

Blooming Resonant Tea: A Multisensory Dining Experience with Dynamic Visuals and Music

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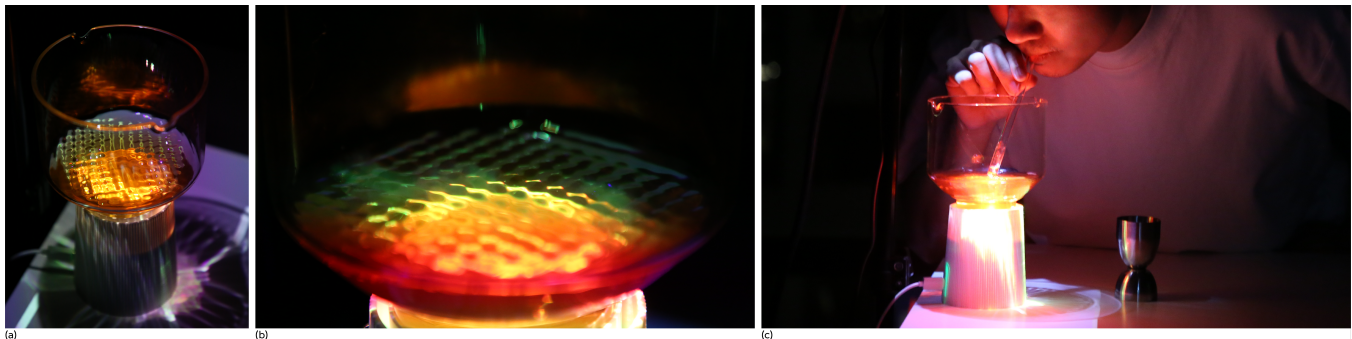


Figure 1: (a) Resonant Cup (b) Blooming Resonant Tea (c) User Scenario

Abstract

This study introduces the Blooming Resonant Tea system, a drinking system that integrates taste, visual, and auditory stimuli to enhance the flavor of herbal tea and ingredient immersion. Studies show that cymatics (the use of vibrational frequencies to create dynamic liquid patterns) and music can amplify existing flavors, while dynamic projections can enhance food perception. To augment flavor, the system employs two methods: generating cymatics patterns through a VP2 vibrator embedded in the cup and using flavor-associated music. For ingredient immersion, blooming projections are used to visually transform the tea from a bud to full

bloom. This system offers a customizable multi-sensory drinking experience, allowing users to select different herbal teas with matching projections, cymatics patterns, and music, creating a tri-sensory tea-drinking ritual for the future.

CCS Concepts

• Human-centered computing → Interaction design.

Keywords

human-food interaction, food design, gastrophysics, crossmodal, cymatics, projection

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1 Introduction

In Human-Food Interaction (HFI) [Khot et al. 2019] research, numerous studies have shown that visual and auditory stimuli can enhance the flavor of existing food and beverages. For instance, cymatics, which is a scientific principle that uses vibrational frequencies to create dynamic patterns on liquid surfaces, can influence the perception of sweetness and bitterness in beverages [Chen et al. 2024]. Similarly, music can affect the flavor perception of sweetness, sourness, and bitterness [Spence and Wang 2015]. Additionally, dynamic projections have been shown to enhance food perception [Suzuki et al. 2021], thereby strengthening ingredient immersion. This raises the question: How does multi-sensory cross-modal stimulation influence taste perception and the overall dining experience?

The Blooming Resonant Tea system integrates these multi-sensory stimuli to transform future tea-drinking rituals. Through customizable flavor enhancements that employ cymatics and music as sensory “seasonings,” along with blooming projections paired with herbal tea flavors to enhance ingredient immersion, the system aims to elevate the tea-drinking experience for rose, chrysanthemum, and jasmine teas.

2 Methods

2.1 Resonant Cup

2.1.1 Electronic Components. The system utilizes a custom-designed circuit board [Qi et al. 2022], based on the ESP32¹, to wirelessly control the VP2 vibrator² through the Open Sound Control (OSC) protocol. The VP2 vibrator generates low-frequency vibrations (ranging from 36 Hz to 65 Hz), which are transmitted through the container to form cymatics patterns on the liquid surface.

2.1.2 Structural Components. The weighted base houses the battery holder (three AAA batteries) and the circuit board, enabling bottom charging and easy battery replacement. A plastic socket with 5mm ethylene-vinyl acetate (EVA) foam allows the vibrator to oscillate freely while minimizing vibration transmission. The glass-to-vibrator connector ensures efficient vibration transfer for stable cymatics pattern formation (Figure 2).

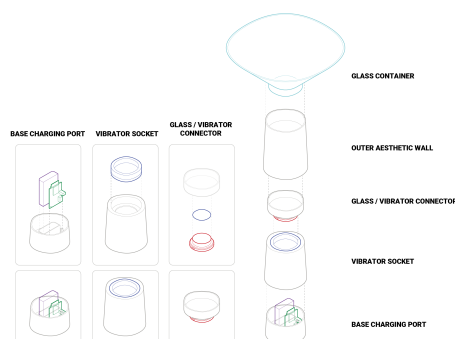


Figure 2: Structural Components

2.1.3 Synchronization. The Max/MSP³ interface manages two audio outputs corresponding to cymatics patterns: bitterness (large and blurry) and sweetness (small and clear). Control messages such as /playloop and /stop are transmitted to the hardware via the udp send object, ensuring real-time synchronization and precise control of patterns on the liquid surface.

2.2 Blooming Projection

We selected three video clips of flowers blooming that matched with tea (rose, chrysanthemum, and jasmine). These videos were then edited to match their playback speeds with the vibration patterns. Using a precisely positioned projector, we map these animations directly onto the center of the Resonant Cup.

3 Demonstration

After confirming no ingredient allergies, three users can simultaneously select herbal teas with blooming projections, choosing from rose, chrysanthemum, or jasmine via the interface. Next, they choose a cymatics pattern to enhance sweetness or bitterness, followed by music to amplify sweetness, bitterness, or sourness. Once submitted, a customized Blooming Resonant Tea is prepared. The experience begins with the flower projection gradually blooming from a closed bud and intensifying music. At full bloom, the cymatics pattern appears, synchronized with visuals and sound. For hygiene considerations, the glass component of each Resonant Cup will be replaced with a transparent disposable plastic cup and a disposable straw to reduce the risk of improper cleaning. Between user groups, the table and headphones will be sanitized with alcohol, and wet wipes will be provided for hand cleaning. Each 5–10 minute session includes a brief introduction, customization, tea enjoyment with various combinations, and a feedback interview.

4 Conclusion and Future Work

The Blooming Resonant Tea system has two potential applications: enhancing multisensory cocktails in bars for entertainment, and improving the experience of those who limit highly flavored beverages for well-being.

Acknowledgments

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¹<https://epartners.co.nz/collections/esp32/products/pb7005-1>

²<https://www.acouve-lab.com/products>

³<https://cycling74.com>