

SHIJIA PAN

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AREAS OF INTERESTS	Cyber-physical sensing systems; Internet-of-Things (IoT); Vibration/acoustic-based sensing; Ubiquitous computing; Continual and multimodal learning for IoT	
ACADEMIC POSITIONS	University of California, Merced , Merced, CA, USA <i>Assistant Professor</i> Computer Science and Engineering September, 2019 - present	
	Carnegie Mellon University , Pittsburgh, PA, USA <i>Postdoctoral Research Associate</i> Joint appointment: Electrical and Computer Engineering and Civil and Environmental Engineering July, 2018 - June, 2019	
	Intelligent Fabric LLC , Pleasanton, CA, USA <i>Research Advisor</i> July, 2018 - February, 2020	
EDUCATION	Carnegie Mellon University , Moffett Field, CA, 94043, USA Ph.D. Electronic and Computer Engineering • Advisors: Professor Pei Zhang (ECE), Professor Hae Young Noh (CEE) • Thesis title: Indoor human information acquisition from physical vibrations. August, 2012 - May, 2018	
	University of Science and Technology of China , Hefei, Anhui P.R.China B.Eng Computer Science • Exchange scholar at CMU in 2010 • Exchange student at HK PolyU in 2009 September, 2007 - July, 2012	
SELECTED HONORS AND AWARDS	Ubicomp 2nd Nurse Care Activity Recognition Challenge Best Paper Award 2019 Best Journal Paper Award (by ASME SHM/NDE Technical Committee) IoTDI 2020 Best Paper Award BuildSys 2019 Best Demo Award IPSN 2019 Best Poster Award N2Women Young Researcher Fellowship Rising Stars in EECS BuildSys 2017 Audience Choice Award SenSys 2017 Doctoral Colloquium Best Presentation Award SenSys 2016 Best Poster Award IPSN 2015 Best Poster Award Nick G. Vlahakis Graduate Fellowship N2Women Student Fellowship UbiComp 2011 Best Demo Award Google Anita Borg Scholarship (China) Student Travel Grants: SenSys (2012, 2017), HotMobile (2015, 2018), CPS Week (2015, 2018)	2020 2020 2020 2019 2019 2018 2018 2017 2017 2016 2015 2013 2012 2011 2011

Sense for Less: Physics-Informed Cyber-Physical Sensing Augmentation **2019-**
University of California, Merced

My role: PI

This project presents a transdisciplinary framework to assess and adapt cyber-physical systems (CPS) and Internet-of-Things (IoT) systems in real-world deployments, aiming to systematically enhance their information inference accuracy and reduce the required resources (cost, labor, labeling, data). For CPS/IoT systems relying on real-world sensor data to realize decision making, sensing (data acquisition) quality directly affects the information representative as well as the model accuracy in various applications. We combine physical and data-driven knowledge to design metrics and methods to assess the acquired sensor data quality for particular sensing tasks. The task-oriented sensing quality assessments are used for:

- Collaboratively sensing system adaptation to optimize data quality by adapting the deployment configuration and to reduce resources needed.
- Enable easy installation and maintenance of the smart systems and large scale deployments through shared context observe by multimodal systems.
- Fair dataset quality comparison for system performance evaluation and datasets sharing.

Continual Cross-modal Learning for IoT Systems **2019-**
University of California, Merced

My role: PI

The heterogeneity of cyber-physical systems brings challenges and opportunities for various applications. Our goal is to explore new methods to combine the complementary characteristics of multiple sensing modalities, especially between infrastructural and mobile sensing, for accurate fine-grained learning with limited (labeled) data.

- **Application 1:** Elderly In-home Long-term Monitoring.
Monitoring older adults' walking patterns and analyzing their fall risk is essential for fall prevention. Prior technologies such as computer vision or audio sensing raise privacy issues for long-term home monitoring scenarios. We look into an alternative solution through structural (e.g., floor) vibration (infrastructural sensing) and wearables (mobile sensing). By utilizing their complementary sensing properties and shared context, we can obtain high-fidelity data for older adults' information learning and modeling.
- **Application 2:** Autonomous Retail.
We utilize the complementary characteristics of multiple sensing modalities including computer vision, weight, and location information of the items to achieve accurate autonomous retail and store inventory management.

Indoor Human Information Acquisition from Physical Vibration **2013-2019**
Carnegie Mellon University

Advisors: Professor Pei Zhang, Professor Hae Young Noh

My role: initiating and leading the project

A smart building's ability to gather information about its occupants (number, location, identity, etc.) is essential to the new generation of smart building applications, such as energy management, space management, etc. Our system utilizes measurements of structural vibrations to sense indoor pedestrian information. A number of challenges appear when exploring human-induced structural vibration, and I focus on **combining physical and data-driven knowledge** to guide sensing and learning. To be more specific, I explore the following aspects:

- **Sensing System** Obtaining high fidelity vibration signals for human information learning is challenging due to the rapid change of human footstep locations. Utilizing the model of human movement in a space to predict the optimal hardware setting for human vibration sensing allows us to obtain high resolution and low distortion human-induced vibration signals.
- **Signal Characterization** Humans interact with structures in various ways which may induce different types of waves (e.g., impact, friction). Understanding the wave properties allows us

to extract the signal characteristics accurately.

- **Information Learning/Inferring** Human-centric sensing and learning face a challenge in getting labeled data for different sensing conditions. However, the data distribution change is correlated with physical phenomena that can be measured. Utilizing transfer learning iteratively guided by these physical measurements allows high prediction accuracy through each iteration while covering a large range of data distribution changes.

GRANTS

Academic Senate Faculty Research Grants Program (\$10,000, sole-PI). **2021-2022**
“TeethVib: Detecting Teeth Ill-Fitting Through Mouth-Guard Vibration Sensing”.

CITRIS Seed Funding Program Award (\$29,000, total \$60,000, Co-PI). **2021-2022**
“Data-Driven Fall Prevention Intervention for Older Adults”.

JOURNAL PUBLICATION

Note: primarily advised students are underlined

[J17] 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. Accepted 2021/06.

[J16] Mostafa Mirshekari, Jonathon Fagert, **Shijia Pan**, Pei Zhang, Hae Young Noh. Obstruction-Invariant Occupant Localization Using Footstep-Induced Structural Vibrations. Mechanical Systems and Signal Processing. Accepted 2020/11.

[J15] Jonathon Fagert, Mostafa Mirshekari, **Shijia Pan**, Linda Lowes, Megan Iammarino, Pei Zhang, Haeyoung Noh. Structure- and Sampling-Adaptive Gait Balance Symmetry Estimation Using Footstep Induced Structural Floor Vibrations. Journal of Engineering Mechanics, Accepted 2020/10.

[J14] Joao Diogo Falcao, Carlos Ruiz, **Shijia Pan**, Hae Young Noh, Pei Zhang. “FAIM: Vision and Weight Sensing Fusion Framework for Autonomous Inventory Monitoring in Convenience Stores”. Frontiers in Built Environment, section Structural Sensing, Accepted 2020/09.

[J13] **Shijia Pan**, Mario Berges, Juleen Rodakowski, Pei Zhang, Hae Young Noh. “Fine-grained Activity of Daily Living (ADL) Recognition through Heterogeneous Sensing Systems with Complementary Spatiotemporal Characteristics”. Frontiers in Built Environment, section Structural Sensing, Accepted 2020/09.

[M12] Pei Zhang, **Shijia Pan**, Mostafa Mirshekari, Jonathon Fagert and Haeyoung Noh, “Structures as Sensors: Indirect Sensing for Inferring Users and Environments” in Computer, vol. 52, no. 10, pp. 84-88, 2019.

[J11] Mostafa Mirshekari, Jonathon Fagert, **Shijia Pan**, Pei Zhang and Hae Young Noh. Step-Level Occupant Detection across Different Structures through Footstep-Induced Floor Vibration using Model Transfer. Journal of Engineering Mechanics 146, no. 3 (2020): 04019137.

Impact factor 2.264. Received the 2019 Best Journal Paper Award by the ASME SHM/NDE Technical Committee.

[J10] Xinlei Chen, Yu Wang, Jiayou He, **Shijia Pan**, Yong Li, Pei Zhang. CAP: Context-aware App Usage Prediction with Heterogeneous Graph Embedding. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2019.

[J9] Ji Jia, Chengtian Xu, **Shijia Pan**, Stephen Xia, Peter Wei, Hae Young Noh, Pei Zhang, and Xiaofan Jiang. Conductive Thread-Based Textile Sensor for Continuous Perspiration Level Monitoring. Sensors, 18(11), 3775.

Impact factor 2.475.

[J8] **Shijia Pan**, Mostafa Mirshekari, Jonathon Fagert, Carlos Ruiz, Hae Young Noh, and Pei Zhang. Area Occupancy Counting through Sparse Ambient Structural Vibration Sensing. IEEE Pervasive Computing Special Issue - IoT Communication.

[J7] Carlos Ruiz, **Shijia Pan**, Adeola Bannis, Xinlei Chen, Carlee Joe-Wong, Hae Young Noh, Pei Zhang. IDrone: Robust Drone Identification through Motion Actuation Feedback. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 2018.

[J6] Jun Han, **Shijia Pan**, Manal Kumar Sinha, Hae Young Noh, Pei Zhang and Patrick Tague. Smart Home Occupant Identification via Sensor Fusion Across On-Object Devices. Fast-tracked at ACM Transactions on Sensor Networks (TOSN) - Special Issue on Systems for Smart and Efficient Built Environments, 2018.

Impact factor 2.313.

[J5] Mostafa Mirshekari, **Shijia Pan**, Jonathon Fagert, Eve Schooler, Pei Zhang and Hae Young Noh. Occupant Localization using Footstep-Induced Structural Vibration. Mechanical Systems and Signal Processing 112 (2018): 77-97.

Impact factor 3.99.

[J4] **Shijia Pan**, Mostafa Mirshekari, Jonathon Fagert, Ceferino Gabriel Ramirez, Albert Jin Chung, Chih Chi Hu, John Paul Shen, Pei Zhang, and Hae Young Noh. "Characterizing human activity induced impulse and slip-pulse excitations through structural vibration." Journal of Sound and Vibration 414 (2018): 61-80.

Impact factor 2.593.

[J3] Xinlei Chen, Aveek Purohit, **Shijia Pan**, Carlos Ruiz, Jun Han, Zheng Sun, Frank Mokaya, Patrick Tague and Pei Zhang. "Design Experiences in Minimalistic Flying Sensor Node Platform through SensorFly." Transactions on Sensor Networks (TOSN), vol. 13, no. 4 (2017).

Impact factor 2.313.

[J2] **Shijia Pan**, Tong Yu, Mostafa Mirshekari, Jonathon Fagert, Amelie Bonde, Ole J. Mengshoel, Hae Young Noh, and Pei Zhang. "FootprintID: Indoor Pedestrian Identification through Ambient Structural Vibration Sensing." In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) 1, no. 3 (2017): 89.

Acceptance rate = 23.9%

[J1] **Shijia Pan**, Susu Xu, Mostafa Mirshekari, Pei Zhang, and Hae Young Noh. "Collaboratively Adaptive Vibration Sensing System for High Fidelity Monitoring of Structural Responses Induced by Pedestrians." Frontiers in Built Environment 3 (2017): 28.

FULLY PEER
REVIEWED
PUBLICATION

[C18] **Shijia Pan**, Dong Yoon Lee, Jun Ho Lee, and Phuc Nguyen. "TeethVib: Monitoring Teeth Functional Occlusion Through Retainer Vibration Sensing." Accepted by the IEEE/ACM international conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE 2021).

Acceptance rate = 41%

[C17] Gang Wang, **Shijia Pan**, and Susu Xu. "Decoupling the Unfairness Propagation Chain in Crowd Sensing and Learning Systems for Spatio-temporal Urban Monitoring." Accepted by the 8th ACM International Conference on Systems for Built Environments (BuildSys'21).

Acceptance rate = 26%

[C16] Amelie Bonde, Jesse Codling, Kanittha Naruethep, Yiwen Dong, Wachirawich Siripaktanakon,

Sripong Ariyadech, Akkarit Sangpetch, Orathai Sangpetch, **Shijia Pan**, Hae Young Noh, Pei Zhang. "PigNet: Failure-Tolerant Pig Activity Monitoring System Using Structural Vibration." In Proceedings of the 20th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2021).

Acceptance rate = 25%

[W15] Prerna Khanna, Tanmay Srivastava, **Shijia Pan**, Shubham Jain, and VP Nguyen. "JawSense: Recognizing Unvoiced Sound using a Low-cost Ear-worn System." In Proceedings of the 22nd International Workshop on Mobile Computing Systems and Applications, pp. 44-49. 2021.

Acceptance rate = 36%

[C14] Amelie Bonde, **Shijia Pan**, Mostafa Mirshekari, Carlos Ruiz, Hae Young Noh, and Pei Zhang. "OAC: Overlapping Office Activity Classification through IoT-Sensed Structural Vibration." In 2020 IEEE/ACM Fifth International Conference on Internet-of-Things Design and Implementation (IoTDI), pp. 216-222. IEEE, 2020.

Acceptance rate = 35%

[C13] Carlos Ruiz, **Shijia Pan**, Adeola Bannis, Ming-Po Chang, Hae Young Noh, and Pei Zhang. "IDIoT: Towards Ubiquitous Identification of IoT Devices through Visual and Inertial Orientation Matching During Human Activity." In 2020 IEEE/ACM Fifth International Conference on Internet-of-Things Design and Implementation (IoTDI), pp. 40-52. IEEE, 2020.

Acceptance rate = 35%, the Best Paper Award

[C12] **Shijia Pan**, Mario Berges, Juleen Rodakowski, Pei Zhang, and Hae Young Noh. Fine-Grained Activities of Daily Living Recognition through Structural Vibration and Electrical Sensing. In the Proceeding of the 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys' 19), November, 2019.

Acceptance rate = 30%

[C11] Carlos Ruiz, Joao Falcao, **Shijia Pan**, Hae Young Noh, and Pei Zhang. AIM3S: Autonomous Inventory Monitoring through Multi-Modal Sensing for Cashier-Less Convenience Stores. In the Proceeding of the 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys' 19), November, 2019.

Acceptance rate = 30%

[C10] Jun Han, Albert Chung, Manal Kumar Sinha, Madhumitha Harishankar, **Shijia Pan**, Hae Young Noh, Pei Zhang, and Patrick Tague. Do You Feel What I Hear? Enabling Autonomous IoT Device Pairing using Different Sensor Types. In the Proceedings of the IEEE Symposium on Security & Privacy, May 2018.

Acceptance rate = 11.5%

[W9] **Shijia Pan**, Carlos Ruiz, Jun Han, Adeola Bannis, Patrick Tague, Hae Young Noh and Pei Zhang. UniverSense: IoT Device Pairing through Heterogeneous Sensing Signals. In Proceedings of the 16th International Workshop on Mobile Computing Systems and Applications. ACM, 2018.

Acceptance rate = 29.2%

[W8] Amelie Bonde, **Shijia Pan**, Zhenhua Jia, Yanyong Zhang, Hae Young Noh and Pei Zhang. VRRM: Vehicular Vibration-based Heart RR-Interval Monitoring System. In Proceedings of the 16th International Workshop on Mobile Computing Systems and Applications, ACM, 2018.

Acceptance rate = 29.2%

[C7] Jun Han, **Shijia Pan**, Manal Kumar Sinha, Hae Young Noh, Pei Zhang and Patrick Tague. SenseTribute: Smart Home Occupant Identification via Fusion Across On-Object Sensing Devices. In Proceedings of the 4th ACM International Conference on Systems for Energy-Efficient Built

Environments (BuildSys 2017).

Acceptance rate = 31.3%, Audience's Choice Award

[C6] **Shijia Pan**, Ceferino Gabriel Ramirez, Mostafa Mirshekari, Jonathon Fagert, Albert Jin Chung, Chih Chi Hu, John Paul Shen, Hae Young Noh, and Pei Zhang. "SurfaceVibe: vibration-based tap & swipe tracking on ubiquitous surfaces." In Proceedings of the 16th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN 2017), pp. 197-208. 2017.

Acceptance rate = 18.3%

[W5] **Shijia Pan**, Ningning Wang, Yuqiu Qian, Irem Velibeyoglu, Hae Young Noh, and Pei Zhang. "Indoor person identification through footstep induced structural vibration." In Proceedings of the 16th International Workshop on Mobile Computing Systems and Applications. ACM, 2015.

Acceptance rate = 28.8%

[C4] Aavek Purohit, Zheng Sun, **Shijia Pan**, and Pei Zhang. "Sugartrail: Indoor navigation in retail environments without surveys and maps." In Proceedings of the 10th Annual IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), 2013 , pp. 300-308. IEEE, 2013.

Acceptance rate = 29.5%

[C3] Zheng Sun, **Shijia Pan**, Yu-Chi Su, and Pei Zhang. "Headio: zero-configured heading acquisition for indoor mobile devices through multimodal context sensing." In Proceedings of the 2013 ACM international joint conference on Pervasive and ubiquitous computing (UbiComp 2013), pp. 33-42. ACM, 2013.

Acceptance rate = 23.4%

[W2] Zheng Sun, Aavek Purohit, **Shijia Pan**, Frank Mokaya, Raja Bose, and Pei Zhang. "Polaris: getting accurate indoor orientations for mobile devices using ubiquitous visual patterns on ceilings." In Proceedings of the Twelfth Workshop on Mobile Computing Systems & Applications, p. 14. ACM, 2012.

Acceptance rate = 21.6%

[C1] Zheng Sun, Aavek Purohit, Kaifei Chen, **Shijia Pan**, Trevor Pering, and Pei Zhang. "PAN-DAA: physical arrangement detection of networked devices through ambient-sound awareness." In Proceedings of the 13th international conference on Ubiquitous computing (UbiComp 2011), pp. 425-434. ACM, 2011.

Acceptance rate = 16.6%

CONFERENCE AND
WORKSHOP
PUBLICATION

Note: primarily advised students are underlined

[W23] Zhizhang Hu, Yue Zhang, **Shijia Pan**. Zhizhang Hu, Yue Zhang, and Shijia Pan. "Footstep-Induced Floor Vibration Dataset: Reusability and Transferability Analysis". In Proceedings of the 19th ACM Conference on Embedded Networked Sensor Systems, pp. 546-551. 2021. (DATA '21).

[W22] Tong Yu, Yue Zhang, Zhizhang Hu, Susu Xu, **Shijia Pan**. "Vibration-Based Indoor Human Sensing Quality Reinforcement via Thompson Sampling." In Proceedings of the 1st ACM Workshop on Cyber-Physical Human Sensing, part of CPS-IoT Week 2021. (Invited Paper)

[W21] **Shijia Pan**, and Phuc Nguyen. "Opportunities in the Cross-Scale Collaborative Human Sensing of Developing Device-Free and Wearable Systems." In Proceedings of the 2nd ACM Workshop on Device-Free Human Sensing, pp. 16-21. 2020.

[W20] Zhizhang Hu, Tong Yu, Yue Zhang, **Shijia Pan**. Fine-grained Activities Recognition with Coarse-grained Labeled Multi-modal Data. In the 2nd Workshop on Continual and Multimodal

Learning for Internet of Things, September 2020.

[W19] Lixing He, Carlos Ruiz, Mostafa Mirshekari, **Shijia Pan**. SCSV2: Physics-informed Self-Configuration Sensing through Vision and Vibration Context Modeling. In the 3rd Workshop on Combining Physical and Data-Driven Knowledge in Ubiquitous Computing, September 2020.

[W18] Yiwen Dong, Jingxiao Liu, Yitao Gao, Sulagna Sarkar, Zhizhang Hu, Jonathon Fagert, **Shijia Pan**, Pei Zhang, Hae Young Noh, Mostafa Mirshekari. A Window-Based Sequence-to-One Approach with Dynamic Voting for Nurse Care Activity Recognition Using Acceleration-Based Wearable Sensor. In the 2nd Nurse Care Activity Recognition Challenge, as part of the UbiComp 2020.

Best Paper Award

[arXiv17] Madhumitha Harishankar, Jun Han, Sai Vineeth Kalluru Srinivas, Faisal Alqarni, Shi Su, **Shijia Pan**, Hae Young Noh, Pei Zhang, Marco Gruteser, and Patrick Tague. "LaNet: Real-time Lane Identification by Learning Road Surface Characteristics from Accelerometer Data." arXiv preprint arXiv:2004.02822 (2020).

[W16] Yue Zhang, Lin Zhang, Hae Young Noh, Pei Zhang, and **Shijia Pan**. A Signal Quality Assessment Metrics for Vibration-based Human Sensing Data Acquisition. In the 2nd Workshop on Data Acquisition to Analysis. November 10, 2019, New York, NY, USA.

[W15] Laixi Shi, Mostafa Mirshekari, Jonathon Fagert, Yuejie Chi, Hae Young Noh, Pei Zhang, and **Shijia Pan**. Device-free Multiple People Localization through Floor Vibration. In the 1st ACM International Workshop on Device-Free Human Sensing, November 10, 2019, New York, NY, USA.

[W14] Zhizhang Hu, Emre Sezgin, Simon Lin, Pei Zhang, Hae Young Noh, and **Shijia Pan**. Device-free Sleep Stage Recognition through Bed Frame Vibration Sensing. In the 1st ACM International Workshop on Device-Free Human Sensing, November 10, 2019, New York, NY, USA.

[W13] Carlos Ruiz, **Shijia Pan**, Hae Young Noh, and Pei Zhang. WhereWear: Calibration-free Wearable Device Identification through Ambient Sensing. In The 5th ACM Workshop on Wearable Systems and Applications (WearSys19), June 21, 2019, Seoul, Republic of Korea.

Invited paper.

[W12] Amelie Bonde, **Shijia Pan**, Orathai Sangpetch, Akkarit Sangpetch, Woranun Woramontri, and Pei Zhang. "Structural vibration sensing to evaluate animal activity on a pig farm." In the 1st Workshop on Data Acquisition to Analysis. pp. 25-26. 2018.

[W11] Yue Zhang, **Shijia Pan**, Jonathon Fagert, Mostafa Mirshekari, Hae Young Noh, Pei Zhang, and Lin Zhang. "Occupant Activity Level Estimation Using Floor Vibration." In Proceedings of the 2018 ACM International Joint Conference and 2018 International Symposium on Pervasive and Ubiquitous Computing and Wearable Computers, pp. 1355-1363. ACM, 2018.

[W10] Tong Yu*, **Shijia Pan***, Susu Xu, Mostafa Mishakeri, Jonathon Fagert, Xinlei Chen, Haeyoung Noh, Pei Zhang and Ole J. Mengshoel. ILPC: Iterative Learning using Physical Constraints in Real-world Sensing Data. AAAI Workshop SmartIoT 2018.

*equal contribution among authors

[W9] Jonathon Fagert, Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. "Monitoring Hand-Washing Practices using Structural Vibrations." In Proceedings of the 11th International Workshop on Structural Health Monitoring, Stanford University, Stanford, CA, USA, September 2017.

[C8] Jonathon Fagert, Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. "Char-

acterizing Left-Right Gait Balance Using Footstep-Induced Structural Vibrations.” In SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring, pp. 1016819-1016819. International Society for Optics and Photonics, Portland, Oregon, United States, March 2017.

[W7] Ji Jia, Chengtian Xu, **Shijia Pan**, Stephen Xia, Peter Wei, Hae Young Noh, Pei Zhang, and Xiaofan Jiang. Moisture Based Perspiration Level Estimation. UbiComp Workshop CPD 2018.

[W6] Xinlei Chen, Xiangxiang Xu, Xinyu Liu, **Shijia Pan**, Jiayou He, Hae Young Noh, Lin Zhang, Pei Zhang. PGA: Physics Guided and Adaptive Approach for Mobile Fine-Grained Air Pollution Estimation. UbiComp Workshop CPD 2018.

[C5] **Shijia Pan**, Mostafa Mirshekari, Pei Zhang, and Hae Young Noh. ”Occupant traffic estimation through structural vibration sensing.” SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring (2016): 980306-980306.

[C4] Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. ”Characterizing wave propagation to improve indoor step-level person localization using floor vibration.” SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring (2016): 980305-980305.

[C3] Lam, Mike, Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. ”Robust occupant detection through step-induced floor vibration by incorporating structural characteristics.” In Dynamics of Coupled Structures, Volume 4, pp. 357-367. Springer International Publishing, 2016.

[C2] **Shijia Pan**, Amelie Bonde, Jie Jing, Lin Zhang, Pei Zhang, and Hae Young Noh. ”Boes: building occupancy estimation system using sparse ambient vibration monitoring.” SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring (2014): 906110-906110.

[W1] **Shijia Pan**, An Chen, and Pei Zhang. ”Securitas: user identification through RGB-NIR camera pair on mobile devices.” In Proceedings of the Third ACM workshop on Security and privacy in smartphones & mobile devices, pp. 99-104. ACM, 2013.

SELECTED POSTER/ [P15] Zhizhang Hu, Yue Zhang, **Shijia Pan**. Poster Abstract: Vibration-based Indoor Occupant
DEMO/ ABSTRACT/ Gait Monitoring with Robot Vacuum Cleaners. In the 6th ACM/IEEE Conference on Internet of
TALK Things Design and Implementation (IoTDI 2021, part of CPS-IoT Week 2021).

[P14] Yue Zhang, Susu Xu, Laixi Shi, **Shijia Pan**. Poster: Using Mobile Sensing to Enable the Signal Quality Assessment for Infrastructure Sensing Systems. In the 21st Annual International Workshop on Mobile Computing Systems and Applications (ACM HotMobile 2020).

[P13] Laixi Shi, Yue Zhang, **Shijia Pan**, Yuejie Chi. Poster: Data Quality-Informed Multiple Occupant Localization using Floor Vibration Sensing. In the 21st Annual International Workshop on Mobile Computing Systems and Applications (ACM HotMobile 2020).

[D12] Carlos Ruiz, Joao Falcao, **Shijia Pan**, Hae Young Noh, and Pei Zhang. Demo Abstract: Autonomous Inventory Monitoring through Multi-Modal Sensing (AIM3S) for Cashier-Less Stores. In the Proceeding of the 6th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (BuildSys’ 19), November, 2019.

Best Demo Award

[T11] Jonathon Fagert, Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. Vibration source characterization for human gait health monitoring using footstep-induced floor vibrations. Engineering Mechanics Institute (EMI) Conference 2019, 18 - 21 June 2019, Caltech.

[P10] Jonathon Fagert, Mostafa Mirshekari, **Shijia Pan**, Pei Zhang, and Hae Young Noh. Poster

Abstract: Gait Health Monitoring through Footstep-Induced Floor Vibrations. ACM IPSN 2019, Montreal, April 2019.

Best Poster Award

[A9] **Shijia Pan**, Mostafa Mirshekari, Jonathon Fagert, Pei Zhang, Hae Young Noh. (2018). Collaborative Sensor Grouping for Indoor Human Sensing through Structural Characterization. The 7th World Conference on Structural Control and Monitoring (WCSCM), 2018, Qingdao, China.

[T8] Mostafa Mirshekari, Jonathon Fagert, **Shijia Pan**, Pei Zhang, Hae Young Noh. (2018). Human Health Tracking through Gait-Induced Floor Vibrations Across Different Structures. 2018 ASCE Engineering Mechanics Institute Conference, Boston, MA.

Best Student Paper Award (from Dynamics Committee)

[A7] **Shijia Pan**. Structure as Sensors: Learning Indoor Human Information from Physical Vibrations. ACM SenSys 2017 Doctoral Colloquium, Delft, Netherlands, November 2017.

Best Presentation Award

[P6] **Shijia Pan**, Kent Lyons, Mostafa Mirshekari, Hae Young Noh, and Pei Zhang. Poster Abstract: Multiple Pedestrian Tracking through Ambient Structural Vibration Sensing. ACM SenSys 2016, Stanford, CA, USA, November 2016.

Best Poster Award

[P5] Mostafa Mirshekari, **Shijia Pan**, Adeola Bannis, YPM Lam, Pei Zhang, Hae Young Noh. Step-level person localization through sparse sensing of structural vibration. ACM IPSN 2015, Seattle, April 2015.

Best Poster Award

[P4] Adeola Bannis, **Shijia Pan**, and Pei Zhang. Towards Targeted Gestures: Adding Directional Context to Gestures Using Doppler Effect. ACM Ubicomp 2014, Seattle, USA, September 2014

[D3] **Shijia Pan**, Yulai Shen, Zheng Sun, Priya Mahaja, Lin Zhang and Pei Zhang. Demo Abstract: Saving Energy in Smart Commercial Buildings through Social Gaming. ACM Ubicomp 2013, Zurich, Switzerland, September 2013.

[D2] **Shijia Pan**, Bo Liu, Lin Zhang, and Pei Zhang. Demo Abstract: iCEnergy: Augmented Reality Display for Intuitive Energy Monitoring. SenSys 2012, Toronto, Canada, November, 2012.

[D1] Zheng Sun, Aveek Purohit, Kaifei Chen, **Shijia Pan**, Trevor Pering, and Pei Zhang. Demo Abstract: PANDAA: Physical Arrangement Detection of Networked Devices through Ambient-Sound Awareness. ACM Ubicomp 2011, Beijing, China, September 2011.

Best Demo Award

PATENTS

[2] ZHANG Pei, NOH Hae Young, **PAN Shijia**, WANG Ningning, BONDE Amelie, and MIR-SHEKARI Moustafa. Indoor identification of individuals through footstep induced structural vibration. U.S. Patent App. 15/544,928.

[1] CHEN Mei An, **PAN Shijia**. Feature identification using an RGB-NIR camera pair. US Patent App. 14/168,267.

INVITED SEMINARS AND KEYNOTES

[32] Sense for Less: Physics-Informed Adaptive Cyber-Physical Systems for Vibration-Based Human Monitoring.

CITRIS Exchange Seminar

Sept, 2021

- [31] Sense for Less: Physical Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
Stony Brook University **March, 2021**
- [30] Sense for Less: Physical Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
University of Texas at Arlington **Feb, 2021**
- [29] Keynote: Sense for Less: Physics-Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
The 2nd Workshop on Device Free Human Sensing **Nov, 2020**
- [28] Sense for Less: Physics-Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
Florida International University **Oct, 2020**
- [27] IoT Device Pairing through Heterogeneous Sensing Signals.
Standard Cognition, San Francisco, CA, USA **Oct, 2019**
- [26] Indoor Human Information Acquisition from Physical Vibrations.
FEAST, Merced, CA, USA **Oct, 2019**
- [25] Indoor Human Information Acquisition from Physical Vibrations.
University of Oxford, Oxford, UK **Sept, 2019**
- [24] Vibration Based Tap & Swipe Tracking on Ubiquitous Surfaces: Combining physical and data-driven knowledge in signal characterization.
CMKL University, Thailand **Aug, 2019**
- [23] Indoor Human Information Acquisition from Physical Vibrations: a case study for cyber-physical systems.
CMKL University, Thailand **Aug, 2019**
- [22] Indoor Human Information Acquisition from Physical Vibrations.
CMKL University, Thailand **June, 2019**
- [21] Indoor Human Information Acquisition from Physical Vibrations.
University of Pittsburgh, USA **March, 2019**
- [20] Indoor Human Information Acquisition from Physical Vibrations.
University of California, Merced, USA **March, 2019**
- [19] Indoor Human Information Acquisition from Physical Vibrations.
University of Michigan, USA **March, 2019**
- [18] Vibration Based Tap & Swipe Tracking on Ubiquitous Surfaces: Combining physical and data-driven knowledge in signal characterization.
ELEN E6908, Topics in Electrical and Computer Engineering. TPC: Cyber-Physical Systems
Guest Lecture, Columbia University **Feb, 2019**
- [17] Vibration Based Tap & Swipe Tracking on Ubiquitous Surfaces: Combining physical and data-driven knowledge in signal characterization.
12-761, Sensing and Data Mining for Smart Structures and Systems
Guest Lecture, Carnegie Mellon University **Feb, 2019**

- [16] Indoor Human Information Acquisition from Physical Vibrations.
ETH (video conference) **Feb, 2019**
- [15] Indoor Human Information Acquisition from Physical Vibrations.
Pennsylvania State University, PA, USA **Nov, 2018**
- [14] Indoor Human Information Acquisition from Physical Vibrations.
Tsinghua University, Beijing, China **Nov, 2018**
- [13] Indoor Human Information Acquisition from Physical Vibrations.
Peking University, Beijing, China **Nov, 2018**
- [12] Indoor Human Information Acquisition from Physical Vibrations.
University of New South Wales, Sydney, Australia **Nov, 2018**
- [11] Indoor Human Information Acquisition from Physical Vibrations.
Princeton University, Princeton, New Jersey, USA **Sept, 2018**
- [10] Indoor Human Information Acquisition from Physical Vibrations.
University of California, Merced, USA **Sept, 2018**
- [9] Indoor Space Usage Monitoring using Structural Vibrations
Google, Sunnyvale, USA **August, 2018**
- [8] Physics Guided and Adaptive Approach for Mobile Fine-Grained Environmental Monitoring
Urban Environmental Sustainability in a Smart and Connected World, USA **August, 2018**
- [7] Indoor Human Information Acquisition from Physical Vibrations.
Tsinghua-UC Berkeley Shenzhen Institute, Shenzhen, China **July, 2018**
- [6] Calibration-Free Occupant Localization using Structural Vibration through Locally Adaptive Multilateration.
7WCSCM, Qingdao, China **July, 2018**
- [5] Indoor Human Information Acquisition from Physical Vibrations.
University of California, Santa Cruz, USA **April, 2018**
- [4] Indoor Human Information Acquisition from Physical Vibrations.
Samsung Research America, Mountain View, USA **April, 2018**
- [3] Indoor Human Information Acquisition from Physical Vibrations.
Singapore Management University, Singapore **March, 2018**
- [2] Indoor Human Information Acquisition from Physical Vibrations.
National University of Singapore, Singapore **March, 2018**
- [1] Structures as Sensors: Indoor Human Monitoring Through Ambient Vibration Sensing.
AiFi Inc., California, USA **Nov, 2017**

PHD STUDENTS

- Zhizhang Hu, UC Merced EECS 2020 fall-
Shubham Rohal, UC Merced EECS 2021 summer-
Yue Zhang, UC Merced EECS 2021 fall-

SUPERVISED STUDENTS

Shreya Shriram, UC Merced (undergraduate)	2021 summer -
Dong Yong Lee, UC Irvine (undergraduate)	2020 fall -
Ronald Chिताuro, Carnegie Mellon University (graduate)	2021 summer
Francisco Lira, UC Merced (undergraduate)	2021 summer
Melody Hu, KIPP San Jose Collegiate (high school junior)	2021 summer
Yue Zhang, UC Merced EECS (J-1 exchange scholar)	2019 fall - 2021 summer
Shubham Rohal, UC Merced EECS (graduate)	2020 fall - 2021 spring
Rahul Sidramappa Hoskeri, UC Merced EECS (graduate)	2020 summer - 2021 spring
Nikhil Pitta, Monta Vista High School (high school senior)	2020 summer
Anthony Sainez, UC Merced (undergraduate)	2020 summer
Lixing He, UESTC/UC Berkeley (exchange undergraduate)	2020 spring
Laixi Shi, Carnegie Mellon University (graduate)	2019 spring - 2020 spring
Zhizhang Hu, Carnegie Mellon University (graduate)	2019 spring - 2020 spring
Di An, UC Merced EECS (graduate)	2019 fall
Jothi Prasanna Shanmuga Sundaram, UC Merced EECS (graduate)	2019 fall

TEACHING EXPERIENCE

CSE 160 Computer Networks

Spring 2021

Instructor, Merced, CA, USA

Course Description: This course introduces the basics of networking, ranging from sending bits over wires to the Web and distributed computing. It is focused on the protocols and design aspects of the Internet. The goal of the course is to give students an appreciation of the fundamental challenges of networking, design strategies of proven value, and common implementation technologies.

EECS 283 Advanced Topics on Intelligent Systems

2020 -

Instructor/Designer, Merced, CA, USA

Course Description: Intelligent systems have become an important part of our everyday life. Smart devices and systems become more and more pervasive. The development of intelligent systems rely on multidisciplinary research, which include and not limited to artificial intelligence, machine learning, communication and networks, robotics, security, and signal processing. This class will review the state-of-the-art in intelligent systems and help students prepare for research in intelligent systems.

Mobile Hardware for Software Engineers

Fall 2013/2016/2017

Teaching Assistant, Pittsburgh, PA/Moffett Field, CA USA

Course Instructor: Prof. Pei Zhang

Course Description: This is a project-based course that is designed to enhance students ability to analyze mobile hardware capabilities and restrictions. The course covers the elements of embedded systems development as well as mobile topics such as power management, machine-to-machine communication, and wireless protocols.

My Role:

- 1-2 lectures per semester highlighting current research in cyber-physical systems
- I managed 10-16 groups per semester; guiding them through the development and completion of their course projects
- I assisted the students with their understanding of the problem definition, hardware capabilities/limitation analysis, as well as system development
- I provided bi-weekly feedback on their project progress reports

INDUSTRIAL RESEARCH EXPERIENCE

Technicolor Research, Los Altos, CA, USA

May, 2016 - August, 2016

Research Intern

Manager/Mentor: Dr. Kent Lyons

Project Leader: structural vibration sensing for multiple occupants monitoring project, the cor-

responding publication [P6] is selected as the Best Poster Award in 2016 SenSys.

Qualcomm Technologies, Inc., San Diego, CA, USA **May, 2013 - August, 2013**
Interim Engineering Intern
Manager/Mentor: Dr. An Mei Chen

Qualcomm Technologies, Inc., San Diego, CA, USA **May, 2014 - August, 2014**
Interim Engineering Intern
Manager/Mentor: Dr. An Mei Chen

Microsoft Research Asia, Beijing, P.R.China **March, 2011 - August, 2011**
Research Intern
Advisor: Dr. Jacky Shen

PROFESSIONAL
SERVICES

Editor Services

Frontiers in Big Data

CCF Transactions on Pervasive Computing and Interaction

Sensors Special Issue on Human Motion Monitoring and Modeling

Sensors Journal

Special Issue Guest Editor

Special Issue Guest Editor

Guest Editor

Topics Board Editor

Technical Program Committee Member

IPSN

2021-2022

AAAI

2019-2022

IJCAI

2019-2022

CHASE

2021

BuildSys

2019-2021

SenSys

2020-2021

EarComp

2021

UIST

2021

IEEE MASS

2019, 2021

SECON

2020-2021

BigCom

2020-2021

ICDCS

2021

DCOSS

2020-2021

EWSN PhD Forum

2021

ENSsys workshop (co-located with ACM SenSys)

2018-2020

Wi-DroIT'20

2020

ICCPS'20

2020

HotMobile'20

2020

ICII'19

2019

Journal Reviewer

ACM IMWUT, Ubicomp

2017-2021

ACM Transactions on Sensor Networks

2018-2021

IEEE Internet of Things Journal

2019-2021

Pervasive and Mobile Computing

2018-2020

ACM Transactions on Cyber Physical Systems

2020

ACM Transactions on Computing for Healthcare

2020

ACM Transactions on Internet of Things

2020

IEEE Computer Architecture Letter

2020

IEEE/ACM Transactions on Networking

2018-2020

IEEE Journal of Biomedical and Health Informatics

2019

IEEE Access

2019

Journal of Vibration and Control

2019

Journal of Engineering Mechanics	2019
IEEE Transactions on Services Computing	2019
Sensor Journal	2018-2019
Engineering Science and Technology, an International Journal	2018
IEEE Transactions on Mobile Computing	2016
IEEE Computer Magazine	2016

Proposal Reviewer

National Science Foundation Review Panel	2020
MIPS proposals	2019

PhD Thesis Committee Member

Wenqian Dong (UC Merced)	Spring, 2022
Amelie Bonde (Carnegie Mellon University)	Nov, 2021
Carlos Ruiz (Carnegie Mellon University)	Nov, 2019

PhD Thesis Reviewer

Miao He (Tsinghua University)	May, 2020
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Steering/Advising Committee

3rd DATA (co-located with ACM SenSys/BuildSys20)	Nov, 2020
2nd DFHS (co-located with ACM BuildSys20)	Nov, 2020

Technical Program Committee Chair/Organizer

Mini-Symposia: Physics-Informed Machine Learning for Smart City	MMLDT-CSET 2021
3rd CPD 2020 (co-located with ACM Ubicomp20)	Sept, 2020
2nd CML-IoT 2020 (co-located with ACM Ubicomp20)	Sept, 2020
AiFiAutoCheckout Competition (co-located with CPS-IoT Week 2020)	April, 2020
2nd DATA workshop (co-located with ACM SenSys19)	Nov, 2019
1st DFHS (co-located with ACM BuildSys19)	Nov, 2019
2nd CPD 2019 (co-located with ACM Ubicomp19)	Sept, 2019
1st CML-IoT 2019 (co-located with ACM Ubicomp19)	Sept, 2019
1st DATA workshop (co-located with ACM SenSys)	Nov, 2018
1st CPD 2018 (co-located with ACM Ubicomp18)	Oct, 2018

Panelist/Judge

DATA 2021: Data Acquisition, Analysis and Reuse for AI + IoT Applications	Nov, 2021
CMU ECE Panel "Women in Academia: Yes We Can"	Apr, 2021
CS4Me Hackthon by the Computing Alliance of Hispanic-Serving Institutions	March, 2021
EWSN 2021 PhD Forum	Feb, 2021
Junior Faculty/Researcher Panel at HotMobile 2020	March, 2020
Doctoral Colloquium at Ubicomp/ISWC 2019	Sept, 2019

Conference Session Chair

SenSys 2020 Session 8: Staying Healthy [Human Activity & Health]	Nov, 2020
SECON 2020 Session 2: Sensing and AR	June, 2020
HotMobile 2020 Session 2: Mobile Sensing and Analytics	March, 2020
BuildSys 2019 Session II: Thermal Comfort	Nov, 2019

Conference Organizing Committee

Community Engagement Chair: MobiSys 2021
Diversity Co-Chair: Ubicomp/ISWC 2021
Post/Demo Chair: BuildSys 2021
PhD Forum Chair: SenSys 2020-2021

Student Travel Grant Chair: BuildSys 2020, MobiSys 2020

Publicity Chair: EWSN 2021, CHASE 2020, CPS-IoTWeek 2019-2020, SenSys 2018-2019, IPSN 2019

Community Engagement Chair: MobiSys 2021

Social Media Chair: IPSN 2021-2022, BuildSys 2019, SenSys 2016

N2Women Event

UbiComp 2021 (mentor), virtual

September, 2021

SenSys 2019 (mentor), New York, USA

November, 2019

SenSys 2018 (organizer), Shenzhen, China

November, 2018

SenSys 2012 (organizer), Toronto, Canada

November, 2012