ALEXANDER (XANDER) TOTH

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SOFTWARE ENGINEER — AUDIO/VISUAL • MACHINE LEARNING • SYSTEM ENGINEERING

Creative technologist and software engineer with a foundation in computer science and background in music composition. I develop interactive systems and intelligent tools spanning system-level programming, real-time audio/visual applications, and ML-powered querying and creation. My work blends system design with artistic intuition, emphasizing low-level performance and sustainability.

TECHNICAL SKILLS

Languages: Python, C/C++, Bash, JavaScript, Java, SQL, Powershell, GLSL
Linux & Systems Programming: Linux CLI, systemd, procfs/sysfs, networking, Netplan, cron
Packaging & Deployment: .deb, Make, Docker/Docker Compose, VS Code Dev Containers
Audio & Graphics: miniaudio, OpenGL, GLSL, Dear ImGui, Max/MSP/Jitter, Processing, React, p5.js
Machine Learning & Data: PyTorch, torchaudio, UMAP, FAISS, LangChain, SQLite
Versioning & Testing: Git, pytest, gdb

SELECTED PROJECTS

(all linked in my GitHub and portfolio)

Autodactyl: LLM-powered educational website (Python, Flask API, LangChain, SQLite, Vite + React)
- Creates lessons, quizzes, exercises, and projects per user interaction with a local LLM.
- Persists courses, conversations, and metadata with SQLite and LangChain's InMessageChatHistory.
- Containerized and orchestrated with Docker Compose.

grpr: ml + audio CLI tool (Python, PyTorch, torchaudio, UMAP, LangChain, SQLite, FAISS, Docker)
- Extracts embeddings from audio files with Wav2Vec2 and fine-tuned projection heads.
- Reduces embeddings with UMAP and groups files with Gaussian Model Mixture.
- Organizes metadata with FAISS and SQLite; labels and queries audio with local LLMs via LangChain.

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 system-level audio integration with miniaudio, uses filesystem API for dynamic file loading.

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.

PROFESSIONAL EXPERIENCE

Adjunct Faculty — Indiana University, Jan 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