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Half-closed Loop — an improvisation environment for covered string and performer

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Abstract. The performance “half-closed loop” is a take on an instrument for a storytelling improvisation. By means of feedback induction on various levels, particularly by a custom instrument consisting of a string in a brass pipe and a wooden board with attached structure-borne drivers, the design’s idea is to not only allow the performer to produce a broad range of musical expressions but to also integrate elements of instability into the performance. Being designed as an open system with a significant amount of complexity in routing and control, the instrument lets performer and instrument “fuse” into one meta-system of human-instrument entanglement.

Keywords: control, interaction, performance, feedback, analogue, digital, improvisation, wavesets, resynthesis, musical instrument

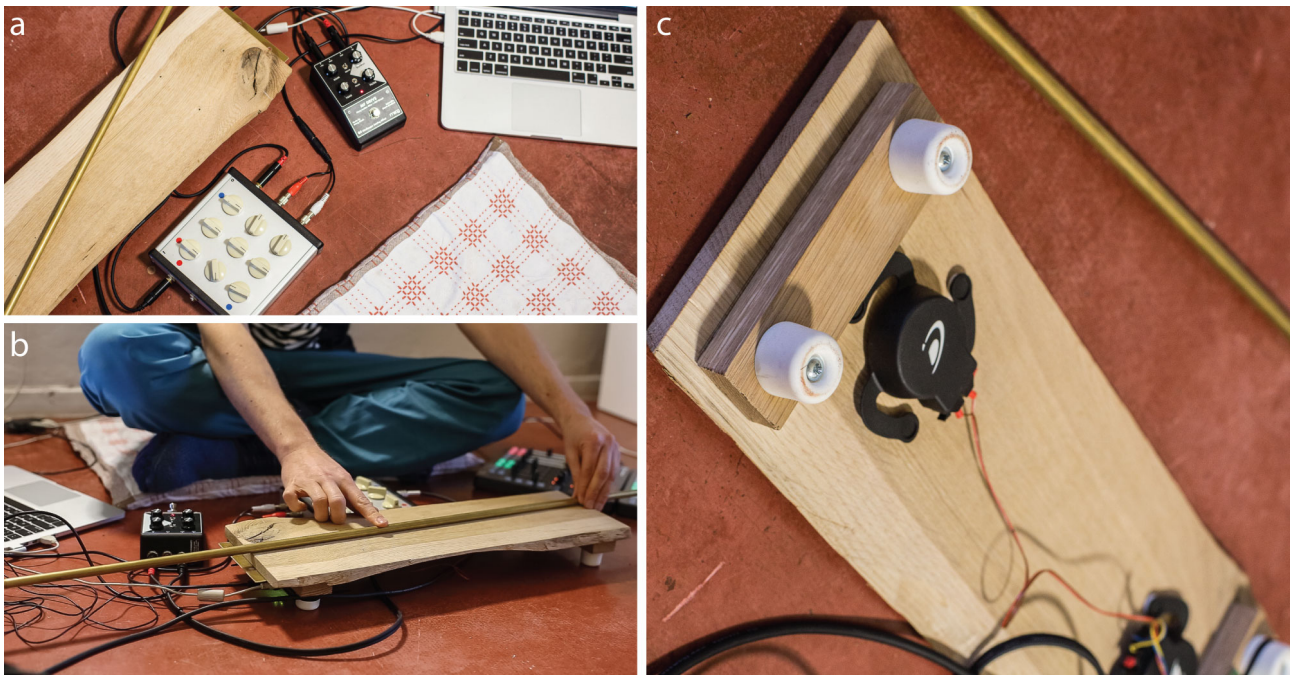

Figure 1: “Half-closed loop”: Setup (a), Performing (b) and driver arrangement (c).

Introduction

Improvisation is the - possibly complex - process in which performers contribute to a piece by selecting while playing from an extensive repertoire of figures and phrases. Their choice is based on personal interpretations and bias as well as the direction the performer intends the piece to advance.

At the same time, the form of an instrument for improvisation influences the sonic character of a performance thoroughly. Its features and characteristics determine how much effort it takes to carry out an intended expression. They have a crucial impact on what the player decides to play.

One form of sonic improvisation can be named “sonic story-telling”. The listener is invited to close her eyes and listen to a sound world to take shape. More quite parts alter with loud and intense phrases, parallel streams take turns in leading or following the soundscape’s gestalt, while surprising elements appear and have to be integrated into the sonic world by both, the performer and the listener.

The performance “half-closed loop” is a take on an instrument for such a storytelling improvisation. Its intention is to not only allow the performer to produce a range of phrases and musical expressions but, to a prominent part, to integrate elements of instability into the performance. These instabilities help keeping the performer alert, her struggle with playing the instrument turns into an inherent part of the storytelling process itself. Being designed as an open system with a significant amount of complexity in routing and control lets performer and instrument “fuse” into a meta-system of human-instrument entanglement (Hinrichsen et al. 2014).

Components

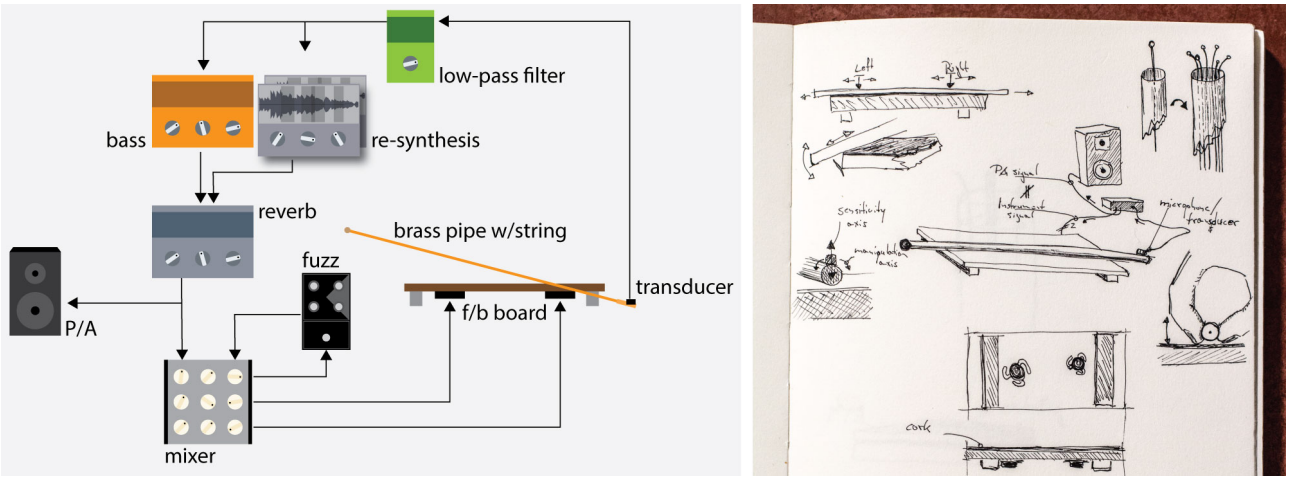

Figure 2: Routing and components of “Half-closed loop”.
Note that the components in the upper left are digital implementations that are controlled with a mixer-like interface.

“Half-closed loop”[1] consists of several parts, each serving a specific purpose for the improvisation setup. The two visually most prominent elements are a brass pipe and a hardwood board. Together they assemble a feedback instrument (see Figure 1): The brass pipe has an audio transducer attached to one of its ends and contains a tightened string that is inaccessible from the outside during performance. The pipe therefore serves as the passive element of the feedback system since it captures vibrations. With two structure-borne drivers attached to its floor-facing side, the hardwood board can be recognised as the active element. Sitting on four rubber feet, its vibrations are picked up by the brass pipe, when placed on its surface.

The signal from the audio transducer is sent to the computer where it is processed by a low-pass filter and a digital reverb.[2] Additionally, it is fed into the analysis part of a WaveSet re-synthesis engine (de Campo 2011)(Wishart 1994). The software setup eventually renders a stereo signal combining the filtered pipe sound, two reproduction parts of the WaveSet re-

[1] A documentation video of one of the first sessions with the system can be viewed at https://vimeo.com/156190237.
[2] JPVerb by Julian Parker, http://tai-studio.org/index.php/deind-ugens/.

synthesis engine, and a bass synth (a feedback FM oscillator wrapped in a ladder filter). The rendered sound is then passed to an analogue matrix mixer (Collins 1997)[3] by which it can be enriched by an analogue effect box containing a ladder filter and a JFET drive circuit.[4] All software parts are implemented in SuperCollider.[5]

With this set of sound generators and shapers, "half-closed loop" provides a broad range of sonic expressions to the performer. Its sonic gestalt is based on environmental as well as artificial parts (audio transducer vs. synthesiser) while at the same time being rooted in multiple domains; analogue and acoustic feedback is opposed by digitally-sounding re-synthesis of previously played elements, which allows for semi-automated regular patterns based on the sonic character of the other elements. At the same time, percussive sounds can be created via physically knocking the pipe or the board, whereas the audio feedback allows to create sustained sounds. All those sounds can be linearly as well as non-linearly altered and time-smeared.

Interaction

Creating and playing a dynamic soundscape with several acoustic levels is challenging for one player. After all, the number of items to control is limited by the number of hands and fingers of the performer. One approach to lower the amount of controls while still keeping a significant amount of complexity is the use of cross-linking mapping matrices as it is described by de Campo (de Campo 2014). The approach used in "half-closed loop" is to outsource decision processes to the system itself: By being prone to external influences such as vibrations in the room, the subliminal muscle tremor of the performer's hands, or just minimal posture changes - e.g., when turning a knob on the matrix mixer the system changes, resulting in a (small or more severe) variation of its sonic output.

All parameters of the digital and electronic sound shaping can be accessed directly via dedicated knobs, buttons, or faders. This immediacy in sound generation combined with a relatively simple playing interface allows for fast reactions to the described unforeseen events. It is supported by vibrational feedback through the hardwood board; changes in the system can be felt much earlier than heard.

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References

Bovermann, T., H. Egermann, A. Foerstel, A. Hinrichsen, D. Hildebrand Marques Lopes, A. Pysiewicz, S. Hard- jowirogo, S. Weinzierl, and A. de Campo. 2014. "3DMIN – Challenges and Interventions in Design, Development and Dissemination of New Musical Instruments." *Proceedings of ICMC/SMC*. Athens: National and Kapodistrian University of Athens.

Collins, N. 1997. "Gain: Reflections on David Tudor." *MusikTexte*.

de Campo, A. 2011. Chapter Microsound of *The SuperCollider Book*, edited by S. Wilson, D. Cottle, and N. Collins. MIT Press.

de Campo, A. 2014. "Lose control, gain influence - Concepts for Metacontrol." *Proceedings of ICMC/SMC*. Athens: National and Kapodistrian University of Athens.

Hinrichsen, A., S. Hardjowirogo, D. Hildebrand Marques Lopes, and T. Bovermann. 2014. "PushPull. Reflections on Building a Musical Instrument Prototype." *Proceedings of the International Conference on Life Interfaces*.

Wishart, T. 1994. *Audible Design: A plain and easy introduction to practical sound composition*. Orpheus the Pantomime Ltd.

[3] Analogue matrix mixer as described at http://tai-studio.org/index.php/matrix-mixer/
[4] Moog MF Drive.
[5] SuperCollider can be found at http://supercollider.github.io