Daren Xu

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EDUCATION

Northeastern University, Boston, MA GPA: 3.8 | Dean's List (Spring 2026)
Candidate for Bachelor of Science in Electrical Engineering Expected May 2028
Relevant Courses: Fundamentals of Electronics & Lab, Fundamentals of Linear Systems, Analysis of Random Phenomena in ECE, Manufacturing Systems & Techniques, Embedded Design: Enabling Robotics (FPGA), Circuits and Signals: Biomedical Applications

EXPERIENCE

Hangzhou Boomy Intelligent Technology Co., Ltd. Hangzhou, China | Aug 2026
Robotics R&D Intern — Real-Time Audio/DSP

- Designed a full-duplex acoustic echo canceller for a robot-to-operator intercom, now running on the robot's RK3588S SoC.
- Implemented a multichannel frequency-domain Kalman filter with Hammerstein saturation modeling and Wiener residual suppression.
- Built a 15-scene acoustic simulator and a manipulation-resistant metric suite after showing that standard ERLE rewards half-duplex gating.
- Quantified the residual-suppression trade-off with paired ablations: +10.1 dB ERLE for 2.7 dB of near-end SDR.
- Averaged 26.8 dB ERLE and 15.3 dB noise attenuation in simulation at 21 ms latency and 9.9% of one CPU core.
- Diagnosed loudspeaker distortion as saturation after measuring 70,000× crest-factor amplification on speech.
- Replaced the diverging polynomial basis with a bounded tanh basis, ending a failure mode that absorbed 95% of filter energy.
- Eliminated clock drift by running playback and capture in one duplex callback on a single sound card.
- Isolated board supply noise during Raspberry Pi 4B and LubanCat-4 bring-up, lowering the microphone noise floor 16 dB.

PROJECTS

Autonomous Hexapod Spider Robot Summer 2026
Course Project, Embedded Design: Enabling Robotics — C++/OOP, Cyclone V SoC (DE10-Nano), embedded Linux, Quartus Prime

- Programmed an 18-servo hexapod in C++, driving FPGA PWM over memory-mapped I/O to walk with a tripod gait.
- Integrated an ultrasonic sonar as an FPGA peripheral and wrote a stop-back-up-turn loop at 20 cm.

Traffic Simulator, Network Routing Engine & Biomedical Signal Processing Spring 2026
Course Projects, Computing Fundamentals for Engineers / Circuits and Signals (Team of 3) — C++, OOP, smart pointers, MATLAB, SPICE, Git/GitHub

- Built a discrete-time C++ intersection simulator across 7 classes: queuing, light synchronization, emergency override.
- Developed a C++ routing engine finding bandwidth-feasible paths by depth-first search, with leak-free smart pointers verified in Valgrind.
- Characterized active op-amp filters in SPICE and processed real ECG in MATLAB with the FFT to remove 60 Hz noise.

Healthy Habit Adventure — Interactive Health-Education Exhibit Fall 2025
Course Project, Cornerstone of Engineering (Team of 4) — Raspberry Pi Pico, MicroPython, SolidWorks, AutoCAD

- Proposed the concept the team ranked first in the design matrix — a museum exhibit teaching children healthy habits.
- Wrote the MicroPython game logic on a Raspberry Pi Pico, including Health Meter scoring and a victory animation.
- Wired the Pico to four servos and an LED strip across breadboards, all powered from one battery pack.

LEADERSHIP & COMMUNITY

Roxbury Robotics Club, Boston, MA Sep 2025 – Dec 2025
STEM Instructor (Volunteer)

- Taught mathematics, physics, and engineering fundamentals to children through hands-on LEGO robotics projects.

SKILLS

Programming & Tools: C++, Python (NumPy/SciPy), MATLAB, R/RStudio, C, MicroPython, Bash; Quartus Prime, PSpice/LTspice, Fusion 360, SolidWorks, AutoCAD, 3D printing; Git & GitHub, Linux/WSL, LaTeX
Electronics & Instrumentation: Op-amp and diode circuits; oscilloscope, function generator, multimeter, breadboarding, soldering
Embedded & DSP: RK3588S & Cyclone V SoC bring-up, FPGA and memory-mapped I/O, embedded Linux, ALSA/PortAudio, real-time audio callbacks, adaptive filtering (Kalman/NLMS), FFT & WOLA, FIR/IIR design, Z-transform & DTFT, sampling and quantization
Probability & Statistics: Probability and random processes, regression, hypothesis testing, Monte Carlo simulation (R)
Languages & Interests: Mandarin Chinese (Native); quantitative trading, cycling