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 passive sensing for human activities and physiological status. I am trying to achieve this goal by leveraging both machine learning and my 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 Research Assistant — 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 and an algorithm that enable accurate and reliable photoplethysmography across multiple Android smart phones
- Designed and built 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 Research Assistant — 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 Researcher Assistant 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)

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, micro-controller programming, Prototype w/ 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., Souza, J., Wen, J., Antipa, N., Moore, A., Wang, E. *Ultra-low-cost Mechanical Smartphone Attachment for No-Calibration Blood Pressure Measurement*
  2. **Xuan, Y.**, Barry, C., Xie, S., Antipa, N., Wang, E. *Fixing a Decade of Inaccurate and Unreliable Smartphone Camera Photoplethysmography*
  3. **Xuan, Y.**, Viswanath, V., Chu, S., Bartolf, O., Echterhoff, J., Wang, E. *SpecTracle: Wearable Facial Motion Tracking from Unobstructing Peripheral Cameras*

- **Peer-Reviewed Publications**
  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
2022 Winter - UCSD ECE 16 Rapid Hardware and Software Design for Interfacing with the World

2018 Fall - UCSD BIPN 100 Human Physiology I

Mentorship
2022 - Grace Jin, undergraduate researcher from UCSD CSE 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

- Madarin - Native Speaker
- English - Professional
- Japanese - Daily Communication (JLPT N1 Equivalent)
- Cantonese - Daily Communication