Exploring Tangible Interaction for Collaborative Creative Experiences

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Abstract
This position paper considers music as a platform to explore tangible interaction for collaborative creative experiences. We present two systems that begin to explore the possibilities and challenges of designing interfaces for creative sound.

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Music and Sound; Creative interfaces; Collaboration

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H.5.m. Information interfaces and presentation: Sound and Music Computing

Introduction
With any form of creative expression, the tools being used to create are highly linked to the creative process. Tools might inspire creation, but also guide and limit what it is possible to create, often through the use of physical constraints. A traditional piano, for example, constrains the musician by providing them only 88 discrete notes, not all of which are even reachable at once. Using constraints for guiding the user is also a common principle in tangible interaction design, where constraints can be leveraged to not only limiting possible actions but also to inspire meaningful interactions. Tangible interaction enables rich input, including touch, physical objects, sensors, and in-air

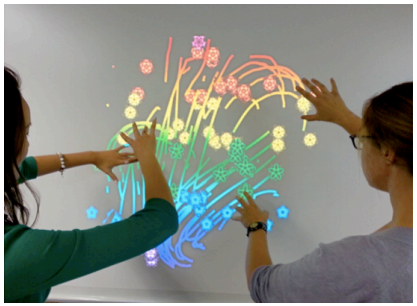

Figure 1. A pair of students use gestures to create music and visuals with musicAir

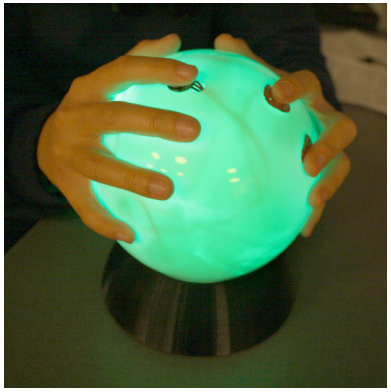

Figure 2. EmotiSphere in use by an individual

gestures. Furthermore, tangible interaction can facilitate collaboration by offering ample space and enhancing visibility of actions. Considering the leverage of constraints in both music making and tangible systems, we see music as a platform to apply and study tangible interaction, especially in collaborative creative scenarios.

Creative Collaboration

In traditional collaborative music making and in real-time collaborative efforts, the integrity for the individual is arguably lost. Each person is contributing only to a collective creation and has little room to explore independently in the moment. Maybe this is a good thing; perhaps the collective is more powerful than anything the individual could contribute. But perhaps there are times when each individual's exploration and contribution are valuable and necessary. Introducing intelligent machines to the collaboration would allow us to explore what models for collaboration help individuals and groups reach new potentials.

In our lab, we explored collaborative music making with musicAir [2], a system that uses a Leap Motion sensor to convert hand gestures into music and visuals (Figure 1). The sensor's visible field is small and limits the interaction to one or two people at a time, so we consider this a tool for small-scale collaboration. The music generated is a repeating loop, where each gesture adds a phrase to the track and a visual representation to the screen. We also considered small gestures performed close to the user's body to be personal or explorative and large gestures as part of a performance. Testing variations of this system could lead to insights about the effect of personal space and integrity of individual contributions on collaborative and creative efforts.

Personal Experiences

One of the risks of using machines for creative expression is losing the human. Traditionally, there are years of history that connect people to their instruments and music, making music-making personal, expressive, and therefore very human. When the instrument is a machine, embodiment could play a large role. Combining tangible interaction with computational power allows us to use information and interactions in music making to inspire new personal connections and expression.

In our lab, students developed EmotiSphere [1], a system that generates music based on the emotional state of the user, assessed with skin and heart rate sensors (Figure 2). This system virtually eliminates the user's ability to control the music, removing the human's own creativity in the process, but still produces something deeply personal. One could easily imagine ways this data could be used by other systems, creative or collaborative, for making the generated music even more personal.

Discussion

The examples above show how music lends itself to exploration of tangible interaction as a platform to break out of traditional creative and collaborative settings. Our future work includes development of new systems for exploring collaborative creative experiences that are meaningful and personal. We look forward to exchanging ideas and experiences with other workshop participants.

References

[1] Chuang, G., Burns, S., Wang, S., Shaer, O. EmotiSphere: From Emotion to Music. Work in Progress ACM TEI 2015.

[2] Kwok, I., Lee, C., Okerlund, J., Zhu, Q., Shaer, O. musicAir: Creating Music Through Movement. Work in Progress ACM TEI 2014.