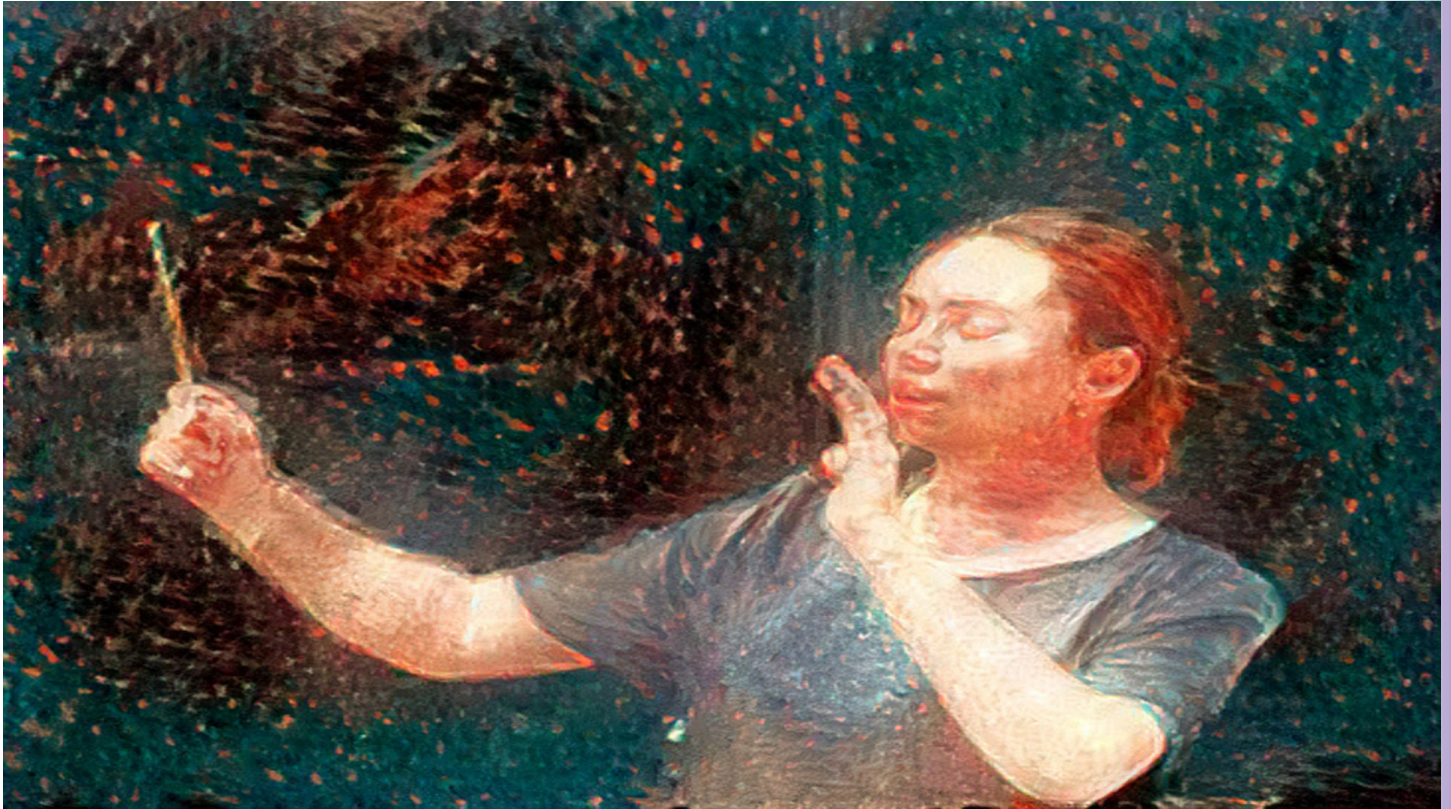




## The Sonic Conductor



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The sonic baton is an intelligent instrument with significant sonic possibilities and has the potential to expand the practice of the iconic role of the conductor. *The Sonic Conductor* uses the sonic baton to lead an ensemble, while the sonic baton translates and sonifies the conductors' movements and gestures making the conductor an audible member of the ensemble. Through a series of graphic scores that use different notations under different performance contexts, the experimental performances explore subversions, extensions, and expansions of conducting practice aiming to test the ultimate boundary – at what point does the conductor lose their iconic role through expanded practice and the sonic baton simply becomes a sound stick?

### Background

Traditional conducting practice and historical chironomy in music is well studied. Technologies applied in musical performance and composition are already proving to have impacts on artistic expression and musical collaboration across multiple genres and instruments for many decades, however those technologies have mainly been devised to control and edit sound rather than integrate it into the musical setting. More recently, there has been considerable complementary research and creative contribution through New Interfaces in Musical Expression (NIME) with new instrumental development, such as the *Halldor-*

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*ophone* (see Úlfarsson and Magnusson 2023; Úlfarsson 2018), the *Proto-langspil* (see Armitage et al. 2022) and the *Overtone Fiddle* (Overholt 2011) to name a few. Scoring tools and softwares such as *Decibel Score-Player* (Hope and Vickery 2015) and The BabelBox (Bell et al. 2019), alternative notations such as The *Magnetic Score* (Privato et al. 2023), and new performance formats, such as *Scoring an Animated Notation Opera* (Hope et al. 2018) and *AI Brainwave Opera* (Pearlman 2022) also create a momentum around NIME and the impact technology in music is having on performance and composition. These developments in artistic research over the past decade point to the relevance and timeliness of exploring a space for expanded conducting practice using music technology, that can potentially contribute to artistic practice, scholarship, and the broader musical community with the utilization of technologies in artistic and musical outcomes.

The significance of the performances described opens the practice of conducting and gesture performance to explore how technology can pioneer new artistic possibilities for not just conductors, but composers, ensembles, and more broadly, larger live music productions and their audiences. Currently there is limited research and media on expanded conducting practice and its impacts, especially with a focus on an integrated role of technology within musical creativity. History does inform us however, that conducting practice and its musical possibilities, does expand with each industrial revolution.

## Technology

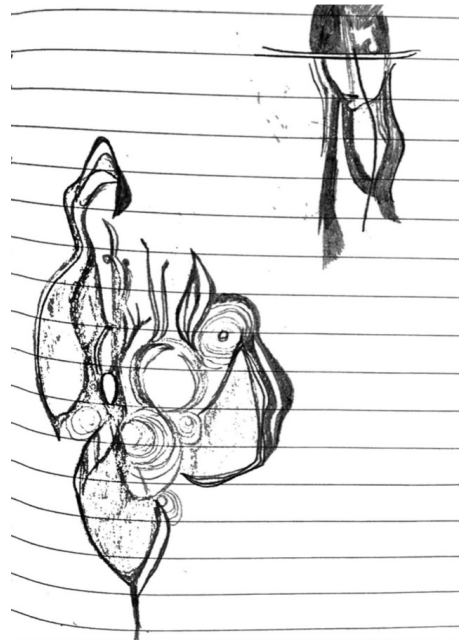
Several sonic conducting batons were built at the same time and contained either an accelerometer sensor or a gyroscope sensor placed on the batons by Sean Patrick O'Brien from the Intelligent Instruments Lab at Iceland University of the Arts. The sensors produced an Arduino signal to a Max patch via a wireless router. Several Max Patches were made by Nicola Privato from the Intelligent Instruments Lab sourcing sound data with a choice from either sea mammals, an electric guitar, or a human voice. These sonic datasets were prepared by Victor Shepardson and researchers at the Intelligent Instruments Lab at Iceland University of the Arts. Each set of sounds was used to train a Realtime Audio Variational autoEncoder (RAVE) following (Caillon and Esling 2021). Acceleration gestures from the batons were mapped to vectors in the learned latent space via an accelerometer sensor, and the RAVE decoder was used to convert the stream of acceleration values into a stream of audio as presented in the sonic baton case study (Armitage, Privato, Shepardson, Gutierrez 2023). This resulted in the spatialization of sound within the latent space that can be used to explore and navigate the RAVE model, thus giving the conductor a degree of agency in performance with the sonic baton.

## Performances

Realizing the expanded sonic possibilities, I (Majella Clarke), a conductor, worked alongside several composers to develop new notations and scoring to integrate the sonic baton into different ensemble set-ups. *May The Whole Universe*, the composition by composer Bergthora Ægisdóttir is a graphic and text score for open ensemble, see Figure 1. The com-

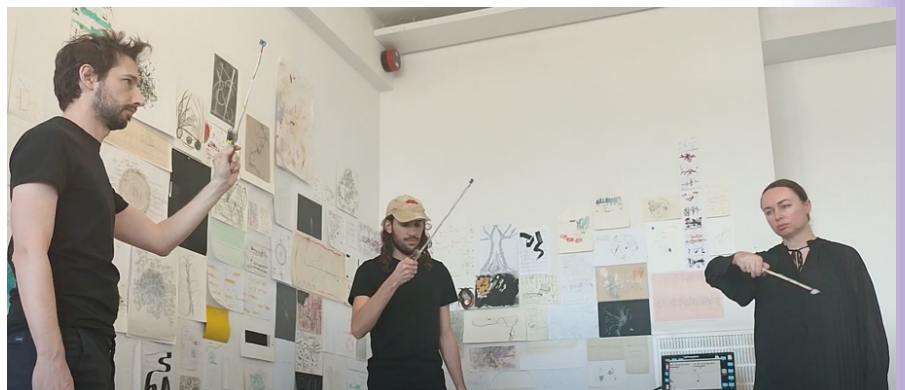
position opens with the statement “May the whole universe, in relation to my body, be to me, what to a blind man his stick is in relation to his hand. His sensitivity is no longer really in his hand but at the end of the stick. May the whole universe become like a second body to me”, from Simone Weil’s book *Gravity and Grace* (Weil 2002, 140).

**Fig. 1.** May The Whole Universe by Bergthora Ægisdóttir.



The composer’s method of scoring was to enter a lucid surrender to the universe with subconscious spontaneous drawing reflecting the artists’ inner sense of time and space. The composition has been performed in several different ensemble set-ups with the sonic batons. The first set up uses only conductors with their sonic batons, eliminating the conventions conductor-performer hierarchy, and subverting the ensemble to include only multiple sonic leaders, see Figure 2. But can everyone be a conductor in an ensemble? And is one conductor more dominant than the others? What makes a dominant conductor? Is it gesture, presence, or the baton’s sonic possibilities? The performance challenges the audience to explore these questions as they watch the three conductors with three sonic batons in performance as a sonic trio of conductors facing each other drawing gestural inspiration from the graphic score.

**Fig. 2.** Video Asset: <https://www.youtube.com/watch?v=4puHR0G6qdI>.



The second setup performed *May The Whole Universe* and included an ensemble with acoustic instruments and vocalists improvising, alongside a conductor with a sonic baton, see Figure 3. This rendition of the composition is completely different, and the performers not only draw musical improvisation from the graphic score, but also from the sonic conductor's gestures. Do the conducting gestures inspire ensemble unity and/or creativity while working with a sonic baton? Or is it just a sound stick where the conductor becomes a performing member of the ensemble?

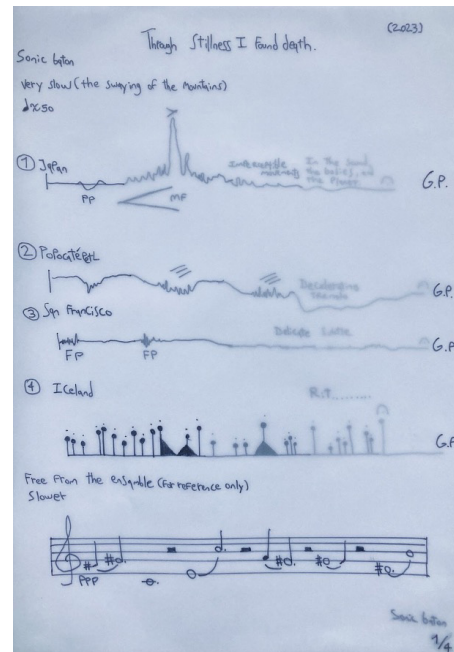
Fig. 3. Video Asset: <https://www.youtube.com/watch?v=Wly0IHtMM4&t=5s>.



In these performances of the same composition, we see two very different styles of conducting, the first is a subversion of the practice of conducting, with all batons on equal role and sonic responsibility in the performance. The gestures of the three performers are experimental as they explore their sonic capabilities facing inward towards each other, listening, and responding to each other's sonic colors and gestures. The second performance depicts the use of the sonic baton in a traditional conducting context. It integrates the intelligent instrument into the ensemble, but also using the sonic baton to provide gestural communication and coordination with the ensemble.

The next composition is *Through Stillness I Found Death* by Juan David Bermúdez for string ensemble and sonic baton. The composition utilizes both standard musical notation and graphic notation on four pages of soft off-white translucent papers representing the stratification processes studied by geologists, see Figure 4.

**Fig. 4.** *Through Stillness I Found Death* by Juan David Bermúdez for string ensemble and sonic baton, excerpt from the sonic baton score.



The sonic baton's notation is based on earthquake data from different parts of the world, while the string ensemble reads notation with some graphic notation to communicate the effect of the scored sound. While the string orchestra has both musical and graphic notation, it is not continuous. More precisely, the composition is modular, and there is also a series of improvising elements to the composition, which means that the players can take gestural direction from the sonic conductor or they can choose not to. What is perhaps important to note is that the left hand without the baton is necessary to direct the ensemble gesturing cues when necessary, and indicating the conclusion of each module, see video asset link under Figure 5.

**Fig. 5.** Video Asset: <https://www.youtube.com/watch?v=rPACyw0rioU>.



## Concluding Remarks

The exploration of the above performances is expected to present insights and inspirations into technology in music, while providing new awareness for conductors, composers, and performers into the possibilities of experimenting with intelligent instruments and hybrid ensembles that use both intelligent and acoustic instruments. For hybrid ensembles, modular compositions applying both graphic and music notations provide ample opportunity to experiment with new sounds through conducting gestures. The performances demonstrate that conducting practice expands with the use of technology in the form of neural audio synthesis. The expected outcome of the performances and use of the sonic baton intends to invigorate new compositional methods and notations, further develop sonic possibilities within the intelligent-acoustic hybrid ensemble formulation and expand the practice of conducting.

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