

XUANYOU (ZED) LIU

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RESEARCH INTERESTS

I aim to build interactive systems that close the loop between humans and machines: **wearable sensing** that lets machines read human state and intent, **electrotactile haptics** that feed information back through the body, and **human-AI decision support** that turns noisy signals into trustworthy judgments. My work combines 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 | Ph.D. 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.

DOI: [10.48550/arXiv.2606.02996](https://doi.org/10.48550/arXiv.2606.02996)

[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.

DOI: [10.1145/3706598.3713419](https://doi.org/10.1145/3706598.3713419)

[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.

DOI: [10.1145/3613904.3642873](https://doi.org/10.1145/3613904.3642873)

WORKING PAPERS

[W1] Evaluating Peer-Review Noise and Procedural Fairness with AI-Assisted Review Checklists

Xuanyou Liu, Jessica Hullman

DEMONSTRATIONS

[D1] Seeing with the Hands: A Sensory Substitution That Supports Manual Interactions

Interactive demonstration, ACM Conference on Human Factors in Computing Systems (CHI), 2025

RESEARCH EXPERIENCE

Research Assistant, [MU Collective](#) | Advisor: Jessica Hullman

May 2026 – Present

- Investigating noise and procedural unfairness in conference peer review by quantifying where checklist answers, reviewer uncertainty, and accept/reject decisions diverge.
- Formalized checklist design as a decision-theoretic selection problem; developing a noise-aware evaluation framework that measures how well candidate checklists preserve decision-relevant distinctions across NeurIPS submissions.
- Building an end-to-end AI-assisted pipeline that generates, screens, and evaluates review-checklist questions, with the goal of making review outcomes more consistent and defensible.

Research Assistant, [SPICE Lab](#) | Advisor: Karan Ahuja

Sep 2025 – May 2026

- Led the design of **EITWatch** ([UIST 2026](#)), the first smartwatch-scale planar EIT system that senses hand gestures from a compact 31 mm single-surface electrode ring, removing the strap electrodes required by prior wrist EIT systems.
- Built the full sensing stack: custom PCB, impedance-measurement front end, and ESP32-S3/FreeRTOS firmware, and devised a multi-distance scanning protocol that probes tissue at multiple depths to enrich gesture signatures.
- Achieved 93.2% macro- and 92.0% micro-gesture recognition accuracy in a 12-participant evaluation (within-session, cross-round).
- Contributed multi-sensor capture hardware and engineered the real-time inference demo for **MARIO** ([CVPR 2026 Findings](#)).
- Mentored junior students on hardware prototyping, data collection, and study execution for ongoing wearable-sensing projects.

Research Assistant, [HCI Lab](#), University of Chicago | Advisor: Pedro Lopes

May 2024 – Sep 2024

- Co-led (equal contribution) **Seeing with the Hands** ([CHI 2025](#)), a sensory-substitution system that renders camera input as tactile images on the back of the hand, letting users “see” objects while grasping them.
- Engineered a 5×6 flexible-PCB electrotactile display and the OpenCV pipeline that maps a wrist-mounted camera feed onto the electrode grid in real time.
- Conducted a user study with sighted and blind/low-vision participants showing that the hand-mounted perspective outperforms head-mounted cameras on manual interaction tasks.

Research Assistant, [ModLab](#), University of Pennsylvania | Advisor: Mark Yim

Jun 2023 – Sep 2023

- Investigated how Variable Topology Truss (VTT) modular robots can exploit environmental features such as slopes, ledges, and gaps to enable self-reconfiguration maneuvers infeasible on flat ground.
- Prototyped and demonstrated planar docking and 2D-to-3D reconfiguration on physical hardware via teleoperation and open-loop control scripts.
- Improved the spherical-joint linkage design and built the experimental setup for automatic module attachment and detachment.

Research Assistant, [ISCAS](#), Chinese Academy of Sciences | Advisor: Teng Han

Sep 2022 – Sep 2023

- Built core electronics for **TacTex** ([CHI 2024](#)), a textile electrotactile interface that delivers high-resolution tactile output and touch input on the same piece of fabric.
- Designed the high-voltage driving electronics for a 512×512 woven electrode array, including a constant-current supply and STM32-based tri-state switching controllers.
- Enabled simultaneous touch tracking and haptic stimulation on shared electrodes through time-division multiplexing.

INDUSTRY EXPERIENCE

Web Engineering Intern, Chinese Mechanical Engineering Society Feb 2022 – Jul 2023

- Redesigned the additive manufacturing branch website UI and optimized page loading, working across the HTML/CSS front end and PHP back end.
- Maintained the site over 1.5 years, handling content updates and day-to-day front-end and back-end fixes.

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

- **Reviewer**, Proc. ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2026
- **Teaching Assistant**, ESE5190 Smart Devices (graduate), University of Pennsylvania 2024
- **Code Instructor**, Fife-Penn CS Academy – Python & Arduino for middle-school students 2024
- **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, SolidWorks, FreeRTOS, ESP32, STM32, Arduino
VR / Tracking	Unity, Meta Quest, HTC Vive, OptiTrack
Languages	Mandarin (native), English (IELTS 8.0; GRE 333), Cantonese (fluent)

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 | SPICE Lab

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

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