

Yufei Shen

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RESEARCH SUMMARY

I develop smartphone- and wearable-based sensing systems and machine learning models to characterize human behaviors and support the early detection and continuous monitoring of health conditions.

Focus Areas: Ubiquitous Computing, Mobile & Wearable Health Sensing, Signal Processing, Time Series, AI & ML for Healthcare

EDUCATION

The University of Texas at Austin, Ph.D. Electrical and Computer Engineering, GPA: 3.96/4.00 Austin, TX
Advisor: Prof. Edison Thomaz, Honors: UT Engineering Fellowship Expected May 2027

Rice University, B.S. Electrical Engineering, B.A. Statistics, GPA: 3.95/4.00 Houston, TX
Advisor: Prof. Akane Sano, Honors: Distinction in Research and Creative Work, Magna Cum Laude May 2022

SKILLS

Programming Languages: Python, R, Bash, Swift, SQL

Tools & Frameworks: PyTorch, TensorFlow, Scikit-learn, Pandas, NumPy, LangChain, iOS SensorKit, Xcode

RESEARCH EXPERIENCE

Human Signals Lab, The University of Texas at Austin, Austin, TX Aug 2022 - Present

- Designed and implemented a scalable mobile and wearable sensing pipeline for cognitive health monitoring, including a custom iOS app in Swift for continuous data collection, a cloud backend on AWS for secure storage, and automated Python scripts for data quality control; generated over 10 TB of multimodal sensor data to support large-scale behavioral analysis.
- Led and trained research coordinators for participant onboarding, data collection monitoring, technical troubleshooting, and follow-up protocols, driving successful recruitment and long-term engagement of 60+ participants over two years.
- Developed personalized deep learning models with PyTorch on behavioral signatures from smartphone sensing data to detect cognitive impairment, improving performance by 20% over non-personalized baselines and outperforming prior work in the field.
- Enhanced the performance of inertial-based human activity recognition for activities of daily living by incorporating audio context through contrastive learning, yielding a 5% relative performance gain without requiring additional sensors at inference.

Computational Wellbeing Group, Rice University, Houston, TX May 2020 - Aug 2022

- Trained personalized machine learning models with TensorFlow and Scikit-learn on multimodal smartphone and wearable sensing data to deliver tailored sleep recommendations for shift workers and detect symptoms in schizophrenia patients.
- Assisted a human subjects study by configuring and testing wearable devices, programming automated daily surveys, monitoring data collection, and managing datasets to ensure data quality and completeness.

PROFESSIONAL EXPERIENCE

R&D Medical Data Science Intern, Alcon, Fort Worth, TX May 2025 - Aug 2025

- Developed a voice assistant for hands-free control of Alcon surgical devices and real-time surgeon support during eye surgeries without disrupting standard surgical workflows.
- Trained two custom wake word detectors with PyTorch leveraging Google's pre-trained speech embeddings and utilized state-of-the-art speech recognition models (NVIDIA Parakeet) to recognize 150 domain-specific intents, achieving over 90% wake word detection and intent recognition accuracy with 0.6-second latency in real-world deployment on an NVIDIA Jetson edge device.

PROJECTS

Integrated AI Framework for Hospital Readmission Prediction and Clinical Decision Support Jan 2024 - Apr 2024

- Built machine learning and risk score models on the MIMIC-III database to predict 30-day unplanned patient readmissions.
- Developed an LLM-based medical assistant using OpenAI Assistants API and LangChain, integrating 7 custom tools to help clinicians retrieve admission data, predict readmissions, and identify patient risk factors.

PUBLICATIONS

- Y. Shen**, J. H. Park, M. Huang, et al. Deep Learning-Based Detection of Cognitive Impairment from Passive Smartphone Sensing with Routine-Aware Augmentation and Demographic Personalization. *IEEE EMBS International Conference on Biomedical and Health Informatics (BHI'25)*, 2025 (accepted).
- Y. Shen**, A. C. Olivier, H. Yu, et al. Personalized Physician-Assisted Sleep Advice for Shift Workers: Algorithm Development and Validation Study. *JMIR Formative Research*, 2025.