Xiaoyang Wu

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RESEARCH INTERESTS

Ubiquitous Sensing: I build sensing systems that capture rich, multimodal signals from humans and environments.
Multimodal AI: I develop multimodal AI to fuse, align, reason over, and generate across heterogeneous modalities.
Embodied Interaction: I fabricate tangible and multisensory systems that bring intelligence into physical experience.

EDUCATION

Harvard University **Cambridge, MA**
Master in Design Studies, Mediums (HCI) *Sept.2025 – present*

- Selected Coursework: Research Topics in HCI, Design Analytics, Biomechanics and Assistive Robotics

MIT Cross-Registration **Cambridge, MA**
Cross-registered at Media Arts and Sciences & EECS *Sept.2025 – present*

- Selected Coursework: Designing AI for Human Flourishing, Tangible Interfaces, Modeling: Multimodal AI, Sensor Technologies, Mobile and Sensor Computing

Zhejiang University **Hangzhou, China**
Bachelor of Architecture *Sept.2020 – Jun.2025*

- Long-term Undergraduate Researcher in HCI at Guanyun Lab (2023 – 2025)

PUBLICATIONS

[C.2] **X-Hair: 3D Printing Hair-like Structures with Multi-form, Multi-property and Multi-function.**
Wang, G., Ji, J., Xu, Y., Ren, L., **Wu, X.**, Zheng, C., Zhou, X., Tang, X., Feng, B., Sun, L., and Tao, Y.
In Proceedings of the ACM Symposium on User Interface Software and Technology **(UIST 2024)**.

[C.1] **KiPneu: Designing a Constructive Pneumatic Platform for Biomimicry Learning in STEAM Education.**
Wang, G., Zheng, C., Fu, Y., Zhu, K., Lai, F., Zhang, L., Li, M., **Wu, X.**, Ren, M., Zheng, Y., and Lian, B.
In Proceedings of the ACM Designing Interactive Systems Conference **(DIS 2024)**.

[P.1] **Mnemonic Mixology: Data Materialization of Personal Memories.**
Guo, J., **Wu, X.**†, Adahidevara, A., Wan, S., Liu, X., Kazar, R., and Ishii, H. (†Corresponding author)
In Extended Abstracts of the CHI Conference on Human Factors in Computing Systems **(CHI EA 2026)**.

RESEARCH EXPERIENCE

Audeate: Earable Creativity Support through AI-Generated Musical Variation **Harvard SEAS**
Originated in CS 2790R (Elena Glassman) | Individual Work | In preparation *Oct.2025 – present*

- Designing a multimodal earable system that integrates screen content analysis, input activity monitoring, and earable sensing (IMU + MEMS mic) with phase-aware multimodal fusion to detect creative behavioral transitions and respond with AI-generated structured musical variation via Lyria RealTime.
- Conducted a two-phase formative study (N=7 interviews, N=4 WoZ probe) validating that harmonic variation supports convergent refinement while timbral variation catalyzes divergent ideation.

Smart Inflatables: Pressure Sensor Networks on Non-Developable Surfaces **MIT Media Lab**
Advisor: Hiroshi Ishii | Submitted to SIGGRAPH'26 Poster *Mar.2026 – present*

- Designed a computational pipeline that takes target 3D inflatable geometry as input and automatically generates per-layer flat material patterns (sensing matrix circuit, bonding geometry, substrate cutlines), enabling precise and scalable sensor placement on non-developable surfaces upon inflation.
- Explored and prototyped multi-layer lamination fabrication methods for integrating piezoresistive sensing networks onto pneumatic inflatable substrates.

Mnemonic Mixology: Data Materialization of Personal Memories **MIT Media Lab**

Advisor: Hiroshi Ishii | Co-Lead Researcher, Corresponding Author | CHI EA'26 *Sept.2025 – Jan.2026*

- Designed a data materialization framework that translates personal memory narratives into tangible gustatory experiences, bridging speech-based emotional data with multi-sensory material output (liquid flavor, color, layering).
- Built a generative pipeline using Gemini 2.5 to extract emotional vectors from unstructured speech and map them to precise liquid dispensing parameters for automated cocktail fabrication with an emotion-gustatory library.

MoMo: Reclaiming Digital Agency through Tangible Affective Co-regulation **MIT Media Lab**

Advisor: Pattie Maes *Sept.2025 – Jan.2026*

- Designed and built a tangible companion that maps real-time smartphone usage to biomimetic affective states (breathing, heartbeat, voice) via an internal state machine, servo-driven actuation, and capacitive touch sensing.
- Evaluated with 10 participants: rated 5/5 purposefulness and 4.17/5 more effective than screen timers at reducing compulsive phone use.

X-Hair & E-Hair: 3D Printing Hair-like Structures – Form & Sensing **Zhejiang University**

Advisor: Guanyun Wang | UIST'24 (X-Hair) *Oct.2023 – May 2025*

- Developed a computational fabrication pipeline (X-Hair) using custom G-code generation (FDM nozzle path planning with Grasshopper and Python) to 3D print hair-like structures with programmable geometry, achieving 5 structural types including 2 novel suspended printing forms.
- Extended the method to conductive materials (E-Hair), creating 8 functional sensor types based on resistance, capacitance, and conductive path principles, with systematic property characterization across all forms.
- Demonstrated applications spanning aesthetics, wearables, sensing, and functional objects.

Large-Scale Text Analysis and NLP Modeling **Zhejiang University**

Advisor: Chunlei Chai | Industry-Deployed *Sept.2024 – May 2025*

- Built automated NLP pipelines for large-scale social media and commercial platform data, covering sentiment classification, topic clustering, and user segmentation.
- Developed structured analysis models mapping NLP-extracted features to standardized insight outputs and visualizations, deployed with industry partners including Starbucks.

KiPneu: Pneumatic Robot Platform for Biomimicry Learning **Zhejiang University**

Advisor: Guanyun Wang | DIS'24 *Jul.2023 – Feb.2024*

- Designed a modular pneumatic platform with 6 deformation modules coupling LEGO-compatible rigid shells with silicone pneumatic actuators, enabling soft robots capable of swimming, crawling, and directional turning.
- Developed a children-friendly logic-gate control architecture: 5 tangible mechanical valves enabling electronic-free Boolean operations for programming soft robot locomotion.

SERVICE

Reviewer, CHI 2026 Poster Track *Feb. 2026*

Vice President, Accessibility Association of Zhejiang University *Sept. 2021 – Jun. 2024*

- Policy Impact: Led 2-year accessibility audit of sports venues and urban transportation for Hangzhou Asian Games; authored evaluation reports officially adopted by the city government for infrastructure construction.
- Industry Reach: Partnered with Apple to curate inclusive design exhibitions.

SKILLS

- **Programming:** Python, JavaScript/TypeScript, C/C++, G-Code
- **Hardware & Embedded:** Arduino, ESP32, nRF52840, BLE, Multiple Sensor Integration, Acoustic Sensing
- **ML & Data:** Multimodal Modeling, Deep Learning, NLP, Signal Processing
- **Fabrication:** 3D Printing (FDM, custom G-code), Laser Cutting, Circuit Prototyping, Silicone Molding
- **Design:** Figma, Rhino/Grasshopper, Adobe Creative Suite, AutoCAD, Rendering