines while placing the sound object. The objects give visual feedback over their parameters. Speed visualizes the volume of the object. The pitch defines the bouncing frequency of the object. The user wears headphones integrated in a helmet to hear the full 3D stereo sound as shown in figure 6. The composition differs according to the position of the user. The intensity of the sound increases as the user approaches the object and it diminishes as the distance to the user increases.

Figure 6: *Sound.toy* at Ars Electronica Festival 2005.

5. INTERACTION MODEL

The GUI interfaces function on a traditional interaction model, the so called *model-view-controller* or MVC model [7]. It visualizes the external physical and digital representation of information as well as the internal model of the computer. In the classical MVC model input and output are digital, clearly defined and only represented as physical objects such as keyboard, mouse or display. The input is set via the controller, the keyboard or the mouse. The output is viewed on the display as screen based graphics or text.

Haptic interfaces try to merge the control and view components and so diminish the gap between input and output. The haptic device of a joystick contains more mechanically-encoded information than a mouse and is programmable. The haptic device conducts a bidirectional exchange of information through programmable mechanical properties.[3]

Using a steering wheel for *sound.toy*, we tried to give the controller a more intuitive physical representation. The view component focuses on the 3D sound and is supported by screen display. The point and click abstraction of mouse and

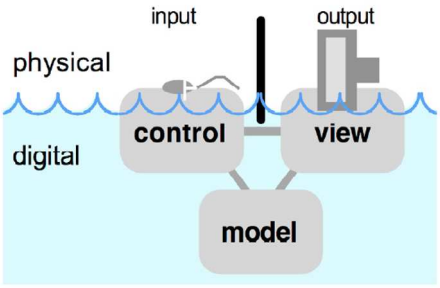

Figure 7: Interaction model of GUI, MVC model.

keyboard has become obsolete. The user interacts directly in space and with the objects.

6. CONCLUSIONS

We introduced a steering wheel interface for an intuitive way of composing electronic music. During the exhibition at the Ars Electronica Festival, as shown in figure 6, we learned that especially children developed the functions of *sound.toy* easily. In further *sound.toy* versions a force feedback could stimulate the sense of touch over the haptic device. Like the visual sense the tactile sense needs an update rate like the frame rate in a video. The tactile sense is more distinct and therefore needs a higher rate. Attended with a graphic display the user combines the force feedback stimulation with the seen objects and adapts to the slight gap. With force feedback the control and view components would blend and therefore become more intuitive for the user to handle.

7. ACKNOWLEDGMENTS

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8. REFERENCES

[1] S. Dinkla. The history of the interface in interactive art. In *ISEA'94 Proceedings: The Next Generation*, 1994.

[2] L. Golan. Scribble. In G. Stocker and C. Schpf, editors, *NEXT SEX, Sex in the Age of its Procreative Superfluousness*, pages 305–306. Springer-Verlag, 2000.

[3] V. Hayward, O. R. Astley, M. Cruz-Hernandez, D. Grant, and G. Robles-De-La-Torre. Haptic interfaces and devices. *Sensor Review*, 24, 2004.

[4] C. A. Rocha. I am driving through sound space. In *DIS '04: Proceedings of the 2004 conference on Designing interactive systems*, pages 313–313, New York, NY, USA, 2004. ACM Press.

[5] T. Towery. A project for artists - physical computing extending the human computer interface beyond point and click. `http://www.timedia.com/physicalprop.html`.

[6] B. Ullmer and H. Ishii. Tangible bits: Towards seamless interfaces between people, bits and atoms. In *Proceedings of CHI'97*, pages 234–241.

[7] B. Ullmer and H. Ishii. Emerging frameworks for tangible user interfaces. In J. M. Carnoll, editor, *Human Computer Interaction in the New Millenium*. Addison-Wesley, 2001.