Pulsar Threads

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Pulsar Threads (c.15-18 mins) is an improvised performance versioning of a fixed media release of an existing work, and explores transformation of material sourced from the New Pulsar Generator (nuPG). *Pulsar Threads* explores, often simultaneously, buffer scratching, corpus scrubbing, waveform scuffing, live sampling and a range of time-based, spectral and neural transformations of material. In order to achieve embodied and rapid transitions between different kinds of material, samples from nuPg improvisations have been analysed in a variety of ways using the Fluid Corpus Manipulation (FluCoMa) toolkit to allow for agile polyphonic and gestural exploration and expression using multitouch controllers. *Pulsar Threads* makes connections in material though superimposition, stratification, juxtaposition and interpolation. There's a retroactive injection of the sound and morphology of pulsar synthesis into an established practice of working with sampled material in real-time in ways that are influenced by both early tape works and modern turntablism.

Jules Rawlinson
University of Edinburgh, Edinburgh, UK
jules.rawlinson@ed.ac.uk

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Overview

Fig. 1. Multitouch Controller Setup.

Pulsar Threads (Rawlinson 2024) is the latest of a series of works that aim to inject the sound and morphology of pulsar synthesis into my practice while maintaining active continuity with prior work with different kinds and orders of improvising with an established but still evolving "performance ecosystem" (Waters 2007) in ways that are influenced by both early tape works and modern turntablism.

Specifically, *Pulsar Threads* explores, often simultaneously, buffer scratching, corpus scrubbing, waveform scuffing, live sampling and a range of time-based, spectral and neural transformations of material sourced from the New Pulsar Generator (nuPg) . To borrow a phrase from Bolt's work on practice-led research, if there is any magic to be found here, "the magic is in the handling" (Bolt 2007) and concerned with material thinking. This music is characterised by fast moving detail, development and interactions between sound objects and embodied technique to make connections in material through superimposition, stratification, juxtaposition and interpolation.

Pulsar synthesis is capable of a wide range of expressive and engaging timbres and forms, but I just can't play nuPg fast enough, or really, I can't play it fast enough with the required precision and agility for creating responsive real-time onset, continuation and closure of sound events at multiple time-scales that cluster and collide then fragment and dissipate, with varied and morphing envelopes, arcs and sharp changes in direction.

nuPg's screen-based interface is more supportive of longer timescale and pre-planned forms when used in live performance. In order to achieve more embodied and rapid transitions between different kinds of material, samples from nuPg improvisations have been analysed in a variety of ways using the Fluid Corpus Manipulation (FluCoMa) toolkit to allow for agile polyphonic and gestural exploration and expression using multitouch controllers that offer differing kinds of continuous, rather than discrete or quantised, control.

Keep's concept of "instrumentalizing" is the discovery of the inherent character and opportunities for manipulation of sound in sounding objects (Keep 2008), and since 2007 I've been working towards instrumentalising high resolution multidimensional surfaces in combination with MaxMSP software and digital sound files in order to achieve rapid gestural and textural transformations of pre-recorded sound files of varied character and differing durations, from milliseconds to minutes. Beginning with a graphics tablet and what has been described as "mixed sensing" I've explored a range of typical tablet gestures (Zbyszynski M. et al. 2007) which, together with scrubbing

and scratching, include dipping and bowing across different kinds of sampling and synthesis methods and material. Additional interfaces augmenting the system include a DJ-Tech USB turntable, Keith McMillen Instruments Quneo offering pressure and location sensitive pads, and a Faderfox compact midi controller.

With time the graphics tablet has given way to a Sensel Morph multitouch device offering greater opportunity to explore simultaneous contrasts and traversal of timbre and temporalities in material. Different approaches to creating and manipulating sound include sample segment triggering and micro-looping, spectral resynthesis, granulation and more. The system uses a range of mapping strategies and design in the interaction of the different DSP layers such as non-linear controller values, and (un)control and unpredictability in the live sampling processes as my attention and intention shifts between simultaneously sounding layers of points, lines and planes in motion.

As the system has developed for different use cases or works, it's generally followed Cook's principle of "Instant music, subtlety later" (Cook 2001). There's an immediacy to triggering sounds, but also a complexity to shaping them, even before we begin to process them. The performance system here meets a number of Croft's conditions for instrumentality (Croft 2007). The scale of physical gestures on the multitouch surface affects the scale of audio output in a fine-grained way, the responses of the software outputs are tightly synchronous with my gestures and generally my dsp processes follow or match the energy motion trajectories of the input audio. The relationship between my actions and the computer is (mostly) stable, and for people watching a performance, there's a visible relationship between action, effort and sound, a "performance ecology" (Bowers 2002).

One aspect of the setup that's easily ignored is the ergonomic assemblage of the system, allowing for single handed control of more than one device simultaneously through consideration of placement and impact on gesture. The surfaces themselves have a series of constraints, e.g. how many fingers can I place on a device before I get in my own way due to size of my fingers and surface, how far can I stretch my fingers, how can I place pressure on one finger and not another, while stretching? In some ways these concerns are not unlike those of player of a stringed instrument such as a violin, especially while double stopping, playing more than one note at once, and perhaps sliding between notes. Some of this control then might be "ergomimetic" (Magnusson 2019), an imitation, translation and transformation of gestures and practices from one instrument or interface to another.

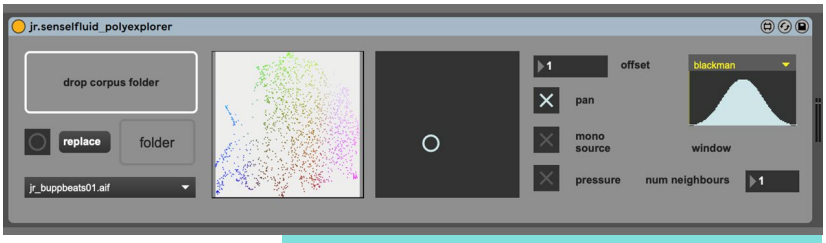

Fig. 2. Custom FluCoMa analysis and clustering Max for Live instrument.

I've designed in "explorability and learnability" (Orio, N., Schnell, N. and Wanderley, M. 2001), and occasionally 'bug' becomes 'feature'. One example of this is polyphonic voice stealing. Reflecting on some glitching that was the result of too many simultaneous multitouch points and too few available voices I thought, "Oh, OK, increase the voice count", then, after a reflective pause, "Oh, no, leave it, because it gives me another place (distortion, saturation, and stuttering overload) to go". This is playful, what Green might describe as a decision to not use tools 'properly' (Green 2011), but also results in opportunities to create emotionally and expressively charged "highly aestheticised digital bits" (Rogers 2003).

This work also explores processing of sound in ways that my previous work with nuPg such as *Pulsar Retcon* (Rawlinson, 2021) has not. In part, this is a result of working more deeply and regularly with nuPg itself, spending more and better time with it. Having moved from initial exploratory sessions to arrive at informed improvisations with shaped sound output, there's more causal understanding and detailed control of nuPg, leading to a more varied palette of pre-recorded material for further typological and transformational discourse and development of sonic morphology (Smalley 1994).

There's also more extensive experience of improvising with the already improvised outputs from nuPg, in mapping them to surfaces and software processes, in understanding the possibilities for threads of connection and combination in and of material. These performed sounds are then sent to multiple auxiliary destinations for further temporal and spectral processes of stuttering, scanning, freezing and looping, of which, these processes can also send to each other in an extended feedback network.

Beyond the auxiliary processing, there's a final couple of developments explored here that aren't present in my earlier solo work in any form. The first is the use of the Fluid Corpus Manipulation (FluCoMa) toolkit for corpus-based similarity analysis, dimension reduction and clustering of fragments of sound across a series of newly developed multitouch controlled software instruments, creating an interpolation space for highly expressive sounding action.

The same kinds of corpus analysis can be used for live input audio matching, where sound input triggers further sound output that is related to the original material across different descriptors. In addition, this work employs neural style transfer, where sound is resynthesised using the timbral characteristics of a trained model. In this case the model has been trained on an improvisation by saxophonist Franziska Schroeder , and my patch allows control of four out of sixteen latent vectors so that I can direct the output character in real-time while keeping sound output roughly proportionate to the energetic characteristics of the input audio.

Overall, there's a rich set of possibilities for monophony and polyphony, precision and instability, simplicity and complexity leading to a wide range of possible outcomes.

Notes

1. https://github.com/marcinpiet/nuPG_1.0

2. https://www.flucoma.org/

3. https://huggingface.co/Intelligent-Instruments-Lab/rave-models

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