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ABSTRACT

This paper suggests that in team-based creative production environments such as music recording and mixing sessions, multi-touch interfaces should be designed to act like tools rather than as collaborators, and no interface element should be created or moved except through a user's touch. While seemingly simple, adhering to these suggestions appears to provide a framework that assists in creating engaging and natural designs.

Keywords

Microsoft Surface, Multi-touch, kinesthetic interface, digital audio workstation, spatial memory, user interface

INTRODUCTION

The modern music control room has evolved a language and pattern of tangible interfaces ideal for a highly demanding creative production environment. The sound engineer is surrounded by equipment providing interactive surfaces with tangible controls that require precise analog adjustments and is challenged to simultaneously: plan complex non-linear editing sequences, consider an imaginary flowchart consisting of hundreds of signal routes and processing algorithms, and make timing decisions within milliseconds - - all while surrounded by artists, producers, and spouses, under stress and without sleep, who all seem to have opinions.

Our lab is experimenting with a Microsoft Surface to discover multi-touch gestures and approaches useful to creative teams collaborating on the production of linear media such as film and music. We initially are focusing on the needs of recording engineers using digital audio workstations, by presenting proof of concept interface mock-ups to professional engineers and incorporating their feedback in our thinking and design. Our initial work has led to a fundamental design approach and method which is described here.

A TOOL, NOT A COLLABORATOR - PROTECTING THE DIALOG BETWEEN ENGINEER AND ARTIST

Our initial design prototypes were tested by sound engineers. While their feedback provided interesting design details, an unexpected realization emerged that had little to do with our initial approach. Design for creative environments is not primarily about Fitts tapping tests or visual aesthetics - it is to avoid interfering with the engineer's core responsibility: to engage in a continuous dialog with the artist and translate this dialog into technical actions.

Accordingly, user interfaces must be designed in such a way as to not provide distractions to the existing dialog between artist and engineer. At first glance, this frames the problem in a manner similar to that of Issacs and Walendowski [1], which states that the goal is to create an collaborative interface for which the ideal movie butler serves as a good example: always available, prepared to do requested tasks, asks few questions, and works around problems.

In exploring the nature of the dialog, however, it was apparent that even this approach would be too intrusive. The making of music involves authoring a wide range of nuanced feelings within the sound. The emotional state of the content - as well as the emotions of the artists and those around them - plays a significant role in the flow of such an authoring process. As such, the engineer is required not only to be emotionally perceptive of the music, but also of the verbal and non-verbal communication taking place among the many people contributing in a studio environment, including cues such as gesture, posture, prosody, and proxemics.

Ideally, the engineer's eye contact, body language, and emotional state would not be influenced or distracted by our interface design, and even a collaborative approach as neutral as a butler would add an unnecessary voice to the studio dialog. The engineers emphasized how important it was for the technology to become part of, and not interfere with, the flow of energy and emotional state of the artists. In looking for solutions, we explored the existing patterns used by recording engineers. An informative interview quote was "I just want big knobs that I can turn, and then

hear something change, the bigger the knob the better." Engineers tend to think of the equipment around them as tools - like a hammer - and they want it to respond directly to their input. To do one thing, do it well, and not talk back.

Thus the classic claw hammer (with its embedded undo feature) embodies our fundamental design approach***: the ideal interface is a tool, not a collaborator – keep it dumb***.

I PUT IT THERE, YOU LEAVE IT THERE - LEVERAGING SPATIAL MEMORY

Digital audio workstations provide a plethora of algorithmic power for which this 'dumb tools' approach would seem ill-prepared. Commercially available multi-touch audio controllers harness such power by initially imitating the look and feel of traditional mixing consoles, then providing deeper layers of control by switching between pre-defined layouts, thumbnail previews, zooming, scrolling and the like.

Systems such as the Jazz Editor for the Lemur and the SurfaceEditor by Kellum and Crevoisier [2] produce experiences that are visually beautiful and quite powerful. Unfortunately, such experiences inherently create a conversation between the device and the user, distracting from the engineer's ultimate collaborator – the artist. This is akin to a DJ spinning records at a party, engrossed in the turntables and mixing board, the DJ may only occasionally look up at the crowd.

Such bi-directional interfaces fail to protect the dialog between artist and engineer because they force an interactive and iterative process. Instead, we suggest that multi-touch surface interfaces should be no smarter than a real table. Menus should not pop up and there should be no modes. In the real world – at least the one Newton described - those things simply do not happen on a table. But without classic interface devices as simple as a pop-up menu, how can an area as small as a Surface provide the complex functions available in a digital audio workstation?

The solution can again be found in the existing patterns used in a recording studio. Engineers create and map their control environment. Notes are written on tape and stuck to control devices, knobs are set, equipment is placed, signals are patched with physical cables. While it seems like a cluttered and chaotic environment, it is well understood by the engineer as nothing moves or changes without the engineer being involved.

On a cluttered desk, users' minds can keep track of a large number of items because of the kinesthetic cues, but not if the items on the desk start to move on their own or are quietly placed by another user. We suggest that if the Surface were to act as a simple table, then users would be able to leverage kinesthetic cues [3] to help create a spatial memory model. This potentially could decrease the interface's cognitive load, thus freeing the engineer to attend more closely to the social dynamic in the studio and the emotional content of the music.

This leads to our second core design principle***: I put it there, you leave it there***. The user must create every element on the Surface through touch, and no element may move or change function without the user's touch.

CONSEQUENCES:

In trying to build interactive prototypes that hold fast to these two core principles, we have found a number of exciting results that look to be generally useful for multi-touch designs. We list some preliminary observations here and hope to discuss a video of our work in progress during the workshop.

- Conventional "zooming" gestures can be used to expose and conceal functional complexity as well as simply to change an object's size. We show an application of these gestures with a LISP-like programming language to display function call hierarchies as code or as a calculated value. Other sorts of tree structures could also be subject to this kind of manual progressive disclosure and function evaluation.
- Another form of manual progressive disclosure lets users "open up" or "fold open" a list by means of a physically analogous gesture. We suspect that using a similar gesture to the movement of the list UI (rather than an arbitrarily mapped gesture like a "tap" or "click") improves user understanding of the list structure as the user forms a tactile map of the elements in the list.
- Permitting users to "build as they go" can lead to atypical signal flow. Some users "brought controls to the signal"—an ordering not found in the classic patch-cord methodology of the studio. It suggests a new type of interface in which the user first defines a need for a control, then refines the control's actual modulation based on experimentation.

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