VideoTable: A Tangible Interface For Collaborative Exploration Of Video Material During Design Sessions

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ABSTRACT
In this paper we present our VideoTable and VideoCards. The VideoTable is an augmented meeting table enabling collaborative exploration of video material through a multi-user tangible interface. The VideoCards are paper card representations of video snippets. Playback of video is initiated by a pushbutton permanently attached to a VideoCard. VideoCards can be manipulated alongside other physical design artifacts present on the VideoTable. Preliminary observations of use indicate that the physical embodiment of digital video provided by our VideoCards enables the seamless mix of video with other physical design artifacts that we are aiming for. Our implementation is based on modified passive Radio Frequency Identification (RFID) tags.

Keywords
Tangible user interfaces, paper interfaces, RFID tagging, CSCW

DIGITAL VIDEO AND OTHER DESIGN ARTIFACTS
We have had the opportunity to explore the use of video material in several design workshops over the last couple of years. In these workshops we have taken the perspective expressed by Buur et.al [1]. Rather than treating video recorded field observations as ‘hard data’ video is seen as both an inspirational and expressive material used alongside other design artifacts. The artifacts either produced at, or brought to, a design session include documents, postit notes, cardboard mockups, etc. These physical artifacts are typically placed on a meeting table and the participants thereby establish a shared physical space for their design activity. In general, the qualities of persistence and tangibility inherent to physical design artifacts seem to be crucial when used as part of collaborative design sessions. Physical artifacts can easily be passed around, manipulated and organized in physical space by the participants. They serve as temporary focal points for the group discussion and permanent reminders of earlier stages in the discussion. In a traditional setup the playback of digital video is typically controlled through a single-user graphical interface. In these settings the ephemeral nature of video playback and the intangible character of the graphical user interface stand in sharp contrast to the persistent and tangible qualities of the physical design artifacts. As a consequence engagement with the video material is separated from the collaborative activities involving manipulation and spatial organization of the artifacts physically present on the meeting table. Watching the playback of a video is therefore often experienced as an activity of its own disrupting the flow of the design discussions. We suggest that the use of paper cards with embedded pushbutton controls (VideoCards) for playback of video snippets can enable a more seamless integration of digital video material with other design artifacts during design sessions. Our VideoTable allows a group of 4-5 people to gather around an augmented meeting table and manipulate and organize VideoCards alongside other design artifacts present on the table.

RELATED WORK
We have borrowed the notion of VideoCards from [1]. We take the idea of using paper card representations of video snippets one step further by demonstrating how the playback of video can be intimately coupled with physical manipulation of the cards. In MediaBlocks [4] wooden blocks are used as generic physical containers for digital video. Rather than using a generic physical embodiment we have deliberately aimed for a design where each of our VideoCards explicitly represent and is permanently associated with a specific video snippet. The VideoCards can thereby enter the design discussion alongside other physical artifacts and be manipulated and organized in meaningful ways even without activating the playback of video. The Palette [2] showing how paper cards are used to control multimedia presentations and PaperButtons [3] exploring how multimedia controls can be made part of the cards are closely related to our VideoCards. The main difference is that we are designing for a collaborative setting and hence, introduce an augmented meeting table as the arena for interaction. Other systems such as [5] have
used passive RFID tags to implicitly initiate computational processes when moving physical objects into proximity of a tag interrogator. We have modified the standard passive RFID tag to allow for a more explicit temporal control.

THE PROTOTYPE

The implementation of our VideoCards and VideoTable prototype revolves around a 125kHz RFID system using Philips Hitag1 transponder chips and four Micro RWD H1C tag interrogators from IB Technology. The tags are modified to allow for explicit user activation by inserting a pushbutton in the tag circuit (see fig.1). The VideoTable is a 75x75 cm acrylic surface on top of four antenna coils connected to each their tag interrogator. The left hand side of figure 1 shows a picture of the VideoTable with 9 VideoCards distributed on the VideoTable surface. The VideoCards are 8x10 cm paper cards and holds the picture of a key frame from the associated video snippet. A pushbutton activated RFID tag is permanently attached/glued to each card. The VideoCards can be moved around on the VideoTable without initiating the playback of video until a design session participant decides to activate playback by pressing a VideoCard pushbutton. VideoCards can be identified and video playback initiated as long as the cards are within 5 cm of the VideoTable surface. When a VideoCard pushbutton is pressed the 32-bit tag ID is read by one of the four tag interrogators beneath the VideoTable surface and passed on to a PC via the serialport. The ID is mapped to the video file associated with the VideoCard and playback of the video snippet begins. The video playing is projected on to a wall or projection screen at the end of the VideoTable. Typical response time from pressing a pushbutton to the start of video playback is about 500 msec. The number of VideoCards that can be present on the VideoTable is only limited by the physical size of the cards and tabletop. But more important, other physical objects can be present on the VideoTable thereby allowing the participants to easily make VideoCards part of the overall spatial organization of design artifacts.

PRELIMINARY OBSERVATIONS OF USE

We introduced our VideoCards to a group of five people during a one-day design workshop. We barely gave any instructions on how to use the system. We had prepared 9 VideoCards representing video material brought to the workshop by the participants. The participants immediately acknowledged how easy it was to activate the playback of video and made comments on how the use of VideoCards made navigation through GUI folders and file systems obsolete. Within 5-10 minutes the VideoTable not only contained VideoCards. Numerous physical artifacts including cardboard mockups, Lego figures and pieces of paper documents were placed on the VideoTable next to and sometimes even on top of the VideoCards. During the following presentation the group asked the other workshop participants to gather around the VideoTable. They then started presenting their design concept by manipulating the artifacts on the table and activating the playback of video when needed.

ONGOING WORK

While we feel that the result of our preliminary observations of use looks promising we need to conduct more thorough studies and intend to do so by bringing our VideoTable to use in a number of workshops within the next couple of months. We are in the process of improving the robustness of the system and the look and feel of our VideoCards. We are at the same time trying to reduce the overhead currently required to produce the VideoCards. One goal is to enable the participants to dynamically create and add new VideoCards based on the viewing of ‘raw’ video material during the design session. In general, we would like to further explore the notion of physical embodiment of digital media and the coupling between physical manipulation and control of computational power in collaborative settings.

REFERENCES