

Jingxiao Liu

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RESEARCH AREAS	<ul style="list-style-type: none">• Structural Health Monitoring Using Vehicle Vibration Responses• Urban Monitoring Using Telecommunication Cables as Distributed Acoustic Sensors• Fiber-optic Sensing for Urban Monitoring• Physics-guided Machine learning• Dynamics of Vehicle-structure Interaction Systems	
EDUCATION	Stanford University , Stanford, California, USA Ph.D. in Civil & Environmental Engineering, Structural Engineering • Cumulative GPA: 4.0 / 4.0 • Advisor: Prof. Hae Young Noh • Committee members: Prof. Hae Young Noh, Prof. Mario Bergés, Prof. Biondo Biondi and Prof. Anne Kiremidjian • Thesis title: Accurate and Scalable Bridge Health Monitoring Using Drive-by Vehicle Vibrations Jan 2020 – Present	
	Ph.D. Minor in Electrical Engineering, • Cumulative GPA: 4.0 / 4.0 Jan 2020 – Mar 2022	
	Carnegie Mellon University , Pittsburgh, Pennsylvania, USA (Transfer out) Ph.D. in Civil & Environmental Engineering, Advanced Infrastructure System • Advisors: Professor Hae Young Noh and Professor Mario Bergés Jan 2018 – Dec 2019	
	Master of Science in Civil Engineering • Cumulative GPA: 3.9 / 4.0 Sep 2016 – Dec 2017	
	Central South University , Changsha, China Bachelor of Engineering in Civil Engineering • Cumulative GPA: 89.6 / 100.0 Sep 2012 – Jun 2016	
APPOINTMENTS	Graduate Research Assistant , Dept. of Civil and Envir. Engineering Stanford University, Stanford, CA, USA Jan 2020 – Present	
	Research Intern - IoT system, data science, fiber-optic sensing , PARC, a Xerox company, Palo Alto, CA, USA Jun 2021 – Sep 2021	
	Data Analyst , Eloque, Remote Joint with the research intern role at PARC, a Xerox company. Jun 2021 – Sep 2021	
	Graduate Research Assistant , Dept. of Civil and Envir. Engineering Carnegie Mellon University, Pittsburgh, PA, USA Jan 2018 – Dec 2019	
	Summer Research Intern , Dept. of Civil and Envir. Engineering Carnegie Mellon University, Pittsburgh, PA, USA Jun 2017 – Sep 2017	
ACADEMIC HONORS & AWARDS	Student Paper Competition, the First-Place Award , Structural Health Monitoring and Control Committee, ASCE Engineering Mechanics Institute 2022	
	Student Paper Competition, the Third-Place Award , Structural Health Monitoring and Control Committee, ASCE Engineering Mechanics Institute 2021	

Best Journal Paper Award Runner-Up, ASME SHM/NDE Committee	2021
Best Presentation Runner-Up Award, BuildSys/SenSys Joint PhD Forum, ACM BuildSys/Sensys Conference	2020
Best Student Paper Award, Second Nurse Care Activity Recognition Challenge, ACM International Joint Conference on Pervasive and Ubiquitous Computing	2020
Leavell Fellowship on Sustainable Built Environment, (support 2-year PhD study) Dept. of Civil and Envir. Engineering, Stanford University	2020
Dean's Fellowship, (support 1-year PhD study) College of Engineering, Carnegie Mellon University	2018
Fenves Travel Grant for Attending IWSHM Conference in Stanford, CA Carnegie Mellon University	2019
Fenves Travel Grant for Attending SPIE Conference in Denver, CO Carnegie Mellon University	2019
Valedictorian of Dept. of Civil and Envir. Engineering, Central South University	2016
Outstanding Undergraduate Thesis, Central South University	2016
Mao Yi-sheng Science and Technology Award - Star of Hope, Mao Yi-sheng Science and Technology Education Foundation	2015

**RESEARCH &
PROFESSIONAL
EXPERIENCES**

Stanford University, Stanford, California, USA & Carnegie Mellon University, Pittsburgh, Pennsylvania, USA	
<i>Vehicle-vibration-based structural health monitoring</i>	Jun 2017 – present
Research Advisor: Professor Hae Young Noh & Professor Mario Bergés	
Lead student researcher	
<ul style="list-style-type: none"> • Introduced signal processing and machine learning approaches to determine structural changes of bridges and railroad tracks using vehicle vibration responses. • Developed a structural health monitoring framework to help monitor railroad tracks of a 42.2-km light rail network in Pittsburgh. • Collected and published a comprehensive dataset from light rail vehicles, which is the first open-access dataset for vehicle-vibration-based structural health monitoring. • Demonstrated the feasibility of the vehicle-vibration-based monitoring approach through numerical simulations, lab-scale and full-scale experiments. 	
<i>Urban system monitoring using combined vehicle on-board sensing (VOS) and roadside distributed acoustic sensing (DAS)</i>	Jun 2020 – present
Research Advisor: Professor Hae Young Noh & Professor Biondo Biondi	
Lead student researcher	
<ul style="list-style-type: none"> • Explored the value of combined VOS and DAS to achieve a cost-effective urban infrastructure monitoring. • Achieved car position and speed estimation, underground fiber localization, and traffic-induced surface wave characterization using combined VOS and DAS. • Demonstrated the capability of using DAS for bridge health monitoring with low cost and low maintenance. 	
PARC, a Xerox Company, Palo Alto, California, USA	
Data Science, IoT system, Fiber-optic sensing	Jun 2021 – Sep 2021
Research Intern	
<ul style="list-style-type: none"> • Contributed to a systematic algorithm and hardware development of a fiber-optic sensing system for civil infrastructure monitoring. The system is successfully deployed in Melbourne, Australia for superload monitoring with Department of Transportation. • Developed signal processing, statistical, and computer vision algorithms for utilizing and validating Fiber Bragg Grating sensors in bridge monitoring and traffic characterization applications. 	

Visiting student researcher

- Developed a traffic characteristic model by analyzing Weigh-in-Motion data to classify vehicles based on the physical nature of the traffic configurations.
- Received an award for the excellent student thesis.

PUBLICATIONS **JOURNAL AND PEER-REVIEWED CONFERENCE PAPERS**

Jingxiao Liu, Susu Xu, Mario Bergés, Hae Young Noh, “HierMUD: Hierarchical Multi-task Unsupervised Domain Adaptation between Bridges for Drive-by Damage Diagnosis,” *Structural health monitoring*, *In press*.

Jingxiao Liu, Siheng Chen, Mario Bergés, Jacobo Bielak, James H Garrett, Jelena Kovačević, Hae Young Noh, “Diagnosis algorithms for indirect structural health monitoring of a bridge model via dimensionality reduction,” *Mechanical Systems and Signal Processing* 136 (2020): 106454.

Jingxiao Liu, Siheng Chen, George Lederman, David B Kramer, Hae Young Noh, Jacobo Bielak, James H Garrett, Jelena Kovačević, Mario Bergés, “Dynamic responses, GPS positions and environmental conditions of two light rail vehicles in Pittsburgh,” *Scientific data*, 6(1) (2019), pp.1-11.

Jingxiao Liu, Bingqing Chen, Siheng Chen, Mario Bergés, Jacobo Bielak, HaeYoung Noh, “Damage-sensitive and domain-invariant feature extraction for vehicle-vibration-based bridge health monitoring,” *Accepted in 45th International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2020*

Bingqing Chen, Jingxiao Liu, Henning Lange, Mario Bergés, “Dyna-BOLT: Domain adaptative binary factorization of current waveforms for energy disaggregation,” *Accepted in 45th International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2020*

Ankit Shrivastava, Jingxiao Liu, Kaushik, Dayal, Hae Young Noh, “Predicting peak stresses in microstructured materials using convolutional encoder-decoder learning,” *Mathematics and Mechanics of Solids*, (2020), 10812865211055504.

OTHER CONFERENCE PAPERS

Jingxiao Liu, “Scalable bridge health monitoring using drive-by vehicles,” *Accepted in Proceedings of the 18th Conference on Embedded Networked Sensor Systems, Sensys 2020*

Jingxiao Liu, Susu Xu, Mario Bergés, Jacobo Bielak, James H. Garrett, HaeYoung Noh, “An Expectation-maximization Algorithm-based Framework for Vehicle-vibration-based Indirect Structural Health Monitoring of Bridges,” *International Workshop on Structural Health Monitoring, IWSHM 2019*.

Jingxiao Liu, Mario Bergés, Jacobo Bielak, James H Garrett, Jelena Kovačević, Hae Young Noh, “A damage localization and quantification algorithm for indirect structural health monitoring of bridges using multi-task learning,” *In AIP Conference Proceedings (Vol. 2102, No. 1, p. 090003). AIP Publishing LLC. QNDE 2018*

Jingxiao Liu, Yujie Wei, Mario Bergés, Jacobo Bielak, James H Garrett Jr, HaeYoung Noh, “Detecting anomalies in longitudinal elevation of track geometry using train dynamic responses via a variational autoencoder,” *Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2019*

Siyuan Yuan, Jingxiao Liu, Hae Young Noh, Biondo Biondi “Urban system monitoring using combined vehicle onboard sensing and roadside distributed acoustic sensing,” *In First International Meeting for Applied Geoscience & Energy*, pp. 3235-3239. *Society of Exploration Geophysicists*, 2021.

Yiwen Dong, Joanna Jiaqi Zou, Jingxiao Liu, Jonathon Fagert, Mostafa Mirshekari, Linda Lowes, Megan Iammarino, Pei Zhang, and Hae Young Noh, “MD-Vibe: physics-informed analysis of patient-induced structural vibration data for monitoring gait health in individuals with muscular dystrophy.” In *Adjunct Proceedings of the 2020 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2020 ACM International Symposium on Wearable Computers, UbiComp-ISWC '20*.

Yiwen Dong, Jingxiao Liu, Yitao Gao, Sulagna Sarkar, Zhizhang Hu, Jonathon Fagert, Shijia Pan, Pei Zhang, Hae Young Noh, and Mostafa Mirshekari, “A window-based sequence-to-one approach with dynamic voting for nurse care activity recognition using acceleration-based wearable sensor.” In *Adjunct Proceedings of the 2020 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2020 ACM International Symposium on Wearable Computers, UbiComp-ISWC '20*.

POSTERS AND EXTENDED ABSTRACTS

Jingxiao Liu, Siheng Chen, Mario Bergés, Jacobo Bielak, James H Garrett, Jelena Kovačević, Hae Young Noh, “A Damage Localization and Quantification Algorithm for Indirect Structural Health Monitoring of Bridges Using Multi-Task Learning,” in *Machine Learning in Science and Engineering, Pittsburgh, PA, 2018*.

Jingxiao Liu, Mario Bergés, Jacobo Bielak, James H Garrett, Jelena Kovačević, Hae Young Noh, “Poster Presentation: Damage Diagnosis Algorithms for Indirect Structural Health Monitoring of Bridges,” in *PIANC-SMART Rivers Conference, Pittsburgh, PA, 2017*.

OPEN-ACCESS DATASET

Jingxiao Liu, Siheng Chen, George Lederman, David B Kramer, Hae Young Noh, Jacobo Bielak, James H Garrett, Jelena Kovačević, Mario Bergés, “The DR-Train dataset: dynamic responses, GPS positions and environmental conditions of two light rail vehicles in Pittsburgh,” *Zenodo 2020*, <https://doi.org/10.5281/zenodo.1432702>

Xinlei Chen, Xinyu Liu, Kent X. Eng, Jingxiao Liu, Hae Young Noh, Lin Zhang, Pei Zhang, “The S&M-HSTPM2d5 dataset: High Spatial-Temporal Resolution PM 2.5 Measures in Multiple Cities Sensed by Static & Mobile Devices,” *Zenodo 2020*, <http://doi.org/10.5281/zenodo.4028130>

PRESENTATIONS AND TALKS

INVITED TALKS

Research Seminar May 2022
Title: “Turning Telecommunication Fiber-cables into Distributed Acoustic Sensors for Vibration-based Bridge Health Monitoring”
Dept. of Geophysics, Stanford University

Research Seminar March 2022
Title: “Accurate and Scalable Bridge Health Monitoring Using Drive-by Vehicle Vibrations”
Dept. of Civil and Envir. Engineering, Carnegie Mellon University

Research Seminar Summer 2021
Title: “Scalable Bridge Health Monitoring Using Drive-by Vehicles”
Eloque & PARC, a Xerox company

Research Seminar Summer 2019
Title: “Diagnosis algorithms for indirect structural health monitoring of a bridge model via dimensionality reduction”
Dept. of Civil and Envir. Engineering, Chongqing University, China

PRESENTATIONS

J. Liu and H. Noh, “Scalable Bridge Health Monitoring Using Drive-by Vehicles,” in *BuildSys/SenSys Doctoral Colloquium, 2020*.

**TEACHING
EXPERIENCES**

Stanford University, Stanford, CA, USA

Head Teaching Assistant

Sep 2020 – Dec 2020

Course Title: Data Analytics for Physical Systems (CEE154/254)

Teaching Faculty: Professor Haeyoung Noh

- Helped design homework and project.
- Held MATLAB tutorial lecture.
- Held weekly office hours to help students develop a better understanding of the course materials.

Carnegie Mellon University, Pittsburgh, PA, USA

Teaching Assistant

Jan 2018 – May 2018, Jan 2019 – May 2019

Course Title: Building information modeling (BIM) for Engineering, Construction and Facility Management (12-711)

Teaching Faculty: Professor Xuesong Liu

- Ran 2-4 labs to assist students to build BIM models and explore contemporary BIM topics.
- Held weekly office hours to help students develop a better understanding of the state-of-the-art BIM-based software systems that are being used during design and construction.

**STUDENTS
MENTORED**

Aaron Appelle

2020

Civil and Environmental Engineering Graduate Students, Stanford

Mentoring Description: Aaron has been doing research with us in the Winter of 2020. He was working on our project for monitoring a light rail bridge using vehicle vibration sensing. I met with him on a bi-weekly basis and tracked his progress. We successfully validated our dimensionality reduction approach for drive-by bridge health monitoring on a field experimental dataset.

Kent Eng

2021

Civil and Environmental Engineering Graduate Students, Stanford

Mentoring Description:

Yiwen Dong, and Joanna Zou

2020

Civil and Environmental Engineering Graduate Students, Stanford

Mentoring Description: Yiwen, and Joanna were involved in our gait health monitoring research in the Spring of 2020. Their work was focused on detection and tracking of Muscular Dystrophy using footstep-induced vibration sensing. We met weekly to discuss their approach for analyzing data collected from Muscular Dystrophy patients as part of our collaboration with Nationwide Children's Hospital. Their work resulted in publication of a paper in the "Combining Physical and Data-Driven Knowledge in Ubiquitous Computing (CPD) Ubicomp 2020 Workshop".

SERVICES

Engineering Mechanics Institute Conference. 2022

Session Chair

ACM IPSN, 2022

Student Volunteer, session zoom chair

Frontiers in Big Data

Reviewer

IEEE ICASSP, 2022

Reviewer

ACM Sensys, Data: Acquisition to Analysis workshop, 2021

Artifact Evaluation Committee

UbiComp, CML-IOT workshop, 2020

Session Chair

Mechanical Systems and Signal Processing, Elsevier

Reviewer

Structural Control & Health Monitoring, Wiley

Reviewer

Canadian Journal of Civil Engineering

Reviewer

Measurement, Elsevier

Reviewer

**PROFESSIONAL
AFFILIATIONS**

Institute of Electrical and Electronics Engineers (IEEE)

Student Member

American Society of Civil Engineers (ASCE)

Student Member

Society of Photographic Instrumentation Engineers (SPIE)

Student Member

SKILLS

COMPUTER LANGUAGES

Python, L^AT_EX, HTML, C++, SQL

APPLICATION SOFTWARE

MATLAB, LabVIEW, ANSYS, MySQL, AutoCAD, Revit, MIDAS, RStudio