

Reinterpretation of Pottery as a Musical Interface

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ABSTRACT

Digitally integrating the materiality, form, and tactility in everyday objects (e.g., pottery) provides inspiration for new ways of musical expression and performance. In this project we reinterpret the creative process and aesthetic philosophy of pottery as algorithmic music to help users rediscover the latent story behind pottery through a synesthetic experience. Projects *Mobius I* and *Mobius II* illustrate two potential directions toward a musical interface, one focusing on the circular form, and the other, on graphical ornaments of pottery. Six conductive graphics on the pottery function as capacitive sensors while retaining their resemblance to traditional ornamental patterns in pottery. Offering pottery as a musical interface, we invite users to orchestrate algorithmic music by physically touching the different graphics.

Author Keywords

Interactive sound art, cultural heritage, capacitive sensing

CCS Concepts

• **Applied computing** → **Sound and music computing**; Performing arts;

1. INTRODUCTION

The maker movement and digital prototyping tools, such as micro controllers, soft circuits, and capacitive sensing, offer technical support for researchers to build their own customized and personalized musical instruments out of everyday objects and materials. Researchers have created musical instruments from touching earth [1], hitting a bicycle wheel [2] or even stitching on conductive fabric [3]. These experiments provide inspiration for new ways of musical expression and performance. While such projects focus on modulating sound utilizing everyday materials, this project focuses on activating sound to rediscover the latent story behind materiality, form, and tactility of everyday objects.

Specifically, we examined the crafting process and aesthetic philosophy of pottery to devise a musical interface. We reviewed previous interaction design projects that design the form of an interface by extracting expected interactions to enhance affordances [4] and integrate objects' wear and tear with digital information to show the hidden story of the object [5]. In this project, we illustrate the story and aesthetic philosophy of pottery through graphical patterns and algorithmic music. Our goal is to activate the latent story imbued within an artifact in the everyday environment such as pottery to treat users to a synesthetic experience that they can cherish.

2. POTTERY AS MUSICAL INTERFACE

Mobius I and *Mobius II* are two different interactive musical interfaces created out of a moon jar. This project was inspired by other types of porcelain potteries that have graphical patterns on them. Therefore, unlike a traditional porcelain moon jar that is pure white, in *Mobius I* and *Mobius II* we adhered capacitive graphics onto a ceramic moon jar. This interface allows users to orchestrate algorithmic music by physically touching six different capacitive graphics. In order to design the graphics and musical system, we referred to literature and novels about the aesthetics and stories of pottery. Novels in Eastern literature, often depict the tactile creative process as the potter establishing his alter ego through crafting a perfect piece of art [6]. A carefully crafted pottery and designs painted on its surface should not only be appreciated for their appearance, but also for connecting the pottery's interior and exterior spaces [7].

In our project, we aim to activate algorithmic music through tactile interaction between the user and the pottery graphics to invoke the aesthetic philosophy of pottery. We custom designed six graphics on a moon jar that users can touch to evoke different sound and melodies that would suggest the pottery's latent story. We adhered six vinyl stickers that are cut through custom graphical patterns and covered with black conductive spray in order to detect touch. Each vinyl sticker forms a contiguous shape and measures 4Mohm on its resistance. A micro controller, resistor, battery, and a Bluetooth module enable the customized vinyl stickers to function as a capacitive sensor. Both projects, *Mobius I* and *Mobius II*, illustrate different potential musical systems toward interpreting pottery. While they use the same capacitive technology, they are programmed with different algorithms for the musical systems and graphical patterns. In *Mobius I*, the ambient sounds that the user hears suggest the potter's striving for spiritual perfection that his/her artwork represents. In *Mobius II*, melodies that the user hears bring out the beauty that the potter created in his/her work of art.



Figure 1. *Mobius I* (left) and *Mobius II* (right)

2.1 Mobius I

The first project, *Mobius I*, aims to allow the user to have an embodied communion with the potter. It focuses on the circular form of pottery, consisting of a six-channel generative sound installation that corresponds to six speakers surrounding the pottery. It was created through Max8 and consists of three different



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synthesizer modules. The first module is an ambient sound with a low pitch. The second module is a pink noise similar to a Sinusoidal sound and is utilized as a harmonic middle-tone pitch. The third module creates a sawtooth wave with random sideband with higher pitch. The first module and second module are played as basic sounds upon the user's interaction. Touching several places activates the third module with a higher pitch of sound on top of the first and second module. When the user touches one of the six touchpoints on the surface of the pottery, an ambient sound becomes audible for the moment from the corresponding speaker. By touching more than one touch point simultaneously, the user can activate higher pitch sounds in the upper registers, and a more dynamic musical system.

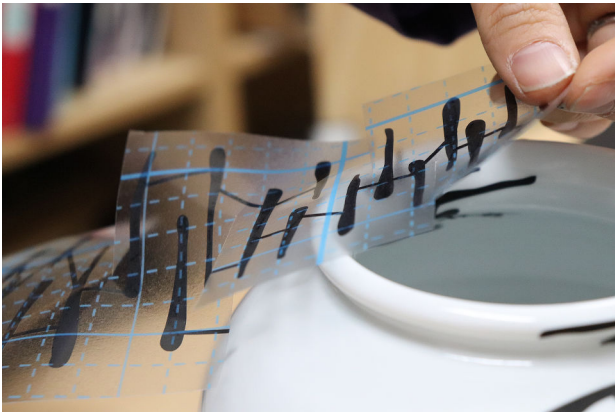


Figure 2. Adhering capacitive graphics on *Mobius I*



Figure 3. Interaction with *Mobius I*

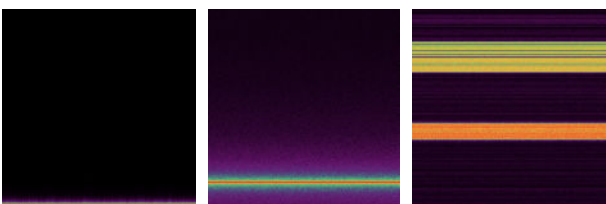


Figure 4. Sonogram from each module of *Mobius I* (110Hz, 8372.01807Hz, 2637.020451Hz)

2.2 Mobius II

The second project, *Mobius II*, depicts the beauty of the pottery metaphorically through graphical patterns and melodies. Ceramic art and oriental paintings have been appreciated not only for their visual appearance, but also for the ideals they depict such as nirvana, fidelity, or sublime beauty. Ceramic pottery has often been decorated with graphical images that are also present in oriental paintings such as nelumbo, bamboo, or crane. Similarly, *Mobius II* is decorated with six graphical patterns. These patterns are arranged within a circular order that represents the seasons. Each pattern is mapped onto different

musical systems. By touching each graphical pattern, the user would trigger a different tune of music.

To create a culturally rich algorithmic music, we have re-interpreted some Korean traditional tunes. The tunes of *Mobius II* consist of numerous electronic sounds generated using wavetable synthesis and samples of traditional Korean musical instruments such as a danso, and sanjo gayageum. The scale of the composition is based on Gyemyeonjo, interpreted as the natural minor pentatonic scale. The harmonic progression is then derived from the scale by analyzing the function of each note and possible relations among the notes in Gyemyeonjo. Each interaction introduces another track to the arrangement, adding complexity to the sound.



Figure 5. Graphical patterns on the *Mobius II*

3. CONCLUSION AND FUTURE WORK

Through this paper, we have shared how we reinterpreted materiality, form, tactility, and aesthetic philosophy behind pottery to digitally integrate them as a musical interface. Both projects reinterpret a cultural artifact as a musical interface that can be placed and cherished within an everyday context. The two projects, *Mobius I* and *Mobius II*, show the possibilities of algorithmic music and sound to reach back to the story with which the potter has imbued a piece of clay. Ambient sounds heard in *Mobius I* suggest a striving for spiritual perfection in creating the pottery; melodies heard in *Mobius II* bring out the beauty of the pottery. With regard to customization and personalization, some users may find the pre-defined sounds and melodies that can be produced limiting, as neither interface allows room for manipulating the touchpoints to change the pitch or algorithms for the melodies being produced. While the current *Mobius I* and *Mobius II* interfaces trigger only a fixed variety of algorithmic music, adding functionality and customization that would enable users to control vibration or generation of sound would enhance the variety and expressiveness of the music that is created. User studies or design workshops may provide insight into designing for other potential types and directions of musical expression that can be derived from pottery.

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