
Everybody to the power of one **for soprano T-Stick**

D. Andrew Stewart

DCS/CIRMMT
Schulich School of Music
McGill University
Montreal, Canada
dandrew.stewart@mail.mcgill.ca

Joseph Malloch

IDMIL/CIRMMT
Schulich School of Music
McGill University
Montreal, Canada
joseph.malloch@mcgill.ca

Abstract

We present a live solo concert performance of an original piece of music – *Everybody to the power of one* – written for the soprano T-Stick digital musical instrument. Like other digital musical instruments, the T-Stick enables the reincorporation of performer gesture as the main source of control in computer-based music making. A brief description of the instrument development, gesture-sound mapping and performance practice is given, followed by an introduction to the compositional motivation and materials of the piece. *Everybody to the power of one* is the fourth musical composition created for the T-Stick by composer and performer D. Andrew Stewart.

Keywords

Computer music composition and performance, digital musical instruments, gestural control, t-stick

ACM Classification Keywords

H5.5. Information interfaces and presentation (e.g., HCI): Sound and Music Computing.

General Terms

Interactive software systems design and implementation, gestural controlled audio system

Copyright is held by the author/owner(s).
CHI 2010, April 10–15, 2010, Atlanta, Georgia, USA.
ACM 978-1-60558-930-5/10/04.

Introduction

Personal computers have become powerful tools for live sound synthesis and processing, but the interfaces we use to explore and control computer-based musical processes are much less developed. A research community exists focusing on the creation of new, special-purpose interfaces for musical expression and digital musical instruments [5].

These interfaces enable the reincorporation of performer gesture (for those who wish it) as the main source of control in computer-based music making.

The T-Stick DMI

The T-Stick is a digital musical instrument developed and built in the IDMIL by Joseph Malloch, in collaboration with composer D. Andrew Stewart [2,4]. Further development took place in the context of the McGill Digital Orchestra Project with performers Fernando Rocha and Xenia Pestova [1,6]. The physical input device can sense where and how much of its surface is touched by the performer, and detect gestures such as tilting, shaking, squeezing or twisting. Unlike most digital musical instruments, the T-Sticks exist as a family, with soprano, alto, tenor, and bass members. The T-Stick is intended to be an “expert” musical interface: engaging to new users, allowing virtuosic playing, and “worth practicing” in that practice time results in increased skill. The T-Stick has been performed and demonstrated many times in Canada, Brazil, Italy, Portugal, and the USA ¹.

The first prototype (a tenor) was completed in 2006, a second (alto) T-Stick was completed in early 2007. A mixture of capacitive, resistive and inertial sensing techniques is used to provide sensing of performer touch, gesture and posture. The hardware is presently in its third revision and approximately twenty more T-Sticks have been built, including several prototypes integrating haptic feedback and additional sensing modalities.

“Mapping” in the context of DMI design is the process by which control signals from sensors or gestures are associated with parameters of a sound synthesizer or other output medium. During development of the T-Stick, we made extensive use of a set of tools for collaborative mapping design developed for the Digital Orchestra Project [3]. These tools include a peer-to-peer network framework for instruments and synthesizers to intercommunicate and a graphical user interface for interacting with the mapping system (figure 1).

Various custom-built and commercial sound synthesis approaches have been used for the T-Stick, including sample-playback, modal synthesis, granular synthesis, physical modeling, and control of musical robots which in turn play acoustic instruments.

The following sections will address the specific creation and performance issues in the piece *Everybody to the power of one*.

¹ Videos of several live performances can be found at www.idmil.org

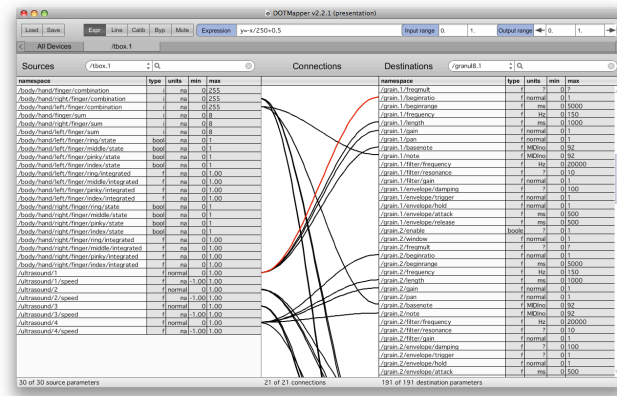


figure 1. Graphical User Interface for interacting with the mapping system.

Everybody to the power of one

The boundaries of a performance space, such as the concert hall stage, for example, are demarcated by the placement of performers across the stage, not to mention the actual walls that enclose the space. In addition, each performer occupies enough space so that they can execute their unique playing gestures. With the exception of some large percussion instruments, most acoustic instrumentalists use a small range of gestures. Consequently, these musicians are commonly perceived as being elements within a larger space.

What happens to the performance space, though, if instrumental playing gestures include expanded movements and result in performers, say, reaching to the ceiling, touching their toes or vigorously waving to and fro?

These expanded gestures may make some audience members conclude that what they are observing is more than just a musical performance – perhaps they are witnessing a dance, perhaps a theatrical narrative. Or perhaps onlookers will understand that in addition to performers being elements within a larger space, each performer delineates himself or herself as a space – a metaphorical space.

In *Everybody to the power of one*, the inherent expanded playing gestures of the T-Stick delineate a symbolic space in which the performer, fused with his instrument, taps, thumps and pounds his way through imaginary walls. We hear wind rush through the cracks and holes he creates. “The power of one” is embodied in the performer’s ability to single-handedly dismantle his virtual enclosure. The title also suggests an intension to question the modern cultural concept of the amateur as the next big commodity in musical composition. Music as an expression of a culture of one is a misconception.

Gesture in Everybody to the power of one

While *Everybody to the power of one* is not written as a “demonstration” of the T-Stick DMI, the piece embraces the idiosyncrasies of the interface. The performer is called upon to use a number of physical techniques that stretch the boundaries of traditional acoustic-instrument performance-practices, and reflect strong influences from dance and the martial arts. In particular, the piece prevalently uses of the following techniques:

Jab: This technique entails selecting the correct hand position, tilting and rotating the instrument (and one’s own body) and applying a proper degree of force not

only in the direction of the jab but also to grip pressure. The sonic result is wide ranging from a low drum sound to a high-pitched bell.

Grip: This refers to placing one's entire hand or both hands around the T-Stick. A preparatory gesture is required before executing a grip. The width of the grip must first be "framed" – normally accomplished with the outer fingers. For instance, a two-handed grip first entails framing with the index finger of one hand and the baby finger of the other. This technique produces sustained spectrally dense sound or sustained flute-like tones.

Lasso (tilting and rolling): Lasso is an expanded movement that involves twirling the T-Stick overhead like a lasso or lariat. The sonic result varies according to lasso speed. The overall effect is fast, or slow, bi-directional frequency motion (e.g., simultaneously ascending and descending pitch bends).

Acknowledgements

The authors wish to thank the Fonds québécois de recherche sur la société et la culture (FQRSC) the Social Sciences and Humanities Research Council of Canada (SSHRC) and the Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT) for supporting this research.

References

[1] Ferguson, S. and Wanderley, M.M. The McGill Digital Orchestra: Interdisciplinarity in Digital musical Instrument Design. To appear in *Proc. of the 5th International Conference on Interdisciplinary Musicology*, (2009), 26-29.



figure 2: D. Andrew Stewart performing *Everybody to the power of one*.

[2] Malloch, J. A Consort of Gestural Musical Controllers: Design, Construction, and Performance. MA thesis, McGill University, Montreal (2007).

[3] Malloch, J. Sinclair, S. and Wanderley, M.M. A network-based framework for collaborative development and performance of digital musical instruments. *CMMR 2007 Revised Papers*. LNCS 4969 (2008), 401-425.

[4] Malloch, J. and Wanderley, M.M. The T-Stick: From Musical Interface to Musical Instrument. In *Proc. NIME 2007*, New York, USA (2007), 66-69.

[5] Miranda, E.R. and Wanderley, M.M. *New Digital Musical Instruments: Control and Interaction beyond the Keyboard*, A-R Editions, (2006).

[6] Pestova, X., Donald, E., Hindman, H., Malloch, J., Marshall, M.T., Rocha, F., Sinclair, S., Stewart, D.A., Wanderley, M.M., and Ferguson, S. The CIRMMT/McGill Digital Orchestra Project. In *Proc. ICMC09*, (2009) 295-298.