Enhanced Interaction with iTV / Interactive Video

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German Abstract

Heutige TV- und Video-Präsentationssysteme bieten Nutzern Interaktion hauptsächlich zur Bedienung des technischen Geräts oder des Mediums. Interaktives Video und auch Interaktives TV (iTV) auf Basis der Konvergenz zwischen Internet und Broadcast-Systemen, erlauben demgegenüber die Möglichkeit zur Interaktion mit Video-Inhalten und weiteren verbundenen Informationen. Gerade im Bereich des iTV muss hierbei auch eine Antwort gefunden werden, wie der Nutzer mit dem neuen Medium interagieren soll.

In diesem Artikel wird die Architektur eines interaktiven Video/TV-Systems beschrieben, das insbesondere den Handhabungsaspekt betont. Dabei wird die Technik des »off-screen hyperlinks« präsentiert, der einen vereinfachten Umgang mit der neuen Interaktivität ermöglicht.
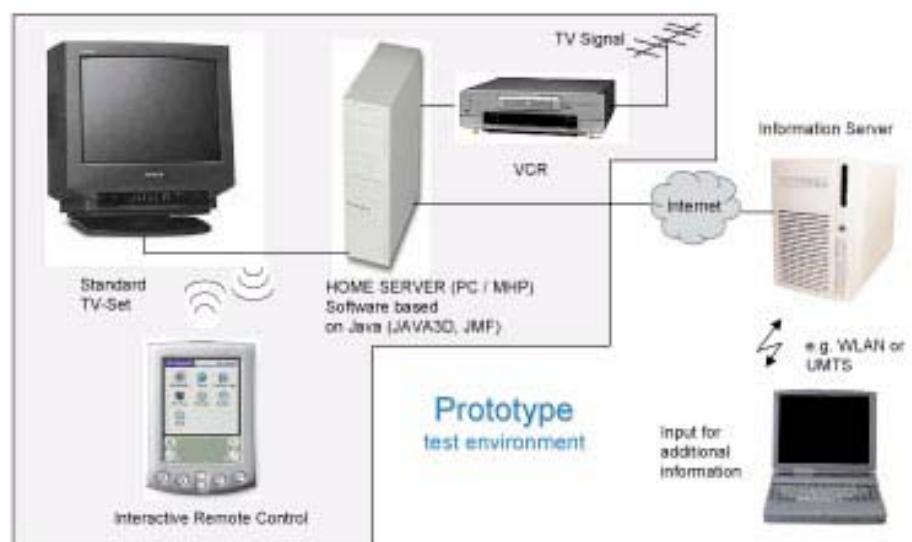
Introduction

Today information retrieval via the Internet and interactive information in multimedia applications such asmultimedia encyclopedias are wellknown and widely used. But now, access through new modes gives users interactive information that is based on their own needs. In contrast, classic television has mainly developed by increasing the number of channels available. The interaction paradigm in television broadcasting has stayed the same. Many attempts to introduce Interactive TV have failed due to the fact that today's users are already accustomed to handling information in a more personalized and interactive way. Past approaches were chiefly limited to Video-on-Demand (VoD) functionality, Home Shopping applications or Electronic Program Guides (EPGs). This range of interactivity does not reach the level that other media already present. For future applications in the area of Interactive video / Interactive TV, it is crucial to provide interaction with the content and not only with the media itself. Possible areas of this interactive broadcast format could be business information, education, edutainment or sports.

System Architecture

The system presented in the following integrates set-top boxes, an Internet back channel and »off-screen« hyperlinking on PDAs used as an intelligent remote control. It enables the former television consumer to play an active part in the video presentation and to control presentation of additional information in order to become an information user - if he wants to. The video presentation consists of video content and additional information, dynamically assembled individually, according to every single client. Figure 1 gives a general overview of the system prototype.

Figure 1: General System Overview

Figure 2: Architecture

Considering video presentation today, the video content can be separated from the information part that is given as an addition and which can be divided into two main groups:

– *Overall information*: This information type has a static character and will not change during the course of the presentation (e.g., abstracts of video content, names and roles of actors). It is usually generated before the presentation and may be provided via video text.

– *Time-dependent information*: This information type is of a highly dynamic character and is often directly related to the current video content. In live videos it is not predictable in any sense and is always time-dependent (e.g., names of persons visible on the screen, current standing in sport matches, stock exchange quotes, etc.). Today this information is often faded into the current video image, leaving no choice to the television user whether or not he wants to see it.

The system presented here provides the user with the option to determine how and when additional information is presented while watching video content.

The main components are the server unit, which may be connected to live sources and/or video-on-demand systems, an advanced television set capable of Internet access, and a bidirectional remote control including a dynamic animated screen. Figure 2 displays the underlying client - server architecture.

The server side is in charge of delivering the video content and the corresponding additional information. A primary task for the server is to handle the synchronization between these two information flows. The server architecture is designed as a distributed system, which means that the actual video server unit might be located at a different location from the information server. A video channel is established between the server side and all clients. This channel carries content, which is the same for all clients accessing it. So far, this channel is based on multicast streaming technologies using Internet connections. In the future, the video content could even be carried by broadcast systems via satellite.

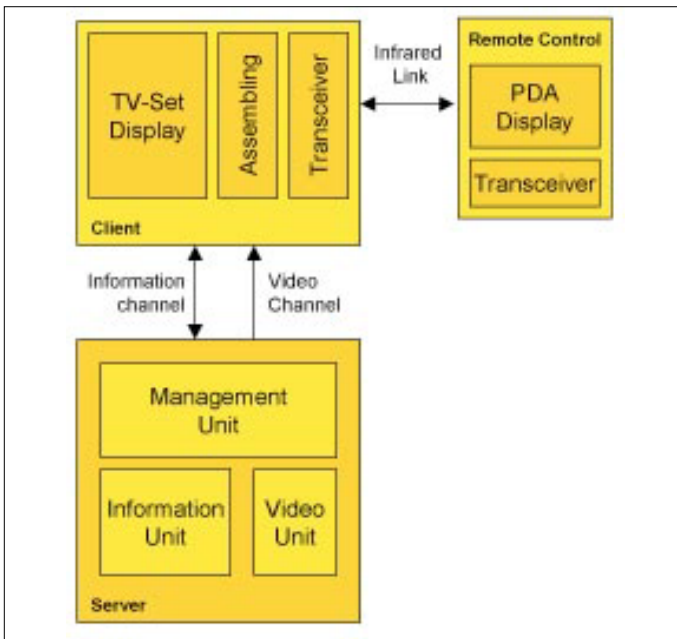A second channel defines the point-to-point connection between each client and the server. The channel realizes the data exchange underlying a point-to-

point connection since it carries the information that is determined for a single client and not for a group. This point-to-point communication is based on Internet connections.

The client side is equipped with an advanced televisionset capable of accessing the Internet. Advanced TVsets from a large number of producers can already be found on the market. For the prototype solution of the system, an advanced Loewe televisionset was chosen, one that is not only equipped for Internet access but also capable of running Java Applets. In future these features will be covered by the standardized Multimedia Home Platform (MHP).

Information Access

The main challenge for the shown system was to find a solution that would provide the user with a simple and yet effective way to access the information resources upon his request. A PDA was chosen to substitute a normal remote control (RC) device for optimization of the information handling. Besides reproducing common RC functionality, the PDA displays within this application charts. A chart is a graphical surface containing icons and/or text elements. An icon or a text represents an »off-screen« hyperlink to additional information. This means with a click on these hyperlinks within the display area, a user requests additional information from the system, like a textual hyperlink within a web page. As a second option for selecting these hyperlinks, the PDA buttons below the display can be used as well. Usually the charts are divided into thematic subject groups providing a more structured overview about the possible information content accessible within the video presentation. Figure 3 shows a typical chart on a PDA device.

A PDA screen can also show the additional information itself. The intention here is to keep the main screen clean from small portions

of information that some users would like to see but not others.

With the PDA, a user requests not only additional information, but also defines his or her personal system preferences. Personal system preference capability is a great advantage for this application, since different users have different interests and background knowledge about the same subjects. When users retrieve identical information linked to the video content, it is always a compromise for the audience, not an ideal solution. Consequently, adapting additional information according to individual user needs results in more satisfaction.

The system preferences that can be set up by the user according to his needs can be divided into three logical main groups:

– *User preferences*: A user might change the language in which the information is displayed or choose certain topic categories of interest. The latter option would lead to adapted information content according to the personal interests of a user. Other options might include the display duration of the information content, etc.
– *Remote Control preferences*: These preferences define the remote control itself, for instance, color or gray scale

displays, the display size or the assignment of the buttons which might be useful for left-handed users.
– *TV preferences*: The preferences of the television set can be compared with the ones of the remote control. Even here certain settings in the preference list allow the definition of the screen size and the TV aspect ratio, for instance.

Figure 4 shows the interplay of the remote control and the advanced television set. The displayed information is usually of a transparent type as can be seen within the figure.

Future work
Considering the convergence between the Internet and broadcast services, the presented system merges both network types in order to provide a video presentation combining video content with direct information retrieval upon user's request by implementing off-screen hyperlinks. In the future, the work will focus on the objects within the video scene. So far, additional information is linked to the video content but not linked to a video object in particular. Retrieving object information from video streams will be a challenging task.

From the hardware point of view, the Multimedia Home Platform (MHP) will be evaluated for the purpose of deploying the system.

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Figure 4: Interplay TV and Remote Control

Figure 3: Typical Chart