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# Development the Interactive Tonality Blending System and Artworks

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## Abstract

The definition of "tonality" includes two meanings on artistic field. In the visual area, it means the system of tones or tints, or the color scheme, of a picture. In the meantime, it means the musical system of the relations of pitch, scale, chord and their progressions. In general, both definitions are expanded as the word that means the quality of visual, auditory perception. This artwork is the trial for assembling visual and auditory "tonality" in an interactive system.

**Keywords:** interactive, tonality, sound design

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## 1 Introduction

Smartphones and tablets become widely used as an artistic presentation tools, not only computer music research but design area. For developing the interactive art with dynamic audio, the artists can use several some sound API or game sound middleware that have the features of modifying the sampled data: changing tempo, transpose per sound file, dynamic filtering and mixing. However, it is still difficult to make some musical variations; switching the musical modes, generating the variation of phrases, rhythms. Our motivation of this project is embedding the dynamic phrase generation and modal changing system into the interactive visual arts.

## 2 Previous Research and Works

Each member of our research team had undertaken independent research into audio and visual area. "Saurat Brush"[1] is the painting tool for making artwork of pointillism on a computer with extracting the drawing features of the existing pointillism paintings. The "iSuperCollider Kit"[2][3] is the port of MacOS version of SuperCollider for iOS that features the live coding, generative music with mode scale changing in real-time. Kuroda explore the technical capabilities and music theoretical side of modal changing and generative progressions of non-harmonic tone in real-time system[4][5]. "Flowing Tonality"[6] is our first trial, both an artwork and a platform assembling the visual image and gradually modal changing in real-time on iOS. We propose the system and some expression

examples the moving tiled visual elements and real-time modal changing.

## 3 Concept Design

The total concept of this work is to express Japanese aesthetic consciousness with contemporary abstract style. Not only the postures and positions of visual elements but audio temporal parameters consist of Japanese traditional gardens' elements. The dumping factor of animation and sound materials refer from the curvatures of Japanese traditional architectures. We express that ratios and curvature factor by the visual spotting colorful particles and wind chime like pitched sound managed by controlled randomness. In other to change the musical modes gradually, the number of particles and bands of colors are measured and calculate the delta in real time and assigned the musical modes and non-diatonic scales by musical differences.

## 4 Implementation

This visual elements of work are programmed by Swift language with Metal API. It features any UI gestures. The color mixture algorithm is arranged based on "Saurat Brush" for applying the Japanese aesthetic ratios. The all sound elements developed by SuperCollider. The timbre definitions make the particles with much inharmonic tones. The any timbre parameters can be changes by receiving the moving parameters of visual elements.

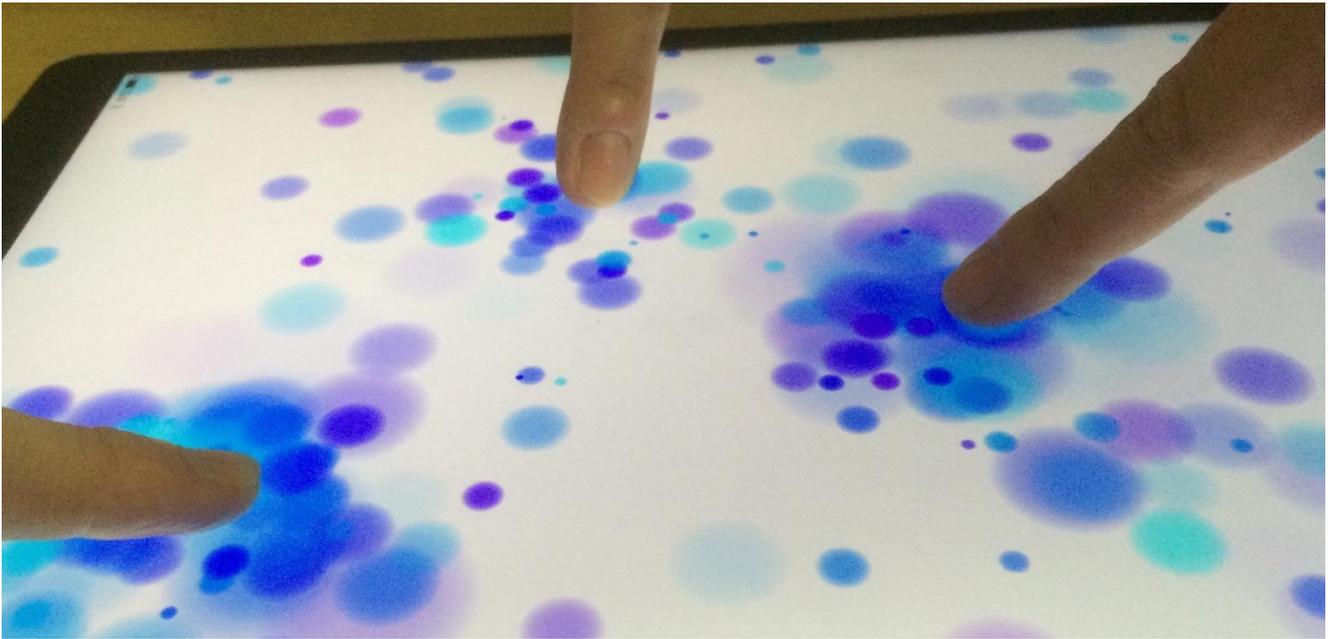


Figure 1: 100 particles on iPad Pro.

## 5 Result

The audience of this interactive work can just watch and listen the moving audio-visuals and change the tonality with their touch gestures. It makes over 100 particles with gradually changing wind-chime like tones stably. We choose the color of typical Japanese four seasons. User can select the color variations by multi-touched or multi users' interaction.



Figure 2: color variations

The radius, color blending parameters, number of particles are variable. Following image is the case of large radius, strong color mixture with 300 particles on iPad Pro.



Figure 3: The result of 300 particles



Figure 4: The large radius image with ambiguous scales

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