Modulating Time

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Live coding performances typically rely on machine-driven time synchrony. While this removes the challenge of manual synchronisation, it also abstracts away the embodied experience of rhythmic entrainment – a core aspect of musical improvisation. This performance explores an alternative approach to time modulation in live coding by replacing machine synchrony with physical interfaces. Through this, we investigate the expressive potential of drifting in and out of synchrony, phasing effects, and rhythmic transformations inspired by Carnatic geometric rhythms and tala structures.

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Motivation

> Sound [...] appears as a symptom of time. In the ambiguity between active and passive aspects of timing, it functions somewhere halfway between actively drawing together and identifying disconnected moments and passively signalling their coincidence. (Rohrhuber 2018, 19)

Fig. 1. Wilson (left) and McLean (right) at performing at PIF_Camp.

Live coding performances – where a live coder will write code in an improvised way to create various art forms (Collins et al. 2003) – are often driven by some kind of clock. Where two people collaborate, time synchrony needs to be achieved between them, and this is seen as a software problem, to set up oscillations across network cables to bring two computers into synchrony. Several live coding systems have standardised on the free/open source *Link* protocol and library created by Ableton, allowing time synchrony across these systems, locked in phase to a tempo.

This works so well, that it is hard to see the trade-offs of this approach. There is no need to manually beat-match, or think about synchrony at all – any one of the performers has full control over each other's tempo, any change made is made perfectly together. Prior to time synchronisation standards, live coders would have to agree on a tempo, start their clocks at the same time, and stick to the same tempo while hoping their clocks don't drift out of sync. Clearly, the shared Link clock is an improvement on this situation.

However, the problem is that rhythmic entrainment, the time synchronisation between musicians, is normally a central part of music making, which Link is abstracting away. Although the use of click tracks has become common, there is still something special about how a group of improvising musicians fluidly negotiate time as an intrinsic part of the musical outcome. Live coding culture has gone from the frustration of having little or no possibility to synchronise time, to having the issue completely 'solved' in software and hardware, but where the rich possibilities of human entrainment in code-based performance is lost. Furthermore, when a live coder wishes to collaborate with instrumental performers, the reliance on computer-based clocks has meant that live coders have tended to monopolise control over time, in that the instrumental performer can only follow the live coder's clock. We see this as a symptom of a general distance between humans and time in live code performance, despite live coders otherwise celebrating being embedded in time.

Prior work

While resident at the week-long “PIFCamp” art camp (PIF_Camp 2024), we collaborated with textile artist and technologist Mika Satomi, exploring possibilities for modulating time with physical interfaces. This followed our earlier collaborative work exploring the integration of e-textile sensors with live coding (Wilson et. al, 2023). We worked on handheld stick-based and woven devices for tactile control of musical pattern and tempo. We then used these devices to manipulate time in our live code duo, eventually passing them into the audience for people to dance with. On a technical level this was achieved with an IMU on a wireless microcontroller integrated into woven grasses, using autocorrelation to identify tempo (Lartillot and Grandjean 2019).[1]

The artists’ experience through performance began to challenge how audience-controlled synchronicity might work in practice. Through vigorous end-of-camp dancing, the sticks experienced natural wear, briefly challenging our control over time. This unpredictability, while disorienting, became an integral part of the experiment – revealing new possibilities for temporal engagement.

This experience inspired the next iteration that we will present at xCoAx.

Prior to this collaboration, McLean and Wilson have also performed live coding both separately and together, around the UK and internationally, under the pseudonyms ‘yaxu’ and ‘digital selves’ respectively.

Proposal

This performance will focus on live coded, from-scratch improvisation between ourselves, without machine synchrony. Instead, we will explore synchronisation through physical devices, as an iteration of our collaboration with Mika Satomi. Through this we will open up exploration of smooth tempo changes where we purposefully drift in and out of synchrony to create phasing both in terms of long-form musical changes, and microtemporal comb filtering. We will also explore geometrical rhythmic transformations inspired by carnatic rhythms (McLean, 2024), to push the possibilities of polymeter in fluid time. Here one will focus on tala-inspired short form repetitions, providing the ground for the other to explore longer form expansions and reductions. We will resolve and conclude these experiments by briefly switching to a machine clock, to create tangible rhythmic counterpoint, before ending the performance in complete temporal disarray.

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Notes

1. For details, please see the prototype-quality source code uploaded here: https://github.com/Patterns-in-between/aacp/blob/main/py/tempo/tempo-minimal-imu-madgwick.py, as well as the video documentation from PIFCamp:

https://youtu.be/MJL0rzY-iWA?si=AL3eYZTHprHXtyJ0&t=71.

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