

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

The data/signal quality of the real-world deployment directly affect learning and modeling accuracy. Due to the complexity of the physical world, various factors may affect the deployment and sensing signal quality [W16, P15]. We combine physical and data-driven knowledge to design metrics to assess the signal and dataset quality for particular sensing tasks. The assessments are used for:

- Fair dataset quality comparison for system performance evaluation and datasets sharing.
- Collaboratively sensing system adaptation to optimize data quality.
- Enable easy installation and maintenance of the smart systems and large scale deployments.

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.

Headio: Multimodal Context Sensing for Mobile Heading Acquisition **2012-2013**
Carnegie Mellon University

Advisor: Professor Pei Zhang, and Dr. Zheng Sun

Headio is an orientation acquisition system for smart devices equipped with cameras. It solves the problem of high orientation reading error caused by the complexity of the indoor magnetic interference. To achieve this, the system utilizes image processing algorithms that combine acceleration sensing data and image data to extract ceiling patterns even when the phone is in a tilted position. Then based on the ceiling pattern, the system obtains the accurate orientation information for various applications. My role in this project is to assist on the algorithm design as well as system implementation.

SensorFly: Indoor Navigation on Micro UAV Platforms **2010-2013**
Carnegie Mellon University

Advisor: Professor Pei Zhang, and Dr. Aveek Purohit

SensorFly is a low cost micro unmanned aerial vehicle platform that autonomously navigates and senses indoor environments with various sensors on board. It is designed to be able to swarm and communicate with other units during tasks. It can be used in emergency situations such as fire

and earthquake for seeking survivors and navigation assistance. SugarTrail is an indoor navigation system that is built on the SensorFly platform. It uses integrated signatures consisting of distance information from round-trip time of flights of RF signals and compass readings to achieve indoor mapping and navigation. My role in this project is to assist on the system and algorithm design, experiment design and implementation.

PANDAA: Networked Devices Localization through Ambient-Sound **2010-2011**
Carnegie Mellon University

Advisor: Professor Pei Zhang, and Dr. Zheng Sun

PANDAA is an indoor positioning system that utilizes ambient acoustic sensing data to determine devices' relative locations. The system is readily applicable for commercial off-the-shelf mobile devices. It achieves a considerable accuracy of 17cm in terms of localization. My role in this project is to assist on the algorithm design and experimentation for evaluation.

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 (\$60,000, Co-PI). **2021-2022**
"Data-Driven Fall Prevention Intervention for Older Adults".

JOURNAL PUBLICATION [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

[C16] Amelie Bonde, Jesse Codling, Kanittha Naruethap, 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%

OTHER
PUBLICATION

[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. "Characterizing 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): 90611O-90611O.

[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/
DEMO/ ABSTRACT/
TALK [P16] Zhizhang Hu, Yue Zhang, **Shijia Pan**. Poster Abstract: Vibration-based Indoor Occupant Gait Monitoring with Robot Vacuum Cleaners. In the 6th ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI 2021, part of CPS-IoT Week 2021).

[P15] 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).

[P14] 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).

[D13] 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

[T12] 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.

[T11] Mostafa Mirshekari, Jonathon Fagert, **Shijia Pan**, Pei Zhang, and Hae Young Noh. Obstruction invariant indoor occupant localization using footstep-induced structural vibration. 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

[30] Sense for Less: Physical Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
University of Texas at Arlington (video conference) **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 (video conference) **Nov, 2020**

[28] Sense for Less: Physics-Informed Adaptive Cyber-Physical Systems for Device-Free Human Monitoring.
Florida International University (video conference) **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**

CONFERENCE
PRESENTATIONS

- [8] Fine-Grained ADL Recognition through Structural Vibration and Electrical Sensing.
BuildSys, New York, USA **Nov, 2019**
- [7] Structural Element Modeling for Vibration-based Indoor Human Sensing Configuration.
7WCSCM, Qingdao, China **July, 2018**
- [6] UniverSense: IoT Device Pairing through Heterogeneous Sensing Signals.
HotMobile 2018, AZ, USA **Feb, 2018**
- [5] FootprintID: Indoor Pedestrian Identification through Ambient Structural Vibration Sensing.
UbiComp 2017, HI, USA **Sept, 2017**
- [4] SurfaceVibe: Vibration-based Tap & Swipe Tracking on Ubiquitous Surface.
IPSN 2017, PA, USA **April, 2017**
- [3] Occupant Traffic Estimation through Structural Vibration Sensing.
SPIE 2016, NV, USA **March, 2016**
- [2] Indoor Person Identification through Footstep Induced Structural Vibration.
HotMobile 2015, NM, USA **Feb, 2015**
- [1] BOES: Building Occupancy Estimation System Using Sparse Ambient Vibration Monitoring.
SPIE 2014, CA, USA **March, 2014**

TEACHING
EXPERIENCE

EECS 283 Advanced Topics on Intelligent Systems, Merced, CA, USA **Spring/Fall, 2020**

Instructor

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, Pittsburgh, PA, USA Fall, 2013/2016/2017

Teaching Assistant

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 corresponding 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

Technical Program Committee

SenSys	2020-2021
SECON	2020-2021
ICDCS	2021
DCOSS	2020-2021
AAAI	2019-2021
IJCAI	2019-2021
IPSN'21	2021
EWSN PhD Forum	2021
BuildSys	2019-2020
ENSsys workshop (co-located with ACM SenSys)	2018-2020
Wi-DroIT'20	2020
BigCom'20	2020
ICCPS'20	2020
HotMobile'20	2020

ICII'19 2019
IEEE MASS'19 2019

Journal Reviewer

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 Internet of Things Journal 2019-2021
Pervasive and Mobile Computing 2018-2020
ACM Transactions on Sensor Networks 2018-2021
IEEE/ACM Transactions on Networking 2018-2020
ACM IMWUT, UbiComp 2017-2021
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 Committee Reviewer

Miao He (Tsinghua University) May, 2020

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

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

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]	November, 2020
<u>SECON 2020</u> Session 2: Sensing and AR	June, 2020
<u>HotMobile 2020</u> Session 2: Mobile Sensing and Analytics	March, 2020
<u>BuildSys 2019</u> Session II: Thermal Comfort	Nov, 2019

Conference Organizing Committee

Diversity Co-Chair: UbiComp/ISWC 2021
PhD Forum Chair: SenSys 2020
Student Travel Grant Chair: BuildSys 2020, MobiSys 2020
Publicity Chair: EWSN 2021, CHASE 2020, CPS-IoTWeek 2019-2020, SenSys 2018-2019, IPSN 2019
Social Media Chair: IPSN 2021, BuildSys 2019, SenSys 2016

N2Women Event

SenSys 2019 (mentor), New York, USA	November, 2019
SenSys 2018 (organizer), Shenzhen, China	November, 2018
SenSys 2012 (organizer), Toronto, Canada	November, 2012