Yue Zhang

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Education

University of California, Merced Ph.D, Sep 2019 – May 2024 (Expected)
Computer Science and Engineering
Area of Study: Machine Learning, Multimodal Sensing, Human Activity Recognition, Cyber Physical System.

Tsinghua University M.Eng, Aug 2016 – May 2019
Electronic Engineering *GPA: 3.9/4.0*
Area of Study: Indoor Human Localization, Robotics, Vibration-based Human Sensing.

Tsinghua University B.Eng, Aug 2012 – May 2016
Electronic Engineering *GPA: 3.8/4.0*
Courses of study: Linear Algebra, Calculus, Electronic Circuit, Signals and Systems, Image Processing, Data and Algorithm, Communication Systems, etc.

Skills

Languages: C/C++, Java, Python, MATLAB, LaTeX
Platform: PyTorch, Raspberry Pi, Arduino, Linux, Android

Professional Experience

Futurewei Technologies | Research Intern on ARVR System and Algorithms 2023 Summer

- Propose a virtual text entry keyboard that improve input efficiency and alleviates physical fatigue by embedding the text entry activity into finger movement for ARVR applications.
- Develop a light finger movement detection algorithm that combination of data-driven method (MediaPipe) and traditional signal processing method for real-time typing event detection.
- Implement the system and evaluate our system with real-world dataset. Our system achieve 0.98 F1 score. (Paper in submission)

AiFi Inc. | Research Intern on Vision-based Autonomous Retail 2021 Summer

- Working on vision-based customer-product interaction event detection, i.e., pick up and put down items from retail store shelf.
- Propose a pose-based physical feature extraction from video for customer event detection, including walking speed, walking direction, and distance to shelf.
- Develop a light-weight model for real time event detection from video stream. Real-world experiment shows our solution achieves 97% accuracy, and 3x lower false positive rate than the baseline method.

Selected Research Projects

Vibration-based Single-Point Sensing for Occupant Tracking | *Human Sensing* Aug 2023 - Now

- Propose a physical encoder and data-driven decoder architecture to handle the signal direction estimation for signal-point occupant tracking.
- Physical encoder: proposed a low-cost and reconfigurable physical structure that make up with LEGO® bricks to embed direction information into mechanical waveform.
- Data-driven decoder: develop a robust contrastive learning algorithm to decode direction information from single signal with the variation of multiple factors, including signal source, location, and medium heterogeneity.

Multimodal Sensing Augmented Robust Autonomous Retails *Multimodal Fusion* Jun 2022 - May 2023

- Design a low-cost and sparse deployed pressure-based sensor on shelf to achieve load monitoring on shelf. (**Filed for patent**)
- Propose a modality-guided multimodal fusion solution that leverage the complementary information from vibration sensing and load sensing for customer event detection and recognition in noisy environment.

Cross-modal Causal Discovery between Wearable and Infrastructure Sensing Feb 2022 - Dec 2022

- Present a Temporal Convolution Network (TCN)-based network to discovery the causality between wearable sensing data and non-intrusive infrastructure sensing data for more efficient data fusion.
- Implement the causal discovery network and evaluate it with public dataset. The accuracy of our network achieves up to 2x improvement than baselines.
- Apply the cross-modal association solution in real human sensing applications, including identification and activity recognition. The accuracy of identification and activity recognition improved 26% and 34%, respectively.

Multimodal Human Activity Recognition | *Multimodal Sensing* Sep 2020 – Dec 2021

- Present a multi-task deep learning framework to fuse the wearable and infrastructural vibration sensing data for fine-grained human activity recognition.
- Introduce a model transfer scheme that leverages the robustness of each modality to handle the domain variance.

Data Quality Assessment Framework for Infrastructure Sensing | *Assessment Metric* Sep 2019 - May 2021

- Investigate the impact of multiple environmental factors on the acquired sensing data and propose a set of physical models to quantify the impact.
- Model the impact of environmental factors on the performance of sensing applications (Object identification, event detection, etc.). Propose an application-oriented solution to handle the quality variation for different applications.

Selected Publications

Yue Zhang, Shiwei Fang, Carlos Ruiz, Zhizhang Hu, Shubham Rohal, Shijia Pan. "Augmenting Vibration-Based Customer-Product Interaction Recognition with Sparse Load Sensing." *Proceedings of Cyber-Physical Systems and Internet of Things Week* (CPS-IoT Week). 2023.

Yue Zhang, Zhizhang Hu, Uri Berger, Shijia Pan. "CMA: Cross-Modal Association Between Wearable and Structural Vibration Signal Segments for Indoor Occupant Sensing." *Proceedings of the 22nd International Conference on Information Processing in Sensor Networks* (IPSN). 2023.

Yue Zhang, Carlos Ruiz, Shubham Rohal, Shijia Pan. "CPA: Cyber-Physical Augmentation for Vibration Sensing in Autonomous Retails." *Proceedings of the 24th International Workshop on Mobile Computing Systems and Applications* (HotMobile). 2023.

Yue Zhang, Zhizhang Hu, Susu Xu, Shijia Pan. "AutoQual: task-oriented structural vibration sensing quality assessment leveraging co-located mobile sensing context." *CCF Transactions on Pervasive Computing and Interaction*. 2021.

Yue Zhang, Shijia Pan, JonathonFagert, Mostafa Mirshekari, Hae Young Noh, Pei Zhang, Lin Zhang. "Occupant activity level estimation using floor vibration." *Proceedings of the 2018 ACM international joint conference and 2018 international symposium on pervasive and ubiquitous computing and wearable computers* (Ubicomp). 2018.

Patent

Lin Zhang, **Yue Zhang**, Tian Zhou, etc. 2017. An indoor powerline-based occupant localization system and method. CN 107942286 B. Issued July 24, 2020. (Authorized)

Honors and Awards

Best Poster award, SenSys 2023	Nov 2023
Best Poster Runner-up award, IPSN 2023	May 2023
SIGMOBILE Travel Award, HotMobile 2023	Feb 2023
Best Demo award, SenSys 2022	Nov 2022
Best Poster award, IPSN 2017, 2022	–
China National Scholarship, Tsinghua University	Feb 2019