Dual/Duel/Duet/for/with/halldorophone

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1 PROGRAM NOTES

The halldorophone is a cello-like, feedback instrument, developed over the past decade by Halldór Úlfarsson. The instrument is well-established in experimental music circles and gaining wider recognition thanks to its use by composer and cellist Hildur Guðnadóttir in film scores, including her Oscar nominated music for *Joker* (2019). The halldorophone utilises a simple system, whereby the vibration of each string is detected by a pickup, amplified and routed to a speaker embedded in the back of the instrument. By adding gain to individual strings in the feedback loop, the instrument's response can become rapidly complex, potentially spinning out of control. While every musical performance of a piece is unique in some way and contingent on its particular moment and situation in time, the unstable nature of the halldorophone exacerbates this condition. Players describe the halldorophone as 'unpredictable', 'very much alive' and as having 'its own ideas', even tiny changes to their body position in performance might produce unexpected effects [5]. In this NIME premiere for the instrument, cellist Nicole Robson will perform a piece for a new digitally endowed halldorophone, and the title of the piece – *Dual/Duel/Duet* – acknowledges the active role of the instrument in shaping the composition and performance.

2 PROJECT DESCRIPTION

In 2018, Úlfarsson completed two new halldorophones called 'The Sisters'; one relies on analogue circuitry and the other introduces an onboard Bela for processing signals from individual strings. Bela is an embedded computing platform resembling a microcontroller that provides low-latency and high quality audio processing [3]. This performance with the digitally endowed halldorophone is the result of cellist and composer Nicole Robson's work with the instrument, which began in early 2020.

In this study, or duet, Robson has learned to play the halldorophone as a new instrument and takes a material-driven approach, acknowledging its influence on her performance. She embraces the possibility of wild moments and has a particular interest in surfing the fragile edges of feedback as a compositional resource. McLaughlin & Thurley [2] relate performing with audio feedback to Ingold's notion of 'wayfaring' [1]. The wayfarer *is* their movement, they do not travel directly from a to b, but are guided by the material landscape as it unfolds before them. Similarly, the nonlinear dynamics of chaotic phenomena have been shown to inspire detailed exploration at the boundaries of control [4].

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Fig. 1. Halldorophone

Chaotic systems are not indeterminate because they respond in a way that is potentially repeatable but requiring a level of control too high for performers to reliably reproduce. Players describe the halldorophone as 'unpredictable', 'very much alive' and as [having] 'its own ideas' and even tiny changes to their body position in performance might produce unexpected effects [5]. Therefore, while we could say that every musical performance of a piece is unique in some way and contingent on its particular moment and situation in time - the mood or energy levels of the performer, arrangement of the performance space, feedback from the audience - the unstable nature of the halldorophone exacerbates this condition. It seems apt to place this performance not in a club or concert setting, but in a transitory or non-place, such as a corridor or stairwell. A place with indeterminate intent, rather than a destination.

The question of how the added affordances of digital processing upset or enhance such an exploratory, conversation-like interaction between instrument and performer is explored in Robson's work with the halldorophone. As a member of the Augmented Instruments Lab, where Bela is developed, she is uniquely placed to explore the digital instrument.

3 TECHNICAL NOTES

At first glance, the halldorophone appears very similar to a cello, but it also has two to four (two on this instrument) sympathetic strings running underneath the fingerboard (like a viola d'amore). Every string has a dedicated pickup, which allows detailed control over the level of prominence each string has in the feedback loop. The signal from each pickup is boosted, passed through a mixing stage before being sent to a 100W power amp driving a mid-range speaker cone planted in the rear of the halldorophone's soundbox, which completes the feedback loop.

A set of sliders available to the right hand of the player control the gain level of each upper string. In previous iterations of the halldorophone, only signals from the sympathetic strings have been externally routable, usually to two stereo foot-controlled volume pedals or mixing desk. The halldorophone used in this performance has an onboard Bela that can be programmed using an array of different languages including C++ and Pure Data. The gain mappings for every string are open to reconfiguration and this opens up many new possibilities, such as dynamically generated behaviour, chance procedures or audio feature extraction to determine control parameters.

Fig. 2. Bela and electronics housed inside the slider casing

4 PERFORMANCE NOTES

The authors would prefer the recorded performance to take place in a liminal space such as a stairwell or hallway, or alternatively a place of special acoustic interest. The viability of this plan will be dictated by the UK coronavirus lockdown. The performance duration is seven minutes.

5 MEDIA LINKS

This performance is the result of a very recent collaboration between the two authors. As such, the following media links serve to demonstrate the viability of a halldorophone performance at NIME, along with its sonic affordances.

- Video: https://www.youtube.com/watch?v=uo4Jq-_tysc
- Audio: https://soundcloud.com/halldorophone/hrimhvita-moir

6 ARTIST BIOGRAPHIES

Nicole Robson is a composer, musician and researcher whose work explores site-specific performance, sound installations and community-focused, public art projects. She is a PhD student in Media and Arts Technology at Queen Mary, University of London, where she is a member the Augmented Instruments Lab. As a classically trained cellist, Nicole is an experienced performer and has played at concert halls and music festivals around the world, on television programmes such as *Later... with Jools Holland* and live for BBC Radio 1, 2, 3 and 6 Music.

Halldór Úlfarsson is an Icelandic artist and designer pursuing a practice-based PhD on musical instrument innovation at the Department of Music, University of Sussex, where he is a member of the Emute Lab. Halldór's artistic practice focuses mostly on his electro acoustic string instrument, the halldorophone, evolving the design of the instrument and

instigating collaborations with artists and institutions on its use. In his work he contemplates the identity of a new musical instrument aspiring to become part of the canon of accepted musical instruments. Halldór is building a Lab dedicated to developing halldorophones in the Kypseli neighbourhood of Athens, Greece.

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REFERENCES

[1] Tim Ingold. 2016. *Lines: a brief history.* Routledge.
[2] Scott McLaughlin and Oliver Thurley. 2020. The tides of feedback: boundaries and fragility. *The Sound of Feedback, The Idea of Feedback in Sound Seminar, Canterbury Christ Church University* (2020).
[3] Giulio Moro, Astrid Bin, Robert H Jack, Christian Heinrichs, Andrew P McPherson, et al. 2016. Making high-performance embedded instruments with Bela and Pure Data. *Live Interfaces* (2016).
[4] Tom Mudd, Simon Holland, and Paul Mulholland. 2019. Nonlinear dynamical processes in musical interactions: Investigating the role of nonlinear dynamics in supporting surprise and exploration in interactions with digital musical instruments. *International Journal of Human-Computer Studies* 128 (2019), 27–40.
[5] Halldór Úlfarsson. 2018. The halldorophone: The ongoing innovation of a cello-like drone instrument. *NIME18* (2018), 269–274.