Study for T-Stick and Granulation

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1 PROGRAM NOTES

This performance offers an exploration of sound synthesis and instrumental gestures using the T-Stick, a well-established gestural controller. Mapped to a granulation-based sound engine developed in the SuperCollider environment, the T-Stick transforms into a digital musical instrument (DMI), enabling the performer to shape sounds in real-time. The choice to employ granulation stems from its capability to effortlessly generate complex sounds by creating dense clusters of short "grains" extracted from sound files. This study marks the initial phase of a research project aimed at expanding the T-Stick repertoire and developing new playing techniques for DMIs.

2 PROJECT DESCRIPTION

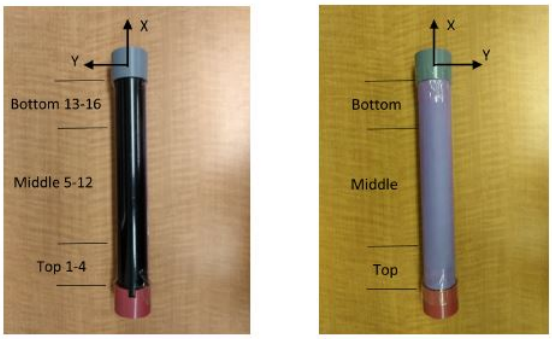
2.1 Context

The persistent issue of digital musical instruments (DMIs) being abandoned after a few performances has been widely acknowledged in the NIME community. Although musicians like Laetitia Sonami (The Lady Glove), Michel Waisvisz (The Hands), Andy Schloss (The Radio Drum), and Mark Goldstein (The Buchla Lightning II and The Marimba Lumina) have mastered these instruments through prolonged use, many new DMIs are often abandoned after a few performances. Identified reasons include a lack of dedicated instrumental technique, the need for a new adapted notation, and the absence of a repertoire [3]. The T-Stick, a gestural controller developed by the Input Devices and Music Interaction Laboratory (IDMIL) at McGill University [2], stands out for its notable longevity, supported by initiatives aimed at developing instrumental technique and repertoire [1]. As part of his Master of Music research, this study represents the author's inaugural composition for the T-Stick. His research project focuses on devising methods for composing a corpus of electroacoustic works for the T-Stick, with the aim of reproducibility by different performers and the integration of embodied instrumental gestures. Subsequent phases of the research will entail further investigations into various sound synthesis techniques, refinement of instrumental gestures, and ultimately, the creation of a more extensive work involving an ensemble of T-Sticks. The author's primary research objective is to expand the repertoire of the T-Stick and promote the adoption of DMIs among composers and performers. This endeavor aims to extend the longevity of these innovative instruments

2.2 Sound Synthesis and Main Mapping Ideas

For this study, granulation was selected as the sound synthesis method due to its capability to generate complex sounds by creating dense clusters of short "grains" extracted from sound files. To diversify the sonic results, a composite file was created from recordings of a cymbal hit, percussions played in reverse and a bass synthesizer C note. The sound production is implemented in SuperCollider.

The T-Stick contains various sensors that allow for touching, shaking, and squeezing: one inertial measurement unit inside the tube, with 16 capacitive strips on one side, and one force sensing resistor (FSR) on the other side (see Fig. 1).



(a) Capacitive Strips Side (b) FSR side

Fig. 1. Front and back views of a Sopranino T-Stick illustrating the three touch-sensitive areas and capacitive strip numbers.

The initial mapping idea involved using the accelerometer to navigate through the sound file. Tilting the T-Stick affects the acceleration along its x-axis (gravity effect). When in a vertical position, grains are extracted from the beginning of the sound file with the x-axis upward, and from the end of the file with the x-axis downward.

The density of grains generated by SuperCollider primarily depends on the surface area of the interface covered by the performer's hands. This mapping allows for playing a few grains per second, individually identifiable, as well as increasing to over 100 grains per second and merging them into a single textured sound object. In calculating the grain density, the percentage of the T-Stick's surface area currently touched is combined with hand pressure (FSR) to further increase density. Pressure, linked to grain duration, causes long grains to overlap when covering a large surface and applying strong pressure, resulting in smoother textures.

Adjusting the grain amplitude is essential for maintaining control over loudness. As the number of grains increases and their duration lengthens, the volume of the sound intensifies. An exponential decay curve links this amplitude coefficient to the surface area, which regulates density.

2.3 Composition Process

Following the implementation of initial mapping ideas into the instrument, the gesture/sound relationships were explored during improvisation sessions. These sessions were regularly recorded in audio and video, thus creating documentation of the performed gestures and produced sounds. This approach aimed to replicate these gestures and refine them as genuine playing techniques. This process proved to be iterative, where the development of playing techniques influenced the evolution of mapping. The improvisations allowed for the discovery of new relationships between gesture and sound, while generating ideas to refine the mapping.

The composition process arises from multiple iterations during the improvisation sessions. Once the playing techniques are established, attention can shift towards the compositional aspect, focusing on form rather than interface manipulations. Composition essentially involves organizing the vocabulary formed by the playing techniques, establishing relationships between them to create a coherent structure.

3 PERFORMANCE NOTES

Duration: 6-7 minutes.

The author will be performing the piece on stage. The following items will be supplied by the author:
- Laptop (x1)
- T-Stick (x1)
- Audio interface with stereo output (1/4" jacks x2).

The author asks organizers to provide:
- Table approximately 1 meter by 1 meter (x1)
- Music stand (x1)
- Music stand lamp (x1)
- Extension cord for connecting the laptop (x1)
- 1/4-inch jack cables (x2) to connect to the mixing console (the setup is stereo).
- Loudspeakers (x2) connected to the mixing console (or directly to performer's interface if no console is available)
- Stage monitors (x2)
- Moderate lighting during the performance

The table with the laptop and interface should be positioned on stage or in close proximity for easy accessibility at the start of the performance. See Fig. 2 for stage setup.

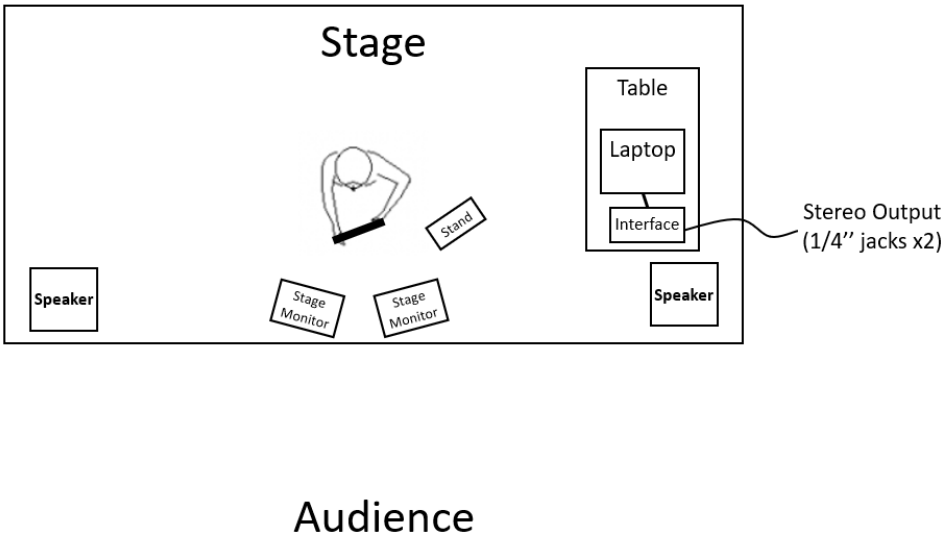


Fig. 2. Stage Setup

4 MEDIA LINKS

- Video recording of a rehearsal: https://vimeo.com/902033741

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ETHICAL STANDARDS

The author recognizes that all DMIs require the utilization of electronic materials and resources, and acknowledges the lasting environmental and social impacts associated with their production.

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