



## Hae Young Noh

Professor of Civil and Environmental Engineering

### CONTACT INFORMATION

- **Alternate Contact**

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### Bio

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#### BIO

Hae Young Noh is a professor in the Department of Civil and Environmental Engineering. Her research introduced the new concept of “structures as sensors” to enable physical structures (e.g., buildings and vehicle frames) to be user- and environment-aware. In particular, these structures indirectly sense humans and surrounding environments through their structural responses (i.e., vibrations) by inferring the desired information (e.g., human behaviors, environmental conditions, heating and cooling system performance), instead of directly measuring the sensing targets with additional dedicated sensors (e.g., cameras, motion sensors). This concept brought a paradigm shift in how we view these structures and how the structures interact with us.

Traditionally, structures that we inhabit (such as buildings or vehicles) are considered as passive and unchanging objects that we need to monitor and control, utilizing a dense set of sensors to collect information. This has often been complicated by “noise” caused by the occupants and environments. For example, building vibrations induced by indoor and outdoor environmental and operational conditions (e.g., people walking around, traffic outside, heating system running, etc.), have been often seen as noise that needs to be removed in traditional building science and structural engineering; however, they are a rich source of information about structure, users, environment, and resources. Similarly, in vehicle engineering, researchers and engineers have been investigating control and dynamics to reduce vehicle vibration for safety and comfort. However, vibrations measured inside vehicles contain information about transportation infrastructure, vehicle itself, and driver.

Noh's work utilizes this “noise” to empower the structures with the ability to perceive and understand the information about users and surroundings using their own responses, and actively adopt and/or interact to enhance their sustainability and the occupants' quality of life. Since she utilizes the structure itself as a sensing medium, information collection involves a simpler set of hardware that can be easily maintained throughout the structural lifetime. However, the analysis of data to separate the desired information becomes more challenging. This challenge is addressed through high-rate dynamic sensing and multi-source inferencing. Ultimately, her work aims to allow structural systems to become general sensing platforms that are easier and more practical to deploy and maintain in a long-term.

At Stanford University, Noh received her PhD and MS degrees in the CEE department and her second MS degree in Electrical Engineering. Noh earned her BS in Mechanical and Aerospace Engineering at Cornell University.

## ACADEMIC APPOINTMENTS

- Professor, Civil and Environmental Engineering
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance

## HONORS AND AWARDS

- Best Paper Award, ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI) (2020)
- Best Student Paper Award, ASCE Engineering Mechanics Institute Dynamics Committee (ASCE EMI) (2020)
- Best Student Paper Award, ASCE Engineering Mechanics Institute Dynamics Committee (ASCE EMI) (2019)
- Best Demo Award, ACM Systems for Energy-Efficient Buildings, Cities, and Transportation (ACM BuildSys) (2019)
- Best Poster Award, IEEE/ACM Information Processing and Sensor Network (IPSN) (2019)
- Best Paper Award, IEEE International Conference on Machine Learning and Applications (ICMLA) (2018)
- Best Student Paper Award, ASCE Engineering Mechanics Institute Dynamics Committee (ASCE EMI) (2018)
- CIT Dean's Early Career Fellow, Carnegie Mellon University (2018)
- NSF CAREER Award, National Science Foundation (NSF) (2017)
- Google Faculty Research Award, Google (2017)
- People's Choice Paper Award, ACM Systems for Energy-Efficient Built Environments (ACM BuildSys) (2017)
- Best Poster Award & Best Poster Runner-Up, ACM Embedded Networked Sensor Systems (ACM SenSys) (2016)
- MobiSys 2016 Junior Faculty/Postdoc Grants, ACM Mobile Systems, Applications, and Services (ACM MobiSys) (2016)
- Best Poster Award, IEEE/ACM Information Processing and Sensor Network (IPSN) (2015)
- Google Faculty Research Award, Google (2014)
- Berkman Faculty Development Fund, Carnegie Mellon University (2013-2015)
- John A. Blume Fellowship, - (2010-2011)
- Samsung Scholarship Foundation Merit-Based Scholarship, Samsung Scholarship Foundation (2006-2010)
- American Society of Civil Engineers Essay Contest Award, American Society of Civil Engineers (2010)

## PROFESSIONAL EDUCATION

- PhD, Stanford University , Civil and Environmental Engineering (2011)
- MS, Stanford University , Electrical Engineering (2011)
- MS, Stanford University , Civil and Environmental Engineering (2008)
- BS, Cornell University , Mechanical and Aerospace Engineering (2005)

## LINKS

- Structures as Sensors Lab: <https://noh-lab.stanford.edu/>

## Teaching

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### COURSES

#### 2025-26

- Data Analytics for Physical Systems: CEE 154, CEE 254 (Win)
- Structural Monitoring: CEE 286 (Spr)

#### 2024-25

- Data Analytics for Physical Systems: CEE 154, CEE 254 (Aut)
- Structural Monitoring: CEE 286 (Win)

#### 2023-24

- Data Analytics for Physical Systems: CEE 154, CEE 254 (Aut)

#### 2022-23

- Data Analytics for Physical Systems: CEE 154, CEE 254 (Aut)
- Intro to Solid Mechanics: ENGR 14 (Spr)
- Structural Monitoring: CEE 286 (Win)

## STANFORD ADVISEES

### Postdoctoral Faculty Sponsor

Amelie Bonde

### Doctoral Dissertation Advisor (AC)

Jatin Aggarwal, Doyun Hwang, Yuyan Wu

### Master's Program Advisor

Jason Bernal Azamar, Angel Dong, Margaret Gereghty, Jack Kong, Xinyi Li, Travis Nitta, Seoyoung Oh, Sabrina Talghader

### Doctoral (Program)

Jatin Aggarwal, Doyun Hwang, Adem Taiyr, Yuyan Wu

## Publications

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### PUBLICATIONS

- **iLOCuS: Incentivizing Vehicle Mobility to Optimize Sensing Distribution in Crowd Sensing** *IEEE TRANSACTIONS ON MOBILE COMPUTING*  
Xu, S., Chen, X., Pi, X., Joe-Wong, C., Zhang, P., Noh, H.  
2020; 19 (8): 1831–47
- **Step-Level Occupant Detection across Different Structures through Footstep-Induced Floor Vibration Using Model Transfer** *JOURNAL OF ENGINEERING MECHANICS*  
Mirshekari, M., Fagert, J., Pan, S., Zhang, P., Noh, H.  
2020; 146 (3)
- **Diagnosis algorithms for indirect structural health monitoring of a bridge model via dimensionality reduction** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Liu, J., Chen, S., Berges, M., Bielak, J., Garrett, J. H., Kovacevic, J., Noh, H.  
2020; 136
- **Occupant localization using footstep-induced structural vibration** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Mirshekari, M., Pan, S., Fagert, J., Schooler, E. M., Zhang, P., Noh, H.  
2018; 112: 77–97
- **Characterizing human activity induced impulse and slip-pulse excitations through structural vibration** *JOURNAL OF SOUND AND VIBRATION*  
Pan, S., Mirshekari, M., Fagert, J., Ramirez, C., Chung, A., Hu, C., Shen, J., Zhang, P., Noh, H.  
2018; 414: 61–80
- **Track monitoring from the dynamic response of a passing train: A sparse approach** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Lederman, G., Chen, S., Garrett, J. H., Kovacevic, J., Noh, H., Bielak, J.  
2017; 90: 141–53

- **Physics-Informed Machine Learning for Inverse Design of Optical Metamaterials** *ADVANCED PHOTONICS RESEARCH*  
Sarkar, S., Ji, A., Jermain, Z., Lipton, R., Brongersma, M., Dayal, K., Noh, H.  
2023
- **Characterizing the variability of footstep-induced structural vibrations for open-world person identification** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Dong, Y., Fagert, J., Noh, H.  
2023; 204
- **TelecomTM: A Fine-Grained and Ubiquitous Traffic Monitoring System Using Pre-Existing Telecommunication Fiber-Optic Cables as Sensors** *PROCEEDINGS OF THE ACM ON INTERACTIVE MOBILE WEARABLE AND UBIQUITOUS TECHNOLOGIES-IMWUT*  
Liu, J., Yuan, S., Dong, Y., Biondi, B., Noh, H.  
2023; 7 (2)
- **IDIoT: Multimodal Framework for Ubiquitous Identification and Assignment of Human-carried Wearable Devices** *ACM TRANSACTIONS ON INTERNET OF THINGS*  
Bannis, A., Pan, S., Ruiz, C., Shen, J., Noh, H., Zhang, P.  
2023; 4 (2)
- **Turning Telecommunication Fiber-Optic Cables into Distributed Acoustic Sensors for Vibration-Based Bridge Health Monitoring** *STRUCTURAL CONTROL & HEALTH MONITORING*  
Liu, J., Yuan, S., Luo, B., Biondi, B., Noh, H.  
2023; 2023
- **A hierarchical semantic segmentation framework for computer vision-based bridge damage detection** *SMART STRUCTURES AND SYSTEMS*  
Liu, J., Wei, Y., Chen, B., Noh, H.  
2023; 31 (4): 325-334
- **Stranger Detection and Occupant Identification Using Structural Vibrations**  
Dong, Y., Fagert, J., Zhang, P., Noh, H.  
edited by Rizzo, P., Milazzo, A.  
SPRINGER-VERLAG SINGAPORE PTE LTD.2023: 905-914
- **The field of human building interaction for convergent research and innovation for intelligent built environments.** *Scientific reports*  
Becerik-Gerber, B., Lucas, G., Aryal, A., Awada, M., Berges, M., Billington, S., Boric-Lubecke, O., Ghahramani, A., Heydarian, A., Hoelscher, C., Jazizadeh, F., Khan, A., Langevin, et al  
2022; 12 (1): 22092
- **Seismic multi-hazard and impact estimation via causal inference from satellite imagery.** *Nature communications*  
Xu, S., Dimasaka, J., Wald, D. J., Noh, H. Y.  
2022; 13 (1): 7793
- **Ten questions concerning human-building interaction research for improving the quality of life** *BUILDING AND ENVIRONMENT*  
Becerik-Gerber, B., Lucas, G., Aryal, A., Awada, M., Berges, M., Billington, S. L., Boric-Lubecke, O., Ghahramani, A., Heydarian, A., Jazizadeh, F., Liu, R., Zhu, R., Marks, et al  
2022; 226
- **HierMUD: Hierarchical multi-task unsupervised domain adaptation between bridges for drive-by damage diagnosis** *STRUCTURAL HEALTH MONITORING-AN INTERNATIONAL JOURNAL*  
Liu, J., Xu, S., Berges, M., Noh, H.  
2022
- **Adaptive Hybrid Model-Enabled Sensing System (HMSS) for Mobile Fine-Grained Air Pollution Estimation** *IEEE TRANSACTIONS ON MOBILE COMPUTING*  
Chen, X., Xu, S., Liu, X., Xu, X., Noh, H., Zhang, L., Zhang, P.  
2022; 21 (6): 1927-1944
- **Recursive Sparse Representation for Identifying Multiple Concurrent Occupants Using Floor Vibration Sensing** *PROCEEDINGS OF THE ACM ON INTERACTIVE MOBILE WEARABLE AND UBIQUITOUS TECHNOLOGIES-IMWUT*  
Fagert, J., Mirshekari, M., Zhang, P., Noh, H.

2022; 6 (1)

- **Predicting peak stresses in microstructured materials using convolutional encoder-decoder learning** *MATHEMATICS AND MECHANICS OF SOLIDS*  
Shrivastava, A., Liu, J., Dayal, K., Noh, H.  
2022
- **Poster Abstract: SeatBeats Heart Rate Monitoring System using Structural Seat Vibrations**  
Codling, J. R., Cohen, L. F., Kalivarapu, V., Noh, H., Zhang, P., IEEE COMP SOC  
IEEE COMPUTER SOC.2022: 511-512
- **Re-Vibe: Vibration-based Indoor Person Re-Identification through Cross-Structure Optimal Transport**  
Dong, Y., Zhu, J., Noh, H., ACM  
ASSOC COMPUTING MACHINERY.2022: 348-352
- **Poster Abstract: Integration of Physics-Based Building Model and Sensor Data to Develop an Adaptive Digital Twin**  
Miao, B. H., Dong, Y., Wu, Z. Y., Alemdar, B. N., Zhang, P., Kohler, M. D., Noh, H., ACM  
ASSOC COMPUTING MACHINERY.2022: 282-283
- **A Neural-Based Bandit Approach to Mobile Crowdsourcing**  
Lin, S., Yao, Y., Zhang, P., Noh, H., Joe-Wong, C., ACM  
ASSOC COMPUTING MACHINERY.2022: 15-21
- **Editorial: Understanding Human-Infrastructure Interactions: Context-Aware Structures and Interfaces** *FRONTIERS IN BUILT ENVIRONMENT*  
Moreu, F., Noh, H., Zhang, P., Mascarenas, D.  
2021; 7
- **Obstruction-invariant occupant localization using footstep-induced structural vibrations** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Mirshekari, M., Fagert, J., Pan, S., Zhang, P., Noh, H.  
2021; 153
- **PhyMDAN: Physics-informed knowledge transfer between buildings for seismic damage diagnosis through adversarial learning** *MECHANICAL SYSTEMS AND SIGNAL PROCESSING*  
Xu, S., Noh, H.  
2021; 151
- **Structure- and Sampling-Adaptive Gait Balance Symmetry Estimation Using Footstep-Induced Structural Floor Vibrations** *JOURNAL OF ENGINEERING MECHANICS*  
Fagert, J., Mirshekari, M., Pan, S., Lowes, L., Iammarino, M., Zhang, P., Noh, H.  
2021; 147 (2)
- **PIWIMS: Physics Informed Warehouse Inventory Monitoring via Synthetic Data Generation**  
Falcao, J., Baweja, P., Wang, Y., Sangpetch, A., Noh, H., Sangpetch, O., Zhang, P., ASSOC COMP MACHINERY  
ASSOC COMPUTING MACHINERY.2021: 613-618
- **MassHog: Weight-Sensitive Occupant Monitoring for Pig Pens using Actuated Structural Vibrations**  
Codling, J. R., Bonde, A., Dong, Y., Cao, S., Sangpetch, A., Sangpetch, O., Noh, H., Zhang, P., ASSOC COMP MACHINERY  
ASSOC COMPUTING MACHINERY.2021: 600-605
- **An efficient Bayesian framework for updating PAGER loss estimates** *EARTHQUAKE SPECTRA*  
Noh, H., Jaiswal, K. S., Engler, D., Wald, D. J.  
2020; 36 (4): 1719–42
- **FAIM: Vision and Weight Sensing Fusion Framework for Autonomous Inventory Monitoring in Convenience Stores** *FRONTIERS IN BUILT ENVIRONMENT*  
Falcao, J., Ruiz, C., Pan, S., Noh, H., Zhang, P.  
2020; 6
- **Fine-Grained Activity of Daily Living (ADL) Recognition Through Heterogeneous Sensing Systems With Complementary Spatiotemporal Characteristics** *FRONTIERS IN BUILT ENVIRONMENT*

- Pan, S., Berges, M., Rodakowski, J., Zhang, P., Noh, H.  
2020; 6
- **PAS: Prediction-Based Actuation System for City-Scale Ridesharing Vehicular Mobile Crowdsensing** *IEEE INTERNET OF THINGS JOURNAL*  
Chen, X., Xu, S., Han, J., Fu, H., Pi, X., Joe-Wong, C., Li, Y., Zhang, L., Noh, H., Zhang, P.  
2020; 7 (5): 3719–34
  - **O-MedAL: Online active deep learning for medical image analysis** *WILEY INTERDISCIPLINARY REVIEWS-DATA MINING AND KNOWLEDGE DISCOVERY*  
Smailagic, A., Costa, P., Gaudio, A., Khandelwal, K., Mirshekari, M., Fagert, J., Walawalkar, D., Xu, S., Galdran, A., Zhang, P., Campilho, A., Noh, H.  
2020; 10 (4)
  - **OAC: Overlapping Office Activity Classification through IoT-Sensed Structural Vibration**  
Bonde, A., Pan, S., Mirshekari, M., Ruiz, C., Noh, H., Zhang, P., IEEE  
IEEE COMPUTER SOC.2020: 216–22
  - **A window-based sequence-to-one approach with dynamic voting for nurse care activity recognition using acceleration-based wearable sensor** *UbiComp-ISWC '20*  
Dong, Y., et al  
2020: 390–395
  - **Structural Property Guided Gait Parameter Estimation Using Footstep-Induced Floor Vibrations**  
Fagert, J., Mirshekari, M., Pan, S., Zhang, P., Noh, H.  
edited by Pakzad, S.  
SPRINGER INTERNATIONAL PUBLISHING AG.2020: 191–94
  - **Enhancing the Data Learning With Physical Knowledge in Fine-Grained Air Pollution Inference** *IEEE ACCESS*  
Ma, R., Liu, N., Xu, X., Wang, Y., Noh, H., Zhang, P., Zhang, L.  
2020; 8: 88372–84
  - **Demo Abstract: Active Structural Occupant Detector**  
Codling, J. R., Mirshekari, M., Noh, H., Zhang, P., IEEE  
IEEE.2020: 353–54
  - **Poster Abstract: Using Deep Learning to Classify The Acceleration Measurement Devices**  
Wu, Y., Ruiz, C., Pan, S., Noh, H., Hassan, M., Zhang, P., Hu, W., IEEE  
IEEE.2020: 351–52
  - **DAMAGE-SENSITIVE AND DOMAIN-INVARIANT FEATURE EXTRACTION FOR VEHICLE-VIBRATION-BASED BRIDGE HEALTH MONITORING**  
Liu, J., Chen, B., Chen, S., Berges, M., Bielak, J., Noh, H., IEEE  
IEEE.2020: 3007–11
  - **IDIoT: Towards Ubiquitous Identification of IoT Devices through Visual and Inertial Orientation Matching During Human Activity**  
Ruiz, C., Pan, S., Bannis, A., Chang, M., Noh, H., Zhang, P., IEEE  
IEEE COMPUTER SOC.2020: 40–52
  - **Structures as Sensors: Indirect Sensing for Inferring Users and Environments** *COMPUTER*  
Zhang, P., Pan, S., Mirshekari, M., Fagert, J., Noh, H.  
2019; 52 (10): 84–88
  - **Dynamic responses, GPS positions and environmental conditions of two light rail vehicles in Pittsburgh** *SCIENTIFIC DATA*  
Liu, J., Chen, S., Lederman, G., Kramer, D. B., Noh, H., Bielak, J., Garrett, J. H., Kovacevic, J., Berges, M.  
2019; 6: 146
  - **Empirical investigation of regression models for predicting system behavior in air handling units** *SCIENCE AND TECHNOLOGY FOR THE BUILT ENVIRONMENT*  
Velibeyoglu, I., Noh, H., Pozzi, M.  
2019; 25 (3): 247–60
  - **A graphical approach to assess the detectability of multiple simultaneous faults in air handling units** *ENERGY AND BUILDINGS*

Velibeyoglu, I., Noh, H., Pozzi, M.  
2019; 184: 275–88

- **Characterizing Structural Changes to Estimate Walking Gait Balance**  
Fagert, J., Mirshekari, M., Pan, S., Zhang, P., Noh, H.  
edited by Pakzad, S.  
SPRINGER INTERNATIONAL PUBLISHING AG.2019: 333–35
- **Fine-Grained Recognition of Activities of Daily Living through Structural Vibration and Electrical Sensing**  
Pan, S., Berges, M., Rodakowski, J., Zhang, P., Noh, H.  
edited by Zhang, M.  
ASSOC COMPUTING MACHINERY.2019: 149–58
- **AIM3S: Autonomous Inventory Monitoring through Multi-Modal Sensing for Cashier-Less Convenience Stores**  
Ruiz, C., Falcao, J., Pan, S., Noh, H., Zhang, P.  
edited by Zhang, M.  
ASSOC COMPUTING MACHINERY.2019: 135–44
- **Area Occupancy Counting Through Sparse Structural Vibration Sensing** *IEEE PERVASIVE COMPUTING*  
Pan, S., Mirshekari, M., Fagert, J., Ruiz, C., Noh, H., Zhang, P.  
2019; 18 (1): 28–37
- **Gait Health Monitoring Through Footstep-Induced Floor Vibrations**  
Fagert, J., Mirshekari, M., Pan, S., Zhang, P., Noh, H., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 319–20
- **Vehicle Dispatching for Sensing Coverage Optimization in Mobile Crowdsensing Systems**  
Xu, S., Chen, X., Pi, X., Joe-Wong, C., Zhang, P., Noh, H., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 311–12
- **Secure Pairing via Video and IMU Verification**  
Ruiz, C., Pan, S., Noh, H., Zhang, P., Han, J., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 333–34
- **Deskbuddy: an Office Activity Detection System**  
Bonde, A., Pan, S., Noh, H., Zhang, P., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 352–53
- **Incentivizing Large-scale Vehicular Crowdsensing System For Smart City Applications**  
Xu, S., Chen, X., Pi, X., Joe-Wong, C., Zhang, P., Noh, H.  
edited by Lynch, J. P., Huang, H., Sohn, H., Wang, K. W.  
SPIE-INT SOC OPTICAL ENGINEERING.2019
- **A Deep Autoencoder Model for Pollution Map Recovery with Mobile Sensing Networks**  
Ma, R., Liu, N., Xu, X., Wang, Y., Noh, H., Zhang, P., Zhang, L., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 577–83
- **Device-free Multiple People Localization through Floor Vibration**  
Shi, L., Mirshekari, M., Fagert, J., Chi, Y., Noh, H., Zhang, P., Pan, S., ACM  
ASSOC COMPUTING MACHINERY.2019: 57–61
- **Device-free Sleep Stage Recognition through Bed Frame Vibration Sensing**  
Hu, Z., Sezgin, E., Lin, S., Zhang, P., Noh, H., Pan, S., ACM  
ASSOC COMPUTING MACHINERY.2019: 39–43
- **A Signal Quality Assessment Metrics for Vibration-based Human Sensing Data Acquisition**  
Zhang, Y., Zhang, L., Noh, H., Zhang, P., Pan, S., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 29–33
- **WhereWear: Calibration-free Wearable Device Identification through Ambient Sensing**

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- Ruiz, C., Pan, S., Noh, H., Zhang, P., *Assoc Comp Machinery*  
ASSOC COMPUTING MACHINERY.2019: 29–34
- **P-Loc: A Device-free Indoor Localization System Utilizing Building Power-line Network**  
Zhou, T., Zhang, Y., Chen, X., Mosalam, K. M., Noh, H., Zhang, P., Zhang, L., *ACM*  
ASSOC COMPUTING MACHINERY.2019: 611–15
  - **Demo Abstract: Autonomous Inventory Monitoring through Multi-Modal Sensing (AIM3S) for Cashier-Less Stores**  
Ruiz, C., Falcao, J., Pan, S., Noh, H., Zhang, P.  
edited by Zhang, M.  
ASSOC COMPUTING MACHINERY.2019: 395–96
  - **Fine-Grained Recognition of Activities of Daily Living through Structural Vibration and Electrical Sensing**  
Pan, S., Berges, M., Rodakowski, J., Zhang, P., Noh, H.  
edited by Zhang, M.  
ASSOC COMPUTING MACHINERY.2019: 149–58
  - **AIM3S: Autonomous Inventory Monitoring through Multi-Modal Sensing for Cashier-Less Convenience Stores**  
Ruiz, C., Falcao, J., Pan, S., Noh, H., Zhang, P.  
edited by Zhang, M.  
ASSOC COMPUTING MACHINERY.2019: 135–44
  - **Smart Home Occupant Identification via Sensor Fusion Across On-Object Devices** *ACM TRANSACTIONS ON SENSOR NETWORKS*  
Han, J., Pan, S., Sinha, M., Noh, H., Zhang, P., Tague, P.  
2018; 14 (3-4)
  - **Conductive Thread-Based Textile Sensor for Continuous Perspiration Level Monitoring** *SENSORS*  
Jia, J., Xu, C., Pan, S., Xia, S., Wei, P., Noh, H., Zhang, P., Jiang, X.  
2018; 18 (11)
  - **Robust Building Energy Load Forecasting Using Physically-Based Kernel Models** *ENERGIES*  
Prakash, A., Xu, S., Rajagopal, R., Noh, H.  
2018; 11 (4)
  - **MyoVibe: Enabling Inertial Sensor-Based Muscle Activation Detection In High-Mobility Exercise Environments** *ACM TRANSACTIONS ON SENSOR NETWORKS*  
Mokaya, F., Noh, H., Lucas, R., Zhang, P.  
2018; 14 (1)
  - **Occupant-Induced Office Floor Vibration Dataset for Activity Level Monitoring**  
Zhang, Y., Pan, S., Fagert, J., Mirshekari, M., Noh, H., Zhang, P., Zhang, L., *ACM*  
ASSOC COMPUTING MACHINERY.2018: 5–6
  - **Do You Peel What I Hear? Enabling Autonomous IoT Device Pairing using Different Sensor Types**  
Han, J., Chung, A., Sinha, M., Harishankar, M., Pan, S., Noh, H., Zhang, P., Tague, P., *IEEE*  
IEEE.2018: 836–52
  - **Demo Abstract: PosePair: Pairing IoT Devices Through Visual Human Pose Analysis**  
Ruiz, C., Pan, S., Sadde, A., Noh, H., Zhang, P., *IEEE*  
IEEE.2018: 144–45
  - **VVRRM: Vehicular Vibration-based Heart RR-Interval Monitoring System**  
Bonde, A., Pan, S., Jia, Z., Zhang, Y., Noh, H., Zhang, P., *Assoc Comp Machinery*  
ASSOC COMPUTING MACHINERY.2018: 37–42
  - **UniverSense: IoT Device Pairing through Heterogeneous Sensing Signals**  
Pan, S., Ruiz, C., Han, J., Bannis, A., Tague, P., Noh, H., Zhang, P., *Assoc Comp Machinery*  
ASSOC COMPUTING MACHINERY.2018: 55–60
  - **MedAL: Accurate and Robust Deep Active Learning for Medical Image Analysis**

- Smailagic, A., Costa, P., Noh, H., Walawalkar, D., Khandelwal, K., Galdran, A., Mirshekari, M., Fagert, J., Xu, S., Zhang, P., Campilho, A.  
edited by Wani, M. A., Kantardzic, M., Sayedmouchaweh, M., Gama, J., Lughofer, E.  
IEEE.2018: 481–88
- **Guiding the Data Learning Process with Physical Model in Air Pollution Inference**  
Ma, R., Xu, X., Wang, Y., Noh, H., Zhang, P., Zhang, L.  
edited by Abe, N., Liu, H., Pu, C., Hu, Ahmed, N., Qiao, M., Song, Y., Kossmann, D., Liu, B., Lee, K., Tang, J., He, J., Saltz, J.  
IEEE.2018: 4475–83
  - **Human Gait Monitoring Using Footstep-Induced Floor Vibrations Across Different Structures**  
Mirshekari, M., Fagert, J., Bonde, A., Zhang, P., Noh, H., ACM  
ASSOC COMPUTING MACHINERY.2018: 1382–91
  - **Occupant Activity Level Estimation Using Floor Vibration**  
Zhang, Y., Pan, S., Fagert, J., Mirshekari, M., Noh, H., Zhang, P., Zhang, L., ACM  
ASSOC COMPUTING MACHINERY.2018: 1355–63
  - **Moisture Based Perspiration Level Estimation**  
Jia, J., Xu, C., Pan, S., Xia, S., Wei, P., Noh, H., Zhang, P., Jiang, X., ACM  
ASSOC COMPUTING MACHINERY.2018: 1301–8
  - **PGA: Physics Guided and Adaptive Approach for Mobile Fine-Grained Air Pollution Estimation**  
Chen, X., Xu, X., Liu, X., Pan, S., He, J., Noh, H., Zhang, L., Zhang, P., ACM  
ASSOC COMPUTING MACHINERY.2018: 1321–30
  - **Poster Abstract: Generative Model Based Fine-Grained Air Pollution Inference for Mobile Sensing Systems**  
Ma, R., Xu, X., Noh, H., Zhang, P., Zhang, L., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2018: 426–27
  - **Demo Abstract: Vibration-Based Occupant Activity Level Monitoring System**  
Zhang, Y., Pan, S., Fagert, J., Mirshekari, M., Noh, H., Zhang, P., Zhang, L., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2018: 349–50
  - **Poster Abstract: Robust Detection of Motor-Produced Audio Signals**  
Bannis, A., Noh, H., Zhang, P., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2018: 412–13
  - **Structural Vibration Sensing to Evaluate Animal Activity on a Pig Farm**  
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