Xiyuan (Alan) Shen

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Education

Tsinghua University, Beijing, China 2016.09 - 2021.07

Bachelor in Creative Design and Intelligent Engineering, GPA=3.90/4.00, Ranking=2/13, With Honor

Tsinghua University, Beijing, China 2021.09 - 2024.06

Master in Computer Science and Technology, GPA=4.00/4.00, Ranking=1/65, With Honor

University of Washington, Seattle, USA 2024.09 - Present

Ph.D. student in Paul G. Allen School of Computer Science & Engineering

Research Experience

ACE Lab, University of Washington 2024.09 - Present

- Advisor: Dr. Jacob O. Wobbrock
- Develop multimodal sensing systems to robustly measure driver cognitive load in real time.
- Design and evaluate adaptive agentic systems and touchscreen user interfaces that dynamically adjust to the driver to improve performance and safety.

Ubicomp Lab, University of Washington 2024.09 - Present

- Advisor: Dr. Shwetak Patel
- Build a wearable-oriented IMU foundation model that autonomously discovers and detects unlabeled health-related hand behaviors in the wild, enabling early identification and prevention of harmful habits such as BFRBs.

Pervasive Interaction Lab, Tsinghua University 2021.09 - 2024.06

- Advisors: Dr. Chun Yu, Dr. Yuanchun Shi
- Develop interactive systems, novel algorithms, and wearable devices to support users interactions through subtle movements, including using EMG sensors to perceive teeth clenching for AR and using smart rings to track finger movements to support always-available touchpad interactions.

Makeability Lab, Washington University 2020.06 - 2020.09

- Advisors: Dr. Liang He, Dr. Jon E.Froehlich
- Design an intelligent manufacturing process for tactile pavement using 3D printing technology, and implement a user-friendly GUI for indoor tactile pavement planning and design.

Future Lab, Tsinghua University 2019.11 - 2020.06

- Advisors: Dr. Jiaxiong Hu, Dr. Yingqing Xu
- Detect user emotions during conversations using NLP techniques, and develop personalized online chatbots that proactively generate questions based on users' emotional states.

Publications

Xiyuan Shen, Seokhyun Hwang, Alexandre L. S. Filipowicz, Andrew Best, Jean M. Costa, Scott Carter, James Forgaty, Jacob O. Wobbrock *Touchscreens in Motion: Quantifying the Impact of Cognitive Load on Distracted Drivers* (UIST 2025)

- We quantitatively study how varying cognitive loads affect drivers' touchscreen pointing performance and visual attention.
- We show how drivers adapt their visual attention to balance touchscreen interaction efficiency and driving safety.

Xiyuan Shen, Chun Yu, Xutong Wang, Chen Liang, Yuanchun Shi. *MouseRing: Always-available Touchpad Interaction with IMU Rings* (CHI 2024, Honorable Mentioned Awards)

- We propose MouseRing, a ring-formed IMU device that supports always-available and accurate touchpad interactions on unmodified physical surfaces.
- We model human finger motility as a prior knowledge of finger-tracking and implement a fingertip-tracking algorithm that incorporates physical knowledge into machine learning methods.

Xiyuan Shen, Yukang Yan, Chun Yu, Yuanchun Shi. *ClenchClick: Hands-Free Target Selection Method Leveraging Teeth-Clench for Augmented Reality* (IMWUT 2022)

- We propose ClenchClick , a novel interaction method that uses teeth clenching to support target selection in AR, achieving a 99% selection accuracy rate and a lower task load compared to gesture interaction.
- We implement a robust clench detection algorithm and an ML-based calibration phase to improve personalized detection.
- We conduct user studies to investigate the usability of ClenchClick in real-world applications.

Minghao Tu, Chun Yu, Zhi Zheng, **Xiyuan Shen**, Li Chen and Yuanchun Shi *TextOnly: A Unified Function Portal for Text-Related Functions on Smartphones* (CCHI 2024)

- We propose TextOnly, a unified function portal of the text box that can interpret user intentions from inputting text taking advantage of LLM, thereby enhancing the efficiency of smartphone function utilization.

Zhe He, Zixuan Wang, Chengwen Zhang, **Xiyuan Shen**, Yuanchun Shi. *WritingRing: Enabling Natural Handwriting Input with a Single IMU Ring* (CHI 2025)

- We propose using a single IMU ring to capture and interpret handwriting on flat surfaces, presenting a promising approach for character and word recognition using real-time data.

Chen Liang, Chi Hsia, **Xiyuan Shen**, Ying Hu, Yuntao Wang, Chun Yu, Yuanchun Shi. *Compensating Visual Hand Tracking Artifacts with Wearable Inertial Sensors*(Under Review)

- We conduct a systematic analysis of visual artifacts by observing visual-inertial channel differences.
- We propose an FCN-based pinch recognition model and a visual-inertial filtering algorithm in optimizing both event detection and hand dynamics.

Industry Experience

Toyota Research Institute(TRI), Research Intern 2025.06 - 2025.09

- Develop cognitive load-aware AI agents to better support human driving under performance-driving scenarios.

Tencent, Xiaowei Cloud-computing Platform, Product Management Intern 2019.06 - 2019.09

- Analyze user data to define and prioritize new Voice UI requirements for millions of smart speaker users.

Global Product Project 2018.08 - 2018.12

- Complete functional prototypes of an algae-based air purifier through 3D modeling and embedded system development.

REMO AI, Research Intern 2018.06 - 2018.08

- Gather user requirements for action cameras through in-depth user interviews.
- Optimize facial recognition algorithms to enhance tracking and shooting for street dance users.

Honors & Awards

Siebel Scholar of Class 2024 (Top 5 for outstanding academic performance and leadership) 2023.09
Tsinghua University Comprehensive Excellence Scholarship 2022.10
Tsinghua University Excellent Graduate(Top 5%) 2021.06
Tsinghua University Science and Technology Innovation Scholarship 2020.10
Tsinghua University Industrial and Commercial Bank Scholarship 2019.10
Tsinghua University Toyota Scholarship 2018.10
Tsinghua University Academic Excellence Scholarship 2017.10

Services

Reviewer of The ACM Conference on Human Factors in Computing Systems (CHI) 2023

Competitions

RecSys 2022 Challenge **33rd place** 2022.06
NeurIPS 2018-Pommerman Reinforcement Learning AI Competition **9rd place** 2018.09

Skills

Programming Languages: Python, C/C++, Java, MATLAB, JavaScript, HTML, Processing, Dart, R
Tools & Platforms: PyTorch, Linux, Arduino, Android SDK, Unity, Verilog, Latex
3D Modeling & Design: Solidworks, Keyshot, AutoCAD, 3D Printing, PS, AI, Lightroom, PR, AU
Sensors: IMU, EMG, Depth Camera, OptiTrack, Pressure Sensors, EEG, Microphone, Eye-tracking, Pupillometry, EDA
Language: Mandarin (Native), English (Toefl = 109, CET-4 = 654)