Haoyang Wu

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Research Interests

My research lies at the intersection of **human–computer interaction** and **artificial intelligence**, with a particular focus on **extended reality**. I study how intelligent systems can understand people, tasks, and environments to enable **adaptive, context-aware interaction** in everyday settings.

Education

University of Cambridge Oct 2025 - Feb 2027 (Expected)
Master of Philosophy in Machine Learning and Machine Intelligence *Department of Engineering*
Human–Computer Interaction Track
Selected Coursework: Advanced Human-Computer Interaction; Designing Intelligent Interactive Systems; Probabilistic Machine Learning; Deep Learning and Structured Data

University College London Sep 2023 - Dec 2024
Master of Science in Systems Engineering for the Internet of Things *Department of Computer Science*
Distinction
Selected Coursework: Real-world Multi-agent Systems; Designing Sensor Systems; Modelling and Designing Embedded Systems; Robotic Control Theory and Systems

University of Liverpool Sep 2021 - Jul 2023
Bachelor of Science in Computer Science *Faculty of Science and Engineering*
First Class Honours (1%)

Xi'an Jiaotong-Liverpool University Sep 2019 - Sep 2021
Bachelor of Science in Information and Computing Science *School of Advanced Technology*
First Class Honours

Professional Experience

Full-time Research Assistant, Situated Reality Lab Nov 2026 - Present
Supervisor: Prof. Xiang Li *The University of Hong Kong*

- Conduct research on situated extended reality (XR) and context-aware adaptive interfaces, with a focus on intelligent systems that adapt interaction to users, tasks, and real-world environments.
- Develop and evaluate multimodal XR systems spanning human–AI interaction, situational spatial intelligence, and deployable interactive systems.

Research Experience

Extending UiVLA: VLA Model for Contextual UI Adaptation Mar 2026 - Sep 2026
Supervisor: Dr. John Dudley *University of Cambridge*

- Extended the UiVLA Vision–Language–Action framework for mixed reality UI adaptation, introducing user-guided interaction and unified support for visibility control, region selection, directional placement, and object-relative placement.
- Fine-tuned a multimodal VLA model for context- and intent-aware UI adaptation, improving region-placement top-1 accuracy from **60.6% to 96.5%** and object-relative placement success within 0.10 from **36.2% to 91.0%**.
- Integrated spoken user requests into the adaptation loop and deployed the end-to-end system on **Microsoft HoloLens 2**, followed by a pilot user study comparing model-driven and manual interaction.

Speaking Superpowers into Being: Exploring Voice-Driven Superpower Interaction in XR May 2026 - Present
Supervisor: Prof. Xiang Li *University of Cambridge*

- Proposed **voice-driven superpower interaction** as a design paradigm for everyday XR, examining how LLM-mediated speech can invoke capabilities beyond ordinary bodily and environmental constraints through remote manipulation, batch operations, and generative creation.
- Synthesised research across XR superpower design, voice interaction, and generative AI to identify design dimensions including spoken congruence, agency, target and scope interpretation, social appropriateness, and recovery from recognition errors, and formulated a research agenda for empirical evaluation of voice-driven superpowers.

Talking Garments: Shopping with Multi-agent Systems and Generative AI Mar 2024 - Sep 2024
Supervisor: Prof. Marianna Obrist *University College London*

- Designed and implemented an LLM-based multi-agent chatbot system to support interactive and multimodal shopping experiences.
- Integrated real-time sensor data into prompt engineering, enabling environment-aware human-AI interaction.
- Developed a dynamic multi-agent interaction framework to coordinate dialogue flow and adapt conversational structure in real time.

Selected Projects

PetMaster: An Integrated IoT System for Enhanced Pet Care Oct 2023 - Apr 2024
Supervisor: Prof. Diego Martínez Plasencia *University College London*

- Led the end-to-end development of an IoT system integrating multiple smart pet devices with a mobile application for real-time monitoring and remote control.
- Designed the edge computing architecture, enabling multi-sensor integration and reliable device-to-server communication.
- Awarded Best Entrepreneurial Spirit Award at the UCL 2024 Industry Showcase.

Publications

[1] **[Submitted to CHI 2027]** Jingyao Zheng, Giacomo Ponzuoli, Vincent Zhang, **Haoyang Wu**, Lik Hang Lee, Per Ola Kristensson, and John J. Dudley. "UiVLA: A Vision–Language–Action Model for Adaptive Mixed Reality User Interfaces." Submitted to the *ACM CHI Conference on Human Factors in Computing Systems (CHI 2027)*, 2026.

[2] **Haoyang Wu** and Xiang Li. "Speaking Superpowers into Being: Exploring Voice-Driven Superpower Interaction in Everyday XR." In *Companion of the 2026 ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp/ISWC 2026)*, EverydayXR Workshop, 2026. **Accepted; Presented by the first author at UbiComp 2026, Shanghai, China.**

Teaching & Mentoring

Day-to-day Mentor, MSc Dissertation Projects Sep 2026 - Present
Department of Data and Systems Engineering *The University of Hong Kong*

- Provide day-to-day research mentoring for MSc students undertaking dissertation projects, supporting project scoping, research methodology, system development, evaluation, and academic writing.
- Conduct regular project meetings, provide technical and research feedback, and coordinate student progress with academic supervisors.

Technical Skills

Machine Learning & Multimodal AI: PyTorch, Transformers, PEFT/LoRA, LLMs, VLMs/VLAs, Multimodal Learning
HCI & XR: Unity, MRTK, HoloLens 2, Human–AI Interaction, VR/AR/MR, User Studies, Experimental Design
Programming: Python, C/C++, C#, JavaScript/TypeScript, SQL, Java, R
Development & Systems: React, Next.js, Node.js, Linux, Git, Docker
Robotics & Embedded Systems: ROS, OpenCV, Raspberry Pi, Arduino, ESP32

Languages

Chinese: Native **English**: Fluent **Japanese**: Basic