Nathan J. Zhang

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PROFILE

Electrical engineering student with expertise in hardware and software with a strong foundation in digital design, signal processing, and HDL programming. Experienced in FPGA development (SystemVerilog), circuit analysis, Agentic AI.

EDUCATION

B.S. Electrical Engineering, Arizona State University - Barrett Honors **Expected May 2027**
M.S. Electrical Engineering Arizona State University **Expected May 2027**
GPA: 3.8/4.0
Relevant Coursework

- HDL, Digital Design, Circuits I & II, Signals and Systems, Random Signal Analysis, Programming Principles, Electromagnetics

Club Leadership: Served as Club President. Led events and managed organizational logistics for over 100+ Chinese American Student Association members.

PROJECTS

Signals Agent- Multiscale FFT Analysis & AI Reasoning Tool 2025-Present

- Developed an intelligent "signals agent" capable of analyzing noisy audio using multiscale FFTs, frequency/time binning, and contextual web search via Perplexity API.
- Processes M4A/MP3 files, segments audio spectrally, identifies dominant frequency trends, and recursively zooms into interesting regions for deeper analysis. Built with a tool-based ReAct agent architecture (LlamaIndex).
- Outputs CSV-formatted time-frequency matrices, colorized spectrograms in the terminal (Rich), and natural-language summaries with citations.

FPGA-Based Digital Systems- DE0-CV Board (Altera Cyclone V) 2024-2025

- Used SystemVerilog in Quartus Prime to design and implement digital systems on DE0-CV FPGA.
- Notably, designed and implemented a custom microprocessor with an instruction set supporting arithmetic, jumps, and immediate loads, including a register file, ALU, and instruction memory.
- Used VGA signal generation to display an animated game, demonstrating pixel timing and raster synchronization.

EXPERIENCE

ASU Bioinformatics Research Group - Research Assistant 2021-2022

- Assembled FED-3 behavioral feeder for rodent-based experiments; integrated Arduino control scripts for behavioral conditioning (Pavlovian, exponential, incremental).
- Authored a technical guide and presentation on device implementation in field settings.

Qubit by Qubit Quantum Computing Program - Student Researcher 2021-2022

- Developed quantum algorithms in Qiskit, including Grover's Search, VQE molecular simulations, and quantum key distribution protocols using Python.
- Conducted experiments on IBM's real quantum hardware via cloud access.

HarvardX/edX - Data Science Program 2021-2022

- Completed modules on Data Science as part of Harvard's professional data science certificate series.
- Certificate IDs: R Basics, Visualization, Probability, Inference and Modeling, Productivity Tools

SKILLS

Technical SystemVerilog, Python, NumPy, Pandas, Java, Git, OpenTelemetry, Linux, Digital Design, SPICE, FPGA Design, Quartus Prime, ModelSim, Arduino, Qiskit, MATLAB, LaTeX
Tools Perplexity API, LlamaIndex, SEM, FIB, TEM, TDR, Oscilloscope, Multimeter, Curve Tracer, Function Generator
Languages English (native), Mandarin (fluent)
Interests Semiconductors, Machine Learning, Agentic AI, Embedded Systems, Computer Architecture, Quantum Computing