VideoPlay: Playful and Social Editing of Video using Tangible Objects and Multi-touch Interaction

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Abstract

VideoPlay is a novel tabletop system for editing video using tangible objects and multi-touch interaction. It targets the unique capabilities of the Microsoft Surface platform which supports high precision multi-touch and physical object sensing and tracking. New interaction techniques are presented that allow content to be downloaded from mobile devices onto the table. Physical tiles representing video clips, transitions and effects can be assembled and locked together with the aid of embedded magnets to create new video sequences. The intention is to support playful interaction, making the process of video editing more collaborative and engaging when compared to traditional techniques.

1. Introduction

Much research has been conducted in the field of tangible user interfaces following Fitzmaurice's pioneering work on graspable interfaces in the mid 90's [1]. By using physical objects, users can employ a large range of expressive gestures leveraging their haptic and spatial reasoning skills, and knowledge of everyday object manipulation. One compelling form of tangible UI is in supporting creative and playful interactions on the tabletop (for example, the reacTable [2]) as physical objects allow for rapid experimentation, spatial rearrangement and movement.

We describe a system that merges both physical and virtual interaction for playful editing of short video sequences. The work is inspired by the unique capabilities of the Microsoft Surface platform which supports high precision multi-touch and sensing and tracking of physical objects.

Building on previously reported work on tangible video editing systems such as [3], the lightweight novel interaction techniques described in this paper open up a range of new interaction possibilities. Using carefully designed physical interface objects, users are able to rapidly explore and create new video sequences.

We also discuss our initial explorations for invisibly marking the physical objects to enable them to be tracked on the Surface.

2. Design and interaction

In this section we describe VideoPlay, including the form, interaction and technology aspects of the design.

2.1 Video content

We anticipate the main source of video clips to come from mobile devices, which when placed on the table, wirelessly transfer their content onto the table surface. We are also investigating other techniques such as wiping the device across the Surface to 'spill out' the content and rotating the device to quickly 'spin' through the content for more detailed navigation.

2.2 Physical tiles

The form of the physical tiles, shown in Figure 1, has been motivated by rapid assembly and rearrangement, coupled with a simple locking mechanism. The latter is achieved by small magnets embedded into the edges of the tiles, in a similar fashion to Triangles [4].
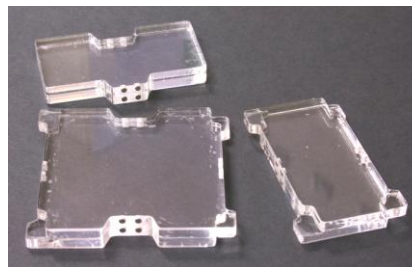

Figure 1. VideoPlay tiles

To sense the tiles we utilize a simple domino style visual marker scheme as used by Surface and described by Wilson [5]. We have been experimenting with materials such as ITO and AgHT to create invisible markers so as to avoid interfering with the virtual content underneath.

2.3 Associating physical with virtual

Tiles can be associated with virtual objects by placing a physical tile over a virtual video clip. Once an

association is made, when the physical tile is moved on the Surface the virtual clip moves directly under it, providing a one to one mapping.

2.4 Assembling physical tiles

The physical design of the tiles afford 'locking' together both because of the magnets and the design of their shape, as shown in Figure 2. This makes it possible to join multiple tiles together to form a linear timeline which can easily be moved on the Surface as a single unit.
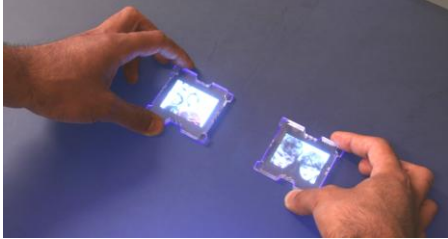

Figure 2. Assembling VideoPlay tiles

Upon assembly, a virtual preview appears to the right of the tiles as depicted in figure 3. This shows a preview of the entire video which can be played and paused by tapping with a finger, or scrubbed by moving a finger horizontally over the preview pane.

2.5 Adding effects and transitions

Video effects and transitions can be added using additional physical tiles as shown in Figure 3. The different physical shapes of the tiles helps guide the user during the assembly process.
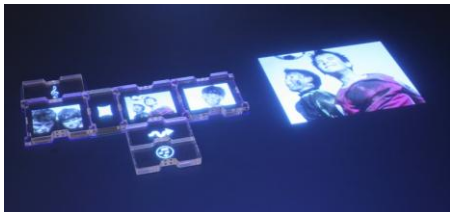

Figure 3. Transitions, effects and preview pane

The desired transition or effect can be associated with a physical tile by moving the tile over a palette of available transitions and effects. Effects and transitions can be aggregated together as also shown. When an effect tile is added to a video tile, the effect is seen immediately.

2.6 Cropping and scrubbing

Another novel feature of VideoPlay is the ability to crop and scrub video clips. Both of these actions are important aspect of video editing, and are often difficult to achieve in traditional UIs, requiring fine-grained selection and mouse control. In VideoPlay, this is done using a more intuitive approach, using a metaphor somewhat analogous to unrolling a reel of film. Each

video tile has virtual buttons rendered on either side of it. To activate this interaction, the user touches a finger on one of the buttons and moves the tile in the opposite direction, 'pulling-out' the video, as shown in figure 4.

The user can then indicate a 'cut' gesture by moving their finger across the video, which causes the video to be cropped at that point. Depending on which side of the tile this action is performed, the video can be cropped either from the beginning or end of the clip.

Further, the user can touch on the 'unwound' video to rapidly scrub forwards and backwards through clip.
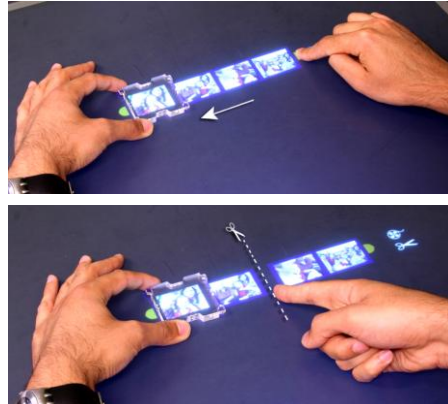

Figure 4. 'Pulling-out' and cutting a video clip

3. Future work and discussion

To extend our work, we see real potential in exploring areas such as improvisational live video performance. To enhance the gestural aspects of the system, we will look at other realms of gestural interaction such as table-top games and performing arts that are using gestural movement compositions. The current use of physical and digital media together also suggests a higher level research question about the design rationale behind the use of physical versus digital, which we want to address as the project progresses.

4. References

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