Zach (Xizhe) Hao

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Education

University of Washington — Seattle, WA
MS in Electrical and Computer Engineering | GPA 3.88/4 — Sep 2024 – Jun 2026

Southern University of Science and Technology — Shenzhen, China
B.Eng. in Automation | Graduated with Distinction | GPA 3.51/4 — Sep 2020 – Jun 2024

Research Experience

Interaction Wearables | Ubicomp Lab | University of Washington — Dec 2024 – Present
Advisors: Dr. Shwetak Patel, PhD Student Alex Ching

- Investigating mechanically mediated sensing structures in ring and watch form factors to enable expressive, low-cost wearable input without reliance on complex ML models.
- Implemented synchronized multi-channel firmware on Seeed XIAO nRF52840 using Arduino to stream calibrated analog strain-gauge readings over BLE in real time.
- Developed a Python-based BLE data pipeline for real-time buffering, segmentation, and visualization, and trained lightweight Conv1D classifiers for gesture recognition analysis.
- Contributed to the IRB and study design for human-subject evaluation, analyzing recognition accuracy across mechanical configurations and wearing conditions.

CircuitSync | Iyer Lab | University of Washington — May 2025 – Present
Advisors: Dr. Vikram Iyer, PhD Student Zachary Englhardt

- Co-designed CircuitSync and led development of its core architecture, integrating circuit schematics with embedded code to enable synchronized, LLM-assisted design and debugging
- Implemented the JSON-based synchronization layer that translates between visual circuit diagrams and structured data, keeping user edits and LLM-generated code updates consistent in real time
- Developed backend integration with Arduino CLI and a multimodal prompting framework combining circuit topology, source code, and runtime traces to enhance LLM reasoning and reduce erroneous fixes
- Conducted a 15-participant mixed-methods evaluation; CircuitSync achieved a System Usability Scale (SUS) score of 78 (SD = 15.36) and strong SPACE outcomes in productivity (M = 5.53) and learning (M = 5.07), validating its usability and efficacy for embedded development

AR Runner and GlanceAR | Makeability Lab | University of Washington — Aug 2025 – Present
Advisors: Dr. Jon E. Froehlich, PhD Student Jaewook Lee

- Engineered an iOS auditory AR system in Xcode using ARKit and Core Audio, delivering head-tracked 3D "ghost pacer" feedback via AirPods Pro 2 to investigate how spatialized audio cues enhance running motivation and spatial awareness in real time.
- Developed a custom HRTF-based spatial audio engine using `AVAudioEnvironmentNode` and `CMHeadphoneMotionManager`, modeling psychoacoustic panning, volume, and head-tracked orientation for perceptually stable feedback.
- Designed the LiDAR-based notification module in GlanceAR, for passive obstacle detection and authored the IRB protocol for human-subject evaluation.

Caterpillar-inspired Soft Robot | NC State University * — Jan 2024 – Feb 2024
Advisor: Dr. Yong Zhu, PhD Student Shuang Wu

- Developed a PCB-based embedded control system for a bio-inspired soft robot driven by resistively heated liquid crystal elastomer (LCE) actuators, integrating MOSFET switching, thermal sensing, and power management to achieve precise, programmable crawling locomotion.
- Implemented real-time wireless control via Wi-Fi/Bluetooth interfaces and experimentally validated programmable motion sequences with synchronized heating profiles and friction modulation.

Publications

Englhardt, Z., **Hao, X.**, Lin, T., Kao, C., Nissanka, D., Zhang, Z., Narayanswamy, G., Breda, J., Liu, X., Patel, S., Li, R., & Iyer, V. "CircuitSync: Bridging Physical Context Gaps in AI-Assisted Embedded System Development." *Manuscript submitted for publication at CHI 2026.*

Posters

Hao, X., Cheng, X., & Liu, G. "Smart Fully Automatic Flowerpot Based on a Micropump" *Undergraduate Research Showcase*, 2024. **(Distinguished Graduation Project Award)**

Hua, Y., Tang, H., **Hao, X.**, & Zhang, Y. "Network Circuit Experiment System Based on Digital Twin" *Undergraduate Innovation and Entrepreneurship Training Program Poster*, 2023.

Selected Projects

Intelligent Fridge System | National University of Singapore * Jul 2023

- Led a team to develop an IoT-based smart refrigerator system that automatically tracks food items, monitors temperature and humidity, and issues expiry alerts through an online dashboard.
- Integrated image-based food recognition (YOLOv8), weight sensing, and environmental monitoring; data flows from sensors through ESP32 and Raspberry Pi to Huawei Cloud and a web interface.
- Led the embedded system design, including integration of HX711 (weight), DHT11, and HC-SR04 (door detection) with buzzer–LED feedback and MQTT data transmission.
- Implemented the GPT-based recipe suggestion module and real-time communication pipeline.

Smart IoT-Based Plant Monitoring and Watering System * Sep 2022 – May 2023

- Developed an AI-driven IoT system integrating Raspberry Pi, multi-sensor modules, and GPT-based analysis for real-time plant monitoring and intelligent decision-making.
- Implemented a closed-loop control that autonomously activates a peristaltic pump for watering and a micro pump for fertilization based on GPT analysis results.
- Built a cloud digital twin with a Flask web dashboard on Alibaba Cloud IoT.
- Awarded a utility patent (CN220441530U) by the China National Intellectual Property Administration.

Entrepreneurship Experience

Founder | Shenzhen Suishi Technology Co., Ltd. Apr 2023 – Jun 2024

- Founded and led a six-member startup developing a WeChat Mini Program integrating campus discounts and local business services, reaching 10K+ users across 3 universities.
- Oversaw technical development, data analytics, and promotional strategy across WeChat, Xiaohongshu, and other social media, ensuring stable deployment, continuous user growth, and achieving 100K+ post views with strong community engagement.
- Secured $1K seed funding, managed team budgeting and compensation with legal and financial compliance, and successfully exited at 3× return (∼$3K).

Awards and Distinctions (SUSTech)

Graduated with Distinction	2024
Distinguished Graduation Project Award (2nd Place among 26 projects)	2024
Ruoshui Scholarship (Top 10 among 833 students)	2023
Practicing Star (Top 36 among 4,804 students)	2023
Merit Student Scholarship	2022
Innovation and Entrepreneurship Award (Top 2 among 833 students)	2021

Service

President – News Agency of SUSTech Sep 2021 – Sep 2022

- Coordinated 100+ members to manage the university's official social media and magazine.
- Won the "Most Impactful University NewsWork" from China Youth Daily.