Improving Direction-Giving Through Utilization of an RFID-Enabled Kiosk

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ABSTRACT
This paper presents an RFID-enabled module for an electronic kiosk physical user interface which provides personalized information retrieval. The system builds on research in direction-giving by streamlining the process of the direction-giving phase and minimizing the introduction and closure phases, thereby providing the user with a quicker transaction for personalized information. The RFID technology also provides potential for greater security and privacy for the user of the kiosk system as compared to traditional magnetic strip methods. The developed RFID-enabled system is built on top of a current production informational kiosk utilized for a building directory, which was used for initial testing and evaluation.

Keywords: Direction Giving, Interface Design, RFID, Kiosk, Physical User Interface

1. INTRODUCTION
Electronic kiosk systems have been extensively utilized for various applications for many years. These applications include informational, advertising, service, and entertainment kiosk systems (Borchers, Deussen, & Knorzer, 1995). Most are utilized in public areas to provide individual users with needed information. Many kiosks have also had personalized content added to the interface to tailor the interface and dialog to the preferences of each user (Russell & Gossweiler, 2001). This can add greater convenience for the user but also create potential privacy concerns. With the ongoing reduction in cost of touch screen technologies in particular and information technologies generally, site located kiosks are becoming a common feature in public buildings. The focus of our research is on one type of public kiosk, which is designed to provide an individual user with information pertinent to his or her query associated with way-finding tasks.

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Direction-giving and way-finding have been studied extensively by cognitive-psychologists, sociologists, and geographers. This has typically been studied within a social context where one or more individuals give directions to one or more other individuals (Golding, Graesser, & Hauselt, 1996), but the same concepts can be applied to kiosk technology. Many kiosks act as direction givers and the same steps that are utilized by human direction-givers are also used by kiosks; the only difference being that the kiosk is the direction giver while the user is the recipient of the directions.

Contemporary kiosks vary in function and design, with some offering very complex informational services and others offering very simple directional services. For most developers, there is a direct tradeoff between usability and information complexity; when kiosks provide too much information, their interface becomes unwieldy. Given that most kiosks are accessed by one-time users, anything that requires a learning curve thwarts the usability of the system; hence, most tend to have very simple and intuitive interfaces.

Unfortunately, because kiosks require such simplicity, they are not generally used to transfer more complex information. Almost by definition, complex informational output to the user requires complex informational input, which complicates the interface and, in turn, complicates the user experience. To meet the paradoxical requirements of a system that is simple to operate, yet which yields rich and complex information, some mechanism must be employed that can provide complex information to the kiosk display without requiring a complex user interface.

RFID technology offers a means for user authentication based on proximity cards, which wirelessly communicate with the kiosk query engine (Finkenzeller, 2003) through communication with a card reader. Compared to traditional technologies like magnetic-strip cards, RFID proximity cards can offer greater flexibility and ease-of-use to the user as well as, potentially, greater security and privacy protections. Most importantly, by identifying the kiosk user (at least in systems with a known potential user population) the kiosk query engine can retrieve data about the user along with information relevant to the user. Knowing about the user then allows the kiosk to present an informational set relevant to the user with little direct action on the user’s part, which means that the user’s task is one of simple selection of information presented by the kiosk.

To address the issue of direction-giving with regards to electronic kiosk systems, this research proposes an RFID-enabled kiosk. Therefore the purpose of this paper is to describe the development and testing of an RFID-enabled kiosk system to alleviate this informational deficiencies in the direction-giving problem. This kiosk utilizes RFID proximity card technology to tailor a kiosk in an academic setting to its current user by retrieving the user’s class schedule. The system streamlines the direction-giving process by focusing primarily on the direction-giving task and bypassing 2 of the 3 phases (i.e., the introduction and closure phases). Also, RFID technology offers the potential of greater security and privacy for the user.

The rest of this paper is organized as follows. Section 2 provides a brief background in kiosk technology, direction-giving, and RFID. In Section 3 the development of the RFID enabled kiosk is described. A discussion regarding both advantages and limitations of the implemented system is given in Section 4. Finally, Section 5 provides a brief conclusion and some future avenues of research.

2. LITERATURE REVIEW

2.1 Kiosk Technology

Kiosk systems have become commonplace in today’s technological society (Barab, Bowdish, Young, & Owen, 2004). Many different areas ranging from entertainment (Stapleton & Hughes, 2005) to healthcare (Nicholas, Huntington, & Williams, 2001) utilize kiosk technology. The systems can consist of simple
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