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SHINAE JANG, Ph.D.

Assistant Professor

Civil & Environmental Engineering
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EDUCATION

Ph. D. in Civil Engineering, August, 2010

Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
Dissertation Title: Structural Health Monitoring for Bridge Structures using Smart Sensors
Dissertation Advisor: Prof. Billie F. Spencer, Jr.

M.S. in Civil Engineering, February 2003

Civil and Environmental Engineering, KAIST, Korea
Thesis Title: Comparative Study on Hilbert-Huang Transform and Wavelet Transform for
Structural Damage Detection
Thesis Advisor: Prof. Chung-Bang Yun

B.S. in Civil Engineering, February 2001

Civil and Environmental Engineering, KAIST, Korea
Graduate *Summa Cum Laude*
Advisor: Prof. Chung-Bang Yun

RESEARCH INTERESTS

- Structural Dynamics and Experimental Dynamics
- Random Vibration, System Identification
- Structural Health Monitoring Algorithms
- Long-term Bridge Health Monitoring
- Wireless Smart Sensor Technology
- Finite Element Modeling and Model Updating
- Railway Monitoring
- Piezoelectric Energy Harvesting

RESEARCH EXPERIENCE

Assistant Professor (2010~ present)

- Full-scale damage identification using flexibility-based method on in-service highway bridge
- Development of hybrid wireless sensor board with displacement measurement capability

- Multi-scale model updating for in-service highway bridge, Flyover Bridge, Hartford, Connecticut
- First deployment of wireless smart sensor network on in-service highway bridges in Meriden, Connecticut
- Development of modal-flexibility based expansion joint monitoring system under temperature fluctuation
- Development of theoretical model of piezoelectric energy harvester for railway monitoring
- Development and deployment of wireless expansion joint monitoring sensor on an in-service highway bridge, Founders Bridge, Hartford, Connecticut

Research Assistant (2004~2010)

- Deployment of the world's largest smart sensor network on the Jindo Bridge in South Korea
- Monitoring a historic moveable truss bridge, Rock Island Arsenal Bridge in Illinois
- Steel corrosion extent estimation through correlation of visual inspection and model updating
- Application and implementation of structural monitoring system using smart wireless sensor on the Mahomet Bridge in Illinois
- Development of the decentralized Receptance-based damage detection method for wireless smart sensor networks
- Long-term performance evaluation of smart sensor network on the Siebel Center Staircase at UIUC
- Model updating for historic structures.
- Reliability-analysis of a damage detection method using FORM method to verify the performance of the method with existence of structural parameter uncertainties
- Development of static strain-based structural health monitoring algorithm and experimental verification

Research Assistant (2001~2003)

- Performance comparison between damage detection methods using Hilbert-Huang Transform and Wavelet Transform
- Experimental verification of the Hilbert-Huang Transform on a steel frame structure
- Assist the structural health monitoring tests for old Han Nam Grand Bridge, Seoul, Korea

PROFESSIONAL SERVICES

Panelist for National Science Foundation (2011~current)

Member of International Committee

ASCE, Structural Health Monitoring and Control Committee
SPIE, Smart Structures & NDE, Program Committee
TRB, Steel Bridge Subcommittee (AFF20)

University of Connecticut Committee and Service

Provost's Library Advisory Committee

ASCE, Student Chapter Faculty Advisor
CEE, ABET, Course and Curriculum Committee
CEE, Website and Newsletter Committee
CEE, Department Colloquium Organization Committee
CEE, Faculty Search Committee, Structural Engineering and Applied Mechanics

Journal Reviewer

Advances in Structural Engineering
ASCE, Journal of Bridge Engineering
ASME, Journal of Dynamic Systems, Measurement, and Control
Computer-Aided Civil and Infrastructure Engineering
Journal of Structural Vibrations
Journal of Earthquake Engineering
Journal of Nondestructive Evaluation
Journal of Civil Engineering, Korea Society of Civil Engineer
Journal of Vibration and Control
Smart Structures and Systems
Transportation Research Board
Structural Control and Health Monitoring
Engineering Optimization
International Journal of Decentralized Sensor Network

TEACHING EXPERIENCE

Lecturer (2011~present) – teaching class, lab session, office hour, grading

CE5090-003 Structural Health Monitoring and Sensors
CE4610 Advanced Structural Analysis
CE3610 Basic Structural Analysis

Guest Lecturer (2010) – lecture on earthquake response analysis

CE5159 Structural Vibrations

Teaching Assistant for School Outreach program (2009)

Organizing lab material and final competition using a shaking table
Prof. Billie F. Spencer, Jr. Shakes and Quakes at Lincoln train school, Mahomet, IL

Teaching Assistant (Fall 2006) –lab technical assistant, guest lectures, grading

Prof. Billie F. Spencer, Jr. Advanced Structural Dynamics

Teaching Assistant (Fall 2001) – teaching at lab class, lab technical assistant, grading

Prof. Chung-Bang Yun, Introduction of Structural Engineering (Lab class)

Teaching Assistant (Spring 2001) – office hour and grading

Prof. Chung-Bang Yun, Mechanics of Materials

JOURNAL PUBLICATIONS

1. **Jang, S.**, Sim, S.H., Jo, H., Spencer, B.F., Jr. (2012). "Full-scale Experimental Validation of Decentralized Damage Identification Using Wireless Smart Sensors." *Smart Materials and Structures*, 21, 115019.
2. **Jang, S.**, Li, J., Spencer, B.F., Jr. (2012). "Corrosion Estimation of a Historic Truss Bridge using Model Updating." *ASCE Journal of Bridge Engineering*. doi:10.1061/(ASCE)BE.1943-5592.0000403. (Published online).
3. **Jang, J.**, Spencer, B.F., Jr., Sim, S.H. (2012). "A Decentralized Receptance-based Damage Detection Strategy for Wireless Smart Sensors." *Smart Materials and Structures*, 21, 055017.
4. **Jang, S.**, Spencer, B.F., Jr., Rice, J.A., Wang, Z. (2011). "Structural Monitoring of a Historic Truss Bridge using a Wireless Sensor Network." *Advances in Structural Engineering* 14(1): 93-101.
5. Rice, J.A., Mechitov, K., Sim, S.H., Nagayama, T., **Jang, S.**, Kim, R., Spencer, B.F., Jr., Agha, G., and Fujino, Y. (2010). "Flexible Smart Sensor Framework for Autonomous Structural Health Monitoring." *Journal of Smart Structures and Systems*, 6(5): 423-438.
6. **Jang, S.**, Jo, H., Cho, S., Mechitov, K., Rice, J.A., Sim, S.H., Jung, H.J., Yun, C.B., Spencer, B.F., Jr., and Agha, G. (2010). "Structural Health Monitoring of a Cable-stayed Bridge using Smart Sensor Technology: Deployment and Evaluation." *Journal of Smart Structures and Systems*, 6(5): 439-460.
7. Cho, S., Jo, H., **Jang, S.**, Park, J., Jung, H.J., Yun, C.B., Spencer, B.F., Jr., Seo, J.W. (2010). "Structural Health Monitoring of a Cable-stayed Bridge using Smart Sensor Technology: Data Analysis." *Journal of Smart Structures and Systems*, 6(5): 461-480.
8. Sim, S.H., **Jang, S.**, Spencer, B.F., Jr. and Song, J. (2008). "Reliability-based Evaluation of the Performance of the DLV method." *Probabilistic Engineering Mechanics*, 23: 489-495.

CONFERENCE PUBLICATIONS

1. **S. Jang**, S. Dahal. (2013). "Rapid Displacement Monitoring using Wireless Hybrid Sensor on an In-service Highway Bridge." Transportation Research Board, Annual Meeting. (accepted).
2. J. Li, **S. Jang**, M. Zuba, J.H. Cui, Y. Zhu. (2012). "Feasibility of Underwater Sensor Networks for Lifetime Assessment of Offshore Civil Structures." OCEANS'12 MTS/IEEE.
3. J. Li, **S. Jang**, J.Tang. (2012). "A Piezoelectric Based Energy Harvester for Railway Health Monitoring." ANCRiSST (CD-ROM).
4. P. Mensah-Bonsu, **S. Jang**. (2012). "Multi-scale Model Updating of a Curved Highway Bridge." SPIE Smart Structures/NDE (CD-ROM).
5. J. Li, **S. Jang**, J. Tang. (2012). "Modeling and Analysis of a Bimorph Piezoelectric Energy Harvester for Railway Bridge Health Monitoring." SPIE Smart Structures/NDE (CD-ROM).
6. S. Dahal, **S. Jang**, P. Mensah-Bonsu. (2012). "Flexibility-based Damage Detection for In-service Highway Bridge." SPIE Smart Structures/NDE (CD-ROM).
7. **S. Jang**, S. Dahal, G. Contreras, J. Fitch, J. Karamavros, R. Bansal. (2012). "Hybrid Structural Health Monitoring for In-service Highway Bridge using Wireless Multi-scale Sensors." SPIE Smart Structures/NDE (CD-ROM).

8. **S. Jang**, S-H., Sim, H. Jo, B.F. Spencer, Jr. (2011). "Experimental Validation of Decentralized Damage Identification on a Historic Truss Bridge using Smart Sensors." ASEM+, International Conference of Smart Structures (Proceedings in press).
9. S. Cho, J-W. Park, **S. Jang**, H.Jo, H-J. Jung, C-B. Yun, B.F. Spencer, Jr. (2011). "Structural Health Monitoring using Wireless Smart Sensor Networks for a Cable-stayed Bridge." *Computational Stochastic Mechanics*.
10. A. Scianna, **S. Jang**. "Model-free Modal Flexibility-based Damage Detection Strategy for In-service Highway Bridges." (2011) *SPIE Smart Structures/NDE* (CD-ROM)
11. **S. Jang**, S.H. Sim, H. Jo, B.F. Spencer, Jr. "Decentralized Full-scale bridge damage identification using wireless smart sensors." (2011) *SPIE Smart Structures/NDE* (CD-ROM).
12. T. Nagayama, H.J. Jung, B. F. Spencer, Jr., **S. Jang**, K. A. Mechitov, S. Cho, M. Ushita, C. B. Yun, G. A. Agha, Y. Fujino. (2010). "International Collaboration to Develop a Structural Health Monitoring System utilizing Wireless Smart Sensor Network and its Deployment on a Cable-stayed Bridge." 5th World Conference of Structural Control and Monitoring.
13. J. W. Park, S. Cho, H.J. Jung, C. B. Yun, **S. Jang**, H. Jo, B. F. Spencer, Jr., T. Nagayama, J.W. Seo. (2010). "Long-term Structural Health Monitoring System of a Cable-stayed Bridge based on Wireless Smart Sensor Networks and Energy Harvesting Techniques." 5th World Conference of Structural Control and Monitoring.
14. L. E. Linderman, J. A. Rice, S. Barot, B. F. Spencer, Jr. J. T. Bernhard, **S. Jang**. (2010). "Experimental Characteristics of Wireless Communication Performance for Network Implementation." 5th World Conference of Structural Control and Monitoring.
15. **S. Jang**, H. Jo, J. A. Rice, K. Mechitov, S. H. Sim, T. Miller, B. F. Spencer Jr., and G. Agha. (2010). "Energy Efficient Autonomous Structural Health Monitoring System on a Cable-stayed Bridge." *The Fifth International Conference on Bridge Maintenance, Safety and Management*.
16. S. Cho, **S. Jang**, H. Jo, J. Park, H. J. Jung, C. B. Yun, and B. F. Spencer, Jr. (2010). "Smart Wireless Sensor Network for Jindo Cable-stayed Bridge Monitoring Test-bed." *The Fifth International Conference on Bridge Maintenance, Safety and Management*.
17. **S. Jang**, S. H. Sim, and B. F. Spencer, Jr. (2010). "Decentralized Bridge Health Monitoring using Wireless Smart Sensors." *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, SPIE Symposium on Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring*.
18. S. Cho, **S. Jang**, H. Jo, K. Mechitov, J. A. Rice, H.-J. Jung, C.B. Yun, B.F. Spencer, Jr., T. Nagayama, J. Seo. (2010). "Structural Health Monitoring System of a Cable-stayed Bridge using a Dense Array of Scalable Smart Sensor Network." *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, SPIE Symposium on Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring*.
19. J. W. Park, I.H. Kim, H. Jo, **S. Jang**, H.J. Jung, (2010). "Feasibility Study of Wind Power Generator for Wireless Smart Sensor Node in Cable-stayed Bridge." *Conference on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, SPIE Symposium on Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring*.

20. S. Cho, **S. Jang**, H. Jo, J. Park, H. J. Jung, C. B. Yun, B. F. Spencer, Jr., T. Nagayama, and J. W. Seo. (2009). "Cable-stayed bridge test-bed for long-term structural health monitoring using smart wireless sensor network." *International Conference on Computational Design in Engineering*.
21. **S. Jang**, J. A. Rice, J. Li, H. Jo, B. F. Spencer, Jr., and Z. Wang. (2009). "Structural Monitoring of a Historic Truss Bridge using Wireless Sensor Network." *The Fifth international Workshop on Advanced Smart Materials and Smart Structures Technology*.
22. **S. Jang** and B. F. Spencer, Jr. (2009). "Receptance-based Structural Health Monitoring Approach for Bridge Structures." *Health Monitoring of Structural and Biological Systems III, 16th International Symposium on: Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, SPIE*.
23. T. Nagayama, M. Ushita, H. M. Dinh, Y. Fujino, B.F. Spencer, Jr., J. A. Rice, **S. Jang**, K. A. Mechtov, and G. Agha. (2009) "Structural Health Monitoring System Development and Full-scale Bridge Vibration Measurement Using Smart Sensors." *10th International Conference on Structural Safety and Reliability (ICOSSAR)*.
24. **S. Jang**, S. H. Sim and B. F. Spencer, Jr., (2008). "Structural Damage Detection Using Static Strain Data, *World Forum on Smart Materials and Smart Structures Technology*, Chongqing and Nanjing, China. (6 pages in CD-ROM).
25. **S. Jang**. (2003). "Comparative Study on Hilbert-Huang Transform and Wavelet Transform for Structural Damage Detection", Master thesis, Korea Advanced Institute of Science and Technology, Daejeon, South Korea.
26. C. B. Yun, **S. Jang**, S. H. Sim, J. J. Lee. (2002). "Damage Detection Method for Bridge Structures using Hilbert-Huang Transform.", *Proceedings of Computer and Structural Engineering Institute of Korea*, Fall Conference, 453-458.
27. C. B. Yun, **S. Jang**, S. H. Sim. (2002). "Damage Location Method using Hilbert-Huang Transform: Theory and Simulation for Pier structures." *Proceedings of Earthquake Engineering Society of Korea*, Fall Conference.
28. S. H. Shim, **S. Jang**, J. J. Lee, C. B. Yun. (2002). "Damage Detection Method for Bridge Structures Using Hilbert-Huang Transform Technique." *Proceedings of The 2nd International Conference on Structural Stability and Dynamics*, Singapore.