

Yinan (Tom) Xuan

yxuan@ucsd.edu

<https://www.yinanxuan.com>

I focus on health sensing technologies, machine learning, and HCI. My expertise lies in developing interdisciplinary, wearable health solutions through an end-to-end approach. As a generalist, I am adept at prototyping both hardware and software systems and applying advanced algorithms. My commitment is to innovate in sensing for precise monitoring of human physiological and activity metrics.

Education

University of California, San Diego

La Jolla, CA

Ph.D. Candidate in Electrical & Computer Engineering

July 2020 – 2024 (expected)

Advisor: Edward Wang

Areas: Ubiquitous Health Sensing

M.S. in Biological Science

Sept. 2017 – June 2020

Advisor: Jing Wang

Thesis: Computer Vision Aided Drosophila Gut Imaging Data Collection and Analysis

B.S. in Physiology & Neuroscience

Sept. 2013 – June 2017

Minor: Cognitive Science

Honors: MAGNA CUM LAUDE (GPA 3.89/4.00)

Experience

Research Scientist Intern

Aug. 2023 – Present

Meta

Redmond, WA

Reality Labs

Sensors Team

- Developed a wearable test vehicle with integrated motion sensors, responsible for its mechanical design, sensor circuit integration, and firmware development. Prepared to conduct a focused user study and refine algorithm.
- Orchestrated the technical setup for a ground truth data collection in a large-scale user study, selecting optimal devices and engineering synchronization solutions for consistent data integration. Crafted a GUI to facilitate the data collection workflow.

Graduate Student Researcher

Oct. 2019 – Present

University of California, San Diego

La Jolla, CA

Electrical and Computer Engineering Department, Jacobs School of Engineering

DigiHealth Lab

- Designed and built BPClip, an ultra low-cost blood pressure monitoring smartphone attachment consisted of 3D-printed hardware accessories and on-device ML/OpenCV Android application.
- 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
- Built an embedded system that allows compression testing for various materials and designs.

Indie Game Developer

June 2021 – Present

- Project Management: Coordinated among team members and made decisions about development details and timeline.
- Development: Built all elements in the game with C# in Unity 2D, including but not limited to: Items, Quests, Dialogues, and Cut Scenes.
- Gameplay Design: Designed player experience and overall gameplay system.
- Technical Art: Designed and built VFXs with 2D lighting, shader graphs and particle system.

Graduate Student Researcher

April 2018 – June 2020

University of California, San Diego
Section of Neurobiology, Division of Biological Science
Wang Lab

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*.

Undergraduate Student Researcher

Jan 2014 – June 2017

University of California, San Diego
Division of Otolaryngology–Head and Neck Surgery, Department of Surgery
Ongkeko Lab

La Jolla, CA

Advisor: Weg Ongkeko

- Studied the role of long non-coding RNAs in head and neck squamous cell cancer.
- Designed and conducted in vitro experiments for various projects.

Research Internship

June 2016 – Aug. 2016

AskGene Pharmaceutical Inc.

Camarillo, CA

- Collaborated in cell line development selecting clone cells with the highest titer.
- Purified recombinant antibodies using Protein-A Affinity Chromatography.

Skills

Software

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

Machine Learning Models: Neural Networks, SVM, Hierarchical Clustering, DBSCAN, Gaussian Mixture Model, etc.

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)

Embedded System Programming: Zephyr w/ Nordic's nRF51 & nRF52 series SoCs, Arduino, STM32, BLE

Web Development: HTML/CSS, Bootstrap, React, Node.js

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

Free-space Optics

Compressed Gas Cylinder Handling

Biotech

Animal Handling: Mice, *Drosophila*, *C. elegans*

Benchwork: cell culture, RNA extraction, qRT-PCR, transfection, etc.

Publications

• Preprints

1. **Xuan, Y.**, Viswanath, V., Chu, S., Bartolf, O., Echterhoff, J., Wang, E. *SpecTracle: Wearable Facial Motion Tracking from Unobstructing Peripheral Cameras* <https://arxiv.org/abs/2308.07502>
2. **Xuan, Y.**, Fascetti, A.J., Barry, C.O., & Wang, E.J. (2023). *Development of a One Dollar Blood Pressure Monitor*. <https://arxiv.org/abs/2308.05897>

• Peer-Reviewed Publications

3. **Xuan, Y.**, Barry, C., Antipa, N., & Wang, E. J. (2023). *A Calibration Method for Smartphone Camera Photoplethysmography*. **Frontiers in Digital Health**, 5. (2023) <https://doi.org/10.3389/fdgth.2023.1301019>
4. **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). <https://doi.org/10.1038/s41598-023-34431-1>
5. Barry, C., Souza, J., **Xuan, Y.**, Holden, J., Granholm, E., Wang, E. *Enabling Smartphone Pupillometry using a Facial Identification Camera in At-Home Environments*. **CHI 2022 Best Paper Honorable Mention Award** <https://dl.acm.org/doi/10.1145/3491102.3502493>
6. 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. <https://www.nature.com/articles/s41586-022-04408-7>
7. Yu, V., Rahimy, M., Korrapati, A., **Xuan, Y.**, Zou, A. E., Krishnan, A. R., Tsui, T., Aguilera, J. A., Advani, S., Crotty Alexander, L. E., Brumund, K. T., Wang-Rodriguez, J., amp; Ongkeko, W. M. (2016). *Electronic cigarettes induce DNA strand breaks and cell death independently of nicotine in cell lines*. *Oral Oncology*, 52, 58–65. <https://doi.org/10.1016/j.oraloncology.2015.10.018>
8. Zou, A. E., Ku, J., Honda, T. K., Yu, V., Kuo, S. Z., Zheng, H., **Xuan, Y.**, Saad, M. A., Hinton, A., Brumund, K. T., Lin, J. H., Wang-Rodriguez, J., amp; Ongkeko, W. M. (2015). *Transcriptome sequencing uncovers novel long noncoding and small nucleolar RNAs dysregulated in head and neck squamous cell carcinoma*. *RNA*, 21(6), 1122–1134. <https://doi.org/10.1261/rna.049262.114>
9. Zou, A. E., Zheng, H., Saad, M. A., Rahimy, M., Ku, J., Kuo, S. Z., Honda, T. K., Wang-Rodriguez, J., **Xuan, Y.**, Korrapati, A., Yu, V., Singh, P., Grandis, J. R., King, C. C., Lippman, S. M., Wang, X. Q., Hinton, A., amp; Ongkeko, W. M. (2016). *The non-coding landscape of head and neck squamous cell carcinoma*. *Oncotarget*, 7(32), 51211–51222. <https://doi.org/10.18632/oncotarget.9979>

• Posters

10. Zou, A. E., Krishnan, A. R., **Xuan, Y.**, Saad, M. A., Korrapati, A., Advani, S. J., Wang-Rodriguez, J., amp; Ongkeko, W. (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*. <https://doi.org/10.1158/1538-7445.am2016-977>
11. Korrapati, A., Yu, V., Saad, M. A., Rahimy, M., **Xuan, Y.**, Zou, A., Krishnan, A., Brumund, K., amp; Ongkeko, W. M. (2016). Abstract 4069: *The carcinogenic effects of electronic cigarettes in oral cancer*. *Tumor Biology*. <https://doi.org/10.1158/1538-7445.am2016-4069>
12. Ku, J., Zou, A. E., Honda, T. K., Zheng, H., Saad, M. A., Yu, V., **Xuan, Y.**, Singh, P., Rahimy, M., Kuo, S. Z., Ongkeko, W. M., amp; Wang-Rodriguez, J. (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*. <https://doi.org/10.1158/1538-7445.am2015-3836>
13. Honda, T. K., Zou, A., Yu, V., Zheng, H., Kuo, S., Saad, M., **Xuan, Y.**, Singh, P., Wang-Rodriguez, J., amp; Ongkeko, W. M. (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*. <https://doi.org/10.1158/1538-7445.am2015-151>

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 IEEE VR 2023
- Reviewer for CHI 2024 Papers
- Reviewer for CHI 2023 Papers
- Reviewer for IMWUT 2023
- Reviewer for IMWUT 2022
- 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 (JLPT N1 Equivalent)
- Cantonese - Daily Communication