Chapter 3.15
Widely Usable User Interfaces on Mobile Devices with RFID

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ABSTRACT

Diffusion of radio frequency identification (RFID) promises to boost the added value of assistive technologies for mobile users. Visually impaired people may benefit from RFID-based applications that support users in maintaining "spatial orientation" (Mann, 2004) through provision of information on where they are, and a description of what lies in their surroundings. To investigate this issue, we have integrated our development tool for mobile device, (namely: MADE, Bellotti, Berta, De Gloria, & Margarone, 2003), with a complete support for RFID tag detection, and implemented an RFID-enabled location-aware tour-guide. We have evaluated the guide in an ecological context (fully operational application, real users, real context of use (Abowd & Mynatt, 2000)) during the EuroFlora 2006 international exhibition (EuroFlora). In this chapter, we describe the MADE enhancement to support RFID-based applications, present the main concepts of the interaction modalities we have designed in order to support visually impaired users, and discuss results from our field experience.

INTRODUCTION

Starting from the European Union cofounded E-Tour project, we designed the tourist digital assistant (TDA) concept and developed multimedia

tour guides on mobile devices (PocketPC and Smartphone devices) for a number of European tourist sites, such as the Costa Aquarium of Genoa, "Strada Nuova" architectonical area and the city of Genoa, the Castellon region in Spain, and the city of Uddevalla in Sweden (Bellotti, Berta, De Gloria, & Margarone,, 2002).

The tour guide provides multimedia contents, added-value information, and location-based services to the tourists. Added-value services are implemented by integrating the mobile devices with additional hardware and software tools such as GPS, electronic compasses, wireless connectivity, digital cameras, written text input, databases, and so forth.

See Figure 1 for snapshots of tourist guide applications.

Relying on the argument that "play is a powerful mediator for learning throughout a person's life," we developed the "educational territorial-gaming" concept in VeGame (Bellotti, Berta, De Gloria, Ferretti, & Margarone, 2003), a computer-supported educational wireless team-game played along Venice's narrow streets to discover the art and the history of the city (see Figure 2), and in ScienceGame (Bellotti, Berta, De Gloria, Ferretti, & Margarone, 2004), a sort of treasure-hunt game inviting players to discover the mysteries and the marvels of the science (see Figure 3) during the "Festival della Scienza" exhibition held in Genoa every year.

These applications were developed from scratch. From these first experiences, we identified common needs and came up with a system to support design of multimedia applications for mobile devices, called Mobile Applications Development Environment (MADE) (Bellotti et al., 2002).

MADE includes M3P (MicroMultiMedia Player), a network-enabled multimedia player easily programmable through the micromultimedia services language (MSL). MSL provides high-level components encapsulating advanced services (e.g., positioning, database query, path search, etc.) that can be easily integrated in multimedia applications. This allows building modular software programs that provide information-rich services to the general public through a coherent and homogeneous HCI that can be learned with low mental workload. On the other hand, MADE hides the low-level aspects of multimedia and service management, allowing designers to focus on the modalities of presentation of information and on user interaction, reducing learning, development, and code maintenance time.

In this chapter, we describe the latest MADE enhancement: we have integrated it with a complete support for RFID detection to allow develop-

Figure 1. Snapshots from the Aquarium and Strada Nuova tour guides on PocketPC device