Tianhong Xie

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Education

Harvey Mudd College — Claremont, CA
BS in Engineering — *Sept. 2023 – May 2027*
GPA: 3.5 (Major)
Coursework: Microprocessor-based Systems (FPGA & MCU), System-on-chip Design (C & Verilog), Digital Electronics, Engineering Math (Matlab), Data Science Math (Python), Signal & System, Electronic Devices, Data Structures (C++)

Experience

United States Department of Agriculture (USDA) — July 2025 – Present
Firmware Engineering Intern

- Collaborated with USDA ecologists to develop Nordic microcontroller firmware for insect brain-signal acquisition
- Implemented a **Zephyr RTOS SPI driver in C** for a digital potentiometer, enabling dynamic voltage control
- Designed an advanced analog-to-digital converter **(ADC)** acquisition pipeline in **C**, increasing sampling throughput by **10×** and enabling ecologists to capture fast insect feeding signals without aliasing
- Developed a waveform generator in **SystemVerilog** on an Upduino **FPGA** for rapid firmware validation

Breker Verification Systems — August 2025 – Present
Design Verification Engineer

- Architected the company's first verification process for the **Physical Memory Protection** (PMP) unit on **RISC-V** processors and built comprehensive graph models in **C++**
- Wrote tests in **RISC-V** to verify load/store memory protection and debugged using common **EDA** simulators
- Developed the first directed assembly tests using **OpenOCD** to verify the RISC-V external debug module

MIT Computer Science & Artificial Intelligence Laboratory — May 2025 – August 2025
Embedded Computer Vision Intern

- Designed an **AI-powered camera system for wildlife monitoring** with continuous on-device learning abilities
- Built a scalable **Python** pipeline with **OpenCV** for animal detection and segmentation across 100k images
- Integrated SX1262 **long-range radios** onto Raspberry Pi, enabling robust, WiFi-less data links up to **400m**
- Fine-tuned variational autoencoders in **PyTorch**, achieving **100× image compression** with minimal quality loss

University of Southern California — May 2024 – May 2025
Robotics Research Assistant

- Designed in **SolidWorks** and **3D-printed** quadruped robots to collect obstacle movement data on sand
- Programmed 8-gait servo control for a quadruped robot's actuators using Python, controlled by **Raspberry Pi**
- Developed a depth video processing pipeline using **OpenCV** in **Python** for robot interaction data collection

Projects

Floating-Point Multiply-Add Unit (FMA) — Dec 2024 – May 2025

- Developed in **SystemVerilog** a FMA unit for RISC-V processor, including functional units such as unpacking, multiplication, alignment, addition, normalization, rounding, and special-case handling (NaN, zero, overflow)
- Verified 80,000 test cases using **Questa**, gaining hands-on experience with **Linux, Git** and **Makefiles**

Autonomous Weather Station Robot — Jan 2025 – May 2025

- Wrote a **C** script for a time-division multiplexer to save GPIO pins between **Teensy MCU** and wind sensor
- Developed in **LTspice** an **op-amp** circuit to shift thermistor output voltage into the desirable temperature range, soldered electrical components on custom circuit board, debugged using **oscilloscopes** and **multimeters**
- Applied Fast Fourier Transform (FFT) in **MATLAB** with low-pass filtering to denoise wind and temperature data

Publications

"Haodi Hu; Yue Wu; **Tian Xie**; Daniel Seita; Feifei Qian; Granular loco-manipulation: Repositioning rocks through strategic sand avalanche", **International Conference on Robotics and Automation (ICRA)** Workshop, 2025

Technical Skills

Languages: Python, Matlab, C/C++, SystemVerilog, SQL, RISC-V
Developer Tools: Git, Docker, LabView, COMSOL, Questa, Oscilloscope, FPGA, Lattice Radiant, SolidWorks, Jira
Libraries: PyTorch, TensorFlow, Pandas, NumPy, Matplotlib, OpenCV, Scikit-Learn