Portable and Mobile Systems in Assistive Technology
Introduction to the Special Thematic Session

R. Manduchi[1] and J. Coughlan[2]

[1]University of California, Santa Cruz, CA
[2]Smith-Kettlewell Eye Research Institute, San Francisco, CA

1. Introduction

Computing power, communications and internet access are becoming increasingly untethered from the desktop and moving to the realm of portable, wireless technology. Devices such as mobile (cell) phones and PDAs (personal digital assistants) have become affordable and ubiquitous, and offer not only substantial computational power but also telephone and internet access, as well as a variety of sensors such as cameras, GPS and RFID readers. While the overwhelming majority of such devices are being marketed primarily to able-bodied users (primarily young, tech-savvy people without obvious disabilities), there is enormous potential to harness their capabilities for use in assistive technology. As of yet, however, this potential remains largely untapped, with very few commercially available systems of this type.

Not only is this potential largely untapped, but many portable and mobile systems are particularly difficult to use for people with disabilities. For instance, Burton explains [1] that visually impaired persons "were left out of the loop when the evolution of cell phones brought display screens and other new advances, such as phone books, text messaging, and e-mail, into the mix," initially resulting in "no text-to-speech functionality to accommodate cell phone users who are blind" and "no display screens with the visual characteristics, such as large fonts or highly contrasting colors, that would accommodate users who have low vision." Similarly, other disabilities such as hearing and motor impairments make it very difficult for some people to operate cell phones and other portable electronics items, which often have limited audio capabilities and small, densely packed buttons.

However, accessible mobile and portable systems, and extensions of existing systems, are now becoming increasingly common. For cell phones, a variety of accessibility options are now available, including text-to-speech output, screen magnification, audio amplifiers, hearing aid compatibility, and hands-free operation. Moreover, increasingly powerful assistive technology capabilities are being developed specifically for mobile and portable devices, such as the Kurzweil-National Federation of the Blind Mobile reader (www.knfbreader.com), which is a commercial OCR (optical character recognition) system running on a standard camera cell phone, and an MMS (multimedia messaging service)-based sign language system for cell phones [14].

The purpose of this special thematic session is to bring together experts in assistive technology and computer science to discuss possible applications of portable and

mobile technology for persons with all types of disabilities and limitations, including visual, auditory and cognitive deficits and motor/mobility problems.

2. Overview of Contributions

This session opens with a survey by Watanabe et al. about the usage of mobile phones by visually impaired persons in Japan [2]. Surveys of this type are instrumental to assess the diffusion of mobile devices among different communities of persons with disabilities, as well as to devise ways to improve the accessibility of such devices. Next, the accessibility of urban environments and public spaces is addressed by three contributions. Voelkel et al. [3] and Holone et al. [4] and propose strategies for annotating and sharing geographical data, augmenting existing databases with information about accessibility (such as obstacles, hazards, lowered curbs, accessible traffic signals). Annotation of as well as access to geographical data is facilitated by the availability of portable navigation systems, possibly integrated in a cell phone. Moreno et al. [5] presents a proposal of accessibility requirements to consider in the design and development of an electronic guide in the application domain of museums.

A consistent portion of this session is devoted to wayfinding for persons with visual impairments. ODILIA [6] is a fully integrated mobility system based on GPS and dead reckoning. URNA [7] uses Bluetooth beacons broadcasting location-based information which is accessible via cell phones. The use of a camera cell phone as an assistive device is considered by Ivanchenko et al. [8], Darvishy et al. [9] and Manduchi at al. [10]. In [8] the goal is to detect zebra (striped) crosswalks, whereas in [9] and [10] special patterns are proposed that can be easily identified and used for wayfinding.

The last two papers in the session focus on other applications for portable devices, addressing different needs of visually impaired persons. Amemiya at al. [11] propose the use of a simple haptic indicator that can guide a person in the case of an emergency (for example when evacuating a building). Yoshida et al. [12] discuss the use of a regular cell phone for the remote control of home appliances using both numeric keys and voce recognition.

References

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