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Sonic Interaction Design

It is quite obvious that sounds can induce actions. Auditory alerts are explicitly designed to induce actions of different kinds and urgency, such as picking up a phone call or searching for a power supply. It is perhaps less obvious that sounds are continuously mediating human–object interactions, even though eminent scholars recently wrote about the role of sound in the experience of everyday objects such as orange juicers (Buxton, 2007) or kettles (Norman, 2007). In reviewing Norman's book, Torenvliet (2008) writes that "in a world where everything beeps he would like to see designers experiment with a richer palette of sounds". To describe his favorite juicer, Buxton tightly couples sound, proprioception, and action when saying that "There is a cadence in the action that is almost musical".

Sounds can be functional to the use of products, and they can contribute to the overall appreciation of an object by participating to the perception–action loop. Sonic Interaction Design is the activity of shaping the relation between humans and objects by means of sound. It explores ways in which sound can be used to convey information, meaning, aesthetic and emotional qualities in interactive contexts. Sonic Interaction Design is an emergent discipline which is the result of efforts that come from different directions. Within human–computer studies, auditory display and sonification have been topics of interest for a couple of decades (Kramer, 1994; Kramer and Walker, 2005). In sound and music computing (Polotti and Rocchesso, 2008), there has been a growing interest into principles and methods to design and evaluate sonic interactive systems, and this is considered to be one of the most promising areas for research and experimentation (The S2S^2 Consortium, 2007). Among scholars in perception and cognition there has been a shift in attention, from the human as a receiver of auditory stimuli, to the perception–action loops that are mediated by acoustic signals (Leman, 2007). In interaction design, the availability of physical computing resources has put the construction of interactive sonic objects among the favorite activities of many practitioners. The emergence of the discipline of Sonic Interaction Design is facilitated by the increasing possibilities offered by sensors and actuators technology. Complex body gestures can nowadays be captured, and tightly coupled to interactive sounds.

1. About this special issue

The COST Action IC0601 on Sonic Interaction Design (SID, www.cost-sid.org) was launched in 2007 to create an interdisciplinary forum where contexts and opportunities are explored, specialties and technologies are integrated and exploited, evaluation methods and quality assessments are applied and compared. Building on a previous COST Action (COST287) that explored the relation between actions and sounds in the context of musical gestures, the SID Action extends the domain of interest to interaction design at large. The SID Action promoted a successful workshop at the CHI conference in Florence in 2008, where the call for papers for this special issue was officially launched. As a result, we collected twenty submissions and six of them passed the thorough evaluation of the reviewers. We think that the articles in this special issue give a faithful, albeit incomplete, picture of some issues that are central to contemporary research in Sonic Interaction Design. The six selected articles range from issues in sonification and auditory display, to applications in an artistic and product design context, to evaluation techniques for sonic interaction design.

Frauenberger and Stockman (2009) analyze the literature of auditory display design, looking for prominent patterns that could be used for designing the auditory aspect of interactive objects. They propose and evaluate a design framework, based on context as a design principle that allows transfer of good practices from experts to novices. Pauletto and Hunt (2009) give two examples of sonification of complex medical data, where interaction is functional to data exploration both for offline analysis and for real-time monitoring. The topic of interactive exploration of complex datasets is also treated in (Thompson et al., 2009), which is the documentation of the design and development of a large immersive environment, where sound is a key ingredient for the exploration of complex structures arising from fMRI brain data. Visell et al. (2009) look at interactions that occur at the interface between feet

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and floor, and survey the literature of display and perception of walking generated sounds and vibrations. They also point to potential future applications, where sonic augmentation of shoes or tiles could produce new experiences of walking. Stowell et al. (2009) tackle the key problem of evaluation of sonic interactive systems in a context that could not exist without sound, i.e., live music making. Qualitative methods (discourse analysis) and quantitative methods (Turing test) are contrasted and compared to other evaluation approaches. Finally, Lemaitre et al. (2009) propose a new approach to the evaluation of the designed sonic feedback in objects that are subject to continuous manipulation. The originality of their contribution is in the use of an abstract object that allows controlled experimentation of an interaction primitive. As a result of their experiments, they show how continuous control over the sound production process modulates product and sound perception.

Acknowledgment

Forty-one reviewers examined the twenty submissions that were sent in response to the call for papers for this special issue. Sixteen of them examined at least two manuscripts each. We are deeply grateful to all of them for their dedication. We are sure that the many comments they provided have been appreciated by the authors, especially the ones who could not be accepted for this issue. We are sure they will make good use of the reviews and find good opportunities to disseminate their research results.

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