

Soobum Lee*

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RESEARCH INTERESTS

Structural Topology and Shape Design Optimization
Vibration Energy Harvester Design (Piezoelectric/Electromagnetic)
Reliability Based Design Optimization
Computer Aided Design / Finite Element Method

PROFESSIONAL EXPERIENCE

Associate Professor (Jul. 2019 – Present)

Assistant Professor (Nov. 2012 – Jun. 2019)

Mechanical Engineering, *University of Maryland Baltimore County, Baltimore USA*

- Researching topology optimization for additive manufacturability and flexural mechanism design.
- Developing an orthodontic force detection sensor for practical force monitoring and reduction of orthodontic treatment cost.
- Developing an intelligent and energy sustainable electromagnetic energy harvesting systems utilizing kinematic/rotational energy and wasted vibration.
- Researching practical piezoelectric energy harvesting systems utilizing broadband frequency and random vibration.

Research Assistant Professor (Sep. 2011 – Sep. 2012)

Aerospace and Mechanical Engineering, *University of Notre Dame, Notre Dame USA*

- Researched robust design of nano/microscale ceramic material for high-temperature application with the uncertainties of operating condition and material properties under consideration (Supported by AFOSR).
- Researched tall building sculpting and structure design subject to aerodynamic load for structural safety and wind energy harvesting.

Postdoctoral Research Associate / Lecturer (Jul. 2010 – Sep. 2011)

Aerospace and Mechanical Engineering, *University of Notre Dame, Notre Dame USA*

- Developed the topology optimization method for piezoelectric energy harvester using hybrid cellular automata algorithm.
- Researched tall building structure design subject to aerodynamic load for structural safety and wind energy harvesting.

Postdoctoral Fellow (Jan. 2008 – Jun. 2010)

Mechanical Engineering, *University of Maryland, College Park USA*

- Designed a new piezoelectric energy harvester named *segment-type energy harvester* for utilization of

*As of 3/10/2024

multimodal vibration from building HVAC system. Increased efficiency by 30% after design optimization using MATLAB and ANSYS, fabricated prototype, and successfully integrated with a wireless temperature sensor for real-time room temperature monitoring.

- Proposed a new practicable conceptual design of energy harvesting device – *energy harvesting skin*. Obtained the optimal design for utilizing outdoor unit vibration, and proved excellent power harvesting capability up to 4mW (sufficient power to operate for structural health monitoring wireless sensor).

Researcher

(Feb. 2007 – Dec. 2007)

KAERI (Korea Atomic Energy Research Institute), Daejeon Korea

- Developed the design procedure of a spacer grid in a nuclear fuel assembly for impact strength improvement up to 20% using experimentally verified ABAQUS FE model.
- Researched a hot gas duct design for nuclear hydrogen generation.

Visiting Researcher, Teaching Assistant

(Nov. 2004 – Mar. 2005)

Queen's University, Kingston Canada

- Researched the design optimization of hip implant using topology optimization methodology to reduce weight by 20% with the same strength.

Researcher, Teaching Assistant

(Mar. 2000 – Feb. 2004)

KAIST, Daejeon Korea

- Developed a 3D CAD-based structural design optimization software through the research project granted by Korean Ministry of Science and Technology (MOST) and Hyundai Motor Company. Achieved CAD-based structural design optimization for more than 10 case studies including the natural frequency improvement of an automobile engine mount bracket by 61%, and the stress reduction of an excavator boom by 20%.
- Developed a shipyard cranes simulator through the research project granted by Hyundai Heavy Industry. Facilitate various cranes scenarios' animation, dynamic stress analysis in a shipblock, and design optimization on stiffener location for stress reduction up to 38%.

Visiting Researcher

(Jul. 2001 – Aug. 2001)

AIST (National Institute of Advanced Industrial Science and Technology), Tsukuba Japan

- Build the mesh adaptation code in FE analysis for 3-dimensional case.

EDUCATION

Ph.D. Mechanical Engineering, KAIST, Korea; Mar. 2000 – Aug. 2007 (Advisor: Prof. Byung Man Kwak)
“Smooth Boundary Topology Optimization Using B-spline and Hole Generation”

M.S. Mechanical Engineering, KAIST, Korea; Mar. 1998 – Feb. 2000

“A CAD-based Software for Simulation of Lifting and Turnover of Ship Block”

B.S. Mechanical Design & Production Engineering, Yonsei University, Korea; Mar. 1994 – Feb. 1998

TEACHING EXPERIENCE

ENME303 Computational Methods for Engineers, 2017 – Present, University of Maryland Baltimore County

Required course for UMBC ME undergraduate, about 90 enrollments per term

ENME360 Vibrations, 2017 – Present, University of Maryland Baltimore County

Required course for UMBC ME undergraduate, about 90 enrollments per term
ENME610 Design optimization with Engineering Application, 2014 – Present, University of Maryland Baltimore County
 Firstly developed in UMBC for Engineering graduate, about 10 enrollments per term
ENME204 Introduction to Design with CAD, 2013 – 2017, University of Maryland Baltimore County
 Required course for UMBC ME undergraduate, about 120 enrollments per year. Introduced 3D printing in fundamental engineering design process
AME60661 Optimum Design of Mechanical Elements, Spring 2011, University of Notre Dame
Advanced Methods in Risk-Based Design (Substitute lecturer), Spring 2008, 2009, University of Maryland
Mathematical Techniques of Reliability (Substitute lecturer, 6 classes), Spring 2009, University of Maryland
Computer Aided Design (Invited lecturer, 3 classes), Fall 2004, Queen’s University
Optimal Design (Invited lecturer), Spring 2004, KAIST
Engineering Design (Capstone Design) (Teaching Assistant), Spring 2003, KAIST
Foundation on Stress Analysis (Teaching Assistant), Spring 2001, KAIST
Mechanical Engineering Laboratory (Teaching Assistant), Fall 2002, KAIST

AWARDS

2019 Best paper award (One of six papers out of 615 publications), Journal of Mechanical Science and Technology, Springer, “Piezoelectric Energy Harvester Utilizing Mandibular Deformation to Power Implantable Biosystems: A Feasibility Study,” 2020
Up and Coming UMBC Inventor, University of Maryland Baltimore County, 2019
Highlight of 2009 (One of 23 highlights out of 300 publications), Smart Materials and Structures, Institute of Physics and IOP Publishing Ltd., “Robust Segment-Type Energy Harvester and Its Application to a Wireless Sensor,” 2010
Best paper prize, CAE department, The Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, “Impact analysis of the spacer grid assembly for PWR fuels(III),” Busan, Korea, 2007
Graduate student scholarship, KAIST, 1998-1999, 2000-2004
Honor student, Yonsei University, 1994, 1995

GRANTS

S. Lee (PI), “STTR Phase I: Enhancing wind-energy industry competitiveness using self-powered blade monitoring sensors,” **National Science Foundation**, \$256,000 (Lee’s portion: 40.0%), Jul. 2023 – Jul. 2024
S. Lee (co-PI), “Lightweight Mirrors for Microsatellites and Small Satellites,” **Office of Naval Research**, \$ 139,792 (Lee’s portion: 31.5%), Aug. 2023 – Jul. 2024
S. Lee (PI), “Power sustainable and maintenance-free sensor node for real time monitoring of ballast tank water/sediment level,” **US Office of Naval Research Sabbatical Leave Program**, \$ 62,033 (Lee’s portion: 100%), Jan. 2023 – Dec. 2023
S. Lee (PI), “Self-Powered and Sustainable Wind Turbine Blade Monitoring Solution,” **Maryland Industrial Partnerships (MIPS) Program**, \$100,000 (Lee’s portion: 100.0%), Sep. 2021 – Aug. 2022
S. Lee (PI), “Force sensing clear aligner for real-time orthodontic force monitoring,” **University of Maryland, Baltimore, Institute for Clinical & Translational Research (ICTR), Accelerated Translational Incubator Pilot (ATIP) Grant**, \$35,000 (Lee’s portion: 57.1%), May. 2020 – Aug. 2021
S. Lee (PI), “Flexsens System for Real Time Orthodontic Force Measurement,” **UMBC Technology Catalyst**

- Fund*, \$10,000 (Lee's portion: 100%), Jan. 2019 – Dec. 2020
- S. Lee (PI), "ActiveCharge™: a Magnet-Driven Piezoelectric Energy Harvester for Wind Turbine Monitoring," *TEDCO Maryland Innovation Initiative (MII) Program, Phase III*, \$150,000 (Lee's portion: 100%), Aug. 2019 – Jun. 2020
- S. Lee (PI), "Topology Optimization of Wind Tunnel Force Balance," *National Aeronautics and Space Administration*, \$166,835 (Lee's portion: 100%), Feb. 2019 – Aug. 2021
- S. Lee (PI), "ActiveCharge™: an Impact-Driven Piezoelectric Energy Harvester," *TEDCO Maryland Innovation Initiative (MII) Program, Phase I-II*, \$115,000 (Lee's portion: 100%), Jan. 2018 – Sep. 2018
- S. Lee (PI), "Force sensing dental bracket design" *UMBC Supplement for Undergraduate Research Experiences (SURE) Award*, \$1,500 (Lee's portion: 100%), Sep. 2017 – Mar. 2018
- S. Lee (PI), "Study on Fault Prediction Technique Considering Physical Characteristics," *Seoul Metro Research Grant* (subcontracted by KAIEM Co. Ltd.), \$43,000 (Lee's portion: 100%), Sep. 2017 – Dec. 2017
- S. Lee (PI), "Development of core technologies for manufacturing and commercializing laboratory weighing scale with 100 million resolution," *Korea Institute for Advancement of Technology (KIAT) World Class 300 Program*, \$97,000 (Lee's portion: 100%), Jan. 2017 – Dec. 2017
- S. Lee (PI), "Electromagnetic Energy Harvester for Self-charging Wind Turbine Monitoring Sensor," *UMBC Technology Catalyst Fund*, \$10,000 (Lee's portion: 100%), Jan. 2017 – Sep. 2017
- S. Lee (PI), "Prototype development of a practicable nonlinear vibration energy harvester" *UMBC Supplement for Undergraduate Research Experiences (SURE) Award*, \$1,500 (Lee's portion: 100%), Sep. 2016 – Mar. 2017
- S. Lee (PI), M. A. Melo (Co-PI), "A Biocompatible and Implantable Dental Energy Harvesting Prototype for Self-Powering Brain Stimulator," *UMB-UMBC Research and Innovation partnership Grant Program*, \$50,000 (Lee's portion: 52%), Jul. 2016 – Sep. 2017
- M. Younis (PI), S. Lee, S. Kim, W. Zhu (Co-PI), "Prototype Development for a Networked Multi-modal Sensor System for Autonomous, Non-intrusive, and Self-sustained Pipeline Monitoring," *UMBC COEIT Strategic Plan Implementation Grant Program*, \$40,000 (Lee's portion: 40%), Feb. 2016 – Feb. 2017
- S. Lee (PI), "Design Optimization of Tire Vibration Energy Harvesting Device for Self-Powering Operation of Tire Monitoring Sensor" *Korea Institute of Machinery and Materials*, \$36,976 (Lee's portion: 100%), Jan. 2015 – Dec. 2015
- S. Lee (PI), "Energy Harvesting Buoy System as a Charging Station for UAVs" *UMBC Undergraduate Research Assistantship Support (URAS) Award*, \$1,500 (Lee's portion: 100%), Jan. 2015 – Jun. 2015
- S. Lee (PI), "Aircraft Subsystem Packaging Design Using Two-Step Multifunctional Design Optimization Methodologies," *US Air Force Summer Faculty Fellowship*, \$22,436 (Lee's portion: 100%), Jun. 2014 – Aug. 2014
- S. Lee (PI), "A Durable Nonlinear Vibration Energy Harvester Design for Reliable and Battery-free Wireless Sensor Operation," *UMBC Special Research Assistantship/Initiative Support*, \$19,954 (Lee's portion: 100%), Aug. 2013 – Jul. 2014
- S. Lee (PI), "Aircraft Subsystem Packaging Design Using Two-Step Multifunctional Design Optimization Methodologies," *US Air Force Summer Faculty Fellowship*, \$11,152 (Lee's portion: 100%), Jun. 2013 – Aug. 2013
- S. Lee (PI), "Design Framework for Multifunctional Skin Structure for Condition Monitoring and Energy Harvesting," *UMBC Summer Faculty Fellowship*, \$6,000 (Lee's portion: 100%), Jun. 2013 – Aug. 2013
- S. Lee (PI), "Design of Multifunctional Energy Harvesting Skin Under Stochastic Vibration and Application to Wireless Sensor Operation," *National Research Foundation of Korea Grant* (NRF-2009-352-D00007),

\$21,800 (Lee's portion: 100%), Jul. 2009 – Jun. 2010.

PATENTS

- S. Lee**, “Dynamic adaptive energy harvesting apparatus,” US11870367B2, Active, 2024
- S. Lee**, “Apparatus and method for harvesting vibration energy from a rotating object,” US20240011470A1, Pending, 2024
- S. Lee**, “Apparatus and method for harvesting vibration energy from a rotating object,” US11725637B2, Active, 2023
- S. Lee**, “Dynamic adaptive energy harvesting apparatus,” US 2021/0184602 A1, Pending, 2021
- S. Lee**, C. Lee, M. A. Melo, and R. Masri, “Orthodontic Measurement Device and Method,” Application No. 62/677706, Submitted Provisional Patent (U.S. only, May. 2018)
- S. Lee**, “A Method for Harvesting Broadband Vibration Energy from a Rotating Object Using Asymmetric Nonlinear Spring,” 62/548,492;62/677,825;PCT/US18/47505, 2018
- M. Song, H. Park, **S. Lee**, “Supporting Spacer Grid for Nuclear Fuel Rods or Cylindrical Tubes,” Korea Patent KR/10-1731915, 2017
- S. Lee**, “Bi-stable Vibration Energy Harvester,” US Provisional Patent Pending (Feb. 2015), University of Maryland Baltimore County (Application No. 62120996; Attorney Docket No: UMBC2014-020SL)
- S. Lee** and R. M. Masri, “A Novel Energy Harvesting Method to Self-Power Implanted Devices,” US Provisional Patent Pending (Jun. 2014), University of Maryland Baltimore County (UMBC Ref. No. 2014-014)
- S. Lee**, “Energy Harvesting Device Using Rotational Energy of Vehicle Wheel and Tire Pressure Monitoring System Using The Same,” Korea Patent KR/10-1310461, 2013
- S. Lee**, “A Method for Creating Electric Energy from the Circumference of a Rotating Object,” US Provisional Patent Pending (Jan. 2013), University of Maryland Baltimore County (App. No.: 61770544)
- S. Lee** and B. D. Youn, “Energy Harvesting Waist Belt,” US Provisional Patent Pending, US/61/505856 (Jul. 2011), University of Maryland (Atty Docket No.: PS-2009-028)

PUBLICATIONS

Web Article:

1. “Potomac’s High Precision Laser Micromachining Advances New Energy-Harvesting Technique at UMBC” at Potomac Photonics: <http://www.potomac-laser.com/blog/potomacs-high-precision-laser-micromachining-advances-new-energy-harvesting-technique-umbc/>
2. **Featured article**, “Energy harvesting skin generates power from air conditioners” at PhysOrg.com (Web-based science, research and technology news service, Global Top 2,000 Websites): <http://www.physorg.com/news/2011-04-energy-harvesting-skin-power-air.html>
3. “Don't let those A/C vibrations go to waste” at PowerElectronics.com (Web-based energy technology news service by Penton Media Inc.): <http://powerelectronics.com/energy-harvesting/dont-let-those-ac-vibrations-go-waste>

Journal Papers:

1. W. Xian, and **S. Lee**, “A Pendulum Based Frequency-Up Conversion Mechanism for Vibrational Energy Harvesting in Low-Speed Rotary Structures,” Journal of Intelligent Material Systems and Structures, Accepted for publication, 2024
2. H. Umar, C. Mullen, **S. Lee**, J. Lee, and J. Kim, “Broadband Energy Harvester for Varied Tram Vibration Frequency Using 2-DOF Mass-Spring-Damper System,” Smart Structures and Systems, 32(6), 383-391,

2023

3. H. Lee, I. Raouf, J. Song, H. S. Kim, and **S. Lee**, "Prognostics and Health Management of the Robotic Servo-Motor under Variable Operating Conditions," *Mathematics*, 11(2), 398, 2023
4. **S. Lee**, C. Lee, J. Bosio, and M. A. S. de Melo, "Smart Flexible 3D sensor for monitoring orthodontics forces: Prototype Design and Proof of Principle experiment," *Bioengineering*, 9(10), 570, 2022
5. T. Chaisson, **S. Lee**, and D. Burns, "Design Optimization of a Wind Tunnel Force Balance Using Stepwise Response Surface Method," *J. Mech. Sci. Technol.*, 36(6), pp.3071-3079, 2022
6. M. Sung, **S. Lee**, and D. Burns, "Robust Topology Optimization of a Flexural Structure Considering Multi-Stress Performance for Force Sensing and Structural Safety," *Struct. Multidiscip. O.*, Vol. 65, No. 1, pp. 1-21, 2022
7. S. Jeong, **S. Lee**, and H. H. Yoo, "Design Scalability Study of the G-Shaped Piezoelectric Harvester Based on Generalized Classical Ritz Method and Optimization," *Electronics*, Vol. 10, No. 16, pp. 1887, 2021
8. H. Jung, A. T. Eshghi, and **S. Lee**, "Structural Failure Detection Using Wireless Transmission Rate from Piezoelectric Energy Harvesters," *IEEE/ASME Transactions on Mechatronics*, doi: 10.1109/TMECH.2020.3037291, 2020
9. S. Nezami and **S. Lee**, "Nonlinear Dynamics of a Rotary Energy Harvester with a Double Frequency Up-Conversion Mechanism," *ASME Journal of Computational and Nonlinear Dynamics*, Vol. 15, No. 9, pp. 091011, 2020
10. H. Jung, S. Nezami, and **S. Lee**, "Power Supply Switch Circuit for Intermittent Energy Harvesting," *Electronics*, Vol. 8, No. 12, pp. 1446, 2019
11. A. T. Eshghi, **S. Lee**, H. Jung, and P. Wang, "Design of Structural Monitoring Sensor Network Using Surrogate Modeling of Stochastic Sensor Signal," *Mechanical Systems and Signal Processing (IF: 4.370)*, Vol. 133, No. 1, pp. 106280, 2019
12. R. Fan, **S. Lee**, H. Jung, M. A. Melo, R. Masri, "Piezoelectric energy harvester utilizing mandibular deformation to power implantable biosystems: a feasibility study," *J. Mech. Sci. Technol.*, Vol. 33, pp. 4039–4045, 2019
13. S. Nezami, H. Jung, and **S. Lee**, "Design of a disk-swing driven piezoelectric energy harvester for slow rotary system application," *Smart Mater. Struct. (IF: 2.963)*, Vol. 28 No. 7 074001, 2019
14. A. T. Eshghi and **S. Lee**, "Adaptive Improved Response Surface Method for Reliability-Based Design Optimization," *Engineering Optimization*, Vol. 51, No. 12, pp. 1-19, 2019
15. M. Li, M. K. Sadoughi, C. Hu, Z. Hu, A. T. Eshghi, and **S. Lee**, "High-Dimensional Reliability-based Design Optimization Involving Highly Nonlinear Constraints and Computationally Expensive Simulations," *Journal of Mechanical Design*, Vol. 141, No. 5, pp. 051402, 2019
16. S. Nezami, **S. Lee**, J. Jin, and K. W. Kang "Shape optimization of railroad vibration energy harvester for structural robustness and power generation performance," *Eng. Struct.*, Vol. 173, No. 15, pp. 460-471, 2018
17. H. Jung, **S. Lee**, S. Jeong, and H. Yoo, "Segmented Impact-Type Piezoelectric Energy Harvester for Self-Start Impedance Matching Circuit," *Smart Mater. Struct. (IF: 2.909)*, In Press, 2018
18. N. Chen, T. Wei, D. Ha, H. Jung, and **S. Lee**, "Alternating Resistive Impedance Matching for an Impact-Type Micro Wind Piezoelectric Energy Harvester," *IEEE T. Ind. Electron.*, Vol. 65, No. 9, pp. 7374-7382, 2018
19. M. K. Sadoughi, M. Li, C. Hu, C. A. MacKenzie, **S. Lee**, and A. T. Eshghi, "A High-Dimensional Reliability Analysis Method for Simulation-Based Design Under Uncertainty." *J. Mech. Design*, 140.7: 071401, 2018

20. A. T. Eshghi, **S. Lee**, M. K. Sadoughi, C. Hu, Y. C. Kim, and J. H. Seo, "Design optimization under uncertainty and speed variability for a piezoelectric energy harvester powering a tire pressure monitoring sensor," *Smart Mater. Struct.*, Vol. 26, No. 10, 105037, 2017
21. M. Sadoughi, C. Hu, C. A. MacKenzie, **S. Lee**, and A. Eshghi "A Maximum Expected Utility Method for Efficient Reliability Analysis of Complex Engineered Systems," *Struct. Multidiscip. O.*, p. 1-16, 2017
22. N. Chen, T. Wei, H. Jung, and **S. Lee**, "Quick self-start and minimum power-loss management circuit for impact-type micro wind piezoelectric energy harvesters," *Sensor. Actuat. A-Phys.*, Vol. 263, pp. 23–29, 2017
23. S. Seong, C. Hu, and **S. Lee**, "Design under Uncertainty for Reliable Power Generation of Nonlinear Piezoelectric Energy Harvester," *J. Intel. Mat. Syst. Str.*, 1045389X17689945, 2017
24. M. Bakhtiarinejad, **S. Lee**, and J. Joo, "Topology Optimization based on Morphing Mesh for Simultaneous Component Relocation and Frame Structure Design," *Struct. Multidiscip. O.*, DOI 10.1007/s00158-016-1468-4, 2016
25. P. Wang, Z. Wang, B. D. Youn, and **S. Lee**, "Reliability-based Robust Design of Smart Sensing Systems for Failure Diagnostics Using Piezoelectric Materials," *Compu. Struct.*, Vol. 156, pp. 110-121, 2015
26. **S. Lee** and F. Semperlotti, "Design Optimization for Passive Adaptive Structural Networks," *J. Intel. Mat. Syst. Str.*, Vol. 26, No. 9, pp. 1110-1127, 2015
27. **S. Lee** and A. Tovar, "Outrigger Placement in Tall Buildings Using Topology Optimization," *Eng. Struct.*, Vol. 74, No. 1, pp. 122-129, 2014
28. M. K. Kang, **S. Lee**, and J. H. Kim, "Shape Optimization of a Mechanically Decoupled Six-Axis Force/Torque Sensor," *Sensor. Actuat. A-Phys.*, Vol. 209, No. 1, pp. 41–51, 2014
29. **S. Lee** and D. H. Kim, "Durable and Sustainable Strap Type Electromagnetic Harvester for Tire Pressure Monitoring System," *J. Magnetism*, Vol. 18, No. 4, pp. 473-480, 2013
30. **S. Lee** and A. Tovar, "Topology Optimization of Energy Harvesting Skin Using Hybrid Cellular Automata," *J. Mech. Design*, Vol. 135, No. 3, pp. 031001 (11 pages), 2013
31. J. I. Park, **S. Lee**, and B. M. Kwak, "Design Optimization of Piezoelectric Energy Harvester Subject to Tip Excitation," *J. Mech. Sci. Technol.*, Vol. 26, No. 1, pp.137-143, 2012
32. **S. Lee** and B. D. Youn, "A New Piezoelectric Energy Harvesting Design Concept: Multimodal Energy Harvesting Skin," *IEEE T. Ultrason. Ferr.*, Vol. 58, No. 3, pp. 629-645, 2011
33. **S. Lee** and B. D. Youn, "A Design and Experimental Verification Methodology for Energy Harvester Skin Structure," *Smart Mater. Struct.*, Vol. 20, No. 5, 057001, 2011
34. B. C. Jung, D. H. Lee, B. D. Youn, and **S. Lee**, "A statistical characterization method for damping material properties and its application to structural-acoustic system design," *J. Mech. Sci. Technol.*, Vol. 25, No. 8, pp. 1893-1904, 2011
35. K. N. Song, **S. Lee**, M. K. Shin, J. J. Lee, and G. J. Park, "New Spacer Grid to Enhance Mechanical/Structural Performance," *J. Nucl. Sci. Technol.* Vol. 47, No. 3, pp. 295–303, 2010
36. **S. Lee**, B. D. Youn, and B. C. Jung, "Robust Segment-Type Energy Harvester and Its Application to a Wireless Sensor," *Smart Mater. Struct.*, Vol. 18, No. 9, 095021 (12pp), 2009 – *Selected as "Highlight of 2009" by the publisher*
37. K. N. Song, S. S. Kim, S. H. Lee, **S. Lee**, "Laser Welding Unit for Intersection Line Welding of Spacer Grid Inner Straps and its Application," *Journal of Laser Micro/Nanoengineering*, Vol. 4, No. 1, pp. 11-17, 2009
38. K. N. Song, S. S. Kim, **S. Lee**, Y. W. Kim, "Development of a LASER Welding Apparatus and a Method for an Inner-Strap Welding of a Spacer Grid Assembly for a PWR Fuel Assembly," *Mater. Sci. Forum*,

Vol. 580-582 pp. 507~510, 2008

39. **S. Lee**, Y. W. Kim, and K. N. Song, "Parameter study of the dimple location in the spacer grid on the impact strength," *J. Mech. Sci. Technol.*, Vol. 22, pp. 2024~2029, 2008
40. D. H. Kim, **S. Lee**, B. M. Kwak, H. G. Kim, and D. A. Lowther, "Smooth boundary topology optimization for electrostatic problems through the combination of shape and topological design sensitivities," *IEEE Trans. Magn.*, Vol. 44, No. 6, pp. 1002-1005, 2008
41. C. H. Chung, **S. Lee**^{*}, B. M. Kwak, G. W. Kim, and J. H. Kim, "A delay line circuit design for crosstalk minimization using genetic algorithm," *IEEE T. Comput. Aid. D.*, Vol. 27, No. 3, pp. 578-583, 2008
42. **S. Lee**, and B. M. Kwak, "Smooth boundary topology optimization for eigenvalue performance and its application to design of flexural stage," *Eng. Optimiz.*, Vol. 40, No. 3, pp. 271-285, 2008
43. K. N. Song and **S. Lee**, "Performance analysis and test on the KAERI devised spacer grids for PWRs," *Journal of Power and Energy Systems*, Vol. 2, No. 1, pp. 47-56, 2008
44. K. N. Song, H. Y. Lee, Y. W. Kim, and **S. Lee**, "Preliminary Design Analysis of a Hot Gas Duct for the NHDD Program at Korea," *Adv. Mat. Res.*, Vol. 33-37, pp. 1227-1232, 2008
45. K. N. Song, S. H. Lee, and **S. Lee**, "Impact Analysis and Test for The Space Grid Assembly of a Nuclear Fuel Assembly," *Int. J. Mod. Phys. B*, Vol. 22, No. 9, 10, and 11 pp. 1228-1234, 2008
46. **S. Lee**, I. Y. Kim, and B. M. Kwak, "Smooth boundary topology optimization using B-spline and hole generation," *International Journal of CAD/CAM*, Vol. 7, No. 1, pp. 16-31, 2007
47. K. N. Song, **S. Lee**, and S. H. Lee, "Performance evaluation of new spacer grid shapes for PWRs," *Nucl. Eng. Technol.*, Vol. 39, No. 6, pp.737-746, 2007
48. **S. Lee** and B. M. Kwak, "Automatic generation of orthogonal arrays and its application to a two-step structural optimization," *Transactions of the KSME A*, Vol. 27, No. 12, pp. 2047-2054, 2003 (in Korean)

Conference Papers:

1. M. Sung, **S. Lee**, D.E. Burns, and J.T. Persia, "Selective Amplification and Suppression of Strain in a Multi-Axis Force Sensor Using Topology Optimization." *Proceedings of the International Design Engineering Technical Conferences (IDETC)*, Boston, MA, USA, Aug. 2023
2. W. Xian, and **S. Lee**, "Experimental Study on Frequency Up Conversion Utilizing a Pendulum Mechanism for Energy Harvesting." *International Design Engineering Technical Conferences (IDETC)*, Boston, MA, USA, Aug. 2023
3. J. Han, and S. Lee, "Simulation-Based Deep Learning Technique for Bolt Loosening Diagnosis in Bolt Jointed Plates Using PZT Sensors," *2023 World Congress on Advances in Structural Engineering and Mechanics*, Seoul, Korea, Aug. 2023
4. C. Mullen and **S. Lee**, "Effect of Misalignment of Inductive Wireless Power Transfer Coils," *49th Power Sources Conference*, Fort Washington, MD, Jun. 2023
5. J. Jung, Y. Yu, and **S. Lee**, "Delay Line Circuit Design Optimization for Crosstalk Minimization using Reinforcement Learning," *Applied Artificial Intelligence Conference (AAiCON) 2022*, Daejeon, Republic of Korea, Jul. 2022
6. H. Lee, S. Kim, A. Rohan, I. Raouf, H. Kim, and **S. Lee**, "Deep Scattering Coefficient Features based Rotate Vector (RV) Reducer Fault Segregation (poster presentation)," *Asia Pacific Conference of the Prognostics and Health Management Society*, Jeju, Republic of Korea, Sep. 2021
7. S. Cheon, J. Park, J. Lee, and **S. Lee**, "A study on the structural design optimization of a co-axial shrouded drone based on surrogate modeling and CFD simulation (poster presentation)," *Asia Pacific Conference of the Prognostics and Health Management Society*, Jeju, Republic of Korea, Sep. 2021
8. M. Sung, **S. Lee**, and D. Burns, "Design of a Wind Tunnel Balance using Topology Optimization

- Considering Multifunctional Stress Performance,” AIAA Science and Technology Forum and Exposition (SciTech) 2021, Virtual, Jan. 2021
9. M. Sung, **S. Lee**, and D. Burns, “Design of Wind Tunnel Balance Structure Using Robust Topology Optimization Using Multiple Stress Constraints,” presented at ASME International Mechanical Engineering Congress and Exposition (IMECE), Virtual, Nov. 2020
 10. C. Mullen and **S. Lee**, “Optimized Wireless Power Transfer,” ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Virtual, Sep. 2020
 11. A. Eshghi, **S. Lee**, H. Jung, and P. Wang, “Design of a probabilistic health monitoring system using embedded piezoelectric patch sensors,” ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Louisville, KY, USA, Sep. 2019
 12. S. Nezami and **S. Lee**, “Mathematical modeling of a two degree of freedom Vibration energy harvester for low speed rotary structure application,” Proceedings of the International Design Engineering Technical Conferences (IDETC), Anaheim, CA, USA, Aug. 2019
 13. A. Lanjile, M. Younis, S.-J. Kim, and **S. Lee**, “Exploiting multi-modal sensing for increased detection fidelity of pipeline leakage,” Proceedings of the International Design Engineering Technical Conferences (IDETC), Anaheim, CA, USA, Aug. 2019
 14. L. McCullum, **S. Lee**, and L. Zhu, “Use of piezoelectric material for advanced and cost-effective tumor screening,” ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), San Antonio, TX, USA, Sep. 2018
 15. S. Nezami, H. Jung, and **S. Lee**, “Dynamics of vibration energy harvester governed by gravity and magnetic force in a rotating wind turbine blade,” ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), San Antonio, TX, USA, Sep. 2018
 16. K. Asadi, S. Nezami, H. Brahmi, **S. Lee**, and H. Cho, “Characterization and optimization of 1:2 internal resonance in a stepped fixed-fixed microbeam (presentation only),” the International Design Engineering Technical Conferences (IDETC), Quebec City, Canada, Aug. 2018
 17. M. Sung and **S. Lee**, “Design of high precision null balancing module using topology optimization (presentation only),” the International Design Engineering Technical Conferences (IDETC), Quebec City, Canada, Aug. 2018
 18. H. Jung, S. Chervin, M. Smith, and **S. Lee**, “Design of an impact-driven piezoelectric energy harvester with gravity-induced rotator for wind turbine blade monitoring system (presentation only),” SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2018, Denver, Colorado, USA, Mar. 2018
 19. R. Fan, D. Joe, P. Shah, H. Jung, **S. Lee**, M. A. Melo, and R. Masri, “Design parameter study on piezoelectric energy harvester for scavenging human mandible deformation energy (presentation only),” SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2018, Denver, Colorado, USA, Mar. 2018
 20. A. Eshghi, **S. Lee**, M. K. Sadoughi, C. Hu, Y. C. Kim, and J. Seo, “Experimental verification of tire energy harvester designed via reliability based design optimization method,” SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2018, Denver, Colorado, USA, Mar. 2018
 21. H. Jung, **S. Lee**, H. Jabbar, S. Y. Jeong, and T. H. Sung, “Self-Start Piezoelectric Energy Harvesting Circuit with Adjustable UVLO Converter for Wireless Sensor Network,” ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Snowbird, UT, USA, Sep. 2017
 22. A. Eshghi, **S. Lee**, and Y-C Kim, “Design under Uncertainty for a Piezoelectric Energy Harvester to Power a Tire Pressure Monitoring System,” Proceedings of the International Design Engineering Technical Conferences (IDETC), Cleveland, OH, USA, Aug. 2017
 23. S. Nezami, **S. Lee**, and K-W Kang, “Design of Leaf Spring Structure to Improve Power and Structural Integrity of a Vibration Energy Harvester,” PHM Asian Pacific 2017, Jeju, Korea, July 2017

24. M. Sung, **S. Lee**, and N. Kim, "Simultaneous Optimization of Printing Angle and Geometry for Additive Manufacturing using Topology Optimization," Proceedings of the 12th World Congress on Structural and Multidisciplinary Optimization (WCSMO12), 5 - 9 June 2017, Braunschweig, Germany
25. V. Dayal and **S. Lee**, "Air Curtain Development: An Energy-Harvesting Solution for Hinged Doors," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2017, Portland, Oregon, USA, Mar. 2017
26. C. Mullen and **S. Lee**, "Experimental Verification and Optimization of a Linear Electromagnetic Energy Harvesting Device," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2017, Portland, Oregon, USA, Mar. 2016
27. S. Nezami, **S. Lee**, K. Kang, and J. Kim, "Improving Durability of a Vibration Energy Harvester Using Structural Design Optimization," ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Stowe, VT, USA, Sep. 2016
28. C. Mullen and **S. Lee**, "Optimization of an Electromagnetic Energy Harvesting Backpack under Actual Walking and Running Scenarios," ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Stowe, VT, USA, Sep. 2016
29. K. Ahmed and **S. Lee**, "Mechanical Motion Conversion from Reciprocating Translation to One-Directional Rotation for Effective Energy Harvesting," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2016, Las Vegas, USA, Mar. 2016
30. A. Eshghi, **S. Lee**, H. Lee, Y-C Kim, "Parameter Study and Optimization for Piezoelectric Energy Harvester for TPMS Considering Speed Variation," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2016, Las Vegas, USA, Mar. 2016
31. M. Bakhtiarinejad, J. Joo, and **S. Lee**, "A New Topology Optimization Method for Simultaneous Design of Component Layout and Frame Structure of Aircraft Wing," AIAA Science and Technology Forum and Exposition (SciTech) 2016, San Diego, USA, Jan. 2016
32. S. Seong, C. Mullen, and **S. Lee**, and C. Hu, "Reliability-Based Design Optimization for Nonlinear Energy Harvesters," ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Colorado Springs, CO, USA, Sep. 2015
33. **S. Lee**, N. Kim, and J. Joo, "Load-Path Design and Control Using Topology Optimization," 11th World Congress on Structural and Multidisciplinary Optimization, Sydney, Australia, Jun. 2015
34. S. Seong, **S. Lee**, and C. Hu, "Reliability-Based Design Optimization for Nonlinear Energy Harvesters," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2015, San Diego, USA, Mar. 2015
35. S. Seong and **S. Lee**, "Design of nonlinear energy harvester with snap-through buckling mechanism," Proceedings of the International Design Engineering Technical Conferences (IDETC), Buffalo, NY, USA, Aug. 2014
36. **S. Lee**, C. Dibernardo and A Tovar, "Outrigger system design of tall building using topology optimization," 8th China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems, Gyeongju, Korea, May 2014
37. **S. Lee** and F. Semperlotti, "Optimal synthesis of passive adaptive structural networks for damping and stiffness improvement," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2014, San Diego, USA, Mar. 2014
38. M. Kang, **S. Lee** and J. Kim, "Optimal design of a mechanically decoupled six-axis force/torque sensor based on the principal cross coupling minimization," SPIE Smart Structures/Non-Destructive Evaluation (NDE) 2014, San Diego, USA, Mar. 2014
39. A. T. Almaktoom, Z. Wang, P. Wang, and **S Lee**, "Smart Sensing Function Design Using Multifunctional Material for Failure Diagnostics and Prognostics," 10th World Congress on Structural and Multidisciplinary Optimization, Orlando, USA, May 2013

40. **S. Lee**, "A Durable and Sustainable Strap Type Electromagnetic Harvester for TPMS," Sensor Expo & Conference, Chicago, USA, Jun. 2012
41. **S. Lee**, K. Khadke, A. Tovar, "Uncertainty Propagation and Stochastic Sensitivity Analysis for Ceramic Composite Material Design Optimization," Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC), Notre Dame, USA, Jun. 2012
42. **S. Lee**, S. Bobby, A. Tovar, A. Kareem, S. M. J. Spence, "Shape and Topology Sculpting of Tall Buildings under Aerodynamic Loads," Proceedings of ASCE Structures Congress, Chicago, USA, Mar. 2012
43. **S. Lee** and A. Tovar, "Topology Optimization of Energy Harvesting Skin Structure Utilizing Harmonic Vibration," Proceedings of the International Design Engineering Technical Conferences (IDETC), Washington D.C., USA, Aug. 2011
44. **S. Lee**, A. Tovar, J. E. Renaud, and A. Kareem, "Topological Optimization of Building Structural Systems and their Shape Optimization under Aerodynamic Loads," Proceedings of the 13th International Conference on Wind Engineering, Amsterdam, The Netherlands, Jul. 2011
45. **S. Lee** and B. D. Youn, "Multimodal Energy Harvesting Skin Using Piezoelectric Unimorph Shell Structure," Proceedings of the 18th International Conference on Composite Materials, Jeju, Korea, Aug. 2011
46. **S. Lee**, B. D. Youn, and M. Giraud, "Designing Energy Harvesting Skin Structure Utilizing Outdoor Unit Vibration," Proceedings of the ASME International Design Engineering Technical Conferences (IDETC), Montreal, Quebec, Canada, Aug. 2010
47. **S. Lee**, and B. D. Youn, "A New Energy Harvesting Design Concept: Multimodal Energy Harvesting Skin," Proceedings of the AIAA/ISSMO Multidisciplinary Analysis and Optimization (MAO), Fort Worth, TX, USA, Aug. 2010
48. **S. Lee**, B. D. Youn, and B. C. Jung, "Robust Segment-Type Energy Harvester Powering Wireless Sensor for Building Automation," Proceedings of the International Design Engineering Technical Conferences (IDETC), San Diego, CA, USA, Aug. 2009
49. **S. Lee** and B. D. Youn, "Computer Model Calibration and Design Comparison on Piezoelectric Energy Harvester," Proceedings of the 12th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference, Victoria, British Columbia Canada, 2008
50. K. N. Song, **S. Lee**, and Y. W. Kim, "Pre-conceptual design of the main components for the NHDD program," Proceedings of the Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, Busan, Korea, pp. 48-51, May. 2007 (in Korean)
51. **S. Lee** and B. M. Kwak, "Design of flexural stage considering multiple constraints using smooth boundary topology optimization," Proceedings of the 7th World Congress on Structural and Multidisciplinary Optimization (WCSMO7), Seoul, Korea, May. 2007
52. C. H. Chung, **S. Lee**, B. M. Kwak, G. W. Kim, and J. H. Kim, "A delay line circuit layout for crosstalk minimization using genetic algorithm and experimental verification," Proceedings of the 7th World Congress on Structural and Multidisciplinary Optimization (WCSMO7), Seoul, Korea, May. 2007
53. D. H. Kim, **S. Lee**, B. M. Kwak, H. G. Kim, and D. A. Lowther, "Smooth boundary topology optimization for electrostatic problems through the combination of shape and topological design sensitivities," Proceedings of the 16th International Conference on the Computation of Electromagnetic Fields (COMPUMAG 2007), Aachen, Germany, Jun. 2007
54. K. N. Song, S. H. Lee, and **S. Lee**, "Impact Analysis and Test for the Spacer Grid Assembly of a Nuclear Fuel Assembly," Proceedings of the 6th International Symposium on Impact Engineering (ISIE2007),

Daejeon, Korea, Sep. 2007

55. **S. Lee** and K. N. Song, "The evaluation of impact strength of IFM support grid and its experimental verification," Proceedings of the Korean Nuclear Society (KNS) Annuals Spring & Fall Conference, Yongpyeong, Korea, Oct. 2007 (in Korean)
56. K. N. Song and **S. Lee**, "Analysis of Impact Strength due to the Variation of Weld Length for the Nuclear Spacer Grid Assembly," Proceedings of the Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, Yongpyeong, Korea, pp. 17-20, Nov. 2007 (in Korean)
57. **S. Lee** and B. M. Kwak, "Design of a flexural stage using smooth boundary topology optimization," Proceedings of the 4th China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems (CJK-OSM4), Kunming, China, Nov. 2006
58. C. H. Chung, **S. Lee**, B. M. Kwak, G. W. Kim, and J. H. Kim, "Delay line circuit design for crosstalk minimization using genetic algorithm," Proceedings of the 4th China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems (CJK-OSM4), Kunming, China, Nov. 2006
59. **S. Lee**, I. Y. Kim, and B. M. Kwak, "Smooth boundary topology optimization and its application to hip prosthesis design," Proceedings of the Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, Yongpyeong, Korea, Nov. 2005 (in Korean)
60. **S. Lee** and B. M. Kwak, "Two-step structural optimization using Taguchi method and finite difference method," Proceedings of the 1st Asia-Pacific International Conference on Computational Methods in Engineering (ICOME), Sapporo, Japan, Nov. 2003
61. **S. Lee** and B. M. Kwak, "Automatic generation of orthogonal arrays for the Taguchi method and applications to structural optimal design," Proceedings of the 2nd China-Japan-Korea Joint Symposium on Optimization of Structural and Mechanical Systems (CJK-OSM2), Busan, Korea, Nov. 2002
62. **S. Lee**, S. B. Shin, J. S. Kim, and B. M. Kwak, "DS/Block – a CAD-based software system for simulation of lifting and turnover of ship block," Proceedings of the Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, Jeju, Korea, 2001 (in Korean)
63. **S. Lee**, I. Y. Kim, and B. M. Kwak, "Continuum topology optimization," Proceedings of the 10th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference (MAO), Albany, NY, Sep. 2004
64. **S. Lee**, S. B. Shin, and B. M. Kwak, "A CAD-based software for the simulation of lifting and turnover of ship block," Proceedings of the Korean Society of Mechanical Engineering (KSME) Annuals Spring & Fall Conference, Ulsan, Korea, 2000 (in Korean)
65. **S. Lee**, J. S. Han, B. M. Kwak, and S. B. Shin, "Motion and structural analysis of a ship block under lifting and turnover operation," Proceedings of the First International Conference on Mechanical Engineering, Shanghai, China, No. 163, Nov. 2000

INVITED SEMINAR

Design Automation of Smart Material and Structure Systems Using Machine Learning Technique, Feb. 2024. United States Naval Academy, Annapolis, MD

Toward Design Automation of Smart Material and Structure Systems Using Machine Learning Technique – focused on Piezoelectric Applications, Jul. 2023. Sungkyunkwan University, Suwon, Korea

Toward Design Automation of Smart Material and Structure Systems Using Machine Learning Technique – focused on Self-powering Sensors for Rotary Machinery Monitoring and Diagnosis, Jul. 2023. Korea Institute of Machinery & Materials, Daejeon, Korea

Design of Energy Sustainable Sensor Node using Advanced Optimization Methodologies, Jan. 2022. Northeastern University, Boston, MA (virtual)

Design Optimization Methodologies for Practical Engineering Systems – focused on Capstone Design

Activities and Sensor/Harvester Design Research at UMBC, Jul. 2021. Andong National University, Andong, Korea (virtual)

Piezoelectric Energy Harvester and Sensor Network Design using Advanced Optimization Methodologies, Dec. 2020. Dongguk University, Seoul, Korea (virtual)

Piezoelectric Energy Harvester and Sensor Network Design using Advanced Optimization Methodologies, Jul. 2019. Intelligent Automation, Inc., Rockville, MD

Topology optimization case studies: civil/mechanical engineering systems design, Apr. 2018. Department of Civil Engineering, Johns Hopkins University, Baltimore, MD

Design Optimization of Energy Harvesting System for Its Practical Use, Jun. 2017. Korea Research Institute of Standards and Science, etc. , Daejeon, Korea

Topology Optimization for Additive Manufacturing, Jun. 2017. Korea Research Institute of Standards and Science, Ulsan, Korea

A New Topology Design for Additively Manufacturable Structure Considering Printing Parameters, Dec. 2016. National Institute of Standards and Technology, Gaithersburg, MD

Design Issues on Electromagnetic Vibration Energy Harvesting for Self-Powering Structural Monitoring, Dec. 2016. National Institute of Standards and Technology, Gaithersburg, MD

Toward Practical Linear Electromagnetic Harvester in Military Backpack, Sep. 2016. US Army CERDEC, Aberdeen, MD

Design Optimization of Energy Harvesters and Smart Sensing System, Jan. 2015. NAVSEA Warfare centers, Carderock, MD

Design Methodologies of Vibration Energy Harvester for Sustainable Monitoring System, May. 2014. Korea Atomic Energy Research Institute, Daejeon, Korea

On Design Methodologies of Nonlinear Energy Harvester toward Broadband Energy Harvesting, May. 2014. Korea Institute of Machinery and Materials, Daejeon, Korea

Energy Harvesting Devices for Battery-less Operation of Small Electronics, Mar. 2014. Department of Civil Engineering, Johns Hopkins University, Baltimore, MD

Energy Harvesting Devices for Battery-less Operation of Small Electronics, Department Seminar Series, Dec. 2013. University of Maryland School of Dentistry, Baltimore, MD

Energy Harvesting Technology toward Self-sustainable Engineering System, ME/ECE Research Seminars, Sep. 2011. Indiana University Purdue University Indianapolis, Indianapolis, IN

Design Optimization Methodologies for Energy Harvesting Devices – Piezoelectric and Electromagnetic Perspectives, Oct. 2012. Korea Institute of Machinery and Materials, Daejeon, Korea

Design Optimization Methodologies for Energy Harvesting Devices – Towards Practical Rail System Application, Oct. 2012. Korea Railroad Research Institute, Uiwang, Gyeonggi, Korea

Design Energy Harvesting Devices for Battery-less Operation of Small Electronics, Dec. 2013. University of Maryland School of Dentistry, Baltimore, MD

PROFESSIONAL ACTIVITIES

Proposal Review Panel:

National Science Foundation, 2013, 2015, 2018, 2020, 2021

ASME Technical Committee Member

Adaptive Structures & Material Systems Group, 2015~

Chair, ASME SMASIS Energy Harvesting Symposium, 2018~2022

Consultation:

“Parametric study on power of a tunable rotational energy harvester,” Innovation KR, Korea, 2014
“Durable high efficiency heat engine based on multi-component shape memory alloys (DHENG – SMA),” Intelligent Automation Inc., Rockville, MD, 2019
“ActiveCharge™: a magnet-driven piezoelectric energy harvester for wind turbine monitoring,” ACTIVEcharge LLC, Halethorpe, MD, 2019

Conference session chair:

“Energy Harvesting and Storage Applications,” in ASME International Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Louisville, Kentucky, USA, Sep 2019
“Understanding Dynamics and Waves for SHM,” in ASME International Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Louisville, Kentucky, USA, Sep 2019
“Nonlinear and Broadband Harvesting I,” in ASME International Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), San Antonio, Texas, USA, Sep 2018
“Nonlinear and Broadband Harvesting II,” in ASME International Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), San Antonio, Texas, USA, Sep 2018
“Energy Harvesting - Design Optimization,” in SPIE Smart Structures/NDE 2018 Symposium, Denver, Colorado, USA, Mar 2018
“Energy Harvesting - Design Optimization,” in SPIE/SS-NDE 2018, Denver, Colorado, USA, Mar 2018
“Design of Interface Circuits,” in ASME SMASIS 2017, Snowbird, Utah, USA, Sep 2017
“Session 7-5 Elastic Wave Harvesting,” in ASME 2016 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS2015), Stowe, VT, USA, Sep 2016
“Nonlinear and Broadband Energy Harvesting II,” in ASME 2015 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS2015), Colorado Springs, CO, USA, Sep 2015
“Energy Harvesting and Scavenging: General Piezoelectrics,” in SPIE Smart Structures/NDE 2015 Symposium, San Diego, USA, Mar 2015
“Energy Harvesting 1,” in ASME International Design Engineering Technical Conferences (IDETC), Buffalo, USA, Aug 2014
“Optimization in Core Engineering Areas (I),” in 8th China-Japan-Korea Joint Symposium on Optimization on Structural and Mechanical Systems, Gyeongju, Korea, May 2014
“Optimization in Emerging Areas (1),” in 10th World Congress on Structural and Multidisciplinary Optimization, Orlando, USA, May 2013

Membership:

AIAA (American Institute of Aeronautics and Astronautics)
ASME (American Society of Mechanical Engineers)
ISSMO (International Society for Structural and Multidisciplinary Optimization)

Student advisees (graduated):

Sumin Seong (MS): Design optimization of nonlinear vibration energy harvester (2013 – 2015)
Mahsan Bakhtiarnejad (MS): Hybrid design optimization methodology for subsystem allocation and topology optimization (2013 – 2015)
Christopher Mullen (MS): Design optimization of an electromagnetic energy harvester backpack for utilization of human walking energy (2014 – 2016)
Richard Fan (MS): Feasibility study of an implantable piezoelectric energy harvester utilizing human mandibular deformation to power an implantable biosystem (2014 – 2016)

Amin Toghi Eshghi (PhD): Hybrid reliability analysis methods and its applications to high dimensional reliability-based design optimization (2015 – 2019)

Saman Nezami (PhD): Modeling and analysis of a vibration energy harvester utilizing frequency up-conversion for low and varied speed of rotary structures (2015 – 2020)

Tom Chaisson (MS): Design optimization of a wind tunnel force balance using stepwise response surface method (2020 – 2021)

Myung Kyun Sung (PhD): Design methodology for multifunctional stress/strain performances of multi-loading sensors using topology optimization (2016 – 2022)

Jude Thaddeus Persia (MS): Neural network-based surrogate modeling for post-processing of topology optimized structures (2022 – 2023)

Peer Reviewer:

Journal of Mechanical Design

Journal of intelligent Material Systems and Structures

Smart Materials and Structures

International Journal for Numerical Methods in Engineering

Structural and Multidisciplinary Optimization

Engineering Structures

Engineering Optimization

Optimization and Engineering

SKILLS

FEM: ANSYS, NASTRAN, ABAQUS, HyperMesh, LS-DYNA, FLUENT

CAD: Pro/ENGINEER, IDEAS, SolidWorks, CATIA, Autodesk Inventor, AutoCAD

Programming Languages: MATLAB, C/C++, FORTRAN, LabView for NI DAQ

SERVICE

Guest journal editor, Special Issue on “Energy Harvesting Systems for Powering Wireless Sensors,” Electronics (ISSN 2079-9292), MDPI, 2019 – 2021

Undergraduate Program Director, Mechanical Engineering Department, UMBC, 2021 – 2022