Interaction Design for Electronic Musical Interfaces

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CHI AND MUSICAL INTERFACES

ABSTRACT: We propose a new Tangible User Interface, which is to be used by musicians and performers to create sounds and music in real-time and stimulate their creativity through experimentation. The interface consists of a number of programmable cubes, made of a translucent material. By positioning the cubes relative to each other, an optical audio processing network of audio signal processing algorithms can be created. The nature of the interface allows the user to achieve a level of interaction hard to achieve using audio software.

Problem with existing audio/music softand hardware: complex user interfaces with lots of parameters. Existing hardware interfaces often try to control software through simple gesture to parameter mappings [1]. Is this a user-centered design?

A NEW APPROACH: AUDIOCUBES

We want to offer the musician or performer a better, more creative, easier way of working with sound and music. *Classical tools:* offer alternative interface to a sound processing algorithm. How can we do better?

New tool for stimulating creative process needed! - Force the musician into re-thinking this





creative process = **persuasive** technology ?

- Requires instrument that is completely unfamiliar ... - 'Reset' learning process: how does an artist work with sound and music? Let's start with simple gestures ...

- Performer creates audio processing algorithm by **arranging cubes** (sound transmitted using light) - Re-positioning cubes = Changing DSP algorithm Similar to *BlockJam* [2] (Sony CSL Interact. Lab) and Audiopad [4] (MIT Media Lab) BUT Audiocubes can process audio signals, they are not a new interface to control existing software on a computer!

How can we design this new musical tool? We try to use research results and strategies from CHI [3] and CS: paper prototyping and usability testing, ubiquitous computing, persuasive design, ...

We now introduce the Audiocube:

- Cube made of translucent material
- Battery powered digital signal processor (DSP)
- Programmed before performance from a PC
- Optical emitter, sensor and full colour LED behind each face

How can we implement the Audiocube and perform user testing? We will need to: - find a technically feasible way to build Audiocubes: first, a test platform using basic (opto)electronics - find musicians and artists willing to experiment with the Audiocubes and integrate them into performances



headphone out





their feedback can be used to learn more about musical interface design and relevant CHI issues





Audiocube Paper Prototypes.

Audiocube Test Platform consisting of TI TMS320F2812 ezDSP kit, Audiocube test board and 3 audiocubes connected to the test board. Audio is generated by establishing an optical (analogue) connection between the cubes.



Schematic overview for the Audiocube test platform.

FUTURE RESEARCH

REFERENCES

[1] Hunt A., Wanderley M.M., Paradis M. The Importance of parameter mapping in electronic instrument design. In Proceedings of the New Instruments for Musical Expression conference, 2002.

Questions...

- How do musicians interact with electronic musical instruments?

- How to design instruments to improve this interaction?

- What tools of CHI can be used when designing musical interfaces and what tools need to be modified in order to become useful?

Audiocubes:

- Can a musician understand the interaction between the cubes? - How can the game (entertainment) aspect contribute to the creative process, efficiency and satisfaction of the musician?
- How can a set of Audiocubes stimulate social contact between musicians meeting each other?
- How can children learn about sound design using the Audiocubes?

[2] Newton-Dunn H. et al. (2003) Block Jam: A Tangible Interface for Interactive Music. In Proc. of NIME 2003.

[3] Orio N., Schnell N., Wanderley M.M. Input Devices for Musical Expression: Borrowing Tools from HCI. At the workshop on New Interfaces for Musical Expression, Conference on Human Factors in Computing Systems (CHI 2001).

[4] Patten, J., Recht, B., Ishii, H., Audiopad: A Tag-based Interface for Musical Performance, in Proceedings of Conference on New Interface for Musical Expression (NIME '02), (Dublin, Ireland, May 24 - 26, 2002)