Accessibility of Mobile Devices for Visually Impaired Users: An Evaluation of the Screen-Reader VoiceOver

Berglind Smaradottir[a], Jarle Håland[b,c], Santiago Martinez[b]

[a] *Department of Information and Communication Technology, University of Agder, Grimstad, Norway*
[b] *Department of Health and Nursing Science, University of Agder, Grimstad, Norway*
[c] *Kongsgård School Centre, Kristiansand, Norway*

Abstract

A mobile device's touchscreen allows users to use a choreography of hand gestures to interact with the user interface. A screen reader on a mobile device is designed to support the interaction of visually disabled users while using gestures. This paper presents an evaluation of VoiceOver, a screen reader in Apple Inc. products. The evaluation was a part of the research project "Visually impaired users touching the screen - a user evaluation of assistive technology".

Keywords:

Visually Impaired Persons, Medical Informatics

Introduction

Mobile technologies with touchscreen allow users to interact with the interface through hand gestures. Touchscreens may represent a significant accessibility and communication barrier to users with visual disabilities since this type of interaction does not usually provide audio or tactile feedback by default. However, there currently are in the market solutions that enable visually impaired users to use technology using voice commands. An example of this technology is the VoiceOver by Apple Inc., developed for iOS devices such as iPhone and iPad. VoiceOver synchronizes speech feedback with user hand gestures. This work presents a user evaluation of the screen reader VoiceOver, with the aim of exploring the challenges that visually disabled users experience when they interact with a touchscreen using hand gestures.

Methods

A usability evaluation in the Usability Laboratory [1] at the Centre for eHealth and Healthcare Technology at the University of Agder, Norway, was made with 6 visually impaired participants. They were asked to use a series of gestures to solve tasks related to the use of a smartphone (i.e., iPhone). Quantitative (time and attempts per gesture) and qualitative (pre- and posttest semi-structured interviews) measures were used for the analysis of the data collection.

Results

Participants reported that most of the hand gestures were generally easy to perform. However, several gestures were described as "challenging" or requiring user-training in advance. The system responded mainly correctly to the set of gestures, but a few times the system did not respond to the hand gestures performed on the user interface (UI). For instance, several participants had problems with ending a phone call. In addition, the speech feedback responded appropriately to the gestures. However, one particular gesture (swipe gesture) was inconsistently interpreted across the tests. The speech feedback provided sufficient information to enable participants to navigate through the UI. Only a few times there was a lack of information in the speech feedback or expressions that were not understood by participants.

Conclusion

Mobile device touch screens are widely used by heterogeneous user groups, which emphasizes the importance of key human-computer interaction concepts such as accessibility and usability. Accessibility and usability evaluations are essential to improve the interface design and the interactions between mobile devices and users with physical, cognitive and/or sensory limitations. This work has summarized an analysis of the usability of the gesture-based speech-assisted interface navigation system, Apple Inc. VoiceOver. The findings showed that, in general, the system feedback was appropriate, but there were some specific functions and speech expressions that could be improved to increase effectiveness, efficiency and user satisfaction of visually impaired users.

Acknowledgements

References

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Address for correspondence

Dr. Berglind Smaradottir, Department of Information and Communication Technology, Faculty of Engineering and Science, University of Agder, PB 422, N-4604 Kristiansand, Norway.
Email: berglind.smaradottir@uia.no