

Amaç Erdem

Composer and Independent Researcher

İzmir, Türkiye · amace@bu.edu

Research project · Personal website · ORCID · Research code and results

RESEARCH INTERESTS

Computational music cognition; auditory perception and prediction;
musical memory and emotion; interpretable models of music listening.

EDUCATION AND FELLOWSHIPS

Boston University, College of Fine Arts - Boston, MA 2024

Master of Music in Composition

GPA: 3.7/4.0 · Composition advisor: Joshua Fineberg

Fulbright Scholarship, 2022–2024 - graduate study at Boston University.

Dokuz Eylül University, State Conservatory - İzmir, Türkiye 2019

Bachelor's degree in Composition and Orchestral Conducting

Coursework included composition, orchestration, musical analysis, computerized music and electronic music.

RESEARCH EXPERIENCE

Independent Researcher - Musical Intelligence 2025–present

- Designed the architecture of Musical Intelligence, connecting acoustic representations, temporal context and explicit computational hypotheses about music listening.
- Designed consonance analysis from pairwise spectral-peak relationships without fundamental-frequency estimation; developed temporal-windowing rules and selective data connections within and between mechanism layers.
- Evaluated selected outputs against public perceptual and affective ratings and explored public fMRI data, using acoustic baselines, regression readouts and cross-validation.
- Documented computational traces and targeted interventions, separating implemented equations from cognitive interpretations; maintained versioned analyses and cached results.

RESEARCH OUTPUTS

Erdem, A. (2026). *Musical Intelligence: A Glass-Box Architecture for Computational Models of Music Listening*. Unpublished manuscript.

Erdem, A. (2026). *Musical Intelligence Reproduction Archive - Results Layer* (Version 2.0.0). Analysis code and cached results. Zenodo. doi:10.5281/zenodo.20457643

ADDITIONAL TRAINING

Self-directed study - Music cognition and auditory neuroscience 2025–present

Literature-based and project-based study of psychoacoustics, auditory prediction, musical memory and emotion, documented in computational specifications and source-linked research notes.

MIT xPRO - AI and Deep Learning: Neural Network Applications 2024

Professional course, non-credit.

SELECTED COMPUTATIONAL PROJECTS

Spectral Sound Space (S³) - Interactive Instrument 2025–2026

Designed and developed gesture mappings for pitch, amplitude and timbre, connecting hand tracking, sample-based synthesis and synchronized WebGL visuals; explored spatial sound visualization in Unity.

M³ / VEILA - System Architecture (Collaborative) 2026

Designed system architecture connecting music-analysis outputs with conversational interfaces, retrieval and tool use; specified research-engine interfaces within a collaborative application project.

Maestro / MI-Maestro - Music Analysis and AI Prototypes 2026

Developed prototypes for score-linked analysis and explanations using MusicXML/MIDI and addressable score facts; explored conditional music generation through conditioning-gated LoRA adapters.

Scientific Visualization and Interface Prototypes 2025–2026

Developed interactive model explorers and audio-synchronized displays across MI-Site, MI-Demo and Resonance, using 3D geometry, shader effects, linked time series and responsive interfaces.

RESEARCH AND TECHNICAL SKILLS

Computational modeling: Psychoacoustic feature design, multiscale temporal operations, layered mechanism dependencies, computational traces and interventions.

AI/ML applications: Neural-network prototyping; pretrained audio-model inference and embedding evaluation; retrieval-augmented generation, LLM tool integration and conditional-generation adapters.

Quantitative analysis: Grouped cross-validation, ridge regression, bootstrap intervals and baseline comparisons; exploratory fMRI encoding, ROI time series and HRF convolution.

Audiovisual interaction: Gesture-to-sound mapping, sample-based synthesis, audio-reactive graphics, interactive 3D visualization and shader-based rendering.

Research software: Analysis pipelines, API integration, structured data storage, data contracts, version control and provenance documentation.

Musical analysis and practice: Composition, orchestration, harmony, score analysis, electronic music and symbolic music processing.

TOOLS

Languages: Python, JavaScript/TypeScript, GLSL; C# in Unity prototypes.

ML and data: PyTorch, NumPy, SciPy, scikit-learn, librosa, ChromaDB.

Audio, graphics and interfaces: React, Three.js, WebGL, Web Audio, Tone.js, MediaPipe, Unity, music21, Verovio.

Software infrastructure: FastAPI, SQLite, HDF5, Git.

SELECTED COMPOSITIONS

- *Enigma in the Veil* - orchestra and electronics; developed with harmonic spectrograms made in Python.
- *A·MOR·PHOUS* - string quartet.
- *An Unquiet Mind* - mixed ensemble and spoken word.