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Open Eyes-Reliable and User Friendly Application for Visually Impaired Users

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Abstract

This project deals with design and implementation of user interface which makes user friendly environment of the mobile operation system Android for blind users. Interface enables to perform basic operations with the system and common used touch gestures. Voice synthesizer, vibration and sound are implemented as a feedback. Our main goal was to design an Android User Interface application for addressing basic functions (calls, SMS, contacts, calendar, alarm, music etc.) solely via use of simple multi-gestures approach.

Introduction

About 285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision. About 90% of the worlds visually impaired live in low-income settings. 82% of people living with blindness are aged 50 and above. One of the most common problems that many blind and visually impaired people experience is their day-to-day challenge in coping with their impairment. Some blind users still face several problems opening and using basic functionalities when interacting with touch interfaces. Sometimes, people with visual impairments may also have problems navigating autonomously, without personal assistance, especially in unknown environments.

Problem Definition

To develop a software solution to a problem, the first step is to understand the problem.

One of the most common problems that many blind people experience is their day-to-day challenge in coping with their impairment. Some blind users still face several problems opening and using basic

functionalities when interacting with touch screen device. Sometimes, people with visual impairments may also have problems navigating autonomously, without personal assistance, especially in unknown environments. But systems available in the market have their drawbacks. Voice clarity is not achieved properly, the systems are not light weighted and hence it makes the mobile slow and consumes more energy.

Need for the New System

Nowadays, majority of blind users still use traditional mobiles with HW keyboard accompanied with special screen reader tool. Despite of fast penetration of smart phones with touch screen there are only few apps targeted on blind users, i.e. Talkback and none of them use exclusively multi-gesture control. The project is based on android platform; it is created for blind people. It helps the person to control the android device with help of voice generated on touch. User can touch anywhere on the screen of smart phones, it simply converts that touch into a voice; it helps to guide the person to reached its destination application what the

person wants to open. The proposed application can generate voice for messages, contacts, application names, music.

Requirement Analysis

User design was applied. First, semi-structure interviews were carried out with 4 blind users at their homes^[2,3]. Each interview took 60-90 minutes. The questions used in the interviews were designed to identify how the participants used and experienced the Open Eyes application in relation to mastering basic functionalities like making call, writing SMS or searching in contact list. Users were divided into 3 groups according their answers:

- Less experienced user – currently uses Nokia mobile phone and basic functions (calls, SMS,
- Less experienced user with touch phone experience - currently uses Nokia mobile phone and book reader, music player). Does not have experience with touch phones. Basic functions (calling, SMS, book reader, music player). Has experience with touch phones.
- Experienced user with touch phone experience – currently uses Nokia mobile phone or touch phone with Android or iPhone. Uses advanced functions like web browsing or emails.

Second, quantitative phase followed based on results of qualitative study. This part was accomplished by 30 partially blind and blind users via electronic form in email conferences and personally at rehabilitation center for blind users^[2,3].

Figure 1 shows how mobile phones are distributed within visually impaired user group.

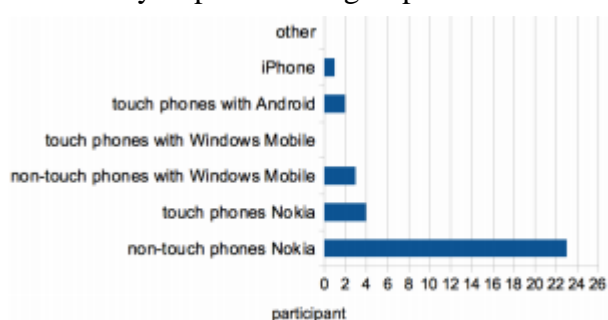


Figure 1: Penetration of mobile phones.

Based on the results of semi-structured interviews, the following design principles were postulated^[3]:

- Alphanumeric keyboard for text input;
- Personalize and settings environment;
- Control using simple touch gestures;
- Notifications on missed events;

Application

Open Eyes is implemented as an Interface Application for Android devices. This Interface replaces default application for system control. Included applications allow blind users to perform basic operations with touch mobile phone as calls, SMS, contacts, alarm, music, information about state and settings.

Conclusion

Development of the application evolved through several stages. First, User study was applied to comprehend needs of blind users. Study was followed by Usability testing, where several prototypes were tested with real users. From best prototypes were selected best concepts and implemented basic core that was enhanced with new features and applications.

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