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YUE ZHANG

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EDUCATION

University of California, Merced	Merced, CA, USA	Ph.D, Sep 2019 – May 2024
		(Expected)

- **Advisor: Dr. Shijia Pan** Computer Science and Engineering.
- **Area of Study:** Non-intrusive Human Sensing, Multimodal Sensing, Human Activity Recognition, Causal Discovery.

Tsinghua University	Beijing, China	M.Eng, Aug 2016 – May 2019

- **Advisor: Dr. Lin Zhang** Electronic Engineering.
- **Area of Study:** Indoor Human Localization, Robotics, Multimodal Emotion Recognition.

Tsinghua University	Beijing, China	B.Eng, Aug 2012 – May 2016

- **Advisor: Dr. Lin Zhang** Electronic Engineering.
- **Courses of study:** Linear Algebra, Calculus, Electronic Circuit, Signals and Systems, Computer Program Design, Data and Algorithm, Communication Systems, etc.

SKILLS

- PyTorch, C++, Matlab, Java, Python, Raspberry Pi, Arduino, Linux, Debian, Android.

INTERN EXPERIENCE

Research Scientist	AiFi Inc.	2021 Summer

Project: Vision-based Customer Event Detection.
- Extract customers' activity features from video, including walking speed, walking direction, and distance to gondola.
- Customer event detection with multiple machine learning models, including SVM, LSTM, and RNN, improved event-detection accuracy to 95% in the internal real-world benchmarking dataset and achieved 3x lower false positive rates than the baseline method.

SELECTED RESEARCH PROJECTS

Data Quality Assessment for Agriculture Sensing   Jul 2022 – Present
- Proposed a data-driven method to assess the data quality for time series data, which relies on the analysis of the associated relationship between sensors to assess its reliability.
- Developed a network architecture to quantify the association relationship based on the temporal convolutional network. We quantify the data quality of each sensor via the quantified association connection with other sensors.

Multimodal Customer Event Detection and Item Recognition for Autonomous Retails   Jun 2022 – Present
- Presented a particular augmentation structure on the gondola to enhance the customer-induced infrastructure signal, and achieved a 10x amplitude increase.
- Developed a deep-learning algorithm to fuse multimodal data for customer information inference, including vision, structural vibration, and thermal sensors.

Cross-modal Causal Discovery between Wearable IMU Data and Infrastructure Data   Sep 2021 – Dec 2022
- Presented a Temporal Convolution Network (TCN)-based framework to discovery the causal between wearable IMU data and infrastructure data, and quantified the connection between two modalities.
- Verified the causal discovery framework on a public dataset, and achieved the best performance compared with SOTA.
- Designed a sensing system (vibration sensing and wearable IMU sensing) and collected uncontrolled data in multiple residential houses to evaluate the framework. The accuracy is 2x higher than SOTA.

Multimodal Human Activity Recognition   Sep 2020 – Dec 2021
- Presented a multi-task deep learning framework to fuse the wearable and infrastructural vibration sensing data fro 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   Sep 2019 - May 2021
- Investigated the impact of multiple environmental factors on the acquired data and proposed three models to quantify their impact.
- Modeled the impact of the environmental factors on the sensing applications (Object identification, event detection, etc.). Proposed an application-oriented solution to handle the application variation.

- Developed a sensing system (including vibration sensing and wearable IMU sensing) to collect data in real-world scenarios to evaluate the framework.

Floor Vibration Based Occupant Activity Level Monitoring in Large Scale Deployment　　　**May 2017 - June 2019**
- Proposed an auto-calibration method for multiple infrastructure sensors leveraging the idle time slot of the occupants.
- Conducted a real-world and long-term (3 months) data collection in a commercial building covering 1000 m^2 and more than 50 participants

Powerline Based Occupant Localization　　　**May 2016 - May 2017**
- Explained the principle and physical model about how the powerline can be used for occupant localization, and verified the model with a controlled experiment.
- Designed a low-cost wireless sensing system that utilizes the pervasive infrastructure (powerline) as an antenna to capture the human body location change induced electromagnetic character changes to achieve decimeter-level localization.

SELECTED PUBLICATIONS

- **Zhang Y**, Hu Z, U Berger, et al. CMA: Cross-Modal Association Between Wearable and Structural Vibration Sensor Signal Segments for Indoor Occupant Sensing[C]//2023 22nd ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN). IEEE, 2023. (Accepted)
- **Zhang Y**, Carlos R, Shubham R, Pan S. CPA: Cyber-Physical Augmentation for Vibration Sensing in Autonomous Retails[C]//Proceedings of the 24th Annual International Workshop on Mobile Computing Systems and Applications. 2023.
- **Zhang Y**, Abdias B, Reza E, Pan S. Data Quality Assessment for Tree Trunk Relative Water Content Sensors in a Pomegranate Orchard[C]//Proceedings of the 20th ACM Conference on Embedded Networked Sensor Systems. 2022.
- **Zhang Y**, Hu Z, Xu S, et al. AutoQual: task-oriented structural vibration sensing quality assessment leveraging co-located mobile sensing context[J]. CCF Transactions on Pervasive Computing and Interaction, 2021, 3(4): 378-396.
- **Zhang Y**, Gu W, Ma F, et al. Real-Time Emotion Detection via E-See[C]//Proceedings of the 16th ACM Conference on Embedded Networked Sensor Systems. 2018: 420-421.
- **Zhang Y**, Pan S, Fagert J, et al. Occupant activity level estimation using floor vibration[C]//Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers. 2018: 1355-1363.

PATENT

- Lin Zhang, **Yue Zhang**, Tian Zhou, etc. 2017. Indoor power line occupant localization system and method. CN 107942286 B. filed August 28, 2017, and issued July 24, 2020. (Authorized)

OTHER EXPERIENCE

Teaching Assistant
- Data Thinking and Behavior, Tsinghua University　　　Spring Semester, 2017-2018
- Algorithm Design and Analysis, UC Merced　　　Spring Semester, 2021-2022
- Algorithm Design and Analysis, UC Merced　　　Spring Semester, 2022-2023

Autonomous Retail Competition　　　[**Link**]　　　**May 2020**
- Proposed a low-computation scheme to fuse the weight sensing data and vision sensing data: rely on the weight sensor to detect the event and then trigger the fusing model to classify the customer pickup/return item.
- Organized and led a team that contained multiple members from different universities with different research backgrounds to implement an available system, including event detection and item recognition.

HONORS AND AWARDS

- SIGMOBILE Travel Award, HotMobile, 2023
- Best Demo award of the 20th ACM Conference on Embedded Networked Sensor Systems (SenSys 2022)
- EECS Bobcat Fellowship (University of California, Merced 2022)
- Best poster award of the ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2017, IPSN 2022)
- Third place award of Autocheckout competition at Cyber-Physical Systems and Internet-of-Things (CPS-IoT) Week's Conference on Internet of Things Design and Implementation (2020)
- China National Scholarship (Tsinghua University 2019)