

Shaping Sounds – A Vision for Tangible Music Interaction

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Abstract

In this article the idea of music composing with an elastic tabletop including tangible objects embedded into its surface is described. An elastic display dynamically creates several physical shapes representing different music samples for interaction. The shapes can be activated and manipulated by the user to arrange the associated samples. The key benefits of this form of interaction are the intuitive use, the ability to playfully explore music and the expressiveness of the physical representation of sound.



Figure 1: The proposed interactive deformable surface.

1 Introduction

Generating Sounds and arranging music has been of major interest in various publications regarding Tangible User Interfaces and multi-touch interaction. Tangible User Interfaces are often utilized in the context of music, because the playful interaction makes it easier to understand the complex abstract concepts which are working “under the surface”. One example for such an interface is the *reactTable* (Jordà et al., 2007), which employs differently shaped tangibles to generate sounds. While the *reactTable* focuses on generating music, the vision proposed in this article describes an innovative interaction technique for arranging and

modifying existing audio data, such as short music samples. Close related examples are the *mixiTUI* (Pedersen & Hornbæk, 2009), a tangible User Interface for tabletop systems, or hardware like the *KORG Kaos Pad* (KORG, 2012) or the *Monome* (Monome, 2012). Although these approaches are similar to traditional instruments, the utilization of sliders, rotary knobs or buttons does not sufficiently convey the underlying musical mechanisms. Additionally these interfaces suffer from their inherent inflexibility. The layout of the employed controls is fixed, controls have discrete states, but the current state is not always obvious. As result there have also been ideas for more artistic user interfaces, which allow the user to interact with music by drawing (Gibson & Love, 2010) or represent different kinds of audio data as a map in order to visualize auditory relations (Bown et al., 2012).

The vision described in this article strives to connect the advantages of tangible interfaces and the polymorphism of digital interfaces in the context of music composition. It employs a deformable display to dynamically generate different shapes, each of them representing a single music sample. The user can interact with these shapes to perform basic task for arranging and modifying complex compositions. Additionally the idea offers the opportunity for collaborative use, like in an orchestra where each musician is contributing a distinct part of the whole composition.

2 Concept

As described above, the proposed concept utilizes an elastic display to generate shapes dynamically. Each shape represents a short music sequence, and can be manipulated separately. A predefined position on the surface for each uploaded sample ensures easy recognition of samples using the strength of human special memory. If the user moves a hand close to the position of the sample shape it starts playing a preview. This hover effect enables the user to explore the different samples and their locations. The fixed position of the shapes allows the user to acquire a mental map of the music, such when playing an instrument where different movement trajectories, hand poses and hand positions closely relate to the resulting sounds. Acting this way, playing music corresponds to physically shaping surfaces which opens a huge design space for interactions and experimenting with music.

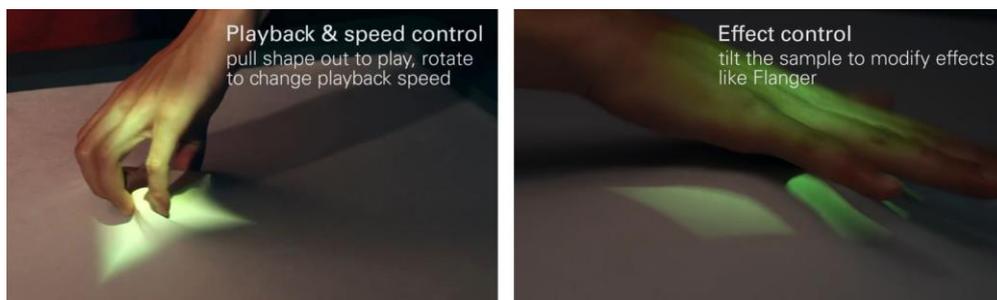


Figure 2: Interacting with the music samples.

The samples can be arranged and manipulated by interacting with their physical shapes. In order to change the volume of an audio sequence, the shape must be lifted for a higher volume or pressed down for lower volume. The activation of a sample is achieved in the same way. When inactive, which means being mute, the samples are positioned under the surface. If the user grabs one shape and pulls it out of the table, the sequence starts playing. Using this behavior the user can easily achieve a volume blending between different samples by pulling one slowly out of the table and in parallel pressing one sample slowly back into the surface. When the samples are released from the hand they stay at the last height pulsing slightly up and down in the rhythm of the sound.

In order to change the playback speed of a sample the user can rotate the shape. More specific effects are applied by tilting the physical representation of a sequence. More complex effects can be achieved by further deforming the shapes, such as twisting, bending or squeezing. Synchronization of samples is established by merging and separating the shapes.

As all the described effects are local effects, meaning they only affect the sample they are applied to, a three-dimensional equalizer is utilized to achieve global effects. Using this, the user can attenuate several frequency bands by blocking them from coming out or stop them at a specific height over the surface. In the same way specific frequencies can be amplified by pulling them out of the table or physically lift them higher up.

The concept is aimed for playful exploration of the device and its abilities. In order to motivate users to interact and to arouse interest, the elastic surface teases its abilities by displaying samples moving close under the surface, when not in use. Acting this way, users should become aware of something that is hidden under the flat surface, in order to motivate them to reveal the shapes by touching them.

3 Conclusion

In this article we present a vision for intuitive music composition using an elastic tabletop device. Solid shapes can be pulled out of the elastic surface to play samples and combining them live to create music. The use of dynamic physical shapes as representations for audio data helps to understand abstract concepts in music such as rhythm, volume effect behavior or equalizer effects. Due to the natural and organic feel, the technical mechanisms of music or sound generation are mediated by a simple interaction concept which encourages playful interaction with the device. Direct interaction with a deformable surface enables complex gestures like pushing, wiping, sliding, spinning, squeezing which can be utilized to shape sounds and rhythms. Similar to other tangible interaction concepts, collaborative use is encouraged by the system. In addition to the physical response of the samples, visual feedback is given. This ensures fluid interaction and facilitates ad hoc creation of music.

However, the presented vision contains several design issues, which have, due to its focus on the basic interaction concept, not been covered in the current article. These include questions regarding the configuration of the samples on the surface, fast switching between several

sample sets or the optimal representation of samples so that they can be remembered easily by the user. Further it will be worth to explore the mapping between different classes of shapes and types of samples, so that the shapes can be formed automatically or manually in respect to the type of resulting sounds.

Apart from the context of music, the presented concept of a deformable interactive surface can be applied to other contexts such as architecture and data visualization. These include concepts like shaping whole architectural models on of the surface or manipulate complex data structures by modeling their physical representation.

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