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Haptic and Audio Interaction Design

8th International Workshop, HAID 2013
Daejeon, Korea, April 18-19, 2013
Revised Selected Papers

Springer

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Preface

Introduction

HAID 2013, the 8th International Workshop on Haptic and Audio Interaction Design was held during April 18–19, 2013, in Daejeon, Korea. The workshop took place immediately after the IEEE World Haptics Conference 2013 (WHC 2013) and with the generous support of this event's organizing team. We are particularly thankful for the strong support of Dong-Soo Kwon (KAIST), the General Chair of WHC 2013. Collocating the two events was also a fruitful merger. Indeed, HAID, with its focus on how computer systems can be best designed to leverage and appeal to the senses of touch and hearing matches naturally with WHC's focus on haptic systems in the broadest terms – from mechanical design of hardware to psychophysical studies of perception. The events both benefited from co-attendance and the different but related foci led to high levels of synergy.

A total of 14 papers were accepted to HAID 2013, each containing novel work merging technological and human concerns. A panel of experts spanning industry and academia reviewed and vetted each paper. We extend our sincerest thanks to all our reviewers, who provided invaluable commentary, advice, and feedback both promptly and respectfully. Their work was essential, not only as input to the authors, but also to establishing the high quality of the final program. HAID 2013 also benefitted from two outstanding invited keynote speakers. Jinsil (Hwaryoung) Seo from Texas A&M University opened the workshop with an inspiring overview of her visceral, evocative, and multisensory digital art. Seungmoon Choi from POSTECH (Pohang University of Science and Technology) closed the event with a discussion of a series of research projects and prototypes tackling the challenging question of how to effectively and easily author rich and expressive haptic, and particularly vibro-tactile, content. These very different speakers both bracketed the workshop temporally and framed it conceptually. They covered a broad range of perspectives from exploratory art through to practical engineering that was mirrored in the paper presentations of the main program.

The papers were organized into five thematic sessions, briefly introduced below.

Non-intrusive and Thermal Haptics

The field of haptic interaction is rapidly maturing and diversifying, trends that were highly evident in the papers presented in this session. Rather than focusing on traditional mechanical haptic feedback systems (such as force feedback or vibrating actuators), this work explored either how changes in the temperature of a touched surface could be used as feedback in computer interfaces (Wilson et

al.) or to convey emotions (Salminen et al.). The remaining paper in this session looked even further afield, at the potential of fully non-contact haptic systems – those using remote actuation techniques based on the sensations evoked by focused jets of air or sound (Tsalamlal et al.). Overall, the work presented in this session highlighted new areas in which the field of haptics is developing both in terms of the interaction scenarios it outlines and the actuation technologies that are emerging.

New Interfaces and Interactions

This session collected contributions that apply haptic and audio cues to existing areas of human–computer interaction, expanding the scope of these feedback modalities to novel domains. In the first paper in this session, L'Orsa et al. detail a new take on how multi-modal cues can enhance remote surgery systems through providing contextual warnings during critical tasks that offer the potential to reduce unintentional tissue damage. Girard et al., on the other hand, expand the literature on haptic collaboration by exploring whether haptic cues can objectively increase the efficiency of tightly coupled physical manipulation tasks. Finally, Mori et al. present a study exploring the potential of haptic cues to form the basis of advanced brain–computer interfaces for tasks such as robotic tele-operation. The focus of all these papers on remote or collaborative interaction highlights this as a promising area for future studies.

Emotion and Affect

Touch is an important affective sense, relating to deep and powerful expressions of emotion. This session included two papers investigating different aspects of this relationship. Fontana revisited a classic experiment that explores how individuals map spatial stimuli to particular sound forms. His work shows that haptic stimuli are associated with sounds in ways that are broadly similar to the way this is achieved with visual cues, a finding which has the potential to cast light on the central cortical processing of shape information. Gaffary et al. also focused on prior work by highlighting the methodological limitations of existing studies linking haptic cues to emotions. To better understand these problems, they contrast the explanatory outcomes achieved through three different statistical procedures, concluding with a concise and valuable summary of the advantages and disadvantages of each. Taken together, these papers highlight how novel empirical methods can advance the field of haptic and audio interaction design, particularly in complex non-traditional application areas.

Music

The session on music dealt with the intimate relationship between using an instrument to produce sound and the highly physical, haptic, skill that is required to do so. This strong focus on merging the senses makes musical contributions

an excellent fit for HAID and the three contributions presented in this session showed the richness and diverse scope of work in this area. Ziat et al. presented a complex psychophysical study looking at the effects of plucking virtual haptic strings of different stiffness values on audio perception of the notes this produced. Giordano and Wanderly presented a complementary but more practically focused paper that surveyed the literature on how haptic cues can be used to augment or enhance music making practices. The paper culminates with a valuable taxonomy of the possibilities in this space. The final paper, by Esteves et al., was entirely application focused – it described the design of a tabletop system that enabled musical novices to collaborate with live performances through manipulating tangible blocks on a tabletop computer.

Mobile Devices and Applications

The final session at HAID 2013 tackled mobile interaction, a recurring and rapidly developing theme in the field. Kim et al. presented fundamental work on the design and evaluation of a novel miniature and expressive tactile actuator designed expressly for embedding within mobile devices. Panëels et al. discussed a more applied HCI study looking at how cues delivered by tactile actuators mounted around the wrist can be understood in real-world tasks and scenarios where orientation of the arm may varying considerably. Finally, Rassmus-Gröhn et al. described a field study of a mobile application that integrated audio cues into a navigation system aimed at pedestrian tourists in order to support both inclusion and lower the attentional demands of the software. Spanning a broad range of perspectives from hardware through empirical experiment to fieldwork, this session truly demonstrated the interdisciplinary nature of the HAID workshop.

In summary, HAID 2013, the 8th International Workshop on Haptic and Audio Interaction Design, showcased work in new sensory interaction modalities and novel HCI application domains. It explored the links between haptic cues and emotions and investigated the rich relationships between touch and sound in the domain of music, a natural fit for such studies. Finally, it expanded on the growing body of research applying non-visual interfaces to mobile devices and scenarios where users are busy and fully engaged with the world, scenarios where cues and information that can be heard and felt stand to convey key advantages.

Organization

The 8th International Workshop on Haptic and Audio Interaction Design was organized in collaboration with IEEE World Haptics 2013.

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