Alexander (Xander) Toth

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# SOFTWARE ENGINEER — MODERN C++ • REAL‑TIME GRAPHICS & AUDIO • CREATIVE CODING Composer‑turned‑developer focused on performance‑sensitive multimedia applications. 2 years hands‑on with modern C++, OpenGL, and ImGui; 4 years designing interactive audio systems in Max/MSP. Adept at turning artistic ideas into efficient cross‑platform code and clear user experiences.

# TECHNICAL SKILLS

* Languages: Python (3 yrs), JavaScript (2 yrs), Java (2 yrs), C/C++ 17/20 (2 yrs), SQL (1 yr), GLSL (1 yr)
* Graphics : OpenGL, GLSL shaders, GLFW, Dear ImGui, SDL2, Jitter (Max), Processing (Java)
* Audio: miniaudio, PortAudio, Max/MSP, MIDI protocol
* Tools: Visual Studio 2022, CMake, Git, GitHub
* Concepts: object-oriented design, linear algebra, basic machine-learning theory, digital signal processing, real-time optimisation

# PROJECTS

* `ezvz`: Audio-Reactive Visualizer (C++, OpenGL, ImGui, miniaduio) – in progress
* Developing application to easily create graphic visualizers that react to imported audio files.
* Incoporates a timeline UI that lets users import multiple audio tracks, drag/resize clips, and group‑edit parameters.
* Implements framebuffer‑based rendering and custom GLSL shader pipeline for shape, colour, and alpha animation.
* Uses a feature‑extraction module (RMS, envelope, ZCR) to map values to object transforms for real‑time audio‑driven effects.
* Modularizes codebase (Canvas, Scene, AnimationPath, etc.).
* `mlx`: ML-based Music Notation Generator (Max/MSP) – GitHub: <https://github.com/gitxandert/mlx>
* Developed software that machine learns MIDI and .musicxml files to render and transform data into musical notation.
* Integrated ml.star library for creating Markov chains and bach environment to generate .musicxml files.
* Presented at AlgoRhythms: The World of Music and AI (2025).
* `bug garden`: Audio-Visual Installation with Computer Vision (Java, Processing, Max/MSP) – GitHub: <https://github.com/gitxandert/bug-garden>
* Orchestrated an audio-visual installation in which users point colored lights at a webcam to manipulate on-screen graphic objects linked to custom-designed audio instruments.
* Used computer vision for color and blob detection in Processing, with Java-based, object-oriented code.
* Premiered at Indiana University, December 2023.
* `bodies`: Web-based Data Sonification (JavaScript, RNBO, p5.js) – GitHub: <https://github.com/gitxandert/bodies>
* Developed interactive website that calls Astronomy API to sonify data-driven instruments created in RNBO.
* Master’s thesis for computer music composition, 2023.

# Professional Experience

* Adjunct Faculty – Indiana University Jacobs School of Music
* Jan 2024 – May 2024
* Designed and taught an introductory computer music course using Ableton Live and Max
* Developed course materials with programming fundamentals in music tech

# Education

* Indiana University Jacobs School of Music — MM, Composition & Computer Music, 2023
* Focus on generative systems, Max/MSP, algorithmic music, and real-time audio
* Research on AI synthesis + neural audio models
* University of Iowa — BM, Vocal Performance + Teaching Licensure, 2018
* Graduated with High Distinction + University Honors
* Studied computer music and algorithmic composition as electives

# Leadership & Activities

* Vice President – Student Composers’ Association, IU
* 2022–2023
* Managed budgets, directed rehearsals, and launched cross-departmental collaborations
* Produced a full ballet performance and coordinated multi-party recording + delivery