Contextual Information System for Urban Orientation of Sighted and Non-Sighted Users

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1. Introduction

The conceptualization of an urban orientation system was based on the idea that an individual's walking journey could be enhanced by providing contextual information about points of interest (POIs) along their route. Research revealed numerous ways to provide serendipitous and task-critical information for both sighted and visually impaired users as they navigate through an urban environment on foot. Thus, a prototype system was developed to meet the following criteria: provide the user with an unobtrusive mobile device to facilitate contextual information presentation; a socially maintained online database containing information about POIs; software that is accessible via both graphical and speech user interaction; and location "tags" to be detected by the unobtrusive device.

2. Methods

Four collection methods were used to gather data regarding characteristics of a walking journey: surveys; observations; focus group evaluations for qualitative data; and "Wizard of Oz" (WOz) simulations, where participants interacted with a system that was simulated by one of the researchers.

3. Findings

We found that blind individuals require numerous waypoints to help with their orientation during a walking journey. They require an orientation device that is unobtrusive and includes accessible information about POIs. Interviews revealed that both blind and sighted individuals felt personalization of an orientation system is very essential. The varying needs of individuals make the ability to filter contextual information indispensable. Accurate location detection and real-time information would allow augmentation of individuals' daily walking journeys, especially those experiencing blindness.

4. Prototype

The data findings described above substantially informed the design of this urban orientation and contextual information system. A prototype system was developed to meet the aforementioned criteria.

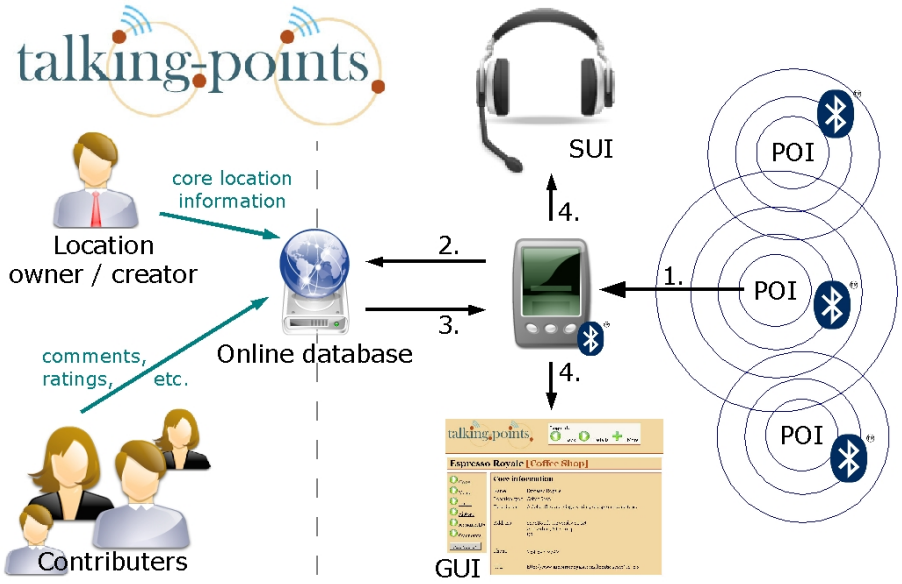

Figure 1: System & interaction diagram

The "Talking Points" system consists of two components (see Figure 1): a social online database, facilitating user-generated content of POI information; and a mobile device that detects POIs and presents the contextual information through either a Speech User Interface (SUI) or a Graphical User Interface (GUI).

5. Conclusions

The goal of this study was to investigate methods of using contextual information systems to enhance the walking journey of both sighted and non-sighted people. Information from the research conducted here demonstrates that both users could benefit from contextual information systems with access to location specific user generated content. A socially maintained urban orientation and contextual system such as this offers relevant, dynamic, and up-to-date information, the combination of which may not otherwise be accessible.

6. References

1. Abowd, G.D., et al., Cyberguide: A Mobile Context-Aware Tour Guide ACM Wireless Networks, 1997. 3(5): p. 421-433.

2. Begole, J., et al., Mobile recommendations for leisure activities, in *International Workshop on Recommendation and Collaboration at IUI 2008*. 2008, Palo Alto Research Center: Canary Islands, Spain.

3. Bradley, N. and M. Dunlop, An Experimental Investigation into Wayfinding Directions for Visually Impaired People. *Pers Ubiquit Comput*, 2005. 9: p. 395-403.

4. Coroama, V. and F. Röthenbacher, The Chatty Environment Providing Everyday Independence to the Visually Impaired in *Ubicomp*. 2003.

5. Coroama, V., T. Kapic, and F. Röthenbacher, Improving the Reality Perception of Visually Impaired through Pervasive Computing, in *Pervasive*. 2004.

6. Coughlan, J., R. Manduchi, and H. Shen, Cell Phone-based Wayfinding for the Visually Impaired, in *IMV 2006*. 2006: Graz University of Technology, Rechbauerstraße, Graz, Austria

7. Davies, N., et al., Using and Determining Location in a *Context-Sensitive Tour Guide*. Computer 2001. 34(8): p. 35-41.

8. Espinoza, F., et al., GeoNotes: Social and Navigational Aspects of Location-Based Information Systems, in *Ubicomp 2001: Ubiquitous Computing: Third International Conference*. 2001: Atlanta, Georgia, USA. p. 2.

9. Gifford, S., Knox, J., James, J., and Prakash, A. Introduction to the talking points project. In *Assets '06*. 2006. p. 271-272.

10. Greenfield, A., *Everyware: The Dawning Age of Ubiquitous Computing*. 2006, Berkeley, CA: New Riders.

11. Griswold, W.G., et al., ActiveCampus - Sustaining Educational Communities through Mobile Technology 2002, Computer Science and Engineering, UC San Diego.

12. Harper, S. and P. Green, A Travel Flow and Mobility Framework for Visually Impaired Travellers, in *International Conference on Computers Helping People with Special Needs*. 2000, OCG Press: Germany.

13. Kaasinen, Eija, User Needs for Location-Aware Mobile Services, *Pers Ubiquit Comput*, 2003. 7: p. 70-79.

14. Kim, Ryan, Bar Codes Create Bridge for Window-Shoppers, SFGate, 27 March 2008 [cited 2008; Available from: http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/03/27/BU1LVQQOB.DTL]

15. Kintsch, A. and R. Depaula, A Framework for the Adoption of Assistive Technology, in *SWAAAC 2002: Supporting Learning Through Assistive Technology*. 2002: Winter Park, CO, USA.

16. Ling, R., *The Mobile Connection: The Cell Phone's Impact on Society*. 2004, San Francisco: Morgan Kauffman Publishers.

17. Loadstone Project. [cited 2008; Available from: http://www.loadstone-gps.com/]

18. Marston, J.R. and R.G. Golledge, Towards an Accessible City: Removing Functional Barriers for the Blind and Vision Impaired: A Case for Auditory Signs. 2000, University of California Berkeley: University of California Transportation Center.

19. Over the Horizon: Potential Impact of Emerging Trends in Information and Communication Technology on Disability Policy and Practice. 2006 December 19, 2006 [cited 2008; Available from: http://www.ncd.gov/newsroom/publications/2006/emerging_trends.htm#_Toc151518465]

20. SESAMONET (SEcure and SAfe MObility NET). [cited 2008; Available from: http://voice.jrc.it/sesamonet/proposal_en.htm]

21. Wayfinder Access. [cited 2008; Available from: http://www.wayfinderaccess.com/]

22. Weinberger, D., *Everything is Miscellaneous: The Power of the New Digital Disorder*. 2007, New York, NY: Times Books.