

Project Summary: *Animated Objects and Moving Sound Sources: Expanding Spatial Audio in Post-Instrumental Practice*

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Introduction: The Post-Instrumental Turn

The *Animated Objects and Moving Sound Sources* research project is situated within a notable evolution in contemporary music, a turn variously described as post-instrumental, expanded music performance, or the “New Discipline.” By applying musical thinking to non-sonic materials such as theatrical sets and physical gestures, these approaches challenge purely sonic conceptions of musical practice, creating instead multi-sensory situations grounded in the embodied experience of performers and listeners.

Focusing on the perceptual qualities and spatial function of object performance, 3D audio (HOA, WFS), and physically moving sound sources, this project investigates their potential to create new spatial relations between sonic and physical forms—bridging the capabilities of advanced spatial audio technologies with the kinetic reality of contemporary embodied performance.

Historical Context: Lifting the Acousmatic Curtain

To understand the significance of this shift, it is helpful to look at the historical foundations of electroacoustic spatial composition. Conceptual thinking in this field is largely founded on Edgard Varèse’s vision of “sound-masses” projected within a space—an idea further developed by the French school of *musique concrète*. It was within this context that the art of sound diffusion emerged, developing into the acousmatic tradition, composing spatial sound forms and spectromorphological practices—where the sonic material is severed from its causal origins to facilitate reduced listening. In this way, sound is often treated as an immaterial phenomenon to be sculpted in an abstract, virtual sonic space.

The development of multichannel systems enabled the polyphonic, immersive spatial imagery exemplified in now classic spatial compositions of the 20th century (Nono, Xenakis, Stockhausen). These works emphasised a geometric, top-down, parametric approach to musical space—rendering sound streams as point-sources moving along defined trajectories—an approach which fundamentally shaped early spatialisation tools.

While this geometric paradigm became dominant in high-resolution spatial audio (such as Wave Field Synthesis and Higher-Order Ambisonics), a counter-current emerged that began to break from abstract control, moving toward a more physical engagement with space. In the installation works of artists like Alvin Lucier and Maryanne Amacher, the loudspeaker was reconceptualised. No longer a transparent medium for acousmatic projection, it became a tool for physical activation. This focus on place and presence initiated a post-acousmatic shift that effectively lifts the acousmatic curtain, emphasising causal and semantic listening—an attention to the sound-producing source and its cultural meaning, foregrounding the tangible presence of objects.

The Gap and Project Vision

These branching streams of spatial compositional work highlight a significant gap: advanced spatial audio technologies still largely rely on trajectory-based virtual rendering, while contemporary avant-garde practice tends towards tangible, multi-sensory physical interaction.

To address this gap, the *Animated Objects* project interrogates the dynamic relationship between tangible physical objects, mechatronic systems, and high-resolution virtual sound rendering. Building upon the ICST's extensive research in spatial audio and instrument design, the project synthesises artistic and scientific methodologies to investigate how we can bring spatial thinking closer to real spaces, bodies, and objects, fundamentally comparing the perception of virtual acoustic motion with literal physical motion.

Research Trajectory and Scales

The project unfolds through a structured sequence of practice-based studies that progressively expand in physical scale and context, continuously probing the boundaries between physical kinetics, motorised systems, and virtual acoustics. Each study will be evaluated in collaboration with a diverse group of experts from overlapping fields.

- **Study 1: Tabletop Interfaces and Animated Objects:** The research begins with the development of computer vision-based tabletop instruments. A central focus here is investigating the perceptual differences between a purely *projected* virtual object moving with virtual sound (using high-resolution rendering like Wave Field Synthesis) versus a *real* performance object (which may be physically silent) manipulated by hand and anchored to a virtual sound. By tracking the performance object, the system makes the object appear to be sounding, allowing us to deeply examine this causal illusion and the relationship between physical manipulation and virtual acoustics.
- **Study 2: Human-Scale Controllers and Moving Sound Sources:** Expanding to a human-scale performance space, this phase centres on physically moving sound sources—specifically, motorised, mechatronic loudspeakers. This allows the project to contrast the aesthetic and phenomenological concerns of literal, physically travelling loudspeakers with the virtual WFS trajectories explored in Study 1. This stage encompasses two distinct approaches: the direct compositional choreography of the robotic

speakers themselves, and the integration of motion capture, where performers or larger objects act as interactive spatial controllers within the room (translating the tabletop concept to a human scale).

- **Study 3: Large-Scale Installations and Site-Specific Ecosystems:** Finally, the project culminates in large-scale installation and performance environments, investigating how these interactive cyber-physical systems generate spatiality, phenomenal presence, and aesthetic meaning in real-world architectural contexts.

Core Inquiries and Exposé Guidelines

As candidates prepare their doctoral exposés (7–15 pages) for submission to the HfMT Hamburg doctoral program, their proposed artistic research should be explicitly guided by the project's central inquiries:

1. **Conceptualising Space:** How can spatial audio practices be reconceptualised to deeply integrate the tangible presence of bodies, objects, and architectural sites, moving beyond trajectory-based virtual sound projection?
2. **Instrument Design:** What new strategies and design ontologies can effectively bridge high-resolution virtual acoustics with the embodied, kinetic reality of physical objects?
3. **Phenomenal Presence:** How does spatial scale fundamentally alter the perception of presence and the construction of aesthetic meaning in performance?

Structuring Your Proposal

A successful proposal will clearly articulate how your personal artistic practice adopts these driving questions. To ensure your exposé meets the rigorous standards of the doctoral program, we recommend structuring it to explicitly address the following:

- **State of the Art & Personal Context:** Frame your existing artistic/compositional practice within the historical and theoretical context of the post-instrumental turn and expanded spatial audio.
- **The Three Scales of Engagement:** Provide a concrete outline of your proposed artistic/compositional approach across the project's three predefined scales (Tabletop Interfaces, Human-Scale Controllers, and Large-Scale Installations). Detail what you intend to build, compose, or choreograph at each stage.
- **Methodology:** Explicitly detail the qualitative and practice-based methodological approaches you will use to evaluate your work (e.g., grounded theory, autoethnography, action research) during the expert workshops.

- **Timeline & Bibliography:** Include a provisional four-year project timeline that aligns with the three scales of study, supported by a foundational academic bibliography.