

JIN YAN

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EDUCATION

Ph.D., Iowa State University 2017 - 2020

- School of Civil, Construction and Environmental Engineering, Intelligent Infrastructure Specialization.
- Dissertation: Integrated Smart Sensor Networks with Adaptive Real-Time Modeling Capabilities
- Advisor: Professor Simon Laflamme

M.Sc., Georgia Institute of Technology 2016

- School of Civil Engineering and Environmental Engineering, Structures Specialization.
- Advisor: Professor Yang Wang

B.Sc., Central South University 2015

- Department of Civil Engineering, Structural Engineering Specialization.

RESEARCH INTERESTS

Intelligent Infrastructure; Structural Health Monitoring (SHM); Structural Dynamics; Experimental Mechanics; Multifunctional Materials; Smart Sensor Technology; Smart Materials and Structures

PROFESSIONAL EXPERIENCE

Work Experience

Data Scientist/Structural Analysis Engineer, Palo Alto Research Center, Palo Alto, CA 2020 - Present

- Developing Structural Health Monitoring product uses fiber optic sensors to collect and return real-time information about structural health, providing asset owners or operators with a wealth of knowledge to proactively assess asset condition, manage maintenance and optimize operations.
- IoT system architecture design and implementation for large scale data stream.
- Hardware and sensor configuration design for traffic and bridge monitoring.

Research Experience

Research Assistant, Iowa State University, Ames, IA 2017 - 2020

- Conducting research in the field of Structural Health Monitoring:
 - *Real-Time Structural Health Monitoring*: Developed online parameter estimation algorithm for high-rate dynamic systems under uncertainties using adaptive control and time-frequency analysis; developed damage identification methods by adapting sensor measurements for probability of detection.
 - *Smart Sensing Technologies*: Developed, prototyped, and characterized a multifunctional CFRP sensor for both strengthening and monitoring large-scale structure; improved applicability of a smart sensing skin for strain sensing.
 - *Resilient Infrastructure*: Conducted condition-based long-term monitoring using data-driven approaches.

Research Assistant, Georgia Institute of Technology, Atlanta, GA 2016

- Experimental modal testing of a highway bridge for finite element model updating and structural identification.

Mentorship Experience

Research Assistant, Iowa State University, Ames, IA 2017 - 2020

- Mentored twelve undergraduate students from Departments of Civil Eng., Mechanical Eng., and Industrial Eng. on sensor noise characterization, CFRP sensor development, computer vision, and sensing skin optimization, resulted in one journal which I am the senior author.
- Mentoring two master students in Civil Eng. on prototyping a new sensing skin and reliability analysis.
- Mentored three Ph.D. students in Civil Eng. on experimental design and instrumentation of alkali-silica reaction investigation, prototyping new structural sensors, and real-time machine learning.

Research Assistant, Georgia Institute of Technology, Atlanta, GA 2016

- Mentored three undergraduate students on structural modeling.

Teaching Experience

Teaching Assistant, Iowa State University, Ames, IA 2019

- CEE 332: Structural Analysis (undergraduate course with 74 students), Professor An Chen.

INVENTION AND PATENTS

[2] System and Methods for Extracting Vehicle Attributes using Fiber Optics Sensors Embedded in Pavement, 2021 (Co-Inventor, Invention locked for approval)

[1] The system configuration and installation procedure of an FBG-based FO sensing system for multi-parameter, 2021 (Co-Inventor, Invention locked for approval)

PUBLICATIONS

See my google scholar profile.

Journals

[12] Chuanzhi Dong, Liangding Li, **Jin Yan**, Zhiming Zhang and Hong Pan.

“Pixel-level Fatigue Crack Segmentation in Large-scale Images of Steel Structures Using an Encoder-decoder”

Sensors 21, no. 12 (2021): 4135.

[11] Zhiming Zhang, **Jin Yan**, Liangding Li, Hong Pan, Chuanzhi Dong.

“Condition Assessment of Stay Cables through Enhanced Time Series Classification Using a Deep Learning Approach”

Under revision at Journal of Smart Structures and Systems.

[10] **Jin Yan**, Simon Laflamme, Jonathan Hong, Jacob Dodson.

“Online Parameter Estimation under Non-Persistent Excitations for High-Rate Dynamic Systems.”

Mechanical Systems and Signal Processing, Volume 161, 107960. 2021.

[9] Qiwu Yan, Zheng Zhang, **Jin Yan**, Simon Laflamme.

“Analysis of Flexural Capacity of A Novel Straight-Side U-Shaped Steel-Encased Concrete Composite Beam.”

Engineering Structures 242, 112447.

[8] **Jin Yan**, Premjeet Singh, Simon Laflamme, Ayan Sadhu, Jonathan Hong, Jacob Dodson.

“A Comparison of Time-Frequency Methods for Real-Time Application to High-Rate Dynamic Systems.”

Vibration 3 (3), 204-216. 2020.

[7] Han Liu, Matthias Kolloche, **Jin Yan**, Eric Zellner, Sarah Bentil, Iris Rivero, Colin Wiersema, Simon Laflamme

“Numerical Investigation of Auxetic Textured SoftStrain Gauge for Monitoring Animal Skin”

Sensors 2020, 20(15), 4185.

- [6] Han Liu, **Jin Yan**(‡), Simon Laflamme, Matthias Kollosche.
“Surface textures for stretchable capacitive strain sensors.”
Smart Materials and Structures. 2020.
- [5] **Jin Yan**, Simon Laflamme, Leifur Leifsson.
“Computational Framework for Dense Sensor Network Evaluation Based on Model Assisted Probability of Detection.”
Materials Evaluation Volume 78, Issue 5, pgs. 573 - 583.
- [4] **Jin Yan**, Austin Downey, An Chen, Simon Laflamme, Sammy Hassan.
“Capacitance-Based Sensor with Layered Carbon-Fiber Reinforced Polymer and Titania-Filled Epoxy.”
Composite Structures, Volume 227, Page 111247. 2019.
- [3] **Jin Yan**, Austin Downey, Alessandro Cancelli, Simon Laflamme, An Chen, Jian Li, Filippo Ubertini.
“Concrete Crack Detection and Monitoring Using a Capacitive Dense Sensor Array.”
MDPI: Sensors, Volume 19, Issue 8, Page 1843. 2019.
- [2] Austin RJ Downey, **Jin Yan**, Eric M Zellner, Karl H Kraus, Iris V Rivero, Simon Laflamme.
“Use of flexible sensor to characterize biomechanics of canine skin.”
BioMed Central: BMC veterinary research, Volume 15, Issue 1, Page 40. 2019.
- [1] Mohammadkazem Sadoughi, Austin Downey, **Jin Yan**, Chao Hu, Simon Laflamme.
“Reconstruction of unidirectional strain maps via iterative signal fusion for mesoscale structures monitored by a sensing skin.”
Mechanical Systems and Signal Processing, Volume 112, Pages 401-416. 2019.

Conference Proceedings

- [9] Hong Pan, **Jin Yan**, Liangding Li, Chuanzhi Dong, Zhiming Zhang.
“A Human Vision-Based Interactive Time-Series Anomaly Classification Framework for Cable-Stayed Bridge”
The 1st International Project Competition for Structural Health Monitoring IPC-SHM, 2020
- [8] **Jin Yan**, Simon Laflamme, An Chen, Austin Downey, Xiaosong Du, Leifur Leifsson, and Chao Hu.
“Surface Sensing-Based Technique for Nondestructive Evaluation.” 46th Annual Review of Progress in Quantitative Nondestructive Evaluation QNDE2019. [Extended Abstract]
- [7] **Jin Yan**, Austin Downey, Alessandro Cancelli, Simon Laflamme, An Chen.
“Detection and Monitoring of Cracks in Reinforced Concrete Using an Elastic Sensing Skin.”
Structures Congress 2019: Bridges, Nonbuilding and Special Structures, and Nonstructural Components, Pages 78-87, 2019. [Peer-reviewed]
- [6] **Jin Yan**, Xiaosong Du, Simon Laflamme, Leifur Leifsson, Chao Hu, An Chen.
“Model-assisted validation of a strain-based dense sensor network.”
Proceedings Volume 10970, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2019.
- [5] Xiaosong Du, **Jin Yan**, Simon Laflamme, Leifur Leifsson, Yonatan Tesfahunegn, Slawomir Koziel.
“Model-assisted probability of detection for structural health monitoring of flat plates.”
Computational Science – ICCS 2018, Volume 10861. Springer, Cham, 2018.
- [4] **Jin Yan**, Xiaosong Du, Austin Downey, Alessandro Cancelli, Simon Laflamme, Leifur Leifsson, An Chen, Filippo Ubertini.
“Surrogate model for condition assessment of structures using a dense sensor network.”
Proc. SPIE Volume 10598, Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2018, 27 March 2018.
- [3] Srikanthan Ramesh, Iris V. Rivero, **Jin Yan**, Austin Downey, Simon Laflamme, and Eric Zellner.

“Solventless Fabrication of Biodegradable Sensors for Measuring Soft Tissue Deformation.” Proceedings of the 2018 Industrial and Systems Engineering Annual Conference, 2018. [Peer-reviewed]

[2] **Jin Yan**, Sammy Hassan, An Chen, Simon Laflamme.

“Novel Capacitive CFRP Sensor for Structural Health Monitoring.”

Proc. 9th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering, July 2018.

[1] Austin Downey, **Jin Yan**, Simon Laflamme, An Chen.

“Dynamic Reconstruction of In-plane Strain Maps using a Two-dimensional Sensing Skin. ” Structural Health Monitoring, 2017.

PRESENTATIONS

- Probability of Detection in Dense Sensor Network Structural Health Monitoring Systems. *Engineering Mechanics Institute Conference*. Oral Presentation. Pasadena, CA, USA. 2019
- Model-assisted validation of a strain-based dense sensor network. *SPIE smart structures and nondestructive evaluation*. Oral Presentation. Denver, CO, USA. 2019
- Multifunctional Carbon Fiber-Reinforced Polymer as structural capacitor for strain sensing. *Engineering Mechanics Institute Conference*. Oral Presentation. Boston, MS, USA. 2018

INVITED TALK

- Model-Assisted Validation of Sensor Networks. *The American Society for Nondestructive Testing (ASNT) Annual Conference*. Oral Presentation. Online. 2020
- Model-Assisted Structural Health Monitoring. *ASNT - Iowa Section Meeting*. Oral Presentation. Ames, IA, USA. 2020

PERSONAL SKILLS & COMPETENCES

Data Science:	Data Mining, Machine Learning, Predictive Modeling, Time Series
Programming:	Python, Matlab, L ^A T _E X, R, LabView, Git, SQL, Javascript, Fortran
Framework/Tools:	Pandas, scikit-learn, Tensorflow, OpenCV, Google Colab, AWS, HPC
Engineering Software:	Abaqus, Ansys, SAP 2000, GTStrudl, AutoCAD, SolidWorks

HONORS & AWARDS

- First Prize in the 1st International Project Competition for Structural Health Monitoring 2021
- The American Society for Nondestructive Testing (ASNT) Fellowship 2018
- International Concrete Repair Institute (ICRI) Scholarship 2018
- National Scholarship (7/504), the highest-level scholarship in China 2015
- First Prize Scholarship of Central South University 2014
- First Prize in Mathematical Modeling Contest of Central South University 2014
- Third Prize Scholarship of Central South University 2014
- Second Prize in The Mathematical Contest in Modeling of Hunan Province 2013

ACADEMIC SERVICES & EDITORIAL ACTIVITIES

- Chairing session on “Skin-based Distributed Sensing for SHM Applications.”, SPIE Smart Structures/NDE, Denver, CO, USA. 2019
- Reviewer: “Experiment Techniques” (5); “Micromachines” (1); “Sensors” (2); “Electronics” (1); “Applied Science” (1); “Healthcase” (1); “Journal of Smart Structures and Systems” (1); Conference “2021 IMAC conference best paper award” (3) - Total: 15

MENTORED STUDENTS

Graduate Students

- [6] Matthew Nelson, Ph.D.; Civil Eng., Investigation of High-rate Dynamic Systems. 2020 [5] Vahid Barzegar, Ph.D.; Civil Eng., A programming model and platform architecture using physics-informed real-time machine learning for sub-second systems. 2019 - 2020
- [4] Han Liu, M.Sc., Ph.D.; Civil Eng., Designing and fabricating a new type of one-directional sensing skin for structural health monitoring. 2019 - 2020
- [3] Zachary Dietrich, M.Sc.; Civil Eng., Fatigue reliability assessment of anchor rods of support structures for signs, luminaires, and traffic signals. 2019
- [2] Hanming Zhang, Ph.D.; Civil Eng., Smart installation and monitoring system for large anchor bolts of a support structure for highway signs, luminaires, and traffic signals. 2018 - 2019
- [1] Nazik Citir, Ph.D.; Civil Eng., Investigating alkali-silica reaction using dense sensor network and ground-penetrating radar. 2018

Undergraduate Students

- [12] Katherine Moretina; Electrical Eng., Capacitance DAQ investigation. 2020
- [11] Colin Wiersema; Civil Eng., Sensing skin fabricating. 2020
- [10] Ash Gutierrez; Civil Eng., Mechanical testing of soft sensing materials. 2020
- [9] Haihan Yu; Civil Eng., Computer vision measurement method of Poisson's ratio of thin films. 2019
- [8] Nick Embray; Mechanical Eng., Sensor contacts investigation for thin-film sensors. 2019
- [7] Jackson Zehr; Mechanical Eng., Pressure sensor materials investigation. 2019
- [6] Theodore Willemssen; Mechanical Eng., Sensor interface development. 2019
- [5] Sammy Hassan; Civil Eng., CFRP sensor fabricating. 2017 - 2018
- [4] Xinqi Mao; Civil Eng., Computer vision for crack detection. 2018
- [3] Pedro Paiva-De-Lima; Civil Eng., Thin film sensor fabricating & 3D printing. 2018
- [2] Nicholas A Chockalingam; Industrial Eng., CFRP sensor fabricating. 2017
- [1] Owen Fischer; Mechanical Eng., CFRP sensor fabricating. 2017