

Future TV Interaction: Augmenting Existing Interaction Techniques

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Abstract: The television concept is changing, while the remote control remains the same and tends to evolve more slowly interaction. The future TV is a complex device and viewers need support to interact with it without difficulty by creating easy to use yet advanced interaction tools. One approach to accomplish this is by augmenting existing interaction tools, such as remote control devices. There are various ways to augment the current interaction. This research is focused on utilizing speech input as a complement to the remote control device. Another futuristic approach that is investigated here is augmentation of printed TV guides.

1 Introduction: Problem Area

In recent years, companies are trying to integrate computer and television. Consequently, new television concepts are brought up such as Interactive TV (ITV) that has created challenges to make it easy for consumers to use. Developers of ITV applications provide additional services to the TV medium such as e-mail, chat, polls, games, and web browsing. Besides the new services, the ITV provides a vast number of TV channels. The current interaction designs for ITV are based on the traditional TV's models and devices, such as the remote control. Remote controls support basic actions like channel switching and volume control. For more advanced actions, such as programming VCRs and searching for TV programs, remote controls are impose awkward and unnatural interaction sequences.

The problem that needs to be solved is that current interaction is cumbersome and unnatural, despite the fact that ease of use is the most important requirement for ITV (Choi et al., 2003). Thus, how can we create suitable, yet more advanced interaction techniques for the future TV by augmenting existing technology?

2 Survey: State of the Art

The main ways researchers have tried to solve this problem is by building personalized TV interfaces, developing new remote control concepts, and utilizing speech control.

Personalized interfaces ensure that the right people provide the right information at the right time (Smyth et al., 2002). One problem with personalization is it is not trivial to easily provide information about the viewer. Another problem is that the provided information does not always meet the viewer's interests and profile.

The second approach to solve the problem is developing new styles of remote controls, such as using a personal digital assistant, PDA (Robertson et al., 1996),

or combining touchpad with gesture-based interaction (Enns and Mackenzie, 1998). One problem with this approach is that the design is complex and is suitable for a limited range of viewers.

Portlan et al have studied the third approach and shown that speech can be an attractive interaction technique for the TV setting (Portlan et al., 1999). Speech input has been explored in various domains. However, little is known about how to design such systems suitable for home environment. Studies have shown that speech input provides shortcuts and increases efficiency (Martin, 1989).

Another approach that has not been investigated in the TV context is augmentation of physical paper. Previous research emphasizes the need of integration of digital computation with physical paper in order to obtain the best properties of both (Scaife et al., 2001). From an interaction standpoint, paper-based media provides many advantages that are difficult to capture in a traditional graphical user interface (Sellen and Harper, 2001). This approach can be a solution for the TV interaction problem.

3 Thesis Problem/Question

In this research we look at methods to ease the burden for the viewer. Thus, other interaction techniques for the ITV setting are explored with the purpose to augment the current interaction through the remote control device. These techniques are investigated with regards to accessibility and viewers' attitudes towards them. This thesis work contributes to work on the overall problem by examining the potential of speech enhancement to the traditional remote control and the potential of augmentation of printed TV guides by focusing on the following questions:

- How can speech enhance viewer interaction?
- How can computer-augmented printed TV guides enhance viewer interaction?

4 Method

The thesis questions are answered by conducting of both qualitative and quantitative studies. The quantitative approach is applied in studies aimed to compare conditions with each other, whereas the qualitative approach is applied to get insights in important design qualities and to reveal design knowledge. Totally four case studies are conducted. The studies are focused on issues that give answers to the addressed questions.

5 Results

5.1 Speech Interaction

In a study to compare speech command input with remote control input, speech input is recommended as a complement to remote control interaction (Ibrahim et al., 2001). The results of the study show that speech input is more efficient than remote control input, but remote control interaction is more satisfying than speech input.

Another study is conducted to reveal design knowledge for combination of spoken natural language input with visual output for TV interfaces (Ibrahim and Johansson, 2002). The results indicate positive attitudes towards spoken input, but negative attitudes towards spoken output.

Furthermore, one of the problems of speech interfaces is that speech recognizers make errors when interpreting the users' utterances and these errors can cause irritation and low performance. This problem has been investigated in the TV domain by comparing four alternative strategies followed when error occurs (Berglund and Qvardfordt, 2003). Results showed that displaying an n-best list contains potential word alternatives that match the viewers' utterance gives the most efficient interaction. Furthermore, additional audio feedback to speak out the first alternative on the list does not influence the performance and is experienced as unnecessarily and disturbing.

5.2 Paper Remote

In a study to reveal design knowledge about enhancing printed TV guides we developed Paper Remote which uses digital pen and paper technology (Berglund et al., 2003). Paper Remote is a computer-augmented TV guide that also functions as a remote control for the TV. Viewers tick designated areas on the printed guide to perform actions such as channel switching, getting more information, programming recordings of TV programs, and interacting with TV program providers. In this study we conducted an initial usability evaluation of the Paper Remote concept. Direct access to TV content, availability in the right place and time, type and lasting of information are some positive aspects raised in the study. However, power conflict, lack of search possibility, and disturbance of TV watching are some negative aspects raised in the study. In summary, results suggest that this concept provides straightforward interaction and is appropriate for the TV setting.

6 Conclusion

This thesis is focused on investigating interaction techniques that augment the current way of interaction through the remote control device. Results show that focusing on augmentation of current interaction models is a strategy that empowers the viewer and enriches the interaction. Furthermore, the potential of speech technologies can provide new ways of interaction that are realizable. The Paper Remote is a more futuristic concept, however, a powerful complement to exiting interaction technology that is worth further research.

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