ASME SMASIS 2023

The ASME 2023 Conference on Smart Materials, Adaptive Structures and Intelligent Systems

Program

CONFERENCE
Sept 11 – 13, 2023

Location:
Doubletree by Hilton Austin
Austin, TX

https://event.asme.org/SMASIS

The American Society of Mechanical Engineers®
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SETTING THE STANDARD

Contents

Dear SMASIS Attendee:

Welcome to the 16th annual conference of the Smart Materials, Adaptive Structures, and Intelligent Systems (SMASIS) community. Our goal, as in previous years, is to provide a friendly, casual forum for the exchange of ideas and the latest engineering innovations in the field. We sincerely thank all the presenters for choosing to share their work at this conference.

This year's SMASIS has evolved into seven symposia.

- Symposium 1: Development and Characterization of Multifunctional Materials
- Symposium 2: Mechanics and Behavior of Active Materials
- Symposium 3: Modeling, Simulation, and Control of Adaptive Systems
- Symposium 4: Integrated System Design and Implementation
- Symposium 5: Structural Health Monitoring
- Symposium 6: Bioinspired Smart Materials and Systems
- Symposium 7: Energy Harvesting

This year, Symposium 5: Structural Health Monitoring and Symposium 7: Energy Harvesting will host joint presentations to further collaboration across these two fields.

SMASIS is committed to the development of future leaders in science, technology, and engineering. This year's conference will have a SMASIS-in-Action Symposium. This symposium will have two special sessions to spotlight student work.

- Student Paper Competition
- Hardware Showcase Competition

Furthermore, the SMASIS-in-Action Symposium will also include high school outreach, a student career panel, and student gatherings to foster networking among the next generation of SMASIS researchers. We are quite proud of the fact that our students and young professionals are constantly looking for opportunities to give back to the community. Please take advantage of these events to meet our emerging stars and future colleagues and leaders!

This year's conference will feature three keynotes given by Dr. Jarret Riddick (Georgetown University), Dr. Nanshun Lu (The University of Texas at Austin), and this year's ASME Adaptive Structures Prize winner, Dr. Aditi Chattopadhay (Arizona State University), along with numerous invited talks.

This year's Pioneer Awards Banquet will be a traditional Texas barbecue at the lovely County Line on the Lake. This should be a wonderful opportunity to network and broaden your horizons, both intellectually and socially, and to enjoy the local cuisine.

This conference has been planned as a collaborative effort by members of the ASME Adaptive Structures and Material Systems Division. Our executive committee gave invaluable assistance and direction. We would not have been able to proceed without the contributions of the symposium chairs, co-chairs, and organizing committees. They deserve our gratitude for putting together an amazing technical program. Also, we extend an abundance of gratitude to the authors, keynote and invited speakers, and panel participants who have significantly contributed to the success of SMASIS. Finally, we would like to express our gratitude to our sponsors and exhibitors, General Motors, Toyota, and Fort Wayne Metals.

We appreciate your participation in this event and commitment to annually submitting your best work. Those of you whom we know personally, we eagerly anticipate our next meeting. And we look forward to introducing ourselves to those of you we have not yet met and participating in thoughtful scientific discussions.

Dr. James Gibert
General Conference Chair
Purdue University

Dr. Shahrzad Towfighian
Technical Conference Chair
Binghamton University

Dr. Johannes Riemenschneider
Technical Program Co-Chair
German Aerospace Center (DLR)

REGISTRATION INFORMATION

Registration will be located each day in the Phoenix Ballroom Pre-Function Foyer located on the Lobby Level.

The hours are as follows:

Sunday, September 10
3:00PM–6:00PM

Monday, September 11
7:00AM–6:00PM

Tuesday, September 12
7:00AM–5:00PM

Wednesday, September 13
7:00AM–3:00PM

ACKNOWLEDGMENT

The ASME Conference on Smart Materials, Adaptive Structures, and Intelligent Systems is sponsored by the SMASIS Division of the American Society of Mechanical Engineers.

HOTEL

Central Austin Convenience Near Downtown

Enjoy a warm DoubleTree cookie on arrival at this convenient location in Central Austin just three miles from The University of Texas and downtown and 20 minutes from Austin Bergstrom International Airport. Zilker Park, South Congress, and The Domain are all within a 20-minute drive. The hotel has an outdoor pool and spa, and a fitness center.

NAME BADGES

Please always wear your name badge for all functions. Admission to all conference functions will be by name badge. Your badge also provides a helpful introduction to other attendees.

TICKETED FUNCTIONS

Entrance to all social functions is included and allowable by wearing your conference badge. If you have purchased an additional ticket for the Pioneer Awards Banquet at County Line for Tuesday, September 12, for your spouse and/or guests. You will receive a ticket for your guest at registration. Please remember to bring it with you.

TAX DEDUCTIBILITY

The expense of attending a professional meeting, such as registration fees and costs of technical publications, are tax deductible as ordinary and necessary business expenses for U.S. citizens. However, recent changes in the tax code have affected the level of deductibility.

INTERNET ACCESS

Complimentary basic internet is provided in the sleeping rooms, if you are staying at the DoubleTree, and in the hotel's public space and meeting space provided by ASME. For access when onsite, please follow these steps:

- On your device, connect to "Hilton Honors Meeting."
- Click on "I have a Promotional Code."
- Read & accept the Terms of Service, click "continue."
- Enter the code SMASIS2023 and click "Connect".

MEMBERSHIP TO ASME (4 MONTHS FREE)

Registrants who paid the non-member conference registration fees will receive a four-month complimentary ASME Membership. ASME will automatically activate this complimentary membership for qualified attendees. Please allow approximately four weeks after the conclusion of the conference for your membership to become active. Visit www.asme.org/membership for more information about the benefits of ASME Membership.

General Information

PRESENTER ATTENDANCE POLICY

According to ASME's Presenter Attendance Policy, if a paper is not presented at the conference, the paper will not be published in the official Archival Proceedings, which are registered with the Library of Congress and are abstracted and indexed. The paper also will not be published in the ASME Digital Collection and may not be cited as a published paper.

EMERGENCY INFORMATION

If you are experiencing a health emergency, please dial 911. If you are able or someone else is able, please dial zero and inform the operator so that the hotel can be on the alert for the emergency response team. The hotel also has 24-hour security and officers trained in first aid, CPR, & AED service.

REGISTRANTS WITH DISABILITIES

Whenever possible, we are pleased to plan for handicapped registrants. Advance notice may be required for certain requests. For on-site assistance, please visit the registration area and ask to speak with a conference representative.

HAVE QUESTIONS ABOUT THE MEETING?

If you have any questions or need assistance, an ASME representative will be located at the registration area.

BREAKFAST

Monday, September 11–Wednesday, September 13
7:00AM–8:00AM
Phoenix Ballroom Central, Lobby Level

Starting with Monday morning prior to the start of the technical sessions, a full breakfast will be provided. All registered conference attendees are welcome! Immediately following breakfast will be the daily Keynote Presentation from 8:00AM to 9:00AM. See the Keynote section of this program for more details as well as information about our Invited Speakers.

COFFEE BREAKS

Monday, September 11–Tuesday, September 12
10:30AM–10:50AM and 3:00PM–3:30PM
Phoenix Ballroom Pre-Function Foyer, Lobby Level

LUNCHES

Monday, September 11–Wednesday, September 13
12:10PM–1:40PM
Phoenix Ballroom Central, Lobby Level

EXHIBIT

Tuesday, September 12
10:00AM–5:00PM
Phoenix Ballroom Pre-Function Foyer, Lobby Level

Please take advantage of the opportunity to visit Fort Wayne Metals, from one of the leading industries in the field. They are making things happen, so be sure to stop by and meet them! Their experts will be on hand to speak with you.

Remember to please stop by. Our Sponsors/Exhibitors help support the conference, so let us support them!

SPECIAL SESSION ON DIVERSITY AND INCLUSION

Tuesday, September 12
9:50AM–11:10AM
Phoenix Ballroom South, Lobby Level

Organizers: **Oliver Myers**, *Clemson University*

Dr. Oliver Myers, Associate Dean of Inclusive Excellence for Undergraduate Studies, Clemson University, was part of the inaugural class (M1) of the renowned Meyerhoff Scholars Program at University of Maryland, Baltimore County. Dr. Myers will discuss the value of programs aimed at supporting marginalized students in STEM and present the challenges and opportunities to making progress towards equity, justice, and inclusion.

PIONEER AWARDS CEREMONY BANQUET

Tuesday, September 12
6:30PM–8:45PM

COUNTY LINE ON THE LAKE

Please note: Buses will depart from the hotel at 6:00PM Sharp, arriving back at the hotel by 9:15PM. Times are approximate.

Please join us for a special evening at the beautiful County Line on the Lake Restaurant that will include the Awards Ceremony and a wonderful plated dinner.

Set in an old lake lodge, the County Line on the Lake is right on Bull Creek, just off Lake Austin, and has been well known for years as THE place in Austin for out-of-town guests. Enjoy the view from the large redwood deck overlooking the water.

Entrance to all social functions is included and allowable by wearing your conference badge. You will receive a ticket for your guest at registration. Please remember to bring it with you.

Student Events

HIGH SCHOOL STUDENT EVENT: K-12 EDUCATIONAL OUTREACH

Monday, September 11
9:00AM–12:00PM
Pheonix Ballroom South, Lobby Level

Chair: **Patrick Walgren** *(AFRL)*

High school students from Austin-area schools will be attending the conference to participate in a workshop on Smart Materials and Structures, in partnership with the Texas A&M Spark! K-12 outreach program. Students will learn about smart materials, participate in hands-on activitie, and meet with conference attendees. This event is led by two graduate students: Hannah Stroud and Priscilla Nizio.

STUDENT CAREER PANEL

Monday, September 11
3:30PM–4:50PM
Magnolia Room, Lobby Level

Chair: Patrick Walgren *(AFRL)*

Have you ever wondered about the differences between working at a university, a government lab, or for an industrial R&D company? A panel of professionals from all three sectors will be discussing their career trajectories and responsibilities and will be answering questions about career options in their respective positions.

STUDENT AUSTIN OUTING

Monday, September 11
6:00PM–8:30PM
Capital Cruises, Meet in Hotel Lobby

No visit to Austin would be complete without witnessing the breathtaking emergence of millions of bats from the Congress Avenue Bridge during sunset, the city's unique spectacle that will leave everyone in awe. Join us on Monday evening for an extraordinary bat watching tour and be a part of this unforgettable moment on our student outing event. Seats are limited RSVP!

STUDENT GAME NIGHT

Tuesday, September 12
10:00PM–12:00AM
Lobby Colonnade

Not ready to call it a night after the fantastic banquet? Look no further - Everyone's welcome to join the game night at Lobby Colonnade. Bring friends, challenge them on board and card games, and keep the fun alive!

STUDENT TRIVIA LUNCH

Tuesday, September 12
12:10PM–1:40PM
Phoenix Ballroom Central, Lobby Level

Are your trivia skills sharper than your SMASIS peers? Everyone is invited to test their knowledge of random and Texas-centric facts during the Trivia Lunch. Participants are encouraged to form multicultural, intergenerational teams by sitting at the same lunch table. A quizmaster will guide the teams through a multi-round "Pub" Style trivia competition, and the top teams will be awarded a unique prize!

BEST STUDENT PAPER COMPETITION

Monday, September 11
3:30PM–4:50PM
Austin Room, Lobby Level

Chair: **Vanessa Restrepo Perez,** *Texas A&M University*

Witness top students compete with their cutting-edge research papers, showcasing innovation and passion across Smart Materials and Structures. Join us for an inspiring event that unveils the future of academia and promises to leave you captivated by the power of young intellect.

HARDWARE SHOWCASE

Monday, September 11
3:30PM–5:30PM
Phoenix Ballroom South, Lobby Level

Chair: **Paul Motzki***: Saarland University*
Co-Chair: **Maria Sakovsky:** *Stanford University*

The hardware showcase features the latest research developments, technology demonstrators and smart material applications from every symposium. Students and researchers will present their work in live demonstrations and compete for the best hardware award. Get inspired by creatively realized prototypes and watch smart materials, adaptive structures, and intelligent systems in action!

Committee Meeting Schedule

SUNDAY, SEPTEMBER 10		
MEETING	**TIME**	**ROOM**
Division Leadership Summit (By Invitation Only)	9:00PM–5:00PM	Dovers Room

MONDAY, SEPTEMBER 11		
TECHNICAL COMMITTEE MEETINGS	**TIME**	**ROOM**
Bioinspired Structures and Systems	12:10PM–1:40PM	Robertson
Active Materials and/or Multifunctional Materials	12:10PM–1:40PM	Magnolia
Active Material Technologies and Integrated Systems	12:10PM–1:40PM	Dovers
Energy Harvesting Technical Committee Meeting	12:10PM–1:40PM	Dezavala
Adaptive Systems Dynamics and Controls	12:10PM–1:40PM	Dewitt
Structural Health Monitoring	12:10PM–1:40PM	Austin
SMASIS Senate Meeting	6:30PM–9:30PM	Phoenix Ballroom South

Keynote Speakers

MONDAY, SEPTEMBER 11
8:00AM–9:00AM PHOENIX BALLROOM NORTH, LOBBY LEVEL

Jaret C. Riddick, Ph.D.
Senior Fellow, CSET
Georgetown University

PRESENTATION TITLE: NANOMATERIALS: THEN, NOW AND OVER THE HORIZON – POLICY IMPLICATIONS

ABSTRACT: The arc of my research career has tracked closely with the emergence of nanomaterials research in the United States. In 1991, the seminal Nature publication "Helical microtubules of graphitic carbon" announced Sumio Iijima's discovery of carbon nanotubes (CNTs). By 1993, when Iijima and Donald Bethune of IBM simultaneously discovered how to synthesize single-wall CNT, I was a recent college graduate launching a research career in computational structural mechanics focused on fiber-reinforced polymer composites. In 2000, U.S. President Bill Clinton announced the U.S. Nanotechnology Initiative (NNI). By 2003, I was a recent PhD graduate when then U.S. President George W. Bush signed into law the 21st Century Nanotechnology Research and Development Act making the NNI official. Over the two decades since, my nanomaterials research has touched upon an array of areas including multifunctional structural applications and advanced hierarchical modeling. Other breakthrough technological advances in nanomaterials over the same period included material synthesis, electro-optical and electro-magnetic applications, semiconductors, battery technology, and drug delivery. This presentation will focus on analysis of the nanomaterials research landscape using the Map of Science from the Emerging Technology Observatory (ETO) project of Georgetown University's Center for Security and Emerging Technology (CSET). ETO's Map of Science includes over 130 million scholarly publications from around the world, algorithmically organized into over 116,000 research clusters – groups of papers that cite each other most often.

The presentation will highlight key trends, hotspots, and concepts identified by filtering research clusters according to growth over time, key topics, countries, and other characteristics. I will also discuss what these trends mean for technical policymakers. Finally, I will explore what's likely to be next in nanomaterials using the tools provided by the Map of Science and discuss the implications for technical policy.

BIOGRAPHY: Dr. Jaret Riddick is a Senior Fellow at Georgetown University's Center for Security and Emerging Technology (CSET). Prior to joining CSET, he was the Principal Director for Autonomy in the Office of the Under Secretary for Research and Engineering (OUSD(R&E)), serving as the Senior DOD official for coordination, strategy, and transition of Autonomy research and development. As Principal Director, he created a DOD-wide initiative on trusted Autonomy, led efforts to advance Autonomy for undersea warfare with allied partners, and provided key strategic analysis to support development of the newest DOD university-affiliated research center (UARC). Prior to OUSD(R&E), Jaret served in executive leadership roles in the US Army Research Laboratory (ARL), where he established a 200-acre robotics research collaboration campus and led ARL Senior leadership efforts to establish the research competencies of the Laboratory. He has also served in leadership roles in the Office of the Deputy Assistant Secretary of the Army for Research and Technology, and the former Office of the Under Secretary of Defense for Acquisition, Technology and Logistics. He holds a Ph.D. in Engineering Mechanics from Virginia Tech, M.S. in Mechanical Engineering from North Carolina A&T State University, and B.S. in Mechanical Engineering from Howard University.

TUESDAY, SEPTEMBER 12
8:00AM–9:00AM PHOENIX BALLROOM NORTH, LOBBY LEVEL

Aditi Chattopadhyay
Regents' Professor
Adaptive Structures Award Recipient
Arizona State University
Tempe, AZ

PRESENTATION TITLE: MULTISCALE METHODOLOGIES FOR MULTIFUNCTIONAL MATERIAL DESIGN

ABSTRACT: There is an increased need for new and improved materials with unprecedented functionalities, and tailorable properties to enhance mobility, maneuverability, survivability, and transportability of aerospace and other assets. The success of such material development requires a strong understanding of mechano-chemical interactions at the constituent scales, and their implementation requires a deeper understanding of deformation, damage, and time to failure in service environment, which depends on a multitude of variables that are stochastic and multiscale in nature. This talk will focus on our research on computationally assisted and experimentally validated high-fidelity models that incorporate multi-physics constitutive laws, scale-dependent experiments, and machine learning to advance the understanding of material failure allowing the exploitation of the multifunctional features for optimum design of advanced materials for use in NextGen applications.

BIOGRAPHY: Dr. Aditi Chattopadhyay is a Regents' Professor at Arizona State University (ASU). She is the Ira A. Fulton Chair Professor of Mechanical and Aerospace Engineering in the School for Engineering of Matter, Transport and Energy and the Director of the Adaptive Intelligent Materials & Systems (AIMS) Center at ASU. She received her B. Tech (Hons) in Aerospace Engineering from the Indian Institute of Technology Kharagpur, followed by M.S. and Ph.D. degrees in Aerospace Engineering from the Georgia Institute of Technology. Her current research areas include multifunctional materials and adaptive structures, high-temperature materials, multiscale modeling, and systems health management. She has been the PI on numerous grants and has collaborated with defense and government labs on significant technical transitions. She graduated 45 Ph.D. students and 25 M.S. students and supervised 20 Postdoctoral Fellows and four Research Assistant Professors. She has published 246 archival journal papers, 385 refereed conference publications, book chapters, and NASA TMs, and is the holder of five patents. She is the recipient of several academic, research and best paper awards. She received the Georgia Institute of Technology Council of Outstanding Young Engineer Award and the Distinguished Alumnus Award from the Indian Institute of Technology. She is the recipient of the Faculty Achievement Award – Excellence in Research, Arizona State University. She has served as an associate editor and/or editorial board member of many journals and is currently serving on the editorial boards of the Journal of Structural Durability and Health Monitoring and Digital Engineering and Digital Twin. She serves on the technical committees of many professional organizations. Dr. Chattopadhyay is a Fellow of the American Institute of Aeronautics & Astronautics (AIAA) and a Fellow of the American Society of Mechanical Engineers (ASME).

WEDNESDAY, SEPTEMBER 13
8:00AM–9:00 AM PHOENIX BALLROOM NORTH, LOBBY LEVEL

Nanshu Lu, Ph.D.
Frank and Kay Reese Professor
Department of Aerospace Engineering & Engineering Mechanics
Department of Biomedical Engineering
Department of Electrical and Computer Engineering
Department of Mechanical Engineering
Texas Materials Institute
The University of Texas at Austin
Austin, TX

PRESENTATION TITLE: E-TATTOOS AND E-SKINS BRIDGING HUMANS AND ROBOTS

ABSTRACT: Many of us share a vision for the future that humans will be more like robots (i.e., digital, computational, cyber, expandable, etc.) whereas robots will be more like humans (i.e., soft, dexterous, intelligent, energy efficient, etc.). My group therefore focuses on soft electronics that can be integrated on humans or robots to facilitate their understanding and interaction. This talk will introduce my research on the mechanics, design, and manufacture of stretchable electronics. In particular, epidermal electronics, a.k.a. e-tattoos, represent a class of stretchable circuits, sensors, and stimulators that are ultrathin, ultrasoft, noninvasive but skin-conformable. My group has invented a dry and freeform "cut-and-paste" fabrication process for the rapid prototyping of multi-material, large-area, or modular e-tattoos capable of high-fidelity and ambulatory biometric sensing. While e-tattoos are for human wear, e-skins are for robot wear to emulate the functionalities and properties of human skins. Soft touch-sensitive e-skins have long been desired, but contamination of pressure responses by stretching has been a persistent challenge. My group recently developed a stretchable hybrid response pressure sensor (SHRPS) that solves this problem. SHRPS-integrated inflatable probes can be used for either accurate and gentle digital palpation or conformable and firm gripping. With e-tattoos digitizing the human body and e-skins mimicking human skin, we aim to bridge the gap between humans and robots for a symbiotic future.

BIOGRAPHY: Dr. Nanshu Lu is the Frank and Kay Reese Professor at The University of Texas at Austin. She received her B.Eng. with honors from Tsinghua University, Beijing, her Ph.D. from Harvard University, and then Beckman Postdoctoral Fellowship at UIUC. Her research concerns the mechanics, materials, manufacture, and human or robot integration of soft electronics. She is a Clarivate (Web of Science) highly cited researcher and a Fellow of the American Society of Mechanical Engineers (ASME). She is on the Board of Directors of the Society of Engineering Science (SES). She is currently an Associate Editor of Nano Letters and Journal of Applied Mechanics. She has been named one of the 35 innovators under 35 by MIT Technology Review (TR 35) and iCANX/ACS Nano Inaugural Rising Star. She has received the US NSF CAREER Award, US ONR and AFOSR Young Investigator Awards, 3M non-tenured faculty award, and the ASME Thomas J.R. Hughes Young Investigator Award. She was selected as one of the five great innovators on campus and five world-changing women at The University of Texas at Austin. For more information, please visit Dr. Lu's research group webpage and follow her on Twitter: @nanshulu.

Symposia Invited Speakers

MONDAY, SEPTEMBER 11
9:10AM–10:30AM MAGNOLIA ROOM, LOBBY LEVEL

Symposium 1
Konrad Rykaczewski, Ph.D.
School for Engineering of Matter, Transport and Energy
Arizona State University
Tempe, AZ

PRESENTATION TITLE: ADDING SOLID AND FLUIDS TO LIQUID METALS: HOW TO MAKE MULTIFUNCTIONAL LIQUID METAL PASTES, FOAMS, AND EMULSIONS

ABSTRACT: Gallium and its eutectic alloys have metallic properties (e.g., high electrical and thermal conductivity) while remaining in liquid state near room temperature. Accordingly, these liquid metals (LMs) are used to make soft and stretchable components and devices for electronics, biomedical, sensor, energy storage, and foremost for thermal management applications. However, the use of the LM is cumbersome because of its rapid oxidation, low viscosity, high surface tension, and reactivity with other metals. These issues can be resolved by adding a variety of solid additives into the LM, which also results in pastes with enhanced properties. Most recently, several routes have also been developed to incorporate secondary fluids into LMs, including air to create foams [1,2] and silicone oils to create emulsions [3,4]. Both the foams and emulsions are substantially lighter and easier to apply to surfaces than original LM. In addition, the oil-in-liquid metal emulsions can prevent one of the major drawbacks of gallium and its alloys. Specifically, the emulsion forms about 500 nm exterior film that prevents gallium-induced embrittlement of contacting aluminum surfaces [3,4]. Despite these interesting properties, our understanding of how these LM-based materials form and can be improved is just beginning to emerge.

In this presentation I will describe the highly intertwined microscale formation mechanisms of LM pastes, foams, and emulsions. First, I will discuss systematic experiments on the internalization of a several sizes and volume fractions of silica microparticles into LM, which demonstrate that some air bubble entrapment always occurs along with particles. Similarly, the experiments demonstrate that addition of solid micro-particles is required for the onset of LM foaming. In other words, there are no pure LM pastes or LM foams but multiphase LM composites with varying volume fractions of solid and air components. The particles size, volume fraction, and mixing method can be used to either promote or inhibit air entrapment leading to more paste-like or foam-like composites. Second, I will discuss the formation of the oil-in-LM emulsions. When mixed with any other liquid, pure LM breaks up into microdroplets. We discovered that this can be prevented when silicone oil is mixed with LM foam. I will discuss how the silicone oil droplets are internalized in the LM foam and how prior addition of even a small volume fraction of silica particles into LM removes the need for foaming of the liquid before oil addition.

We acknowledge funding from National Science Foundation grant 2034015.

[1] Wang, X., Fan, L., Zhang, J., Sun, X., Chang, H., Yuan, B., Guo, R., Duan, M., and Liu, J., 2019, “Printed Con-formable Liquid Metal E-Skin-Enabled Spatiotemporally Controlled Bioelectromagnetics for Wireless Multisite Tu-mor Therapy,” Adv Funct Mater, p. 1907063.

[2] Kong, W., Shah, N. U. H., Neumann, T. v, Vong, M. H., Kotagama, P., Dickey, M. D., Wang, R. Y., and Rykaczewski, K., 2020, “Oxide-Mediated Mechanisms of Gallium Foam Generation and Stabilization during Shear Mixing in Air,” Soft Matter, 16, pp. 5801–5805.

[3] Shah, N. U. H., Kong, W., Casey, N., Kanetkar, S., Wang, R. Y.-S., and Rykaczewski, K., 2021, “Gallium Oxide-Stabilized Oil in Liquid Metal Emulsions,” Soft Matter, 17, pp. 8269–8275.

[4] Shah, N. U. H., Kanetkar, S., Uppal, A., Dickey, M. D., Wang, R. Y., and Rykaczewski, K., 2022, “Mechanism of Oil-in-Liquid Metal Emulsion Formation,” Langmuir, 38(43), pp. 13279–13287.

BIOGRAPHY: Konrad Rykaczewski is an associate professor at School for Engineering of Matter, Transport and Energy at ASU. He received his B.S. (2005), M.S. (2007), and Ph.D. (2009) in mechanical engineering from the Georgia Institute of Technology. Prior to his appointment at ASU, he was a research scientist at MIT and NRC postdoctoral fellow at NIST.

MONDAY, SEPTEMBER 11
10:50AM–12:10PM MAGNOLIA ROOM, LOBBY LEVEL

Symposium 1
Ximin He, Ph.D.
Associate Professor of Materials Science and Engineering
University of California, Los Angeles
Los Angeles, CA

PRESENTATION TITLE: BIO-LIKE SOFT MATERIALS WITH LIFE-LIKE INTELLIGENCE

ABSTRACT: From the cellular level up to the body system level, living organisms present elegant designs to realize the desirable structures, properties, and functions. For example, tendons and muscles are tough but soft, owing to highly complex hierarchical structures rarely found in synthetic materials. Our neuromuscular system enables our motion sensing and response with built-in feedback control, presenting superior intelligence also lacking in manmade systems. Gels, as a class of liquid-laden crosslinked polymer networks, not only have tissue-like water-rich porous networks and can also change their volume and physical properties in response to environmental cues. At the UCLA He Lab, we exploit fundamental material

processing-structure-property-function studies of hydrogels and their derivatives, to create (i) 'bio-like' structures and properties and (ii) 'life-like' intelligence in functional soft materials for applications in robotics, biomedicine, energy, and environment. This talk will present how these could be realized by mastering polymer-water interactions. Specifically, using classic chemical physical principles to modulate macromolecule assembly up to complex polymer networks, the fundamental limits in mechanical, diffusion and electrical properties could be broken to design extreme properties. The enabled soft materials featuring high mechanical toughness, ion/electron conduction, fast stimuli response, and "synthetic intelligence" make possible the next-generation energy-self-sufficient robots, personalized medical implants, as well as futuristic smart wearable electronics and battery-powered flight.

BIOGRAPHY: Ximin He is an associate professor of Materials Science and Engineering at University of California, Los Angeles (UCLA) and Faculty of California Nanosystems Institute (CNSI). Dr. He was a postdoctoral research fellow in the School of Engineering and Applied Science and the Wyss Institute of Bioinspired Engineering at Harvard University. Dr. He received her Ph.D. in Chemistry at Melville Laboratory for Polymer Synthesis from the University of Cambridge. Dr. He's research focuses on bioinspired soft materials, structural polymers and their physical, mechanical, electrical and photothermal properties with broad applications in biomedicine, energy, environment, and robotics. Dr. He is the recipient of the NSF CAREER award, AFOSR Young Investigator award, CIFAR Global Scholar, SES Young Investigator Medal, International Society of Bionic Engineering (ISBE) Outstanding Youth Award, Advanced Materials Rising Star Award, 3M Non-tenured Faculty Award, Hellman Fellows Award, and UCLA Faculty Career Development Award. Her research on bioinspired tough hydrogels, phototropic, phototaxic, homeostatic and anti-icing has garnereda number of regional and international awards and was featured in >100 international news outlets.

WEDNESDAY, SEPTEMBER 13
9:10AM–10:30AM AUSTIN ROOM, LOBBY LEVEL

Symposium 2
Dr. Mikhail Shamonin
Ostbayerische Technische Hochschule Regensburg
Regensburg, Germany

PRESENTATION TITLE: MAGNETOACTIVE ELASTOMERS: EXTRAORDINARY PROPERTIES AND PHYSICS OF IRON IN RUBBER

ABSTRACT: The cutting-edge research in the field of magnetoactive elastomers (MAEs), which comprise soft-magnetic particles embedded into a soft polymeric matrix, will be presented. After introducing the concept, an overview of several extraordinary bulk properties and physical phenomena in these smart materials will be given. The "colossal" magnetorheological effect, the "giant" magnetodielectric effect, the "giant" magnetostriction, and the magnetic properties of MAEs will be discussed. The physical origin of these phenomena is attributed to the rearrangement (changes in mutual positions) of magnetic particles in a mechanically soft polymer matrix in the presence of an external magnetic field. This phenomenon is usually designated as the restructuring of magnetic filler particles. I will discuss possible theoretical approaches to describe significant changes of physical properties of MAEs in external magnetic fields. I will also present multilayered heterostructures comprising a magnetoactive elastomer (MAE) slab and a commercially available piezoelectric polymer multilayer. These multiferroic structures are promising as sensitive low-frequency sensors of magnetic field. It can be expected that the restructuring of the filler should also be "visible" on MAE surface. In this context, recent results on magnetically controllable surface properties of MAEs will be presented. The control of the wettability of non-structured and microstructured MAEs by magnetic field will be demonstrated. Novel approaches to control drop splashing on non-structured and microstructured MAE surfaces will be discussed.

BIOGRAPHY: Mikhail Shamonin studied physics at Lomonosov University in Moscow, Russia and engineering science at Oxford University in the UK. He received his Ph.D. degree in physics from the University of Osnabrück in Germany with a thesis on magneto-optical waveguides. After a short post-doctoral position at the University of Osnabrück, he worked for more than five years as a physicist for a high-tech company (H. Rosen Engineering GmbH) in Lower Saxony in Germany, which business is mainly in research, development, production, and operation of inspection devices for pipelines and other complex technical systems. Since 2002 he has been Professor for Sensor Technology in the Faculty of Electrical Engineering and Information Technology of the Ostbayerische Technische Hochschule Regensburg in Bavaria, Germany. In recent years, his interest has shifted from sensor technology and metamaterials towards smart materials, particularly magnetoactive elastomers and energy harvesting.

TUESDAY, SEPTEMBER 12
10:50AM–12:10PM AUSTIN ROOM, LOBBY LEVEL

Symposium 2

Yunlan (Emma) Zhang, Ph.D.
Assistant Professor, Department of Civil Architectural and Environmental Engineering
The University of Texas at Austin
Austin, TX

PRESENTATION TITLE: ARCHITECTED MATERIAL ANALOGS OF SHAPE MEMORY ALLOYS

ABSTRACT: Shape memory alloys (SMAs) are smart materials that find applications in areas as diverse as medical devices, endodontic files, and structural dampers for infrastructure. Nevertheless, the widespread use of these materials is limited by their high cost, which is driven by the need for high-purity raw materials and extensive thermomechanical processing.

Symposia Invited Speakers

Architected materials are another class of emerging materials that usually consist of numerous unit cells. By tailoring the geometry and topology of the unit cells, these materials can exhibit novel and/or customized properties and responses to physical stimuli. Here, we create a type of architected material that can reproduce the novel properties of SMAs, which are referred to as Architected Material Analogs of SMAs (ASMAs). ASMAs comprise periodic multistable unit cells and can exhibit both the salient behaviors, super elasticity and shape memory effect of SMAs. ASMAs can be made from a wide variety of polymers, made by many different low-cost production processes as well as 3D printing, and are designed to respond to various stimuli such as heat, magnetic fields, and solvent absorption. ASMAs offer a lower-cost alternative that can expand the design space for SMA-like material behavior to include larger-scale (e.g., seismic resistance device) or lower-cost applications (e.g., medical implants).

BIOGRAPHY: Yunlan Zhang is an Assistant Professor of Civil, Architectural and Environmental Engineering at The University of Texas at Austin. Before she joined UT, she was a Postdoctoral Researcher in the Department of Engineering Science at the University of Oxford. She received her Ph.D. and M.S. degrees in civil engineering from Purdue University in 2019, and her B.S. in civil engineering from The Ohio State University in 2012. Her research interests include architected materials, deployable structures, and bioinspired design. She wants to combine her knowledge of structures and materials to create advanced structures with applications that range in scale from microscopic medical devices to macroscopic infrastructure retrofits and extraterrestrial habitats. She enjoys working with students just as much as conducting research.

TUESDAY, SEPTEMBER 12
1:40PM–2:20PM **DEWITT ROOM**

Symposium 3
Jovana Jovanova, Ph.D.
Assistant Professor
Faculty of Mechanical, Maritime and Materials Engineering
Delft University of Technology
Delft, The Netherlands

PRESENTATION TITLE: DESIGN OF MECHANICALLY INTELLIGENT STRUCTURES

ABSTRACT: The world we live in is dynamic, continuously changing due to different cyclic or disruptive occurrences. Adaptation of engineering systems to changes, as a feature, has become more valued, even expected, when new designs are developed. Whether it is adapting to operational conditions, people and/or their environment, structures, and machines rely on a set of technologies to be able to function in a desired fashion. The complexity of the adaptive function requires model-based design of the interaction between the structure/machines and its operational environment, which requires new modelling approaches to capture this interaction. The advantage of adaptation can be achieved by reducing complexity if the functionality is encoded in the early design of the structures opposed to the traditional way when it is added later in the design process. Encoding functionality in structures during their early design phase is achieved by the combined effort of the geometry and the material property by capturing the flexibility of a structure in large deformation domain and the smart material behaviour. The developed models can also be used for uncovering the scaling rules and the size limits imposed by the material, the geometry, and the manufacturing technology. In this talk the idea of mechanically intelligent structures will be presented and discussed, followed by examples of integrating different smart materials (SMAs, hydrogels, piezoelectric materials) in a variety of applications for grabbing, soft robotics, multimodal locomotion, and energy absorption.

BIOGRAPHY: Jovana Jovanova is assistant professor at the Transport Engineering and Logistics Section, Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology in the Netherlands working on the design of large-scale adaptive (meta)structures, mechanisms, and machines able to change their properties and/or functionality over time to improve performance, reliability, and efficiency. Adaptation in this context is the ability of structures, mechanisms, or machines to recognize the changes occurring in their environment and adjust internally to respond in a desired way. Her research includes analytical, numerical, and data-based modelling and characterization of mechanically intelligent structures that utilize smart materials and/or large deformations for adaptation. She integrates concepts of compliant mechanisms, smart materials, metamaterials, bio-inspired design, and soft robotics into adaptive machines for the applications in maritime, offshore, and transport technology.

Jovana is involved in TU Delft initiatives within the Robotics and the Bioengineering Institutes, as well as the Dutch Soft Robotics national initiative. She has been an active member of SMASIS since 2016 serving in different Bioinspired TC roles. She has also supported the organization of the Compliant Mechanisms Symposium within ASME IDETC and RoboSoft 2023 conference. She is associate editor at Journal of the Brazilian Society of Mechanical Sciences and Engineering, and Robotics Reports.

MONDAY, SEPTEMBER 11
1:40PM–2:20PM **DOVERS ROOM, LOBBY LEVEL**

Symposium 4
Dr. Francis Phillips
DEVCOM Army Research Laboratory
College Station, TX, USA

PRESENTATION TITLE: AEROELASTIC ANALYSIS OF CONTROLS INFORMED ADAPTIVE SMALL UNMANNED AERIAL SYSTEM

ABSTRACT: The use of small unmanned aerial systems (sUAS) has expanded dramatically over the last decade. These systems can be used for many applications ranging from communications to bridge inspections, agriculture, payload transport, firefighting, meteorology, and beyond. The low cost and low risk nature of sUAS has enabled the testing of various types of adaptive structures which may enable significant performance enhancements including maneuverability, range, and endurance. These adaptive structures may lead to changes in various physical aspects of the vehicle including variable wing camber, twist, sweep, and span. A specific example of utilizing an adaptive structure for sUAS can be found through the Powerline Unmanned Surfer concept which uses novel integrated design strategies in structure, aerodynamics, and controls to extend the flight time. While it is necessary to predict the impact of these adaptive structures on the aerodynamic and control properties of these aerial vehicles, it is also vital to understand the inverse relationships of how aerodynamic and controls will impact the elastic deformation of these active structures. In this talk, the uncoupled static aeroelastic analysis method is presented along with various augmentations for its use in integrated, adaptive structures via the inclusion of an adaptation parameter to correspond with the level of adaptivity required by the controller. Key results including the analysis of wings with either variable wing-span or thickness will be presented. By integrating results from the uncoupled static aeroelastic analysis method into the flight controller, it is possible to better predict the performance of adaptive sUAS.

BIOGRAPHY: Dr. Francis Phillips currently works as a research aerospace engineer for the U.S. Army DEVCOM Army Research Laboratory, where he leads a program focused on development of reconfigurable aerial vehicles including exploring the application and control of active materials to enable reconfiguration as well as aeroelastic analysis coupled to design for reconfigurable vehicles. Prior to joining the Army Research Laboratory, he earned his Ph.D. in Aerospace Engineering from Texas A&M University studying the fatigue of shape memory alloys. Dr. Phillips' areas of interest include smart materials, reconfigurable structures, and aeroelasticity.

TUESDAY, SEPTEMBER 12
11:30AM–12:10PM **DOVERS ROOM, LOBBY LEVEL**

Symposium 4
Dr. Roeland De Breuker
Faculty of Aerospace Engineering,
Department of Aerospace Structures and Materials,
Delft University of Technology
Delft, Netherlands

PRESENTATION TITLE: SMARTX: INTELLIGENT WINGS ENABLING MORE SUSTAINABLE AVIATION

ABSTRACT: Making aviation more sustainable means we need breakthroughs in many aeronautical disciplines simultaneously. One of these disciplines is innovative wing design. Such a design can reduce drag and alleviate loads and hence reduce mass. Reduced drag and reduced mass lead to lower energy consumption during flight, which reduces greenhouse gas emissions and enables the use of sustainable but lower energy-density energy carriers.

We will present the intelligent wing of the future concept that was developed at the Delft University of Technology within the SmartX project. This wing can sense its own structural and flow state and take autonomous decisions by using nonlinear AI control algorithms to actively change its static and dynamic shape by using distributed morphing control surfaces to reduce drag and alleviate loads. The SmartX project philosophy and the past, ongoing, and future research activities regarding design and bench, wind tunnel and flight testing will be introduced. Important results that have already been obtained will be presented and discussed, as well as the roadmap for future activities.

BIOGRAPHY: Roeland De Breuker is an associate professor at the Delft University of Technology. He is also Director of Research at the Department of Aerospace Structures and Materials. He specialises in the field of smart and aeroelastic structures. He focuses on developing analysis tools, optimisation, and design of structures and related bench and wind tunnel experiments for code validation and proofs of concept. His research activities range from technology readiness levels 1-4. While employed at the Delft University of Technology, he had former experiences with three-month visits to the DLR in Göttingen, Germany and Clarkson University in Potsdam, NY. He was also a visiting professor at Airbus Group Innovations in Munich, Germany, for half a year.

Roeland De Breuker is involved in multiple European and Dutch government-funded projects, as well as industry-funded projects, in the research fields of smart and aeroelastic structures. He is (co-)advising 20 Ph.D. students, he graduated 12 Ph.D. students as (co-) promotor and is advising/has advised over 70 M.Sc. students. He currently holds 58 refereed journal papers and three patents.

Symposia Invited Speakers

MONDAY, SEPTEMBER 11
9:10AM–10:30AM **DEZAVALA ROOM, LOBBY LEVEL**

Symposium 5
Roozbeh Jafari, Ph.D.
Tim and Amy Leach Professor
Texas A&M University
College Station, TX

PRESENTATION TITLE: DIGITAL MEDICINE FOR CARDIOVASCULAR HEALTH

ABSTRACT: The bold vision of pervasive physiological monitoring, through proliferation of off-the-shelf wearables that began a decade ago, has created immense opportunities for precision medicine outside clinics and in ambulatory settings. Although significant progress has been made, several unmet needs remain; limited availability of advanced wearable sensing paradigms, noise and missingness in wearable data and labels in ambulatory settings, the unknown circumstances surrounding data capture in wearable paradigms, heterogeneity of the users both in terms of physiological and behavioral states, and often limited view into the user's physiological state prevent extraction of actionable information.

This seminar presents several topics that coherently articulate vision and the opportunities of digital medicine for cardiovascular health. The seminar covers three pillars of digital medicine, i) sensing, ii) signal processing, and iii) context aware and personalized AI as it pertains to cardiovascular health. We will introduce several novel sensing paradigms using bio-impedance that leverage various types of electrodes and electronic tattoos enabling blood pressure measurement with clinical grade accuracy. We will discuss the notion of particle filters that provide a generalizable and robust paradigm for reducing the impact of noise. Finally, we will discuss the concept of a digital twin for cardiovascular health, that will enhance the ability to extract actionable information in the context of several real-world applications.

Digital medicine and wearables will play a significant role in the future of medicine outside clinics. The future directions present opportunities both in short-term translational research efforts with direct influence on clinical practice as well as long-term foundational development of theories and computational frameworks combining human physiology, physics, computer science, engineering, and medicine, all aimed at impacting the health and well-being of our communities.

BIOGRAPHY: Roozbeh Jafari is the Tim and Amy Leach Professor at Texas A&M university with appointments in the School of Engineering Medicine in Houston TX and College of Engineering in College Station, TX. His appointments span over Electrical and Computer Engineering, Biomedical Engineering, Computer Science and Engineering departments. He received his Ph.D. in Computer Science from UCLA and completed a postdoctoral fellowship at UC-Berkeley. His research interest lies in the area of wearable computer design and signal processing. He has raised more than $86M for research with $23M directed towards his lab. His research has been funded by the NSF, NIH, DoD (TATRC), DTRA, DIU, AFRL, AFOSR, DARPA, SRC ,and industry (Texas Instruments, Tektronix, Samsung, & Telecom Italia). He has published over 200 papers in refereed journals and conferences. He has served as the general chair and technical program committee chair for several flagship conferences in the areas of wearable computers. Dr. Jafari is the recipient of the NSF CAREER award (2012), IEEE Real-Time & Embedded Technology & Applications Symposium best paper award (2011), Andrew P. Sage best transactions paper award (2014), ACM Transactions on Embedded Computing Systems best paper award (2019), William O. and Montine P. Head Memorial research award for outstanding engineering contribution award from the College of Engineering at Texas A&M (2019), dean of engineering excellence award at Texas of A&M University (2021), and TEES research impact award at Texas A&M University (2021). He has been named Texas A&M Presidential Fellow (2019). He serves on the editorial board for the Nature Digital Medicine, IEEE Transactions on Biomedical Circuits and Systems, IEEE Sensors Journal, IEEE Internet of Things Journal, IEEE Journal of Biomedical and Health Informatics, IEEE Open Journal of Engineering in Medicine and Biology, and ACM Transactions on Computing for Healthcare. He is currently the chair of the IEEE Wearable Biomedical Sensors and Systems Technical Committee (elected) as well as the IEEE Applied Signal Processing Technical Committee (elected). He serves on scientific panels for funding agencies frequently, served as a standing member of the NIH Biomedical Computing and Health Informatics (BCHI) study section (2017–2021), and was the inaugural chair of the NIH Clinical Informatics and Digital Health (CIDH) study section (2020–2022). He is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE).

WEDNESDAY, SEPTEMBER 12
10:50AM–12:10PM **DEZAVALA ROOM, LOBBY LEVEL**

Symposium 5
Tanya Hutter, Ph.D.
The University of Texas at Austin
Austin, TX

PRESENTATION TITLE: SMART MATERIALS AND DEVICES FOR SENSING AND DEGRADATION OF TOXIC GASES

ABSTRACT: Indoor and outdoor air quality is extremely important for health. Detection and measurement of volatile organic compounds (VOCs) is of great importance for many applications including air quality, industrial monitoring, and medical diagnostics.

Commercially available low-cost sensor technologies are either only capable of measuring a single gas, or only provide a total VOC concentration without ability to differentiate between them. We present a new approach for improving selectivity based on temporally resolved thermal desorption of VOCs from a nanoporous material, which can be combined with any existing VOC detector. An example of a detection system using a commercial total VOC photoionization detector and a nanoporous silica preconcentrator demonstrates several different VOCs and shows potential for discrimination between them.

In the second part of the talk, I will discuss materials for photocatalytic degradation of volatile organics. Most photocatalytic methods use ultraviolet light, however catalyst materials that perform under visible light could be used as an effective approach for improving indoor and outdoor air quality and reducing the health risks associated with exposure to VOCs. Our study investigates the use of visible light and plasmonic gold nano island-enhanced anatase TiO2 as a photocatalyst, and the efficiency of the photocatalysis is evaluated as a function of various fabrication parameters.

BIOGRAPHY: Dr. Tanya Hutter is an Assistant Professor in the Walker Department of Mechanical Engineering at The University of Texas at Austin. She has a B.Sc. in Chemical Engineering (Ben-Gurion University), M.Sc. in Materials Science and Engineering (Tel-Aviv University), and Ph.D. in Physical Chemistry (University of Cambridge). Since completing her Ph.D., she worked as a Research Fellow in Physical Chemistry at the University of Cambridge and received several prestigious fellowships to develop her independent research. In 2016, she was awarded L'Oréal-UNESCO for Women in Science Fellowship UK & Ireland for her scientific achievements.

Her research interests lie in the fields of emerging molecular sensing technologies, nanomaterials, microfabrication, and nanophotonics with applications in environmental and industrial sensing, homeland security, and medical diagnostics. Dr. Hutter published over 40 peer-reviewed papers and is an inventor on six patents. Dr. Hutter also has a strong interest in technology commercialization and entrepreneurship. Alongside her academic career she co-foundered two startups in the fields of nanophotonic sensing and MedTech.

MONDAY, SEPTEMBER 11
1:40PM–3:00PM **DEZAVALA ROOM, LOBBY LEVEL**

Symposium 5
Peng "Patrick" Sun, Ph.D.
Assistant Professor, Department of Civil, Environmental, and Construction Engineering
University of Central Florida
Orlando, FL

PRESENTATION TITLE: UAV-BASED REMOTE SENSING FOR MUNICIPAL SOLID WASTE LANDFILL INSPECTION AND MONITORING

ABSTRACT: Municipal solid waste (MSW) landfills need regular management and maintenance to ensure proper operations and meet the environment protection requirements. One requirement is to monitor landfill gases (LFGs) which emit from landfill cover into the environment contributing to global warming. While another requirement is to monitor the potential settlement on MSW landfill covers for maintenance purposes. Surveying tasks are needed to be performed regularly (e.g., quarterly) that are time and labor consuming. Therefore, there is a need for an efficient method to monitor landfill surface conditions. Unmanned aerial vehicles (UAVs) were usually adopted in LFGs emissions and perform landfill surveys as individual tasks, and few studies have been reported to achieve multiple UAV surveying tasks synergistically. In addition, the automatic detection of water ponding issues yet remains to be studied, which may cause water infiltrations. Hence, the study proposes a UAV-based sensing approach and data collection/analysis method to monitor landfill and detect water ponding issues using multimodal sensor fusion. The proposed approach has been applied on a MSW landfill before and after Hurricane Ian, which passed near the study location in Florida. The comparative study between the proposed ponding index map and the manual survey shows satisfactory performance.

BIOGRAPHY: Dr. Patrick Sun is an Assistant Professor in Structural Engineering and Smart Cities in the CECE department and Director of Resilient Infrastructure Sensing and Evaluation (RISE) Laboratory at the University of Central Florida since 2020. Prior to his appointment at UCF, he obtained his Ph.D. from Rice University and postdoc training from the University of Michigan. He is a passionate researcher for smart sensors and sensing systems, in which he incorporates his scientific and engineering understanding of built environments and people. Now he expands his research into UAV-based remote sensing and its applications in environmental engineering and water resource engineering.

Symposia Invited Speakers

TUESDAY, SEPTEMBER 12
3:30PM–4:10PM **DEZAVALA ROOM, LOBBY LEVEL**

Symposium 5
Haifeng Zhang, Ph.D.
Professor, Department of Mechanical Engineering
University of North Texas
Denton, TX

PRESENTATION TITLE: SURFACE ACOUSTIC WAVE QUARTZ RESONATORS FOR NONDESTRUCTIVE STRUCTURAL MONITORING OF NUCLEAR SPENT FUEL CANISTERS BY MEASURING INTERNAL PRESSURE AT ELEVATED TEMPERATURE

ABSTRACT: A nondestructive method of monitoring the internal pressure of spent fuel canisters is desired for structural monitoring at high-temperature and radioactive environments. Surface Acoustic Wave (SAW) sensors are ideal for use in such hostile situations. In this work, a method for nondestructively monitoring the pressure inside a cylindrical canister using SAW resonators was developed. A prototype of the canister was fabricated for laboratory-level experiments, and a SAW resonator was mounted to the prototype's outside surface. The internal pressure creates hoop strain on the cylinder's outer surface, which strains the attached SAW substrate and affects its resonance frequency. Finite element simulations were used to estimate the hoop strain developed on the outer surface of the prototype. The SAW sensor was calibrated by comparing the frequency shift in the resonance frequency to various internal pressures. Initially, a strain gauge was used to calibrate the sensor on a cantilever. Then, the procedure was validated experimentally on a pressurized canister prototype at room temperature. A sensitivity of -30 Hz/kPa was obtained for the SAW sensor attached to the cylinder. Finally, the test was repeated at higher temperatures (up to 60°C) to investigate the sensor's temperature dependency, and a temperature compensation approach was used for reliable pressure reading at higher temperatures.

BIOGRAPHY: Haifeng Zhang is a Professor of the Department of Mechanical Engineering at the University of North Texas (Denton, TX). His research interests include advanced sensors, energy harvesters, structural health monitoring and ultrasonic nondestructive evaluation. He received his B.S. in Engineering Mechanics from Hunan University, China in 1997, his M.S. degree in Solid Mechanics from Northwestern Polytechnical University, Xian, China, in 2001, and his Ph.D. degree in Engineering Mechanics from University of Nebraska, Lincoln in 2007. He was a postdoctoral researcher in the Department of Material Science and Engineering at Ohio State University before joining the University of North Texas in 2008. Dr. Zhang is a committee member of the ASME energy harvesting technical committee.

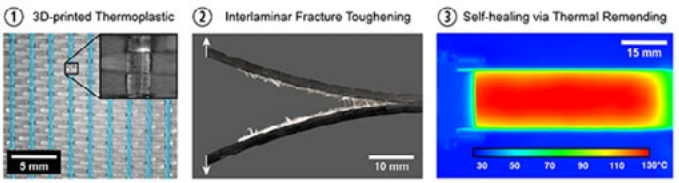
TUESDAY, SEPTEMBER 12
9:10AM–10:30AM **ROBERTSON ROOM, LOBBY LEVEL**

Symposium 6
Jason Patrick, Ph.D.
Assistant Professor
Department of Civil, Construction, and Environmental Engineering
North Carolina State University
Raliegh, NC

PRESENTATION TITLE: SUSTAINED SELF-HEALING OF FIBER-REINFORCED POLYMER COMPOSITES VIA IN SITU THERMAL REMENDING

ABSTRACT: Fiber-reinforced polymer (FRP) composites are attractive structural materials due to their high specific strength/stiffness and excellent corrosion resistance. However, the lack of through-thickness reinforcement in laminated composites creates inherent susceptibility to fiber-matrix debonding (i.e., interlaminar delamination). This multi-scale damage mode has proven difficult to detect and nearly impossible to repair via conventional methods, and thus remains a significant factor limiting the reliability of laminated composites in lightweight structures. An emerging class of synthetic self-healing polymers and composites possess property-retaining functions with the promise of longer lifetimes. But prolonged in-service repair of structural fiber-reinforced composites remains unfulfilled due to material heterogeneity and thermodynamic barriers in commonly cross-linked polymer-matrix constituents. Overcoming these inherent challenges for mechanical self-recovery is vital to extend in-service operation and attain widespread adoption of such bioinspired structural materials.

In this talk, I will describe the recent development of a new self-healing FRP composite platform [1,2] based on thermally induced dynamic bond re-association of 3D-printed polymer interlayers. In contrast to prior thermal remending approaches, self-repair of delamination occurs in situ via resistive heating and below the glass-transition temperature of the thermoset matrix, thereby maintaining elastic modulus during repair. Rapid (minute-scale) and sustained (100+) self-healing cycles have been achieved with fracture recovery reaching 100% of the interlayer toughened composite. Moreover, this latest self-healing advancement in both glass- and carbon-fiber composites exhibits unprecedented potential for prolonged in-service repair along with material multi-functionality (e.g., deicing ability), thereby enabling application versatility.



References

[1] Snyder, A.D., Phillips, Z.J., Turicek, J.S., Diesendruck, C.E., Nakshatrala, K.B., & Patrick, J.F., Prolonged in situ self-healing in structural composites via thermo-reversible entanglement, Nature Communications, 13:6511 (2022).

[2] Patrick, J.F., & Snyder, A.D., U.S. Patent No. 11,618,088 – Self-healing interlaminar delamination in fiber-reinforced composites via thermal remending. Issued: 28 Mar. 2023

BIOGRAPHY: Jason Patrick is an Assistant Professor in the Department of Civil, Construction, and Environmental Engineering with a courtesy appointment in Mechanical and Aerospace Engineering at NC State University. He obtained his Ph.D. in Structural Engineering from the University of Illinois Urbana-Champaign and was a post-doctoral fellow at the Beckman Institute for Advanced Science and Technology before becoming faculty. Prof. Patrick has 20+ years of experience in R&D of advanced fiber-reinforced polymer composites with ongoing federally funded research projects by the DoD and NSF. Research in Dr. Patrick's group is directed toward the understanding and development of bioinspired material systems that exhibit multi-functionality for enhanced performance, reliability, and longevity. Jason has made significant contributions to the field of multifunctional materials, being a pioneer in self-healing composites, including co-inventing the vaporization of sacrificial components (VaSC) process to create complex internal microvasculature and recently patenting the first self-healing composite laminates with in situ repair capacity via thermal remending. Prof. Patrick has a passion for education and mentoring students while also being driven by research translation where he is the President and Chief Technology Officer (CTO) of the start-up company Structeryx, Inc.

TUESDAY, SEPTEMBER 12
3:30PM–4:50PM **ROBERTSON ROOM, LOBBY LEVEL**

Symposium 6
Ankur Mehta, Ph.D.
University of California, Los Angeles
Los Angeles, CA

PRESENTATION TITLE: MATERIALS TO MAKERS

ABSTRACT: Robots are pretty great—they can make some hard tasks easy, some dangerous tasks safe, or some unthinkable tasks possible. And they're just plain fun to boot. But how many robots have you made, or even interacted with recently? And where do you think that puts you compared to the rest of the world's people?

In contrast to computation, automating physical interactions continues to be limited in scope and breadth. I'd like to change that. But in particular, I'd like to do so in a way that's accessible to everyone, everywhere, letting more people into the engineering conversation. In our lab, we work to lower barriers to the design, creation, and operation of mechanical machines—from material and mechanism design, through mathematical analysis, to computational frameworks and tools.

We start from everyday materials, such as paper and string, forming them using broadly available tools and infrastructure. By understanding and applying—sometimes in surprising and nontraditional ways—the material properties of these 2D and 1D substrates, we realize mechanisms with nontrivial responsive behaviors. And by composing these mechanisms, we develop a process to design and build robots without a state-of-the-art engineering or manufacturing facility. With these efforts, we hope to widen the circle of makers, enabling everyone with an idea and an interest to create and enjoy the benefits of custom robotics to work, to learn, and to play.

BIOGRAPHY: Now, this is a story all about how my life took me to where I am now, and I'd like to take a minute—just sit right there—I'll tell you how I became a prof at UCLA. From East Pennsylvania, born and raised, MIT is where I spent the next of my days, getting my Masters and Bachelor's, too—ECE is the field I did then pursue. Then a couple of years until I finally would from California, Berkeley, get my doctor hood; I got in one little postdoc at MIT CSAIL, and then I moved to LA just south of Bel Air.

Prof. Ankur Mehta is an assistant professor of Electrical and Computer Engineering at UCLA and directs the Laboratory for Embedded Machines and Ubiquitous Robots (LEMUR). Pushing towards his visions of a future filled with robots, his research interests involve printable robotics, rapid design and fabrication, control systems, and multi-agent networks. He has received the DARPA Young Faculty Award, NSF CAREER award, and a Samueli fellowship; he has also received best paper awards in the IEEE Robotics & Automation Magazine and the International Conference on Intelligent Robots and Systems (IROS).

MONDAY, SEPTEMBER 11
10:50PM–12:10PM **DEZAVALA ROOM, LOBBY LEVEL**

Symposium 7
Jayant Sirohi, Ph.D.
The University of Texas at Austin
Austin, TX

PRESENTATION TITLE: HARVESTING ENERGY FROM AEROELASTIC INSTABILITIES

ABSTRACT: Aeroelastic Instabilities lead to large amplitude oscillatory motion or deformation in a structure, eventually resulting in failure. These instabilities can occur in atmospheric flight vehicles, vehicles that operate in water, and civil engineering structures such as buildings, lamp posts, and bridges. Therefore, the conditions at which these instabilities occur are generally to be avoided. However, large amplitude oscillations also present an opportunity for energy harvesting. Aeroelastic instabilities

arise when the net effective damping of the coupled fluid structure system becomes negative; that is, the incident fluid continually adds energy to the structural motion. At the same time, energy harvesting serves to extract energy from the structure, effectively adding damping to it. Combining these two concepts, harvesting energy from a structure in an incident fluid stream that is prone to aeroelastic instability has the added benefit of stabilizing the structure by increasing the net damping of the system. This lecture will present the basic physical phenomena responsible for several well-known aeroelastic instabilities, such as galloping and flutter. The fundamental concepts of harvesting energy from a structure using active materials such as piezoceramics will also be explained. These two seemingly disparate fields will then be brought together, illustrating methods to harness the aeroelastic instability and extract energy. Prototype devices along with a few possible applications will be presented. The role of structural nonlinearities in enhancing the energy extracted will be discussed.

BIOGRAPHY: Jayant Sirohi is a Professor in the Department of Aerospace Engineering and Engineering Mechanics at The University of Texas at Austin. He got his Ph.D. in Aerospace Engineering in 2002 and was an Assistant Research Scientist at the University of Maryland, College Park from 2002 to 2007. During this time, he worked on numerous projects related to Smart Structures and Rotary-wing Micro-Aerial Vehicles. During 2007–2008, Dr. Sirohi worked at Sikorsky Aircraft Corporation, where he was a Staff Engineer in the Advanced Concepts group. At Sikorsky, he was the Technical Lead on analytical and numerical tools for conceptual design. Dr. Sirohi joined UT Austin in 2008 and has been working on Rotary-wing experimental aerome¬chanics, Smart Structures, plasma flow control, and aeroelasticity. His research group specializes in experimental techniques for structural dynamics and aerodynamics, such as Digital Image Correlation and Particle Image Velocimetry, as well as the aeromechanics of rotary-wing aircraft. The contributions of his research group have been acknowledged by several best paper awards, including the ASME/Boeing award (2011) and in conferences by the VFS (2017, 2018), AIAA (2019), and SEM (2019). He is a member of ASME, SEM, and VFS; an Associate Fellow of AIAA; and a Technical Fellow of the Vertical Flight Society. In 2017, he was the Technical Chair of the AHS 73rd Annual Forum. In 2019, he was awarded the Friedrich Wilhelm Bessel award by the Alexander von Humboldt Foundation.

ASME ADAPTIVE STRUCTURES AND MATERIAL SYSTEMS AWARD

Aditi Chattopadhyay
Regents' Professor
Adaptive Structures Award Recipient,
Arizona State University
Tempe, AZ

BIOGRAPHY: Dr. Aditi Chattopadhyay is a Regents' Professor at Arizona State University (ASU). She is the Ira A. Fulton Chair Professor of Mechanical and Aerospace Engineering in the School for Engineering of Matter, Transport and Energy and the Director of the Adaptive Intelligent Materials & Systems (AIMS) Center at ASU. She received her B. Tech (Hons) in Aerospace Engineering from the Indian Institute of Technology Kharagpur, followed by M.S. and Ph.D. degrees in Aerospace Engineering from the Georgia Institute of Technology. Her current research areas include multifunctional materials and adaptive structures, high temperature materials, multiscale modeling, and systems health management. She has been the PI on numerous grants and has collaborated with defense and government labs on significant technical transitions. She graduated 45 Ph.D. students and 25 M.S. students and supervised 20 Postdoctoral Fellows and four Research Assistant Professors. She has published 246 archival journal papers, 385 refereed conference publications, book chapters, and NASA TMs, and is the holder of five patents. She is the recipient of several academic, research and best paper awards. She received the Georgia Institute of Technology Council of Outstanding Young Engineer Award and the Distinguished Alumnus Award from the Indian Institute of Technology. She is the recipient of the Faculty Achievement Award – Excellence in Research, Arizona State University. She has served as an associate editor and/or editorial board member of many journals and is currently serving on the editorial boards of the Journal of Structural Durability and Health Monitoring and Digital Engineering and Digital Twin. She serves on the technical committees of many professional organizations. Dr. Chattopadhyay is a Fellow of the American Institute of Aeronautics & Astronautics (AIAA) and a Fellow of the American Society of Mechanical Engineers (ASME)

GARY ANDERSON EARLY ACHIEVEMENT AWARD

Shima Shahab
Virginia Tech,,
Blacksburg, VA

BIOGRAPHY: Dr. Shima Shahab completed her Ph.D. and M.Sc. in mechanical engineering at Georgia Institute of Technology, in 2013 and 2015, respectively. She is currently an Associate Professor and Mary V. Jones Faculty Fellow of mechanical engineering at Virginia Tech and the director of the Multiphysics Intelligent and Dynamical Systems (MInDS) Laboratory. The theoretical and experimental research programs at MInDS focus on structural dynamics and wave propagation in ultrasound-responsive intelligent material systems. The various interdisciplinary applications include wireless ultrasound power transfer, acoustic holographic lenses, ultrasound atomization, and ultrasound-responsive polymer-based systems. Among other awards, Dr. Shahab is the recipient of the College of Engineering Undergraduate Research Advisor Award in 2017 for her exceptional leadership, dedication, and success in working with undergraduate research students. She received recognition for one of her journal articles with the 2019 ASME Energy Harvesting Best Paper Award. In 2020, she was selected to receive the prestigious Virginia Tech ICTAS Junior Faculty Award. She received the Virginia Tech Engineering Faculty Organization (EFO) award in 2021. In addition to receiving the NSF CAREER award in 2022 to create new techniques for administering ultrasound treatments, she most recently received the 2023 College of Engineering Faculty Fellow Award in honor of her outstanding research accomplishments.

ASME DEDICATED SERVICE AWARD

Marcelo Dapino
The Ohio State University,
Columbus, OH

BIOGRAPHY: Dr. Marcelo is the Honda R&D Americas Designated Chair in Engineering at the Ohio State University, where he is a Professor in the Department of Mechanical and Aerospace Engineering. Prof. Dapino serves as Director of the Smart Vehicle Concepts Center, a National Science Foundation Industry-University Cooperative Research Center established in 2007. Professor Dapino joined the Ohio State University as a faculty member in 2001 where he has served as a mechanical engineering educator and primary advisor for 97 graduate dissertations and theses, undergraduate theses, and post-doctoral associates. Together with his advisees and collaborators, he has published extensively in the field of smart materials and structures. As an early adopter of solid-state metal additive manufacturing, his group has also made significant contributions to the literature on multi-material joining

and welding, vehicle lightweighting, and structural functionalization. His publications include a total of 140 archival journal articles, 9 book chapters, 125 conference papers, and 20 US and international patents. Professor Dapino has an extensive record of service to ASME and SPIE, and is a Fellow of both societies. He has successfully nominated 20 ASME Fellows on behalf of the ASME SMASIS Division.

EPHRAIM GARCIA BEST PAPER AWARD

Haitian Hao
Apple, Inc.,
Cupertino, CA

BIOGRAPHY: Dr. Haitian Hao received his M.S. and Ph.D. degrees from the Department of Mechanical Engineering at Purdue University. Dr. Hao attended college and received his B.S. in Mechanical Engineering at Shanghai Jiao Tong University in China. His research interests include thermoacoustic phenomena in solid and fluid media, acoustic metamaterials, and structural vibrations. Dr. Hao is the recipient of the Leo Beranek Medal for Excellence in Noise Control Studies, ASME SMASIS Best Paper Award, etc. Dr. Hao currently works as an N&V test engineer at Apple Inc.

Carlo Scalo
Purdue University,
West Lafayette, IN

BIOGRAPHY: Dr. Carlo Scalo is an Associate Professor in the School of Mechanical, and Aeronautical and Astronautical Engineering (by courtesy) at Purdue University. His research interests focus on computational aeroacoustics, vortex dynamics, low- and high-speed turbulent boundary layers, and hypersonics. In particular, Dr. Scalo has developed computational techniques for prediction of acoustic noise propagation and control in hypersonic boundary layers, low-speed and high-speed transitional and fully developed turbulence and thermoacoustic instability in combustion systems. Scalo has received three distinct Young Investigator Program (YIP) Awards from the Department of Defense in: hypersonic boundary layer transition (Air Force), hypersonic boundary layer turbulence (Navy) and vortex dynamics (Army). He is also the founder of HySonic Technologies – a Purdue start-up that received ONR funding to develop passive control of hypersonic boundary layers and high-speed propulsion systems.

Fabio Semperlotti
Purdue University,
West Lafayette, IN

BIOGRAPHY: Dr. Fabio Semperlotti is a Professor and the Perry Academic Excellence Scholar in the School of Mechanical Engineering at Purdue University and holds a courtesy appointment in the School of Aeronautics and Astronautics Engineering. He received a M.S. in Aerospace Engineering (2000), and a M.S. in Astronautic Engineering (2002) both from the University of Rome “La Sapienza” (Italy), and a Ph.D. in Aerospace engineering (2009) from the Pennsylvania State University (USA). Prior to joining Penn State, Dr. Semperlotti served as a structural engineer for a few European aerospace industries, including the French Space Agency (CNES), working on the structural design of space launch systems (such as Ariane 5 and Vega) and satellite platforms.

Dr. Semperlotti is a member of the Ray W. Herrick laboratory and directs the Structural Health Monitoring and Dynamics laboratory (SHMD) where he conducts, together with his research group, research on several aspects of structures and materials including structural dynamics and wave propagation, elastic metamaterials, structural health monitoring, and computational mechanics. Dr. Semperlotti has been the recipient of national awards including the National Science Foundation CAREER award (2015), the Air Force Office of Scientific Research Young Investigator Program (YIP) (2015), the DARPA Young Faculty Award (YFA) 2019, and the ASME C.D. Mote Jr. Early Career Award 2019.

TITLE: ON THE USE OF NEGATIVE THERMAL EXPANSION ENGINEERED STRUCTURES IN FLEXURAL-MODE SOLID-STATE THERMOACOUSTICS

Journal of Sound and Vibration 538 (2022), 117223

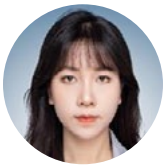
ABSTRACT: Recent numerical studies have shown evidence of self-sustained oscillations in solids due to externally-applied spatial thermal gradients. In analogy with its acoustic counterpart in gases, this phenomenon was dubbed solid-state thermoacoustics (SSTA). Such heat-driven oscillation can give rise to either longitudinal or flexural motion, depending on the specific design of the system. Although an experimental proof of self-sustained motion in flexural-mode SSTA (FSSTA) devices has yet to be produced, previous experimental studies pointed to the reduction of the effective damping as a clear indicator of the thermo-mechanical energy conversion process at the core of the F-SSTA mechanism. The F-SSTA theory suggested that negative thermal expansion (NTE), which is not a common property in natural materials, offers a remarkable opportunity to enhance the F-SSTA instability. The present study explores a design approach that leverages the unique features afforded by the solid state design in order to improve the overall performance of F-SSTA’s devices and reduce the technological gap to achieve, in a near future, a successful experimental validation. The proposed design approach leverages a hybrid bilayer beam concept where one of the two layers is designed to exhibit NTE properties. More specifically, the NTE layer is composed of a bi-material octet truss that contracts in the axial direction upon heating. This axial contraction is

particularly beneficial to induce a strong thermal bending moment that ultimately enhances the F-SSTA instability. In addition, this work also furthers the conceptual understanding of the F-SSTA process by presenting an analytical perturbation energy budget developed on the basis of a simplified discrete model. These theoretical considerations provide new important insights in the energy conversion mechanism at the basis of the F-SSTA process, hence helping reducing the gap of knowledge towards a successful experimental realization of the F-SSTA effect.

SMASIS DIVISION BEST PAPER AWARD IN STRUCTURAL DYNAMICS AND CONTROL

Keyu Chen
The Chinese University of Hong Kong

BIOGRAPHY: Dr. Keyu Chen is currently a Research Associate in the Department of Automation and Mechanical Engineering, The Chinese University of Hong Kong, Hong Kong, China. He received the B.S. degree in mechanical engineering from the Beihang University, Beijing, China, in 2015 and the Ph.D. degree in automation and mechanical engineering from The Chinese University of Hong Kong, Hong Kong, China, in 2023. His current research interests include vibration energy harvesting, vibration suppression, and multi-objective optimization.



Shitong Fang
Shenzhen University, China

BIOGRAPHY: Dr. Shitong Fang received the B.Eng. degree from Sun Yat-sen University, Guangzhou, China in 2017 and the Ph.D. degree in mechanical engineering from The Chinese University of Hong Kong, Hong Kong, China in 2021. She currently works as an Associate Professor with the College of Mechatronics and Control Engineering, Shenzhen University, China. Her research interests include nonlinear dynamics, vibration energy harvesting, and vibration suppression. Dr. Fang was a recipient of the Outstanding Thesis Award from the Faculty of Engineering, The Chinese University of Hong Kong.

Qiang Gao
Southeast University, China

BIOGRAPHY: Dr. Qiang Gao is an Associate Professor in the School of Mechanical Engineering at Southeast University. He received his B.S. and Ph.D. degrees from the Department of Mechanical Engineering at Nanjing University of Science and Technology. Before joining Southeast University, he did the research work at the University of Michigan and The Chinese University of Hong Kong. His research interests focus on the smart material and structures, topology optimization and machine learning based design.

Donglin Zou
Shanghai Jiao Tong University, China

BIOGRAPHY: Dr. Donglin Zou is currently an Assistant Professor at the School of Mechanical Engineering, Shanghai Jiao Tong University, China. He received his B.S. degree from Wuhan University of Technology, China, M.S. degree from Xi'an Jiao Tong University, China, and Ph.D. degree from Shanghai Jiao Tong University, China. His research interests include structural dynamics, vibration and noise reduction, fluid-structure interaction, computational fluid dynamics, smart materials, and vibration energy harvesting.

Junyi Cao
Xi'an Jiaotong University, China

BIOGRAPHY: Dr. Junyi Cao is a Professor in the School of Mechanical Engineering at Xi'an Jiaotong University. He received the Ph.D. degree of Mechanical Engineering from Xi'an Jiaotong University, Xi'an, China, in 2006. From September 2013 to September 2014, he was a visiting scholar with the Department of Aerospace Engineering, University of Michigan, Ann Arbor. His main research interests include smart materials and structures, vibration control and energy harvesting. He is a recipient of 2021 Best Paper Award of ASME Journal of Vibration and Acoustics.

Awards

Wei-Hsin Liao
The Chinese University of Hong Kong

BIOGRAPHY: Dr. Wei-Hsin Liao received the Ph.D. degree in mechanical engineering from The Pennsylvania State University, University Park, PA, USA, in 1997. He is currently the Department Chairman and Choh-Ming Li Professor of Mechanical and Automation Engineering, The Chinese University of Hong Kong, Hong Kong, China. His research interests include smart materials and structures, energy harvesting, vibration control, mechatronics, exoskeleton, and prosthesis. Dr. Liao currently serves as an Associate Editor for Journal of Intelligent Material Systems and Structures, and on the Executive Editorial Board of Smart Materials and Structures. He is a Fellow of the American Society of Mechanical Engineers, the Institute of Physics, and the Hong Kong Institution of Engineers. Dr. Liao is the recipient of 2020 ASME Adaptive Structures and Material Systems Award and 2018 SPIE SSM Lifetime Achievement Award.

TITLE: ENHANCING POWER OUTPUT OF PIEZOELECTRIC ENERGY HARVESTING BY GRADIENT AUXETIC STRUCTURES
Applied Physics Letters 120 (2022), 103901

ABSTRACT: In this Letter, a method is proposed to increase the power output of piezoelectric energy harvesting via gradient auxetic structures. This method is validated through a gradient auxetic piezoelectric energy harvester, which combines a cantilever beam and a gradient auxetic structure. Compared with the normal uniform auxetic structure, the gradient auxetic structure can contribute to a more uniform strain distribution of the piezoelectric cantilever beam; thus, the proposed gradient auxetic energy harvester can produce higher power than the uniform auxetic energy harvester without increasing the stress concentration at the same time. Finite element simulation is performed to analyze the characteristics of the gradient auxetic energy harvester. From the experimental results, under the base excitation of 1 m/s2, the power density of the gradient auxetic energy harvester is increased by 356% and 55%, respectively, compared with the conventional plain energy harvester without auxetic structure and the uniform auxetic energy harvester.

SMASIS DIVISION BEST PAPER AWARD IN MECHANICS AND MATERIAL SYSTEMS

Katherine S. Riley
Purdue University,
West Lafayette, IN

BIOGRAPHY: Katherine Riley received her BS in structural engineering from the University of California, San Diego and her MS and PhD in mechanical engineering from Purdue University. Her research interests include multistable structures, programmable materials, and structures with sensing and memory capabilities.

Subhadeep Koner
University of Tennessee,
Knoxville, TN

BIOGRAPHY: Dr. Subhadeep Koner received a bachelor's degree in mechanical engineering from Jalpaiguri Government Engineering College in India. Later, he graduated from University of Tennessee with a PhD in mechanical engineering. His research was focused on brain inspired materials and electronic devices for adaptive signal processing, memory and learning. Currently, he works at Lam Research Corporation as a Process Engineer in their R&D division.

Juan C. Osorio
Purdue University,
West Lafayette, IN

BIOGRAPHY: Juan Osorio received his BS and MS degrees in Mechanical Engineering from Universidad de los Andes, Bogota, Colombia, in 2017 and 2019, respectively. He is a Ph.D. student in the School of Mechanical Engineering at Purdue, working at the Programmable Structures Lab. His research interests include finite element analysis, soft robotics, and physical computation with hierarchically multistable structures.

Yongchao Yu
University of Tennessee,
Nanyang Technological University, Singapore

BIOGRAPHY: Dr. Yongchao Yu received his B.S. and M.S. degrees in electrical engineering from the University of Tennessee, Knoxville, USA, in 2013 and 2015, respectively. He earned his Ph.D. in mechanical engineering from the University of Tennessee, Knoxville, USA, in 2019. Currently, he is a research fellow at the Schaeffler Hub for Advanced Research in Singapore and is also affiliated with the School of Mechanical and Aerospace Engineering at Nanyang Technological University, Singapore. His research interests encompass condition monitoring, machine learning, laser processing, and nanomaterials.

Harith Morgan
Purdue University,
West Lafayette, IN

BIOGRAPHY: Harith Morgan received his M.S. in Mechanical Engineering from Purdue University and his B.S. in Mechanical Engineering from the Massachusetts Institute of Technology. His research interests include control of soft robotics with multistable structures and machine design. Harith currently works as a design engineer at ASML.

Janav P. Udani
Purdue University,
West Lafayette, IN

BIOGRAPHY: Dr. Janav P. Udani has a PhD in Mechanical Engineering from Purdue University. Dr. Udani's doctoral research focused on the mechanics of nonlinear multistable structural systems and covered the areas of nonlinear mechanics, dynamics, controls, programmable structures, smart materials, and mechanical computing. Following his doctorate degree, Dr. Udani has been working at 3M on the research and development of hardware and membrane technologies for filtration and purification solutions for the biopharmaceutical purification space.

Stephen A. Sarles
University of Tennessee,
Knoxville, TN

BIOGRAPHY: Dr. Andy Sarles is an Associate Professor and the James Conklin Faculty Fellow in the Dept. of Mech., Aero. and Biomed. Engr. at the University of Tennessee. His research interests include transport and signaling through biomimetic interfaces and tissue-inspired materials, revealing nanomaterial-membrane interactions, and artificial synapses and neurons for neuromorphic computing. Sarles' work is supported by NSF, AFOSR, & ONR. He is a Fellow of ASME, and recently served as the General Chair of the 2021 ASME Conference on Smart Materials Adaptive Structures and Intelligent Systems (SMASIS)

Andres F. Arrieta
Purdue University,
West Lafayette, IN

BIOGRAPHY: Dr. Andres F. Arrieta is an Associate Professor of Mechanical Engineering and Aeronautics and Astronautics Engineering (by courtesy) at Purdue University, where he leads the Programmable Structures Lab. Previously, he worked as a Group Leader at ETH Zurich's CMAS Lab and as a Research Associate at the Dynamics and Oscillations Group at TU Darmstadt. He received his Ph.D. in Mechanical Engineering from the University of Bristol and his BEng from the Los Andes University, Bogota, Colombia. Dr. Arrieta's research focuses on investigating instabilities and nonlinearity in structural mechanics and the fundamental interaction between geometry, hierarchy, and nonlinearity to design structural systems with intrinsic properties enabling adaptation, autonomy, and environmental responsiveness. Current efforts concentrate on the modeling and designing of programmable structures, soft robotics, bioinspired design, embodied intelligence in structures, nonlinear metamaterials, and morphing structures. The Programmable Structures Lab's work has been highlighted by several media outlets, including National Geographic and Nature's News and Views.

He has received several personal awards, including the 2021 inaugural Emerging Leaders Award in Smart Materials and Structures (IOP Publications); NSF CAREER Award (2020); the ASME Gary Anderson Award (2018) for "outstanding contributions to the field of Adaptive Structures;" and the ETH Postdoctoral Fellowship (2012).

TITLE: NEUROMORPHIC METAMATERIALS FOR MECHANOSENSING AND PERCEPTUAL ASSOCIATIVE LEARNING
Advanced Intelligent Systems 4 (2022), 2200158

ABSTRACT: Physical systems exhibiting neuromechanical functions promise to enable structures with directly encoded autonomy and intelligence. A neuromorphic metamaterials class embodying bioinspired

mechanosensing, memory, and learning functionalities obtained by leveraging mechanical instabilities integrated with memristive materials is reported. The prototype system comprises a multistable metamaterial whose bistable dome-shaped units collectively filter, amplify, and transduce external mechanical inputs over large areas into simple electrical signals using embedded piezoresistive sensors. Dome deformations in nonvolatile memristors triggered by the transduced signals, providing a means to store loading events in measurable material states are recorded. Sequentially applied mechanical inputs result in accumulated memristance changes that allow us to physically encode a Hopfield network into the neuromorphic metamaterials. This physical network learns the history of spatially distributed input patterns. Crucially, the neuromorphic metamaterials can retrieve the learned patterns from the memristors' final accumulated state. Therefore, the system exhibits the ability to learn without supervised training and retain spatially distributed inputs with minimal external overhead. The system's embodied mechanosensing, memory, and learning capabilities establish an avenue for synthetic neuromorphic metamaterials that learn via tactile interactions. This capability suggests new types of large-area smart surfaces for robotics, autonomous systems, wearables, and morphing structures subjected to spatiotemporal mechanical loading.

Benjamin Grossmann
Air Force Research Laboratory,
Wright-Patterson AFB, OH

Christopher E. Tabor
Air Force Research Laboratory,
Wright-Patterson AFB, OH

Philip R. Buskohl
Air Force Research Laboratory,
Wright-Patterson AFB, OH

Ryan L. Harne
Exponent, Inc.

ACTIVE AND MULTIFUNCTIONAL MATERIALS TC OUTSTANDING CONTRIBUTION AWARD

Charles El Helou
Intel, Inc.,
Allentown, PA

BIOGRAPHY: Charles is currently a Research Engineer at Intel. Prior to joining Intel, Charles completed his Ph.D. in Mechanical Engineering with the Laboratory of Sound and Vibration Research at the Pennsylvania State University. His dissertation focused on soft electromechanical material systems with sensing and computing capabilities. He established unconventional computer and material architecture design frameworks to program integrated circuits for digital logic processes in autonomous matter. During this period, Charles was also a graduate fellow with the Air Force Research Laboratory where he worked on developing and printing flexible electronic devices. He was initially introduced to academic research while receiving his B.S. in Mechanical Engineering from the Ohio State University.

TITLE: MECHANICAL INTEGRATED CIRCUIT MATERIALS
Nature 608 (2022), 699-703

ABSTRACT: Recent developments in autonomous engineered matter have introduced the ability for intelligent materials to process environmental stimuli and functionally adapt. To formulate a foundation for such an engineered living material paradigm, researchers have introduced sensing and actuating functionalities in soft matter. Yet, information processing is the key functional element of autonomous engineered matter that has been recently explored through unconventional techniques with limited computing scalability. Here we uncover a relation between Boolean mathematics and kinematically reconfigurable electrical circuits to realize all combinational logic operations in soft, conductive mechanical materials. We establish an analytical framework that minimizes the canonical functions of combinational logic by the Quine-McCluskey method, and governs the mechanical design of reconfigurable integrated circuit switching networks in soft matter. The resulting mechanical integrated circuit materials perform higher-level arithmetic, number comparison, and decode binary data to visual representations. We exemplify two methods to automate the design on the basis of canonical Boolean functions and individual gate-switching assemblies. We also increase the computational density of the materials by a monolithic layer-by-layer design approach. As the framework established here leverages mathematics and kinematics for system design, the proposed approach of mechanical integrated circuit materials can be realized on any length scale and in a wide variety of physics.

ENERGY HARVESTING TC BEST PAPER AWARD

Guobiao Hu
The Hong Kong University of Science and Technology

BIOGRAPHY: Dr. Guobiao Hu is currently an assistant professor with the Internet of Things Thrust at the Hong Kong University of Science and Technology (Guangzhou). He received his Ph.D. degree in Mechanical Engineering from the University of Auckland. Before joining HKUST(GZ), he was a Research Fellow at Nanyang Technological University. His research interests include energy harvesting, acoustic-elastic metamaterials, and smart material structures & systems. Dr. Hu has published over 80 peer-reviewed technical papers in prestigious journals and international conferences, including 5 ESI highly cited papers. He received the Best Paper Finalist Award at the SPIE Conference on Smart Structures/NDE 2018. He has filed 3 patents, including 1 Singapore and 2 Chinese patents. He is named in the world's top 2% of Scientists List (2022) identified by Stanford University. He serves as reviewer for more than 60 SCI journals and guest editor for 5 SCI-indexed journals.

Chunbo Lan
Nanjing University of Aeronautics and Astronautics, China

BIOGRAPHY: Dr. Chunbo Lan is currently an assistant professor with the college of Aerospace Engineering at Nanjing University of Aeronautics and Astronautics. He received his Master degree and Ph.D. degree in Engineering Mechanics from Northwest Polytechnical University, China. Before joining NUAA, he was a visiting Ph.D. at the University of Auckland, New Zealand. His research interests focus on vibration energy harvesting and mechanical metamaterial for vibration suppression. Dr. Lan has authored about 40 peer-reviewed papers and received the Science and Technical Award of Shaanxi Province (2021). He serves as Guest Editor for 3 SCI-indexed Journals and reviewer for more than 40 Journals.

Lihua Tang
The University of Auckland, New Zealand, Auckland, New Zealand

BIOGRAPHY: Lihua Tang received his BEng in engineering mechanics and MEng in solid mechanics from Shanghai Jiao Tong University, China, in 2005 and 2008, respectively, and PhD in structures and mechanics from Nanyang Technological University, Singapore, in 2012. He is currently an associate professor with the Department of Mechanical and Mechatronics Engineering, The University of Auckland, New Zealand. He has published over 230 peer-reviewed journal and conference papers. His main research interests include smart materials and adaptive structures, energy harvesting, vibration control, acoustic/elastic metamaterials and thermoacoustics. He currently serves as the associate editor of Journal of Intelligent Material Systems and Structures.

Bo Zhou
Dalian University of Technology, China

BIOGRAPHY: Dr Bo Zhou is currently a Professor of Dalian University of Technology (DUT). Dr. Zhou has been engaged in research and development of vibration and noise reduction new energy, applications of ship and marine engineering, and dynamic response characteristics of offshore structures for 20 years. He published more than 90 academic papers and filed 12 Chinese patents.

Awards

Yaowen Yang
Nanyang Technological University, Singapore

BIOGRAPHY: Prof. Yaowen Yang presently holds the position of a Professor within the School of Civil and Environmental Engineering, while also serving as the Deputy Associate Provost (Continuing Education) in the President's Office, Nanyang Technological University (NTU), Singapore. He stands as a prominent researcher in the areas of small energy harvesting and structural health monitoring. His research interests include aeroelastic and vibration energy harvesting, metamaterials, structural health and geotechnical monitoring and uncertainty analysis in structural dynamics. Accomplished and highly cited in his field, Prof Yang has clinched more than S$12 million in research funding, and published over 280 papers in reputable journals and conferences. Prof. Yang's educational background includes a B.Eng and M.Eng from Shanghai Jiao Tong University, followed by a Ph.D. from Nanyang Technological University. He serves as Associate Editor and Editorial Board member for multiple international journals and delivered keynote and invited lectures at many international conferences. Beyond academia, Prof. Yang wears an entrepreneurial hat as well. He established a company aimed at implementing his patented technologies, thereby offering comprehensive solutions for geotechnical, structural, and construction process monitoring, culminating in informed decision-making. For his innovative research strides and entrepreneurial pursuits, Prof. Yang is designated as an iNTUitive Fellow, showcasing his distinguished contributions to the university.

TITLE: DYNAMICS AND POWER LIMIT ANALYSIS OF A GALLOPING PIEZOELECTRIC ENERGY HARVESTER UNDER FORCED EXCITATION
Mechanical Systems and Signal Processing 168 (2022), 108724

ABSTRACT: This paper presents a rigorous analytical solution to the dynamics of a single-degree-of-freedom (SDOF) piezoelectric energy harvester (PEH) under the combined wind and base excitations using the harmonic balance method. The boundaries of the quenching region are predicted using the multi-scale method. An equivalent circuit model (ECM) is established to verify the analytical solution, and the simulation results based on the ECM are in good agreement with the analytical ones. Subsequently, the power limit of the SDOF PEH under the combined excitations is analysed for the first time using the impedance theory based on a simplified model. The maximum power amplitudes at different excitation frequencies are also sought by numerically sweeping the load resistance. It is found that the impedance theory that has been successfully adopted in the literature is inapplicable in analysing the power limit of the SDOF PEH under the combined excitations. The impedance plots obtained based on resistance sweeping clearly indicate that, in contrast to the conclusions given in the literature, impedance matching is not the condition to attain the power limit of the SDOF PEH under the combined excitations. A mathematical proof is provided for a reasonable explanation. Finally, it is demonstrated that numerical simulations based on the original model can verify the power limit calculated based on the simplified model.

ADAPTIVE SYSTEMS DYNAMICS AND CONTROLS TC BEST SYMPOSIUM PAPER AWARD

Samikshak Gupta
Michigan Technological University<
Houghton, MI

BIOGRAPHY: Samikhshak Gupta, a Graduate Student in Mechanical Engineering at Michigan Technological University. He holds a B.Tech degree in Mechanical Engineering from the National Institute of Technology, Jalandhar (2020). With a keen interest in modal analysis, adaptive structures, structural dynamics, signal processing, and computational mechanics, he wants to "blend his learning into an engaging and enjoyable experience."

Hrishikesh Gosavi
Michigan Technological University<
Houghton, MI

BIOGRAPHY: Hrishikesh Gosavi is a Ph.D. candidate at Michigan Technological University. He is from Pune, India and completed his undergraduate studies from Pune University in 2018. He came to Michigan Tech in Fall 2019 to pursue an MS in Mechanical Engineering which he obtained in 2021. His areas of interest include modal analysis, data-driven modeling, metamaterials, traveling waves and structural dynamics.

Vijaya V N Sriram Malladi
Michigan Technological University,
Houghton, MI

BIOGRAPHY: Dr. Malladi is an Assistant Professor in the Department of Mechanical Engineering-Engineering Mechanics at Michigan Technological University. He obtained his B.Tech degree in Mining Machinery Engineering from the Indian Institute of Technology, Dhanbad, India, in 2011. He then pursued his M.S. and Ph.D. in Mechanical Engineering from Virginia Polytechnic Institute and State University, completing them in 2013 and 2016, respectively. Dr. Malladi's research interests encompass structural dynamics, adaptive structures, data-driven modeling, and modal testing.

TITLE: PARAMETRIC-FEEL ALGORITHM: DEVELOPING A PARAMETRIC VECTORFITTING MODEL FOR EVENT LOCALIZATION IN CALIBRATED STRUCTURE

ABSTRACT: For smart structures, especially in the context of human activity, the force exerted and the location it happened is of significant relevance. This paper revisits and improves the performance in localizing and characterizing an input force with pre-calibrated structures through vibration measurement. The Force Estimation and Event Localization (FEEL) Algorithm have been discussed as a means of calculating the force of an impact and pinpointing its location. Unlike other time-of-flight approaches, FEEL does not require time synchronization, instead using transfer functions between possible impact locations and sensor locations to estimate force and localize impact. However, this approach is limited to locations where transfer functions are available. To overcome this limitation, a rowing hammer test was used to determine Frequency Response Functions (FRFs) at various points on a beam with a uniform rectangular cross-section. The Vector-Fitting algorithm was then used to improve the FRF approximation by moving poles to more advantageous locations, enhancing convergence, and lowering noise. Using the curve fitting approach, residues and FRFs were interpolated for additional locations. The extended FEEL algorithm was then used to localize impacts and estimate forces at these additional locations. This method can be used in applications such as tracking customer movement in retail establishments, detecting falls, tracking rehabilitation progress, and estimating building occupancy.

ACTIVE MATERIAL TECHNOLOGY AND INTEGRATED SYSTEMS TC OUTSTANDING CONTRIBUTION AWARD

Daniel C. Miller
Paragon Space Development Corporation, Houston, TX

BIOGRAPHY: Mr. Miller is a Thermal Engineer at Paragon Space Development Corporation. His research and development work focuses on thermal radiator design and research for spacecraft, satellite, and human habitat applications. He also works in thermal management system development for complex and extreme environments such as high-flux electronics, satellite thermal control, and extreme heating, ventilation, air conditioning, and refrigeration (HVACR). Mr. Miller earned his B.S. in Mechanical Engineering from Oregon State University and his M.S. in Mechanical Engineering from Colorado School of Mines, specializing in thermal fluid sciences and concentrating solar power.

Connor J. Joyce
Paragon Space Development Corporation, Houston, TX

BIOGRAPHY: Connor Joyce is a thermal-fluids engineer at Paragon Space Development Corporation in Houston, Texas. He received a BS in Mechanical Engineering with University Honors from the University of Houston. His research focuses on complex multiphysics problems including the thermal behavior of advanced materials, multiphase flow manipulation in microgravity, and the purification of water using ionomer membrane and frost deposition technologies.

Darren Hartl
Texas A&M University, College Station, TX

BIOGRAPHY: Darren Hartl is an Associate Professor at Texas A&M in the Department of Aerospace Engineering. His work bridges the topics of advanced multifunctional material systems and their integration into aerospace platforms and he held previous joint appointments at the Air Force Research Laboratory (AFRL) in the Materials and Manufacturing Directorate and Aerospace Systems Directorate. Dr. Hartl has over 20 years of experience working with multifunctional and morphing structures and has co-authored 200+ technical publications on the topics of active materials modeling, testing, and integration.

Priscilla Nizio
Texas A&M University College Station, TX

BIOGRAPHY: Priscilla Nizio is a graduate researcher at Texas A&M University. She received a BS in Chemical Engineering from the University of Houston and is currently pursuing a PhD in Aerospace engineering at Texas A&M University. She is a Pathways graduate student trainee in the Crew and Thermal Systems division at NASA Johnson Space Center. Her research focuses on shape memory alloys for thermal control in extreme environments.

Douglas E. Nicholson
The Boeing Company,
Berkeley, MO

BIOGRAPHY: Doug Nicholson currently resides as a technical lead engineer at Boeing Research and Technology (BR&T) on the Integrated Vehicle Systems (IVS) team. His current work focuses on the development and transition of smart materials and adaptive structures for space and aeronautical applications. These activities include standards development, material development and processing, design optimization, system integration, and relevant environment to sub and full-scale flight demonstrations. Doug earned his Ph.D. in mechanical engineering and M.S. in aerospace engineering from the University of Central Florida, and B.S. in mathematics and physics from Florida Atlantic University.

Sean Nevin
The Boeing Company,
Berkeley, MO

BIOGRAPHY: Sean Nevin currently resides as a mechanical system design and analysis engineer at Boeing Research and Technology (BR&T) on the Integrated Vehicle Systems (IVS) team. His current work focuses on the development and transition of smart materials and adaptive structures for space and aeronautical applications. These activities include standards development, material development and processing, design optimization, system integration, and relevant environment to sub and full-scale flight demonstrations. His research interests include designs with smart materials along with structural and thermal computational analysis (FEA). Sean earned his M.S. in aerospace engineering from the University of Texas A&M, and B.S. in mechanical engineering from Loyola Marymount University.

Othmane Benafan
NASA Glenn Research Center,
Washington, DC

BIOGRAPHY: Othmane Benafan is a materials research engineer in the High Temperature and Smart Alloys Branch at NASA Glenn Research Center. He received his Ph.D. in Mechanical Engineering from the University of Central Florida. His research is focused on developing fit-for-purpose shape memory alloys for aeronautics and space applications. He is currently leading multiple teams to design lightweight actuators and morphing structures for NASA. He is currently the immediate past president of the ASM International Organization on Shape Memory and Superelastic Technologies (SMST), and a past-chairman of the joint industry-government-academia Consortium for the Advancement of Shape Memory Alloy Research and Technology (CASMART).

Glen S. Bigelow
NASA Glenn Research Center,
Washington, DC

BIOGRAPHY: Glen Bigelow is a materials research engineer at the NASA Glenn Research Center in Cleveland, OH. He received his BS in Mechanical Engineering and his BS and MS in Metallurgical and Materials Engineering from Colorado School of Mines. His research focuses on shape memory alloy material design, processing, and applications in aeronautics and space.

Darrell J. Gaydosh
NASA Glenn Research Center,
Washington, DC

BIOGRAPHY: Darrell Gaydosh was formerly a senior researcher at HX5, LLC.

TITLE: SHAPE MEMORY ALLOYS FOR REGULATING TCS IN SPACE (SMARTS): SYSTEM DESIGN AND THERMAL VACUUM DEMONSTRATION

Proceedings of the 51st International Conference on Environmental Systems ICES-2022-291, 10-14 July 2022, St. Paul, Minnesota

ABSTRACT: Variable-geometry radiators provide variable heat rejection capability, or turndown, to meet variable heat loads and environments, as might be experienced in a Lunar habitat or interplanetary vehicle carrying astronauts. Shape Memory Alloy (SMA) actuation offers lightweight, compact, and rugged methods for passive control of morphing radiators that vary geometry, providing turndown, in response to thermal stimuli. SMAs for Regulating Thermal control systems (TCS) in Space, or SMARTS, is an SMA enabled radiator system with thermal switch for adverse heating protection. SMA wires are conductively coupled to coolant passages, providing thermally responsive actuation to open and close the composite radiator at design temperatures to passively vary heat rejection, ensuring stable coolant outlet temperatures. SMA actuators, conductively coupled to the radiator, respond to adverse heating on the radiator panels by breaking thermal contact between the panel and the coolant passages at design temperatures. SMARTS has been built at a prototype system level and demonstrated in a relevant thermal vacuum (TVAC) environment. Heat rejection comparable to flat panel radiators was demonstrated with the additional benefits of greater turndown than the NASA roadmap target of 6:1 and passive protection to adverse heating conditions. This work summarizes TVAC test results and demonstrates design and analysis methods employed to tune SMA transition temperatures and predict response to thermal and mechanical loads.

STRUCTURAL HEALTH MONITORING TC BEST PAPER AWARD

Jingxiao Liu
Stanford Universtiy,
Stanford, CA

BIOGRAPHY: Jingxiao Liu is a post-doctoral fellow in the Geophysics Department at Stanford University. He received his Ph.D. in the Department of Civil & Environmental Engineering with a Ph.D. minor in Electrical Engineering at Stanford University. His research focuses on structural health monitoring, smart infrastructure systems, and smart city applications integrating structural dynamics, signal processing, physics-guided machine learning, mobile sensing, and fiber-optic sensing techniques. He received his M.S. in Civil Engineering from Carnegie Mellon University, and his B.S. in Civil Engineering from Central South University, China. He received the Leavell Fellowship on Sustainable Built Environment and various best paper and presentation awards from ASCE, ASME, and ACM conferences.

Susu Xu
Stony Brook University,
Stony Brook, NY

BIOGRAPHY: Susu Xu is an Assistant Professor in the Department of Civil Engineering at Stony Brook University. She received her Ph.D. in Civil Engineering, a Master's in Machine Learning from Carnegie Mellon University, and her bachelor's degree from Tsinghua University. She has been a postdoctoral research fellow at Stanford University and a research scientist at the AI research team in Qualcomm Technologies. Her research focuses on crowdsensing, physics-informed machine learning, and causal Bayesian inference for enabling resilient, effective, and equitable infrastructure systems. She received the Best Paper Award at the IEEE International Conference of Machine Learning and Applications (ICMLA) in 2018, and was the champion of NeurIPS 2018 Adversarial Vision Challenge. She is also the recipient of the 2019 MIT CEE Rising Star and Dowd Fellowship.

Mario Bergés
Carnegie Mellon University,
Pittsburgh, PA

BIOGRAPHY: Mario Bergés is a professor in the Department of Civil and Environmental Engineering at Carnegie Mellon University (CMU). He is interested in making our built environment more operationally efficient and robust through the use of information and communication technologies, so that it can better deal with future resource constraints and a changing environment. Currently his work largely focuses on developing approximate inference techniques to extract useful information from sensor data coming from civil infrastructure systems, with a particular focus on buildings and energy efficiency. Dr. Bergés is the faculty co-director of the Smart Infrastructure Institute at CMU, as well as the director of the Intelligent Infrastructure Research Lab (INFERLab). Among recent awards, he received the Professor of the Year Award by the ASCE Pittsburgh Chapter in 2018, Outstanding Early Career Researcher award from FIATECH in 2010, and the Dean's Early Career Fellowship from CMU in 2015. Dr. Bergés received his B.Sc. in 2004 from the Instituto Tecnológico de Santo Domingo, in the Dominican Republic; and his M.Sc. and Ph.D. in Civil and Environmental Engineering in 2007 and 2010, respectively, both from Carnegie Mellon University.

Hae Young Noh
Stanford University,
Stanford, CA

BIOGRAPHY: Hae Young Noh is an Associate Professor in the Department of Civil and Environmental Engineering at Stanford University. Her research focuses on indirect sensing and physics-guided data analytics to enable low-cost non-intrusive monitoring of cyber-physical-human systems. She is particularly interested in developing structures to be self-, user-, and surrounding-aware to improve users' quality of life and provide safe and sustainable built environments. The results of her work have been deployed in a number of real-world applications from trains, to the Amish community, to eldercare centers, to pig farms. Before joining Stanford, she was a faculty member at Carnegie Mellon University. She received her Ph.D. and M.S. degrees in Civil and Environmental Engineering and her second M.S. degree in Electrical Engineering at Stanford University. She earned her B.S. degree in Mechanical and Aerospace Engineering at Cornell University. She received several awards, including the Google Faculty Research Awards (2013, 2016), the Dean's Early Career Fellowship (2018), the NSF CAREER Award (2017), and various Best Paper Awards from ASCE, ASME, ACM, IEEE, and SEM conferences.

TITLE: HIERMUD: HIERARCHICAL MULTI-TASK UNSUPERVISED DOMAIN ADAPTATION BETWEEN BRIDGES FOR DRIVE-BY DAMAGE DIAGNOSIS

Structural Health Monitoring 22 (2022), 1941-1968

ABSTRACT: Monitoring bridges through vibration responses of drive-by vehicles enables efficient and low-cost bridge maintenance by allowing each vehicle to inspect multiple bridges and eliminating the needs for installing and maintaining sensors on every bridge. However, many existing drive-by monitoring approaches are based on supervised learning models that require massive labeled data from every bridge. It is expensive and time-consuming, if not impossible, to obtain these labeled data. Furthermore, directly applying a supervised learning model trained on one bridge to new bridges would result in low accuracy due to the shift between different bridges' data distributions. Moreover, when we have multiple tasks (e.g., damage detection, localization, and quantification), the distribution shifts become more challenging than having only one task because different tasks have distinct distribution shifts and varying task difficulties. To this end, we introduce HierMUD, the first Hierarchical Multi-task Unsupervised Domain adaptation framework that transfers the damage diagnosis model learned from one bridge to a new bridge without requiring any labels from the new bridge. Specifically, our framework learns a hierarchical neural network model in an adversarial way to extract features that are informative to multiple tasks and invariant across multiple bridges. To match distributions over multiple tasks, we design a new loss function based on a newly derived generalization risk bound to adaptively assign higher weights to tasks with more shifted distributions. To learn multiple tasks with varying task difficulties, we split them into easy-to-learn and hard-to-learn tasks based on their distributions. Then, we formulate a feature hierarchy to utilize more learning resources to improve the hard-to-learn tasks' performance. We evaluate our framework with experimental data from 2 bridges and 3 vehicles. We achieve up to 2X better performance than baseline methods, including average accuracy of 95% for damage detection, 93% for localization, and 0.38 lbs mean absolute error for quantification.

STRUCTURAL HEALTH MONITORING TC RUNNER-UP BEST PAPER AWARD

Long Wang
California Polytechnic State University, San Luis Obispon CA

BIOGRAPHY: Dr. Long Wang is an Assistant Professor in Structural Engineering in the Department of Civil and Environmental Engineering at the California Polytechnic State University, San Luis Obispo. Prior to joining Cal Poly, he received his M.S. in Civil Engineering and M.S. in Mechanical & Aerospace Engineering from the University of California Davis, as well as his Ph.D. in Structural Engineering from the University of California San Diego, all under the supervision of Prof. Ken Loh.

Wei-Hung Chiang
National University of Science and Technology, Taiwan

BIOGRAPHY: Dr. Wei-Hung Chiang is a Professor in the Department of Chemical Engineering at the National University of Science and Technology in Taiwan. He has broad scientific and engineering interests that encompass functional material design, synthesis and processing, device fabrication and integration. His work has been recognized by scientific publications in high impact journals such as Nature Materials, ACS NANO, and Advance Materials, by mainstream media such as Forbes Magazine and ScienceDaily, and by international conferences (e.g., MRS, AICHE, ECS, and AVS).

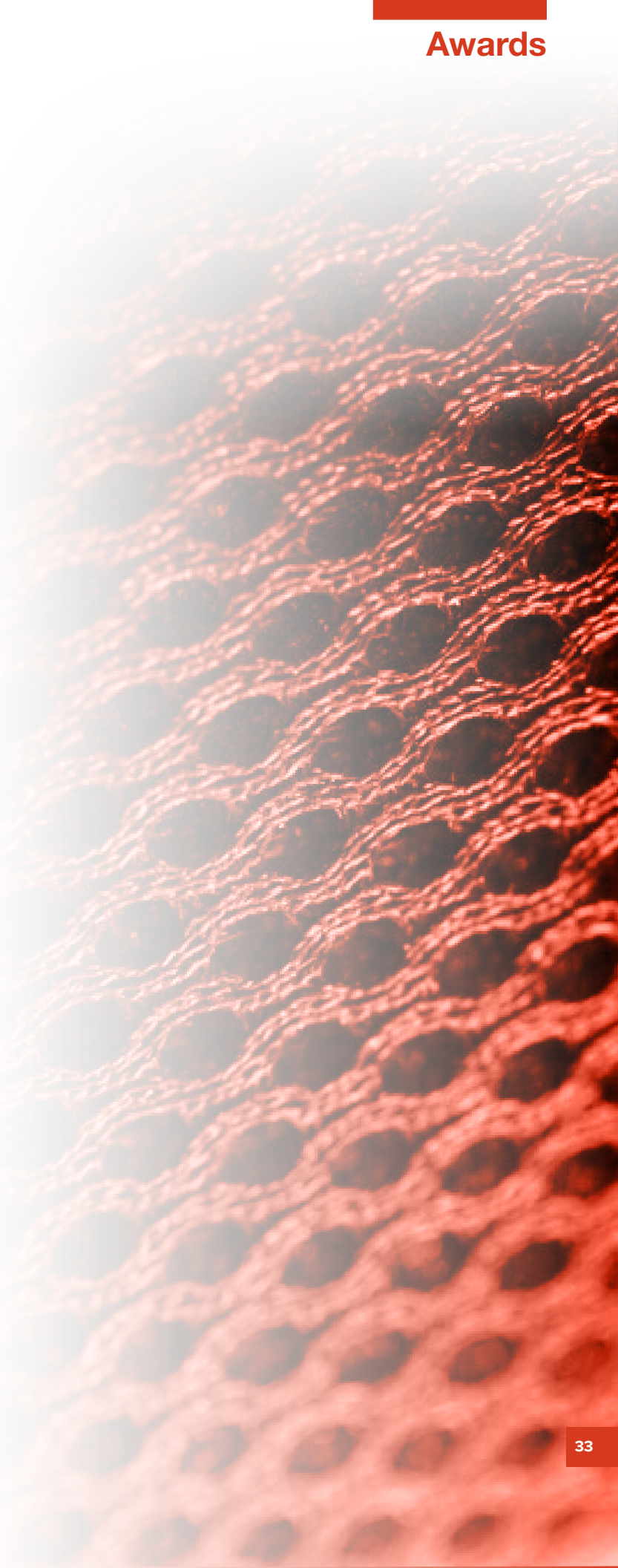
Kenneth J. Loh
UC San Diego, La Jolla, CA

BIOGRAPHY: Dr. Ken Loh is a Professor and was the former Vice Chair (2018-2021) of the Department of Structural Engineering at UC San Diego. He is the Director of the Active, Responsive, Multifunctional, and Ordered-materials Research (ARMOR) Lab and is the Director of the Jacobs School of Engineering, Center for Extreme Events Research (CEER). He is also an affiliate faculty member of the Materials Science & Engineering Program. His research interests are in multifunctional and stimuli-responsive materials, tomographic imaging techniques, wearable sensors, active metamaterials, and soft material actuators applied towards solving problems related to human performance, structural sustainment, and human-structure interactions.

TITLE: TOPOLOGICAL DESIGN OF STRAIN SENSING NANOCOMPOSITES

Scientific Reports 12 (2022), 9179

ABSTRACT: High-performance piezoresistive nanocomposites have attracted extensive attention because of their significant potential as next-generation sensing devices for a broad range of applications, such as monitoring structural integrity and human performance. While various piezoresistive nanocomposites have been successfully developed using different material compositions and manufacturing techniques, current development procedures typically involve empirical trial and error that can be laborious, inefficient, and, most importantly, unpredictable. Therefore, this paper proposed and validated a topological design-based methodology to strategically manipulate the piezoresistive effect of nanocomposites to achieve a wide range of strain sensitivities without changing the material system. In particular, patterned nanocomposite thin films with stress-concentrating and stress-releasing topologies were designed. The strain sensing properties of the different topology nanocomposites were characterized and compared via electromechanical experiments. Those results were compared to both linear and nonlinear piezoresistive material model numerical simulations. Both the experimental and simulation results indicated that the stress-concentrating topologies could enhance strain sensitivity, whereas the stress-releasing topologies could significantly suppress bulk film piezoresistivity.



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We would like to express our appreciation to our Sponsors, General Motors, TOYOTA, Inc., and Fort Wayne Metals, for their generosity and continued support. Their contributions help make this conference sustainable.

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Technical Sessions

MONDAY, SEPTEMBER 11 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Magnolia Room

01-01: Liquid Metals

Chair: **Mohammad Malakooti** - *University of Washington*
Co-Chair: **Youngshang Han** - *University of Washington*

Adding Solid and Fluids to Liquid Metals: How to Make Multifunctional Liquid Metal Pastes, Foams, and Emulsions

Invited Speaker Presentation:
SMASIS2023-112282

Konrad Rykaczewski - *Arizona State University,* **Najam Ul Hassan Shan** - *Arizona State University,* **Shreyas Kanetkar** - *Arizona State University,* **Robert Y. Wang** - *Arizona State University*

Lightweight Soft Conductive Composites Embedded With Liquid Metal Fiber Networks

Technical Presentation Only:
SMASIS2023-110804

Jiexian Ma - *SUNY Binghamton,* **Zihan Liu** - *SUNY Binghamton,* **Pu Zhang** - *SUNY Binghamton*

Printing Functional Elastomers for Stretchable Thermoelectric Devices

Technical Presentation Only:
SMASIS2023-111059

Youngshang Han - *University of Washington,* **Halil Tetik** - *University of Washington,* **Mohammad Malakooti** - *University of Washington*

MONDAY, SEPTEMBER 11 - 9:10AM–10:30AM			
9:10AM	9:30AM	9:50AM	10:10AM

Robertson Room

06-01: Artificial Muscle Actuators

Chair: **Matthew Bryant** - *North Carolina State University*
Co-Chair: **Caterina Lamuta** - *University of Iowa*

Spatial Optimization for Fluidic Artificial Muscle (FAM) Bundle

Technical Presentation Only:
SMASIS2023-111022

Emily Duan - *North Carolina State University,* **Matthew Bryant** - *North Carolina State University*

Passive Priming of Fluidic Artificial Muscles in Variable Recruitment

Technical Presentation Only:
SMASIS2023-112290
Olivia Mabe - *North Carolina State University,* **Matthew Bryant** - *North Carolina State University*

High Performance Hierarchical Supercoiled and Hypercoiled Muscles With Embedded Heating Wire

Technical Presentation Only:
SMASIS2023-111078

Samuel Tsai - *University of Illinois at Urbana-Champaign,* **Qiong Wang** - *University of Illinois at Urbana-Champaign,* **Jeongmin Kim** - *University of Illinois at Urbana-Champaign,* **Liuyang Cheng** - *University of Illinois at Urbana-Champaign,* **Wonsik Eom** - *University of Illinois at Urbana-Champaign,* **Charlie Simcox** - *University of Illinois at Urbana-Champaign,* **Marco Guzman** - *University of Illinois at Urbana-Champaign,* **Montse Solis** - *University of Illinois at Urbana-Champaign,* **William King** - *University of Illinois at Urbana-Champaign,* **Sameh Tawfick** - *University of Illinois at Urbana-Champaign*

Fabrication and Characterization of Mesoporous Carbon-Nickel Silver Powder-Poly (Vinyl Alcohol) Coated Mandrel-Coiled TCPFL Artificial Muscles for Enhanced Performance

Technical Paper Publication:
SMASIS2023-113809

Pawandeep Singh Matharu - *The University of Texas at Dallas,* **Yuyang Song** - *Toyota Research Institute of North America,* **Umesh Gandhi** - *Toyota Research Institute of North America,* **Yonas Tadesse** - *The University of Texas at Dallas*

Technical Sessions

MONDAY, SEPTEMBER 11 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Austin Room

02-01: Shape Memory Alloy Actuators

Chair: **Othmane Benafan** - *National Aeronautics and Space Administration*
Co-Chair: **Marcus Young** - *University of North Texas*

Shape Memory NiTiHf Machined Helical Springs: Balancing Displacement and Force Output for Actuation **Technical Presentation Only:** SMASIS2023-110390 **Peter Caltagirone** - *NASA Glenn Research Center,* **Othmane Benafan** - *NASA Glenn Research Center*	**Shape Memory NiTiHf Machined Helical Springs: Balancing Displacement and Force Output for Actuation** **Technical Presentation Only:** SMASIS2023-110390 **Peter Caltagirone** - *NASA Glenn Research Center,* **Othmane Benafan** - *NASA Glenn Research Center*	**High Temperature Micro-Scale Actuators From Melt-Spun Shape Memory Alloy: Microstructure and Functional Performance** **Technical Presentation Only:** SMASIS2023-111548 **Jak Li** - *Smarter Alloys,* **Michael Kuntz** - *Smarter Alloys,* **Ibraheem Khan** - *Smarter Alloys*	

MONDAY, SEPTEMBER 11 - 9:10AM–10:30AM

9:10AM	9:30AM	9:50AM	10:10AM

Dewitt Room

03-01: Emerging Techniques in Control and Programming

Chair: **James Gibert** - *Purdue University*
Co-Chair: **Paul Motzki** - *Saarland University*

Integrating Multivariate Signal Processing and Machine Learning for Optimal Control of Prosthetic Hands

Technical Paper Publication:
SMASIS2023-110634

Mortaza Pirouz - *The University of Texas at Dallas*, **Yonas Tadesse** - *The University of Texas at Dallas*

Inertial Programming Through Heterogeneity

Technical Presentation Only:
SMASIS2023-111410

Xinhao Quan - *Purdue University,* **Hongcheng Tao** - *Purdue University,* **James Gibert** - *Purdue University*

Heterogeneous Nonlinear Stiffness Programming

Technical Presentation Only:
SMASIS2023-111412

Qianyu Zhao - *Purdue University,* **Hongcheng Tao** - *Purdue University,* **James Gibert** - *Purdue University*

Dovers Room

04-01: Mechanics of Smart Structure Applications

Chair: **Francis Phillips** - *U.S. Army DEVCOM Army Research Laboratory*
Co-Chair: **Martin Radestock** - *German Aerospace Center*

Artificial Intelligence for Active Vibration Control Optimization on Smart Structures

Technical Paper Publication:
SMASIS2023-110216

Maryne Febvre - *Université de Lyon,* **Jonathan Rodriguez** - *Université de Lyon,* **Simon Chesne** - *Université de Lyon,* **Manuel Collet** - *Université de Lyon*

Indoor Impact Event Localization via Velocity and Energy Ratio Mapping Function in Dispersive Media

Technical Paper Publication:
SMASIS2023-110685

Andrew Gothard - Tennessee Technological University, **Steven Anton** - *Tennessee Technological University*

Morphing Turbofan Engine Inlet at Take-Off Cross-Wind Conditions

Technical Paper Publication:
SMASIS2023-110999
Giada Abate - *German Aerospace Center,* **Srinivas Vasista** - *German Aerospace Center,* **Sven Christian Künnecke** - *German Aerospace Center,* **Johannes Riemenschneider** - *German Aerospace Center*

Technical Sessions

MONDAY, SEPTEMBER 11 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dezavala Room

05-01: Biosensing

Chair: **Peng (Patrick) Sun** - *University of Central Florida*
Co-Chair: **Shahrzad Towfighian** - *Binghamton University*
Co-Chair: **Zhenhua Tian** - *Virginia Tech*

Development of a Laser Vibrometer-Based Shear Wave Sensing System for Characterizing Mechanical Properties of Viscoelastic Materials

Technical Paper Publication:
SMASIS2023-110811

Bowen Cai - *Mississippi State University,* **Liang Shen** - *Virginia Tech,* **Zhe Pei** - *Virginia Tech,* **Teng Li** - *Virginia Tech,* **Jiali Li** - *Virginia Tech,* **Luyu Bo** - *Virginia Tech,* **Yingshan Du** - *Virginia Tech,* **Zhenhua Tian** - *Virginia Tech*

Monitoring Volumetric Defects in 3D Bioprinting Using Video-Based Vibrometry

Technical Paper Publication:
SMASIS2023-117601

Rayanne Taylor - *Georgia Southern University,* **Jinki Kim** - *Georgia Southern University*

Digital Medicine for Cardiovascular Health

Invited Speaker Presentation:
SMASIS2023-117534

Roozbeh Jafari - *Texas A&M University*

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Magnolia Room

01-02: Functional Soft Materials

Chair: **Mohammad Malakooti** - *University of Washington*
Co-Chair: **Russell Mailen** - *Auburn University*

Bio-Like Soft Materials With Life-Like Intelligence **Invited Speaker Presentation:** SMASIS2023-118554 **Ximin He** - *University of California, Los Angeles*	**Thermally Reversible Origami Using Bilayer Liquid Crystal Elastomer Films** **Technical Presentation Only:** SMASIS2023-111164 **Greg Mccallum** - *Auburn University,* **Yi-Hung Lin** - *Auburn University,* **Bryan Beckingham** - *Auburn University,* **Russell Mailen** - *Auburn University*	**Electrically Conductive EGain-Elastomer Composites for Printing Stretchable Circuits** **Technical Presentation Only:** SMASIS2023-113183 **Youngshang Han** - *University of Washington,* **Ren-Mian Chin** - *University of Washington,* **Mohammad Malakooti** - *University of Washington*	

Technical Sessions

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Robertson Room

06-02: Marine and Underwater Robotics

Chair: **Jovana Jovanova** - *Technische Universität Delft*
Co-Chair: **Michael Philen** - *Virginia Tech*

Design of a Soft Underwater Gripper With SMA Actuation

Technical Paper Publication:
SMASIS2023-111702

Sezer Var - *Technische Universität Delft,* **Jovana Jovanova** - *Technische Universität Delft*

Prediction of Hydrodynamic Loads on a Flexible Bio-Inspired Underwater Propulsor Using Physical Reservoir Computing

Technical Paper Publication:
SMASIS2023-111137

Shan He - *University of Florida,* **Isabel Hess** - *University of Florida,* **Patrick Musgrave** - *University of Florida*

Nebula: A Flexible, Solid-State Swimming Robot Enabled by HASEL Actuators

Technical Paper Publication:
SMASIS2023-110945

Isabel Hess - *University of Florida,* **Patrick Musgrave** - *University of Florida*

Jelly-Z 2.0: 3D Printed Soft Jellyfish Robot Actuated With Self-Coiled CNT-C-Ni-PVA Coated TCPFL

Technical Paper Publication:
SMASIS2023-111077

Pawandeep Singh Matharu - *The University of Texas at Dallas,* **S.M. Al Islam Ovy** - *The University of Texas at Dallas,* **Abhishek Pratap Singh** - *The University of Texas at Dallas,* **Yuyang Song** - *Toyota Research Institute of North America,* **Umesh Gandhi** - *Toyota Research Institute of North America,* **Yonas Tadesse** - *The University of Texas at Dallas*

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Austin Room

02-02: Shape Memory Alloy Actuator Material and Characterization Standards

Chair: **Darren Hartl** - *Texas A&M University*
Co-Chair: **Santo Padula** - *NASA Glenn Research Center*

Standard Test Methods for Shape Memory Alloys for Actuation

Technical Presentation Only:
SMASIS2023-111147

Douglas Nicholson - *Boeing,* **Othmane Benafan** - *NASA Glenn Research Center,* **Glen Bigelow** - *NASA Glenn Research Center,* **Dean Pick** - *Kinitics Automation Limited,* **Alexander Demblon** - *Texas A&M University,* **James Mabe** - *Texas A&M University,* **Ibrahim Karaman** - *Texas A&M University,* **Drew Forbes** - *Fort Wayne Metals,* **Frank Sczerzenie** - *SAES Smart Materials,* **Luca Fumagalli** - *SAES Getters,* **Cassio Wallner** - *Embraer*

Standard Material Specifications for Shape Memory Alloys for Actuation

Technical Presentation Only:
SMASIS2023-111420

Dean Pick - *Kinitics Automation Limited,* **Douglas Nicholson** - *Boeing,* **Othmane Benafan** - *NASA Glenn Research Center,* **Glen Bigelow** - *NASA Glenn Research Center,* **Alexander Demblon** - *Texas A&M University,* **James Mabe** - *Texas A&M University,* **Ibrahim Karaman** - *Texas A&M University,* **Brian Van Doren** - *ATI Specialty Alloys and Components,* **Drew Forbes** - *Fort Wayne Metals,* **Luca Fumagalli** - *SAES Getters S.p.A,* **Frank Sczerzenie** - *SAES Smart Materials,* **Cassio Wallner** - *Embraer*

A Unified Approach for Characterizing Mechanical and Actuation Fatigue in SMAs

Technical Presentation Only:
SMASIS2023-110739

Hrishikesh Padalia - *Texas A&M University,* **Dimitris Lagoudas** - *Texas A&M University*

Shape Memory Materials Analysis and Research Tool (SM2ART) Database: Comparing Legacy Data to New Experimental and Computational Data

Technical Presentation Only:
SMASIS2023-110624

Othmane Benafan - *NASA Glenn Research Center,* **Peter Caltagirone** - *Oak Ridge Associated Universities,* **Tyler Kujawa** - *Banner Quality Management Inc.,* **Edward Jones** - *Peerless Technologies Corp.,* **Ron Gould** - *Banner Quality Management Inc.*

Technical Sessions

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dewitt Room

03-02: Methods for Dynamics and Structural Analysis

Chair: **James Gibert** - *Purdue University*
Co-Chair: **Paul Motzki** - *Saarland University*

Modal Analysis of 2D Periodic Structures Using Dynamic Condensation With Primal Assembly

Technical Paper Publication:
SMASIS2023-110973

Robel Weldebrhan Hagos - *Korea Advanced Institute of Science and Technology,* **Seongmin Chang** - *Chungnam National University,* **Jae-Hung Han** - *Korea Advanced Institute of Science and Technology*

Resonant Suspended Beam Mechanism for Weight Measurement

Technical Paper Publication:
SMASIS2023-111060
Shuai Ju - *University of North Texas,* **Masoud Naghdi** - *University of North Texas,* **Muhammad Aslam** - *University of North Texas,* **Sreejith Sreedharan** - *University of North Texas,* **Mitali Hardik Desai** - *University of North Texas,* **Haifeng Zhang** - *University of North Texas*

Tuning Modal Response by Moment Coupled Subordinate Comb-Shaped Oscillator Array

Technical Presentation Only:
SMASIS2023-110914

Sourabh Sangle - *Texas A&M University,* **William Rogers** - *Texas A&M University,* **Pablo Tarazaga** - *Texas A&M University,* **Mohammad Albakri** - *Texas A&M University - Qatar*

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dovers Room

02-02: Shape Memory Alloy Actuator Material and Characterization Standards

Chair: **Maria Sakovsky** - *Stanford University*
Co-Chair: **Francis Phillips** - *U.S. Army DEVCOM Army Research Laboratory*

Enhancing the Design Space of Bistable Laminates by Tailoring the Attachment Boundary Conditions

Technical Paper Publication:
SMASIS2023-111093

Aghna Mukherjee - *ETH Zurich,* **Tom Vogel** - *ETH Zurich,* **Paolo Ermanni** - *ETH Zurich*

Aero-Structural Response of a Slitted Bistable Laminate

Technical Paper Publication:
SMASIS2023-110581

Karthik Boddapati - *Purdue University,* **D. Matthew Boston** - *Purdue University,* **Jose R. Rivas-Padilla** - *Purdue University,* **Andres F. Arrieta** - *Purdue University*

Multistable Soft Robotics for Force Modulation and Programmed Dynamics

Technical Presentation Only:
SMASIS2023-119396

Juan C. Osorio - *Purdue University,* **Harith Morgan** - *Purdue University,* **Chelsea Tinsley** - *Purdue University,* **Kendal Tinsley** - *Purdue University,* **Andres Arrieta** - *Purdue University*

Technical Sessions

MONDAY, SEPTEMBER 11 - 10:15AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dezavala Room

07-01: Flow-Induced Vibration Energy Harvesting

Chair: **Serife Tol**, *University of Michigan*
Co-Chair: **Guobiao Hu**, *The Hong Kong University of Science and Technology*

Nonlinear Dynamics of Two-Degree-of-Freedom Vortex-Induced Vibration Energy Harvester **Technical Paper Publication:** SMASIS2023-111066 **Guobiao Hu** - *The Hong Kong University of Science and Technology,* **Lihua Tang** - *The University of Auckland,* **Junlei Wang** - *Zhengzhou University,* **Xin Li** - *Xidian University,* **Junrui Liang** - *ShanghaiTech University*	**The Performance Investigation of Triboelectric Nanogenerator Based on Flow Induced Vibration by Applying Bluff Bodies With Different Cross Sections** **Technical Paper Publication:** SMASIS2023-111090 **Zhongjie Li** - *Shanghai University,* **Yukun Yuan** - *Shanghai University,* **Hao Wu** - *Shanghai University,* **Di Zhang** - *Shanghai University,* **Min Wang** - *Shanghai University,* **Jiheng Ding** - *Shanghai University*	**Harvesting Energy From Aeroelastic Instabilities** **Invited Speaker Presentation:** SMASIS2023-118600 **Jayant Sirohi** - *The University of Texas at Austin*	

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Magnolia Room

01-03: Integrated Sensing

Chair: **Russell Mailen** - *Auburn University*
Co-Chair: **Tyler Tallman** - *Purdue University*

Embedded Sensing and Localization of Pressure in Silicone Skin Using Sensors Printed From CNF/TPU Filament

Technical Paper Publication:
SMASIS2023-111109

Joseph Meier - *Purdue University,* **Steven Turnbull** - *Purdue University,* **Julio Hernandez** - *Purdue University,* **Cole Maynard** - *Purdue University,* **David Rodrigez** - *Purdue University,* **Brittany Newell** - *Purdue University,* **Tyler Tallman** - *Purdue University*

Characterization of Electrospun, Conducting Polymer Electrodes Enabling Mobility for All

Technical Presentation Only:
SMASIS2023-111162

Midhan Siwakoti - *Auburn University,* **Leily Majidi** - *Auburn University,* **Avinash Baskaran** - *Auburn University,* **Chad G. Rose** - *Auburn University,* **Russell Mailen** - *Auburn University*

Effect of Area Density on Sensitivity and Strain Survival of Reduced Graphene Oxide Under Large Strains

Technical Paper Publication:
SMASIS2023-111169

Armin Yazdi - *University of Wisconsin-Milwaukee,* **Li-Chih Tsai** - *University of Wisconsin-Milwaukee,* **Nathan Salowitz** - *University of Wisconsin-Milwaukee*

Colloidal Microchannel Formation via Directed Self-Assembly on Substrate of Tunable Stiffness

Technical Paper Publication:
SMASIS2023-108891

Ryan Dumont - *Kennesaw State University,* **Spandana Thammisetty** - *Kennesaw State University,* **Bo Li** - *Kennesaw State University*

Technical Sessions

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Robertson Room

06-03 Bioinspired Vibrations and Waves

Chair: **Pablo Tarazaga** - *Texas A&M University*
Co-Chair: **Steven Anton** - *Tennessee Tech University*

Directed Particle Motion Driven by Superimposed Two-Dimensional Traveling Waves

Technical Paper Publication:
SMASIS2023-110915

William Rogers - *Texas A&M University,* **Mohammad Albakri** - *Texas A&M University Qatar, Pablo Tarazaga - Texas A&M University*

Novel Pumping Mechanism for Heat Sinks With Fluid Medium Using Steady State Traveling Waves

Technical Paper Publication:
SMASIS2023-113286

Krishnakumar Rajendran - *Michigan Technological University,* **Hrishikesh Gosavi** - *Michigan Technological University,* **Sriram Malladi** - *Michigan Technological University*

An Investigation on the Effectiveness of Cross-Sectional Tapering for Broadband Non-Reflective Traveling Waves Generation in Beams With Passive Discontinuities

Technical Paper Publication:
SMASIS2023-110641

Amirhossein Omidi Soroor - *Texas A&M University,* **Pablo Tarazaga** - *Texas A&M University*

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Austin Room

02-03: Design and Application of Shape Memory Alloy Rotary Actuators

Chair: **Dean Pick** - *Kinitics Automation Limited*
Co-Chair: **Marcus Young** - *University of North Texas*

Simulation of Buckling Shape Memory Alloy Tubes Under Torsional Loading

Technical Presentation Only:
SMASIS2023-111153

Kevin Lieb - Texas A&M University, **Jared Lilly** *- Texas A&M University,* **Darren Hartl** *- Texas A&M University*

Development, Fabrication and Testing of a Self-Biasing Shape Memory Alloy Torque Tube

Technical Presentation Only:
SMASIS2023-111551

Siu Kei Tang *- Smarter Alloys,* **Ibraheem Khan** *- Smarter Alloys,* **Michael Kuntz** *- Smarter Alloys*

Shape Memory Alloy Reconfigurable Technology-Vortex Generators: Targeted Alloy Design

Technical Presentation Only:
SMASIS2023-111028

Othmane Benafan *- NASA Glenn Research Center,* **Glen S. Bigelow** *- NASA Glenn Research Center,* **Anita Garg** *- University of Toledo,* **Douglas E. Nicholson** *- Boeing Research & Technology,* **Tad Calkins** *- Boeing Research & Technology*

Shape Memory Alloy Actuated Vortex Generators: Development and Flight Test

Technical Presentation Only:
SMASIS2023-111216

Frederick Calkins *- Boeing,* **Douglas Nicholson** *- Boeing, Othmane Benafan - NASA Glenn Research Center,* **Chris Yeeles** *- Boeing, Zachary Jones - Boeing,* **Alexander Lafranchi** *- Boeing*

Technical Sessions

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Dewitt Room

03-03: Compliant Structures and Mechanisms

Chair: **Greta Vazzoler** - *University of Genoa*
Co-Chair: **Jovana Jovanova** - *Technische Universität Delft*

Conceptual Design of a Compliant, Low-Cost Prosthetic Hand **Technical Paper Publication:** SMASIS2023-110461 **Mario Baggetta** - *University of Genova*, **Margherita Vazzoler** - *University of Genova*, **Gianluca Palli** - *University of Bologna*, **Claudio Melchiorri** - *University of Bologna*, **Giovanni Berselli** - *University of Genova*	**A Comparison of Mechanics Simplifications in Pose Estimation for Thermally-Actuated Soft Robot Limbs** **Technical Paper Publication:** SMASIS2023-110774 **Juan Pacheco Garcia** - *Boston University*, **Ran Jing** - *Boston University*, **Meredith Anderson** - *Boston University*, **Miguel Ianus-Valdivia** - *Boston University*, **Andrew Sabelhaus** - *Boston University*	**Parametric Studies of Flexible Sandwich Panels as a Compliant Fairing for Folding Wingtip Joints** **Technical Paper Publication:** SMASIS2023-110481 **Nuhaadh Mohamed Mahid** - *University of Bristol*, **Mark Schenk** - *University of Bristol*, **Branislav Titurus** - *University of Bristol*, **Benjamin King Sutton Woods** - *University of Bristol*	**Adaptive Bandgap Formation in a Periodic Tensegrity Structure** **Technical Presentation Only:** SMASIS2023-111065 **Rawad Yazbeck** - *Texas A&M University*, **Muhao Chen** - *Texas A&M University*, **Sami Borgi** - *Texas A&M University at Qatar*, **James Boyd** - *Texas A&M University*, **Dimitris Lagoudas** - *Texas A&M University*

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Dovers Room

04-03: End Effector Development

Chair: **Brent Utter** - *Lafayette College*
Co-Chair: **Farhan Gandhi** - *Rensselaer Polytechnic Institute*

Active Gripper Development for Perching of Small Unmanned Aerial Systems

Invited Speaker Presentation:
SMASIS2023-110931

Francis Phillips - *U.S. Army DEVCOM Army Research Laboratory*

A Novel Design of Shape-Memory Alloy Actuated Grippers

Technical Paper Publication:
SMASIS2023-110416

Benjamin John - Fraunhofer Institute for Machine Tools and Forming Technology, **Thomas Schubert** - *KOSTAL Kontakt Systeme GmbH, Matthias Casper - KOSTAL Kontakt Systeme GmbH,* **Tino Karl** - *KOSTAL Kontakt Systeme GmbH,* **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Welf-Guntram Drossel** - *Fraunhofer Institute for Machine Tools and Forming Technology*

3D Printed Flexible Gripper With Capacitance Sensing

Technical Paper Publication:
SMASIS2023-110732

Hernan David Moreno - *Purdue University,* **Julio Hernandez** - *Purdue University,* **Cole Maynard** - *Purdue University,* **Tyler Tallman** - *Purdue University,* **Brittany Newell** - *Purdue University,* **Jose Garcia** - *Purdue University*

Technical Sessions

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Dovers Room

04-03: End Effector Development

Chair: **Brent Utter** - *Lafayette College*
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Benjamin John - Fraunhofer Institute for Machine Tools and Forming Technology, **Thomas Schubert** - *KOSTAL Kontakt Systeme GmbH, Matthias Casper - KOSTAL Kontakt Systeme GmbH,* **Tino Karl** - *KOSTAL Kontakt Systeme GmbH,* **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Welf-Guntram Drossel** - *Fraunhofer Institute for Machine Tools and Forming Technology*

3D Printed Flexible Gripper With Capacitance Sensing

Technical Paper Publication:
SMASIS2023-110732

Hernan David Moreno - *Purdue University,* **Julio Hernandez** - *Purdue University,* **Cole Maynard** - *Purdue University,* **Tyler Tallman** - *Purdue University,* **Brittany Newell** - *Purdue University,* **Jose Garcia** - *Purdue University*

MONDAY, SEPTEMBER 11 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

			Dezavala Room
05-02: Monitoring Civil Infrastructure Chair: **Sumit Gupta** - *Oak Ridge National Laboratory* Co-Chair: **Shahrzad Towfighian** - *Binghamton University* Co-Chair: **Xuan Zhu** - *The University of Utah*			
UAV-Based Remote Sensing for Municipal Solid Waste Landfill Cover Integrity Inspection and Monitoring **Invited Speaker Presentation:** SMASIS2023-111824 **Peng Patrick Sun** - *University of Central Florida,* **Syed Zohaib Hassan** - *University of Central Florida*	**Classifying Soil Saturation Levels Using a Network of UAV-Deployed Smart Penetrometers** **Technical Paper Publication:** SMASIS2023-111009 **Puja Chowdhury** - *University of South Carolina,* **Joud N. Satme** - *University of South Carolina,* **Ryan Yount** - *University of South Carolina,* **Austin r.j. Downey** - *University of South Carolina,* **Sadik Khan** - *Jackson State University,* **Jasim Imran** - *University of South Carolina,* **Laura Micheli** - *University of South Carolina*		

Technical Sessions

MONDAY, SEPTEMBER 11 - 3:30PM–4:50PM			
3:40PM	**4:00PM**	**4:20PM**	**4:40PM**

Dovers Room

04-04: Structural Design and Optimization

Chair: **Martin Radestock** - *German Aerospace Center - DLR*
Co-Chair: **Roeland De Breuker** - *TU Delft*

Structurally Functional RC Filters Using Coupled Three-Dimensional Topology Optimization

Technical Presentation Only:
SMASIS2023-111014

Jessica Zamarripa - *Texas A&M University,* **Brent Bielefeldt** - *National Research Council ,* **Darren Hartl** - *Texas A&M University*

Development and Validation of a Multiscale Topology Optimization Framework Using Material Property Feasibility Constraints

Technical Presentation Only:
SMASIS2023-111067

Brent Bielefeldt - *National Research Council,* *Richard Beblo - U.S. Air Force Research Laboratory,* **Eddie Meixner** - *University of Dayton, Robert Lowe - University of Dayton*

Mechanics of Infilled Morphing Skins: Design Rules and Application to Twist-Morphing Wings

Technical Presentation Only:
SMASIS2023-110742

Patrick Walgren - *National Research Council,* **Jared Neely** - *Air Force Research Laboratory,* **Daniel Woods** - *Air Force Research Laboratory*

Low-Energy Stiffness Modulation in Lattice Structures

Technical Presentation Only:
SMASIS2023-110955

Maria Sakovsky - *Stanford University,* **Daniel Oluwalana** - *Stanford University*

TUESDAY, SEPTEMBER 12 - 9:10AM–10:30AM

9:10AM	9:30AM	9:50AM	10:10AM

Magnolia Room

01-04: Fiber Composites

Chair: **Amir Ameli** - *University of Massachusetts Lowell*
Co-Chair: **Sumit Gupta** - *Oak Ridge National Laboratory*

An Analytical Model for the Transverse Piezoresistive Response of Fiber-Reinforced Nano-Modified Polymers via an Electrical Concentric Cylinders Assemblage Approach

Technical Paper Publication:
SMASIS2023-111044

Sultan Ghazzawi - Purdue University, **Tyler Tallman** - *Purdue University*

The Effects of Electroplating on the Mechanical Properties of Additively Manufactured Structures

Technical Paper Publication:
SMASIS2023-110933

Kevin Simonson - *Purdue University,* **Kateryna Vyshniakova** - *Purdue University,* **Robert Nawrocki** - *Purdue University,* **Adel El-Shahat** - *Purdue University,* **Brittany Newell** - *Purdue University*

Investigation of Yarn Pullout as a Mechanism of Ballistic Performance Enhancement in Silica Nanoparticle-Impregnated Kevlar Fabric

Technical Paper Publication:
SMASIS2023-111430

Nicholas Nowak - Oklahoma State University, **Muhammad Ali Bablu** - *Oklahoma State University,* **James Manimala** - *Oklahoma State University*

Development of Structural Batteries Based on Carbon Fiber Composites

Technical Presentation Only:
SMASIS2023-117613

Paul Gilmore - *Toyota Research Institute of North America, Umesh Gandhi - Toyota Research Institute of North America*

Austin Room

02-04: Design and Application of Shape Memory Alloy Structures and Devices

Chair: **Tad Calkins** - *Boeing*
Co-Chair: **Mike Kuntz** - *Smarter Alloys*

Finite Element Analyses and Experimental Studies of Knitted Shape Memory Alloy Actuation Behavior Under High Loads

Technical Presentation Only:
SMASIS2023-111522

Darren Hartl - *Texas A&M University,* **Hannah Stroud** - *Texas A&M University*

Performance of Self-Folding Shape Memory Polymer Origami

Technical Presentation Only:
SMASIS2023-111165

Robin Weaver - *Auburn University,* **Ryan Long** - *Auburn University,* **Davide Guzzetti** - *Auburn University,* **Russell Mailen** - *Auburn University*

Effectiveness of Shape Memory Alloy Golf Clubs in Enhancing Golfer Performance

Technical Paper Publication:
SMASIS2023-111248

R. Mason Ward - *Texas A&M University,* **Daniel Kirby** - *Texas A&M University,* **John Hardy** - *Texas A&M University,* **Darren Hartl** - *Texas A&M University*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dewitt Room

03-04: Foldable Structures

Chair: **Jeff Hill** - *Brigham Young University*
Co-Chair: **Givoanni Berselli** - *University of Genoa*

Selective 1 DOF Deformation and Rigidity of Tendon Constrained Inflatables

Technical Presentation Only:
SMASIS2023-117643

Ellen Kim - *University of Michigan,* **Jonathan Luntz** - *University of Michigan,* **Diann Brei** - *University of Michigan*

Modeling of a Nonlinear-Elastic Compliant Mechanism With Tension-Compression Asymmetry

Technical Presentation Only:
SMASIS2023-109911

Brianne Hargrove - *The Pennsylvania State University,* **Mary Frecker** - *The Pennsylvania State University*

Actuated Folding of Origami Structures Through Thin-Layered Tile-Based Air Surface Inflation Bladders

Technical Presentation Only:
SMASIS2023-117579

Li Tiantian - *University of Michigan,* **Jonathan Luntz** - *University of Michigan,* **Diann Brei** - *University of Michigan*

TUESDAY, SEPTEMBER 12 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dovers Room

04-05: Aerospace Applications

Chair: **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology*
Co-Chair: **James Gibert** - *Purdue University*
Co-Chair: **Johannes Riemenschneider** - *German Aerospace Center*

Aeroelastic Investigation of Spanwise Morphing Wings From Multistable Honeycombs

Technical Presentation Only:
SMASIS2023-119404

D. Matthew Boston - *Purdue University,* **Andres Arrieta** - *Purdue University*

A Theoretical and Experimental Analysis of the Aerodynamic Response of a Piezocomposite Ornithopter Wing

Technical Paper Publication:
SMASIS2023-111168

Mohammad Katibeh - Rutgers University, **Onur Bilgen** - *Rutgers University*

Wind Tunnel and Flight Demonstrations in AIRGREEN2

Technical Paper Publication:
SMASIS2023-117647

Salvatore Ameduri - *Italian Aerospace Research Centre,* **Ignazio Dimino** - *Italian Aerospace Research Centre,* **Lorenzo Pellone** - *Italian Aerospace Research Centre,* **Antonio Concilio** - *Italian Aerospace Research Centre,* **Umberto Mercurio** - *Italian Aerospace Research Centre,* **Rosario Pecora** - *Università degli Studi di Napoli "Federico II",* **Vittorio Cavalieri** - *Politecnico di Milano,* **Francesco Toffol** - *Politecnico di Milano,* **Sergio Ricci** - *Politecnico di Milano,* **Alessandro De Gaspari** - *Politecnico di Milano,* **Eugenio Colella** - *TECNAM,* **Michelangelo Giuliani** - *TECNAM,* **Flavio Giannetti** - *Università degli Studi di Salerno,* **Giovanni Carossa** - *Leonardo Company,* **Maurizio Giannetti** - *Leonardo Company*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 9:10AM–10:30AM

9:10AM	9:30AM	9:50AM	10:10AM

Robertson Room

06-04: Bioinspired Smart Composites

Chair: **Matthew Bryant** - *North Carolina State University*
Co-Chair: **Vanessa Restrepo Perez** - *Texas A&M University*

Sustained Self-Healing of Fiber-Reinforced Polymer Composites via In Situ Thermal Remending

Invited Speaker Presentation:
SMASIS2023-117652

Jason Patrick - *North Carolina State University*

Design and Development of Self-Adaptive Composite Materials With Temperature Induced Shape-Shifting Properties

Technical Presentation Only:
SMASIS2023-110495

Manuel Jose Carvajal Loaiza - *Texas A&M University,* **Vanessa Restrepo Perez** - *Texas A&M University*

Characterization of Shape Memory Alloys for Smart Composites Under Different Environmental Conditions Using an In-Situ Thermal Chamber

Technical Presentation Only:
SMASIS2023-111179

Avik Ahuja - *Texas A&M University,* **Vanessa Restrepo** - *Texas A&M University*

Dezavala Room

07-02: Energy Harvesting, Sensing, Monitoring

Chair: **Wei-Che Tai** - *Michigan State University*
Co-Chair: **Serife Tol** - *University of Michigan*

On Phase Coupling of a Vortex-Induced Swing Sensor

Technical Paper Publication:
SMASIS2023-111091

Ying Gong - *Shanghai University,* **Qianyi Peng** - *Shanghai University,* **Zhongjie Li** - *Shanghai University*

Vortex Intensification of a Triboelectric Nanogenerator Array for Water Energy Harvesting

Technical Paper Publication:
SMASIS2023-110971

Zhongjie Li - *Shanghai University,* **Chenyu Wang** - *Shanghai University,* **Ying Gong** - *Shanghai University,* **Yuan Zhou** - *Shanghai University,* **Biao Wang** - *Shanghai University*

Vortex Intensification of a Triboelectric Nanogenerator Array for Water Energy Harvesting

Technical Paper Publication:
SMASIS2023-110971

Zhongjie Li - *Shanghai University,* **Chenyu Wang** - *Shanghai University,* **Ying Gong** - *Shanghai University,* **Yuan Zhou** - *Shanghai University,* **Biao Wang** - *Shanghai University*

Numerical Study of a Piezoelectric Vibration Energy Harvester Without and With an Ortho-Planar Spring Using a Modified H-Shape Structure

Technical Paper Publication:
SMASIS2023-109903

Ibnu Taufan - *University of Limerick,* **Jeff Punch** - *University of Limerick,* **Valeria Nico** - *University of Limerick*

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Magnolia Room

01-05: Functional Printing

Chair: **Amir Ameli** - *University of Massachusetts Lowell*
Co-Chair: **Tyler Tallman** - *Purdue University*

In Situ Foam 3-D Printing of Carbon Nanotube/Thermoplastic Polyurethane Nanocomposites **Technical Presentation Only:** SMASIS2023-111208 **Milad Azami** - *University of Massachusetts Lowell,* **Karun Kalia** - *University of Massachusetts Lowell,* **Amir Ameli** - *University of Massachusetts Lowell*	**Finite Strain Sensing via Additively Manufactured CNF/TPU Strain Gauges** **Technical Paper Publication:** SMASIS2023-110626 **Julio Hernandez** - *Purdue University,* **Cole Maynard** - *Purdue University,* **Corey O'brien** - *Purdue University,* **David Rodriguez** - *Purdue University,* **Brittany Newell** - *Purdue University,* **Tyler Tallman** - *Purdue University*	**Scanning on a Thin Slice: An Examination of a Magnetostrictive Sputtered 3D Printed Carbon Fiber Composite** **Technical Paper Publication:** SMASIS2023-111036 **Christopher Nelon** - *Clemson University,* **Brandon Williams** - *Clemson University,* **Oliver Myers** - *Clemson University,* **Asha Hall** - *U.S. Army Research Laboratory,* **Dereje Seifu** - *Morgan State University*	**Effect of Filament Color on the Development of Bistability In Switchable Bistable Squares** **Technical Paper Publication:** SMASIS2023-111035 **Katie A. Martin** - *U.S. Army Corps of Engineers, Engineer Research and Development Center,* **Travis L. Thornell** - *U.S. Army Corps of Engineers, Engineer Research and Development Center,* **Hayden A. Hanna** - *U.S. Army Corps of Engineers, Engineer Research and Development Center,* **Charles A. Weiss, Jr.** - *U.S. Army Corps of Engineers, Engineer Research and Development Center,* **Zackery B. Mcclelland** - *U.S. Army Corps of Engineers, Engineer Research and Development Center*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

			Austin Room
02-05: Mechanics and Behavior of Shape Memory Alloys Chair: **Santo Padula** - *NASA Glenn Research Center* Co-Chair: **Douglas E. Nicholson** - *Boeing*			
Architected Material Analogs for Shape Memory Alloys **Invited Speaker Presentation:** SMASIS2023-110907 **Yunlan Zhang** - *The University of Texas at Austin,* **Mirian Velay-Lizancos** - *Purdue University,* **David Restrepo** - *The University of Texas at San Antonio,* **Nilesh Mankame** - *General Motors Global Research & Development,* **Pablo Zavattieri** - *Purdue University*	**Effects of Oxidation and Plasticity on Transformation Temperatures in a High Temperature Shape Memory Alloy (HTSMA)** **Technical Presentation Only:** SMASIS2023-111206 **Adrien Cassagne** - *Texas A&M University,* **Thomas Ralph** - *Texas A&M University,* **Jean Briac Le Graverend** - *Texas A&M University*		

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dewitt Room

03-05: Vibration Control and Noise Reduction

Chair: **Abdessattar Abdelkefi** - *New Mexico State University*
Co-Chair: **James Gibert** - *Purdue University*

Development of Numerical Models Based on Experimental Tests for the Design of Active Vibration Controllers

Technical Paper Publication:
SMASIS2023-111106

Tarcisio Marinelli Pereira Silva - *Technology Innovation Institute,* **Prabakaran Balasubramanian** - *Technology Innovation institute,* **Giovanni Ferrari** - *McGill University,* **Celia Hameury** - *McGill University,* **Abdulaziz Buabdulla** - *Technology Innovation Institute,* **Giulio Franchini** - *Technology Innovation Institute,* **Marco Amabili** - *McGill University*

On the Noise Reduction via a Weakly-Coupled Digitally Programmed Nonlinear Electroacoustic Absorber

Technical Presentation Only:
SMASIS2023-109669

Maxime Morell - *Université de Lyon,* **Manuel Collet** - *Université de Lyon,* **Emmanuel Gourdon** - *Université de Lyon,* **Alireza Ture Savadkoohi** - *Université de Lyon,* **Emanuele De Bono** - *Université de Bourgogne Franche-Comt´e*

Programmable Bandgaps in Meta-Structures With Dynamic Vibration Resonators

Technical Paper Publication:
SMASIS2023-112818

Shantanu Chavan - *Michigan Technological University,* **Vijaya V.N. Sriram Malladi** - *Michigan Technological University*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

			Dovers Room
04-06: Morphing Aerospace Applications Chair: **Farhan Gandhi** - *Rensselaer Polytechnic Institute* Co-Chair: **Brent Utter** - *Lafayette College*			
DLR UAS Test Platform for Morphing Wings **Technical Presentation Only:** SMASIS2023-110993 **Martin Radestock** - *German Aerospace Center,* **Jan Tikalsky** - *German Aerospace Center,* **Heiko Von Geyr** - *German Aerospace Center,* **Lennart Kracke** - *German Aerospace Center,* **Sebastian Cain** - *German Aerospace Center,* **Johann Dauer** - *German Aerospace Center*	**High-Throughput Analysis and Morphing Design Space Decomposition for Mission-Adaptive Air Vehicles** **Technical Presentation Only:** SMASIS2023-111011 **Jared Lilly** - *Texas A&M University,* **Allen Davis** - *Texas A&M University,* **Walker Buckle** - *Texas A&M University,* **Trent White** - *Texas A&M University,* **Darren Hartl** - *Texas A&M University,* **Gerardo Cervantes** - *NextGen Aeronautics*	**SmartX: Intelligent Wings Enabling More Sustainable Aviation** **Invited Speaker Presentation:** SMASIS2023-114990 **Roeland De Breuker** - *Delft University of Technology*	

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Robertson Room

06-05: Continuum Robotics

Chair: **Mary Frecker** - *The Pennsylvania State University*
Co-Chair: **Sameh Tawfick** - *University of Illinois*

Soft Tentacles for Underwater Robotics Powered by Twisted and Coiled Artificial Muscles (TCAMs) **Technical Presentation Only:** SMASIS2023-110881 **Sean Maxson** - *The University of Iowa,* **Parth Kotak** - *The University of Iowa,* **Thilina Weerakkody** - *The University of Iowa,* **Caterina Lamuta** - *The University of Iowa*	**A Cosserat Rod Model for a Hyperelastic Continuum Robot Actuated by Twisted and Coiled Artificial Muscles** **Technical Presentation Only:** SMASIS2023-111027 **Maxwell Hammond** - *The University of Iowa,* **Niloufar Sadat Seyfi** - *The University of Iowa,* **Venanzio Cichella** - *The University of Iowa,* **Caterina Lamuta** - *The University of Iowa*	**Comparative Review of Two Different Design Approaches for SMA Based Continuum Robots** **Technical Paper Publication:** SMASIS2023-111253 **Rawan Barakat** - *ZeMA - Center for Mechatronics and Automation Technology,* **Yannik Goergen** - *ZeMA - Center for Mechatronics and Automation Technology,* **Rouven Britz** - *Saarland University,* **Michele Mandolino** - *Saarland University,* **Gianluca Rizzello** - *Saarland University,* **Paul Motzki** - *Saarland University*	**Reduced-Dimensional Modeling of Magneto-Active Elastomer Unimorph Actuators** **Technical Presentation Only:** SMASIS2023-111030 **Tan Pan** - *The Pennsylvania State University,* **Zoubeida Ounaies** - *The Pennsylvania State University,* **Carolyn Seepersad** - *The University of Texas at Austin,* **Mary Frecker** - *The Pennsylvania State University*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dezavala Room

05-03: SHM and NDT

Chair: **Tyler Tallman** - *Purdue University*
Co-Chair: **Shahrzad Towfighian** - *Binghamton University*
Co-Chair: **Rishikesh Srinivasaraghavan Govindarajan** - *Embry-Riddle Aeronautical University*

Smart Structural Materials With Embedded Fiber Optic Sensors for Health Monitoring in Harsh Environments

Technical Paper Publication:
SMASIS2023-117419

Xinchang Zhang - *Idaho National Laboratory* , **ilong Hua** - *Idaho National Laboratory,* **Jorgen Rufner** - *Idaho National Laboratory*

A Non-Destructive Method for Underwater Material Second-Order Elastic Constants Measurement

Technical Paper Publication:
SMASIS2023-111055

Shuai Ju - *University of North Texas,* **Masoud Naghdi** - *University of North Texas,* **Muhammad Aslam** - *University of North Texas,* **Sreejith Sreedharan** - *University of North Texas,* **Mitali Hardik Desai** - *University of North Texas,* **Haifeng Zhang** - *University of North Texas*

Electromechanical Impedance Based Part Identification via Linear Projection

Technical Paper Publication:
SMASIS2023-111211

Sourabh Sangle - *Texas A&M University,* **Pablo Tarazaga** - *Texas A&M University*

TUESDAY, SEPTEMBER 12 - 1:40PM–3:00PM

1:40PM	2:00PM	2:20PM	2:40PM

Dezavala Room

07-03: Nonlinear Energy Harvesting

Chair: **Wei-Che Tai** - *Michigan State University*
Co-Chair: **Guobiao Hu** - *The Hong Kong University of Science and Technology*

Effect of Hysteresis on a Piezoelectric Inverted Beam Energy Harvester **Technical Paper Publication:** SMASIS2023-111072 **Masoud Zarepoor** - *Lake Superior State University,* **Onur Bilgen** - *Rutgers, The State University of New Jersey*	**An Investigation on the Impact and Linear Double Springs Based Mechanism in the Vibration Energy Harvesting** **Technical Presentation Only:** SMASIS2023-112083 **Chung Ket Thein** - *University of Nottingham Ningbo China*	**Energy Transfer in a Quarter-Car Model With Inertially Nonlinear Inerter-Based Pendulum Vibration Absorber** **Technical Paper Publication:** SMASIS2023-110951 **Joel Cosner** - *Michigan State University,* **Wei-Che Tai** - *Michigan State University*	

Magnolia Room

01-06: Shape Memory Alloy

Chair: **Ji Su** - *National Aeronautics and Space Administration*
Co-Chair: **Faith Gantz** - *University of North Texas*

Additive Manufacturing of Fe-Mn-Al-Ni Shape Memory Alloy: Microstructure and Phase Transformation Characteristics **Technical Paper Publication:** SMASIS2023-109874 **Anwar Algamal** - *The University of Toledo,* **Ismail Alhamdi** - *The University of Toledo,* **Majed Ali** - *The University of Toledo,* **Abdalmageed Almotari** - *The University of Toledo,* **Umesh Gandhi** - *Toyota Research Institute,* **Ala Qattawi** - *The University of Toledo*	**Fabrication, Experimentation, and Characterization of a Shape Memory Alloy Driven Composite Morphing Radiator** **Technical Presentation Only:** SMASIS2023-111003 **Priscilla Nizio** - *Texas A&M University,* **Darren Hartl** - *Texas A&M University*	**Validation of Smanalytics: Comparison of Automatic and Human Analyzed Shape Memory Alloy Test Data** **Technical Presentation Only:** SMASIS2023-110692 **Glen Bigelow** - *NASA Glenn Research Center,* **Hector Luna** - *NASA Glenn Research Center,* **Zachary Toom** - *HX5, LLC,* **Othmane Benafan** - *NASA Glenn Research Center*	**Thermomechanical Processing of NiTiCu Shape Memory Alloy From Button to Wire** **Technical Paper Publication:** SMASIS2023-111572 **Faith Gantz** - *University of North Texas,* **Nehal Al Jabri** - *University of North Texas,* **Dominique Worrell** - *University of North Texas,* **Marcus Young** - *University of North Texas,* **Art Palisoc** - *L'Garde, Inc.*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Austin Room

02-06: Applications of Advanced Materials in Aerospace Applications

Chair: **Oliver Myers** - *Clemson University*
Co-Chair: **Cody Gonzales** - *The University of Texas at San Antonio*

In-Flight Structural Test of a Hoverbike Using Fiber Optic Sensors

Technical Paper Publication:
SMASIS2023-110974

Yong-Ha Hwang - *Korea Advanced Institute of Science and Technology,* **Kwangwoo Jang** - *Korea Advanced Institute of Science and Technology,* **Hyungjoo Ahn** - *Korea Advanced Institute of Science and Technology,* **Hyochoong Bang** - *Korea Advanced Institute of Science and Technology,* **Jae-Hung Han** - *Korea Advanced Institute of Science and Technology*

Flight Performance Evaluation of a Mini Drone by Revisiting Structural Design via Additive Manufacturing Technology

Technical Presentation Only:
SMASIS2023-110391

Hande Yavuz - *Ostim Technical University,* **Safak Nesli** - *Ostim Technical University,* **Cem Mert Borucu** - *Ostim Technical University,* **Mehmet Ali Mızrak** - *Arı Savunma Havacılık Elektronik ve Elektromekanik Ltd Şti,* **Hikmet Bal** - *Ostim Technical University*

Environmental Tests of a Parabolic Self-Deployable Tapespring Boom for CubeSat Applications

Technical Paper Publication:
SMASIS2023-110423

Deven Mhadgut - *Virginia Tech,* **Patrick Thomas** - *Virginia Tech,* **Minzhen Du** - *Virginia Tech,* **Austin Phoenix** - *Virginia Tech,* **Sheyda Davaria** - *Virginia Tech,* **Jonathan Black** - *Virginia Tech*

TUESDAY, SEPTEMBER 12 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Dewitt Room

03-06: Design and Optimization of Intelligent Structures

Chair: **Darren Hartl** - *Texas A&M University*
Co-Chair: **Jeff Hill** - *Brigham Young University*

Design of Mechanically Intelligent Structures

Invited Speaker Presentation:
SMASIS2023-111355

Jovana Jovanova - *Technische Universität Delft*

Design and Optimization of the Conformal Surface for an Adaptive Structure

Technical Presentation Only:
SMASIS2023-111187

Alejandro Martinez - *Texas A&M University,* **Darren Hartl** - *Texas A&M University,* **Dimitris Lagoudas** - *Texas A&M University*

Determination of Material Parameters and FEM Simulation for the Development of a Design System for Shape Memory Springs

Technical Paper Publication:
SMASIS2023-111107

Alexander Hiekel - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Fabian Hoffmann** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Romina Krieg** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Ralf Theiß** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Christian Pelshenke** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Simon Horn** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Mehrdad Mehrbakhsh** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.,* **Welf-Guntram Drossel** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Peter Dültgen** - *Forschungsgemeinschaft Werkzeuge und Werkstoffe e.V.*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Dovers Room

04-07: Novel Actuators

Chair: **Wonhee Kim** - *General Motors*
Co-Chair: **Paul Motzki** - *Saarland University*

Soft Actuators From Flexible Auxetic Metamaterials and Shape Memory Alloys Springs

Technical Paper Publication:
SMASIS2023-111012

Janghoon Woo - *University of Minnesota Twin Cities*, **Julianna Abel** - *University of Minnesota Twin Cities*

An Innovative Multi-Layer System for Thermally Activated Switching Actions

Technical Paper Publication:
SMASIS2023-111166

Giulia Lanzara - *University of Rome, RomaTre*, **Ginevra Hausherr** - *University of Rome, RomaTre*

Demonstrator for Linear Dielectric Elatomer Actuator Systems Coupled to Compliant Joint Linkage Transmission Mechanisms

Technical Paper Publication:
SMASIS2023-111273

Daniel Bruch - *Saarland University*, **Ilja Naumov** - *ZeMA GmbH*, **Tobias Willian** - *Saarland University*, **Paul Motzki** - *Saarland University*

A Hybrid Piezoelectric-Hydraulic Actuator Model and Prototype With Large Stroke and Force Parameters

Technical Paper Publication:
SMASIS2023-112125

Yan Borden - *University of Michigan*, **Daniel Inman** - *University of Michigan*

TUESDAY, SEPTEMBER 12 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Robertson Room

06-06: Bioinspired Structures

Chair: **Michael Philen** - *Virginia Tech*
Co-Chair: **Shahrzad (Sherry) Towfighian** - *Binghamton University*

Fabrication and Characterization of Flexible Matrix Composite Wafers

Technical Paper Publication:
SMASIS2023-111069

Masaki Hada - *Virginia Tech,* **Michael Philen** - *Virginia Tech*

Investigating the Effects of Eccentricity on the Dynamics of Spider Webs

Technical Presentation Only:
SMASIS2023-111209

Thijs Masmeijer - *University of Washington,* **Ed Habtour** - *University of Washington*

Spider-Web-Inspired Metamaterial Design and Experimental Validation

Technical Presentation Only:
SMASIS2023-111231

Krishna Chinnam - *University of RomeTre,* **Sawan Guruva** - *Sapienza University of Rome,* **Yichang Shen** - *Sapienza University of Rome,* **Giulia Lanzara** - *University of RomeTre,* **Walter Lacarbonara** - *Sapienza University of Rome*

Hybrid Soft-Rigid Joint With Inherent Sensing and Actuation Capabilities Based on Rolled Dielectric Elastomers

Technical Paper Publication:
SMASIS2023-111235

Andreas Meyer - *ZeMA - Center for Mechatronics and Automation Technology,* **Christian Johannes Schmidt** - *ZeMA - Center for Mechatronics and Automation Technology,* **Paul Motzki** - *ZeMA - Center for Mechatronics and Automation Technology*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 3:30PM–4:50PM			
3:30PM	**3:50PM**	**4:10PM**	**4:30PM**

Magnolia Room

01-07: Multifunctional Composites

Chair: **Sumit Gupta** - *Oak Ridge National Laboratory*
Co-Chair: **Nathan Salowitz** - *University of Wisconsin-Milwaukee*

Self Healing of Fibre-Reinforced Delaminated Composites

Technical Paper Publication:
SMASIS2023-111115

Giulia Lanzara - *University of Rome, RomaTre,* **Alessandro Porrari** - *University of Rome, RomaTre*

A Recyclable Self-Healing Composite With Advanced Sensing Property

Technical Presentation Only:
SMASIS2023-111197

Sargun Singh Rohewal - *Oak Ridge National Laboratory and The University of Tennessee,* **Sumit Gupta** - *Oak Ridge National Laboratory,* **Logan T Kearney** - *Oak Ridge National Laboratory,* **Amit K Naskar** - *Oak Ridge National Laboratory,* **Christopher C Bowland** - *Oak Ridge National Laboratory*

Evaluation of Interface Strength and Failure Between Nickel-Titanium Shape-Memory-Alloy Wire and Bismuth-Tin Matrix for the Design of Self-Healing Composites

Technical Paper Publication:
SMASIS2023-111016

Muhammad Istiaque Haider - *University of Wisconsin-Milwaukee,* **Benjamin Church** - *University of Wisconsin-Milwaukee,* **Nathan Salowitz** - *University of Wisconsin-Milwaukee*

Numerical Prediction of the Effective Mechanical Behavior of Interpenetrating Phase Composites Comprising Architected Nitinol Cores

Technical Paper Publication:
SMASIS2023-111103

Shahzaib Ilyas - *Khalifa University of Science and Technology,* **Rashid Abu Al-Rub** - *Khalifa University of Science and Technology,* **Bashar Khasawneh** - *Khalifa University of Science and Technology,* **Wael Zaki** - *Khalifa University of Science and Technology*

TUESDAY, SEPTEMBER 12 - 3:30PM–4:50PM

3:30PM	3:50PM	4:10PM	4:30PM

Austin Room

02-07: Smart Material Actuators and Their Applications

Chair: **Chris Lynch** - *University of California, Riverside*
Co-Chair: **Paris Von Lockette** - *The Pennsylvania State University*

Exploring 6-Ply Twisted and Coiled Polymer Actuators With Active Cooling and Position Control

Technical Paper Publication:
SMASIS2023-111182

Abhishek Singh - *The University of Texas at Dallas*, **Yonas Tadesse** - *The University of Texas at Dallas*

Characterization of Shape Memory Polymer Yarns With Few Filaments for Force Generation

Technical Presentation Only:
SMASIS2023-109978

Michaela Andrews - *University of Minnesota Twin Cities*, **Julianna Abel** - *University of Minnesota Twin Cities*, **Susan Mantell** - *University of Minnesota Twin Cities*

An Experimental Investigation Into Design Parameters of 4D-Printed Actuators on Time-Depend Behavior

Technical Paper Publication:
SMASIS2023-110975

Yicong Gao - *Zhejiang University*, **Dongxin Duan** - *Zhejiang University*, **Jianrong Tan** - *Zhejiang University*, **Siyuan Zeng** - *Tsinghua University*, **Zhe Wei** - *Shenyang University of Technology*

Experimental Study on Gradually Varying Thickness Patch for Elastic Wave Manipulation Using Piezo Disk Actuators

Technical Paper Publication:
SMASIS2023-110972

Hyun-Su Park - *Korea Advanced Institute of Science and Technology*, **Dae-Hyun Hwang** - *Perigee Aerospace Inc.*, **Jae-Hung Han** - *Korea Advanced Institute of Science and Technology*

Dewitt Room

03-07: Advanced Manufacturing and Characterization

Chair: **Greta Vazzoler** - *University of Genoa*
Co-Chair: **Jovana Jovanova** - *Technische Universität Delft*

Interlocking Metasurfaces: A Joining Technology for Adaptive Structures

Technical Presentation Only:
SMASIS2023-110621

Ophelia Bolmin - *Sandia National Laboratories*, **Benjamin Young** - *Sandia National Laboratories*, **Philip Noell** - *Sandia National Laboratories*, **Brad Boyce** - *Sandia National Laboratories*

Fabrication of Parallel Compliant Mechanisms via Additive Manufacturing

Technical Paper Publication:
SMASIS2023-111684

Divya Shah - *Fondazione Istituto Italiano di Tecnologia*, **Giovanni Berselli** - *University of Genova*, **Alberto Parmiggiani** - *Fondazione Istituto Italiano di Tecnologia*

Acoustic Meta-Structure Transmission Loss Characterization via an Impedance Tube and the Transfer Matrix Approach

Technical Paper Publication:
SMASIS2023-112997

Matt Beals - *Michigan Technological University*, **Shantanu Chavan** - *Michigan Technological University*, **Vijaya V.N. Sriram Malladi** - *Michigan Technological University*

Vibration Absorption in 3D Printers Using Subordinate Oscillator Arrays for Mobile Manufacturing

Technical Presentation Only:
SMASIS2023-112816

Shantanu Chavan - *Michigan Technological University*, **Vijaya V.N. Sriram Malladi** - *Michigan Technological University*

Technical Sessions

TUESDAY, SEPTEMBER 12 - 3:30PM–4:50PM			
3:30PM	**3:50PM**	**4:10PM**	**4:30PM**

Dovers Room

04-08: SMA Applications

Chair: **Jayant Sirohi** - *The University of Texas at Austin*
Co-Chair: **Wonhee Kim** - *General Motors*

In Situ Actuation of Shape Memory Alloy Using Focused Ultrasound

Technical Paper Publication:
SMASIS2023-110681

Aldo Chipana - *Brigham Young University,* **Jeff Hill** - *Brigham Young University,* **Christopher Dillon** - *Brigham Young University*

Active Implant System Based on SMA Actuators for Improved Bone Facture Healing

Technical Paper Publication:
SMASIS2023-110858

Felix Welsch - *Saarland University,* **Susanne-Marie Kirsch** - *Saarland University,* **Lukas Ehl** - *Saarland University,* **Rouven Britz** - *Saarland University,* **Tim Pohlemann** - *Saarland University,* **Bergita Ganse** - *Saarland University,* **Stefan Seelecke** - *Saarland University,* **Paul Motzki** - *Saarland University*

Development of Adaptive Connectors Based on Shape Memory Alloys

Technical Paper Publication:
SMASIS2023-110980

Andreas Hofer - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Kai Thüsing** - *Fraunhofer Institute for Machine Tools and Forming Technology,* **Sven Langbein** - *Kunststoffverarbeitung Hoffmann GmbH,* **Dietrich Lembke** - *ECL Engineering Consultants,* **Welf-Guntram Drossel** - *Fraunhofer Institute for Machine Tools and Forming Technology*

Econo-Finger: 3D Printed Soft Orthotic Finger With Embedded Strain Gauge and Actuated by Coiled Shape Memory Alloy Muscles

Technical Paper Publication:
SMASIS2023-111149

Drew Miles - *The University of Texas at Dallas,* **Yonas Tadesse** - *The University of Texas at Dallas*

TUESDAY, SEPTEMBER 12 - 3:30PM–4:50PM			
3:30PM	3:50PM	4:10PM	4:30PM

			Robertson Room
06-07: Materials and Structures for Bio-inspired Robotics Chair: **Caterina Lamuta** - *The University of Iowa* Co-Chair: **Sameh Tawfick** - *University of Illinois*			
Bioinspired Active Vortex Generators to Delay Stall on an Airfoil at Low Reynolds Number **Technical Presentation Only:** SMASIS2023-110880 **Rabiu Mamman** - *The University of Iowa,* **Parth Kotak** - *The University of Iowa,* **Krebill Austin** - *The University of Iowa,* **James Buchholz** - *The University of Iowa,* **Caterina Lamuta** - *The University of Iowa*	**Water Entry Dynamics of Avian Inspired Divers** **Technical Paper Publication:** SMASIS2023-109800 **Bart Boom** - *University of Washington,* **Tadd Truscott** - *King Abdullah University of Science and Technology,* **Frank Fish** - *West Chester University,* **Adam Summers** - *University of Washington,* **Ed Habtour** - *University of Washington*	**Materials to Makers** **Invited Speaker Presentation:** SMASIS2023-118556 **Ankur Mehta** - *University of California, Los Angeles*	

Technical Sessions

TUESDAY, SEPTEMBER 12 - 3:30PM–4:50PM			
3:30PM	**3:50PM**	**4:10PM**	**4:30PM**

			Dezavala Room
05-04: Wave-Based Sensing Chair: **Zhenhua Tian** - *Virginia Tech* Co-Chair: **Shahrzad Towfighian** - *Binghamton University* Co-Chair: **Bowen Cai** - *Mississippi State University*			
Surface Acoustic Wave Sensors for Nondestructive Structural Monitoring of Nuclear Spent Fuel Canisters at Elevated Temperature **Invited Speaker Presentation:** SMASIS2023-111038 **Haifeng Zhang** - *University of North Texas,* **V.S. Sreejith** - *University of North Texas,* **Mitali Desai** - *University of North Texas*			

WEDNESDAY, SEPTEMBER 13 - 8:00AM–9:00AM

8:00AM

Phoenix Ballroom North

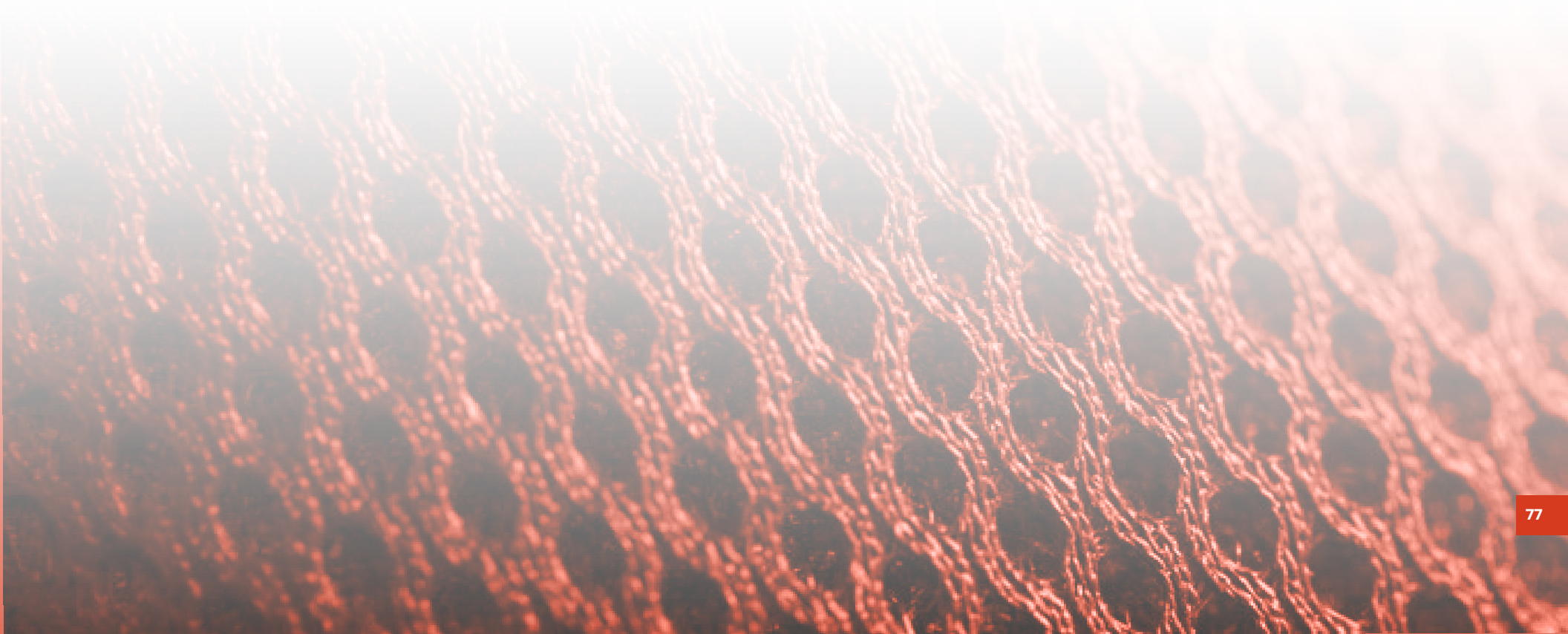
Keynote: E-Tattoos and E-Skins Bridging Humans and Robots

Chair: **James Gibert** - *Purdue University*

Wearable E-Tattoos for Digitizing Human Body

Invited Speaker Presentation: SMASIS2023-110922

Nanshu Lu - *The University of Texas at Austin*



Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM

9:10AM	9:30AM	9:50AM	10:10AM
			Phoenix Ballroom North
01-08: Surface Engineering Chair: **Tanya Hutter** -*The University of Texas at Austin* Co-Chair: **Ginevra Hausherr** - *University of Rome, Roma Tre*			
Antibacterial Properties of Snakeskin Inspired PDMS Surfaces Layered With Poly-DL-Lactic Acid Nanosheet **Technical Paper Publication:** SMASIS2023-111176 **Mohd Danial Ibrahim** - *Universiti Malaysia Sarawak,* **Alyssa Asong Ananthan** - *Universiti Malaysia Sarawak,* **Dayang Salyani Abang Mahmod** - *Universiti Malaysia Sarawak,* **Awang Ahmad Sallehin Awang Husaini** - *Universiti Malaysia Sarawak,* **Ngieng Ngui Sing** - *Universiti Malaysia Sarawak,* **Shunsuke Nakano** - *Tokai University,* **Yuta Sunami** - *Tokai University, Pierre Barroy - Université de Picardie Jules Verne*	**Evaluation of Antibacterial Activities for Poly-DL-Lactic Acid Nanosheet on the Biomimetic Sharkskin** **Technical Paper Publication:** SMASIS2023-109323 **Shunsuke Nakano** - *Tokai University,* **Alyssa Asong Ananthan** - *Universiti Malaysia Sarawak,* **Mohd Danial Ibrahim** - *Universiti Malaysia Sarawak,* **Dayang Salyani Abang Mahmod** - *Universiti Malaysia Sarawak,* **Awang Ahmad Sallehin Awang Husain** - *Universiti Malaysia Sarawak,* **Ngui Sing Ngieng** - *Universiti Malaysia Sarawak* **Yuta Sunami** - *Tokai University*	**Microstructured Magneto-Responsive Surfaces for Active Droplet Manipulation** **Technical Presentation Only:** SMASIS2023-110845 **Gaia Kravanja** - *University of Ljubljana,* **Raphael Kriegl** - *Ostbayerische Technische Hochschule Regensburg,* **Luka Hribar** - *University of Ljubljana,* **Irena Drevenšek-Olenik** - *Jožef Štefan Institute,* **Mikhail Shamonin** - *Ostbayerische Technische Hochschule Regensburg,* **Matija Jezeršek** - *University of Ljubljana*	

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Austin Room

02-08: Mechanics and Behavior of Magneto-Active Composites and Structures

Chair: **Chris Lynch** - *University of California, Riverside*
Co-Chair: **Paris Von Lockette** - *The Pennsylvania State University*

Magnetoactive Elastomers: Extraordinary Properties and Physics of Iron in Rubber **Invited Speaker Presentation:** SMASIS2023-117721 **Mikhail Shamonin** - *Ostbayerische Technische Hochschule Regensburg*	**Spatial and Temporal Homogenization of Phase-Field Equations With an Application to Iron-Based Shape Memory Alloy Modeling** **Technical Paper Publication:** SMASIS2023-111143 **Vincent Von Oertzen** - *Technische Universität Bergakademie Freiberg*, **Bjoern Kiefer** - *Technische Universität Bergakademie Freiberg*	**Toward a Phase Field Fracture Mechanics Model for Ni_2MnGa Magnetic Shape Memory Alloys** **Technical Presentation Only:** SMASIS2023-116571 **Constantin Ciocanel** - *Northern Arizona University*, **Glen D'Silva** - *Northern Arizona University*	

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dewitt Room

03-08: Structural Dynamics and Monitoring

Chair: **Stefan Seelecke** - *Saarland University*
Co-Chair: **James Gibert** - *Purdue University*

Parametric-Feel Algorithm: Developing a Parametric Vector fitting Model for Event Localization in Calibrated Structures

Technical Paper Publication:
SMASIS2023-113760

Samikhshak Gupta - *Michigan Technological University,* **Hrishikesh Gosavi** - *Michigan Technological University,* **Sriram Malladi** - *Michigan Technological University*

Dynamic Mode Decomposition Approach for Estimating the Shape of a Cable

Technical Paper Publication:
SMASIS2023-113911

Yash Manik Chavan - *Michigan Technological University,* **Vijaya V.N. Sriram Malladi** - *Michigan Technological University,* **Jung Yun Bae** - *Michigan Technological University,* **Myoungkuk Park** - *Michigan Technological University,* **Manu Krishnan** - *Virginia Tech*

Pressure Measurement Using Surface Acoustic Wave Sensor on a Curved Shape of a Vessel

Technical Presentation Only:
SMASIS2023-110730

Masoud Naghdi - *University of North Texas,* **Sreejith V.S.** - *University of North Texas,* **Muhammad Aslam** - *University of North Texas,* **Mitali Hardik Desai** - *University of North Texas,* **Shuai Ju** - *University of North Texas,* **Haifeng Zhang** - *University of North Texas*

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dovers Room

04-09: SMA Enabled Smart Structures

Chair: **Paul Motzki** - *Saarland University*
Co-Chair: **Darren Hartl** - *Texas A&M University*

Adaptive Aerodynamic Structure Based on Antagonistic Shape Memory Alloy Wire Actuators

Technical Paper Publication:
SMASIS2023-111227

Philipp Göddel - *Saarland University,* **Rouven Britz** - *Saarland University,* **Paul Motzki** - *Saarland University*

Simulation of Shape Memory Alloy-Actuated Adaptive Thermal Control Systems in Space Environments

Technical Presentation Only:
SMASIS2023-111116

Collette Gillaspie - *Texas A&M University,* **Darren Hartl** - *Texas A&M University*

Investigation of the Thermal Heat Exchange Between NiTi-Wire Bundles and Airflow for Different Wire Arrangements

Technical Paper Publication:
SMASIS2023-111395
Felix Welsch - *ZeMA - Center for Mechatronics and Automation Technology,* **Susanne-Marie Kirsch -** *ZeMA - Center for Mechatronics and Automation Technology,* **Franziska Louia** - *Intelligent Material Systems Lab,* **Stefan Seelecke** - *Intelligent Material Systems Lab,* **Paul Motzki** - *ZeMA - Center for Mechatronics and Automation Technology*

Systematic Thermo-Mechanical Validation of Numerous Tensile-Loaded NiTi Wire Bundles Used for Elastocaloric Heating and Cooling

Technical Paper Publication:
SMASIS2023-110889

Susanne-Marie Kirsch - *iMSL ZeMA,* **Felix Welsch** - *ZeMA,* **Lukas Ehl** - *iMSL ZeMA,* **Franziska Louia** - *iMSL ZeMA,* **Stefan Seelecke** - *Saarland University,* **Paul Motzki** - *ZeMA, Saarland University*

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Robertson Room

06-08: Bioinspired Networks and Neurons

Chair: **Joseph Najem** - *The Pennsylvania State University*
Co-Chair**: Stephen A. Sarles -** *The University of Tennessee*

Synaptic Plasticity in Electroosmosis-Driven Geopolymer Memristors **Technical Presentation Only:** SMASIS2023-110619 **Mahmudul Alam Shakib** - *University of Iowa,* **Zhaolin Gao** - *The University of Iowa,* **Caterina Lamuta** - *The University of Iowa*	**Brain-Inspired Biomolecular Networks for Adaptive Sensing and Reservoir Computing** **Technical Presentation Only:** SMASIS2023-110904 *Joshua Maraj - The University of Tennessee,* **Stephen A. Sarles -** *The University of Tennesee*	**Memory in Droplets: Retaining Voltage Signals in Biologically-Inspired Droplet Networks** **Technical Presentation Only:** SMASIS2023-111131 **Braydon Segars** - *University of Georgia,* **Eric Freeman** - *University of Georgia*	**Optimization of Biomolecular Neuristor Action Potentials to Mimic Biological Response** **Technical Paper Publication:** SMASIS2023-111189 **Jason P. Lord** - *The Pennsylvania State University,* **Ahmed Mohamed** - *The Pennsylvania State University,* **Md Sakib Hasan** - *University of Mississippi,* **Joseph S. Najem** - *The Pennsylvania State University* **Herschel C. Pangborn** - *The Pennsylvania State University*

WEDNESDAY, SEPTEMBER 13 - 9:10AM–10:30AM			
9:10AM	**9:30AM**	**9:50AM**	**10:10AM**

Dezavala Room

07-04: Electromagnetic Energy Harvesting

Chair: **Chung Ket Thein** - *University of Nottingham Ningbo China*
Co-Chair: **Lihua Tang** - *University of Auckland*

Design Optimisation of a Planar Electromagnetic Energy Harvester Suitable for Low Frequency Vibrations **Technical Paper Publication:** SMASIS2023-110988 **Nouman Ghafoor** - *University of Limerick,* **Jeff Punch** - *University of Limerick,* **Valeria Nico** - *University of Limerick*	**A Multi-Directional Low-Frequency Electromagnetic Energy Harvester** **Technical Paper Publication:** SMASIS2023-113439 **Nok Yin Christie Law** - *The University of Auckland,* **Lihua Tang** - *The University of Auckland*	**On the Resonance/Bandwidth-Coupling Relationship of Electromagnetic Vibration Energy Harvester With a Non-Varying Magnetic Flux Density** **Technical Paper Publication:** SMASIS2023-111515 **Tunde Isaiah Toluwaloju** - *University of Nottingham Ningbo China,* **Chung Ket Thein** - *University of Nottingham Ningbo China, Dunant Halim - University of Nottingham Ningbo China*	**On the Resonance/Bandwidth-Coupling Relationship of Electromagnetic Vibration Energy Harvester With a Non-Varying Magnetic Flux Density** **Technical Paper Publication:** SMASIS2023-111515 **Tunde Isaiah Toluwaloju** - *University of Nottingham Ningbo China,* **Chung Ket Thein** - *University of Nottingham Ningbo China,* **Dunant Halim** - *University of Nottingham Ningbo China*

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Phoenix Ballroom North

01-09: Magnetic Materials

Chair: **Mikhail Shamonin** - *Ostbayerische Technische Hochschule Regensburg*
Co-Chair: **Joy Morin** - *Boise State University*

Magnetostrictive Properties of Magnetoactive Elastomeric Cylinders

Technical Presentation Only:
SMASIS2023-110855

Gašper Glavan - *Ostbayerische Technische Hochschule Regensburg,* **Inna Belyaeva** - *Ostbayerische Technische Hochschule Regensburg, Mikhail Shamonin - Ostbayerische Technische Hochschule Regensburg*

Nanosynthesis of Terfenol-D Enabled by High Energy Ball Milling

Technical Paper Publication:
SMASIS2023-111048

Joy Morin - *Boise State University,* **Zhangxian Deng** - *Boise State University*

Characterization of Wetting Properties of Magnetoactive Elastomer Surfaces

Technical Paper Publication:
SMASIS2023-110998

Raphael Kriegl - *Ostbayerische Technische Hochschule Regensburg,* **Gaia Kravanja** - *University of Ljubljana,* **Luka Hribar** - *University of Ljubljana,* **Matija Jezeršek** - *University of Ljubljana,* **Irena Drevenšek-Olenik** - *University of Ljubljana and J. Stefan Institute,* **Mikhail Shamonin** - *Ostbayerische Technische Hochschule Regensburg*

Morphing Carbon Fiber Reinforced Composite Coated With Magnetic Alginate Spheres

Technical Paper Publication:
SMASIS2023-111175

Luis Alexandrino - *University of Rome, RomaTre,* **Alessandro Porrari** - *University of Rome, RomaTre,* **Stefania Fontanella** - *University of Rome, RomaTre,* **Giulia Lanzara** - *University of Rome, RomaTre*

WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Austin Room

02-09: Mechanics of Composites, Films, and Graded Materials

Chair: **Oliver Myers** - *Clemson University*
Co-Chair: **Cody Gonzales** - *The University of Texas at San Antonio*

Prediction of Load in a Bistable CFRP Laminate Undergoing Fatigue Loading Using Machine Learning **Technical Presentation Only:** SMASIS2023-110752 **Shoab Ahmed Chowdhury** - *Clemson University,* **Christopher Nelon** - *Clemson University,* **Suyi Li** - *Virginia Polytechnic Institute and State University,* **Oliver Myers** - *Clemson University*	**Non-Hookean Scale-Dependent Mechanical Properties in Rippled Films** **Technical Presentation Only:** SMASIS2023-112865 **Jian Zhou** - *Argonne National Laboratory,* **Nicolaie Moldovan** - *Argonne National Laboratory,* **Liliana Stan** - *Argonne National Laboratory,* **Jianguo Wen** - *Argonne National Laboratory,* **Dafei Jin** - *Argonne National Laboratory,* **Daniel López** - *The Pennsylvania State University,* **David Czaplewski** - *Argonne National Laboratory*	**Non-Hookean Scale-Dependent Mechanical Properties in Rippled Films** **Technical Presentation Only:** SMASIS2023-112865 **Jian Zhou** - *Argonne National Laboratory,* **Nicolaie Moldovan** - *Argonne National Laboratory,* **Liliana Stan** - *Argonne National Laboratory,* **Jianguo Wen** - *Argonne National Laboratory,* **Dafei Jin** - *Argonne National Laboratory,* **Daniel López** - *The Pennsylvania State University,* **David Czaplewski** - *Argonne National Laboratory*	

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dewitt Room

03-09: Machine Language for Dynamic Systems

Chair: **Amin Joodaky** - *Michigan State University*
Co-Chair: **Sriram Malladi** - *Michigan Tech University*

Design of Multifunctional Mechano-Luminescence-Optoelectronic Composite Using Machine Learning and Multiphysics Material Characterization

Technical Presentation Only:
SMASIS2023-109635

Donghyeon Ryu - *New Mexico Tech,* **Alfred Mongare** - *New Mexico Tech,* **George Hoover** - *New Mexico Tech,* **Andy Huang** - *Sandia National Laboratories*

Data-Driven Estimation of Bandgap Frequencies in Metastructures for Elastic Wave Absorption

Technical Paper Publication:
SMASIS2023-112598

Hrishikesh Gosavi - *Michigan Technological University,* **Vijaya V.N. Sriram Malladi** - *Michigan Technological University*

Buckling Strength Prediction of Thin Plates With Cutouts Using Machine Learning

Technical Presentation Only:
SMASIS2023-114737

Amin Joodaky - *Michigan State University,* **Khadijeh Shirzad** - *Michigan State University*

Estimation of Stress State in an Axially Loaded Beam Using Modal Data

Technical Paper Publication:
SMASIS2023-113529

Hrishikesh Gosavi - *Michigan Technological University,* **Vijaya V.N. Sriram Malladi** - *Michigan Technological University*

WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Dovers Room

04-10: SMA Mechanisms

Chair: **Darren Hartl** - *Texas A&M University*
Co-Chair: **Kenny Pagel** - *Fraunhofer Institute for Machine Tools and Forming Technology*

An Embedded System for Data-Based Self-Sensing in Shape Memory Alloy Wire Actuators

Technical Paper Publication:
SMASIS2023-110385

Krunal Jagdishbhai Koshiya - *Center for Mechatronics and Automation Technology, ZeMA GmbH,* **Gianluca Rizzello** - *Saarland University,* **Paul Motzki** - *Center for Mechatronics and Automation Technology, ZeMA GmbH*

SMA Micro-Wire Bundle With High Cyclic Actuation Frequency

Technical Paper Publication:
SMASIS2023-110997

Susanne-Marie Kirsch - *Saarland University,* **Felix Welsch** - *ZeMA,* **Stefan Seelecke** - *Saarland University,* **Paul Motzki** - *Saarland University*

Technology Demonstrator Platform for Fast-Switching Decoupled Antagonistic SMA Actuators

Technical Paper Publication:
SMASIS2023-111249

Tom Gorges - *ZeMA - Center for Mechatronics and Automation Technolog\,* **Philipp Molitor** - *ZeMA - Center for Mechatronics and Automation Technology,* **Rouven Britz** - *ZeMA - Center for Mechatronics and Automation Technology,* **Yannik Goergen** - *ZeMA - Center for Mechatronics and Automation Technology,* **Paul Motzki** - *ZeMA - Center for Mechatronics and Automation Technology*

Fully Integrated Rotary Motor Based on Antagonistic Shape Memory Alloy Wire Bundles

Technical Paper Publication:
SMASIS2023-111255

Carmelo Pirritano - *Saarland University,* **Tom Gorges** - *ZeMA - Center for Mechatronics and Automation Technology,* **Rouven Britz** - *Saarland University,* **Dominik Scholtes** - *ZeMA - Center for Mechatronics and Automation Technology,* **Lukas Zimmer** - *ZeMA - Center for Mechatronics and Automation Technology,* **Jens Preetz** - *mateligent GmbH,* **Yannik Goergen** - *ZeMA - Center for Mechatronics and Automation Technology,* **Paul Motzki** - *Saarland University*

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WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
10:50AM	**11:10AM**	**11:30AM**	**11:50AM**

Robertson Room

06-09: Bioinspired Systems

Chair: Vanessa **Restrepo Perez** - *Texas A&M University*
Co-Chair: **Stephen A. Sarles** - *The University of Tennessee*

Understanding the Role of Diblock-Copolymer Molecular Structure on Osmotically-Actuated, Compartmentalized Tissues

Technical Presentation Only:
SMASIS2023-110640

McKayla Torbett - *The University of Tennessee,* **Isabella Macher** - *University of Tennessee,* **Andy Sarles** - *The University of Tennessee*

Bio-Ionic Transistors for the Study of Cellular Bioelectric Attributes

Technical Presentation Only:
SMASIS2023-118882

Reza Montazami - *Iowa State University,* **Nicole Hashemi** - *Iowa State University*

WEDNESDAY, SEPTEMBER 13 - 10:50AM–12:10PM			
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Dezavala Room

05-05: Smart Sensors

Chair: **Daewon Kim** - *Embry-Riddle Aeronautical University*
Co-Chair: **Shahrzad Towfighian** - *Binghamton University*
Co-Chair: **Steven Anton** - *Tennessee Tech University*

Smart Materials and Devices for Sensing and Degradation of Toxic Gases

Invited Speaker Presentation:
SMASIS2023-117727

Tanya Hutter - *The University of Texas at Austin*

Additive Manufacturing of Photocurable PVDF-Based Capacitive Sensor

Technical Paper Publication:
SMASIS2023-111151

Rishikesh Srinivasaraghavan Govindarajan - *Embry-Riddle Aeronautical University,* **Zefu Ren** - *Embry-Riddle Aeronautical University,* **Foram Madiyar** - *Embry-Riddle Aeronautical University,* **Daewon Kim** - *Embry-Riddle Aeronautical University*

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Austin Room

02-10: Design, Modeling, and Behavior of Functional and Shape Memory Materials and Composites

Chair: **Mikhail Shamonin** - *Ostbayerische Technische Hochschule Regensburg*
Co-Chair: **Paris von Lockette** - *The Pennsylvania State University*

Design Approach to Particulate-Based Multifunctional Polymer Composite Materials

Technical Paper Publication:
SMASIS2023-111901

Robin Collet - *University of California, Riverside*, **Christopher S. Lynch** - *University of California, Riverside*

Multifractal Behavior and Material Complexity in Functional Materials

Technical Presentation Only:
SMASIS2023-111183

Mario Carvajal - *Florida A&M-Florida State University*, **Basanta Pahari** - *Florida A&M-Florida State University*, **William Oates** - *Florida A&M--Florida State University*

The Influence of Substitutional Elements in Hysteresis Reduction and Thermo-Mechanical Stability of Shape Memory Alloys

Technical Presentation Only:
SMASIS2023-112318

Andre Montagnoli - *University of North Texas*, **Douglas Nicholson** - *The Boeing Company*, **F. Tad Calkins** - *The Boeing Company*, **Marcus Young** - *University of North Texas*, **Jan Frenzel** - *Ruhr University*

WEDNESDAY, SEPTEMBER 13 - 1:40PM–3:00PM			
1:40PM	2:00PM	2:20PM	2:40PM

Dovers Room

04-11: Multifunctional Electrical Structures

Chair: **Jayant Sirohi** - *The University of Texas at Austin*
Co-Chair: **Johannes Riemenschneider** - *German Aerospace Center*
Co-Chair: **James Gibert** - *Purdue University*

Annealed Pyrolytic Graphitic Carbon Electrodes for Piezoelectric Acoustic Nanoweb

Technical Paper Publication:
SMASIS2023-111178

Krishna Chytanya Chinnam - *University of Rome, RomaTre,* **Seyed Sepehr Moeini** - *University of Rome, RomaTre,* **Simonetta Tuti** - *University of Rome, RomaTre,* **Giulia Lanzara** - *University of Rome, RomaTre*

Polymeric Ionic Electrolytes vs. Liquid Ionic Electrolytes in Thin-Film Supercapacitors Integrated in Highly Complex Aerospace Structures

Technical Paper Publication:
SMASIS2023-111184

Sebastian Geier - *German Aerospace Center,* **Jan Petersen** - *German Aerospace Center,* **Christian Krasmann** - *German Aerospace Center,* **Apurba Ray** - *German Aerospace Center,* **Bilge Saruhan** - *German Aerospace Center*

An Integrated Audio-Tactile Interface Based on Dielectric Elastomer Actuators for User Interaction

Technical Paper Publication:
SMASIS2023-111228

Sebastian Gratz-Kelly - *ZeMA - Center for Mechatronics and Automation Technology,* **Benedikt Holz** - *Saarland University,* **Tim Krüger** - *ZeMA,* **Stefan Seelecke** - *Saarland University,* **Gianluca Rizzello** - *Saarland University,* **Paul Motzki** - *Saarland University,* **Giacomo Moretti** - *University of Trento*

Technical Sessions

WEDNESDAY, SEPTEMBER 13 - 1:40PM–3:00PM			
1:40PM	**2:00PM**	**2:20PM**	**2:40PM**

Dezavala Room

06-10: Biomedical Applications

Chair: **Steven Anton** - *Tennessee Tech University*
Co-Chair: **Emily Duan** - *North Carolina State University*

Simulation and Parametric Analysis of Transducer Locations in a Realistic, Compartmental Force Sensing Total Knee Replacement

Technical Paper Publication:
SMASIS2023-111029

Brandon Hines - *Tennessee Tech University,* **Steven Anton** - *Tennessee Technological University*

Metal-Organic Framework-Based Platform Technology for Bioinspired Smart Textiles

Technical Presentation Only:
SMASIS2023-119103

Reza Montazami - *Iowa State University,* **Nursultan Turdakyn** - *Iowa State University*

Efforts to Standardize Uniaxial Tensile Testing of Well-Preserved Human Tissue

Technical Paper Publication:
SMASIS2023-111396

Miguel Angel Fuentes Garcia - *Tennessee Technological University,* **Abigail Wohlfert** - *Alma College,* **Jennifer Vranish** - *Alma College,* **Steven Anton** - *Tennessee Technological University*

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Ahuja	Avik	111179	Characterization of Shape Memory Alloys for Smart Composites Under Different Environmental Conditions Using an In-Situ Thermal Chamber	06-04: Bioinspired Smart Composites	9/12/2023 9:10AM–10:30AM	Robertson Room
Ameli	Amir	111208	In Situ Foam 3-D Printing of Carbon Nanotube/ Thermoplastic Polyurethane Nanocomposites	01-05: Functional Printing	9/12/2023 10:50AM–12:10PM	Magnolia Room
Andrews	Michaela	109978	Characterization of Shape Memory Polymer Yarns With Few Filaments for Force Generation	02-07: Smart Material Actuators and Their Applications	9/12/2023 3:30PM–4:50PM	Austin Room
Arrieta	Andres	119396	Multistable Soft Robotics for Force Modulation and Programmed Dynamics	04-02: Multistable Structures	9/11/2023 10:50AM–12:10PM	Dovers Room
Arrieta	Andres	119404	Aeroelastic Investigation of Spanwise Morphing Wings From Multistable Honeycombs	04-05: Aerospace Applications	9/12/2023 9:10AM–10:30AM	Dovers Room
Beals	Matt	112997	Acoustic Meta-Structure Transmission Loss Characterization via an Impedance Tube and the Transfer Matrix Approach	03-07: Advanced Manufacturing and Characterization	9/12/2023 3:30PM–4:50PM	Dewitt Room
Benafan	Othmane	110624	Shape Memory Materials Analysis and Research Tool (SM2ART) Database: Comparing Legacy Data to New Experimental and Computational Data	02-02: Shape Memory Alloy Actuator Material and Characterization Standards	9/11/2023 10:50AM–12:10PM	Austin Room
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Berselli	Giovanni	110461	Conceptual Design of a Compliant Low-Cost Prosthetic Hand	03-03: Compliant Structures and Mechanisms	9/11/2023 1:40PM–3:00PM	Dewitt Room
Berselli	Giovanni	111684	Fabrication of Parallel Compliant Mechanisms via Additive Manufacturing	03-07: Advanced Manufacturing and Characterization	9/12/2023 3:30PM–4:50PM	Dewitt Room
Bielefeldt	Brent	111067	Development and Validation of a Multiscale Topology Optimization Framework Using Material Property Feasibility Constraints	04-04: Structural Design and Optimization	9/11/2023 3:30PM–4:50PM	Dovers Room
Bigelow	Glen	110692	Validation of Smanalytics: Comparison of Automatic and Human Analyzed Shape Memory Alloy Test Data	01-06: Shape Memory Alloy	9/12/2023 1:40PM–3:00PM	Magnolia Room

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Bolmin	Ophelia	110621	Interlocking Metasurfaces: A Joining Technology for Adaptive Structures	03-07: Advanced Manufacturing and Characterization	9/12/2023 3:30PM–4:50PM	Dewitt Room
Boom	Bart	109800	Water Entry Dynamics of Avian Inspired Divers	06-07: Materials and Structures for Bio-inspired Robotics	9/12/2023 3:30PM–4:50PM	Robertson Room
Borden	Yan	112125	A Hybrid Piezoelectric-Hydraulic Actuator Model and Prototype With Large Stroke and Force Parameters	04-07: Novel Actuators	9/12/2023 1:40PM–3:00PM	Dovers Room
Bruch	Daniel	111273	Demonstrator for Linear Dielectric Elatomer Actuator Systems Coupled to Compliant Joint Linkage Transmission Mechanisms	04-07: Novel Actuators	9/12/2023 1:40PM–3:00PM	Dovers Room
Cai	Bowen	110811	Development of a Laser Vibrometer-Based Shear Wave Sensing System for Characterizing Mechanical Properties of Viscoelastic Materials	05-01: Biosensing	9/11/2023 9:10AM–10:30AM	Dezavala Room
Calkins	Frederick	111216	Shape Memory Alloy Actuated Vortex Generators: Development and Flight Test	02-03: Design and Application of Shape Memory Alloy Rotary Actuators	9/11/2023 1:40PM–3:00PM	Austin Room
Caltagirone	Peter	110390	Shape Memory NiTiHf Machined Helical Springs: Balancing Displacement and Force Output for Actuation	02-01: Shape Memory Alloy Actuators	9/11/2023 9:10AM–10:30AM	Austin Room
Carvajal	Mario	111183	Multifractal Behavior and Material Complexity in Functional Materials	02-10: Design Modeling and Behavior of Functional and Shape Memory Materials and Composites	9/13/2023 1:40PM–3:00PM	Austin Room
Carvajal Loaiza	Manuel Jose	110495	Design and Development of Self-Adaptive Composite Materials With Temperature Induced Shape-Shifting Properties	06-04: Bioinspired Smart Composites	9/12/2023 9:10AM–10:30AM	Robertson Room
Cassagne	Adrien	111206	Effects of Oxidation and Plasticity on Transformation Temperatures in a High Temperature Shape Memory Alloy (HTSMA)	02-05: Mechanics and Behavior of Shape Memory Alloys	9/12/2023 10:50AM–12:10PM	Austin Room
Chahari	Mahmood	111152	Improving Durability of Triboelectric Energy Harvester for Load Monitoring in Total Knee Replacement	07-02: Energy Harvesting Sensing Monitoring	9/12/2023 9:10AM–10:30AM	Dezavala Room

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Chavan	Shantanu	112818	Programmable Bandgaps in Meta-Structures With Dynamic Vibration Resonators	01-10: Smart Structures	9/13/2023 1:40PM–3:00PM	Phoenix Ballroom North
Chavan	Yash Manik	113911	Dynamic Mode Decomposition Approach for Estimating the Shape of a Cable	03-08: Structural Dynamics and Monitoring	9/13/2023 9:10AM–10:30AM	Dewitt Room
Chipana	Aldo	110681	In Situ Actuation of Shape Memory Alloy Using Focused Ultrasound	04-08: SMA Applications	9/12/2023 3:30PM–4:50PM	Dovers Room
Chowdhury	Shoab Ahmed	110752	Prediction of Load in a Bistable CFRP Laminate Undergoing Fatigue Loading Using Machine Learning	02-09: Mechanics of Composites Films and Graded Materials	9/13/2023 10:50AM–12:10PM	Austin Room
Chowdhury	Puja	111009	Classifying Soil Saturation Levels Using a Network of UAV-Deployed Smart Penetrometers	05-02: Monitoring Civil Infrastructure	9/11/2023 1:40PM–3:00PM	Dezavala Room
Chytanya Chinnam	Krishna	111178	Annealed Pyrolytic Graphitic Carbon Electrodes for Piezoelectric Acoustic Nanoweb	04-11: Multifunctional Electrical Structures	9/13/2023 1:40PM–3:00PM	Dovers Room
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De Breuker	Roeland	114990	SmartX: Intelligent Wings Enabling More Sustainable Aviation	04-06: Morphing Aerospace Applications	9/12/2023 10:50AM–12:10PM	Dovers Room
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Febvre	Maryne	110216	Artificial Intelligence for Active Vibration Control Optimization on Smart Structures	04-01: Mechanics of Smart Structure Applications	9/11/2023 9:10AM–10:30AM	Dovers Room

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Geier	Sebastian	111184	Polymeric Ionic Electrolytes vs. Liquid Ionic Electrolytes in Thin-Film Supercapacitors Integrated in Highly Complex Aerospace Structures	04-11: Multifunctional Electrical Structures	9/13/2023 1:40PM–3:00PM	Dovers Room
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Ghazzawi	Sultan	111044	An Analytical Model for the Transverse Piezoresistive Response of Fiber-Reinforced Nano-Modified Polymers via an Electrical Concentric Cylinders Assemblage Approach	01-04: Fiber Composites	9/12/2023 9:10AM–10:30AM	Magnolia Room
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Gong	Ying	111091	On Phase Coupling of a Vortex-Induced Swing Sensor	07-02: Energy Harvesting Sensing Monitoring	9/12/2023 9:10AM–10:30AM	Dezavala Room
Gosavi	Hrishikesh	112598	Data-Driven Estimation of Bandgap Frequencies in Metastructures for Elastic Wave Absorption	03-09: Machine Language for Dynamic Systems	9/13/2023 10:50AM–12:10PM	Dewitt Room
Gosavi	Hrishikesh	113529	Estimation of Stress State in an Axially Loaded Beam Using Modal Data	03-09: Machine Language for Dynamic Systems	9/13/2023 10:50AM–12:10PM	Dewitt Room
Gothard	Andrew	110685	Indoor Impact Event Localization via Velocity and Energy Ratio Mapping Function in Dispersive Media	04-01: Mechanics of Smart Structure Applications	9/11/2023 9:10AM–10:30AM	Dovers Room

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Han	Youngshang	113183	Electrically Conductive EGain-Elastomer Composites for Printing Stretchable Circuits	01-02: Functional Soft Materials	9/11/2023 10:50AM–12:10PM	Magnolia Room
Hargrove	Brianne	109911	Modeling of a Nonlinear-Elastic Compliant Mechanism With Tension-Compression Asymmetry	03-04: Foldable Structures	9/12/2023 9:10AM–10:30AM	Dewitt Room
Hausherr	Ginevra	111166	An Innovative Multi-Layer System for Thermally Activated Switching Actions	04-07: Novel Actuators	9/12/2023 1:40PM–3:00PM	Dovers Room
He	Shan	111137	Prediction of Hydrodynamic Loads on a Flexible Bio-Inspired Underwater Propulsor Using Physical Reservoir Computing	06-02: Marine and Underwater Robotics	9/11/2023 10:50AM–12:10PM	Robertson Room
He	Ximin	118554	Bio-Like Soft Materials With Life-Like Intelligence	01-02: Functional Soft Materials	9/11/2023 10:50AM–12:10PM	Magnolia Room
Hess	Isabel	110945	Nebula: A Flexible Solid-State Swimming Robot Enabled by HASEL Actuators	06-02: Marine and Underwater Robotics	9/11/2023 10:50AM–12:10PM	Robertson Room
Hines	Brandon	111029	Simulation and Parametric Analysis of Transducer Locations in a Realistic Compartmental Force Sensing Total Knee Replacement	06-10: Biomedical Applications	9/13/2023 1:40PM–3:00PM	Dezavala Room
Hutter	Tanya	117727	Smart Materials and Devices for Sensing and Degradation of Toxic Gases	05-05: Smart Sensors	9/13/2023 10:50AM–12:10PM	Dezavala Room

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Ju	Shuai	111060	Resonant Suspended Beam Mechanism for Weight Measurement	03-02: Methods for Dynamics and Structural Analysis	9/11/2023 10:50AM–12:10PM	Dewitt Room
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Kirsch	Susanne-Marie	110889	Systematic Thermo-Mechanical Validation of Numerous Tensile-Loaded NiTi Wire Bundles Used for Elastocaloric Heating and Cooling	04-09: SMA Enabled Smart Structures	9/13/2023 9:10AM–10:30AM	Dovers Room
Kirsch	Susanne-Marie	110997	SMA Micro-Wire Bundle With High Cyclic Actuation Frequency	04-10: SMA Mechanisms	9/13/2023 10:50AM–12:10PM	Dovers Room
Koshiya	Krunal Jagdishbhai	110385	An Embedded System for Data-Based Self-Sensing in Shape Memory Alloy Wire Actuators	04-10: SMA Mechanisms	9/13/2023 10:50AM–12:10PM	Dovers Room
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Lacarbonara	Walter	111231	Spider-Web-Inspired Metamaterial Design and Experimental Validation	06-06: Bioinspired Structures	9/12/2023 1:40PM–3:00PM	Robertson Room
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Lieb	Kevin	111153	Simulation of Buckling Shape Memory Alloy Tubes Under Torsional Loading	02-03: Design and Application of Shape Memory Alloy Rotary Actuators	9/11/2023 1:40PM–3:00PM	Austin Room
Lilly	Jared	111011	High-Throughput Analysis and Morphing Design Space Decomposition for Mission-Adaptive Air Vehicles	04-06: Morphing Aerospace Applications	9/12/2023 10:50AM–12:10PM	Dovers Room
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Mabe	Olivia	112290	Passive Priming of Fluidic Artificial Muscles in Variable Recruitment	06-01: Artificial Muscle Actuators	9/11/2023 9:10AM–10:30AM	Robertson Room
Mahid	Nuhaadh Mohamed	110481	Parametric Studies of Flexible Sandwich Panels as a Compliant Fairing for Folding Wingtip Joints	03-03: Compliant Structures and Mechanisms	9/11/2023 1:40PM–3:00PM	Dewitt Room
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Martin	Katie A.	111035	Effect of Filament Color on the Development of Bistability In Switchable Bistable Squares	01-05: Functional Printing	9/12/2023 10:50AM–12:10PM	Magnolia Room
Martinez	Alejandro	111187	Design and Optimization of the Conformal Surface for an Adaptive Structure	03-06: Design and Optimization of Intelligent Structures	9/12/2023 1:40PM–3:00PM	Dewitt Room
Masmeijer	Thijs	111209	Investigating the Effects of Eccentricity on the Dynamics of Spider Webs	06-06: Bioinspired Structures	9/12/2023 1:40PM–3:00PM	Robertson Room
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Mehta	Ankur	118556	Materials to Makers	06-07: Materials and Structures for Bio-inspired Robotics	9/12/2023 3:30PM–4:50PM	Robertson Room
Mercurio	Umberto	117647	Wind Tunnel and Flight Demonstrations in AIRGREEN2	04-05: Aerospace Applications	9/12/2023 9:10AM–10:30AM	Dovers Room
Meyer	Andreas	111235	Hybrid Soft-Rigid Joint With Inherent Sensing and Actuation Capabilities Based on Rolled Dielectric Elastomers	06-06: Bioinspired Structures	9/12/2023 1:40PM–3:00PM	Robertson Room
Mhadgut	Deven	110423	Environmental Tests of a Parabolic Self-Deployable Tapespring Boom for CubeSat Applications	02-06: Applications of Advanced Materials in Aerospace Applications	9/12/2023 1:40PM–3:00PM	Austin Room
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Moreno	Hernan David	110732	3D Printed Flexible Gripper With Capacitance Sensing	04-03: End Effector Development	9/11/2023 1:40PM–3:00PM	Dovers Room
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Nizio	Priscilla	111003	Fabrication Experimentation and Characterization of a Shape Memory Alloy Driven Composite Morphing Radiator	01-06: Shape Memory Alloy	9/12/2023 1:40PM–3:00PM	Magnolia Room

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Phillips	Francis	110931	Active Gripper Development for Perching of Small Unmanned Aerial Systems	04-03: End Effector Development	9/11/2023 1:40PM–3:00PM	Dovers Room
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Pirritano	Carmelo	111255	Fully Integrated Rotary Motor Based on Antagonistic Shape Memory Alloy Wire Bundles	04-10: SMA Mechanisms	9/13/2023 10:50AM–12:10PM	Dovers Room
Porrari	Alessandro	111115	Self Healing of Fibre-Reinforced Delaminated Composites	01-09: Magnetic Materials	9/12/2023 3:30PM–4:50PM	Magnolia Room
Porrari	Alessandro	111175	Morphing Carbon Fiber Reinforced Composite Coated With Magnetic Alginate Spheres	01-10: Smart Structures	9/13/2023 1:40PM–3:00PM	Phoenix Ballroom North
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Quan	Xinhao	111410	Inertial Programming Through Heterogeneity	03-01: Emerging Techniques in Control and Programming	9/11/2023 9:10AM–10:30AM	Dewitt Room
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Rogers	William	110915	Directed Particle Motion Driven by Superimposed Two-Dimensional Traveling Waves	06-03 Bioinspired Vibrations and Waves	9/11/2023 1:40PM–3:00PM	Robertson Room
Rohewal	Sargun Singh	111197	A Recyclable Self-Healing Composite With Advanced Sensing Property	01-07: Multifunctional Composites	9/12/2023 3:30PM–4:50PM	Magnolia Room
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Toluwaloju	Tunde Isaiah	111515	On the Resonance/Bandwidth-Coupling Relationship of Electromagnetic Vibration Energy Harvester With a Non-Varying Magnetic Flux Density	07-04: Electromagnetic Energy Harvesting	9/13/2023 9:10AM–10:30AM	Dezavala Room
Torbett	McKayla	110640	Understanding the Role of Diblock-Copolymer Molecular Structure on Osmotically-Actuated Compartmentalized Tissues	06-09: Bioinspired Systems	9/13/2023 10:50AM–12:10PM	Robertson Room
Tsai	Samuel	111078	High Performance Hierarchical Supercoiled and Hypercoiled Muscles With Embedded Heating Wire	06-01: Artificial Muscle Actuators	9/11/2023 9:10AM–10:30AM	Robertson Room
Var	Sezer	111702	Design of a Soft Underwater Gripper With SMA Actuation	06-02: Marine and Underwater Robotics	9/11/2023 10:50AM–12:10PM	Robertson Room
Von Oertzen	Vincent	111143	Spatial and Temporal Homogenization of Phase-Field Equations With an Application to Iron-Based Shape Memory Alloy Modeling	02-08: Mechanics and Behavior of Magneto-Active Composites and Structures	9/13/2023 9:10AM–10:30AM	Austin Room
Walgren	Patrick	110742	Mechanics of Infilled Morphing Skins: Design Rules and Application to Twist-Morphing Wings	04-04: Structural Design and Optimization	9/11/2023 3:30PM–4:50PM	Dovers Room
Wang	Biao	110971	Vortex Intensification of a Triboelectric Nanogenerator Array for Water Energy Harvesting	07-02: Energy Harvesting Sensing Monitoring	9/12/2023 9:10AM–10:30AM	Dezavala Room
Ward	R. Mason	111248	Effectiveness of Shape Memory Alloy Golf Clubs in Enhancing Golfer Performance	02-04: Design and Application of Shape Memory Alloy Structures and Devices	9/12/2023 9:10AM–10:30AM	Austin Room
Weaver	Robin	111165	Performance of Self-Folding Shape Memory Polymer Origami	02-04: Design and Application of Shape Memory Alloy Structures and Devices	9/12/2023 9:10AM–10:30AM	Austin Room
Welsch	Felix	110858	Active Implant System Based on SMA Actuators for Improved Bone Facture Healing	04-08: SMA Applications	9/12/2023 3:30PM–4:50PM	Dovers Room
Welsch	Felix	111395	Investigation of the Thermal Heat Exchange Between NiTi-Wire Bundles and Airflow for Different Wire Arrangements	04-09: SMA Enabled Smart Structures	9/13/2023 9:10AM–10:30AM	Dovers Room

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Woo	Janghoon	111012	Soft Actuators From Flexible Auxetic Metamaterials and Shape Memory Alloys Springs	04-07: Novel Actuators	9/12/2023 1:40PM–3:00PM	Dovers Room
Wu	Hao	111090	The Performance Investigation of Triboelectric Nanogenerator Based on Flow Induced Vibration by Applying Bluff Bodies With Different Cross Sections	07-01: Flow-Induced Vibration Energy Harvesting	9/11/2023 10:50AM–12:10PM	Dezavala Room
Yavuz	Hande	110391	Flight Performance Evaluation of a Mini Drone by Revisiting Structural Design via Additive Manufacturing Technology	02-06: Applications of Advanced Materials in Aerospace Applications	9/12/2023 1:40PM–3:00PM	Austin Room
Yazbeck	Rawad	111065	Adaptive Bandgap Formation in a Periodic Tensegrity Structure	03-03: Compliant Structures and Mechanisms	9/11/2023 1:40PM–3:00PM	Dewitt Room
Zamarripa	Jessica	111014	Structurally Functional RC Filters Using Coupled Three-Dimensional Topology Optimization	04-04: Structural Design and Optimization	9/11/2023 3:30PM–4:50PM	Dovers Room
Zarepoor	Masoud	111072	Effect of Hysteresis on a Piezoelectric Inverted Beam Energy Harvester	07-03: Nonlinear Energy Harvesting	9/12/2023 1:40PM–3:00PM	Dezavala Room
Zeng	Siyuan	110975	An Experimental Investigation Into Design Parameters of 4D-Printed Actuators on Time-Depend Behavior	02-07: Smart Material Actuators and Their Applications	9/12/2023 3:30PM–4:50PM	Austin Room
Zhang	Yunlan	110907	Architected Material Analogs for Shape Memory Alloys	02-05: Mechanics and Behavior of Shape Memory Alloys	9/12/2023 10:50AM–12:10PM	Austin Room
Zhang	Haifeng	111038	Surface Acoustic Wave Sensors for Nondestructive Structural Monitoring of Nuclear Spent Fuel Canisters at Elevated Temperature	05-04: Wave-Based Sensing	9/12/2023 3:30PM–4:50PM	Dezavala Room
Zhang	Xinchang	117419	Smart Structural Materials With Embedded Fiber Optic Sensors for Health Monitoring in Harsh Environments	05-03: SHM and NDT	9/12/2023 10:50AM–12:10PM	Dezavala Room
Zhao	Qianyu	111412	Heterogeneous Nonlinear Stiffness Programming	03-01: Emerging Techniques in Control and Programming	9/11/2023 9:10AM–10:30AM	Dewitt Room
Zhong	Rui	111590	Effect of Multiple Combination Modes of Reactive Components on the Response of Electromagnetic Vibration Energy Harvester	07-04: Electromagnetic Energy Harvesting	9/13/2023 9:10AM–10:30AM	Dezavala Room
Zhou	Jian	112865	Non-Hookean Scale-Dependent Mechanical Properties in Rippled Films	02-09: Mechanics of Composites Films and Graded Materials	9/13/2023 10:50AM–12:10PM	Austin Room

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2	Mechanics & Behavior Active Materials	Chair Co-Chair Co-Chair	Paris Von Lockette Douglas Nicholson John Gallagher	Penn State University Boeing Merrimack College
3	Modeling, Simulation and Control of Adaptive Systems – Chairs need to be confirmed	Chair Co-Chair Co-Chair	Giovanni Berselli Abdessattar Abdelkefi Jeff Hill	University of Genoa New Mexico State University Brigham Young University
4	Integrated System Design and Implementation	Chair Co-Chair Co-Chair	Brent Utter Patrick Musgrave Farhan Gandhi	Lafayette College University of Florida Rensselaer Polytechnic Institute
5	Structural Health Monitoring	Chair Co-Chair Co-Chair	Daewon Kim Zhenhua Tian Sumit Gupta	Embry Riddle Aeronautical University Virginia Tech Oak Ridge National Laboratory
6	Bioinspired Smart Materials and Systems	Chair Co-Chair Co-Chair	Matthew Bryant Vanessa Restrepo Perez Caterina Lamuta	North Carolina State University Texas A&M University University of Iowa
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	Student Outreach	Chair Co-Chair	Patrick Walgren Hongcheng Tao	AFRL Purdue University
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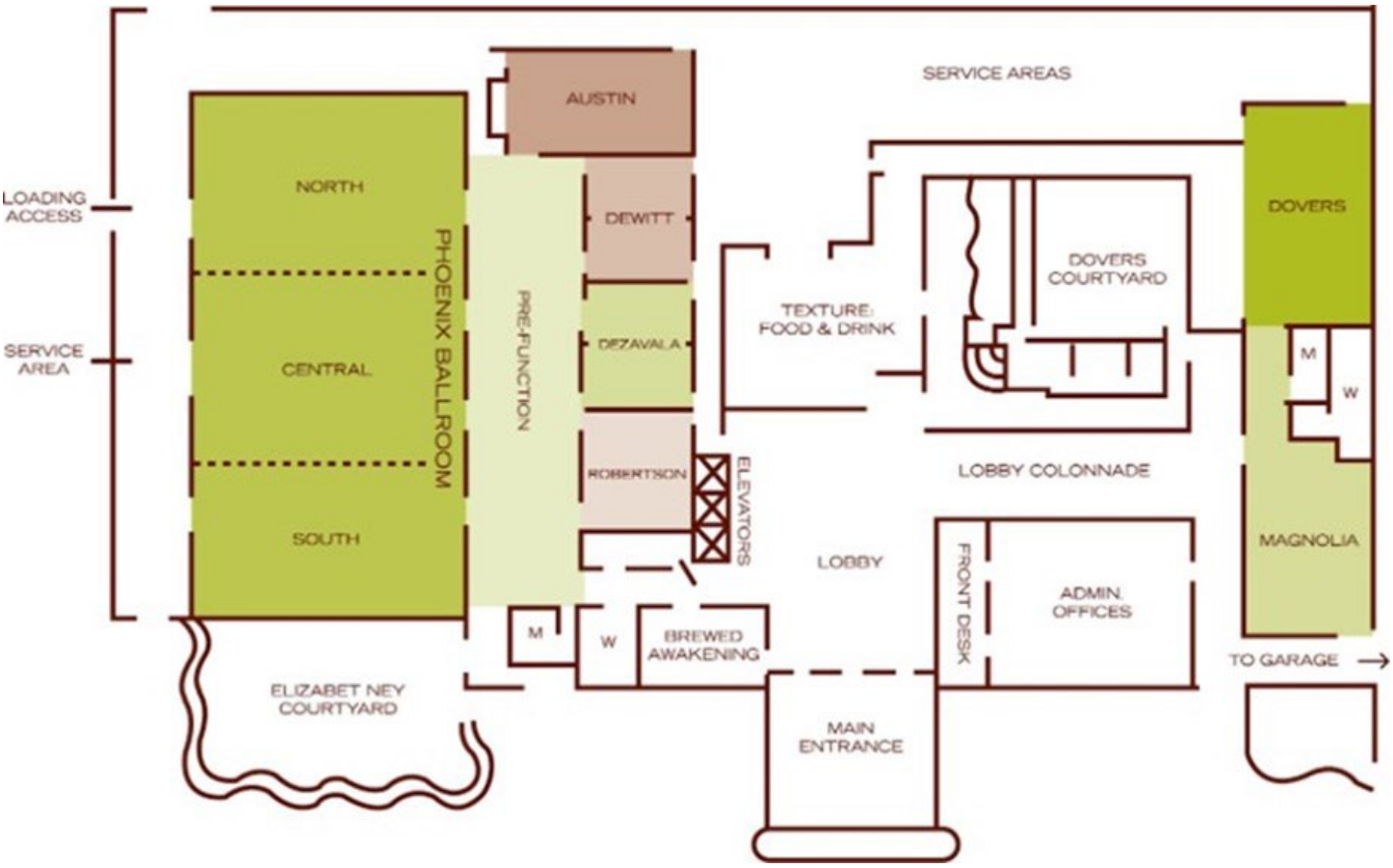

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