

Yinan (Tom) Xuan
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Ph.D. in ECE specializing in **Applied ML** and HCI.
Expert in **full-stack system design** from hardware prototypes to real-time software, with a proven track record at Meta Reality Labs. Passionate about **bridging hardware and AI** through RAG pipelines, Agentic workflows, and robust LLM applications.

Education

University of California, San Diego	La Jolla, CA
<i>Ph.D. Candidate in Electrical & Computer Engineering</i>	<i>July 2020 – 2025 (expected)</i>
<i>Advisor: Edward Wang</i>	
<i>Areas: Ubiquitous Health Sensing</i>	
<i>M.S. in Biological Science</i>	<i>Sept. 2017 – June 2020</i>
<i>Advisor: Jing Wang</i>	
<i>Thesis: Computer Vision Aided Drosophila Gut Imaging Data Collection and Analysis</i>	
<i>B.S. in Physiology & Neuroscience</i>	<i>Sept. 2013 – June 2017</i>
<i>Minor: Cognitive Science</i>	<i>Honors: MAGNA CUM LAUDE (GPA 3.89/4.00)</i>

Experience

Meta – Reality Labs	Jun. 2024 – Feb. 2025
<i>Research Scientist Intern</i>	<i>Redmond, WA</i>
- Developed novel sub-vocal speech detection on smart glasses (US provisional patent application # 63/762,845) by leveraging expertise in acoustics, sensors, ML, and DSP. Collaborated closely with multiple cross-functional teams and showcased a real-time demo to Meta C-suite executives .	
- Led the design and built a novel data collection vehicle in glasses form factor. Worked with both ME and EE on the design and bring up of the system.	
Meta – Reality Labs	Aug. 2023 – Jan. 2024
<i>Research Scientist Intern</i>	<i>Redmond, WA</i>
- Developed a wearable test vehicle with integrated motion sensors, responsible for its mechanical design, sensor circuit integration, and firmware development . Conducted a focused user study and trained an NN model . Developed a real-time demo w/ visualization.	
- Orchestrated the technical setup for a ground truth data collection in a 100 people user study , selecting optimal devices and engineering synchronization solutions for consistent data integration. Crafted a Unity app to facilitate the data collection workflow.	
Independent LLM Related Projects	Aug. 2025 – Present
- AI-Powered IoT System: Built a Python/MCP server enabling natural language control of open-source hardware (lights, HVAC), featuring context-aware retrieval and automated state verification.	
- Adaptive Learning Platform: Developed a full-stack (Node.js/React) educational app using LLM with search grounding for factual accuracy.	
- Interactive Narrative Engine: Engineered a state-managed AI storytelling engine with strict output validation (Pydantic) and complex system prompts to maintain consistent long-context narratives.	

University of California, San Diego – Electronic & Computer Engineering	Oct. 2019 – Present
<i>Graduate Student Researcher</i>	<i>La Jolla, CA</i>
- Developed a full-stack blood pressure prototype, integrating a real-time audio event detection NN on an NVIDIA Jetson with a multi-threaded Python application featuring a PyQt5 GUI for automated pneumatic pump and cuff control.	
- Engineered BPClip, an ultra-low-cost (<\$1) smartphone attachment for blood pressure monitoring. Developed the complete system, from 3D-printed hardware to an on-device Android application leveraging ML and OpenCV for real-time analysis.	
- Innovating a BLE-enabled tracking solution using the Nordic nRF52810 SoC to monitor bowel movements in IBS patients, enhancing patient care through precise activity logging. Complementing the hardware, an Android app is developed to facilitate real-time data capture and patient engagement.	
- Developed a calibration method that enable accurate and consistent camera photoplethysmography measurement across multiple Android smart phones	

- Designed and implemented SpecTracle, a vision-based unobtrusive facial tracking system for AR, which consists of fisheye lens cameras controlled by Raspberry Pi and an image based neural network model.
 - Implemented a Unity exercising game prototype that uses IMU signals on Vuzix AR glasses
- Indie Game Developer** June 2021 – Present
Developing a 2D RPG in Unity, implementing core features like quest, item, and dialogue systems in C# while also designing and building custom VFX with shaders and particle systems.
- University of California, San Diego - Biology** April 2018 – June 2020
Graduate Student Researcher La Jolla, CA
- Designed and implemented an olfaction VR device as a novel instrument to observe odor guided behaviors in *Drosophila*
 - Designed, implemented and deployed an image processing software to facilitate bio-imaging data analysis pipeline that profiles *Drosophila* intestinal cells' response to different nutrients.
 - Designed, implemented and deployed an automated solenoid valve control system for perfusion experiments that can independently control up to 22 valves.
 - Collaborated in building and testing a customized three-photon fluorescent imaging microscope.
 - Built a feedback-controlled temperature-based anesthetic platform to facilitate surgery process on *Drosophila*.

Skills

Software

Languages: Python, C/C++, JavaScript/TypeScript, Kotlin, C#, Java, SQL (MySQL/PostgreSQL), MATLAB

AI & Machine Learning: RAG Pipelines, Agentic Workflows, Large Language Models (Gemini/OpenAI), Model Context Protocol (MCP), Vector Embeddings, Neural Networks, SVM, Clustering

Data Analysis/Preprocessing: Dimension Reduction, Computer Vision / Image Processing, etc.

Digital Signal Processing : FIR/IIR Filter Design, Welch's Method for Noise Characterization, FFT, Spectrogram Analysis, PDM to PCM Conversion, Audio Signal Processing

Mobile Development: Android (Kotlin/JAVA), iOS (Swift), Bluetooth Low Energy (BLE)

Hardware & Embedded: IoT Device Integration, Home Assistant API, Open-Source Hardware Interfacing, nRF Connect SDK, Arduino, STM32, BLE

Web & Infrastructure: React.js, Node.js, Flask, Docker, Railway, RESTful APIs

Game and UI Development: Unity, Qt6, PyQt, VisPy, Real-Time Data Visualization

Hardware

Rapid Prototyping: SolidWorks, NX, 3D printing with SLA/FDM using rigid/flexible material, laser cutting

Embedded System Prototyping: PCB design, hardware/component selection, Raspberry Pi

Publications

Peer-Reviewed Publications

1. Xuan, Y., Barry, C., De Souza, J. et al. [Ultra-low-cost mechanical smartphone attachment for no-calibration blood pressure measurement](#). **Nature Scientific Reports** 13, 8105 (2023).
2. Barry, C., Xuan, Y., Fascetti, A. et al. [Oscillometric blood pressure measurements on smartphones using vibrometric force estimation](#). **Nature Scientific Reports** 14, 26206 (2024).
3. Xuan, Y., Barry, C., Antipa, N., & Wang, E. J. (2023). [A Calibration Method for Smartphone Camera Photoplethysmography](#). **Frontiers in Digital Health**, 5. (2023)
4. Barry, C., Souza, J., Xuan, Y., Holden, J., Granholm, E., Wang, E. [At-Home Pupilometry using Smartphone Facial Identification Cameras](#). **CHI 2022 Best Paper Honorable Mention Award**
5. Lin, H.-H., Kuang, M. C., Hossain, I., Xuan, Y., Beebe, L., Shepherd, A. K., Rolandi, M., Wang, J. W. (2022). [A nutrient-specific gut hormone arbitrates between courtship and feeding](#). In **Nature**. Springer Science and Business Media LLC.
6. Yu, V., Rahimy, M., Korrapati, A., Xuan, Y., et al. (2016). [Electronic cigarettes induce DNA strand breaks and cell death independently of nicotine in cell lines](#). **Oral Oncology**, 52, 58–65.
7. Zou, A. E., Ku, J., Honda, T. K., Yu, V., Kuo, S. Z., Zheng, H., Xuan, Y., et al. (2015). [Transcriptome sequencing uncovers novel long noncoding and small nucleolar RNAs dysregulated in head and neck squamous cell carcinoma](#). **RNA**, 21(6), 1122–1134.
8. Zou, A. E., Zheng, H., Saad, M. A., Rahimy, M., Ku, J., Kuo, S. Z., Honda, T. K., Wang-Rodriguez, J., Xuan, Y., et al. (2016). [The non-coding landscape of head and neck squamous cell carcinoma](#). **Oncotarget**, 7(32)

Preprints

9. **Xuan, Y.**, Viswanath, V., Chu, S., Bartolf, O., Echterhoff, J., Wang, E. [SpecTrace: Wearable Facial Motion Tracking from Unobstructing Peripheral Cameras](#)

Posters

10. **Xuan, Y.**, Fascetti, A.J., Barry, C.O., & Wang, E.J. (2024). [Development of a One Dollar Blood Pressure Monitor](#).
11. Zou, A. E., Krishnan, A. R., **Xuan, Y.**, et al. (2016). [Abstract 977: RNA-sequencing analysis implicates novel non-coding RNAs in human papillomavirus-associated head and neck squamous cell carcinoma](#). Molecular and Cellular Biology, Genetics.
12. Korrapati, A., Yu, V., Saad, M. A., Rahimy, M., **Xuan, Y.**, et al. (2016). [Abstract 4069: The carcinogenic effects of electronic cigarettes in oral cancer](#). Tumor Biology.
13. Ku, J., Zou, A. E., Honda, T. K., Zheng, H., Saad, M. A., Yu, V., **Xuan, Y.**, et al. (2015). [Abstract 3836: Identification of key survival-correlating microRNAs and Piwi-interacting RNAs dysregulated in head and neck squamous cell carcinoma](#). Molecular and Cellular Biology.
14. Honda, T. K., Zou, A., Yu, V., Zheng, H., Kuo, S., Saad, M., **Xuan, Y.**, et al. (2015). [Abstract 151: Transcriptome-wide expression profiling of long noncoding and small nucleolar RNAs in head and neck squamous cell carcinomas identifies novel transcripts associated with survival](#). Molecular and Cellular Biology.

Teaching and Mentoring Experience

Teaching Assistant

2023 Spring - UCSD ECE 16 - Rapid Hardware and Software Design for Interfacing with the World

2022 Winter - UCSD ECE 16

2018 Fall - UCSD BIPN 100 - Human Physiology I

Mentorship

2022 - Grace Jin, undergraduate researcher from UCSD CSE department

2022 - Joseph Kuo, undergraduate researcher from UCSD ESE department

2021 - MAE student team, undergraduate capstone project

2020 - Sunny Chu, undergraduate researcher from UCSD ECE department

2020 - Owen Bartolf, undergraduate researcher from UCSD CSE department

Service

- Reviewer for npj Digital Medicine
- Reviewer for The Lancet Digital Health
- Reviewer for Frontiers In Digital Health
- Reviewer for CHI 2025 Papers
- Reviewer for CHI 2024 Papers
- Reviewer for CHI 2023 Papers
- Reviewer for IMWUT 2023
- Reviewer for IMWUT 2022
- Reviewer for IEEE VR 2023
- Reviewer for ISWC 2022 Notes Briefs
- Reviewer for UbiComp/ISWC 2020 Posters and Demos

Membership & Honors

- Member of Phi Beta Kappa Honor Society
- Member of Muir College's Senior Honors Caledonian Society

Languages

- Mandarin - Native Speaker
- English - Professional
- Japanese – Limited Professional (passed JLPT N1 w/ full score)
- Cantonese - Daily Communication