Yinan (Tom) Xuan

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My research interests lie at the intersection of ubiquitous computing, health monitoring, and implicit interaction. I am interested in using passive sensing to understand human activities and physiological status by utilizing my expertise in applied machine learning and prototyping skills in both software and hardware.

Education

University of California, San Diego — La Jolla, CA

Ph.D. in Electrical & Computer Engineering — *July 2020 – Dec. 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

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

- Developed a calibration method that enable accurate and consistent camera photoplethysmography measurement across multiple Android smart phones
- 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.
- 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 — *La Jolla, CA*
Section of Neurobiology, Division of Biological Science
Wang Lab

- 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 *La Jolla, CA*
Division of Otolaryngology–Head and Neck Surgery, Department of Surgery
Ongkeko Lab *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++, MATLAB, Java, JavaScript, SQL (MySQL)

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

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

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

Embedded System Programming: Zephyr w/ nRF51 & nRF52 series, Arduino, Bluetooth Low Energy

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

Hardware

Rapid Prototyping: SolidWorks, 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

- **Papers under Review**
  1. **Xuan, Y.**, Barry, C., Antipa, N., Wang, E. *A Calibration Method for Smartphone Camera Photophlethysmography*
  2. **Xuan, Y.**, Viswanath, V., Chu, S., Bartolf, O., Echterhoff, J., Wang, E. *SpecTracle: Wearable Facial Motion Tracking from Unobstructing Peripheral Cameras*

- **Peer-Reviewed Publications**
  3. **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
  4. 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
  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. https://doi.org/10.1038/s41586-022-04408-7

6. 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
7. 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
8. 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**

9. 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
10. 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
11. 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
12. 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 The Lancet Digital Health
- Reviewer for Frontiers In Digital Health
- Reviewer for IEEE VR 2023
- Reviewer for CHI 2023 Papers
- 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