

Ryan L. Harne, Ph.D.

James F. Will Career Development Associate Professor, Department of Mechanical Engineering
Director, Laboratory of Sound and Vibration Research. [LSVR.psu.edu](https://lsvr.psu.edu)

The Pennsylvania State University

Co-Founder and Chief Technology Officer, [HyperDamping, Inc.](https://hyperdamping.com)

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EDUCATION

Ph.D., Mechanical Engineering, Virginia Tech, 2012.

M.S., Mechanical Engineering, Virginia Tech, 2009.

B.S., Mechanical Engineering, Virginia Tech, 2008.

Minor, Industrial Design (School of Architecture and Design), Virginia Tech, 2008.

EMPLOYMENT

The Pennsylvania State University, Department of Mechanical Engineering.

James F. Will Career Development Associate Professor. August 2020 - present.

HyperDamping, Inc., Columbus, OH

Co-Founder and Chief Technology Officer. August 2018 - present.

Lead the development of commercial noise, vibration, and shock mitigation products. Identifying, initiating, and cultivating client relationships. Managing supply chain logistics and inventory.

The Sound Enterprise LLC., Columbus, OH

Founder. March 2021 - present.

Consulting for noise and vibration needs throughout engineering, medicine, and science applications.

The Ohio State University, Department of Mechanical and Aerospace Engineering.

Assistant Professor. August 2015 - August 2020.

University of Michigan, Mechanical Engineering, Structural Dynamics and Controls Lab (SDCL).

Postdoctoral Research Fellow. June 2012 - July 2015. *Mentor*: Dr. Kon-Well Wang.

Virginia Tech, Mechanical Engineering, Vibration and Acoustics Labs (VAL).

Graduate Research Assistant. May 2008 - May 2012. *Advisors*: Drs. Ricardo A. Burdisso and Chris R. Fuller.

Virginia Tech, Mechanical Engineering, VAL.

Undergraduate Research Assistant. April 2007 - May 2008. *Advisor*: Dr. Marty E. Johnson.

EXPERTISE

- Guiding engineers to promote the health, sustainability, well-being, and security of society
- Creating engaging instructional tools and content to attract youth to STEM subjects
- Startup leadership: R&D, sourcing, logistics, sales, marketing, messaging, growth, expansion
- Dynamics, vibrations, acoustics, and waves pertaining to a variety of interdisciplinary areas including engineering, materials science, physics, and biology
- Soft matter physics and applications to intelligent materials, metamaterials, soft robotics, functional devices, active media, and protective materials and systems

- Linear and nonlinear wave propagation, including applications to acoustics in medicine such as cavitation, high-intensity focused ultrasound, and other acoustic treatments in industry
- Design, modeling, and experimentation for: structural-acoustic performance; active/passive noise, vibration, and shock mitigation materials; acoustic signal processing; vibration/wave energy guiding/harvesting; sensing and health monitoring via ultrasonic imaging and machine learning
- Adaptive structures and material systems for multifunctional capabilities and properties, including formulation and study of metastructures and metamaterials and soft, flexible electronic materials

HONORS AND AWARDS

- Invited speaker for the 2022 Gordon Research Conference "Imparting Intelligence in and Through Self-Learning Materials and Structures". Ventura, CA. September 2022.
- Invited speaker for the 2022 National Academy of Engineering China-America Frontiers of Engineering Conference. Irvine, CA. July 2022.
- 2021 U.S. Air Force Research Lab Summer Faculty Fellowship. RXAS Soft Matter Materials Branch, Materials and Manufacturing Directorate, WPAFB, OH. May 2021.
- 2020 ASME CD Mote Jr. Early Career Award. August 2020.
- 2019 ASME Gary Anderson Early Achievement Award. September 2019.
- 2019 U.S. Air Force Research Lab Summer Faculty Fellowship. RXAS Soft Matter Materials Branch, Materials and Manufacturing Directorate, WPAFB, OH. March 2019.
- Invitation to participate in the ARO Workshop on "Meta-structures: Dynamics, Topology and Related Opportunities". May 2018.
- National Science Foundation (NSF) CAREER Award. March 2018.
- Recognized by the ASME as a "Newsmaker" for the Society. October 2017. <https://www.asme.org/topics-resources/society-news/asme-news/newsmakers>
- Invitation to participate in the NSF Workshop on "Acoustics: New Fundamentals and Applications". October 2017.
- 2017 Committee on Women in Acoustics Young Investigator Travel Grant. The Acoustical Society of America. "This competitive grant is awarded to promising young acousticians who present their work at an ASA Meeting". Boston, MA, USA, June 2017.
- 2017 U.S. Air Force Research Lab Summer Faculty Fellowship. RQHF Hypersonic Sciences Branch, Aerospace Systems Directorate, WPAFB, OH. May 2017.
- 2017 ASME Best Paper Award in Structures and Structural Dynamics. See "Publications".
- 2016 ASME Haythornthwaite Young Investigator Award, facilitated by the Applied Mechanics Division. "This Award recognizes excellence in early career tenure-track faculty researchers engaged in studies in the areas of theoretical and applied mechanics". October 2016.
- Royal invitation to present our research "Energy-Generating Mechanical Trees" in the audience of H.S.H. Prince Albert II of Monaco and His Excellency Bernard Fautrier, Vice President and CEO of the Prince Albert II of Monaco Foundation at The Ohio State University. August 2016.
- Invitation and Travel Grant to participate in the NSF Workshop on "Energy Transport and Control in Solids and Structures". May 2015.

- Acoustical Society of America (ASA) Royster Award: Scholarship for research excellence in noise control and hearing conservation. 2011
- NASA-Virginia Space Grant Consortium (VSGC) Research Fellowship: For exhibiting "high academic achievement and promise" in aerospace-related fields of research. 2011
- North Carolina Chapter of the ASA Student poster competition 1st prize. 2011
- North Carolina Chapter of the ASA Student poster competition 2nd prize. 2010
- Virginia Tech College of Engineering Scholarship. 2006

STUDENTS ADVISED. SUMMARY TO DATE: **GRADUATED 4 PHD, 7 MS STUDENTS**

Graduate students advised

1. Tholen, Haley. *Ph.D.* 08/2021 to present. Project: "Multifunctional material integrations for photoresponsive soft, active matter".
 - Ph.D. Qualifying exam passed, 2022.
2. Bentley, Christopher. *Ph.D.* 08/2020 to present. Project: "A foundation for deployable structures devised by origami-mechanism synthesis".
 - Ph.D. Qualifying exam passed, 2021.
 - Ph.D. Comprehensive exam passed, 2022.
3. Hyatt, Lance. *Ph.D.* 08/2020 to present. Project: "Intelligent matter with soft, digital mechanical materials".
 - Ph.D. Qualifying exam passed, 2021.
 - Ph.D. Comprehensive exam passed, 2022.
4. El-Helou, Charles. *Ph.D.* 05/2019 to present. Project: "Information processing in soft conductive mechanical materials".
 - U.S. Air Force Research Lab Summer Faculty-Student Fellowship Program, 2019.
 - U.S. Air Force Research Lab Summer Faculty-Student Fellowship Program, 2021.
 - Ph.D. Qualifying exam passed, 2018.
 - Ph.D. Comprehensive exam passed, 2022.
5. Ajaz, Mahnoor. *M.S.* 01/2020 to present. Project: "Parametric acoustic arrays for personalized sound fields in vehicle environments".
 - M.S. degree conferral 05/2021. **Graduate program complete at OSU.**
 - Successful thesis defense, 04/2021.
 - Now at: Researcher at GE, Schenectady, NY.
6. Srinivas, Vivek. *M.S.* 01/2019 to 05/2020. Thesis: "Adaptive, wave guiding acoustic arrays using circularly symmetric reconfigurable structures".
 - M.S. degree conferral 05/2020. **Graduate program complete at OSU.**
 - Successful thesis defense, 04/2020.
 - Now at: Ph.D. student at The Ohio State University, Columbus, OH.
7. Zhao, Ningxiner. *M.S.* 08/2018 to 05/2020. Thesis: "Design and analysis of piecewise assembled, reconfigurable acoustic arrays for sound wave focusing".
 - M.S. degree conferral 05/2020. **Graduate program complete at OSU.**
 - Successful thesis defense, 04/2020.
 - Now at: Ph.D. student at The Ohio State University, Columbus, OH.

8. Nick, Zachary. *M.S.* 08/2018 to 05/2020. Thesis: "Foundations for smart metamaterials by liquid metal digital logic and magnetoelastic properties control".
 - U.S. Air Force Research Lab Summer Faculty-Student Fellowship Program, 2019
 - M.S. degree conferral 05/2020. **Graduate program complete at OSU.**
 - Successful thesis defense, 04/2020.
9. Yeh, Sih-Ling. *Ph.D.* 08/2017 to present. Project: "Lightweight, integrated engineered material systems for broadband vibration energy attenuation in structural systems".
 - Ph.D. degree conferral 05/2021. **Graduate program complete at OSU.**
 - Successful Ph.D. dissertation defense, 04/2021.
 - Ph.D. Candidacy exam passed, 2019.
 - Ph.D. Qualifying exam passed, 2018.
10. Cai, Wen. *Ph.D.* 08/2017 to present. Project: "Understanding and harnessing coupled mechanical-electrical nonlinearities and multimodality for advancements in vibration energy harvesting systems".
 - Ph.D. degree conferral 05/2021. **Graduate program complete at OSU.**
 - Successful Ph.D. dissertation defense, 04/2021.
 - **Awarded** the 2019 OSU Presidential Fellowship, the highest honor for PhD students approaching their dissertation defense, 11/2019.
 - Ph.D. Candidacy exam passed, 2019.
 - Ph.D. Qualifying exam passed, 2018.
 - Now at: Postdoctoral researcher at University of Michigan.
11. Goodpaster, Ben. *M.S.* 05/2017 to 05/2018. Thesis: "Analytical modeling and impedance characterization of nonlinear, steady-state structural dynamics in thermomechanical loading environments".
 - **Awarded** the 2019 Hirschvogel Excellence Award for best OSU MAE Master's Thesis in the calendar year 2018, 04/2019.
 - U.S. Air Force Research Lab Summer Faculty-Student Fellowship Program, 2017.
 - U.S. Department of Defense Science Mathematics and Research for Transformation (SMART) Scholarship
 - M.S. degree conferral 5/2018. **Graduate program complete at OSU.**
 - Successful thesis defense, 4/2018.
 - Now at: Researcher at Los Angeles Air Force Base, Space and Missile Systems Center.
12. Sears, Nick. *M.S.* 05/2017 to 05/2018. Thesis: "Investigations into the quasi-static and dynamic properties of flexible hybrid electronic material systems".
 - **Awarded** the Air Force Research Lab / Dayton Area Graduate Studies Institute (AFRL/DAGSI) Student-Faculty Research Fellowship, 2017.
 - M.S. degree conferral 8/2018. **Graduate program complete at OSU.**
 - Successful thesis defense, 4/2018.
 - Now at: Researcher at NSWC Carderock Division, MD.
13. Dai, Quanqi. *M.S.* 05/2016 to 12/2017. Thesis: "Self-powering sensors for system condition monitoring applications through the captured energy in multistable dynamic structures".
 - M.S. degree conferral 12/2017. **Graduate program complete at OSU.**
 - Successful thesis defense, 11/2017.
 - Now at: Apple, Inc.

14. Cui, Shichao. *Ph.D.* 08/2016 to 05/2020. Thesis: "Elastomeric material systems for vibroacoustic energy control".
 - Ph.D. degree conferral 05/2020. **Graduate program complete at OSU.**
 - Successful Ph.D. dissertation defense, 04/2020.
 - Ph.D. Candidacy exam passed, 2018.
 - Ph.D. Qualifying exam passed, 2017.
 - **Awarded** the 2017 Beverley Swain Staley Leadership Graduate Scholarship from the Women in Transportation Society, 2018.
 - Now at: Apple, Inc.
15. Zou, Chengzhe. *Ph.D.* 08/2016 to 12/2019. Thesis: "Structural acoustics of reconfigurable tessellated arrays for acoustic energy guiding".
 - Ph.D. degree conferral 12/2019. **Graduate program complete at OSU.**
 - Successful Ph.D. dissertation defense, 11/2019.
 - **Awarded** the 2018/19 Future Academic Scholars Training (FAST) Fellowship by the OSU MAE Department, 2018.
 - Ph.D. Candidacy exam passed, 2018.
 - Ph.D. Qualifying exam passed, 2017.
 - Now at: Apple, Inc.

Undergraduate research students advised

1. Edwards, Laura. 01/2022 to present. Project: "Design of massively deployable acoustic arrays"
2. Burlovic, Benjamin. 01/2022 to present. Project: "Machine learning methods for defect characterization in cellular composites"
3. Noguera-Devers, Jamila. 09/2021 to present. Project: "Development of motion control for automated ultrasonic condition monitoring of composites"
4. George, Addison. 09/2021 to present. Project: "Development of motion control for automated ultrasonic condition monitoring of composites"
5. Kraklio, Tannon. 09/2021 to 05/2022. Project: "Additively manufactured mechanical integrated circuits"
6. Corridoni, Larry. 09/2021 to 05/2022. Project: "Mechanical cloaks in soft matter"
7. Cliber, Joseph Aidan. 09/2021 to present. Project: "PVDF-based energy harvesters for electrical power capture in extreme environments"
8. Back, Cameron. 09/2021 to present. Project: "Structural synthesis of cut-out resonators for control of noise and vibration"
 - **Awarded** the Richard E. Biancardi Memorial Scholarship in Mechanical Engineering, 05/2022.
9. Moore, Nick. 01/2021 to 05/2022. Project: "Determination of deployable transducer array dimensions for treating ocular melanomas"
 - **Awarded** the Richard E. Biancardi Memorial Scholarship in Mechanical Engineering, 05/2022. Successful thesis defense 05/2022.
10. LaMarche, Nolan. 5/2019 to 08/2020. Project: "Strategies for active and reconfigurable origami structures"
11. Lebrón, Anna. 10/2018 to 05/2020. Project: "Soft material systems for broadband noise control"

12. Frost, Katie. 05/2018 to 12/2020. Project: "Integrated liquid metal elastomers for flexible electronics"
 - **Awarded** College of Engineering Honors Research Scholarship, 12/2019. Successful thesis defense, 12/2020.
 - **Awarded** College of Engineering Undergraduate Summer Research Scholarship, 05/2018.
13. Maloney, Andrew. 05/2018 to 09/2018. Project: "Efficient power management circuits for vibration energy harvesting"
14. Grimes, Carter. 05/2018 to 12/2018. Project: "Experimental setup, undertaking, and assessment of ultrasonic parametric arrays for audio applications"
15. Inshaar, Abdullahi. 01/2018 to 05/2019. Project: "Origami inspired tessellation arrays for reconfigurable antennas"
 - **Awarded** First Prize for Best Research Poster Presentation in the "Structural and Material Fabrication and Design" segment of the 2019 Denman Undergraduate Research Forum, a highly competitive forum event, 02/2019.
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2018. Successful thesis defense, 04/2019.
16. Shah, Hamil. 12/2017 to 05/2019. Project: "Modeling and simulation of folding-tuned origami-inspired reconfigurable antennas"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2018.
17. El-Helou, Charles. 09/2017 to 05/2019. Project: "Experimental characterization of magnetoelastic metamaterials"
 - **Awarded** Third Prize for Best Research Poster Presentation in the "Structural and Material Fabrication and Design" segment of the 2019 Denman Undergraduate Research Forum, a highly competitive forum event, 02/2019.
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2018. Successful thesis defense, 04/2019.
18. Kosnik, John. 09/2017 to 05/2018. Project: "Mechanical properties and dynamic response of functionally graded metamaterials under constraints"
19. DeNise, Adam. 09/2017 to 05/2019. Project: "Experimental studies of non-local coupling in multistable structures driven by harmonic forces"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2018. Successful thesis defense, 04/2019.
20. Luke, Mark. 08/2017 to 02/2018. Project: "Computational studies of modular mechanics and acoustics of tessellated arrays"
21. Vuyk, Peter. 10/2016 to 12/2018. Project: "High-speed 2D-digital image correlation to quantify energy mitigation behaviors of engineered elastomeric materials subjected to shock"
 - **Awarded** College of Engineering Honors Research Scholarship, 12/2017. Successful thesis defense, 12/2018.
 - **Awarded** Third Prize poster presentation at the OSU Denman Undergraduate Research Forum, 03/2018.
 - **Awarded** 2018 Outstanding Leadership and Research Award from the OSU Department of Mechanical and Aerospace Engineering, 04/2018.
 - Now at: Cummins, Columbus, IN.

22. Park, Inhyuk. 09/2016 to 12/2017. Project: "Converting impulsive kinetic energy to DC power for self-powered microelectronics by tunable, nonlinear vibration energy harvester"
 - **Awarded** College of Engineering Honors Research Scholarship, 01/2017. Successful thesis defense, 11/2017.
23. Urbanek, Daniel. 09/2016 to 12/2016. Project: "Experimental study of exploiting local buckling modes in constrained metamaterials"
 - Now at: Mechanical engineer at STERIS Corporation, a healthcare products provider
24. Sears, Nick. 08/2015 to 05/2017. Project: "Computational and experimental studies of microvascular void features for passive-adaptation of structural panel dynamic performance"
 - NASA Glenn Higher Education Summer Internship, summer 2016.
 - **Awarded** College of Engineering Honors Research Scholarship, 05/2016. Successful thesis defense, 03/2017.
 - Now at: Graduate school, OSU. See *Graduate students advised*.
25. Song, Yu. 08/2015 to 05/2017. Project: "Optimizing hyperdamping materials for enhancing vibration control and shock attenuation properties"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2016. Successful thesis defense, 04/2017.
 - Now at: Graduate school, U.C. Berkeley
26. Goodpaster, Ben. 08/2015 to 05/2017. Project: "An experimental investigation of the impedance of coupled multistable structures subjected to harmonic excitation"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2016. Successful thesis defense, 04/2017.
 - Now at: Graduate school, OSU. See *Graduate students advised*.
27. Bishop, Justin. 01/2016 to 05/2017. Project: "Periodic hyperdamping inclusions in resonant metamaterials for control of broadband vibroacoustic energy"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2016. Successful thesis defense, 03/2017.
 - Now at: Engineer at Mettler Toledo, development of scientific metrology systems
28. Lynd, Danielle. 08/2015 to 05/2017. Project: "Origami-inspired acoustic transducer arrays: a first design and characterization study"
 - **Winner** of the Acoustical Society of America 2016 Robert W. Young Award for Undergraduate Student Research in Acoustics
 - http://acousticalsociety.org/funding_resources/fellowships_scholarships#young
 - **Best Paper** by a Young Presenter Award Third Prize from the Acoustical Society of America (ASA) at the 171st annual meeting in Salt Lake City, Utah, 05/2016.
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2016. Successful thesis defense, 04/2017.
 - Now at: Researcher at Norwood Medical, medical device design and manufacturing.
29. Saxena, Sansriti. 08/2015 to 05/2017. Project: "Development and study of hyperdamping protective material systems for shock mitigation"
 - **Awarded** College of Engineering Honors Research Scholarship, 08/2016. Successful thesis defense, 04/2017.
 - Now at: Researcher at DNV GL, engineering consulting firm

30. Dai, Quanqi. 08/2015 to 05/2016. Project: "An experimental study on the dynamic sensitivities of bistable structures under combined stochastic and harmonic excitations"
- **Awarded** College of Engineering Honors Research Scholarship, 12/2015. Successful thesis defense, 04/2016.
 - Now at: Graduate school, OSU. See *Graduate students advised*.

High school research student interns

1. Littman, Beth. 01/2020 to 05/2020. Project: "Soft flexible metamaterials with programmable digital logic circuits"
2. Groene, Adam. 06/2018 to 08/2018. Project: "Computational modeling of flat-foldable tessellated acoustic transducer arrays"
3. Rickard, Alexander. 01/2018 to 05/2019. Project: "Computational modeling of flat-foldable tessellated acoustic transducer arrays"
4. Wolf, Elijah. 10/2017 to 01/2018. Project: "Computational modeling of flat-foldable tessellated acoustic transducer arrays"
5. Crump, Joseph. 09/2016 to 05/2017. Project: "Optimizing acoustic directivity and focusing with origami-based transducer arrays"
 - Now at: Pursuing undergraduate degree at OSU
6. Swigert, Kate. 02/2016 to 05/2016. Project: "Designing a robotic data acquisition system to measure sound pressure"
 - Now at: Pursuing undergraduate degree at Columbus State Comm. Coll. prior to OSU

POSTDOCTORAL RESEARCHERS ADVISED

1. Pishvar, Maya. 08/2019 to 08/2021.
 - Now at: Assistant Professor in the Department of Mechanical Engineering, California State University, Northridge

PUBLICATIONS ‡

Books

1. R.L. Harne and K.W. Wang. *Harnessing Bistable Structural Dynamics: for Vibration Control, Energy Harvesting and Sensing*. Wiley. Chichester, United Kingdom. 2017. 408 pages. <http://www.wiley.com/WileyCDA/WileyTitle/productCd-1119128048.html>

Peer-Reviewed Journal Articles

1. C. El Helou, B. Grossmann, C.E. Tabor, P.R. Buskohl, and R.L. Harne. "Mechanical integrated circuit materials." *Nature*. 608:699-703. Aug. 2022.
2. C.S. Bentley and R.L. Harne. "Acoustic wave focusing from reconfigurable acoustic arrays based on a Bricard-Miura synthesis." *Journal of Vibration and Acoustics*. 144:041014. Apr. 2022.
3. L. Hyatt and R.L. Harne. "Rapid pneumatic control of bimodal, hierarchical mechanical metamaterials." *Advanced Engineering Materials*. 24:2101375. July 2022.

‡ Underlined names indicate the students or postdocs are advised or mentored by RLH.

4. M. Pishvar and R.L. Harne. "Nonlinear behavior of helmholtz resonator with a compliant wall for low frequency broadband noise control." *Journal of Vibration and Acoustics*. 144:031008. Jun. 2022.
5. J. Kim, R.L. Harne, and K.W. Wang. "Online signal denoising using adaptive stochastic resonance in parallel arrays and its application to acoustic emission signals." *Journal of Vibration and Acoustics*. 144:031006. Jun. 2022.
6. W. Cai and R.L. Harne. "A machine learning approach for maximizing direct current power of nonlinear energy harvesting systems subjected to periodic impulse excitation." *Mechanical Systems and Signal Processing*. 164:108262. Feb. 2022.
7. S.L. Yeh and R.L. Harne. "Cut-out resonators for tuned vibration suppression of plates." *Thin-Walled Structures*. 167:108200. Aug. 2021. **Featured on Phys.org and other science-focused media outlets.**
 - <https://phys.org/news/2021-08-built-in-vibration-soundproof-spaces.html>
8. N. Zhao, C. Zou, and R.L. Harne. "Partially activated reconfigurable arrays to guide acoustic waves." *Journal of Intelligent Material Systems and Structures*. 32:2529-2540. Dec. 2021.
9. C. El Helou, P.R. Buskohl, C.E. Tabor, and R.L. Harne. "Digital logic gates in soft, conductive mechanical metamaterials." *Nature Communications*. 12:1633. Mar. 2021. **Featured on Phys.org and other science-focused media outlets.**
 - <https://phys.org/news/2021-04-future-machines.html>
10. N. Zhao and R.L. Harne. "Reconfigurable acoustic arrays with deployable structure based on a Hoberman–Miura system synthesis." *Journal of Mechanical Design*. 143:063301 June 2021.
11. V. Srinivas and R.L. Harne. "Directing acoustic energy by flasher-based origami inspired arrays." *The Journal of the Acoustical Society of America*. 148:2935-2944. Dec. 2020.
12. M. Pishvar and R.L. Harne. "Soft topological metamaterials with pronounced polar elasticity in mechanical and dynamic behaviors." *Physical Review Applied*. 14:044034. Oct. 2020.
13. M. Pishvar and R.L. Harne. "Foundations for soft, smart matter by active mechanical metamaterials." *Advanced Science*. 7:2001384. Sept. 2020.
14. Z.H. Nick, C.E. Tabor, and R.L. Harne. "Liquid metal microchannels as digital sensors in mechanical metamaterials." *Extreme Mechanics Letters*. 40:100871. Oct. 2020.
15. W. Cai and R.L. Harne. "Characterization of challenges in asymmetric nonlinear vibration energy harvesters subjected to realistic excitation." *Journal of Sound and Vibration*. 482:115460. Sept. 2020.

Journal articles above here were completed and published after RLH joined Penn State

16. S.L. Yeh and R.L. Harne. "Structurally-integrated resonators for broadband panel vibration suppression." *Smart Materials and Structures*. 29:085010. May 2020.
17. V. Srinivas and R.L. Harne. "Acoustic wave focusing by doubly curved origami-inspired arrays." *Journal of Intelligent Material Systems and Structures*. 31:1041-1052. May 2020.

18. C. Zhang, R.L. Harne, B. Li, and K.W. Wang. "Harmonic analysis and experimental validation of bistable vibration energy harvesters interfaced with rectifying electrical circuits." *Communications in Nonlinear Science and Numerical Simulation*. 82:105069. May 2020.
19. C. Zou and R.L. Harne. "Deployable tessellated transducer array for ultrasound focusing and bio-heat generation in a multilayer environment." *Ultrasonics*. 104:106108. May 2020.
20. P. Vuyk and R.L. Harne. "Collapse characterization and shock mitigation by elastomeric metastructures." *Extreme Mechanics Letters*. 37:100682. Apr. 2020.
21. S. Cui and R.L. Harne. "Acoustic-structure interaction in an adaptive Helmholtz resonator by compliance and constraint." *Journal of Vibration and Acoustics*. 142:021005. Jan. 2020.
22. S. Cui and R.L. Harne. "Soft materials with broadband and near-total absorption of sound." *Physical Review Applied*. 12:064059. Dec. 2019.
23. C. El-Helou and R.L. Harne. "Exploiting functionally graded elastomeric materials to program collapse and mechanical properties." *Advanced Engineering Materials*. 21:1900807. Sept. 2019.
24. S.L. Yeh and R.L. Harne. "Origins of broadband vibration attenuation empowered by optimized viscoelastic metamaterial inclusions." *Journal of Sound and Vibration*. 458:218-237. June 2019.
25. W. Cai and R.L. Harne. "Vibration energy harvesters with optimized geometry, design, and nonlinearity for robust direct current power delivery." *Smart Materials and Structures*. 28:075040. June 2019.
26. C. Zou and R.L. Harne. "Tailoring reflected and diffracted wave fields from tessellated acoustic arrays by origami folding." *Wave Motion*. 89:193-206. Apr. 2019.
27. W. Cai and R.L. Harne. "Electrical power management and optimization with nonlinear energy harvesting structures." *Journal of Intelligent Material Systems and Structures*. 30:213-227. Jan. 2019.
28. C. Zhang, R.L. Harne, B. Li, and K.W. Wang. "Statistical quantification of DC power generated by bistable piezoelectric energy harvesters when driven by random excitations." *Journal of Sound and Vibration*. 442:770-786. Mar. 2019.
29. N.C. Sears, J.D. Berrigan, P.R. Buskohl, and R.L. Harne. "Dynamic response of flexible hybrid electronic material systems." *Composite Structures*. 208:377-384. Jan. 2019.
30. S. Alharbi, S. Chaudhari, A. Inshaar, H. Shah, C. Zou, R.L. Harne, and A. Kiourti. "E-textile origami dipole antennas with graded embroidery for adaptive rf performance." *IEEE Antennas and Wireless Propagation Letters*. 17:2218-2222. Dec. 2018.
31. C. Zou and R.L. Harne. "Piecewise assembled acoustic arrays based on reconfigurable tessellated structures." *The Journal of the Acoustical Society of America*. 144:2324-2333. Oct. 2018.
32. N. Kidambi, R.L. Harne, and K.W. Wang. "Modular and programmable material systems drawing from the architecture of skeletal muscle." *Physical Review E*. 98:043001. Nov. 2018.
33. S.L. Yeh and R.L. Harne. "Tailoring concurrent shear and translational vibration control mechanisms in elastomeric metamaterials for cylindrical structures." *Mechanical Systems and Signal Processing*. 117:609-633. Feb. 2019.

34. B.A. Goodpaster, R.A. Perez, and R.L. Harne. "Modal evaluation and generalized analysis of the steady-state dynamics of harmonically excited multistable structures." *Journal of Sound and Vibration*. 432:387-404. Oct. 2018.
35. N.C. Sears, J.D. Berrigan, P.R. Buskohl, and R.L. Harne. "Flexible hybrid electronic material systems with programmable strain sensing architectures." *Advanced Engineering Materials*. 20:1800499. June 2018.
36. B.A. Goodpaster and R.L. Harne. "Analytical modeling and impedance characterization of thermomechanically-coupled nonlinear structural dynamics." *Journal of Applied Mechanics*. 85:081010. Oct. 2018.
37. Q. Dai, I. Park, and R.L. Harne. "Impulsive energy conversion with magnetically coupled nonlinear energy harvesting systems." *Journal of Intelligent Material Systems and Structures*. 29:2374-2391. July 2018.
38. B.A. Goodpaster and R.L. Harne. "An experimental characterization of the impedance and spectral content of multistable structural responses during dynamic bifurcations." *Journal of Vibration and Acoustics*. 140:051009. Oct. 2018.
39. C. Lan, L. Tang, and R.L. Harne. "Comparative methods to assess harmonic response of nonlinear piezoelectric energy harvesters interfaced with AC and DC circuits." *Journal of Sound and Vibration*. 421:61-78. May 2018.
40. D.T. Lynd, C. Zou, J. Crump, and R.L. Harne. "Directive and focused acoustic wave radiation by tessellated transducers with folded curvatures." *The Journal of the Acoustical Society of America Proceedings of Meetings on Acoustics*. 30:055010. Jan. 2018.
41. C. Zou, D.T. Lynd, and R.L. Harne. "Acoustic wave guiding by reconfigurable tessellated arrays." *Physical Review Applied*. 9:014009. Jan. 2018.
42. P. Vuyk, S. Cui, and R.L. Harne. "Illuminating origins of impact energy mitigation in mechanical metamaterials." *Advanced Engineering Materials*. 20:1700828. June 2018.
43. S. Cui and R.L. Harne. "Characterizing the nonlinear response of elastomeric material systems under critical point constraints." *International Journal of Solids and Structures*. 135:197-207. Mar. 2018.
44. Q. Dai and R.L. Harne. "Charging power optimization for nonlinear vibration energy harvesting systems subjected to arbitrary, persistent base excitations." *Smart Materials and Structures*. 27:015011. Jan. 2018.
45. J. Bishop and R.L. Harne. "Leveraging the arrangement of multiple, critically constrained inclusions in resonant metamaterials for control of broadband vibroacoustic energy." *Applied Acoustics*. 130:222-229. Jan. 2018.
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67. R.L. Harne and C.R. Fuller. "Shape optimization of an acoustic horn in the presence of mean, compressible flow." *North Carolina Chapter of the Acoustical Society of America Meeting*. Charlotte, North Carolina. April 2011.
68. R.L. Harne and C.R. Fuller. "Analytical modeling of a distributed vibration absorber with sinusoidally woven spring layer using equivalent orthotropic plate properties." in *Proceedings of the 13th Nonlinear Vibrations, Dynamics and Multibody Systems Conference*. Blacksburg, Virginia. May 2010.
69. R.L. Harne and C.R. Fuller. "Lightweight distributed vibration absorbers for marine structures." *Joint Meeting of the ASA and NOISE-CON 2010*. Baltimore, Maryland. April 2010.
70. R.L. Harne. "A computational model of a distributed vibration absorber for broadband noise control." *North Carolina Chapter of the Acoustical Society of America Meeting*. Raleigh, North Carolina. March 2010.
71. C.R. Fuller and R.L. Harne. "Advanced passive treatment of low frequency sound and vibration." in *Proceedings of Acoustics 2009*. Adelaide, Australia. August 2009.

Invited Presentations

1. R.L. Harne. "What If Materials Could Think?" Research Unplugged. State College Community Event. October 6, 2022.
2. R.L. Harne. "A Dream to Animate [Inanimate] Matter." Penn State Materials Research Institute. Millennium Cafe. September 6, 2022.
3. R.L. Harne. "Mechanical Materials that Sense, Think, React, and Learn." Johns Hopkins University. March 29, 2022.
4. R.L. Harne. "The Science and Applications of Mechanical Metamaterials." U.S. Government STEP Smart Materials and Intelligent Systems Seminar. October 7, 2021.
5. R.L. Harne. "Smart Mechanical Matter." Levin Group at Tufts University. April 12, 2021.

6. R.L. Harne. "Smart Mechanical Matter." Penn State Materials Research Institute. Millennium Cafe. March 16, 2021.
7. R.L. Harne. "Soft, Autonomous Engineered Matter." National Science Foundation Program Board. February 17, 2021.
8. R.L. Harne. "Soft, Autonomous Engineered Matter." National Science Foundation Program Board. January 13, 2021.
9. R.L. Harne. "Smart Mechanical Matter." Penn State Materials Research Institute. Virtual Seminar. November 18, 2020.
10. R.L. Harne. "Smart Mechanical Matter." ASME Technical Committee on Vibration and Sound. Virtual Seminar. November 12, 2020.
11. R.L. Harne. "Smart Mechanical Matter." ASME SMASIS 2020 Conference. Virtual Keynote. September 15, 2020.
12. R.L. Harne. "Multifunctional Mechanical Metamaterials: Building Blocks for Soft Robots, Medical Devices, and More." The Pennsylvania State University, Department of Mechanical Engineering. State College, Pennsylvania. December 3, 2019.
13. R.L. Harne. "Multifunctional Material Systems with Tunable Properties to Mitigate Vibration, Shock, and Sound." Fiat Chrysler Automobiles. Auburn Hills, Michigan. October 19, 2018.
14. R.L. Harne. "Dynamic Behavior of Elastomeric Metastructures and Metamaterials Subjected to Shock and Vibration." ARO Workshop on "Meta-structures: Dynamics, Topology and Related Opportunities". Atlanta, Georgia. May 18, 2018.
15. R.L. Harne. "Multifunctional Material Systems with Tunable Properties to Mitigate Vibration, Shock, and Sound." Ford Motor Company. Dearborn, Michigan. May 2, 2018.
16. R.L. Harne. "Origami Acoustics and Mechanical Metamaterials: Recent Discoveries with Adaptive Structural and Material Systems for Elastic and Acoustic Wave Propagation Control." Department of Mechanical Engineering, University of Connecticut. Storrs, Connecticut. October 27, 2017.
17. R.L. Harne. "Impedance-based Analysis and Response Prediction of Aerostructural Systems in Combined, Extreme Loading Environments." AFRL-University Collaborative Center in Structural Sciences, Air Force Research Laboratory. Dayton, Ohio. October 18, 2017.
18. R.L. Harne. "Impedance-based Analysis and Response Prediction of Aerostructural Systems in Combined, Extreme Loading Environments." Aerospace Systems Directorate, Air Force Research Laboratory. Dayton, Ohio. August 1, 2017.
19. R.L. Harne. "Navigating the Faculty Track." The Ohio State University Postdoctoral Advisory Council. Columbus, Ohio. April 18, 2017.
20. R.L. Harne. "From Origami to Metamaterials: Waves Into and Out Of Tunable, Adaptive Structural and Material Systems." Department of Mechanical Engineering, Virginia Tech. Blacksburg, Virginia. April 14, 2017.
21. R.L. Harne. "Guidance for Faculty Position Applications: Interviews." The Ohio State University Postdoctoral Advisory Council. Columbus, Ohio. December 7, 2016.

22. R.L. Harne. "Vibration Energy Transfer in Solids and Structures: Perspectives and Projections." ARO Workshop on "The Future of Vibration Energy Transfer in Solids and Structures: Needs and Opportunities". University of Washington. Seattle, Washington. October 18, 2016.
23. R.L. Harne. "Applying for Faculty Positions: Advice from Current Faculty." The Ohio State University Postdoctoral Advisory Council. Columbus, Ohio. September 1, 2016.
24. R.L. Harne and Q. Dai. "Energy-Generating Mechanical Trees." In the audience of H.S.H. Prince Albert II of Monaco at the Sustainability Research Luncheon. The Ohio State University, The Ohio Stadium. Columbus, Ohio. August 31, 2016.
25. R.L. Harne. "Trees from the Vantage Point of Structural Dynamics." The STEAM Factory. Columbus, Ohio. April 21, 2016.
26. R.L. Harne. "Creating Exceptional and Adaptive Vibroacoustic Performance and Functionality in Structural/Material Systems." Materials and Manufacturing Directorate, Air Force Research Laboratory. Dayton, Ohio. March 18, 2016.
27. R.L. Harne. "Energy Harvesting and Damping Advancements via Strategically Leveraging Dynamic Snap-through Buckling." Center for Automotive Research, The Ohio State University. Columbus, Ohio. September 29, 2015.
28. R.L. Harne. "Insights for Leveraging Dynamic Snap-through Buckling for Structural/Material System Enhancements and Versatility." Materials and Manufacturing Directorate, Air Force Research Laboratory. Dayton, Ohio. September 10, 2015.
29. R.L. Harne. "Energy Transfer Principles Drawn from Understanding the Dynamics of Bistable Structures." NSF Workshop on "Energy Transport and Control in Solids and Structures". Arlington, Virginia. May 27, 2015.
30. R.L. Harne. "Harnessing Bistable Structural Dynamics: for Vibration Energy Harvesting." Department of Mechanical Engineering, Southern Illinois University Edwardsville. Edwardsville, Illinois. February 27, 2015.
31. R.L. Harne. "Harnessing Bistable Structural Dynamics: for Vibration Energy Harvesting." Department of Aerospace Engineering, Auburn University. Auburn, Alabama. February 13, 2015.
32. R.L. Harne. "Harnessing Bistable Structural Dynamics: for Vibration Energy Harvesting." Department of Mechanical and Aerospace Engineering, The Ohio State University. Columbus, Ohio. January 30, 2015.
33. R.L. Harne. "Dynamics, Vibrations and Acoustics: A Broader Perspective of Vibrational Energy Harvesting and Emerging Frontiers." Department of Mechanical Engineering, Binghamton University, State University of New York. Binghamton, New York. February 24, 2012.
34. R.L. Harne. "Dynamics, Vibrations and Acoustics: A Broader Perspective of Vibrational Energy Harvesting and Emerging Frontiers." Department of Building, Civil and Environmental Engineering, Concordia University. Montreal, Quebec, Canada. January 30, 2012.
35. R.L. Harne. "Dynamics, Vibrations and Acoustics: A Broader Perspective of Vibrational Energy Harvesting and Emerging Frontiers." Department of Mechanical and Industrial Engineering, The University of Iowa. Iowa City, Iowa. January 23, 2012.

36. R.L. Harne. "The Concurrent Suppression of and Energy Harvesting from Surface Vibrations: Modeling and Applications." The Applied Research Laboratory, The Pennsylvania State University. State College, Pennsylvania. November 7, 2011.

Short Courses

1. R.L. Harne. "Engineering Vibroacoustics: A Short Course." 2018 Spring Meeting of the NSF IUCRC Smart Vehicle Concepts Center. Columbus, Ohio. 2-hour short course. March 1, 2018.

PROFESSIONAL ACTIVITIES AND SERVICE

Society Membership

- Member 000100143950, American Society of Mechanical Engineers (ASME), 2011-present
- Member 1239916, Acoustical Society of America (ASA), 2010-11, 2016-present
- Member 3438137, International Society for Optical Engineering (SPIE), 2013-present

Associate Editorship

- Associate Editor, 2020-present, *ASME Journal of Vibration and Acoustics*
- Associate Editor, 2017-present, *The Journal of the Acoustical Society of America, Proceedings of Meetings on Acoustics*, Signal Processing in Acoustics
- Guest Associate Editor, 2015-2016, *Journal of Intelligent Material Systems and Structures*, Special Issue on Dynamics and Designs for Energy Harvesting Enhancements. Editorial: *J. Intell. Mat. Sys. Struct.* 28:293. 2017. doi: 10.1177/1045389X17689980
- Guest Associate Editor, 2014-2015, *ASME Journal of Vibration and Acoustics*, Special Issue on Modeling and Control of Adaptive Dynamic Systems and Structures. Editorial: *ASME JVA.* 137:010201. 2015. doi: 10.1115/1.4028884

Technical Committees

- Elected Member, 2014-2020: ASME Technical Committee on Vibration and Sound (TCVS). Student Activities Chair. Secretary 2020-2021.
- Appointed Member, 2016-2019: ASA Technical Committee on Signal Processing in Acoustics (TCSP)
- Appointed Member, 2016-2019: ASA Technical Committee on Structural Acoustics and Vibration (TCSAV)
- Elected Member, 2013-present: ASME Aerospace Division (AD), Adaptive Structures and Material Systems (ASMS) Branch
- Elected Chair, 2017-2018; Co-Chair, 2017; Secretary, 2014-2016; Member, 2013-present: ASME AD, ASMS, Technical Committee on Energy Harvesting (EH TC)
- Member, 2013-2015: ASME AD, ASMS, EH TC Best Paper Award Development Sub-committee

Conference Organization

- Conference Organizer for Student Activities, IDETC 2019/2020/2021 ASME International Design Engineering Technical Conferences
- Conference Chair, Behavior and Mechanics of Multifunctional Materials Conference at the SPIE Smart Structures NDE 2020, 2021.

- Technical Program Organizer Signal Processing in Acoustics in the ASA Meetings: 180th, 2021, 179th 2020, 177th 2019. Construct the technical program for the SP conference for each Meeting
- Session Organizer, 179th Meeting of the Acoustical Society of America, 2019, Session on "Soft and Compliant Metamaterials"
- Session Organizer, 177th Meeting of the Acoustical Society of America, 2019, Session on "Reconfigurable Arrays for Adaptive Wave Guiding"
- Session Organizer, 175th Meeting of the Acoustical Society of America, 2018, Session on "Reconfigurable and Conformal Acoustic Arrays" and the TCSP general session on "Signal Processing in Acoustics"
- Symposium Chair, IDETC 2017, 18, 19 ASME International Design Engineering Technical Conferences, Symposium on "Acoustic and Mechanical Metamaterials"
- Symposium Chair, IDETC 2017, 18, 19 ASME International Design Engineering Technical Conferences, Symposium on "Vibration Control, Energy Harvesting, and Smart Structures"
- Conference Co-Organizer, SPIE Smart Structures NDE 2018, 19, Conference on "Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems"
- Conference Co-Organizer, SPIE Smart Structures NDE 2017, 18, 19, Conference on "Active and Passive Smart Structures and Integrated Systems"
- Symposium Co-Organizer, IDETC 2016, ASME International Design Engineering Technical Conferences, Symposium on "Vibration Control, Energy Harvesting, and Smart Structures"
- Session Co-Organizer, DSCC 2015, ASME Dynamics Systems and Control Conference, Invited Sessions on "Energy Harvesting"
- Symposium Co-Organizer, IDETC 2015, ASME International Design Engineering Technical Conferences, Symposium on "Energy Transfer, Energy Harvesting, and Damping"
- Session Co-Organizer, SMASIS 2014, ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems, Sessions on "Advanced Smart Materials and Structures" and "Bio-Inspired and Biological Applications of Energy Harvesting"
- Session Chair, ASME IDETC 2014-present
- Session Chair, ASME SMASIS 2014-present
- Session Chair, SPIE Smart Structures NDE 2013-present
- Session Chair, ICAST 2013, 24th International Conference on Adaptive Structures Technologies

Reviewer for research proposals

- Reviewer for Department of Defense Multidisciplinary Research Program of the University Research Initiative (MURI) Proposals
- Ad-hoc Expert Reviewer for National Science Foundation CMMI Proposals
- Reviewer for proposals submitted to private foundations
- NSF CMMI, Dynamics, Control and Systems Diagnostics Program, 2014-2018, 2021. CMMI, Mechanics of Materials and Structures Program, 2017, 2018.
- U.S. Army Research Office, 2015, 2017

Reviewer for journals and conferences

- Review around 15 manuscripts per year submitted to the following journals
- Science Advances
- Nature Scientific Reports
- Advanced Materials and Adv. Mat. family of journals
- ASME Journal of Vibration and Acoustics and other ASME Journals
- Applied Physics Letters
- Smart Materials and Structures
- Extreme Mechanics Letters
- Journal of Sound and Vibration
- The Journal of the Acoustical Society of America
- Proceedings of the Royal Society A
- Journal of Intelligent Material Systems and Structures
- International Journal of Solids and Structures
- Mechanical Systems and Signal Processing
- and others

PATENTS

- US Patent Application # 63/249,084. Invention Disclosure 2021-0113 "Integrated Circuit Design for Digital Computing and Information Processing of Mechanical Signals". 13 April 2021.
- Patent # US 10/458,501. US Application # 15/447,934. "Designs and Manufacturing Methods for Lightweight Hyperdamping Materials Providing Large Attenuation of Broadband-Frequency Structure-Borne Sound." Exclusively licensed by HyperDamping, Inc., effective 25 Sept 2018.
- Patent # US 10/546,572. US Application # 15/461,887. "Folded Transducer Array for Compact and Deployable Wave-Energy Guiding System."
- University of Michigan Invention Disclosure 2013-5818. "Vibration Energy Harvesting Enhancement Using Coupled Linear-Bistable Dynamics."
- University of Michigan Invention Disclosure 2013-5711. "Coupled Linear-Bistable Dynamics-Based Sensing Methodology and Devices for Structural and System Change and Damage Detection."

EXTERNAL PROFESSIONAL ACTIVITIES

- [HyperDamping, Inc.](#) 2018 to present. Startup company co-founded by RLH and Rhapsody Venture Partners, Cambridge, MA.
 - Products developed by HyperDamping are sold on the market, Q2 2022.
 - An exclusive contract executed with international commercial partner for HyperDamping flooring-specific products, Q1 2022.
- Air Force Research Laboratory, through UES, Inc. 2016. Grant FA8650-12-D-2225. Developing analytical methods and undertaking experiments in technical topics pertinent to hypersonic aviation.

- University of Michigan Department of Mechanical Engineering. 2016 to 2019. Senior personnel role on Army Research Office grant W911NF1510114. Guiding and undertaking theoretical and experimental research efforts for muscle-inspired advanced materials.

SPONSORED RESEARCH PROJECTS (\$2M AS PI, \$4.7K AS CO-PI)

- STTR: (Phase I) Real-Time Abnormality Detection System for Propulsion Systems (NASA subcontracted through Nokomis). 2022. PI. \$38k.
- "Real-time FOAMGLAS Insulation Quality Characterization by Ultrasonic Interrogation and Machine Learning Evaluation." 2021-2022, Owens Corning Science & Technology, PI. \$89k
- "Low Frequency, Broadband Noise Control with Enhanced Interior Environment by Integrated Helmholtz Resonators." 2019-2021, Ford Motor Company, PI. \$229k
- "Enhancing Interior Acoustics and Vehicle NVH by Next Generation Engine/Body Mounts for Lightweight and Battery-Electric Vehicles." 2019-2021, Ford Motor Company, PI. \$185k
- "Establishing Computational and Experimental Frameworks to Elucidate Magnetoelastic Interactions in Smart Metamaterials." 2018-2019, OSU Institute for Materials Research Exploratory Materials Research Grant, PI. (Co-PI: Marcelo Dapino, OSU). \$40k
- "Creating Personalized and Shielded Sound Fields via Ultrasonic Parametric Array Noise Control." 2018-2020, Ford Motor Company, PI. \$150k
- "CAREER: Adaptive Origami Structures for Acoustic Wave Guiding." 2018-2023, National Science Foundation, PI. \$500k
- "Establishing a Computational Foundation for the Investigation of Magnetoelastic Metamaterials." 2017-2018, OSU Institute for Materials Research Exploratory Materials Research Grant, PI. (Co-PI: Marcelo Dapino, OSU). \$40k
- "Collaborative Research: Understanding and Harnessing Complex Dynamics of Coupled Mechanical-Electrical System for Improved Vibration Energy Harvesting." 2017-2020, National Science Foundation, PI. (Collaborative PI: Kon-Well Wang, Univ. of Michigan). To OSU: \$218.3k
- "E-textile Origami." 2017-2018, The STEAM Factory, Co-PI. (PI: Asimina Kiourti, OSU). \$9.2k
- "Development and Characterization of Tile-like Material Systems for Large, Tunable Damping of Shock and Vibration." 2017-2018, Owens Corning Science and Technology, PI. \$43.6k
- "Conductive, Elastomeric Architectures for Enhanced Survivability of Electronic Systems." 2017-2018, Air Force Research Laboratory/ Dayton Area Graduate Studies Institute Ohio Student-Faculty Graduate Fellowship, PI. \$58.8k
- "Development of Lightweight, Integrated Hyperdamping Materials for Broadband Vibration Energy Attenuation in Subframe and Floor Panel Systems." 2017-2019, Honda Research and Development Americas, Inc., PI. \$120k
- "Complementary Piezoelectric Energy Harvesting For Small Satellites In Eclipse." 2017, Defense Advanced Research Projects Agency (DARPA) sub-contract through Mide Technologies, PI. \$33k
- "Integrated, Optimized, And Robust Nonlinear Energy Harvesting Solutions For Self-Powered System Condition Monitoring Sensors." 2017, OSU Center for Automotive Research Exploratory Research Program, PI. \$40k

- "Engineered Materials and System Integrations for Tunable Stiffness and Damping to Suppress Low Frequency Cabin Noise and for Enhanced Fuel Economy." 2017-2019, Ford Motor Company, PI. \$169k
- "Instrumentation for a Unique Platform to Elucidate the Complex Responses of Coupled Multistable Structures." 2017, Haythorhwaite Foundation Young Investigator Award, ASME, PI. \$20k
- "Self-powering sensors for system condition monitoring applications through the captured energy in multistable dynamic structures." 2016, OSU Center for Automotive Research Exploratory Research Program, PI. \$40k
- "Muscle: Inspiration for a New Class of Engineered Adaptive System." 2015-2019, U.S. Army Research Office, Co-PI. (PI: KW Wang). \$700k (Amount not counted in grant \$ totals)
- "Workshop: The Future of Vibration Energy Transfer in Solids and Structures: Needs and Opportunities." 2016, U.S. Army Research Office, Co-PI. (PI: N Boechler. Co-PIs: D. Kochmann, JK Yang). \$21k (Amount not counted in grant \$ totals)

TEACHING

The Pennsylvania State University

- ME 370, Vibration of Mechanical Systems. Fall 2021. The goals of this course are to introduce vibration modeling principles and to help students understand how to conceptualize and analyze vibration problems throughout engineering. Student Evaluation of Instructor: 6.64/7.
- ME 490, Professional Development for Mechanical Engineers. Fall 2022. ME 490 is designed to help students to transition into their professional careers. This class dives into 8 topics that represent the core subjects underlying the formulation of your well-rounded, professional self.
- ME 497, Engineering Acoustics. Spring 2021, 2022. A new online course for hands- and ears-on approach to learning basic acoustics theory and acoustics applications in engineering, with project-based activities to demonstrate mastery of techniques to deploy essential acoustical design and synthesis methodologies. The course consists of 70+ YouTube/Coursera-style instructional videos including numerous demos, with real-time classes to cultivate group discussions of detailed topics and practical examples. Student Evaluation of Instructor: 6.36/7.

The Ohio State University

- ME 4870, Mechanical Engineering Capstone Lab. Each semester beginning Autumn 2018. This lecture/lab course brings together the many sub-disciplines of mechanical engineering into guided lab activities that challenge one to tie together the elements of engineering practice, from hypothesizing, experimental design, to data collection and reporting.
- ME 4999, Engineering Presentation and Communication. Each semester beginning Autumn 2019. This course establishes presentation skills for honors mechanical engineering students for technical work presented to technical and non-technical audiences.
- ME 5241, Engineering Acoustics. Each Autumn semester beginning Autumn 2018. Continued updates, more in-class demos, each year a more and more hands/ears-on course! Overall Student Evaluation of Instructor: 4.8/5.
- ME 5134, Introduction to Vibration of Deformable Solids. Spring 2018. An introductory course on the vibrations of continuous structures. Analytical methods are presented to study the free and forced vibrations of one-dimensional systems such as bars, strings, shafts, and beams. The course also

covers semi-analytical methods such as the Ritz method and introduces the relationship of the finite element method with the analytical and semi-analytical methods.

- ME 5194, Engineering Acoustics. Autumn 2017. Steady but significant improvements to 5194 of August 2016 semester! The same physics, yet greater and more diverse examples of deploying the principles to applications, more ears-on demonstrations, and new guest speakers that will share their experiences of applying acoustics concepts in their disciplines.
- ME 8260, Advanced Engineering Acoustics. Spring 2017, Spring 2019. A revitalization of an advanced acoustics course previously taught in the Department, where the new curriculum developed by RLH includes a broader perspective of emerging research topics in the field of acoustics with respect to the physics and fundamentals involved. In this course, students will translate the classroom-taught knowledge to research relevance. Overall Student Evaluation of Instructor: 4.43/5.
- ME 5194, Engineering Acoustics. Autumn 2016. New course for senior-year undergraduates and graduate students initiated and composed by RLH, with emphasis on balancing insights on the physics of sound with methods by which to best apply acoustic principles in the design and utilization of engineering system development
- ME 3260, System Dynamics and Vibrations. Autumn 2015

University of Michigan

- Substitute for 1 lecture, ME 510, Mechanical Vibrations. Winter 2015
- Substitute for 4 lectures, ME 440, Intermediate Dynamics and Vibrations. Fall 2013

Virginia Tech

- ME 3514, System Dynamics. Spring 2012.
- Substitute for 9 lectures, ME 5734, Advanced Engineering Acoustics. Spring 2010/11
- Graduate advisor and instructor, ME 4015/4016, Mechanical Engineering Undergraduate Senior Design Team. Topic: Real-time surfboard stress and loading analysis. Fall/Spring 2010/11
- Teaching Assistant, ME 3514, System Dynamics. Spring 2008
- Teaching Assistant, MATH 1205/1206/2214/2224, various calculus courses. Fall/Spring 2005/6

UNIVERSITY SERVICE

The Pennsylvania State University

- 2022 - 2023 AY
 - Chair, Dynamics and Controls Qualifying Exam Committee
- 2021 - 2022 AY
 - Chair, Mechanical Systems Faculty Search Committee
 - Member, Systems Dynamics Qualifying Exam Committee
- 2020 - 2021 AY
 - Member, Teaching Load Committee
 - Member, Seminars and Graduate Policy Committee
 - Member, Systems Dynamics Qualifying Exam Committee

- Student committee service
 - Pillarisetta, Lalith, 2021, Ph.D. Comprehensive Exam Committee
 - Ji Jun, 2021, Ph.D. Comprehensive Exam Committee
 - Deng, Hankun, 2021, Ph.D. Comprehensive Exam Committee
 - Giraldo Guzman, Daniel, 2021, Ph.D. Comprehensive Exam Committee
 - Deng, Yuanchen, 2022, Ph.D. Final Defense
 - Katch, Lauren, 2022, Ph.D. Comprehensive Exam Committee

The Ohio State University

- 2019 - 2020 AY
 - Chair, MAE Fellowship Committee
 - Chair, MAE Design, Materials, and Manufacturing Seminar Committee
 - Member, MAE Diversity and Inclusion Committee
 - Member, MAE Undergraduate Studies Committee
 - Member, MAE Communications Committee
 - Member, MAE Admissions Committee
- 2018 - 2019 AY
 - Chair, MAE Fellowship Committee
 - Chair, MAE Design, Materials, and Manufacturing Seminar Committee
 - Member, MAE Undergraduate Studies Committee
 - Member, MAE Communications Committee
 - Member, MAE Admissions Committee
 - Member, MAE Strategic Planning Committee, establishing 20-year department plan
- 2017 - 2018 AY
 - Chair, MAE Fellowship Committee
 - Chair, MAE Materials and Manufacturing Seminar Committee
 - Member, MAE Communications Committee
 - Member, MAE Admissions Committee
 - Member, MAE Faculty Search Committee
 - Member, MAE Strategic Planning Committee, establishing 20-year department plan
 - Faculty organizer for MEGA (Mechanical Engineering Graduate Student Association) New Student/Faculty Meet-and-Greet Event 18 Aug 2017
 - Faculty presenter for Undergraduate Engineering Career Services seminar to freshman MAE pre-major students 9 Oct 2017. Presentation entitled "How They All Add Up to Your Professional Futures: Coursework, Industry Experiences, Undergraduate Research, Graduate School"
 - Faculty representative and presenter for MAE Dept. session of Graduate School Open House for recruiting incoming graduate student applicants, with emphasis on recruiting students from underrepresented and minority groups to STEM disciplines

- 2016 - 2017 AY
 - Chair, MAE Fellowship Committee
 - Member, MAE Admissions in Energy & Environment Committee
 - Member, MAE Strategic Plan Committee
 - Invited and hosted premier guest researchers for MAE Departmental seminars
 - Faculty representative and presenter for MAE Dept. session of Graduate School Open House for recruiting incoming graduate student applicants, with emphasis on recruiting students from underrepresented and minority groups to STEM disciplines
- 2015 - 2016 AY
 - Member, MAE Fellowship Committee
- Student committee service
 - Chaudhari, Shreyas, 2018, Undergraduate honors thesis final defense
 - Taylor, Daniel, 2018, Ph.D. final defense Graduate Faculty Representative
 - Chillara, Siva, 2017-2018, Ph.D. candidacy exam, Ph.D. final defense
 - Krishnan, Srivatsava, 2017-2018 Ph.D. candidacy exam, Ph.D. final defense
 - van Schijndel, Marten, 2017, Ph.D. final defense Graduate Faculty Representative
 - Mikol, Colin, 2017, Undergraduate honors thesis final defense
 - Chen, Yimin, 2017, Ph.D. candidacy exam
 - Shafer, Jennifer, 2016, Ph.D. final defense Graduate Faculty Representative
 - Nagarajan, Anand, 2016, Ph.D. candidacy exam
 - Yu, Zitian, 2016-2018, Ph.D. candidacy exam, Ph.D. final defense
 - Estadt, Daniel, 2016, Undergraduate honors thesis final defense
 - Zeng, Xiangrui, 2016, Ph.D. final defense

OUTREACH AND COMMUNITY ENGAGEMENT

Appointments

- Member, Metro Early College High School External Advisory Board (EAB), Design Learning Center. Dec. 2018 to Aug. 2020.

Activities

- Autumn semesters 2018 and 2019. LSVR students and RLH create design challenges to be delivered in the after school STEM program at KIPP Academy in downtown Columbus, primarily serving African American students. The design challenges bear technical themes of reconfigurable structures, origami, and sound to get kids thinking of concepts that promote technical problem solving when multiple design elements are involved. To date, Katie Frost and Nolan LaMarche are the LSVR students who have helped lead this initiative with RLH.
- 2019 Oct. 15. Students from the Metro Early College High School of the Design Learning Center visit LSVR with their teacher, Mr. Tyler Hertenstein. RLH and LSVR graduate students share with the Metro team about engineering and science research at OSU in the Department of Mechanical and Aerospace Engineering, and about the investigations ongoing at the LSVR.

- 2019 May 22 and 23. RLH, MS student Ningxiner Zhao, and Undergraduate Research Assistant Nolan LaMarche undertake a 2-day design challenge with a senior year class of AP Physics students at the St. Charles School in Columbus, OH. The students are challenged to devise methods of folding loudspeaker-like structures. This event built upon and advanced the foundation from the prior year's event and design challenge.
- 2018 Sept. 10. Students from the Metro Early College High School of the Design Learning Center visit LSVR with their teacher, Mr. Tyler Hertenstein. RLH and LSVR graduate students share with the Metro team about engineering and science research at OSU in the Department of Mechanical and Aerospace Engineering, and about the investigations ongoing at the LSVR.
- 2018 May 23 and 24. RLH, PhD student Chengzhe Zou, and Undergraduate Research Assistant Katie Frost undertake a 2-day design challenge with a senior year class of AP Physics students at the St. Charles School in Columbus, OH. The students are challenged to devise methods of folding acoustic wave focusing or wave diffusion systems and build their concepts in small teams using large cardstock and duct tape.
- 2018 Jan. 31. RLH is invited to and participates in the Metro School "State of STEM" event to discuss the formulation of the Metro School STEM-based education model and how it promotes diversity, active learning, and workforce-preparedness for students throughout Central Ohio.
- 2017 Sept. 11. Students from the Metro Early College High School visit LSVR with their teacher, Mr. Tyler Hertenstein. RLH and the LSVR graduate students share with the Metro team about engineering and science research at OSU in the Department of Mechanical and Aerospace Engineering, and about the specific investigations ongoing at LSVR in acoustics and dynamics.
- 2017 June 22. RLH and PhD students Chengzhe Zou and Shichao Cui share about origami engineering at the Columbus, OH, Center Of Science and Industry (COSI). Hands-on activities of folding tessellations are provided and ears-on demonstrations of foldable acoustic loudspeakers are given.
- 2016 Sept. 28. Students from the Metro Early College High School visit LSVR with their teacher, Mr. John Thesing. RLH and the LSVR graduate students share with the Metro team about engineering and science research at OSU in the Department of Mechanical and Aerospace Engineering, and about the specific investigations ongoing at LSVR in acoustics and dynamics.
- 2015 to 2020. **5** Student research interns hosted on semester-to-semester basis. Engagement between LSVR and the Metro Middle/High Schools and the St. Charles School in Columbus, OH. Interns research on acoustics/vibrations topics at LSVR/OSU, are mentored by RLH and LSVR Team Members, and present their research results at the conclusion of the intern experience.