

ALEXANDER (XANDER) TOTH

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SOFTWARE ENGINEER—SYSTEMS • AUDIO/VISUAL INTERACTIONS • CREATIVE TECHNOLOGY

Creative technologist and software engineer with a foundation in computer science and background in music composition. I develop interactive systems and intelligent tools spanning real-time audio/visual applications, data-driven feature extraction, and human-centered interfaces. My work bridges algorithmic thinking and artistic intuition, enabling designs that are inventive, technical, and robust.

TECHNICAL SKILLS

Languages: Python, C/C++, Java, JavaScript, GLSL, SQL

Machine Learning & Data: PyTorch, torchaudio, TensorFlow, UMAP, ml.star

Graphics & GUI: OpenGL, Dear ImGui, GLAD, SDL2, React, p5.js

DevOps & Testing: Docker, pytest, Git, VS Code Dev Containers

Visualization & Plotting: matplotlib, librosa

Creative & Audio Coding: Max/MSP/Jitter, Processing, miniaudio

SELECTED PROJECTS

grpr: ml audio feature extraction (Python, PyTorch, torchaudio, UMAP, librosa, Docker)

- Extracts semantic audio embeddings from input audio files with Wav2Vec2.
- Reduces embeddings with UMAP and groups files based on semantic similarity.
- Containerized in Docker to ensure a reproducible development environment.

ezvz: audio-reactive visualizer (C++, GLSL, OpenGL, ImGui, GLFW, GLAD, miniaudio)

- Maps values extracted from real-time audio features (RMS, ZCR, etc.) to graphic object transforms.
- Implements framebuffer-based rendering and custom GLSL shader pipeline.
- Incorporates timeline UI for audio track imports, clip drag/resize, and parameter edits.

mlx: machine-learning-generated music notation (Max, bach, ml.star)

- Learns MIDI and .musicxml data to create notated musical scores.
- Enables creative output through parameter-shaping UI.
- Presented at Algorhythms: The World of Music and AI at Indiana University, 2025.

bug garden: audiovisual installation (Java, Processing, Max)

- Uses colored lights and a webcam to manipulate audio and on-screen graphics.
- Utilizes computer vision for color and blob detection in Java via Processing.
- Premiered at Indiana University, December 2023.

PROFESSIONAL EXPERIENCE

Adjunct Faculty

Indiana University, January 2024 - May 2024

- Lectured on audio DSP basics, MIDI fundamentals, DAW functionality, musical concepts.
- Redesigned curriculum for compatibility with Ableton 11.
- Updated Canvas HTMLs, graded students with Excel.

EDUCATION

MM, Composition and Computer Music Composition

Indiana University, 2021 - 2023

- Vice-President of Student Composers Association

BM, Vocal Performance + Teaching Licensure

University of Iowa, 2014 - 2018

- High Distinction, University Honors