Exploring Voice User Interfaces for Seniors

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ABSTRACT

Recent product releases such as Apple's *Siri* and Google's *Voice Search* have strongly emphasized the use of voice as a modern interaction modality. Seniors, in particular, might appreciate an alternative to small mobile phone keypads, touchpads and computer mice. This paper presents initial explorations of how elderly people would interact with language-technology-driven interfaces, how these interactions measure up against traditional physical interaction channels, and what features they may require to satisfy the needs of this very specific user group.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: User-centered design; H.5.2 [**User Interfaces**]: Voice I/O

General Terms

Human Factors; Design.

Keywords

Ambient Assisted Living; Voice User Interfaces.

1. INTRODUCTION

We are living in a world that increasingly faces the challenge of technological divergence – a separation that is not only driven by people's social and economical background but also related to a constantly aging society. Consequently, we may find people who want to, or simply have to, operate technologies that often offer only little support for physical or cognitive limitations. In 2010 17.38% of Europe's population was older than 65 years of age and soon we will have less than two people of working age for every person beyond 65 [2]. A better adaptation of products and services to the cognitive and physical abilities of this constantly increasing group of users seems therefore crucial.

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Ever since the presentation of Apple's *Siri*[1] Voice User Interfaces (VUIs) are booming. Potential application scenarios are demonstrated for which spoken language may be seen as the best way of operation. The *vAssist*[2] and the *ARHOME* project aim to adopt this trend by developing VUIs that are optimized for seniors suffering from age-related restrictions. We seek an understanding for the specific needs of this user group, and aim at identifying cases where technology adaptation may be necessary. This paper presents first insights of this work by discussing the results of two focus groups in which participants were asked to use both physical and (prototypical) voice-based interaction channels.

2. BUILDING VUIs FOR SENIORS

An obvious starting point for building technology for seniors is a clear definition of potential users and their requirements. Following this motivation we distinguish between primary, secondary and tertiary users. Primary users are defined as persons aged 65 and older. These persons may show physical limitations as well as restrictions in their vision and hearing, and/or show types of AAMI (Age Associated Memory Impairment). Secondary users are divided into formal and informal caregivers. Formal caregivers are health professionals with a specific (academic) medical education who receive payment for their work. In general these professionals supply diverse supportive (home) care and/or medical care services to senior citizens. Informal caregivers are defined as family members, relatives and/or friends who voluntarily take care of elderly people without any contract or payment. They provide supportive services ranging from housekeeping and grocery shopping to helping with sanitary care. Finally, tertiary users are service providers which are defined as third party companies and institutions that are involved in the provision, operation and maintenance of socio-technological solutions.

2.1 Gathering Initial Feedback

With this concrete user definition in mind two different focus groups were organized; both of which let primary users discuss devices, potential services and interaction requirements of future voice-operated tele-communication and telemedicine applications. The Wizard of Oz (WOZ) method [3] was used to convey the idea of a potential future system. In addition existing voice-control features were demonstrated, using a recent smartphone and a tablet computer. The goal

[1] http://www.apple.com/ios/siri/
[2] http://vassist.cure.at/

of these demonstrations was to give participants a general impression of how a future product might work. In order to better structure the feedback we asked participants to choose EmoCards [1] as a way to express their emotional reactions to the different interaction modalities. EmoCards help to determine the level of pleasantness and arousal of products and services by offering a selection of nine different cards, each of which representing a different emotional state. A user is then asked to select the one state that best describes the interaction with the product.

2.2 First Results

10 potential primary users (4 male, 6 female; mean age: 70.20 years; SD: 3.19 years) participated in the the first focus group, all of whom had at least some experience with modern Information and Communication Technology (ICT) and showed age-related restrictions in their (fine-) motor skills. We started with an exploration of technical devices and their physical location at people's homes and then followed with a discussion about the types of communication channels participants would normally use to interact with their family members and friends. Results show that mobile and land-line phones are preferred communication instruments for short distance, and PCs/laptops for long-distance interactions with family and friends. Devices are usually situated in the living room, the kitchen and the home, and often several of them are available (e.g. mobile phone, land-line and internet-enabled PC). Participants highlighted the cost-effectiveness of text-based communication (i.e. email, text message) which (if necessary) can outweigh potential problems of controlling physical interaction devices (e.g. mouse, touchscreen). In general participants showed an affinity to text-based communication when using the PC/laptop. Text messaging on mobile phones is, however, only used if general input barriers can be overcome (e.g. too small mobile phone keypads or fonts). Spoken input was perceived as a good alternative to finger-operated input techniques.

The second focus group consisted of 8 potential primary users (4 male, 4 female; mean age: 70.22 years; SD: 8.84 years). This time we started with a demonstration of different voice-controlled interaction scenarios using Apple's *Siri* on a recent iPhone. Such was followed by a group work session where each participant had the chance to write an email using both the VUI and a Graphical User Interface (GUI), respectively. The following discussions highlighted some important characteristics of VUIs such as personalization and feedback mechanisms that should be taken into account when designing these types of technologies for seniors. From a GUI perspective the small size of the screen, the font and the keyboard were perceived as the main interaction barriers. The interaction with the VUI, however, was generally perceived as positive; in particular with respect to its input characteristics which did not require the operation of small controls.

Even though these focus groups provided only some basic insight into how people with age-related restriction may operate VUIs, they already permit the definition of some simple requirements for this user group. From a hardware perspective we learned that, in order to be able to physically interact with devices, they should at least have the size of a postcard. Also, while users are generally flexible with respect to the type of device they use (i.e. mobile phones, tablet computer as well as PC/laptops are generally accepted) they do require a simple and clearly structured interface as well as an easy to understand written instruction manual. In addition, font sizes and manual input elements, if necessary (e.g. buttons), need to be adjustable to support users' physical restrictions. Looking more specifically at the aspect of voice-control our explorations showed that our users generally preferred using this new way of interaction over operating a GUI (i.e. the results of the EmoCards highlight that 75% of them found the interaction with the VUI to be "pleasant" or "neutral" whereas for the GUI interaction these categories accounted for only 37,5% of the feedback). They preferred a natural input language over commands although sentences tended to be short and rather precise (i.e. command-like). In cases where problems with the voice recognition or language understanding occurred users expected from the system to pro-actively provide a solution or offer them an alternative interaction channel. Also, our participants consistently preferred a female voice over a male one as they found such was easier to understand. Generally it seemed that the voice-based interaction increased the overall engagement with the device. This impression was supported by participants' demands for giving the system a name so that it better resembles the characteristics of a (virtual) human and their preference for a 'friend-like' interaction style. That is, most participants would choose a personal form of communication (e.g. "Hi Paul") over a formal one (e.g. "Hello Mr. Smith"). In summary we may therefore argue that overall participants were inclined to use VUIs, in particular if such reduces the often tedious interaction with traditional physical interaction channels.

3. CONCLUSIONS

The preliminary results discussed in this paper indicate that voice can be seen as an efficient and engaging input modality for seniors; in particular if they suffer from age-related physical restrictions. Efficient error recovery strategies, sufficient feedback, and an additional fall-back modality that may be used in cases where voice-based interaction becomes too tedious or simply remains stuck are, however, 'must-have' features that applications targeting this specific user group need to offer. Future work will use this initial evaluation results to drive the further design and development of VUIs that are optimized for seniors.

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