Xuanyou (Zed) Liu

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Research Interests

My research develops interactive sensing and feedback systems that help people perceive, act, and make decisions under uncertainty. I focus on **wearable sensing**, **electrotactile haptics**, and **human-AI decision support**, combining hardware prototyping, signal processing, machine learning, and user studies.

Keywords: Wearable Sensing · Electrotactile Haptics · Human-AI Decision Support · Decision-Making under Uncertainty

Education

Northwestern University | Graduate Studies in Computer Science — *Evanston, IL, USA*
GPA: 3.89/4.00 | Advisor: Jessica Hullman — *Sep 2025 – Present*

University of Pennsylvania | M.S.E. in Robotics — *Philadelphia, PA, USA*
GPA: 4.00/4.00 | Advisor: Michelle Johnson — *Sep 2023 – May 2025*

Xi'an Jiaotong University | B.E. in Industrial Design — *Xi'an, China*
GPA: 3.86/4.30 | Advisor: Teng Han — *Sep 2019 – Jul 2023*

University of Pennsylvania | International Guest Student Program — *Philadelphia, PA, USA*
GPA: 3.93/4.00 — *Aug 2021 – Dec 2021*

Peer-Reviewed Publications

An asterisk (*) denotes equal contribution.

[C4] Integrating Wrist EIT Gesture Sensing into Smartwatch Hardware
Xuanyou Liu, Novel Alam, Karan Ahuja
ACM Symposium on User Interface Software and Technology (UIST), 2026. To appear.

[C3] MARIO: Motion-Augmented Real-Time Multi-Sensor Inertial Odometry
Yiquan Li*, Taeyoung Yeon*, Chenfeng Gao, Vasco Xu, **Xuanyou Liu**, Karan Ahuja
Findings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR Findings), 2026.

[C2] Seeing with the Hands: A Sensory Substitution That Supports Manual Interactions
Shan-Yuan Teng*, Gene Kim*, **Xuanyou Liu***, Pedro Lopes
ACM Conference on Human Factors in Computing Systems (CHI), 2025.

[C1] TacTex: A Textile Interface with Seamlessly-Integrated Electrodes for High-Resolution Electrotactile Stimulation
Hongnan Lin, **Xuanyou Liu**, Shengsheng Jiang, Qi Wang, Ye Tao, Guanyun Wang, Wei Sun, Teng Han, Feng Tian
ACM Conference on Human Factors in Computing Systems (CHI), 2024.

Demonstrations

- **Seeing with the Hands: A Sensory Substitution That Supports Manual Interactions** — Interactive demonstration presented at ACM CHI 2025. *2025*

Research Experience

Research Assistant, MU Collective | Advisor: Jessica Hullman — *Sep 2025 – Present*

- Studying peer-review noise and potential procedural unfairness in conference reviewing: when do checklist answers, reviewer uncertainty, and accept/reject decisions diverge?
- Developed a noise-aware evaluation framework for measuring how different review checklists preserve decision-relevant distinctions across NeurIPS submissions.
- Building an AI-assisted pipeline that generates, selects, and evaluates checklist questions to reduce decision confusion and improve the reliability of peer-review processes.

Research Assistant, SPICE Lab | Advisor: Karan Ahuja *Sep 2025 – Present*

- Designed **EITWatch** (UIST 2026), a smartwatch-scale planar EIT system for sensing hand gestures through a compact 31 mm single-surface electrode ring.
- Built the custom PCB, impedance-measurement front end, and ESP32-S3/FreeRTOS firmware; developed a multi-distance scanning protocol for probing multiple tissue depths.
- Reached 93.2% macro- and 92.0% micro-gesture accuracy across the gesture set.
- Contributed capture hardware and the real-time demo for **MARIO** (CVPR 2026 Findings).
- Mentored junior students on hardware prototyping and data collection for ongoing wearable-sensing research.

Research Assistant, HCI Lab, University of Chicago | Advisor: Pedro Lopes *May 2024 – Sep 2024*

- Co-developed **Seeing with the Hands** (CHI 2025), a sensory-substitution system that renders camera input as tactile images on the back of the hand.
- Engineered a 5×6 flexible-PCB electrotactile display and built the OpenCV pipeline that maps a wrist-mounted camera feed onto the electrode grid.
- Ran a user study with sighted and blind/low-vision participants comparing hand- vs. head-mounted camera perspectives on manual interaction tasks.

Research Assistant, ModLab, University of Pennsylvania | Advisor: Mark Yim *Jun 2023 – Sep 2023*

- Explored environment exploitation for Variable Topology Truss (VTT) modular robots, using slopes, ledges, and gaps to support self-reconfiguration.
- Prototyped and tested planar docking and 2D-to-3D reconfiguration demonstrations with teleoperation and open-loop scripts.
- Contributed to improved spherical-joint linkage and experiment setup for automatic module attachment and detachment.

Research Assistant, ISCAS, Chinese Academy of Sciences | Advisor: Teng Han *Sep 2022 – Sep 2023*

- Contributed to **TacTex** (CHI 2024), a textile electrotactile interface for high-resolution tactile output and touch input on fabric.
- Designed high-voltage driving electronics for a 512×512 woven electrode array, including a constant-current supply and STM32-based tri-state switching controllers.
- Integrated touch tracking on the same electrodes through time-division multiplexing without disrupting haptic stimulation.

Industry Experience

R&D Intern, Component Factory, Luxottica Tristar Optical Co., Ltd. *Jul 2020 – Sep 2020*

- Analyzed lost-wax casting process parameters for eyewear components and tuned temperature windows with factory engineers, reducing casting defect rate by 15%.
- Refactored Ladder Logic for PLC-controlled production steps, clarifying sensor/actuator states and cycle transitions to improve line debugging and cycle-time consistency.

Awards & Fellowships

- **TGS First-Year Fellowship**, The Graduate School, Northwestern University *2025*
- **GAPSA Professional Student Travel Award**, University of Pennsylvania *2024*
- **Altium Outstanding Independent Study Award**, University of Pennsylvania *2024*
- **Second National Prize**, 16th National College Students Chemical Design Competition *2022*
- **Undergraduate Research Scholarship**, Xi'an Jiaotong University *2022*
- **Most Innovative Design Award**, RCA-Imperial Design for Global Challenges Competition *2021*
- **Outstanding Graduate**, **Outstanding Student** & **Student Leader**, Xi'an Jiaotong University *2020 – 2023*

Teaching & Academic Service

- **Teaching Assistant**, ESE5190 Smart Devices (graduate), University of Pennsylvania *2024*
- **Code Instructor**, Fife-Penn CS Academy — Python & Arduino for middle-school students *2024*
- **Reviewer**, Proc. ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) *2026*
- **Volunteer**, UNICEF, ILO, and XJTU volunteer service *2019 – 2023*

Technical Skills

Programming	Python, C/C++, MATLAB, LaTeX
ML / Data	PyTorch, scikit-learn, NumPy, pandas, OpenCV
Hardware / Embedded	Altium Designer, FreeRTOS, ESP32, STM32
Languages	Mandarin (native), English (IELTS 8.0; GRE 333)

References

Jessica Hullman | Ginni Rometty Professor of Computer Science
Northwestern University | Current advisor, MU Collective

Karan Ahuja | Lisa Wissner-Slivka and Benjamin Slivka Assistant Professor of Computer Science
Northwestern University | Current advisor, SPICE Lab

Pedro Lopes | Associate Professor, Computer Science
University of Chicago | HC-Integration Lab

Teng Han | Professor, Institute of Software
Chinese Academy of Sciences | ISCAS