Luke Qiao

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EDUCATION

Stanford University **Stanford, CA**
Bachelor of Science, ***Electrical Engineering*** *(GPA: 4.07/4.0)* *2023 – Present*

EXPERIENCES

Sandia National Laboratories **June 2025 – Present**
R&D Intern, III-V Microelectronics Group *Albuquerque, NM*

- Currently designing high-fidelity **analog/RF + mixed-signal PCBs and ICs** and improving **device noise modeling** for simulations using LTSpice, Altium Designer, and Siemens Tanner EDA Suite

Apple **Jun – Sep 2024**
CAD Engineer Intern, Silicon Engineering Group *Santa Clara, CA*

- Built **machine learning (ML) models** in **Python** to reduce **physical design verification (PDV)** algorithm runtime (**50% decrease**) via optimal CPU allocation; deployed to production as a useful tool in Apple's design flow
- Developed multithreaded heuristic algorithms for efficient automated data collection; trained FNN & mathematical models for PDV runtime prediction **(5% error)**
- Gained technical experience in **VLSI, Verilog**, and **physical layout**; presented project to high-level Apple SEG executives

Stanford Radio Glaciology Research Group **Feb 2025 – June 2025**
Undergraduate Researcher *Stanford University*

- Leveraging multistatic **ApRES radar** for ice temperature & bed material estimation and high-res bed topography imaging
- Optimized onboard signal processing; mixed chirped Tx/Rx signals, applied **LPF and FFT** for object depth estimation
- Tested and characterized various **bowtie antenna** designs; deployed **RFoF** links to mitigate coaxial attenuation loss and impedance mismatch; performed coherent phase-aligned averaging to **enhance SNR** across trials

Stanford Student Space Initiative **Nov 2023 – Apr 2024**
Battery Board Co-Lead *Stanford University*

- Co-led the **Battery Board Thermal Circuit** project for SAMWISE, Stanford Student Space Initiative's 2U CubeSat, a custom-built satellite (launching with SpaceX in 2025)
- Designed and analyzed **MOSFET circuit** to regulate battery temperature for **optimal power efficiency**, met required specs
- Created **printed circuit board** (PCB) schematic and layout in **KiCad**; simulated & validated behavior using **LTSpice**; automated heating coil trace wiring with **Python scripts**

PROJECTS

Music Synthesizer | *Verilog, Xilinx Vivado, FPGAs, Digital System Design, Static Timing Analysis, CNNs*

- Created a music synthesizer on a **FPGA** using **Verilog** in **Xilinx Vivado**; implemented features **purely in hardware**
- Emotion prediction with 1D CNN, DSP & harmonic synthesis, ADSR envelope, ROMs, screen display via HDMI protocol
- Developed proficiency in **digital system design**, testbench development, pipelining to fix **static timing analysis** errors

Adaptive Musical Accompanist | *Signal Processing, MATLAB, 1st Place @ California Science and Engineering Fair*

- Currently building a product enabling musicians to rehearse with computers, simulating behavior of human accompanists
- Designed novel tempo-detection algorithms via **signal processing methods** in **MATLAB** (STFT + wavelet transform and tempograms for onset detection, filtering & smoothing)

Custom Stereo Bluetooth Speaker | *Analog Circuits, ICs, FFT, Soldering, Oscilloscope*

- Engineered **stereo bluetooth speaker** from scratch; created a **class-D amplifier** to drive two speakers, with input signal via bluetooth receiver; designed custom power brick (achieved **< 1%** total harmonic distortion)
- Evaluated circuit performance through **analog circuit analysis** and **FFT** measurements to validate calculations; gained foundational knowledge in **analog ICs**
- Developed proficiency in soldering, oscilloscopes, multimeters, power supplies & function generators

TECHNICAL SKILLS AND INTERESTS

Python, Java, C++, Analog & Digital Circuit Design, PCB Design, KiCad, Altium Designer, LTSpice & HSPICE, Verilog, Xilinx Vivado, FPGA, EDA Tools, Linux, Machine Learning, Signal Processing, MATLAB, Design Verification, Git, Robotics

HONORS AND AWARDS

- Professional Society Award Winner, Society of American Military Engineers
- American Invitational Mathematics Examination Qualifier (Top 2.5%), Mathematical Association of America
- 1st Place and Piano Performance at Carnegie Hall, American Protégé International Competition of Romantic Music