

Mobile Music Making with Sonic City

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ABSTRACT

Sonic City is a wearable system in which the urban environment acts as an interface for real-time electronic music making; the user creates music dynamically by walking through a city. The system senses the user's activities and the surrounding context, and maps this information in real time to the processing of urban sounds that are collected with a microphone. This video shows participants of a short-term study using our prototype in everyday settings. The actual music created with the system is heard together with users' comments. The Sonic City project illustrates how ubiquitous and wearable computing can enable new types of applications that encourage everyday creativity.

Keywords

Mobile music, everyday creativity, interactive music, ubiquitous computing, wearable computing, mobility, context awareness, user study.

1. INTRODUCTION

Sonic City enables the use of the urban environment as an interface for real-time electronic music making. When walking through a city, the system collects information about the user's interaction with the environment and about the context through which she walks. This is mapped in real time to the processing of urban sounds, which are collected "live" through a microphone. The resulting music is output through headphones. Unlike MP3 players or shared mobile music applications such as TunA [2] or SoundPryer [1], the music in Sonic City is unique and created dynamically as the user moves through the environment.

Sonic City is an example of emerging new application areas for ubiquitous computing. Whereas context-aware systems are currently mostly used for practical applications, Sonic City is designed to promote personal creativity in everyday settings. A simple walk becomes a musical duet with the urban environment; everyday events are transformed into aesthetic ones. We believe that this kind of applications has great potential for transforming and augmenting the human experience through ubicomp technology.

2. SONIC CITY IN USE

The video show results from a short-term user study of Sonic City. We were interested in how people would use the system in real-world settings. We conducted a study of the system, where 5 participants used the prototype in 5-20 minutes long sessions. The study also included cultural probes, in-depth interviews, and other



Figure 1: Sonic City user in action

methods to gain insight into users experience and use of the system [3].

In the video, we see some of the participants using the system in environments that are familiar to them personally. The video footages of the subjects are synchronised with the actual music created in real time with the system. The video is also overlaid with scene-specific comments by the users, that were recorded while they were watching it. We see how users actively influenced how the music sounded through different tactics, such as taking different paths or modulating the sensor input with changes of body orientation [3].

3. THE SONIC CITY SYSTEM

The Sonic City prototype [4] is an open-ended platform for iterative prototyping of sound content and musical interaction that enables testing in real-world settings. It consists of a central processing unit (a small laptop computer); a microphone; a microcontroller; a MIDI interface; and a number of sensors (see Figure 2). The system senses the user's context and actions, maps this information to the audio processing of live urban sounds in real time, and outputs the resulting music through headphones.

Sensor input is collected by a BasicX-24 microcontroller, which sends results in MIDI format to the laptop computer (carried in a shoulder-bag) via a USB-MIDI converter. The data is then reconverted and processed for context and action recognition. The context data is mapped to musical parameters in a modular program created in the interactive music creation environment PD [7].

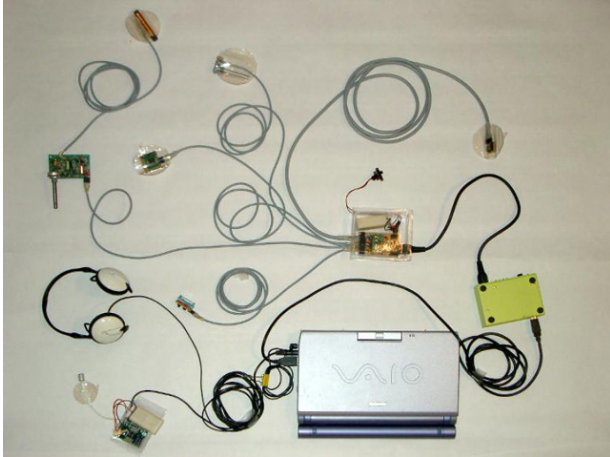


Figure 2: The Sonic City prototype

The sensors used in this implementation include a metal detector; an IR-sensor measuring proximity to walls and objects; a light intensity sensor; a microphone measuring sound level; and an accelerometer which senses stops, starts, and the initial user pace that determines the music tempo of a whole session. We have also experimented with sensing pollution and temperature and plan to add a heart-rate sensor.

The context-aware music generation works on two levels. On a low level, sensor input such as sound level, light intensity, proximity to metal, walls or objects, are mapped to micro sound aspects. On a high level, action and context information such as standing still at night (which can be retrieved from low-level input) affect the macro structural composition of the music.

Low-level sensor input are continuously measured and instantly mapped to the music. The recognition of high-level contexts are updated every other beat.

Sounds are captured by the microphone, and are processed in real time into music based on sensor input. The music is created and controlled in a program created in PD (Pure Data), a real-time graphical programming environment for audio, video, and graphical processing [3]. The Sonic City PD program is composed of small modular units that create the music algorithmically. The result of each module depends on what factors trigger it, and the values of the data mapped to them. The modularity of the program and the flexibility of the mapping models has enabled us to easily test various types of musical output.

4. CONCLUSION

This video is intended to illustrate the experience of using the Sonic City in an everyday environment. We believe that there are many potential application areas for context-aware and ubiquitous

computing, and that interactive music created by everyday activities and environments could be one of them. With the proliferation of portable music players and the increasing potential for creating music on the move, it is only natural to let the environment and the characteristics of people's paths start influencing the music experience. Other areas where context-awareness could create new opportunities for applications include photography [3] and mobile games [4].

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6. REFERENCES

- [1] Axelsson, F. and Östergren, M. SoundPryer: Joint Music Listening on the Road. In *Adjunct proceedings of UbiComp'02* (Göteborg, Sweden, 2002).
- [2] Bassoli, A., Cullinan, C., Moore, J. and Agamanolis, S. TunA: a Mobile Music Experience to Foster Local Interactions. In *Adjunct proceedings of UbiComp'03* (Seattle, USA, 2003).
- [3] Gaye, L. and Holmquist, L. E. In Duet with Everyday Urban Settings: a User Study of Sonic City. In *Proc. of NIME'04 (New Interfaces for Musical Expression)* (Hamamatsu, Japan, 2004)
- [4] Gaye, L., Mazé, R., and Holmquist, L. E. Sonic City: The Urban Environment as a Musical Interface. In *Proceedings of NIME'03 (New Interfaces for Musical Expression)* (Montréal, Canada, 2003)
- [5] Ljungblad, S., Håkansson, M., Gaye, L. and Holmquist, L.E. Context Photography: Modifying the Digital Camera into a New Creative Tool. *Extended abstracts of CHI 2004*, ACM Press (Vienna, Austria, 2004).
- [6] Mitchell, K., et al. Six in the cCty: Introducing Real Tournament - a Mobile IPv6 Based Context-Aware Multiplayer Game. *Proceedings of NETGAMES'03 (2nd Workshop on Network and System Support for Games)*, ACM Press, (Redwood City, USA 2003).
- [7] Puckette, M. *PD: real-time music and multimedia environment*. Documentation available at: http://www.crca.ucsd.edu/~msp/Pd_documentation/