# Twisted Circuits | Rhythm Traces - II
# For Buchla Music Easel, Musical Agent System, and Sonic Acceleration Box (Bela Gem)

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## 1 Program Notes

The piece Twisted Circuits | Rhythm Traces - II focuses on the integration of the Sonic Acceleration Box (SAB), a synthesizer, drum machine, and multi-effect unit realized with Bela Gem and programmed in SuperCollider, into the performative economy of the Buchla Music Easel in combination with a musical agent system.

The SAB is programmed in SuperCollider and can be used as an additional synthesis voice and live electronics, or as a drum machine (with two distinct code sets). SAB uses a minimalistic interface, with a single Trill Square as a touch interface, and handles commands for multi-effect and synthesis algorithms via MIDI input (with SoftStep2 and Faderfox EC4). Housed in a 3D-printed case and attached to the Music Easel with 3D-printed hinges, it integrates with and extends the movement economy of the performer playing the Music Easel. The SAB is integrated into the performative economy of the Buchla Music Easel, extending the players' motions during performance to the sides, thereby enabling new forms of motional and sonic polyphony. These motions are integrated with a unique skin-resistance controller that fundamentally alters the musical interpretation of the 1970s Buchla Music Easel, developing the body as part of the technical object. Through this process, what develops is an augmented instrument, as an assemblage, that takes this instrument but develops and changes it.

Furthermore, the work employs a musical agent system, implemented in SuperCollider using the FluCoMa library, that learns in real time from performers playing Buchla and SAB and operates in a player paradigm fashion, based on the musical material it has learned. The musical agent system can learn and adapt the instrument's tonal and rhythmic fluidity, extending its capabilities beyond its limits. Hein's musical agent learns to interact musically, creating music in real time with Hein on the synthesizer and developing the interaction between a human and a machine-generated musical voice. The systemic economy of movement and the interaction with the AI musical agent create polyphonic rhythmic, tonal, and spatial structures and a performance ecosystem. The piece focuses on the emergent Dances of Agency between the human performer, the musical agent system, and DMI, developing a form of cybernetic listening.

Music Easel, SAB, and a musical agent system are individually live spatialised on the performance (multichannel) sound system, using different audio descriptors, which are translated into source positions in the ambisonics encoder.



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Fig. 1. SAB – Front Perspective

Fig. 2. SAB – Back Perspective in 3D printed hanger

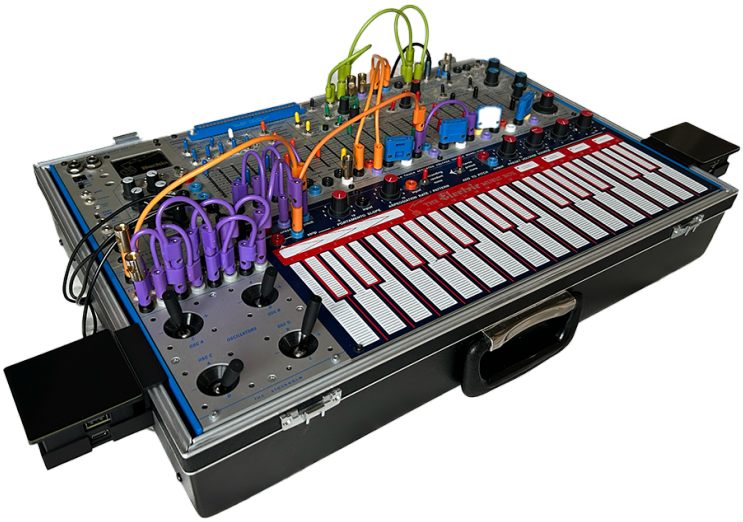

Fig. 3. Buchla Music Easel with SAB attached left and right


Fig. 4. Buchla Music Easel with SAB and extra extension Trill.

Fig. 5. Buchla Music Easel with two SAB, midi controller, and body touch interface.

## 2 Project Description

The piece Twisted Circuits | Rhythm Traces - II focuses on the integration of the Sonic Acceleration Box (SAB), a synthesizer, drum machine, and multi-effect unit realized with Bela [5] Gem and programmed in SuperCollider [10], into the performative economy of the Buchla Music Easel in combination with a musical agent system.

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With the SAB, the performer is no longer merely "turning knobs" or "patching signals"; the performer's epidermis becomes part of the sonic computation. Touch is not an external command but an internal condition of the circuit's behavior.

Furthermore, the work employs a musical agent system, implemented in SuperCollider using the FluCoMa [8] library, that learns in real time from performers playing Buchla and SAB and operates in a player paradigm fashion [7,4], based on the musical material it has learned. The musical agent system can learn and adapt the instrument's tonal and rhythmic fluidity, extending its capabilities beyond its limits. Hein's musical agent learns to interact musically, creating music in real time with Hein on the synthesizer and developing the interaction between a human and a machine-generated musical voice. The systemic economy of movement and the interaction with the AI musical agent create polyphonic rhythmic, tonal, and spatial structures and a performance ecosystem [9]. The piece focuses on the emergent Dances of Agency [6] between the human performer, the musical agent system, and DMI, developing a form of cybernetic listening [2].

Twisted Circuits | Rhythm Traces asks what happens to rhythmic and timbral agency when the "instrument" stops being a bounded object and becomes an ecology: a mutable field of couplings between skin, voltage, software, learned behavior, and the acoustics of the space. The piece begins from a very concrete intervention: Hein integrates the body—specifically skin resistance—directly into the circuit of an analog synthesizer (Buchla Music Easel), and then extends this already unstable analog body–machine assemblage through live electronics and a machine-learning–based musical agent system (SuperCollider) that is trained in real time. What results is not simply an expanded controller scheme, nor an "AI accompaniment," but a dynamic system in which listening, action, and adaptation circulate across heterogeneous components. In other words: the work stages improvisation as a cybernetic practice—not in the narrow sense of "control," but as a distributed, recursive, and emergent mode of becoming-with technology.

Music Easel, SAB, and a musical agent system are individually live spatialised on the performance (multichannel) sound system, using different audio descriptors, which are translated into source positions in the ambisonics encoder.

In the resulting concept of ecology, improvisation is not located "inside" the performer; it is distributed across circuits, buffers, algorithms, speakers, and room reflections. Human–machine improvisation is not simply a human making choices "with" technology, but a practice in which co-composition occurs across agents and mediations. The piece's most explicit form of machinic co-agency is the musical agent system programmed for the piece. Crucially, this agent is trained in real time on the musical material produced by Hein during performance. This is what Hein calls auto-cybernetization: a process in which a musical agent system learns from the musician's own gestures and idioms, translating the performer's material into a machinic capacity to act on the shared musical ecology. Auto-cybernetization has an immediate aesthetic edge: it makes "selfhood" audible as a feedback

phenomenon. The piece focuses on the emergent Dances of Agency [5] between the human performer, the Buchla Music Easel, the DMI, and the musical agent system.

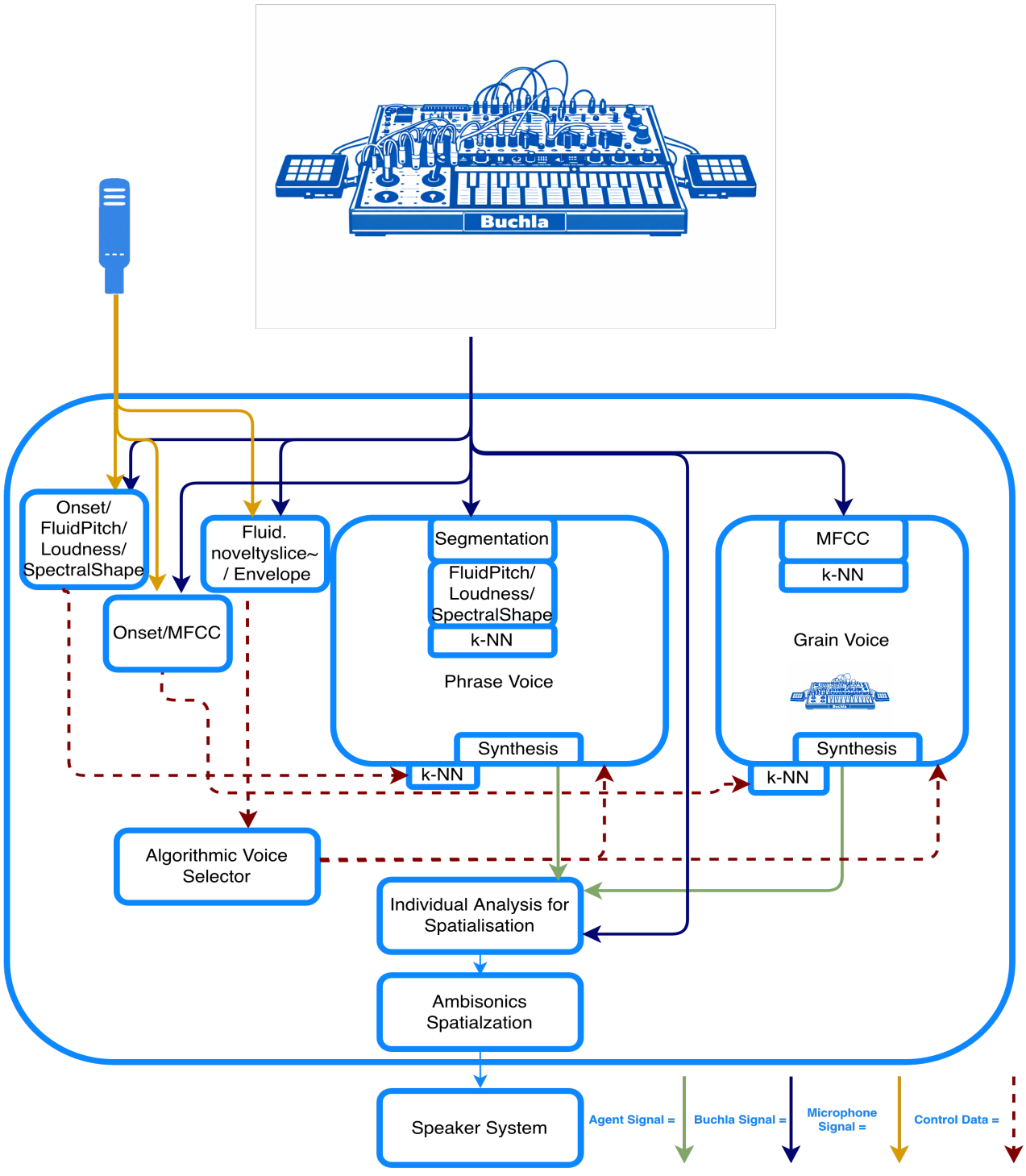


Fig. 6. Structure of Musical Agent System.

## 3 Technical Notes

The performance needs at least a stereo or (preferred!) multichannel sound system. I can adapt to any sound system (ambisonics or WFS) and will send our output accordingly. I only need to be able to

connect to the PA, either via analog out, Dante or Madi. Spatialization is done on my computer and can be adjusted to any multichannel system. Furthermore, I need a table of approximately 1m x 1.5m in size and one plug with an extension cord (I will bring my own extension cord to extend from there, since I am using Schuko plugs).

## 4 Media Link(s)

- Video of SAB demonstration: https://youtu.be/IO-WaDY3Nt4
- Video of Twisted Circuits | Rhythm Traces – I: https://youtu.be/pjXoZVD5jvU

## Acknowledgments

The author would like to thank the Bela company for allowing me to serve as a beta tester for Bela Gem. Furthermore, I would like to thank the Academy of Sciences and Literature | Mainz for supporting the development of prior work (entitled "Imitation Game") that led to this piece.

## Compliance with Ethical Standards

No possible conflict of interest between this work and the hosting institution of NIME 2026 is known to the authors. The human researcher, as the performer of their own work, consented to the research conducted to realize the work.

## References

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