Surface Interaction to Support Collaborative Multimedia Live Performances

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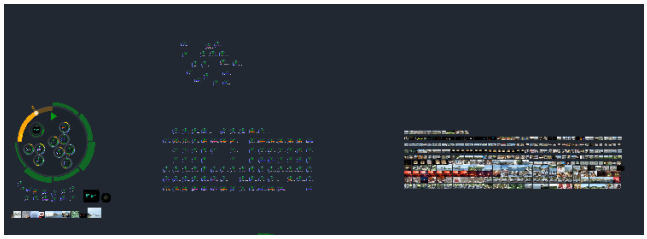

Figure 1. The prototype at *show-all* zoom factor. 500 media content items are displayed at once, full fidelity images, audio and video. An LoD algorithm sustains responsiveness.

ABSTRACT
This paper describes surface interaction applied to a research prototype used in real world longitudinal studies of collaborative multimedia live performance and rehearsal.

Categories and Subject Descriptors
H5.m. Information interfaces and presentation (e.g., HCI): J.5. Arts and Humanities: Performing arts

General Terms
Design, Human Factors.

Keywords
Surface Interaction, Zoom User Interface, ZUI, HCI, CSCW.

1.INTRODUCTION
This paper presents the construction of an interactive prototype for collaborative live multimedia performances whose purpose is to explore "surface interaction" in practice. The prototype is currently being field-tested. Collaborating laptop musicians and video artists use the prototype in real performance situations using monophonic touch screen or keyboard-and-mouse. The driving vision is that information content is the base for all interaction between users and the systems. I call this concept content centric interaction. Users conduct their activities in an unbroken creative flow. The computer is a surface onto which all the user's' information content is visualised; the surface can extend to infinity like a magic paper. Surface interaction permits content centric computing, where content of different data type is moulded into blended media. Surface interaction is well suited for exploring novel interaction techniques for instance gesture control and multi touch displays, and is quickly emerging from a concept to usable tools and systems. The most prominent and recent example of surface interaction is Microsoft Surface [1], and Silverlight Deepzoom of Microsoft Live Labs Seadragon [2].

2.PROTOTYPE EXPOSÉ
The prototype relies on the navigation techniques: zoom, pan, and search/filter. Commands are issued by either keyboard typing or direct pointing and click/touch. Figure 1 displays an overview of the prototype with 500 media content items, sound clips, images and movies, in its database.

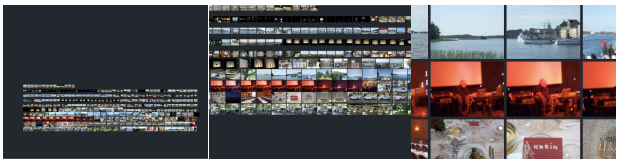

Figure 2. Interactive zoom sequence from the overview image content items (left) to inspection of a few items (right)

- Zoom is a basic navigation technique in surface interaction [3]. Figure 2 shows three keyframes in smooth graphical zoom with transition along the trajectory through the cursor screen position into the surface, intermediate frames are left out. A level-of-detail algorithm sustains responsiveness. The concept is similar to Deepzoom from Microsoft Live Labs Seadragon [2]. There are two interaction methods for zoom. First, the users circulate the cursor over the item to zoom in on, clockwise zoom in, and counter clockwise zoom out. With a touch screen, users touch the surface, and then circulate their finger over the item of interest which is different to the pinch gesture in Minority Report [4], Jefferson's demo [5], iPhone [6], and Microsoft Surface [1]. Second, with a mouse, zooming is achieved with the scroll-wheel; an upwards scroll maps to an increase of zoom factor and vice versa.
- Pan navigation is done by *dragging*. The down event (mouse button or touch) must not hit any item, or the drag will move the item on the surface. Alternatively, using the right mouse button will pan through out the interface..
- Incremental search and filtering are powerful techniques for navigation, information retrieval, and non-direct manipulation. The users type short substrings and get immediate feedback, for each key-press. The system zooms to display the selected items.

It takes only a few keystroke to navigate to and select a specific item.

2.1Command Invocation

Command invocation is the basic control mechanism of the prototype. There are two ways to send commands to items. Both follow the structure of noun-then-verb; first users select items (noun), then they select commands. They either type the command by incremental search, for example, the letter 's' maps to *scale*, 'm' to *move*, and 'u' to *undo,* or they touch the command from a menu. The menu is actually the initial command search list. The prototype has direct manipulation controllers, such as buttons and sliders. These are particularly useful with touch screen in live performance situations.

3.IN PRACTICE

Longitudinal studies of the prototype requires usable features for collaborative music and video live performances. Figure 3 shows the performance item, its contained media content, and sound and image processing components. The performance item can be shared, among users in collaboration, any change on one computer is immediately broadcasted to all the participating users' computers. The prototype's context of use and design is similar to the ReacTable by Kaltenbrunner et. al.s´ReacTable [7], but users have their own personal devices synchronised similar to the daisyphone group improvisation tool by Bryan-Kinns [8]. Figure 3 shows how audio loops are surrounded by phrase selector controllers and audio processing components. Different parameter dimensions map to colours: time – orange, frequency – yellow, amplitude – blue, balance – cyan. A glowing ball indicates the slider's current value, and affords touch. Sliders increase clockwise. As figure 3 illustrates, have avoided a classical rectangular-boxes-along-a-timeline design of the performance and media content items. In a broad study with 50 respondents I discovered that users of Ableton Live [9] use the *timelineless* Session View for 95% of the time during a live performance. Based on this study, all temporal media in my design are circular and their position on the surface has no temporal meaning.

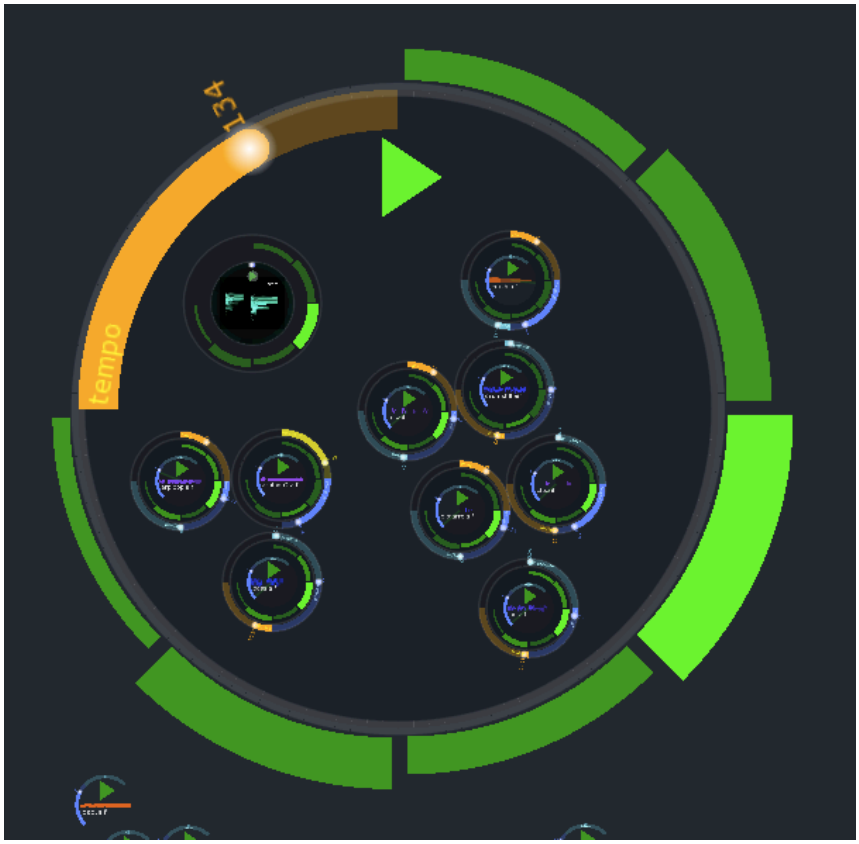

Figure 3. The performance item component. The green controllers around the component play different phrases. Similar controllers enable (or disable) media content in phrases. Media content can be surrounded with unit effects for image and sound processing. The line width of surrounding circle is proportional to the audio output, looking like a vibrating loudspeaker. Sliders run clockwise from lowest to highest value.

4.REFERENCES

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