Yinan (Tom) Xuan
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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

Meta – Reality Labs — Aug. 2023 – Jan. 2024

Research Scientist Intern — *Redmond, WA*

- 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.

University of California, San Diego – ECE — Oct. 2019 – Present

Graduate Student Researcher — *La Jolla, CA*

- 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.

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, 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

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 Photophlethysmography*. **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 (passed JLPT N1 w/ full points)
- Cantonese - Daily Communication