NICHOLAS SOLEM
Audio Software Engineer

nickosolem@gmail.com
https://nvssynthesis.github.io/
San Diego, CA

SKILLS

Programming Languages
C++, C, Python, Bash, Matlab, Max/MSP, Pd

Build and Version Control Systems
CMake, Make, Ninja, Git, GitHub, git-lfs

Libraries, Frameworks, APIs
Boost, gtest, JUCE, CoreAudio, Accelerate, FFTW, Essentia, Eigen, PyTorch, Librosa

Fields of Expertise
Audio Analysis & Synthesis
Digital Signal Processing
Analogue Modeling Techniques
Software Design Patterns
Machine Learning

DAWs
Live, Logic, Pro Tools, Reaper, Reason

EDUCATION

Ph.D. in Computer Music
Summer 2025
University of California San Diego, San Diego, CA
- Dissertation: *Navigating Timbre Space: Adaptable Corpus-Based Sound Synthesis*
- Research in DSP, virtual instrument design
- GPA: 4.0

Master of Music in Music Technology
Fall 2017
New York University, New York, NY
- Thesis on Frequency-Domain Morphing

B.A. in Philosophy
Spring 2015
The College of Wooster, Wooster, OH
- Graduated with Cum Laude

EMPLOYMENT

Software Design Engineer 10/2023 – Present
Outlier Technology San Diego, CA
- Developed cross-platform, interactive music software in Python and C++, leveraging multithreaded & asynchronous code to manage MIDI, audio, and computer vision functionalities.
- Collaborated closely with a multidisciplinary development team to design and implement an accessible API, streamlining the integration of multifaceted program components.
- Created and maintained a robust automated test suite to ensure maintainability and guarantee functionality across updates.
- Miscellaneous creative tasks, including composition, sound design, and mixing for promotional video.

Graduate Researcher, Instructor, and Technical Specialist 10/2018 – 09/2023
University of California San Diego San Diego, CA
- Taught classes on mixing techniques, signal theory, and music technology history, with a focus on hands-on learning.
- Processed arctic field recordings, optimizing signal to noise ratio and improving perceived quality for faculty composer.
- Provided technical support and troubleshooting for recording studios and equipment, assisting students with digital audio workstation workflows.

Adjunct Audio Professor 01/2018 – 09/2018
Art Institute of Michigan Novi, MI
- Taught courses such as Musical Acoustics and Digital Electronics, delivering lectures and leading hands-on labs.

Audio Software Intern 11/2016 – 11/2017
Eventide Audio Little Ferry, NJ
- Wrote custom Python scripts to automate documentation from C++ source
- Debugged and documented faults in presets and behaviors for cutting-edge multi-effects rackmount unit.

Max/MSP Tutor and Studio Technician 01/2016 – 09/2017
New York University New York, NY
- Tutored graduate and undergraduate students in Max/MSP and MATLAB.
- Maintained and calibrated multiple music studios.
- Provided troubleshooting support for studio workflows and equipment.

RESEARCH PRESENTATIONS & CONFERENCES

Wavetable-Inspired Artificial Neural Network Synthesis
Sound and Music Computing 2022, St. Etienne, France
- Presented recent developments in automated waveform generation within continuous multidimensional timbre spaces.

Curl and Skew Generator
Heretical Sound Synthesis Mini-Symposium 2019, Helsinki, Finland
- Outlined the inner workings of experimental digital noise synthesizer, demonstrating principles of chaos theory in sound.

SELECTED SOFTWARE PROJECTS

tsn_granular and **tsn_additive** (available as **AU** and **VST** synthesizer plugins)
- Granular and Additive + Residual synthesizer plugins using *timbre-space navigation* (TSN) format to traverse timbre spaces of audio files.
- Uses graph structure, probability theory, and chaos theory to accomplish stochastic timbre space traversal.

Wavetable Manifold Synthesizer, formerly WTIANNS (available as **Audio Unit**, **VST** plugin, and **Pure Data** external)
- Uses custom TSN format and recurrent neural networks to synthesize high-dimensional wavetables.
- Presented this synthesis method at Sound and Music Computing 2022 Conference.

Shredverb (available as **AU** and **VST** plugin)
- Employs audio-rate modulated Time-Variant Allpass Filters to obtain novel, unique sounds not found in standard reverb algorithms.

Curl and Skew Generator (CSG) Chaotic modulated feedback Synthesizer (available as **AU** and **VST** synthesizer plugins)
- Employs delayed frequency modulation, phase distortion, bitcrushing, and nonlinear analog-modeled state variable filter.

nvssynthesis DSP C++ Template Libraries
- Custom lightweight DSP libraries for ~50 and counting filters, oscillators, envelopes, interpolators, and nonlinear processing.
- Employs research in virtual analog signal processing.