Introduction to the Special Issue on Technology to Support Independent Orientation and Mobility of People with Visual Impairments

We are pleased to present the first five articles that have been accepted for the TACCESS special issue on technology to support independent orientation and mobility of people with visual impairments. Additional articles on this topic may appear in future issues.

The lead guest editors for this special issue were João Guerreiro (University of Lisbon), Anke M. Brock (ENAC Toulouse), and Hernisa Kacorri (University of Maryland, College Park). They were supported by guest editors Dragan Ahmetovic (University of Milan), Chieko Asakawa (IBM Research and Carnegie Mellon University), Nicholas A. Giudice (University of Maine), Roberto Manduchi (University of California, Santa Cruz), and Daisuke Sato (Carnegie Mellon University). The supervising editor-in-chief for this issue was at first Kathleen F. McCoy (University of Delaware) and later Tiago Guerreiro (University of Lisbon).

In the call for submissions to this issue, the guest editors invited multidisciplinary research efforts that contribute to better understanding of the behavior and spatial cognition of people with visual impairments. An emphasis was also given to work that explores the design, development, and evaluation of innovative solutions for supporting independent orientation and mobility for this user group.

The first article, “Tactile Working Memory Capacity of Users Who Are Blind in an Electronic Travel Aid Application with a Vibration Belt” presents an experimental study with 14 blind participants wearing a vibration belt that indicates the direction and distance of obstacles. It shows that mobility and distractions can have an effect on participants’ tactile working memory and provides practical guidance on the number of distinct vibrations to be used in similar applications.

The second article, “Mental Maps and the Use of Sensory Information by Blind and Partially Sighted People”, presents an interview study with 100 participants with visual impairments across five countries. It explores how people who are blind or have low vision create mental maps and how they use these mental representations when navigating.

The third article, “X-Road: Virtual Reality Glasses for Orientation and Mobility Training of People with Visual Impairments”, presents an iterative design of a virtual reality system in collaboration with orientation and mobility specialists. Findings from the evaluation of the final prototype with 13 students with visual impairments suggests that virtual reality can help in teaching and learning classical orientation and mobility tasks and contribute with a set of design recommendations for inclusive virtual reality systems.

The fourth article, “Spotlights and Soundscapes: On the Design of Mixed Reality Auditory Environments for Persons with Visual Impairment”, presents two experiments, with five participants

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each, investigating the use of mixed reality auditory technologies to increase the accessibility of indoor navigation systems for people with visual impairments. The focus is both on avoiding obstacles and building cognitive maps of the environment.

The fifth article, “O & M Indoor Virtual Environments for People Who Are Blind: A Systematic Literature Review”, identifies and analyzes 51 papers that use virtual environments to help blind users develop orientation and mobility skills or mental representations of real-world locations. It uncovers common interaction techniques and evaluation methods found in the literature.

We thank the guest editors involved in this issue and the reviewers for their time, effort, and expertise to this process. Finally, we thank the authors for their excellent submissions.

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Lead Guest Editors