

## Books

e107, Monday 14 November 2011 - 16:18:23

» F. Fontana, Y. Visell, eds., *Walking with the senses - Perceptual techniques for walking in simulated environments*, Logos Verlag, Berlin, Germany, 2011.

*The first inspiration to collectively study technologically-mediated interactions between the feet and ground, and the possibility to influence these interactions through novel human-computer interfaces, arose on while we were navigating the streets of Venice toward the railway station, after the conclusion of a research project meeting. The first ideas emerged while waiting for the Vaporetto water bus, as the boat stop bobbed gently under our feet on the waters of the lagoon, where we hypothesized preliminary directions for a research project on walking. Only later did we note the special position Venice occupied as it was evoked by Marcel Proust in his Remembrance of Things Past (À la recherche du temps perdu). The narrator of the book recalls a time when, while stepping into the courtyard of the Princess de Guermantes residence in Paris, he is caught in a moment of accidental imbalance between two uneven flagstones, which joyfully evoked a similar experience he felt while walking at the baptistry of Piazza San Marco in Venice. Of course, there was a more pragmatic impetus as well. Separate investigations at McGill University (on haptic interactive floors) and at the University of Verona (on footstep sound synthesis) spoke compellingly toward new possibilities that might emerge through such a joint collaboration. Although these technological tools were available, along with further expertise in areas including immersive virtual reality display and haptic engineering (at Univ. Paris 6, INRIA IRISA, and Aalborg University), the act of bringing these pieces together raised as many challenges as it solved. This included both pragmatic questions, such as how to effectively integrate different technologies, and more fundamental ones, related to the evaluation of novel, often multimodal perceptual effects that related to an interactive setting (human locomotion augmented with virtual multimodal stimuli) that had been seldom studied. The latter fit the goal of our investigation, which, complementing preexisting work on the design of walking interfaces for navigation in primarily visually rendered virtual environments, instead directed attention to the rich variety of multisensory phenomena that emerge when the foot and body enter into contact with a firm ground surface composed of complex, natural materials. The sounds, bodily movements, and tactile sensations we experience as a result signify the spaces we traverse in an intuitive and familiar way, and communicate to us their characteristics. The ecological information we thus acquire allows us to balance, navigate and orient during everyday tasks in unfamiliar environments, by making use of the invariant ecological meanings that we have learned through extensive prior experience with walking tasks. The ambitious and wide-ranging research plan we embarked on in the Natural Interactive Walking project is reflected in the contents of the present volume. Its goals included the design, prototyping and evaluation of multimodal floor-based machine interfaces for the interactive augmentation of otherwise neutral (i.e., flat, silent, and visually homogeneous) ground surfaces; the study of multisensory effects and cross-modal illusions, involving the senses of touch, kinesthesia, audition, and vision, that were made possible by the novel interfaces that were explored; the realization of rich interaction contexts based on ensembles of the previous interface designs; the study of foot-floor interaction paradigms occurring in these contexts, and of the opportunities that they may offer thanks to the high sensitivity of the human feet. Applications of such paradigms may include active signalling for simplified navigation in functional spaces, support to human labor in hostile environments, and healthcare applications for aiding people with reduced foot sensitivity and during rehabilitation of impairments affecting locomotion. To innovate within a field encompassing such a wide spectrum of knowledge requires competence and technical skills in a diverse array of topics that are not accessible to any single scientific or engineering researcher, that are essentially collaborative and interdisciplinary. However, we took encouragement from the existence of compelling research in related interdisciplinary research areas, including haptic interaction for the hands and human interaction in virtual reality environments. Indeed, several of the technologies and methodologies described in the chapters of this book can be said to be borrowed, at least in part, from those fields. Success in this endeavor could only be achieved through the collaboration of an ensemble of researchers organized around an ambitious set of interrelated goals, which also permitted sufficient independence for them to develop constituent competencies. The research plan was enriched with further components having an orientation toward applications in virtual reality: among these, the development of novel interfaces for navigation in virtual spaces. The Natural Interactive Walking project was realized thanks to funding from the European Union and the*

*Qu'ébec Ministère de Développement Économique, Innovation, et Exportation which permitted a team of researchers to collaborate on the themes described above for a total of three years. In providing a survey of the most interesting results of this project, the present book represents one of the most important products of the project itself. The result is far from free of defects, as the strong interdisciplinary character of the research makes it difficult to integrate it into a global view. As a result, and in spite of the editorial efforts made in bringing together the present content, we expect that the reader will notice the discontinuities that we, as principle project investigators, have endeavored to smooth out during the course of evolution of the research. Finally, the production of this book occurred within a necessarily highly constrained schedule, which required, among other things, that relatively fresh research contents be digested and organized quickly in order to finalize the publication prior to the completion of the project itself. While this may have diminished the quality, it has allowed us to make this book available in the public domain. Ultimately, we think this is a worthy outcome, one of its most dear qualities. As one final note at the outset, as editors, we agreed that we would be listed in the bibliographic data in alphabetic order, since any classification based on the order of names included would not be able to acknowledge the joint effort we have both made on the book, acknowledging from the beginning that neither editor's work was more important to realizing this book.*