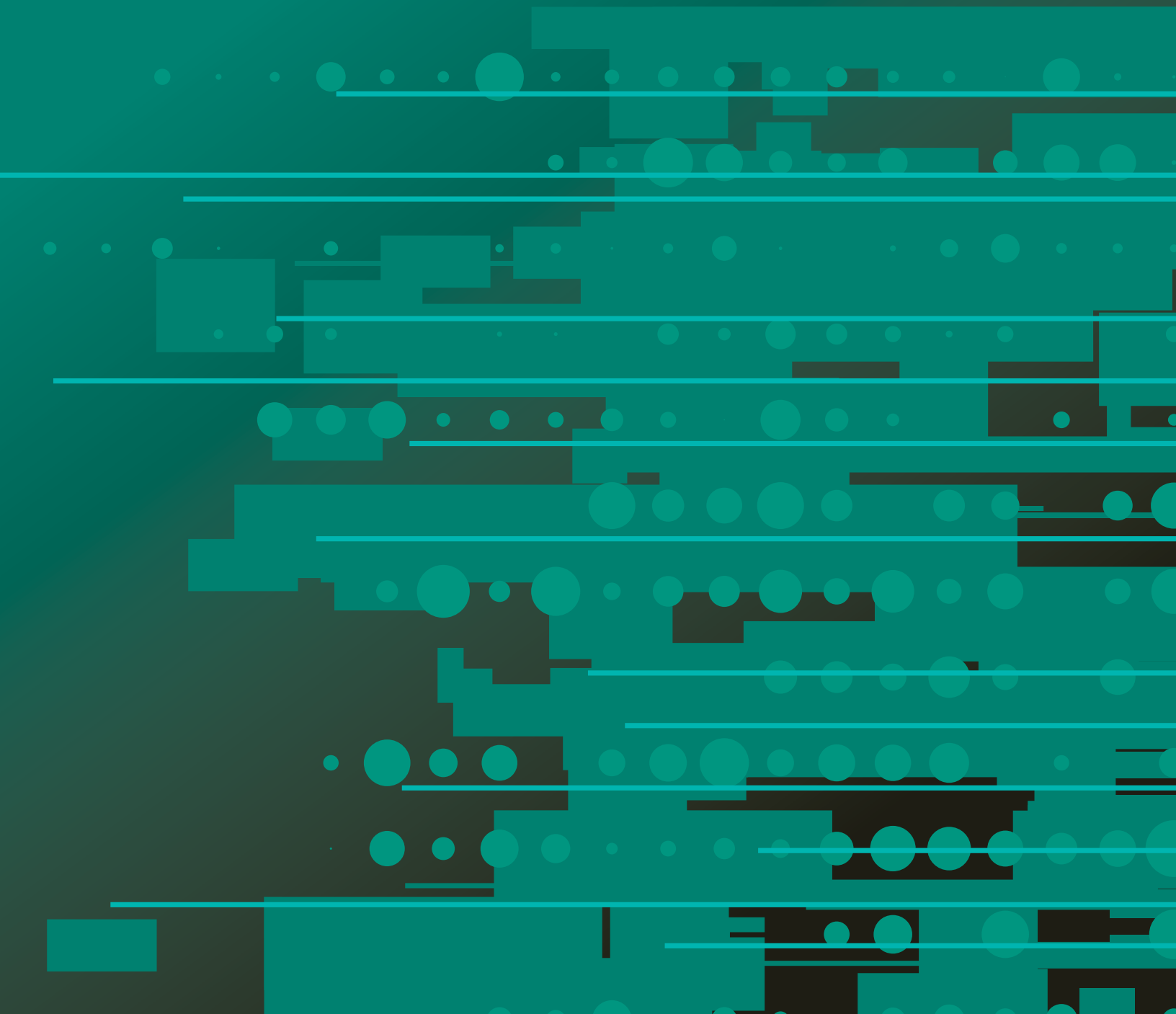
TECHNICAL PROGRAM

SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

25–28 MARCH 2024 | HILTON LONG BEACH HOTEL | LONG BEACH, CALIFORNIA, USA



TECHNICAL PROGRAM

SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION

THE MEETING FOR ADVANCED MATERIALS AND SENSOR SYSTEMS

Cutting-Edge Research

Close-Knit Community

25–28 March 2024
Hilton Long Beach Hotel
Long Beach, California, USA

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SPIE.

SPIE is the international society for optics and photonics. We bring together engineers, scientists, students, and industry leaders, strengthening the global optics and photonics community through conferences, publications, and professional development. Inspired by the transformative power of photonics to enhance life around the globe, over the past five years SPIE has contributed more than $24 million to the international optics community.

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The Univ. of Texas at Arlington (USA)

Hani Naguib
Univ. of Toronto (Canada)

SYMPOSIUM CO-CHAIRS

Asha J. Hall
DEVCOM Army Research Lab. (USA)

Jae-Hung Han
KAIST (Republic of Korea)

CONFERENCE 12944

Bioinspiration, Biomimetics, and Bioreplication XIV

Conference Chair: **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

Conference Co-Chairs: **Mato Knez,** CIC nanoGUNE Consolider (Spain); **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (USA)

CONFERENCE 12945

Electroactive Polymer Actuators and Devices (EAPAD) XXVI

Conference Chair: **John D. W. Madden,** The Univ. of British Columbia (Canada)

Conference Co-Chairs: **Stefan S. Seelecke,** Saarland Univ. (Germany); **Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

CONFERENCE 12946

Active and Passive Smart Structures and Integrated Systems XVIII

Conference Chair: **Serife Tol,** Univ. of Michigan (USA)

Conference Co-Chairs: **Guoliang Huang,** Univ. of Missouri (USA); **Xiaopeng Li,** Toyota Research Institute, North America (USA); **Mostafa A. Nouh,** Univ. at Buffalo (USA); **Shima Shahab,** Virginia Polytechnic Institute and State Univ. (USA); **Jinkyu Yang,** Univ. of Washington (USA)

CONFERENCE 12947

Behavior and Mechanics of Multifunctional Materials XVIII

Conference Chair: **Aimy Wissa,** Princeton Univ. (USA)

Conference Co-Chairs: **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (USA); **Russell W. Mailen,** Auburn Univ. (USA)

CONFERENCE 12948

Soft Mechatronics and Wearable Systems

Conference Chair: **Ilkwon Oh,** KAIST (Republic of Korea)

Conference Co-Chairs: **Sang-Woo Kim,** Yonsei Univ. (Republic of Korea); **Maurizio Porfiri,** NYU Tandon School of Engineering (USA); **Woon-Hong Yeo,** Georgia Institute of Technology (USA)

CONFERENCE 12949

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024

Conference Chair: **Branko Glisic,** Princeton Univ. (USA)

Conference Co-Chairs: **Maria Pina Limongelli,** Politecnico di Milano (Italy); **Ching Tai Ng,** The Univ. of Adelaide (Australia)

CONFERENCE 12950

Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII

Conference Chair: **Andrew L. Gyekenyesi,** Ohio Aerospace Institute (USA)

Conference Co-Chairs: **Peter J. Shull,** The Pennsylvania State Univ. (USA); **H. Felix Wu,** U.S. Dept. of Energy (USA); **Tzuyang Yu,** Univ. of Massachusetts Lowell (USA)

CONFERENCE 12951

Health Monitoring of Structural and Biological Systems XVIII

Conference Chair: **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Conference Co-Chairs: **Kara J. Peters,** North Carolina State Univ. (USA); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy); **Piervincenzo Rizzo,** Univ. of Pittsburgh (USA)

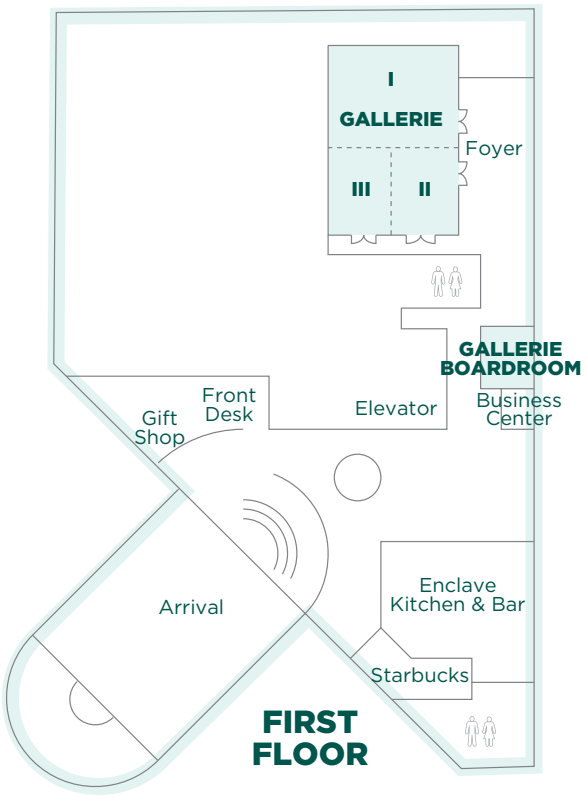
CONFERENCE 12952

NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II

Conference Chair: **Christopher Niezrecki,** Univ. of Massachusetts Lowell (USA)

Conference Co-Chairs: **Saman Farhangdoust,** Stanford Univ. (USA); **Norbert G. Meyendorf,** Fraunhofer IKTS (Germany), Univ. of Dayton (United States)

HILTON LONG BEACH HOTEL



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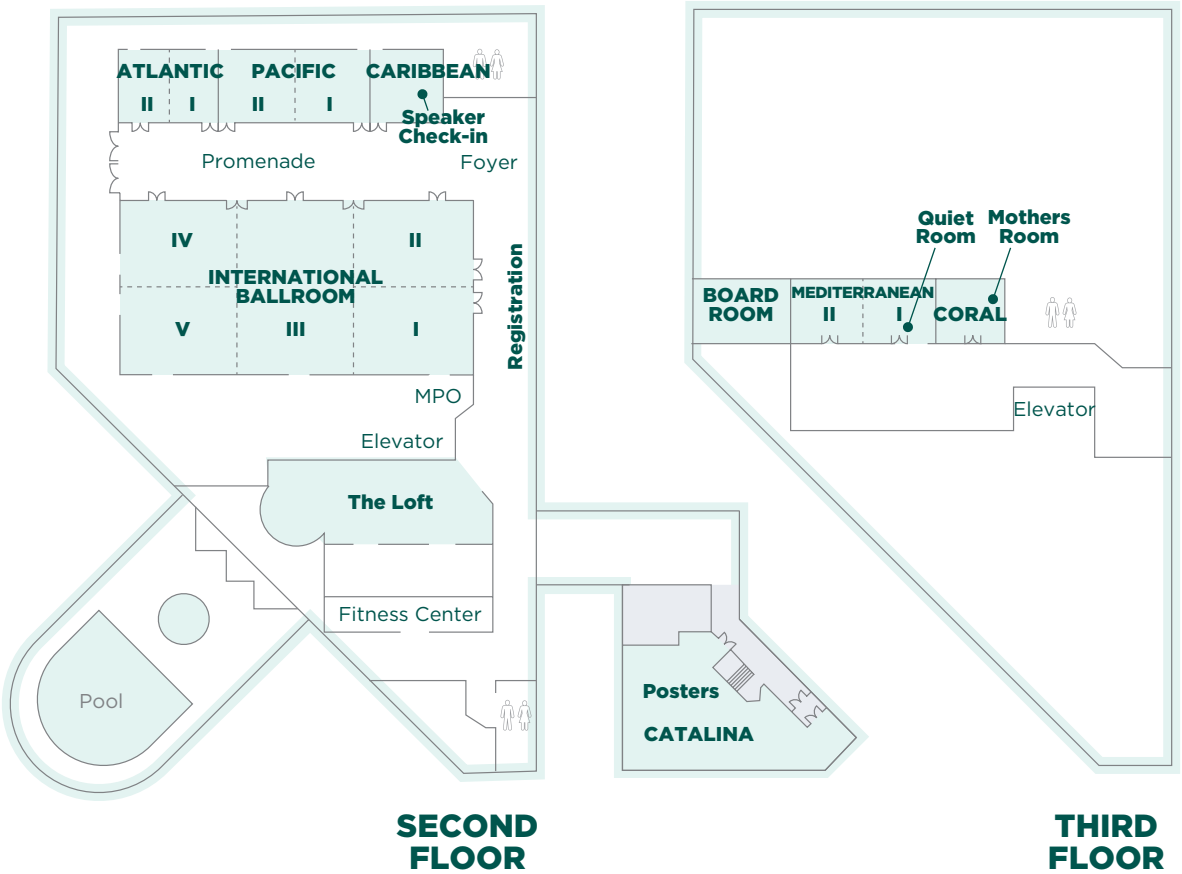


PLENARY PRESENTATIONS

Smart Structures + NDE plenary sessions feature presentations from a wide range of leaders in the field, with focus on developing research and visions of the future of sensors and materials technologies..

Monday Plenary

25 March 2024 • 8:15 AM–10:00 AM
Hilton, International Ballroom III (2nd Floor)

Session Chairs: **Hani Naguib,** Univ. of Toronto (Canada) and **Asha Hall,** DEVCOM Army Research Lab. (USA)

8:15 AM–8:20 AM:

Welcome and opening remarks

8:20 AM–8:30 AM:

2024 SSM Lifetime Achievement Award presented to:
Steven F. Griffin, Boeing LTS Inc. (USA)

2024 NDE Lifetime Achievement Award presented to:
Michael D. Todd, Univ. of California, San Diego (USA)

8:30 AM–9:15 AM:

Acoustic and mechanical metamaterials for energy and sensing applications and beyond

Miso Kim
Sungkyunkwan Univ. (Republic of Korea)

Metamaterials are artificially engineered structures that can exhibit unconventional properties not easily observed in nature. These unique architectures offer a robust platform for manipulating acoustic or elastic wave properties for energy localization and focusing, thus broadening their potential applications in energy harvesting and sensing. This talk will provide a comprehensive overview of the latest breakthroughs in the design of phononic crystals and acoustic metamaterials.

9:15 AM–10:00 AM:

Soft actuators for wearable robotics

Herbert Shea
Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Fabric-based exosuits, for VR body haptics or to generate muscular assistance, require compliant, efficient, fast, lightweight yet high-force actuators. Much prior work has focused on pneumatic principles, an effective solution, but that needs an external pump or compressor. Shea will present several electrically-driven fiber-format flexible actuators developed in his lab. He will also report on fiber-shaped electrostatic sliding stepper motors, 4 mm in diameter, that serve as long thin muscles to power gloves for VR and back-support exoskeletons. He will discuss open challenges and opportunities in making active wearables.

Tuesday Plenary

26 March 2024 • 8:15 AM–10:00 AM
Hilton, International Ballroom III (2nd Floor)

Session Chairs: **Asha Hall,** DEVCOM Army Research Lab. (USA) and **Jae-Hung Han,** KAIST (Republic of Korea)

8:15 AM–8:30 AM:

Welcome and opening remarks

SPIE Fellow recognition:

Mohammad Elahinia, The Univ. of Toledo (USA)
Jae-Hung Han, KAIST (Republic of Korea)
Oliver Myers, Clemson Univ. (USA)

8:30 AM–9:15 AM:

Acoustic-optical interactions in fibers for ultrasonic inspection of structures

Kara Peters
North Carolina State Univ. (USA)

Optical fibers are one example of waveguides that can transmit multi-modal information. This information can be encoded in different optical modes in a multi-mode fiber or in different types of modes. For example, optical fibers have also recently been demonstrated to be excellent waveguide for acoustic modes. This means that sensing does not have to be performed at the location that the optical fiber is bonded to the structure, but instead Lamb waves can be converted into propagating acoustic modes in optical fibers. These modes can be transmitted to different sensor locations within the optical fiber. This presentation discusses the physical characteristics of these optical fiber acoustic modes and their use to increase the signal to noise ratio of the collection of Lamb wave information. Experimental verifications of the physical behavior of these modes using micro-laser Doppler vibrometry is also presented.

9:15 AM–10:00 AM:

The division of labor for in situ sensing in additive manufacturing

John Middendorf
The Ohio State Univ. (USA)

Metal additive manufacturing (AM) has experienced an explosive growth in interest within the aerospace and space sectors, but the adoption in real application has lagged interest. Process qualification (or lack thereof) is the primary reason and to date in situ sensing has failed to make a substantial impact, despite obvious utility. The primary premise of this talk is that current sensing techniques used in industry lag significantly behind what is possible and already implemented in other industries, and proper focus and division of labor between academia and industry can remedy the situation. Through this discourse we will assess whether or not current sensors used in AM are sufficient, what roadblocks may exist for academia to assist in developing solutions for industry, and how the in situ sensing community should focus their efforts for maximum impact.

Wednesday Plenary

27 March 2024 • 8:15 AM–10:00 AM
Hilton, International Ballroom III (2nd Floor)

Session Chairs: **Asha Hall,** DEVCOM Army Research Lab. (USA) and **Jae-Hung Han,** KAIST (Republic of Korea)

8:15 AM - 8:30 AM:

Welcome and opening remarks

EAP-in-Action Demonstration Awards

Craig F. Bohren Best Student Presentation Award

Health Monitoring of Structural and Biological Systems Best Student Paper Award

8:30 AM–9:15 AM:

Digital twin: the future of aircraft health monitoring

Fuh-Gwo Yuan
North Carolina State Univ. (USA) and National Cheng Kung Univ. (Taiwan, Republic of China)

The talk will begin with a brief introduction of structural health monitoring (SHM) which has been attracting intensive attention since early 1990s. An essential difference between sensor centric SHM and nondestructive evaluation (NDE) will be highlighted. Advances in smart sensors powered by energy harvesting via ambient vibrations will be exemplified by two practical case studies. Recent advances in computer vision based SHM techniques using optical non-contact sensors with machine learning to detect impact loading and barely visible impact damage (BVID) in composite panels will be discussed in details. Finally, the digital twin framework under digital transformation and artificial intelligence (AI) is gaining potential to pave the way for future aircraft health monitoring.

9:15 AM–10:00 AM:

Electroactive polymer, dielectric elastomer, bistable actuation and modulation

Qibing Pei
Univ. of California, Los Angeles (USA)

Electroactive polymers cover a broad spectrum of actuation properties. Conjugated polymers (CP) can be electrochemically doped and undoped at low voltages. Dielectric elastomers (DE) require high voltage to output large force and high strain. Side-chain crystallizable polymers (SCP) exhibit three orders of magnitude change in stiffness during the reversible melting and recrystallization of the side chains. SCP behave like the DE at the soft state, and can thus be explored for bistable actuation. SCP also exhibit other important properties resulted from the phase change. These material research and device exploration undertaken at our Soft Materials Research Lab will be presented.

SOCIAL AND NETWORKING EVENTS

These events provide the opportunity to network, learn, and discuss research with professionals from around the world.

SPIE Community Lounge

Hilton, Atlantic II (2nd Floor)

25 March 2024 . . . . . .8:00 AM–5:00 PM
26 March 2024 . . . . . .8:00 AM–5:00 PM
28 March 2024 . . . . . .8:00 AM–5:00 PM

Visit the SPIE Community Lounge to relax and recharge between sessions.

Women's Networking Lunch

25 March 2024 • 12:00 PM–1:00 PM
Hilton, The Loft (2nd Floor)

Join other women in the field for informal discussions and networking.

All-Symposium Welcome Reception

25 March 2024 • 6:00 PM–7:30 PM
Hilton, Catalina, Pool Terrace, The Loft (2nd Floor)

All attendees are invited to relax, socialize, and enjoy refreshments. Please remember to wear your conference registration badges. Dress is casual.

SPIE Student and Mentor Luncheon

26 March 2024 • 12:00 PM–1:30 PM
Hilton, The Loft (2nd Floor)

An opportunity for students to have a casual lunch with established leaders in the Smart Structures + NDE community.

24TH ANNUAL EAP-IN-ACTION SESSION AND DEMONSTRATION

The EAP-in-Action session has shared advances through technical demonstrations for over 20 years. Attendees can see materials in action and see the latest technologies showcased each year.

24th Annual EAP-in-Action Session and Demonstrations

25 March 2024 • 4:30 PM–5:45 PM
Hilton, International Ballroom III (2nd Floor)

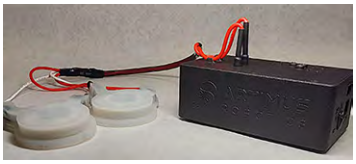
The EAP-in-Action Session and Demonstration is part of the Electroactive Polymer Actuators and Devices (EAPAD) XXVI conference.

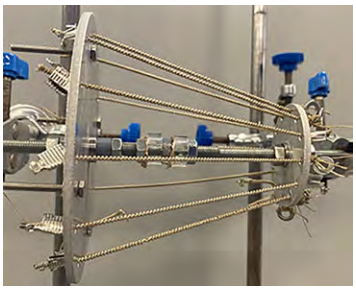
This session highlights some of the latest capabilities and applications of Electroactive Polymers (EAP) materials where the attendees are shown demonstrations of these materials in action. Attendees interact directly with technology developers and are given a "hands-on" experience with this emerging technology. The first Human/EAP-Robot Arm Wrestling Contest was held during this session of the 2005 EAPAD conference.

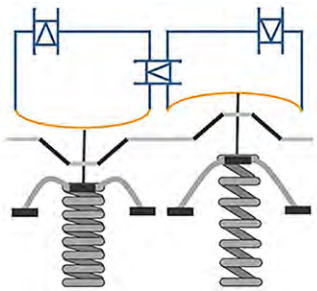
Session Chair:

Iain Anderson
The Univ. of Auckland (New Zealand)

EAP DEMONSTRATIONS







Commercializing multi-channel high voltage amplifiers for electroactive polymers

Shane Mitchell, Artimus Robotics (USA)

Environmental engines using twisted and coiled polymer fibers

Burhan Abbasi, Zhen Jiang, and **Geoffrey Spinks,** Univ. of Wollongong (Australia)

Haptic devices for refreshable and dynamic tactile information communication

Qibing Pei, Hyeon Ji Hong, Yuxuan Guo, Kede Liu, Yang Luo, and **Ziqing Han,** Univ. of California, Los Angeles (USA)

Resonance-optimized dielectric elastomer pump demonstrator

Matthias Baltes, ZeMA gGmbH (Germany), **Daniel Bruch,** Univ. des Saarlandes (Germany), **Paul Motzki,** ZeMA gGmbH and Univ. des Saarlandes (Germany), and **Stefan Seelecke,** ZeMA gGmbH and Univ. des Saarlandes (Germany)

Tactile Fingertips™ and Synthetic Muscle™ in robotics for human-like grip

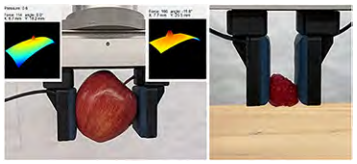
Lenore Rasmussen, Calum Briggs, and **Peter Vicars,** Ras Labs, Inc. (USA)

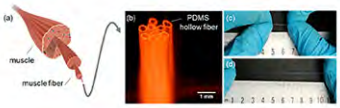
TouchDetect: Tactile sensation for industrial robotic grippers, enabled by soft elastomers

Artem Prokopchuk, Institute for Semiconductors and Microsystems, TU Dresden (Germany)

Towards artificial muscles using PDMS thin fiber actuators

Magdalena Skowyra, Christopher Daniel Woolridge, Zhaoqing Kang, Florina-Elena Comanici, Liyun Yu, and **Anne Ladegaard Skov,** Danish Polymer Ctr., Technical Univ. of Denmark (Denmark)





TECHNICAL EVENTS

Meet peers interested in the same topics and explore the latest research, hear different perspectives, and participate in engaging discussions. Reconnect with old friends and discover new partnerships.

Health Monitoring of Structural and Biological Systems Best Student Paper Session

26 March 2024 • 4:10 PM–6:10 PM
Hilton, International Ballroom I (2nd Floor)

The Health Monitoring of Structural and Biological Systems Best Student Paper Award finalists will present their papers and answer questions in this special session.

PRESENTATIONS:

12951-59, Acoustic streaming effects on collagen self-assembly

12951-62, Design and investigation of polymer-based terahertz nearfield imaging probes for the high-resolution nondestructive imaging applications

12951-63, Improvements on focused tactile feedback using time reversal mirror

12951-77, All-printed multifunctional sensors for structural health monitoring of inflatable habitats

12951-89, An entropy-based probabilistic model for acoustic emission RA value-average frequency data

12951-90, Time integration with proper generalized decomposition for efficient time response analysis in nonlinear dynamical systems

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Poster Sessions

Hilton, Catalina (2nd Floor)

26 March 2024 . . . . . 6:00 PM–7:30 PM

Tuesday Poster Setup: 12:00 PM–4:00 PM

27 March 2024 . . . . . 6:00 PM–7:30 PM

Wednesday Poster Setup: 12:00 PM–4:00 PM

Conference attendees are invited to attend the Smart Structures + Nondestructive Evaluation poster sessions on Tuesday and Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field.

Poster authors, view poster presentation guidelines and set-up instructions at **http://spie.org/SS/Poster-Guidelines**

EVENT SCHEDULE

TIME	CONF. 12944 Bioinspiration, Biomimetics, and Bioreplication XIV Chair: Raúl J. Martín-Palma 25–26 March 2024 Hilton, Atlantic I (2nd Floor)	CONF. 12945 Electroactive Polymer Actuators and Devices (EAPAD) XXVI Chair: John D. W. Madden 25–27 March 2024 Hilton, International Ballroom III (2nd Floor)	CONF. 12946 Active and Passive Smart Structures and Integrated Systems XVIII Chair: Serife Tol 25–28 March 2024 Hilton, Gallerie I/II (1st Floor)	CONF. 12947 Behavior and Mechanics of Multifunctional Materials XVIII Chair: Aimy Wissa 27–28 March 2024 Hilton, Atlantic I (2nd Floor)	
MONDAY 25 MARCH					
MORNING 8:15 AM - 10:00 AM	**Monday Plenary** Hilton, International Ballroom III (2nd Floor) Session Chairs: **Hani Naguib,** Univ. of Toronto (Canada) and **Asha Hall,** DEVCOM Army Research Lab. (USA) **Welcome and Opening Remarks** **2024 SSM Lifetime Achievement Award** **2024 NDE Lifetime Achievement Award** **Acoustic and mechanical metamaterials for energy and sensing applications and beyond** *(Plenary Presentation)* **Miso Kim,** Sungkyunkwan Univ. (Republic of Korea) **Soft actuators for wearable robotics** *(Plenary Presentation)* **Herbert Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)				
	COFFEE BREAK				
	10:30 AM - 12:20 PM SESSION 1: Materials	10:30 AM - 12:10 PM SESSION 1: EAPs: Reaching for High Performance	10:30 AM - 11:15 AM Hilton, Gallerie I (1st Floor) **Engineered matter with embodied programmability and mechano-intelligence** **Kon-Well Wang,** Univ of Michigan (USA) 11:15 AM - 12:25 PM SESSION 1: Acoustic/Elastic Metamaterials I		
AFTERNOON	LUNCH BREAK				
	1:50 PM - 3:30 PM SESSION 2: Locomotion	1:40 PM - 3:20 PM SESSION 2: Artificial Muscle and the Body	2:15 PM - 3:55 PM SESSION 2: Piezoelectric Metamaterials		
	COFFEE BREAK				
	4:00 PM - 5:20 PM SESSION 3: Applications and Devices	4:30 PM - 5:45 PM EAP-in-Action Demonstration Session	4:25 PM - 6:05 PM SESSION 3: Metasurfaces and Data-Driven Methods		

	CONF. 12948 Soft Mechatronics and Wearable Systems Chair: Ilkwon Oh 25–28 March 2024 Hilton, International Ballroom IV (2nd Floor)	CONF. 12949 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024 Chair: Branko Glisic 25–28 March 2024 Hilton, Pacific I (2nd Floor)	CONF. 12950 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII Chair: Andrew L. Gyekenyesi 25–27 March 2024 Hilton, Pacific II (2nd Floor)	CONF. 12951 Health Monitoring of Structural and Biological Systems XVIII Chair: Zhongqing Su 25–28 March 2024 Hilton, International Ballroom I/II (2nd Floor)		CONF. 12952 NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II Chair: Christopher Niezrecki 25 March 2024 Hilton, Gallerie III (1st Floor)
MONDAY 25 MARCH						
	10:20 AM - 12:10 PM SESSION 1: Wearable Technologies I	10:30 AM - 12:10 PM SESSION 1: Applications of Sensory Systems and Smart Structures I	10:30 AM - 12:10 PM SESSION 1: NDE of Advanced Materials I	10:30 AM - 11:10 AM Hilton, International Ballroom I (2nd Floor) **Monday Keynote** **Microscale actuation using acoustofluidics for rapid micromanipulation and 3D printing** **David Collins,** The Univ. of Melbourne (Australia)		10:30 AM - 11:10 AM **Keynote Session** **Keynote Presentation** **Fu-Kuo Chang,** Stanford Univ. (USA)
				Sessions 1-3 run concurrently with sessions 4-6 **NOTE ROOM CHANGE**		11:10 AM - 12:50 PM SESSION 1: NDE 4.0: Predictive Maintenance and Monitoring
				11:10 AM - 12:30 PM Hilton, International Ballroom I (2nd Floor) SESSION 1: Special Session: Guided Waves for SHM and NDE I	11:10 AM - 12:10 PM Hilton, International Ballroom II (2nd Floor) SESSION 4: Additive Manufacturing and AI-Driven SHM I	
	1:40 PM - 3:50 PM SESSION 2: Wearable Technologies II	1:40 PM - 3:30 PM SESSION 2: Sensor and Smart Structure Design, Fabrication, and Implementation I	1:40 PM - 3:20 PM SESSION 2: SHM/NDE of Transportation Infrastructure I	2:00 PM - 4:00 PM SESSION 2: Special Session: Guided Waves for SHM and NDE II	1:40 PM to 3:20 PM SESSION 5: Special Session: NDE and SHM of Battery Materials, Structures, and Systems	2:20 PM - 4:00 PM SESSION 2: NDE 4.0 and SHM of Energy Systems I
	4:10 PM - 5:50 PM SESSION 3: Wearable Technologies III	4:00 PM - 6:00 PM SESSION 3: Advances in Sensing and Smart Structure Technologies I	3:50 PM - 5:30 PM SESSION 3: NDE of Advanced Materials II	4:30 PM - 6:10 PM SESSION 3: Special Session: Guided Waves for SHM and NDE III	3:50 PM - 5:50 PM SESSION 6: Special Session: Phononic Crystals and Acoustic/Elastic Metamaterials	4:30 PM - 5:50 PM SESSION 3: NDE 4.0 and SHM of Energy Systems II

Event Schedule continued on next page

EVENT SCHEDULE

TIME	CONF. 12944 Bioinspiration, Biomimetics, and Bioreplication XIV Chair: Raúl J. Martín-Palma 25–26 March 2024 Hilton, Atlantic I (2nd Floor)	CONF. 12945 Electroactive Polymer Actuators and Devices (EAPAD) XXVI Chair: John D. W. Madden 25–27 March 2024 Hilton, International Ballroom III (2nd Floor)	CONF. 12946 Active and Passive Smart Structures and Integrated Systems XVIII Chair: Serife Tol 25–28 March 2024 Hilton, Gallerie I/II (1st Floor)	CONF. 12947 Behavior and Mechanics of Multifunctional Materials XVIII Chair: Aimy Wissa 27–28 March 2024 Hilton, Atlantic I (2nd Floor)	
TUESDAY 26 MARCH					
MORNING 8:15 AM - 10:00 AM	**Tuesday Plenary** Hilton, International Ballroom III (2nd Floor) Session Chairs: **Asha Hall,** DEVCOM Army Research Lab. (USA) and **Jae-Hung Han,** KAIST (Republic of Korea) **Welcome and Opening Remarks** **SPIE Fellow recognition** **Mohammad Elahinia,** The Univ. of Toledo (USA) **Jae-Hung Han,** KAIST (Republic of Korea) **Oliver Myers,** Clemson Univ. (USA) **Acoustic-optical interactions in fibers for ultrasonic inspection of structures** *(Plenary Presentation)* **Kara Peters,** North Carolina State Univ. (USA) **The division of labor for in situ sensing in additive manufacturing** *(Plenary Presentation)* **John Middendorf,** The Ohio State Univ. (USA)				
	COFFEE BREAK				
	10:30 AM - 12:00 PM SESSION 4: Bioinspired Design I	10:30 AM - 11:40 AM SESSION 3: EAP for Soft Robotics	10:30 AM - 12:10 PM SESSION 4: Acoustic/Elastic Metamaterials II		
AFTERNOON	LUNCH BREAK				
	1:50 PM - 3:10 PM SESSION 5: Bioinspired Design II	1:40 PM - 3:40 PM SESSION 4: Materials, Fabrication, and Characterization I	1:40 PM - 3:00 PM SESSION 5: Topological Modes and Nonlinear Metamaterials		
	COFFEE BREAK				
		4:10 PM - 5:40 PM SESSION 5: Ionic and Thermal Actuators	3:30 PM - 5:10 PM SESSION 6: Bandgap and Dispersion Engineering		
EVENING 6:00 PM - 7:30 PM	**POSTER SESSION (TUESDAY)** Hilton, Catalina (2nd Floor)				

	CONF. 12948 Soft Mechatronics and Wearable Systems Chair: Ilkwon Oh 25–28 March 2024 Hilton, International Ballroom IV (2nd Floor)	CONF. 12949 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024 Chair: Branko Glisic 25–28 March 2024 Hilton, Pacific I (2nd Floor)	CONF. 12950 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII Chair: Andrew L. Gyekenyesi 25–27 March 2024 Hilton, Pacific II (2nd Floor)	CONF. 12951 Health Monitoring of Structural and Biological Systems XVIII Chair: Zhongqing Su 25–28 March 2024 Hilton, International Ballroom I/II (2nd Floor)		CONF. 12952 NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II Chair: Christopher Niezrecki 25 March 2024 Hilton, Gallerie III (1st Floor)
TUESDAY 26 MARCH						
	10:30 AM - 12:20 PM SESSION 4: Wearable Technologies IV	10:30 AM - 11:50 AM SESSION 4: Advances in Sensing and Smart Structure Technologies II	10:30 AM - 11:50 AM SESSION 4: Computational Data Analysis I	10:30 AM - 11:10 AM Hilton, International Ballroom I (2nd Floor) **Tuesday Keynote** **Passive ultrasonic sensing for NDT and SHM** **Francesco Lanza di Scalea,** Univ. of California, San Diego (USA) ***Sessions 7-8 run concurrently with sessions 9-10*** **NOTE ROOM CHANGE**		
				11:10 AM - 12:30 PM Hilton, International Ballroom I (2nd Floor) SESSION 7: Recent Advances in SHM I	11:10 AM - 12:10 PM Hilton, International Ballroom II (2nd Floor) SESSION 9: Biomedical Applications and Devices I	
	1:30 PM - 3:50 PM SESSION 5: Soft Robotics I	1:40 PM - 3:00 PM SESSION 5: Physics-Based and Data-Driven Analysis of Sensory Systems and Smart Structures I	1:40 PM - 3:20 PM SESSION 5: Ultrasonic Technologies	1:40 PM - 3:40 PM SESSION 8: Recent Advances in SHM II	2:00 PM - 3:20 PM SESSION 10: Biomedical Applications and Devices II	
	4:10 PM - 5:50 PM SESSION 6: Soft Robotics II	3:30 PM - 5:30 PM SESSION 6: Applications of Sensory Systems and Smart Structures II	3:50 PM - 5:30 PM SESSION 6: Computational Data Analysis II	4:10 PM - 6:10 PM Hilton, International Ballroom I (2nd Floor) Health Monitoring of Structural and Biological Systems Best Student Paper Session		

See full details and updates at **spie.org/ssnde** or on the **SPIE App**

Event Schedule continued on next page

EVENT SCHEDULE

TIME	CONF. 12944 Bioinspiration, Biomimetics, and Bioreplication XIV Chair: Raúl J. Martín-Palma 25–26 March 2024 Hilton, Atlantic I (2nd Floor)	CONF. 12945 Electroactive Polymer Actuators and Devices (EAPAD) XXVI Chair: John D. W. Madden 25–27 March 2024 Hilton, International Ballroom III (2nd Floor)	CONF. 12946 Active and Passive Smart Structures and Integrated Systems XVIII Chair: Serife Tol 25–28 March 2024 Hilton, Gallerie I/II (1st Floor)		CONF. 12947 Behavior and Mechanics of Multifunctional Materials XVIII Chair: Aimy Wissa 27–28 March 2024 Hilton, Atlantic I (2nd Floor)	
WEDNESDAY 27 MARCH						
MORNING 8:15 AM - 10:00 AM	**Wednesday Plenary** Hilton, International Ballroom III (2nd Floor) Session Chairs: **Asha Hall,** DEVCOM Army Research Lab. (USA) and **Jae-Hung Han,** KAIST (Republic of Korea) **Welcome and Opening Remarks** **EAP-in-Action Demonstration Awards** **Craig F. Bohren Best Student Presentation Award** **Health Monitoring of Structural and Biological Systems Best Student Paper Award** **Digital twin: the future of aircraft health monitoring** *(Plenary Presentation)* **Fuh-Gwo Yuan,** North Carolina State Univ. (USA), National Cheng Kung Univ. (Taiwan, Republic of China) **Electroactive polymer, dielectric elastomer, bistable actuation, and modulation** *(Plenary Presentation)* **Qibing Pei,** Univ. of California, Los Angeles (USA)					
	COFFEE BREAK					
		10:30 AM - 12:30 PM SESSION 6: Materials, Fabrication, and Characterization II	***Sessions 7-10 run concurrently with sessions 11-13*** **NOTE ROOM CHANGE** 10:30 AM - 12:10 PM Hilton, Gallerie I (1st Floor) SESSION 7: Energy Harvesting and Scavenging I	10:30 AM - 11:50 AM Hilton, Gallerie II (1st Floor) SESSION 11: Smart Sensing and Signal Processing for Diagnostics and Prognostics	10:30 AM - 12:00 PM SESSION 1: Mechanics of Multifunctional Materials	
AFTERNOON	LUNCH BREAK					
		2:00 PM - 3:00 PM SESSION 7: Simulation	1:40 PM - 3:20 PM SESSION 8: Energy Harvesting and Scavenging II	1:20 PM - 3:20 PM SESSION 12: Modeling, Optimization, Signal Processing, Control, and Design of Integrated Systems	1:30 PM - 3:00 PM SESSION 2: Manufacturing and Evaluation of Multifunctional Materials	
	COFFEE BREAK					
		3:30 PM - 5:30 PM SESSION 8: Sensors and Strain	3:50 PM - 4:30 PM SESSION 9: Energy Harvesting and Scavenging III 4:30 PM - 5:50 PM SESSION 10: Passive and Active Vibration Isolation Systems	3:50 PM - 5:10 PM SESSION 13: Acoustics and Fluid-Structure Interaction	3:30 PM - 5:10 PM SESSION 3: Adaptive Multifunctional Materials	
EVENING 6:00 PM - 7:30 PM	**POSTER SESSION (WEDNESDAY)** Hilton, Catalina (2nd Floor)					

	CONF. 12948 Soft Mechatronics and Wearable Systems Chair: Ilkwon Oh 25–28 March 2024 Hilton, International Ballroom IV (2nd Floor)	CONF. 12949 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024 Chair: Branko Glisic 25–28 March 2024 Hilton, Pacific I (2nd Floor)	CONF. 12950 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII Chair: Andrew L. Gyekenyesi 25–27 March 2024 Hilton, Pacific II (2nd Floor)	CONF. 12951 Health Monitoring of Structural and Biological Systems XVIII Chair: Zhongqing Su 25–28 March 2024 Hilton, International Ballroom I/II (2nd Floor)		CONF. 12952 NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II Chair: Christopher Niezrecki 25 March 2024 Hilton, Gallerie III (1st Floor)
WEDNESDAY 27 MARCH						
	10:30 AM - 12:20 PM SESSION 7: Energy Devices I	10:30 AM - 12:10 PM Session 7: Physics-Based and Data-Driven Analysis of Sensory Systems and Smart Structures II	10:30 AM - 12:10 PM SESSION 7: SHM/NDE of Transportation Infrastructure II	10:30 AM - 11:10 AM Hilton, International Ballroom I (2nd Floor) **Wednesday Keynote** **From defect imaging to microstructure characterization using ultrasonic waves** **Zheng Fan,** Nanyang Technological Univ. (Singapore) ***Sessions 11-13 run concurrently with sessions 14-16*** **NOTE ROOM CHANGE**		
				11:10 AM - 12:10 PM Hilton, International Ballroom I (2nd Floor) SESSION 11: Additive Manufacturing and AI-Driven SHM II	11:10 AM - 12:10 PM Hilton, International Ballroom II (2nd Floor) SESSION 14: Special Session: Recent Advances in Nonlinear Ultrasonics-Based NDE and SHM	
	1:50 PM - 3:30 PM SESSION 8: Energy Devices II	1:40 PM - 3:20 PM SESSION 8: Sensor and Smart Structure Design, Fabrication, and Implementation II	1:40 PM - 3:00 PM SESSION 8: NDE of Advanced Materials III	1:40 PM - 3:40 PM SESSION 12: Recent Advances in SHM III	1:40 PM - 3:00 PM SESSION 15: Sensors and Energy Harvesting	
	4:00 PM - 5:20 PM SESSION 9: Biomedical Applications I	3:50 PM - 5:20 PM SESSION 9: Advances in Sensing and Smart Structure Technologies III	3:30 PM - 5:30 PM SESSION 9: SHM/NDE of Transportation Infrastructure III	4:00 PM - 6:00 PM SESSION 13: Signal and Imaging Processing	3:30 PM - 4:50 PM SESSION 16: Special Session: 3D-Printed Sensors	

Event Schedule continued on next page

EVENT SCHEDULE

TIME	CONF. 12944 Bioinspiration, Biomimetics, and Bioreplication XIV Chair: Raúl J. Martín-Palma 25–26 March 2024 Hilton, Atlantic I (2nd Floor)	CONF. 12945 Electroactive Polymer Actuators and Devices (EAPAD) XXVI Chair: John D. W. Madden 25–27 March 2024 Hilton, International Ballroom III (2nd Floor)	CONF. 12946 Active and Passive Smart Structures and Integrated Systems XVIII Chair: Serife Tol 25–28 March 2024 Hilton, Gallerie I/II (1st Floor)		CONF. 12947 Behavior and Mechanics of Multifunctional Materials XVIII Chair: Aimy Wissa 27–28 March 2024 Hilton, Atlantic I (2nd Floor)
THURSDAY 28 MARCH					
MORNING			***Session 14 runs concurrently with session 16*** **NOTE ROOM CHANGE**		8:00 AM - 9:20 AM SESSION 4: Programmable Multifunctional Materials
			8:30 AM - 9:50 AM Hilton, Gallerie I (1st Floor) SESSION 14: Aircraft, MAV/ UAV, and Morphing Systems	8:00 AM - 10:00 AM Hilton, Gallerie II (1st Floor) SESSION 16: Magneto-Rheological Systems	
	COFFEE BREAK				
			10:20 AM - 12:00 PM Hilton, Gallerie I (1st Floor) SESSION 15: SMA- and Piezo-Based Materials and Systems		
AFTERNOON	LUNCH BREAK				

	CONF. 12948 Soft Mechatronics and Wearable Systems Chair: Ilkwon Oh 25–28 March 2024 Hilton, International Ballroom IV (2nd Floor)	CONF. 12949 Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024 Chair: Branko Glisic 25–28 March 2024 Hilton, Pacific I (2nd Floor)	CONF. 12950 Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII Chair: Andrew L. Gyekenyesi 25–27 March 2024 Hilton, Pacific II (2nd Floor)	CONF. 12951 Health Monitoring of Structural and Biological Systems XVIII Chair: Zhongqing Su 25–28 March 2024 Hilton, International Ballroom I/II (2nd Floor)	CONF. 12952 NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II Chair: Christopher Niezrecki 25 March 2024 Hilton, Gallerie III (1st Floor)
	THURSDAY 28 MARCH				
	8:00 AM - 9:50 AM SESSION 10: Biomedical Applications II	8:30 AM - 10:10 AM SESSION 10: Advances in Sensing and Smart Structure Technologies IV		8:30 AM - 9:50 AM Hilton, International Ballroom I (2nd Floor) SESSION 17: Special Session: Optical Sensing and Machine Learning for SHM and NDE	
	10:10 AM - 12:10 PM SESSION 11: Biomedical Applications III	10:40 AM - 11:50 AM SESSION 11: Physics-Based and Data-Driven Analysis of Sensory Systems and Smart Structures III 11:50 AM - 12:50 PM SESSION 12: Applications of Sensory Systems and Smart Structures III		10:20 AM - 11:20 AM SESSION 18: Recent Advances in SHM IV	
	1:30 PM - 3:00 PM SESSION 12: Functional Materials and Convergence Tech			12:50 PM - 2:10 PM SESSION 19: Advanced Modeling	

See full details and updates at **spie.org/ssnde** or on the **SPIE App**

2024 Lifetime Achievement Award Winners

Join us in congratulating these winners as we acknowledge their contributions to the fields of Smart Structures and Materials and Nondestructive Evaluation and Structural Health Monitoring.

Smart Structures and Materials (SSM) Lifetime Achievement Award

Steven F. Griffin
Boeing LTS Inc. (USA)

Nondestructive Evaluation (NDE) Lifetime Achievement Award

Michael D. Todd
Univ. of California, San Diego (USA)

Craig F. Bohren Best Student Presentation Award

The Bioinspiration, Biomimetics, and Bioreplication conference chairs choose the Best Student Presentation Award from their conference. This award is sponsored by an SPIE Fellow. A cash prize will be given to the first, second, and third place winners.

Health Monitoring of Structural and Biological Systems Best Student Paper Award

The Health Monitoring of Structural and Biological Systems conference committee will choose the Best Student Paper Award from their conference. Applicants will then submit an extended abstract for review, and selected finalists will present in a special session at the Smart Structures + Nondestructive Evaluation meeting. This award is sponsored by RDI Technologies. A cash prize will be given to the first, second, and third place winners.

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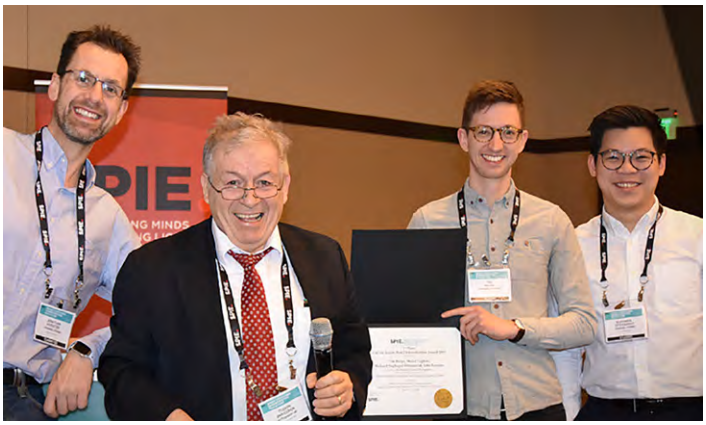

EAP-In-Action Demonstration Awards

As part of the Electroactive Polymer Actuators and Devices (EAPAD) conference, the EAP-in-Action Demonstration Session has been held over the past 23 years. New electroactive polymer materials and application areas are continuing to emerge and this session offers up-close demonstrations of EAP materials and devices in action from industry and academia. There is never a dull moment at this session which features everything from early university prototypes to products. The demonstration format enables interaction between the developers and potential users as well as a "hands-on" experience with our emerging technology.

Award certificates will be given to the three best EAP-in-Action demonstrations. The judges will assess the presenters' performance as well as the quality and content of the demos.

See full details and updates at **spie.org/ssnde** or on the **SPIE App**

Badge pick up and registration hours

Hilton Long Beach Hotel - 2nd floor, Lobbyy

Sunday 24 March	2:00 PM–5:00 PM
Monday 25 March	7:00 AM–5:00 PM
Tuesday 26 March	7:30 AM–5:00 PM
Wednesday 27 March	7:45 AM–5:00 PM
Thursday 28 March	7:45 AM–3:30 PM

SPIE Cashier

2nd Floor, Lobby - Open during registration hours

Registration payments
If you are planning to register onsite, please do so at the "Need to Register" laptop station. Your credit card payment will be processed during registration. If you wish to pay with cash or check, you will be directed to the Cashier once you have completed registration for final payment.

If you have already registered and wish to add a course, workshop, or special event, you may do this online by signing into your SPIE account.

Receipt and Certificate of Attendance
Preregistered attendees who need an SPIE-stamped receipt or attendees who need a Certificate of Attendance may obtain those at the Cashier.

Badge Corrections
Badge corrections can be made at the Cashier. Please mark your badge with your changes before approaching the counter.

Speaker check-in and preview station

2nd Floor, Caribbean Room

Sunday 24 March	2:00 PM–5:00 PM
Monday 25 March	7:00 AM–5:00 PM
Tuesday 26 March	7:30 AM–5:00 PM
Wednesday 27 March	7:45 AM–5:00 PM
Thursday 28 March	7:45 AM–3:30 PM

All speakers must stop at Speaker Check-In to upload and preview their slide presentation files at least two hours before their scheduled session or the day before if they present in the first session. Speakers are not able to present using their own devices. All conference rooms are equipped with a laptop, projector, screen, lapel microphone, and laser pointer.

Internet access

Hotel lobbies, meeting rooms, and registration area

Complimentary wireless internet access is provided in meeting rooms and lobbies on the conference room levels. Instructions will be posted onsite.

SPIE Conference app and event information

This useful tool allows you to search and browse the program, special events, participants, courses, and more. It is free and available for iPhone and Android phones. If you don't already have it, Download the SPIE App: https://apps.apple.com/us/app/spie-conferences/id349678364.

Luggage & coat check

1st floor, Bag check

Complimentary luggage, package, and coat storage are available.

Business Center Office

1st floor

Printing services are available.

Child Care Services

Childtime of Long Beach - 562-437-7498

WeeCare - listings for local daycare and caregivers in the area.

SPIE does not imply an endorsement or recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

Gender-inclusive restroom

Gender-inclusive restrooms are available on the first and second floors. Please ask the hotel or SPIE staff for directions.

Mother's Room

3rd floor, Coral Room - Open during registration hours

The Mothers' Room is a lockable room intended for nursing mothers. There is no storage or running water. There is a refrigerator available in this space. The key can be picked up from the SPIE Cashier.

Quiet Room

3rd floor, Mediterranean I - Open during registration hours

The Quiet Room is intended for silent meditation, reflection, and prayer. No mobile devices or computer use is allowed, and no food or beverages are allowed.

Urgent message line

An urgent message line is available during registration hours: 360-223-3378

Lost and found

2nd Floor, Lobby - Open during registration hours.

Found items will be kept at the SPIE Cashier in the Registration area during the meeting and available only during registration hours. At the end of the meeting, all found items will be turned over to the Hilton Long Beach Security. Lost and Found hotline: +1 585-232-7200.

Food and beverage services

Coffee Breaks

1st floor, Gallerie Foyer and 2nd floor, Foyer and Promenade

Complimentary coffee

Monday . . . . . 7:00 AM–4:00 PM
Tuesday . . . . . 7:30 AM–4:00 PM
Wednesday - Thursday . . . . . 7:45 AM–4:00 PM

Food and refreshments for purchase

1st floor, Lobby

Café

We proudly brew Starbucks coffee and offer freshly baked pastries, sandwiches, and salads. Fresh fruit and healthy snacks are also available.

Enclave Lobby Bar and Kitchen

Savor innovative dishes prepared with fresh ingredients at our exclusive on-site restaurant. The Enclave is also perfect for pre-dinner drinks or end of the day cocktails, offering an extensive menu of fine wines, imported and domestic beers, and handcrafted cocktails in a modern casual setting.

The Loft

2nd floor

The Loft Restaurant offers fresh breakfast daily from continental to hot buffet including made to order omelets.

In-Room Dining - See hotel instructions

Relax in the comfort of your room as you enjoy breakfast, lunch, dinner, or even a late-night snack from our In-Room Dining Menu.

Restaurants and entertainment

Places to eat, drink and explore in Long Beach

- You will find more than 100 quality restaurants within an eight block radius in downtown, serving everything from hot wings to haute cuisine.
- Show Your Badge and Save throughout the city. Click the link to access amazing deals for both things to do and see as well as places to eat.
- Aquarium of the Pacific get a great deal on the admission fee.

Long Beach is a foodie's paradise. Whether it is sampling international flavors at standout seaside restaurants, enjoying creative cocktails while listening to live jazz, raising a pint at beachside breweries, or enjoying a casual coffee, breakfast or brunch al fresco, Long Beach delivers a culinary experience sure to please any taste.

Explore our diverse neighborhoods to discover the food halls, local favorites, and multicultural menus that establish Long Beach as a haven for foodies, or set sail and enjoy brunch, lunch, or dinner aboard one of several cruises and boat excursions.

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CONFERENCE 12944

Bioinspiration, Biomimetics, and Bioreplication XIV

25 - 26 March 2024 | Hilton, Atlantic I (2nd Floor)

Conference Chair(s): **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

Conference Co-Chair(s): **Mato Knez,** CIC nanoGUNE Consolider (Spain); **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (United States)

Program Committee: **Youngsu Cha,** Korea Univ. (Korea, Republic of); **Chih-Hung Chang,** Oregon State Univ. (United States); **Alon Gorodetsky,** Univ. of California, Irvine (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Olaf Karthaus,** Chitose Institute of Science and Technology (Japan); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Torben A. Lenau,** Technical Univ. of Denmark (Denmark); **Bert Müller,** Univ. Basel (Switzerland); **Zoubeida Ounaies**, **Christian Peco,** The Pennsylvania State Univ. (United States); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Akira Saito,** Osaka Univ. (Japan); **Radwanul H. Siddique,** SAMSUNG Semiconductor, Inc. (United States); **Luat T. Vuong,** Univ. of California, Riverside (United States)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: MATERIALS

25 March 2024 • 10:30 AM - 11:50 AM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Raúl J. Martín-Palma**, Univ. Autónoma de Madrid (Spain)

12944-2 • 10:30 AM - 10:50 AM
Bioinspired daytime radiative cooling performance: a new experimental protocol for scaling up passive cooling through the atmospheric windows
Author(s): **Claudia Fabiani,** Univ. degli Studi di Perugia (Italy); **Alberto Muscio,** University of Modena & Reggio Emilia (Italy); **Anna Laura Pisello,** Univ. degli Studi di Perugia (Italy)

12944-3 • 10:50 AM - 11:10 AM
Disordered chirality
Author(s): **Akhlesh Lakhtakia,** The Pennsylvania State Univ. (United States)

12944-4 • 11:10 AM - 11:30 AM
Dynamic excitations in periodic fish scale inspired structures
Author(s): **Omid Bateniparvar**, **Md Shahjahan Hossain, Ranajay R. Ghosh,** Univ. of Central Florida (United States)

12944-5 • 11:30 AM - 11:50 AM
Advanced self-cleaning and antimicrobial organic-inorganic hybrid textiles achieved through Vapor Phase Infiltration (VPI)
Author(s): **Ana Álvarez-Yenes**, **Marina Borraz, Mato Knez,** CIC nanoGUNE (Spain)

Lunch Break 11:50 AM - 01:20 PM

SESSION 2: LOCOMOTION

25 March 2024 • 01:20 PM - 03:00 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Alessandro Chiolerio**, Istituto Italiano di Tecnologia (Italy)

12944-6 • 01:20 PM - 01:40 PM **(CANCELLED)**
Aerodynamics and transition dynamics of the hind wings of Schistocerca americana grasshopper
Author(s): **Kyung Jun Paul Lee, Aimy Wissa,** Princeton Univ. (United States)

12944-7 • 01:40 PM - 02:00 PM
Biomimetic quadrupedal soft robot using origami cylinder actuator
Author(s): **Jinho Kim, Youngsu Cha,** Korea Univ. (Korea, Republic of)

12944-8 • 02:00 PM - 02:20 PM
Avian-inspired wing sweep
Author(s): **Daniel J. Inman**, **J. Boomer Perry, Derek J. Willis,** Univ. of Michigan (United States)

12944-9 • 02:20 PM - 02:40 PM
Performance analysis of agonist-antagonist SMA micro-wires and resonant compliant joint in bio-inspired bat-like flapping wings
Author(s): **Domenico Bevilacqua,** Univ. des Saarlandes (Germany); **Tom Gorges**, **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Gianluca Rizzello,** Lehrstuhl für intelligente Materialsysteme (Germany); **Paul Motzki,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

12944-10 • 02:40 PM - 03:00 PM
Bio-inspired, 3D printed feather transducers for in flight aerodynamic force and vibration sensing
Author(s): **Ruowen Tu,** Univ. of Michigan (United States); **Rémy A. Delplanche,** The Univ. of Montana (United States); **Lawren L. Gamble,** Univ. of Michigan (United States), Exponent, Inc. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Bret W. Tobalske,** The Univ. of Montana (United States); **Henry A. Sodano,** Univ. of Michigan (United States)

Coffee Break 03:00 PM - 03:30 PM

SESSION 3: APPLICATIONS AND DEVICES

25 March 2024 • 03:30 PM - 04:50 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Akira Saito**, Osaka Univ. (Japan)

12944-11 • 03:30 PM - 03:50 PM
Bio-inspired mangroves: saltwater evaporative cooling shelters
Author(s): **Luat T. Vuong,** Univ. of California, Riverside (United States)

12944-12 • 03:50 PM - 04:10 PM
Design of a bionic prosthetic foot with energy harvesting
Author(s): **Gang Gao,** Chinese Academy of Sciences (China); **Xuan Zhao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Qiuyu Shi**, **Haisu Liao**, **Yongji Lin,** Chinese Academy of Sciences (China); **Xinyu Wu,** Shenzhen Institute of Advanced Technology (China); **Fei Gao,** The Chinese Univ. of Hong Kong (Hong Kong, China), Shenzhen Institute of Advanced Technology (China)

12944-13 • 04:10 PM - 04:30 PM
A comprehensive study of ultrasound-enhanced transdermal drug delivery via microneedle array
Author(s): **Yiran Tian,** Shanghai Jiao Tong Univ. (China), Univ. of Missouri (United States); **Jiaji Chen,** Univ. of Missouri (United States); **Yanfeng Shen,** Shanghai Jiao Tong Univ. (China); **Guoliang Huang,** Univ. of Missouri (United States)

12944-14 • 04:30 PM - 04:50 PM
Invasive insect pest monitoring using low-cost, field deployable, machine-learning-assisted sensor systems
Author(s): **Aviad Golan**, **Seth McNeill,** Embry-Riddle Aeronautical Univ. (United States); **Richard Mankin,** U.S. Dept. of Agriculture (United States); **Yabin Liao, Heeirthan Shanthan,** Embry-Riddle Aeronautical Univ. (United States)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: BIOINSPIRED DESIGN I

26 March 2024 • 10:30 AM - 12:00 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Akhlesh Lakhtakia**, The Pennsylvania State Univ. (United States)

12944-16 • 10:30 AM - 11:00 AM
Rationally designing dynamic protein cross-linked hydrogels across length scales *(Invited Paper)*
Author(s): **Zarah Korb,** Univ. Basel (Switzerland)

12944-17 • 11:00 AM - 11:20 AM
Optimization of the optical diffuser inspired by *Morpho* butterflies for the feasible fabrication
Author(s): **Shuta Sakamoto**, **Kazuma Yamashita**, **Junpei Ohga**, **Takuma Hattori**, **Yuji Kuwahara,** Osaka Univ. (Japan); **Akira Saito,** Osaka Univ. (Japan), RIKEN SPring-8 Ctr. (Japan)

12944-28 • 11:20 AM - 11:40 AM
Exploring natural concepts: advancing materials through hybridization
Author(s): **Mato Knez,** CIC nanoGUNE (Spain)

12944-19 • 11:40 AM - 12:00 PM
Toward scalable bio-inspired manufacturing from molecules to industrial-scale bio-inspired structures
Author(s): **Chih-Hung Chang,** Oregon State Univ. (United States)

Lunch Break 12:00 PM - 01:50 PM

SESSION 5: BIOINSPIRED DESIGN II

26 March 2024 • 01:50 PM - 03:40 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Luat T. Vuong**, Univ. of California, Riverside (United States)

12944-1 • 01:50 PM - 02:20 PM
Colloid intelligence *(Invited Paper)*
Author(s): **Alessandro Chiolerio,** Istituto Italiano di Tecnologia (Italy)

12944-29 • 02:20 PM - 02:40 PM
Enhancing biomimetic design of tap scanning sensors through high-resolution thermal camera-based behavioral studies
Author(s): **Nihar Masurkar**, **Hamidreza Nemati, Ehsan Dehghan Niri,** Arizona State Univ. (United States)

12944-22 • 02:40 PM - 03:00 PM
From bioimaging to artificial anatomy: 3D printing biomimetic marine life structures
Author(s): **Daniel Fisher**, **Abdulkarem Sennain**, **Nazanin Minaian, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

12944-24 • 03:00 PM - 03:20 PM
Exploring neuromorphic potentials of silver-based self-directed-channel memristors for artificial synapses in neural network circuits
Author(s): **Dhiman Biswas**, **Thirumalai Venkatesan, Yaser Mike Banad,** The Univ. of Oklahoma (United States)

12944-25 • 03:20 PM - 03:40 PM
Nanopores generate broadband reflecting structures in snakes and bees
Author(s): **KM Samaun Reza**, **Luisa Borgmann**, **Junchi Chen**, **Richard Thelen,** Karlsruher Institut für Technologie (Germany); **Guillaume Gomard,** Zeiss Innovation Hub @ KIT (Germany); **Ulrich Lemmer, Hendrik Hölscher,** Karlsruher Institut für Technologie (Germany)

POSTER SESSION - TUESDAY

26 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Tuesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12944-26 • 06:00 PM - 07:30 PM
Biomimetics for future security and defense applications
Author(s): **Raúl J. Martín-Palma,** Univ. Autónoma de Madrid (Spain)

12944-27 • 06:00 PM - 07:30 PM
Hard X-ray nanotomography of dental composites for wide color matching
Author(s): **Dimitrios Tripkis**, **Mattia Humbel**, **Hans Deyhle**, **Georg Schulz,** Univ. Basel (Switzerland); **Mario Scheel**, **Timm Weitkamp,** Synchrotron SOLEIL (France); **Bert Müller,** Univ. Basel (Switzerland)

CONFERENCE 12945

Electroactive Polymer Actuators and Devices (EAPAD) XXVI

25 - 27 March 2024 | Hilton, International Ballroom III (2nd Floor)

Conference Chair(s): **John D. W. Madden,** The Univ. of British Columbia (Canada)

Conference Co-Chair(s): **Stefan S. Seelecke,** Saarland Univ. (Germany); **Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

Program Committee: **Barbar J. Akle,** Lebanese American Univ. (Lebanon); **Iain A. Anderson,** The Univ. of Auckland (New Zealand); **Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States); **Ray H. Baughman,** The Univ. of Texas at Dallas (United States); **Holger Böse,** Fraunhofer-Institut für Silicatforschung ISC (Germany); **Eric Cattan,** Univ. Polytechnique Hauts-de-France (France); **Hyouk Ryeol Choi,** Sungkyunkwan Univ. (Korea, Republic of); **Marco Fontana,** Scuola Superiore Sant'Anna (Italy); **Edwin W. H. Jager,** Linköping Univ. (Sweden); **Giedrius Janusas,** Kaunas Univ. of Technology (Lithuania); **Martin Kaltenbrunner,** Johannes Kepler Univ. Linz (Austria); **Christoph Keplinger,** Max-Planck-Institut für Intelligente Systeme (Germany); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Soo Jin Adrian Koh,** Max-Planck-Institut für Intelligente Systeme (Germany); **Gabor M. Kovacs,** CTsystems AG (Switzerland); **Maarja Kruusmaa,** Tallinn Univ. of Technology (Estonia); **Jinsong Leng,** Harbin Institute of Technology (China); **Tiefeng Li,** Zhejiang Univ. (China); **Jürgen Maas,** Technische Univ. Berlin (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Il-Kwon Oh,** KAIST (Korea, Republic of); **Qibing Pei,** Univ. of California, Los Angeles (United States); **Cédric Plesse,** CY Cergy Paris Univ. (France); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Aaron D. Price,** Western Univ. (Canada); **Gianluca Rizzello,** Saarland Univ. (Germany); **Jonathan M. Rossiter,** Univ. of Bristol (United Kingdom); **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jun Shintake,** The Univ. of Electro-Communications (Japan); **Anuvat Sirivat,** The Petroleum and Petrochemical College (Thailand); **Geoffrey M. Spinks,** Univ. of Wollongong (Australia); **Ji Su,** NASA Langley Research Ctr. (United States); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Rocco Vertechy,** Univ. degli Studi di Bologna (Italy); **Thomas Wallmersperger,** TU Dresden (Germany); **Jian Zhu,** The Chinese Univ. of Hong Kong, Shenzhen (China)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: EAPS: REACHING FOR HIGH PERFORMANCE

25 March 2024 • 10:30 AM - 12:10 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **John D. W. Madden**, The Univ. of British Columbia (Canada); **Anne Ladegaard Skov**, Technical Univ. of Denmark (Denmark); **Stefan S. Seelecke**, Univ. des Saarlandes (Germany)

12945-1 • 10:30 AM - 11:00 AM
Silicone dielectric elastomer fiber for artificial muscle *(Invited Paper)*
Author(s): **Zhaoqing Kang**, **Magdalena Skowyra**, **Liyun Yu, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

12945-2 • 11:00 AM - 11:20 AM
Designing ultrasoft, high-performance soft actuators
Author(s): **Zhen Jiang,** Univ. of Wollongong (Australia)

12945-3 • 11:20 AM - 11:50 AM
Resonance-optimized dielectric elastomer pump demonstrator: a dynamic systems approach *(Invited Paper)*
Author(s): **Matthias Baltes,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Univ. des Saarlandes (Germany); **Stefan S. Seelecke, Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

12945-4 • 11:50 AM - 12:10 PM
Design and manufacturing of high-strain P(VDF-TrFE-CTFE) actuators
Author(s): **Giulio Gallucci**, **Victor Jaarsma, Andres Hunt,** Technische Univ. Delft (Netherlands)

Lunch Break 12:10 PM - 01:40 PM

SESSION 2: ARTIFICIAL MUSCLE AND THE BODY

25 March 2024 • 01:40 PM - 03:00 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **Herbert R. Shea**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Stefan S. Seelecke**, Univ. des Saarlandes (Germany)

12945-9 • 01:40 PM - 02:00 PM
Characterizing the response of piezoelectric-polymer composite haptic actuators and their interaction with skin
Author(s): **Alain Boldini,** New York Institute of Technology (United States), NYU Tandon School of Engineering (United States); **John R. Rizzo,** NYU Grossman School of Medicine (United States), NYU Tandon School of Engineering (United States); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States)

12945-6 • 02:00 PM - 02:20 PM
An artificial urinary sphincter based on dielectric elastomer technology
Author(s): **Quentin De Menech**, **Sloan Zammouri**, **Stefania Konstantinidi**, **Amine Benouhiba**, **Yoan Civet, Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (Switzerland), Integrated Actuators Lab. (Switzerland)

12945-7 • 02:20 PM - 02:40 PM
Adaptive artificial muscles for the treatment of incontinence
Author(s): **Bert Müller**, **Beate Lyko,** Univ. Basel (Switzerland); **Stephan- Daniel Gravert,**ETH Zurich (Switzerland); **Hans Deyhle**, **Bekim Osmani**, **Tino Töpper,** Univ. Basel (Switzerland); **Robert Katzschmann,** ETH Zurich (Switzerland)

12945-10 • 02:40 PM - 03:00 PM
Rotary haptic device solutions using a conical dielectric elastomer actuator
Author(s): **Leonardus Depari,** Nanyang Technological Univ (Singapore); **Milan Shrestha, Edwin Hang Tong Teo,** Nanyang Technological Univ. (Singapore)

OPEN DISCUSSION: EAP APPLICATIONS, MATERIALS, AND NEW DIRECTIONS

25 March 2024 • 03:00 PM - 03:20 PM | Hilton, International Ballroom III (2nd Floor)
Join us for an interactive discussion on EAP applications, materials, and new directions.

Coffee Break 03:20 PM - 03:50 PM

EAP-IN-ACTION DEMONSTRATION SESSION

25 March 2024 • 04:30 PM - 05:45 PM | Hilton, International Ballroom III (2nd Floor)

Session Chair(s): **Iain A. Anderson**, The Univ. of Auckland (New Zealand)

This session highlights some of the latest capabilities and applications of Electroactive Polymers (EAP) materials where the attendees are shown demonstrations of these materials in action. Attendees interact directly with technology developers and are given a "hands-on" experience with this emerging technology. The first Human/EAP-Robot Arm Wrestling Contest was held during this session of the 2005 EAPAD conference.

View the full list, including images, of the planned demonstrations here.

12945-201 • 04:30 PM - 05:45 PM
DEMO: Commercializing multi-channel high voltage amplifiers for electroactive polymers
Author(s): **Shane K. Mitchell,** Artimus Robotics (United States)

12945-202 • 04:30 PM - 05:45 PM
DEMO: Environmental engines using twisted and coiled polymer fibers
Author(s): **Burhan B. A. Abbasi**, **Zhen Jiang, Geoffrey M. Spinks,** Univ. of Wollongong (Australia)

12945-203 • 04:30 PM - 05:45 PM
DEMO: Haptic devices for refreshable and dynamic tactile information communication
Author(s): **Qibing Pei**, **Yuxuan Guo, Ziqing Han,** Univ. of California, Los Angeles (United States)

12945-204 • 04:30 PM - 05:45 PM
Resonance-optimized dielectric elastomer pump demonstrator: a dynamic systems approach
Author(s): **Matthias Baltes,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Univ. des Saarlandes (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

12945-205 • 04:30 PM - 05:45 PM
Tactile fingertips and synthetic muscle in robotics for human-like grip
Author(s): **Lenore Rasmussen**, **Peter N. Vicars**, **Calum R. Briggs,** Ras Labs., Inc. (United States); **Yanni Sporidis,** Ras Labs. (United States)

12945-206 • 04:30 PM - 05:45 PM
DEMO: TouchDetect: Tactile sensation for industrial robotic grippers, enabled by soft elastomers
Author(s): **Artem Prokopchuk,** TU Dresden (Germany)

12945-207 • 04:30 PM - 05:45 PM
DEMO: Towards artificial muscles using PDMS thin fiber actuators
Author(s): **Magdalena Skowyra**, **Christopher Daniel Woolridge**, **Zhaoqing Kang**, **Florina-Elena Comanici**, **Liyun Yu, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 3: EAP FOR SOFT ROBOTICS

26 March 2024 • 10:30 AM - 11:40 AM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **Jürgen Maas**, Technische Univ. Berlin (Germany); **Anne Ladegaard Skov**, Technical Univ. of Denmark (Denmark)

12945-11 • 10:30 AM - 11:00 AM
Industrial developments of dielectric EAP sensor technology *(Invited Paper)*
Author(s): **Alexander York,** mateligent iDEAS GmbH (Germany)

12945-14 • 11:00 AM - 11:20 AM
Self-sensing investigation of a dielectric elastomer actuator array
Author(s): **Sipontina Croce**, **Julian Neu,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Jonas Hubertus**, **Günter Schultes,** Hochschule für Technik und Wirtschaft des Saarlandes (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Bettina Fasolt,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Gianluca Rizzello,** Univ. des Saarlandes (Germany)

12945-15 • 11:20 AM - 11:40 AM
Development and experimental evaluation of a compact 3D bending module actuated by rolled dielectric elastomer actuators (RDEAs)
Author(s): **Julian Kunze,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Giovanni Soleti**, **Daniel Bruch,** Univ. des Saarlandes (Germany); **Paul Motzki**, **Sophie Nalbach**, **Stefan S. Seelecke,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Gianluca Rizzello,** Univ. des Saarlandes (Germany)

Lunch Break 11:40 AM - 01:40 PM

SESSION 4: MATERIALS, FABRICATION, AND CHARACTERIZATION I

26 March 2024 • 01:40 PM - 03:40 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **Magdalena Skowyra**, Technical Univ. of Denmark (Denmark); **Kentaro Takagi**, Toyohashi Univ. of Technology (Japan)

12945-16 • 01:40 PM - 02:00 PM
Advances in buckling dielectric elastomer transducers
Author(s): **Andreas Hubracht**, **Tim Krüger, Jürgen Maas,** Technische Univ. Berlin (Germany)

12945-51 • 02:00 PM - 02:20 PM
Wet-spun and fibrous conjugated polymer actuators for interactive textiles
Author(s): **Mathis Bruns**, **Chokri Cherif**, **Iris Kruppke, Markus Koenigsdorff,** TU Dresden (Germany)

12945-18 • 02:20 PM - 02:40 PM
Thermoplastic polymer based negative biasing mechanism for high stroke dielectric elastomer actuator systems
Author(s): **Saverio Addario**, **Alberto Priuli**, **Jonas Hubertus**, **Sebastian Gratz-Kelly,** Univ. des Saarlandes (Germany); **Julian Neu,** Saarland Univ. (Germany); **Günter Schultes**, **Stefan S. Seelecke, Gianluca Rizzello,** Univ. des Saarlandes (Germany)

12945-19 • 02:40 PM - 03:00 PM
Influence of stretch-dependent permittivity on power generation output of dielectric elastomer
Author(s): **Sun Dejie**, **Kazuma Tagawa,** Nagoya Univ. (Japan); **Shijie Zhu,** Fukuoka Institute of Technology (Japan); **Yasuo Suzuoki,** Aichi Institute of Technology (Japan); **Muneaki Kurimoto,** Nagoya Univ. (Japan)

12945-20 • 03:00 PM - 03:20 PM
Soft and stretchable piezoresistive devices fabricated with inkjet-printed carbon black
Author(s): **Jianan Yi,** TU Dresden (Germany); **Katherine E. Wilson,** PowerOn Ltd. (New Zealand); **Iain A. Anderson,** PowerOn Ltd. (New Zealand), The Univ. of Auckland (New Zealand), StretchSense Ltd. (New Zealand); **Andreas Richter,** TU Dresden (Germany); **Ernst-Friedrich Markus Henke,** TU Dresden (Germany), PowerOn Ltd. (New Zealand), The Univ. of Auckland (New Zealand)

12945-21 • 03:20 PM - 03:40 PM
Yield increase of DE actuators using novel repair process
Author(s): **Bettina Fasolt,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Tobias Willian**, **Aurel Weller**, **Daniel Bruch**, **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

Coffee Break 03:40 PM - 04:10 PM

SESSION 5: IONIC AND THERMAL ACTUATORS

26 March 2024 • 04:10 PM - 05:40 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **Geoffrey M. Spinks**, Univ. of Wollongong (Australia); **John D. W. Madden**, The Univ. of British Columbia (Canada)

12945-22 • 04:10 PM - 04:40 PM
Comparative study of the influence of the ionic coatings on the performances of air-operating coiled carbon nanotubes yarn actuators *(Invited Paper)*
Author(s): **Bin Ni**, **Fengdi Li**, **Gabriela Ananieva**, **Loris Gelas**, **Cedric Vancaeyzeele**, **Tran Minh Giao Nguyen,** CY Cergy Paris Univ. (France); **Edwin W. H. Jager,** Linköping Univ. (Sweden); **Frederic Vidal, Cédric Plesse,** CY Cergy Paris Univ. (France)

12945-23 • 04:40 PM - 05:00 PM
On the time response properties predicted from the exact transfer function of a multiphysics model of IPMC sensors
Author(s): **Kosetsu Ishikawa,** Toyohashi Univ. of Technology (Japan); **Zicai Zhu,** Xi'an Jiaotong Univ. (China); **Kinji Asaka,** Ritsumeikan Univ. (Japan); **Toshiki Hiruta, Kentaro Takagi,** Toyohashi Univ. of Technology (Japan)

12945-24 • 05:00 PM - 05:20 PM
Heat engine driven by twisted and coiled actuator
Author(s): **Burhan Bin Asghar Abbasi,** Univ. of Wollongong (Australia)

12945-25 • 05:20 PM - 05:40 PM
Dynamic/static ionic composite sensor
Author(s): **Qian Yang,** Univ. of Tartu (Estonia), Xi'an Jiaotong Univ. (China); **Longfei Chang,** Univ. of Tartu (Estonia), Hefei Univ. of Technology (China); **Qiao Hu,** Xi'an Jiaotong University (China); **Veiko Vunder,** University of Tartu (Estonia); **Janno Torop,** Univ. of Tartu (Estonia); **Heiki Kasemägi**, **Teet Tilk,** University of Tartu (Estonia); **Alvo Aabloo,** Univ. of Tartu (Estonia)

POSTER SESSION - TUESDAY

26 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Tuesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12945-17 • 06:00 PM - 07:30 PM
Influence of genetically modified proteins on the electro-mechanical properties of silicone elastomers
Author(s): **Florina-Elena Comanici, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

12945-43 • 06:00 PM - 07:30 PM
Carbon based printed electrodes for DEAs: study of pad, inkjet, and stencil printing
Author(s): **Simon Holzer**, **Armando Walter**, **Stefania Konstantinidi**, **Thomas Martinez**, **Yoan Civet, Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

12945-44 • 06:00 PM - 07:30 PM
Inversing the actuation cycle of dielectric elastomer actuators for a facial prosthesis
Author(s): **Stefania Konstantinidi**, **Quentin De Menech**, **Thomas Martinez**, **Paolo Germano**, **Alexis Boegli**, **Yoan Civet, Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

12945-45 • 06:00 PM - 07:30 PM
Dielectric elastomer actuator with electro adhesion for a vibration excitation of a conductive structure
Author(s): **Toshiki Hiruta**, **Junya Ohno, Kentaro Takagi,** Toyohashi Univ. of Technology (Japan)

12945-47 • 06:00 PM - 07:30 PM
Impact of moisture absorption on the performance of a polyurethane-based dielectric elastomer actuator
Author(s): **Hans Liebscher**, **Markus Koenigsdorff,** TU Dresden (Germany); **Jishnu Nirmala Suresh**, **Sven Wießner,** Leibniz-Institut für Polymerforschung Dresden e.V. (Germany); **Gerald Gerlach,** TU Dresden (Germany)

12945-48 • 06:00 PM - 07:30 PM
Soft touch sensor for the reading of touch position and force
Author(s): **Eric Chang**, **Masoumeh H. Mahmoudinezhad**, **Iain A. Anderson, Samuel Rosset,** The Univ. of Auckland (New Zealand)

12945-49 • 06:00 PM - 07:30 PM
Advancing dielectric elastomers in soft robotics: project BROADCAST's multidisciplinary approach
Author(s): **Mario De Lorenzo,** TU Dresden (Germany)

12945-52 • 06:00 PM - 07:30 PM
A novel method for developing a tube-shaped IPMC actuator
Author(s): **Nadia Triki**, **Julian Kunze,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Daniel Bruch,** Univ. des Saarlandes (Germany); **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Paul Motzki,** Univ. des Saarlandes (Germany), Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 6: MATERIALS, FABRICATION, AND CHARACTERIZATION II

27 March 2024 • 10:30 AM - 12:30 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **Paul Motzki**, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Qibing Pei**, Univ. of California, Los Angeles (United States)

12945-26 • 10:30 AM - 10:50 AM
Highly anisotropic carbon fiber electrodes for DEAs and their dynamic non-monotonic conductive properties
Author(s): **Markus Koenigsdorff,** TU Dresden (Germany); **Johannes Mersch,** Johannes Kepler University (Austria); **Stefania Konstantinidi**, **Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Gerald Gerlach,** TU Dresden (Germany)

12945-27 • 10:50 AM - 11:10 AM
Fully inkjet-printed dielectric elastomer actuators
Author(s): **Giulio Gallucci**, **Yantong Wu**, **Marcel Tichem, Andres Hunt,** Technische Univ. Delft (Netherlands)

12945-28 • 11:10 AM - 11:30 AM
Frequency response of fiber reinforced DEAs
Author(s): **Stefania Konstantinidi,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Markus Koenigsdorff,** TU Dresden (Germany); **Thomas Martinez**, **Yoan Civet,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Gerald Gerlach,** TU Dresden (Germany); **Yves Perriard,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

12945-29 • 11:30 AM - 11:50 AM
Multilayer dielectric elastomer actuators: processing and characterization in an out-of-plane actuator configuration
Author(s): **Daniel Pinkal**, **Sven-Oliver Seidel, Michael Wegener,** Fraunhofer-Institut für Angewandte Polymerforschung IAP (Germany)

12945-30 • 11:50 AM - 12:10 PM
Selective laser-beam degradation for sheet-to-sheet manufacturing process of dielectric elastomer transducers
Author(s): **Tim Krüger, Jürgen Maas,** Technische Univ. Berlin (Germany)

12945-50 • 12:10 PM - 12:30 PM
Transparent stretchable compliant electrodes for hydrophobic substrates using PEDOT:PSS/PDMS composite ink
Author(s): **Milan Shrestha**, **Leonardus Depari**, **Abhinay Shreeram, Edwin Hang Tong Teo,** Nanyang Technological Univ. (Singapore)

Lunch Break 12:30 PM - 02:00 PM

SESSION 7: SIMULATION

27 March 2024 • 02:00 PM - 03:00 PM | Hilton, International Ballroom III (2nd Floor)

12945-31 • 02:00 PM - 02:20 PM
Finite element modeling and numerical investigation of the effects of miniaturization on the performance of dielectric elastomer actuators
Author(s): **Alberto Priuli**, **Saverio Addario,** Univ. des Saarlandes (Germany); **Sipontina Croce,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Jonas Hubertus**, **Günter Schultes,** Hochschule für Technik und Wirtschaft des Saarlandes (Germany); **Gianluca Rizzello,** Univ. des Saarlandes (Germany)

12945-32 • 02:20 PM - 02:40 PM
Characterization of HASEL actuator performance using dimensional analysis
Author(s): **Alexandrea Washington,** Univ. of Nevada, Las Vegas (United States); **Ji Su,** NASA Langley Research Ctr. (United States); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

12945-33 • 02:40 PM - 03:00 PM
Unveiling design criteria of hollow fibers dielectric elastomer actuators: a computational and experimental study
Author(s): **Sina Jafarzadeh**, **Maxim Gokova**, **Zhaoqing Kang**, **Liyun Yu, Anne Ladegaard Skov,** Technical Univ. of Denmark (Denmark)

Coffee Break 03:00 PM - 03:30 PM

SESSION 8: SENSORS AND STRAIN

27 March 2024 • 03:30 PM - 05:30 PM | Hilton, International Ballroom III (2nd Floor)
Session Chair(s): **John D. W. Madden**, The Univ. of British Columbia (Canada); **Kwang Jin Kim**, Univ. of Nevada, Las Vegas (United States)

12945-35 • 03:30 PM - 03:50 PM
Deformation mapping in dielectric elastomer actuators using electrical impedance tomography
Author(s): **Richie Ellingham**, **Yeni Choi, Timothy J. Giffney,** Univ. of Canterbury (New Zealand)

12945-36 • 03:50 PM - 04:10 PM
Soft capacitive strain sensor based on dielectric elastomers for smart machine elements
Author(s): **Artem Prokopchuk**, **Arthur Ewert**, **Johannes D. M. Menning**, **Andreas Richter**, **Berthold Schlecht**, **Thomas Wallmersperger,** TU Dresden (Germany); **Ernst-Friedrich Markus Henke,** TU Dresden (Germany), PowerOn Ltd. (New Zealand)

12945-37 • 04:10 PM - 04:30 PM
Shielded fringe field compression sensors for open ocean applications
Author(s): **Arne Bruns**, **Gabor Papotti**, **Masoumeh H. Mahmoudinezhad, Iain A. Anderson,** The Univ. of Auckland (New Zealand)

12945-38 • 04:30 PM - 04:50 PM
Printed stretchable dielectric sensor grids for pressure monitoring in orthopedics
Author(s): **Sina Martin**, **Lukas Gugel**, **Sophie Schedel**, **Sebastian Reitelshöfer, Jörg Franke,** Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)

12945-39 • 04:50 PM - 05:10 PM
Electromechanical characterization of piezoresistive carbon-elastomer composites
Author(s): **Logan Ritchie,** The Univ. of Auckland (New Zealand); **Markus Henke,** TU Dresden (Germany); **Elke Pahl, Iain A. Anderson,** The Univ. of Auckland (New Zealand)

12945-40 • 05:10 PM - 05:30 PM
Sensing like aquatic organisms: using electroactive polymers (EAPs) in an artificial lateral line system
Author(s): **Nazanin Minaian**, **Daniel Fisher, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

CONFERENCE 12946

Active and Passive Smart Structures and Integrated Systems XVIII

25 - 28 March 2024 | Hilton, Gallerie I/II (1st Floor)

Conference Chair(s): **Serife Tol,** Univ. of Michigan (United States)

Conference Co-Chair(s): **Guoliang Huang,** Univ. of Missouri (United States); **Xiaopeng Li,** Toyota Research Institute, North America (United States); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Shima Shahab,** Virginia Polytechnic Institute and State Univ. (United States); **Jinkyu Yang,** Univ. of Washington (United States)

Program Committee: **Amir H. Alavi,** Univ. of Pittsburgh (United States); **Steven R. Anton,** Tennessee Technological Univ. (United States); **Andres F. Arrieta,** Purdue Univ. (United States); **Hiroshi Asanuma,** Chiba Univ. (Japan); **Diann E. Brei,** Univ. of Michigan (United States); **Matthew Bryant,** North Carolina State Univ. (United States); **Gregory P. Carman,** Univ. of California, Los Angeles (United States); **Eun Jung Chae,** California State Univ., Long Beach (United States); **Seung-Bok Choi,** SUNY Korea (Korea, Republic of); **Amir H. Danesh-Yazdi,** Rose-Hulman Institute of Technology (United States); **Carlos De Marqui,** Univ. de São Paulo (Brazil); **Alper Erturk,** Georgia Institute of Technology (United States); **James M. Gibert,** Purdue Univ. (United States); **Mehrdad N. Ghasemi-Nejhad,** Univ. of Hawai'i at Manoa (United States); **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Nam Seo Goo,** Konkuk Univ. (Korea, Republic of); **Faramarz Gordaninejad,** Univ. of Nevada, Reno (United States); **Jae-Hung Han,** KAIST (Korea, Republic of); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Hyung-Jo Jung,** KAIST (Korea, Republic of); **Andrew Lee,** North Carolina State Univ. (United States); **Jung-Ryul Lee,** KAIST (Korea, Republic of); **Soobum Lee,** Univ. of Maryland, Baltimore County (United States); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Zhu Mao,** Worcester Polytechnic Institute (United States); **Jochen Mueller,** Johns Hopkins Univ. (United States); **Junrui Liang,** ShanghaiTech Univ. (China); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Fabio Semperlotti,** Purdue Univ. (United States); **Yi-Chung Shu,** National Taiwan Univ. (Taiwan); **Henry A. Sodano,** Univ. of Michigan (United States); **Yuyang Song,** Toyota Motor North America, Inc. (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Lihua Tang,** The Univ. of Auckland (New Zealand); **Kon-Well Wang,** Univ. of Michigan (United States); **Ya S. Wang,** Texas A&M Univ. (United States); **Norman M. Wereley,** Univ. of Maryland, College Park (United States); **Byeng D. Youn,** Seoul National Univ. (Korea, Republic of); **Haifeng Zhang,** Univ. of North Texas (United States); **Lei Zuo,** Univ. of Michigan (United States)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

KEYNOTE SESSION

25 March 2024 • 10:30 AM - 11:15 AM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Serife Tol**, Univ. of Michigan (United States)

12946-1 • 10:30 AM - 11:15 AM
Engineered matter with embodied programmability and mechano-intelligence (Keynote Presentation)
Author(s): **Kon-Well Wang,** Univ. of Michigan (United States)

SESSION 1: ACOUSTIC/ELASTIC METAMATERIALS I

25 March 2024 • 11:15 AM - 12:25 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Serife Tol**, Univ. of Michigan (United States)

12946-2 • 11:15 AM - 11:45 AM
Super-resolution acoustic imaging with acousto-optical metasurfaces *(Invited Paper)*
Author(s): **Bogdan Popa,** Univ. of Michigan (United States)

12946-3 • 11:45 AM - 12:05 PM
Reconfigurable mechanical metamaterials based on Tachi-Miura Polyhedron
Author(s): **Yuyang Song,** Toyota Motor North America, Inc. (United States); **Koshiro Yamaguchi**, **Yasuhiro Miyazawa,** Univ. of Washington (United States), Seoul National Univ. (Korea, Republic of); **Jinkyu Yang,** Univ. of Washington (United States)

12946-4 • 12:05 PM - 12:25 PM
Scalable active acoustic metamaterials with programmable bulk modulus and mass density tensor
Author(s): **Dylan A. Kovacevich, Bogdan-Ioan Popa,** Univ. of Michigan (United States)

Lunch Break 12:25 PM - 02:15 PM

SESSION 2: PIEZOELECTRIC METAMATERIALS

25 March 2024 • 02:15 PM - 03:35 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Guoliang Huang**, Univ. of Missouri (United States)

12946-7 • 02:15 PM - 02:35 PM
Local resonance prediction based on physics-informed machine learning in piezoelectric metamaterials
Author(s): **Ting Wang**, **Qianyu Zhou, Jiong Tang,** Univ. of Connecticut (United States)

12946-8 • 02:35 PM - 02:55 PM
Tailoring electro-momentum coupling in piezoelectric metamaterials with resonant shunts
Author(s): **Hrishikesh Danawe, Serife Tol,** Univ. of Michigan (United States)

12946-9 • 02:55 PM - 03:15 PM
Non-reciprocal dispersion tailoring in non-local piezoelectric metamaterials
Author(s): **Muhammad Bilal Khan, Christopher Sugino,** Stevens Institute of Technology (United States)

12946-10 • 03:15 PM - 03:35 PM **(CANCELLED)**
Topological interface states in interconnected piezoelectric metamaterials
Author(s): **Luis Alfredo Perez Martinez**, **Carlos De Marqui,** Univ. de São Paulo (Brazil); **Danilo Beli,** Technische Univ. Eindhoven (Netherlands)

Coffee Break 03:35 PM - 04:05 PM

SESSION 3: METASURFACES AND DATA-DRIVEN METHODS

25 March 2024 • 04:05 PM - 05:25 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Rico Schmidt**, Univ. at Buffalo (United States)

12946-11 • 04:05 PM - 04:25 PM
Parallel mechanical computing via temporally modulated metasurfaces
Author(s): **Mohamed Mousa, Mostafa A. Nouh,** Univ. at Buffalo (United States)

12946-12 • 04:25 PM - 04:45 PM
A locally resonant non-contact absorber based on electromagnetic induction for vibration suppression
Author(s): **Joshua Dupont, Jiong Tang,** Univ. of Connecticut (United States)

12946-13 • 04:45 PM - 05:05 PM
Equilibrium learning: inverse design of intelligent mechanical machines for prescribed behavior control
Author(s): **Jiaji Chen**, **Xuanbo Miao**, **Hongbin Ma, Guoliang Huang,** Univ. of Missouri (United States)

12946-14 • 05:05 PM - 05:25 PM
Passive metasurface for tunable hotspots in dispersive media based on generalized Snell's law
Author(s): **Sinuhé Perea-Puente, Francisco J. Rodriguez-Fortuno,** King's College London (United Kingdom)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: ACOUSTIC/ELASTIC METAMATERIALS II

26 March 2024 • 10:30 AM - 12:10 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Xiaopeng Li**, Toyota Research Institute, North America (United States)

12946-16 • 10:30 AM - 10:50 AM
Maxon-like ultrasound in elastic metabeam
Author(s): **Peng Zhang**, **Yunya Liu**, **Keping Zhang**, **Yuning Wu**, **Fei Chen,** The Univ. of Utah (United States); **Yi Chen,** Karlsruher Institut für Technologie (Germany); **Pai Wang, Xuan Zhu,** The Univ. of Utah (United States)

12946-17 • 10:50 AM - 11:10 AM
Metamaterial design technologies toward in-space manufacturing
Author(s): **Wei-Chun Lu**, **Othman Oudghiri-Idrissi, Serife Tol,** Univ. of Michigan (United States)

12946-82 • 11:10 AM - 11:30 AM
A roadmap for truncation resonance placement in lattice-based phononic materials
Author(s): **Hasan B Al Ba'ba'a,** Union College (United States); **Hosam Yousef,** Univ. at Buffalo (United States); **Mostafa A. Nouh,** Univ at Buffalo (United States)

12946-19 • 11:30 AM - 11:50 AM
Development of an auxetic mounting structure for refractive optical systems
Author(s): **Johannes Frasch,** Fraunhofer-Institut für Angewandte Optik und Feinmechanik IOF (Germany), Friedrich-Schiller-Univ. Jena (Germany); **Henrik von Lukowicz, Stefan Risse,** Fraunhofer-Institut für Angewandte Optik und Feinmechanik IOF (Germany)

12946-84 • 11:50 AM - 12:10 PM
Piezoelectric compensation of structural damping in metamaterial beams: stability and performance analysis
Author(s): **Hossein Alimohammadi**, **Kristina Vassiljeva,** Tallinn Univ. of Technology (Estonia); **S. Hassan HosseinNia,** Delft University of Technology (Netherlands); **Peeter Ellervee, Eduard Petlenkov,** Tallinn Univ. of Technology (Estonia)

Lunch Break 12:10 PM - 02:00 PM

SESSION 5: TOPOLOGICAL MODES AND NONLINEAR METAMATERIALS

26 March 2024 • 02:00 PM - 03:00 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Serife Tol**, Univ. of Michigan (United States)

12946-20 • 02:00 PM - 02:20 PM
Uncovering higher-order topological states in fractal mechanical metamaterials
Author(s): **Patrick Dorin, Kon-Well Wang,** Univ. of Michigan (United States)

12946-83 • 02:20 PM - 02:40 PM
Merging topological bandgaps in a programmable piezoelectric metamaterial to realize multiple interface modes
Author(s): **Prabhakaran Manogharan**, **Joseph Shedleski, Alper Erturk,** Georgia Institute of Technology (United States)

12946-22 • 02:40 PM - 03:00 PM
The morphing of topological modes in continuum elastic medium via non-Hermitian skin effect
Author(s): **Honghua Qian,** Univ. of Missouri (United States)

Coffee Break 03:00 PM - 03:30 PM

SESSION 6: BANDGAP AND DISPERSION ENGINEERING

26 March 2024 • 03:30 PM - 05:10 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Christopher Sugino**, Stevens Institute of Technology (United States)

12946-24 • 03:30 PM - 03:50 PM
Quantum computing for dispersion bands
Author(s): **Yunya Liu, Pai Wang,** The Univ. of Utah (United States)

12946-25 • 03:50 PM - 04:10 PM
Modeling of 3-D printed membrane-type acoustic metamaterial unit cells and investigating the dynamic behaviors
Author(s): **Ugur Dinçer**, **Stephan Algermissen**, **Malte Misol, Hans Peter Monner,** Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany)

12946-26 • 04:10 PM - 04:30 PM
Inerter-based metamaterials to overcome fundamental challenges in creating Hz and sub-Hz band gaps
Author(s): **Faisal Jamil**, **Fei Chen,** The Univ. of Utah (United States); **Bolei Deng,** Georgia Institute of Technology (United States); **Robert G. Parker, Pai Wang,** The Univ. of Utah (United States)

12946-27 • 04:30 PM - 04:50 PM
Any dispersion relation you want
Author(s): **Arash Kazemi**, **Kshiteej Deshmukh**, **Fei Chen**, **Yunya Liu,** The Univ. of Utah (United States); **Bolei Deng,** Georgia Institute of Technology (United States); **Henry C. Fu, Pai Wang,** The Univ. of Utah (United States)

12946-28 • 04:50 PM - 05:10 PM
Enhanced seismic wave attenuation in graded seismic metamaterials with novel unit cells
Author(s): **Hongshan Pan,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Zequn Wang,** Univ. of Electronic Science and Technology of China (China); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: ENERGY HARVESTING AND SCAVENGING I

27 March 2024 • 10:30 AM - 12:10 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Christopher Sugino**, Stevens Institute of Technology (United States)
Sessions 7-10 run concurrently with sessions 11-13

12946-29 • 10:30 AM - 10:50 AM
Comparative studies on galloping energy harvesters with optimally designed leeward surface protrusions
Author(s): **Juntong Xing**, **Masoud Rezaei, Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

12946-30 • 10:50 AM - 11:10 AM
Harnessing energy from low-frequency vibrations with a magnetic gear-based electromagnetic energy harvester
Author(s): **Peilun Yin**, **Angeline K. David**, **Lihua Tang, Kean C. Aw,** The Univ. of Auckland (New Zealand)

12946-31 • 11:10 AM - 11:30 AM
Design of piezoelectric energy harvesters for cardiac applications based on medical image processing
Author(s): **Leila Talebpour**, **Amit Kumar Bhayadia**, **Anthony Olivett, M. Amin Karami,** Univ. at Buffalo (United States)

12946-32 • 11:30 AM - 11:50 AM
Wireless sensor node powered by piezoelectric vibration energy harvester for vibrational mode identification and structural health monitoring
Author(s): **Takaharu Yamada**, **Haruhiko Asanuma,** Kanazawa Univ. (Japan); **Yushin Hara,** Tohoku Univ. (Japan)

12946-33 • 11:50 AM - 12:10 PM
Mechanical input energy optimization of quasi-static-toggling electromagnetic energy harvester
Author(s): **Yu Yin,** ShanghaiTech Univ. (China); **Guobiao Hu,** Hong Kong Univ. of Science and Technology (China); **Junrui Liang,** ShanghaiTech Univ. (China)

Lunch Break 12:10 PM - 01:40 PM

SESSION 8: ENERGY HARVESTING AND SCAVENGING II

27 March 2024 • 01:40 PM - 03:20 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Juntong Xing**, The Chinese Univ. of Hong Kong (Hong Kong, China)
Sessions 7-10 run concurrently with sessions 11-13

12946-37 • 01:40 PM - 02:00 PM
Experimentally optimized and field validated three-dimensional electromagnetic energy harvester for smart farming applications
Author(s): **David Blaževic**, **Jesse Ranta,** Tampere Univ. (Finland); **Marla Grunewald,** Technische Univ. Braunschweig (Germany); **Yoshito Mizukawa,** Tampere Univ. (Finland); **Jasenka Dizdarevic,** Technische Univ. Braunschweig (Germany); **Riitta Niiranen,** Ahlmanin koulun Säätiö (Finland); **Paavo Rasilo,** Tampere Univ. (Finland); **Admela Jukan,** Technische Univ. Braunschweig (Germany)

12946-34 • 02:00 PM - 02:20 PM
Simulation of a bio-inspired, bistable energy harvester
Author(s): **Mrunal Bhalerao,** Virginia Polytechnic Institute and State Univ. (United States); **Muhammad Hajj,** Stevens Institute of Technology (United States); **Lei Zuo,** Univ. of Michigan (United States)

12946-35 • 02:20 PM - 02:40 PM
Power and bandwidth analysis of vibration-based piezoelectric energy harvesting systems using electrically induced damping
Author(s): **Yabin Liao,** Embry-Riddle Aeronautical Univ. (United States); **Feng Qian,** Penn State Behrend (United States); **Yi-Chung Shu,** National Taiwan Univ. (Taiwan)

12946-36 • 02:40 PM - 03:00 PM
Low-cost micro wind turbine control system with monitoring and braking capabilities
Author(s): **Diego Aponte-Roa**, **Edgardo Ortiz-Rodríguez**, **Jorge E. Vélez-Miranda**, **Santiago A. Goenaga-Buelvas**, **Dylan Rodríguez-Flores, Alex D. Santiago-Vargas,** Univ. Ana G. Méndez (United States)

12946-38 • 03:00 PM - 03:20 PM
Piezoelectric annular stable broadband vibration energy harvesting
Author(s): **Jiawen Xu,** Southeast Univ. (China)

Coffee Break 03:20 PM - 03:50 PM

SESSION 9: ENERGY HARVESTING AND SCAVENGING III

27 March 2024 • 03:50 PM - 04:30 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Lihua Tang**, The Univ. of Auckland (New Zealand)
Sessions 7-10 run concurrently with sessions 11-13

12946-39 • 03:50 PM - 04:10 PM
Physics-informed neural network for parameter identification in a piezoelectric harvester
Author(s): **Chin-Yu Bai**, **Fang-Yu Yeh, Yi-Chung Shu,** National Taiwan Univ. (Taiwan)

12946-40 • 04:10 PM - 04:30 PM
Experimental investigation of optimal damping ratio for magnetostrictive energy harvester under free vibration
Author(s): **Yoshito Mizukawa**, **Jesse Ranta**, **David Blaževic, Paavo Rasilo,** Tampere Univ. (Finland)

SESSION 10: PASSIVE AND ACTIVE VIBRATION ISOLATION SYSTEMS

27 March 2024 • 04:30 PM - 05:50 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Lihua Tang**, The Univ. of Auckland (New Zealand)
Sessions 7-10 run concurrently with sessions 11-13

12946-85 • 04:30 PM - 04:50 PM
Exploring internally coupled resonator's dynamics and spatial variability in metamaterials for vibration suppression
Author(s): **Hossein Alimohammadi**, **Kristina Vassiljeva,** Tallinn Univ. of Technology (Estonia); **S. Hassan HosseinNia,** Delft University of Technology (Netherlands); **Eduard Petlenkov,** Tallinn Univ. of Technology (Estonia)

12946-42 • 04:50 PM - 05:10 PM
A Parametric Study on the Energy Dissipation Capability of Frictional Mechanical Metamaterials Engineered for Vibration Isolation
Author(s): **Shayan Khosravi, Mohsen Amjadian,** The Univ. of Texas Rio Grande Valley (United States)

12946-43 • 05:10 PM - 05:30 PM
Design of lightweight broadband flexural wave absorber for noise and vibration attenuation through topological optimization
Author(s): **Xiaopeng Li**, **Taehwa Lee**, **Ziqi Yu,** Toyota Motor Engineering & Manufacturing North America, Inc. (United States); **Yuyang Song,** Toyota Motor North America, Inc. (United States); **Xintong Deng,** Toyota Motor Engineering & Manufacturing North America, Inc. (United States)

12946-44 • 05:30 PM - 05:50 PM
Innovative wave energy converter inspired latched mass damper for vibration control
Author(s): **Hao Wang, Songye Zhu,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

SESSION 11: SMART SENSING AND SIGNAL PROCESSING FOR DIAGNOSTICS AND PROGNOSTICS

27 March 2024 • 10:30 AM - 11:50 AM | Hilton, Gallerie II (1st Floor)
Session Chair(s): **Jiong Tang**, Univ. of Connecticut (United States)
Sessions 7-10 run concurrently with sessions 11-13

12946-45 • 10:30 AM - 10:50 AM
Triboelectric metamaterial for health monitoring of the total knee replacement
Author(s): **Osama Abdalla,** Binghamton Univ. (United States); **Emre Salman**, **Milutin Stanacevic,** Stony Brook Univ. (United States); **Ryan Willing,** Western Univ. (Canada); **Shahrzad Towfighian,** Binghamton Univ. (United States)

12946-47 • 10:50 AM - 11:10 AM
Development of measurement method of effective elastic properties of 3D printed CFRP plates using laser ultrasonic technique
Author(s): **Jaeho Lee, Jung-Ryul Lee,** KAIST (Korea, Republic of)

12946-48 • 11:10 AM - 11:30 AM
Multi-location fault detection with piezoelectric arrays and multi-task CNN learning
Author(s): **Yu-Cheng Chiu**, **Yu-Cheng Lo, Yi-Chung Shu,** National Taiwan Univ. (Taiwan)

12946-63 • 11:30 AM - 11:50 AM
Self-sustained mechanical oscillator with SMA coil for controller-free locomotion
Author(s): **Ziyang Zhou, Suyi Li,** Virginia Polytechnic Institute and State Univ. (United States)

Lunch Break 11:50 AM - 01:20 PM

SESSION 12: MODELING, OPTIMIZATION, SIGNAL PROCESSING, CONTROL, AND DESIGN OF INTEGRATED SYSTEMS

27 March 2024 • 01:20 PM - 03:20 PM | Hilton, Gallerie II (1st Floor)
Session Chair(s): **Haifeng Zhang**, Univ. of North Texas (United States)
Sessions 7-10 run concurrently with sessions 11-13

12946-49 • 01:20 PM - 01:40 PM
Generating surface acoustic wave on a non-metallic plate using a piezoelectric actuator with a uniform electrode design
Author(s): **Yu-Yi Chang**, **Yu-Hsiang Hsu, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

12946-50 • 01:40 PM - 02:00 PM
Development of 3D scan integrated robot arm control for pulse-echo laser ultrasonic testing
Author(s): **King Sum Ma**, **Kyu-Jin Lee, Jung-Ryul Lee,** KAIST (Korea, Republic of)

12946-51 • 02:00 PM - 02:20 PM
Optimizing crystal cut and the frequency shift of a langasite surface acoustic pressure sensor with new FEM approach
Author(s): **Masoud Naghdi**, **Haifeng Zhang**, **Sreejith Sreedharan Vattaparambil**, **Shuai Ju**, **Mitali H. Desai, Sai K. Chinka,** Univ. of North Texas (United States)

12946-52 • 02:20 PM - 02:40 PM
Fluid depth sensor using surface acoustic wave resonator
Author(s): **Sreejith Sreedharan Vattaparambil**, **Masoud Naghdi,** Univ. of North Texas (United States); **Muhammad Zubair Aslam,** Univ. of Pennsylvania (United States); **Mitali H. Desai**, **Shuai Ju**, **Sai K. Chinka, Haifeng Zhang,** Univ. of North Texas (United States)

12946-53 • 02:40 PM - 03:00 PM
Online model-based structural damage detection in electronic assemblies
Author(s): **Emmanuel A. Ogunniyi**, **Joud Satme, Austin R. J. Downey,** Univ. of South Carolina (United States)

12946-62 • 03:00 PM - 03:20 PM
Actuation study of self-reconfigurable bistable robots based on Kresling tower
Author(s): **Kejun Hu**, **Pierre Roux**, **François Marionnet,** FEMTO-ST (France); **Morvan Ouisse,** FEMTO-ST, Univ. de Franche-Comté, CNRS (France); **Kanty Rabenorosoa,** FEMTO-ST (France)

Coffee Break 03:20 PM - 03:50 PM

SESSION 13: ACOUSTICS AND FLUID-STRUCTURE INTERACTION

27 March 2024 • 03:50 PM - 05:10 PM | Hilton, Gallerie II (1st Floor)
Session Chair(s): **Othman Oudghiri-Idrissi**, Univ. of Michigan (United States)
Sessions 7-10 run concurrently with sessions 11-13

12946-54 • 03:50 PM - 04:10 PM
Increasing temperature sensing resolution using multiple non-continuous cascade connected SAWRs
Author(s): **Mitali H. Desai**, **Haifeng Zhang**, **Sreejith Sreedharan Vattaparambil**, **Shuai Ju**, **Masoud Naghdi, Sai K. Chinka,** Univ. of North Texas (United States)

12946-55 • 04:10 PM - 04:30 PM
Breaking the limitations of local impedance noise control: passivity, and scattering performances of the Advection Boundary Law
Author(s): **Emanuele De Bono**, **Manuel Collet,** Ecole Centrale de Lyon (France); **Morvan Ouisse,** FEMTO-ST, Univ. de Franche-Comté (France)

12946-56 • 04:30 PM - 04:50 PM
The Advection Boundary Law in presence of mean-flow and spinning modes
Author(s): **Emanuele De Bono**, **Manuel Collet,** Ecole Centrale de Lyon (France); **Morvan Ouisse,** FEMTO-ST, Univ. de Franche-Comté (France); **Edouard Salze,** Ecole Centrale de Lyon (France); **Maxime Volery**, **Hervé Lissek,** Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Jacky Mardjono,** Safran Aircraft Engines (France)

12946-57 • 04:50 PM - 05:10 PM
Study on the generation of surface acoustic waves by using a ring-type piezoelectric actuator on a thick ringdisk
Author(s): **Wei Chieh Hsu**, **Yu-Hsiang Hsu, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

POSTER SESSION - WEDNESDAY

27 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Wednesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12946-78 • 06:00 PM - 07:30 PM
A model comparing and combining NIR and THz spectroscopy to enhance the prediction accuracy of components in food samples
Author(s): **Qingxia Li, Da-Wen Sun,** Univ. College Dublin (Ireland)

12946-80 • 06:00 PM - 07:30 PM
Quasi-zero stiffness metamaterial structure design and vibration isolation performance regulation research
Author(s): **Han Zhang,** Institute of Acoustics (China)

12946-81 • 06:00 PM - 07:30 PM
Investigation of the design of a piezoelectric deicing system based on extension resonant modes
Author(s): **Modar Jomaa,** École normale supérieure Paris-Saclay (France); **Dejan Vasic,** CY Cergy Paris Univ. (France); **François Costa,** Univ. Paris-Est Crétail (France); **Pierre-Etienne Lévy,** École normale supérieure Paris-Saclay (France); **Marwan Ali,** Safran (France)

Thursday 28 March 2024

SESSION 14: AIRCRAFT, MAV/UAV, AND MORPHING SYSTEMS

28 March 2024 • 08:30 AM - 09:50 AM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Serife Tol**, Univ. of Michigan (United States)
Session 14 runs concurrently with session 16

12946-58 • 08:30 AM - 08:50 AM
Development and performance analysis of deployable reflector based on origami flasher pattern
Author(s): **Keon Ik Jang**, **Tae-Hyun Kim**, **Dae-Young Lee, Jae-Hung Han,** KAIST (Korea, Republic of)

12946-59 • 08:50 AM - 09:10 AM
Recessed pyramid origami module and its tessellation
Author(s): **Tae-Hyun Kim**, **Keon-Ik Jang**, **Dae-Young Lee, Jae-Hung Han,** KAIST (Korea, Republic of)

12946-60 • 09:10 AM - 09:30 AM
In-space manufacturing of morphing electronics
Author(s): **Isaac J. Little**, **Adam Tran, Zhangxian Deng,** Boise State Univ. (United States)

12946-61 • 09:30 AM - 09:50 AM
Aerodynamic performance of the electric vertical take-off and landing (eVTOL)
Author(s): **Shimpei Tomimoto**, **Eun Jung Chae, Chae (Chris) Lee,** California State Univ., Long Beach (United States)

Coffee Break 09:50 AM - 10:20 AM

SESSION 15: SMA- AND PIEZO-BASED MATERIALS AND SYSTEMS

28 March 2024 • 10:20 AM - 12:00 PM | Hilton, Gallerie I (1st Floor)
Session Chair(s): **Carlos De Marqui**, Univ. de São Paulo (Brazil); **Hrishikesh Danawe**, Univ. of Michigan (United States)

12946-64 • 10:20 AM - 10:40 AM
Modeling and analysis of a tunable topological demutiplexer with piezoelectric and shape memory alloy attachments
Author(s): **Virgilio J. Caetano, Carlos De Marqui,** Univ. de São Paulo (Brazil)

12946-67 • 10:40 AM - 11:00 AM
Research on the self-heating of PCSA driven by high-frequency and high electric field
Author(s): **Hao Sun, Dai-Hua Wang,** Chongqing Univ. (China)

12946-68 • 11:00 AM - 11:20 AM
Monitoring and control of crack propagation of flexural SMA-fiber reinforced concrete members
Author(s): **Abolghassem Zabihollah**, **Rajesh Vuddandam, Raul Sandoval,** Tarleton State Univ. (United States)

12946-70 • 11:20 AM - 11:40 AM
Shape memory alloy and electrostatic brake hybrid actuator system for energy-efficient actuation strategies
Author(s): **Vignesh Venkatachalam,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Joshua Mayer**, **Daniel Bruch,** Univ. des Saarlandes (Germany); **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Gianluca Rizzello,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

12946-71 • 11:40 AM - 12:00 PM
Design of a modular lifespan test bench for redirected shape memory alloy wires
Author(s): **Carmelo Pirritano**, **Joshua Mayer**, **Dominik Scholtes**, **Yannik Goergen**, **Tom Gorges**, **Sophie Nalbach,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Stefan S. Seelecke,** Univ. des Saarlandes (Germany); **Paul Motzki,** Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany)

SESSION 16: MAGNETO-RHEOLOGICAL SYSTEMS

28 March 2024 • 08:00 AM - 10:00 AM | Hilton, Gallerie II (1st Floor)
Session Chair(s): **Xiaopeng Li**, Toyota Research Institute, North America (United States)
Session 14 runs concurrently with session 16

12946-72 • 08:00 AM - 08:20 AM
Optimizing the structural shape of magneto-rheological elastomers for enhanced performance
Author(s): **Youjin Kim**, **Seohyun Min**, **Chanwoo Lee, Hyung-Jo Jung,** KAIST (Korea, Republic of)

12946-73 • 08:20 AM - 08:40 AM
Effect of particle sedimentation on the dynamic properties of magnetorheological sandwich beams
Author(s): **Christian G. Vazquez**, **Juan Ortega, Jeffrey L. Kauffman,** Univ. of Central Florida (United States)

12946-74 • 08:40 AM - 09:00 AM
Experimental assessment of long-term durability of MR fluids
Author(s): **Andreas Lios**, **Richard E. Christenson, Jiong Tang,** Univ. of Connecticut (United States)

12946-75 • 09:00 AM - 09:20 AM
Semi-active vibration isolation design using magnetorheological damper
Author(s): **Sarah Gordon**, **Richard E. Christenson, Jiong Tang,** Univ. of Connecticut (United States)

12946-76 • 09:20 AM - 09:40 AM
Comparison of real time hybrid testing of magnetorheological damper with pure numerical and physical systems
Author(s): **Nicholas Nguyen**, **Richard E. Christenson, Jiong Tang,** Univ. of Connecticut (United States)

12946-77 • 09:40 AM - 10:00 AM
Mechanical characterization and dynamic modeling of magnetorheological elastomers under shear mode
Author(s): **Sina Tavassoli Naini**, **Seyed Alireza Moezi, Ramin Sedaghati,** Concordia Univ. (Canada)

DIGITAL POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + NDE 2024.

12946-15
Data-driven machine learning for optimal hourglass lattice metamaterial designs
Author(s): **Akash S.**, **Vivek Gupta**, **Tanuj Gupta, Bishakh Bhattacharya,** Indian Institute of Technology Kanpur (India)

12946-65
Tailoring of interface mode with actively controlled SMA spring
Author(s): **Tanuj Gupta**, **Vivek Gupta, Bishakh Bhattacharya,** Indian Institute of Technology Kanpur (India)

12946-66
Enhancing actuation frequency of shape memory alloy-based system with a novel evaporative cooling technique for fast cyclic applications
Author(s): **Kanhaiya Lal Chaurasiya,** Indian Institute of Technology Kanpur (India); **Navya Gupta,** Shiv Nadar Institution of Eminence (India); **Fahad Javeed,** National Institute of Technology Srinagar (India); **Virkeshwar Kumar, Bishakh Bhattacharya,** Indian Institute of Technology Kanpur (India)

12946-69

Design and development of a shape memory alloy-powered rotary variable stiffness actuator embedded with an agonist-antagonist mechanism

Author(s): **Arnav Pandey,** Indian Institute of Technology Kanpur (India); **Janees Haneef,** National Institute of Technology Srinagar (India); **Yashaswi Sinha**, **Kanhaiya Lal Chaurasiya, Bishakh Bhattacharya,** Indian Institute of Technology Kanpur (India)

CONFERENCE 12947

Behavior and Mechanics of Multifunctional Materials XVIII

27 - 28 March 2024 | Hilton, Atlantic I (2nd Floor)

Conference Chair(s): **Aimy Wissa,** Princeton Univ. (United States)

Conference Co-Chair(s): **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States); **Russell W. Mailen,** Auburn Univ. (United States)

Program Committee: **Amir Ameli,** Washington State Univ. Tri-Cities (United States); **Gregory P. Carman,** Univ. of California, Los Angeles (United States); **Constantin Ciocanel,** Northern Arizona Univ. (United States); **Marcelo J. Dapino,** The Ohio State Univ. (United States); **Mohammad H. Elahinia,** The Univ. of Toledo (United States); **Nakhiah C. Goulbourne,** Univ. of Michigan (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Darren J. Hartl,** Texas A&M Univ. (United States); **Daniel J. Inman,** Univ. of Michigan (United States); **Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States); **Dimitris C. Lagoudas,** Texas A&M Univ. (United States); **Hyeong Jae Lee,** Jet Propulsion Lab. (United States); **Donald J. Leo,** The Univ. of Georgia (United States); **Jiangyu Li,** Southern Univ. of Science and Technology (China); **Christopher S. Lynch,** Univ. of California, Riverside (United States); **Hani E. Naguib,** Univ. of Toronto (Canada); **William S. Oates,** Florida A&M Univ. - Florida State Univ. (United States); **Zoubeida Ounaies,** The Pennsylvania State Univ. (United States); **Reza Rizvi,** York Univ. (Canada); **Ralph C. Smith,** North Carolina State Univ. (United States); **Vishnu Baba Sundaresan,** Defense Advanced Research Projects Agency (United States)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks

SPIE Fellow recognition:

- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM

Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)

Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM

The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)

Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks

- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: MECHANICS OF MULTIFUNCTIONAL MATERIALS

27 March 2024 • 10:30 AM - 12:00 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Aimy Wissa**, Princeton Univ. (United States)

12947-1 • 10:30 AM - 10:50 AM
Critical buckling load distribution of thin-walled cylindrical shells: a closer look at the lower tail
Author(s): **Wen Luo,** Auburn Univ. (United States)

12947-2 • 10:50 AM - 11:20 AM
Design with the bend in mind: compliance for bones and beyond *(Invited Paper)*
Author(s): **Jared Butler,** The Pennsylvania State Univ. (United States)

12947-3 • 11:20 AM - 11:40 AM
Investigation of damages in impacted thick composite panels by NDI methods
Author(s): **Pietro Russo,** Institute of Polymers, Composites and Biomaterials, Consiglio Nazionale delle Ricerche (Italy); **Veronica Vespini**, **Sara Coppola**, **Fabiana Graziano**, **Pietro Ferraro**, **Simonetta Grilli,** Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello," CNR (Italy); **Ettore Stella**, **Massimiliano Nitti**, **Vito Renò,** Sistemi e Tecnologie Industriali Intelligenti per il Manifattuiero Avanzato, CNR (Italy); **Giuseppe Del Prete,** Leonardo SpA – Divisione Aerostrutture, Aerotech Accademy – University of Naples Federico II (Italy); **Valerio Dentico,** Leonardo SpA – Divisione Aerostrutture Strada per Monteiasi, 74023 Grottaglie (Italy); **Nicola Gallo,** Leonardo SpA – Divisione Aerostrutture Strada per Monteiasi (Italy); **Vittorio Memmolo**, **Ernesto Monaco, Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy)

12947-4 • 11:40 AM - 12:00 PM
A ferroelectric phase field study of nanoindentation contact mechanics
Author(s): **William S. Oates, Oluwafemi Ogunlana,** Florida A&M Univ. - Florida State Univ. (United States)

Lunch Break 12:00 PM - 01:30 PM

SESSION 2: MANUFACTURING AND EVALUATION OF MULTIFUNCTIONAL MATERIALS

27 March 2024 • 01:30 PM - 03:00 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Russell W. Mailen**, Auburn Univ. (United States)

12947-7 • 01:30 PM - 01:50 PM
Non-destructive three-dimensional observation of dynamic behavior inside microparticle composite rubbers using dynamic x-ray CT

Author(s): **Masami Matsubara,** Waseda Univ. (Japan); **Ryo Takara**, **Shogo Furuta**, **Khoo Pei Loon**, **Masakazu Kobayashi**, **Shozo Kawamura, Daiki Tajiri,** Toyohashi Univ. of Technology (Japan)

12947-8 • 01:50 PM - 02:10 PM
Multifractal analysis of heat transport in DLA structures
Author(s): **Mario Carvajal**, **William S. Oates, Basanta R. Pahari,** Florida A&M Univ. - Florida State Univ. (United States)

12947-9 • 02:10 PM - 02:40 PM
Novel solutions for structural protections: retrofitting impact-vulnerable structures with non-Newtonian polymers *(Invited Paper)*
Author(s): **Omar Elhawary**, **Atheeb Amjard**, **Chanel Fallon**, **Alexander Lunt, Fulvio Pinto,** Univ. of Bath (United Kingdom)

12947-6 • 02:40 PM - 03:00 PM
Statistical image reconstruction-based characterization of the corona-enabled electrostatic printed flexible sensors
Author(s): **Logan G. Schmid**, **Keala M. Sunada**, **Marina G. Wong, Long Wang,** California Polytechnic State Univ., San Luis Obispo (United States)

Coffee Break 03:00 PM - 03:30 PM

SESSION 3: ADAPTIVE MULTIFUNCTIONAL MATERIALS

27 March 2024 • 03:30 PM - 05:10 PM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Fulvio Pinto**, Univ. of Bath (United Kingdom)

12947-11 • 03:30 PM - 03:50 PM
Mechano-optoelectronic and micro-mechanical properties of conjugated polymeric thin films with nano-structured lamellae
Author(s): **Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States); **Kyungtae Kim,** Los Alamos National Lab. (United States); **Youngmin Lee,** New Mexico Institute of Mining and Technology (United States); **Yu-Ling Shen,** The Univ. of New Mexico (United States); **Sohail Ayazi, Carlos Neri Soto,** New Mexico Institute of Mining and Technology (United States)

12947-12 • 03:50 PM - 04:10 PM
Utilizing WVASE to identify Smart Optical Materials
Author(s): **John Patrick Harris,** Norfolk State Univ. (United States)

12947-13 • 04:10 PM - 04:30 PM
Self-folding behavior of bilayer films actuated by liquid crystal elastomers
Author(s): **Russell W. Mailen**, **Yi-Hung Lin,** Auburn Univ. (United States); **Braden Starver,** Morehouse College (United States); **Bryan Beckingham,** Auburn Univ. (United States)

12947-14 • 04:30 PM - 04:50 PM
Improvement of the power generation efficiency of magnetostrictive vibration generators using multiple magnetic circuits
Author(s): **Jie Zhang**, **Toshiyuki Ueno, Shota Kita,** Kanazawa Univ. (Japan)

12947-15 • 04:50 PM - 05:10 PM
Realization and experimental validation of multi-material 4D-printed self-actuating structures with two morphing phases
Author(s): **Hoomin Lee**, **Solji Han**, **Minje Kim,** Hanyang Univ. (Korea, Republic of); **Gil Ho Yoon,** Hanyang University (Korea, Republic of)

Thursday 28 March 2024

SESSION 4: PROGRAMMABLE MULTIFUNCTIONAL MATERIALS

28 March 2024 • 08:00 AM - 09:20 AM | Hilton, Atlantic I (2nd Floor)
Session Chair(s): **Mariantonieta Gutierrez Soto**, The Pennsylvania State Univ. (United States)

12947-16 • 08:00 AM - 08:20 AM
Robust control of friction-driven reconfigurable adaptive structures
Author(s): **Alejandro Palacio-Betancur**, **Chiranjeev Sohan Singh,** The Pennsylvania State Univ. (United States); **Adam Rácz**, **Mohammad Ali Maghsoudlourad**, **Viacheslav Slesarenko,** Univ. of Freiburg (Germany); **Mariantonieta Gutierrez Soto,** The Pennsylvania State Univ. (United States)

12947-17 • 08:20 AM - 08:40 AM
Magnetostrictive materials for tunable fluid pumps
Author(s): **Marcelo J. Dapino**, **Leon M. Headings**, **Mohid M. Khattak, Anthony Dolph,** The Ohio State Univ. (United States)

12947-18 • 08:40 AM - 09:00 AM
Tetra-, tri-, di-, and mono-mode metamaterials with cubic symmetry
Author(s): **Yunya Liu**, **Pai Wang**, **Christian Kern,** The Univ. of Utah (United States); **Bolei Deng,** Massachusetts Institute of Technology (United States)

12947-19 • 09:00 AM - 09:20 AM
Tunable and broadband low-frequency noise control via multifunctional polyborosiloxane thin membrane gels
Author(s): **Konstantinos Myronidis,** Univ. of Bath (United Kingdom); **Gian Piero Malfense Fierro,** The Manufacturing Technology Ctr. Ltd. (United Kingdom); **Michele Meo,** Univ. of Southampton (United Kingdom); **Fulvio Pinto,** Univ. of Bath (United Kingdom)

CONFERENCE 12948

Soft Mechatronics and Wearable Systems

25 - 28 March 2024 | Hilton, International Ballroom IV (2nd Floor)

Conference Chair(s): **Ilkwon Oh,** KAIST (Korea, Republic of)

Conference Co-Chair(s): **Sang-Woo Kim,** Yonsei Univ. (Korea, Republic of); **Maurizio Porfiri,** NYU Tandon School of Engineering (United States); **Woon-Hong Yeo,** Georgia Institute of Technology (United States)

Program Committee: **Chi Won Ahn,** National Nanofab Ctr. (Korea, Republic of); **Kean C. Aw,** The Univ. of Auckland (New Zealand); **Jeong Min Baik**, **Seunghyun Baik,** Sungkyunkwan Univ. (Korea, Republic of); **Youngsu Cha,** Korea Univ. (Korea, Republic of); **Jun Chen,** UCLA Samueli School of Engineering (United States); **Wei Chen,** The Hong Kong Polytechnic Univ. (China); **Wei Gao,** Caltech (United States); **Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India); **Jae-Woong Jeong,** KAIST (Korea, Republic of); **Gi-Woo Kim,** Inha Univ. (Korea, Republic of); **Heung Soo Kim,** Dongguk Univ. (Korea, Republic of); **Jaehwan Kim,** Inha Univ. (Korea, Republic of); **Jaehwan Kim,** Kumoh National Institute of Technology (Korea, Republic of); **Joo-Hyung Kim,** Inha Univ. (Korea, Republic of); **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of); **Yun Soung Kim,** Icahn School of Medicine at Mount Sinai (United States); **Soo Jin Adrian Koh,** Max-Planck-Institut für Intelligente Systeme (Germany); **Keon Jae Lee,** KAIST (Korea, Republic of); **Zong-Hong Lin,** National Taiwan Univ. (Taiwan); **Hani E. Naguib,** Univ. of Toronto (Canada); **Tse Nga Ng,** Univ. of California, San Diego (United States); **Simon Park,** Univ. of Calgary (Canada); **Steve Park,** KAIST (Korea, Republic of); **Jung Woo Sohn,** Kumoh National Institute of Technology (Korea, Republic of); **Kyo D. Song,** Norfolk State Univ. (United States); **Rassoul Tabassian,** Aarhus Univ. (Denmark); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan); **Limei Tian,** Texas A&M Univ. (United States); **Vijay K. Varadan,** The Pennsylvania State Univ. (United States); **Wei-Chih Wang,** Univ. of Washington (United States); **Sheng Xu,** Univ. of California, San Diego (United States); **Hargsoon Yoon,** Norfolk State Univ. (United States); **Jianfeng Zang,** Huazhong Univ. of Science and Technology (China); **Xuanhe Zhao,** Massachusetts Institute of Technology (United States)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:20 AM

SESSION 1: WEARABLE TECHNOLOGIES I

25 March 2024 • 10:20 AM - 12:10 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Woon-Hong Yeo**, Georgia Institute of Technology (United States)

12948-1 • 10:20 AM - 11:00 AM
Smart textiles for personalized health care (Keynote Presentation)
Author(s): **Jun Chen,** UCLA Samueli School of Engineering (United States)

12948-2 • 11:00 AM - 11:30 AM
Lighting up the brain: optogenetic deep brain stimulator for high-precision neuromodulation *(Invited Paper)*
Author(s): **Jae-Woong Jeong,** KAIST (Korea, Republic of)

12948-3 • 11:30 AM - 11:50 AM
A novel in-situ hemocompatibility enhancement in endovascular devices through arterial pulsation-driven surface modification
Author(s): **Mohamed S. Ibrahim,** Univ. of Pittsburgh (United States); **Sang-Ho Ye**, **William R. Wagner,** Univ. of Pittsburgh Medical Ctr. (United States), McGowan Institute for Regenerative Medicine (United States); **Youngjae Chun,** Univ. of Pittsburgh (United States), McGowan Institute for Regenerative Medicine (United States)

12948-4 • 11:50 AM - 12:10 PM
Soft, tissue-integrated devices with advanced fluid handling capabilities, biofuel-inspired self-powered biosensors, and biofluid-powered batteries
Author(s): **Amay J. Bandodkar,** North Carolina State Univ. (United States)

Lunch Break 12:10 PM - 01:40 PM

SESSION 2: WEARABLE TECHNOLOGIES II

25 March 2024 • 01:40 PM - 03:50 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Jae-Woong Jeong**, KAIST (Korea, Republic of)

12948-5 • 01:40 PM - 02:10 PM
Self-powered flexible piezo-sensor and microLED: toward commercialization *(Invited Paper)*
Author(s): **Keon Jae Lee,** KAIST (Korea, Republic of)

12948-6 • 02:10 PM - 02:40 PM
Flexible organic sensors for evaluating motor disorders *(Invited Paper)*
Author(s): **Tse Nga Ng,** Univ. of California, San Diego (United States)

12948-79 • 02:40 PM - 03:10 PM
Graphene and other 2D material-based smart textiles *(Invited Paper)*
Author(s): **Nazmul Karim,** Nottingham Trent University (United Kingdom)

12948-7 • 03:10 PM - 03:30 PM
Cardiovascular health monitoring using multiple conformal photoplethysmography devices
Author(s): **Yongkuk Lee,** Wichita State Univ. (United States)

12948-8 • 03:30 PM - 03:50 PM
A novel fusion method for intense heat detection and localization solely based on surface temperature with multi-mode DEA feedback
Author(s): **Tajbeed A. Chowdhury**, **Sebastian Gratz-Kelly,** Lehrstuhl für intelligente Materialsysteme, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany); **Giacomo Moretti,** Univ. degli Studi di Trento (Italy); **Eric Wagner,** Lehrstuhl für intelligente Materialsysteme, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Hochschule für Technik und Wirtschaft des Saarlandes (Germany); **Paul Motzki,** Lehrstuhl für intelligente Materialsysteme, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Univ. des Saarlandes (Germany); **Martina Lehser,** Lehrstuhl für intelligente Materialsysteme, Zentrum für Mechatronik und Automatisierungstechnik gGmbH (Germany), Hochschule für Technik und Wirtschaft des Saarlandes (Germany)

Coffee Break 03:50 PM - 04:10 PM

SESSION 3: WEARABLE TECHNOLOGIES III

25 March 2024 • 04:10 PM - 05:50 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Jun Chen**, UCLA Samueli School of Engineering (United States)

12948-9 • 04:10 PM - 04:40 PM
Soft bio-integrated electronics for unconventional brain-machine interfaces *(Invited Paper)*
Author(s): **Ki Jun Yu,** Yonsei Univ. (United States)

12948-10 • 04:40 PM - 05:10 PM
Soft wireless at-home sleep wearables for the clinical assessment of sleep quality and sleep apnea *(Invited Paper)*
Author(s): **Hyeonseok Kim, Woon-Hong Yeo,** Georgia Institute of Technology (United States)

12948-11 • 05:10 PM - 05:30 PM
Flexible sensor and energy harvesting technology based on ferroelectret for the acquisition of mechanical and physiological parameters close to the body
Author(s): **Michael Matthias,** Fraunhofer-Institut für Betriebsfestigkeit und Systemzuverlässigkeit LBF (Germany); **Bjoern Seipel,** Fraunhofer Institute for Structural Durability and System Reliability LBF (Germany)

12948-12 • 05:30 PM - 05:50 PM
Auxetic-architectured SMA-based wearable haptics
Author(s): **Saewoong Oh, Il-Kwon Oh,** KAIST (Korea, Republic of)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: WEARABLE TECHNOLOGIES IV

26 March 2024 • 10:30 AM - 12:20 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Keon Jae Lee**, KAIST (Korea, Republic of)

12948-14 • 10:30 AM - 11:10 AM
Skin-interfaced wearable biosensors (Keynote Presentation)
Author(s): **Wei Gao,** Caltech (United States)

12948-15 • 11:10 AM - 11:40 AM
Wearable microfluidic devices for sweat analysis *(Invited Paper)*
Author(s): **Limei Tian,** Texas A&M Univ. (United States)

12948-16 • 11:40 AM - 12:00 PM
Smart mouthguard and soft cardiac patch for health monitoring of athletes
Author(s): **Karam Kim**, **Tae Woog Kang**, **Hodam Kim**, **Sung Hoon Lee**, **Yoon Jae Lee**, **Hoon Yi, Woon-Hong Yeo,** Georgia Institute of Technology (United States)

12948-17 • 12:00 PM - 12:20 PM
Wearable and flexible multi-sensor smart patch for breathing pattern detection
Author(s): **Jalal Ahamed,** Univ. of Windsor (Canada)

Lunch Break 12:20 PM - 01:30 PM

SESSION 5: SOFT ROBOTICS I

26 March 2024 • 01:30 PM - 03:50 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Sae-Woong Oh**, KAIST (Korea, Republic of)

12948-18 • 01:30 PM - 02:00 PM
Dielectric elastomer actuators driven by mechanical energy conversion for wearable haptic vibrators *(Invited Paper)*
Author(s): **Henrik Sandström,** Uppsala Univ. (Sweden); **Yusuf Mulla**, **Jesper Edberg,** RISE Research Institutes of Sweden AB (Sweden); **Seunghee Jeong,** Uppsala Univ. (Sweden)

12948-19 • 02:00 PM - 02:30 PM
Liquid crystalline elastomer films fly in the sky *(Invited Paper)*
Author(s): **Hao Zeng, Jianfeng Yang,** Tampere Univ. (Finland)

12948-20 • 02:30 PM - 02:50 PM
Shape morphing magnetic materials using liquid metal for 3D electronics and soft robots
Author(s): **Subin Oh, Jae-Woong Jeong,** KAIST (Korea, Republic of)

12948-21 • 02:50 PM - 03:10 PM
Soft electro-ionic artificial muscles based on 3D-networked metal sulfide-graphene electrodes
Author(s): **Jaehwan Kim,** Kumoh National Institute of Technology (Korea, Republic of)

12948-22 • 03:10 PM - 03:30 PM
Multimodal motion of soft origami tripod using electrohydraulic actuator
Author(s): **Joohyeon Kang**, **Sohyun Kim, Youngsu Cha,** Korea Univ. (Korea, Republic of)

12948-23 • 03:30 PM - 03:50 PM
Tunable stiffness soft robotic gripper with embedded sensors by 3D hybrid printing
Author(s): **Justin Rejimone**, **Hyun Jae Lee**, **Keekyoung Kim, Simon Park,** Univ. of Calgary (Canada)

Coffee Break 03:50 PM - 04:10 PM

SESSION 6: SOFT ROBOTICS II

26 March 2024 • 04:10 PM - 05:50 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Rassoul Tabassian**, Aarhus Univ. (Denmark)

12948-24 • 04:10 PM - 04:40 PM
Boosting the actuation performance by growing vanadium oxide nanowires on cellulose actuators *(Invited Paper)*
Author(s): **Rassoul Tabassian,** Aarhus Univ. (Denmark), KAIST (Korea, Republic of); **Il-Kwon Oh,** KAIST (Korea, Republic of)

12948-25 • 04:40 PM - 05:10 PM
Advancements in functional carbon materials for enhanced robotic interactions: a contemporary overview *(Invited Paper)*
Author(s): **Manmatha Mahato, Il-Kwon Oh,** KAIST (Korea, Republic of)

12948-27 • 05:10 PM - 05:30 PM
3D-manufactured soft haptic actuators utilizing electrostatically driven pneumatic valves
Author(s): **I-Hui Chien**, **I-Lun He**, **Yu-Chuan Su,** National Tsing Hua Univ. (Taiwan); **Chih-Cheng Cheng, Chen-Tsai Yang,** Industrial Technology Research Institute (Taiwan)

12948-28 • 05:30 PM - 05:50 PM
Haptic-based robot hand grasping technique using reinforcement learning
Author(s): **Dogyeong Yuk, Jung Woo Sohn,** Kumoh National Institute of Technology (Korea, Republic of)

POSTER SESSION - TUESDAY

26 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Tuesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12948-57 • 06:00 PM - 07:30 PM
3D printed strong and highly conductive graphene nanoplatelets/nanocellulose films
Author(s): **Muhammad Latif**, **Yangxiaozhe Jiang**, **Giseok Park, Jaehwan Kim,** Inha Univ. (Korea, Republic of)

12948-59 • 06:00 PM - 07:30 PM
New electronic health telemetry device (Stakecare) applied in the monitoring and controlling falls of individuals
Author(s): **Andre F. S. Guedes**, **Delmonte N. Friedrich**, **Fabio M. Bock**, **Dilmar F. Isidoro,** StakeCare (Brazil); **Luis F. Casagranda,** Tecnoflex (Brazil); **Renata M. Brasil,** Porto Alegre Emergency Hospital (Brazil)

12948-60 • 06:00 PM - 07:30 PM
Modular wireless neural devices with one-touch magnetic assembly for versatile multimodal neural interfacing
Author(s): **Inho Kang, Jae-Woong Jeong,** KAIST (Korea, Republic of)

12948-61 • 06:00 PM - 07:30 PM
Biomechanical energy harvesting device for smart wearable systems
Author(s): **Ji-Seok Kim, Il-Kwon Oh,** KAIST (Korea, Republic of)

12948-62 • 06:00 PM - 07:30 PM
Development of unit cell model for prediction of large deformation in SMA-textile base actuator
Author(s): **Muhammad Umar Elahi**, **Salman Khalid**, **Jinwoo Song, Heung Soo Kim,** Dongguk Univ. (Korea, Republic of)

12948-63 • 06:00 PM - 07:30 PM
Pantograph structure based self-powered force sensor
Author(s): **Dongwon Seo**, **Giyoung Son, Jihoon Chung,** Kumoh National Institute of Technology (Korea, Republic of)

12948-64 • 06:00 PM - 07:30 PM
Electrochemically full-functionalized carbon nanotube yarns for actuator and supercapacitor
Author(s): **Jae Myeong Lee**, **Gyu Hyeon Song**, **Jong Woo Park**, **Seongjun Kim,** Hanyang Univ. (Korea, Republic of); **Changsoon Choi,** Dongguk Univ. (Korea, Republic of); **Seon Jeong Kim,** Hanyang Univ. (Korea, Republic of)

12948-65 • 06:00 PM - 07:30 PM
Capacitor based self-powered sound sensor for enhanced electrical output
Author(s): **Giyoung Son**, **Dongwon Seo, Jihoon Chung,** Kumoh National Institute of Technology (Korea, Republic of)

12948-66 • 06:00 PM - 07:30 PM
A novel low-profile deployable and retrievable epidural lead array system
Author(s): **Hassan Beheshti Seresht,** Univ. of Pittsburgh (United States); **Trent Emerick**, **Gaurav Chauhan,** Univ. of Pittsburgh Medical Ctr. (United States); **Youngjae Chun,** Univ. of Pittsburgh (United States)

12948-67 • 06:00 PM - 07:30 PM
Accelerating electro-ionic soft actuators by feedforward control and the performance degradation by voltage limits
Author(s): **Junya Nakada,** Toyohashi Univ. of Technology (Japan); **Mousumi Garai,** KAIST (Korea, Republic of); **Toshiki Hiruta,** Toyohashi Univ. of Technology (Japan); **Il-Kwon Oh,** KAIST (Korea, Republic of); **Kentaro Takagi,** Toyohashi Univ. of Technology (Japan)

12948-68 • 06:00 PM - 07:30 PM
IMU-based gait and posture recognition
Author(s): **Minseo Kim, Jung Woo Sohn,** Kumoh National Institute of Technology (Korea, Republic of)

12948-69 • 06:00 PM - 07:30 PM
Autonomous energy-based electronic skin sensor for identifying multi-directional joint movement
Author(s): **Tao Li**, **Ho Cheol Gwac**, **Ji Hwan Moon**, **Junggi Choi, Seon Jeong Kim,** Hanyang Univ. (Korea, Republic of)

12948-70 • 06:00 PM - 07:30 PM
Reprogrammable poly (n-isopropylacrylamide) composite for actuator
Author(s): **Junggi Choi**, **Jae Sang Hyeon**, **Ho Cheol Gwac**, **Tao Li, Seon Jeong Kim,** Hanyang Univ. (Korea, Republic of)

12948-71 • 06:00 PM - 07:30 PM
Hybrid electrochemical energy harvester for implantable device
Author(s): **Dong Yeop Lee**, **Jae Sang Hyeon**, **Jong Woo Park**, **Jae Myeong Lee, Seon Jeong Kim,** Hanyang Univ. (Korea, Republic of)

12948-72 • 06:00 PM - 07:30 PM
Wireless soft multifunctional biopatch for preventing heat-related illness of construction workers
Author(s): **Hoon Yi**, **Karam Kim**, **Hodam Kim**, **Eugene Kim, Woon-Hong Yeo,** Georgia Institute of Technology (United States)

12948-73 • 06:00 PM - 07:30 PM
Micro-power system: design of all-solid state micro-batteries and developing manufacturing equipment in NNFC
Author(s): **Chi Won Ahn**, **Su-ho Cho**, **Yong-Hee Lee**, **Hee Han, Jae Hong Park,** National Nanofab Ctr. (Korea, Republic of)

12948-74 • 06:00 PM - 07:30 PM
The use of polyhedral oligomeric silsesquioxane for the detection of nerve agents and blister agents
Author(s): **Hee-chan Jang**, **Hyeong Seon Choi,** Inha Univ. (Korea, Republic of); **Jin Hyun Park**, **Woo Hee Kim,** Sungkyunkwan Univ. (Korea, Republic of); **Young-Jun Lee**, **Joo-Hyung Kim,** Inha Univ. (Korea, Republic of); **Changsik Song**, **Han Yong Bae,** Sungkyunkwan Univ. (Korea, Republic of); **Sungki Kim**, **Janggyu Kang, Changryeol Lee,** CBRN Defense Research Institute (Korea, Republic of)

12948-75 • 06:00 PM - 07:30 PM
Controlling triboelectrification through the deformation effect
Author(s): **Donghyeon Kang**, **SeongMin Kim, Sang-Woo Kim,** Yonsei Univ. (Korea, Republic of)

12948-76 • 06:00 PM - 07:30 PM
Developing a novel 2D electro-optic scanner for potential micro display and head mounted display application
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Vinayak Ghorapade**, **Sudarshan Kalel, karthickraj Muthuramalingam,** National Tsing Hua Univ. (Taiwan)

12948-77 • 06:00 PM - 07:30 PM
Bio-inspired sensor network to enhance the stretchability of wearable sensors in soft robotics
Author(s): **Elliot Ransom**, **Saman Farhangdoust, Fu-Kuo Chang,** Stanford Univ. (United States)

12948-78 • 06:00 PM - 07:30 PM
Heat exchanger performance simulation and demonstration for thermoelectric power generation system
Author(s): **Kyeong Ho Shin**, **Yunho Jung, Joo-Hyung Kim,** Inha Univ. (Korea, Republic of)

12948-82 • 06:00 PM - 07:30 PM
CNT/SMP foam micro actuator
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Yu Chang**, **Tsung-Chen Hsieh,** National Tsing Hua Univ. (Taiwan); **, Karthickraj Muthuramalingam,** National Tsing Hua University (Taiwan)

12948-83 • 06:00 PM - 07:30 PM
ML driven optical monitoring of stress through electrodermal activity
Author(s): **Md Farhad Hassan**, **Samiha Tasnim**, **Leikhang Xiong**, **Munia Ferdoushi**, **Mohammed Arfan, Yasser Khan,** The Univ. of Southern California (United States)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: ENERGY DEVICES I

27 March 2024 • 10:30 AM - 12:20 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Sang-Woo Kim**, Yonsei Univ. (Korea, Republic of)

12948-29 • 10:30 AM - 11:10 AM
Flexible and biocompatible piezoelectric materials for wearable and implantable medical devices (Keynote Presentation)
Author(s): **Xudong Wang,** Univ. of Wisconsin-Madison (United States)

12948-30 • 11:10 AM - 11:40 AM
Functional electroactive materials for energy harvesting and environmental applications *(Invited Paper)*
Author(s): **Jeong Min Baik,** Sungkyunkwan Univ. (Korea, Republic of)

12948-31 • 11:40 AM - 12:00 PM
Tailoring material properties for user-friendly self-powered sensors based on triboelectric nanogenerators
Author(s): **Hyunjoon Yoo**, **Manmatha Mahato, Il-Kwon Oh,** KAIST (Korea, Republic of)

12948-32 • 12:00 PM - 12:20 PM
An on-demand bioresorbable triboelectric neurostimulator
Author(s): **Dong-Min Lee, Sang-Woo Kim,** Yonsei Univ. (Korea, Republic of)

Lunch Break 12:20 PM - 01:50 PM

SESSION 8: ENERGY DEVICES II

27 March 2024 • 01:50 PM - 03:30 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Jeong Min Baik**, Sungkyunkwan Univ. (Korea, Republic of)

12948-33 • 01:50 PM - 02:20 PM
Tailoring piezoelectric fibers and yarns for wearable self-powered sensing and biomedical applications *(Invited Paper)*
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-34 • 02:20 PM - 02:50 PM
Animal hair based triboelectric generators and sensors *(Invited Paper)*
Author(s): **David Blaževic**, **Jesse Ranta**, **Asif Shaikh**, **Yoshito Mizukawa**, **Johanna Virkki, Paavo Rasilo,** Tampere Univ. (Finland)

12948-35 • 02:50 PM - 03:10 PM
Multifunctional porous piezoelectric fibers for accelerating chronic wound healing
Author(s): **Jaewon Cho**, **Jina Bae**, **Jung Heon Lee, Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-37 • 03:10 PM - 03:30 PM
Vat photopolymerization-based 3D printing for highly dense and accurate lead-free piezoelectric BaTiO3 ceramics and composites
Author(s): **Hyungyong Kim,** Sungkyunkwan Univ. (Korea, Republic of); **Yong-Il Kim,** Korea Research Institute of Standards and Science (Korea, Republic of); **Jisoo Nam**, **Dongsu Lee,** Sungkyunkwan Univ. (Korea, Republic of); **Hyun-Cheol Song,** Korea Institute of Science and Technology (Korea, Republic of); **Jungho Ryu,** Yeungnam Univ. (Korea, Republic of); **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

Coffee Break 03:30 PM - 04:00 PM

SESSION 9: BIOMEDICAL APPLICATIONS I

27 March 2024 • 04:00 PM - 05:20 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Yun Soung Kim**, Icahn School of Medicine at Mount Sinai (United States)

12948-80 • 04:00 PM - 04:20 PM
Multimodal wearable swallowing monitor: auto-classification of swallowing behavior and diagnosis of silent aspiration
Author(s): **Beomjune Shin**, **Sung Hoon Lee**, **Kangkyu Kwon**, **Yoon Jae Lee**, **Nikita Crispe,** Georgia Institute of Technology (United States); **So-Young Ahn,** Chungnam National Univ. (Korea, Republic of); **Sandeep Shelly**, **Nathaniel Sundholm**, **Andrew Tkaczuk,** Emory Univ. (United States); **Min-Kyung Yeo,** Chungnam National Univ. (Korea, Republic of); **Hyojung Choo,** Emory Univ. (United States); **Woon-Hong Yeo,** Georgia Institute of Technology (United States)

12948-39 • 04:20 PM - 04:40 PM
EcoCFTrack: advanced diagnostic, monitoring, and tracking device for affordable cystic fibrosis care
Author(s): **Qianyun Zhang, Roshira Premadasa,** New Mexico State Univ. (United States)

12948-41 • 04:40 PM - 05:00 PM
Smart adhesive-based wireless device for perioperative ECG monitoring
Author(s): **Ashok Chhetry**, **Mathew A. Levin**, **Philip Susser**, **Valentin Fauveau, Yun Soung Kim,** Icahn School of Medicine at Mount Sinai (United States)

12948-42 • 05:00 PM - 05:20 PM
Wireless vascular bioelectronic systems with printed soft sensors and flexible electronic stents
Author(s): **Robert Herbert,** Louisiana State Univ. (United States)

Thursday 28 March 2024

SESSION 10: BIOMEDICAL APPLICATIONS II

28 March 2024 • 08:00 AM - 09:50 AM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Limei Tian**, Texas A&M Univ. (United States)

12948-43 • 08:00 AM - 08:30 AM
Recyclable, degradable, and sustainable cellulose hybrid films for advanced applications *(Invited Paper)*
Author(s): **Jaehwan Kim, Dickens Owino Agumba,** Inha Univ. (Korea, Republic of)

12948-44 • 08:30 AM - 08:50 AM
Mechano-luminescence-optoelectronic strain sensing fibers for health monitoring wearables
Author(s): **Donghyeon Ryu**, **Geronimo Macias**, **Derek Plummer**, **William Fawcett, Isaiah Ontiveros,** New Mexico Institute of Mining and Technology (United States)

12948-55 • 08:50 AM - 09:10 AM
Printed organic-electrochemical-transistor-based sensors for precision health
Author(s): **Yasser Khan**, **Mohammad Shafiqul Islam**, **Munia Ferdoushi, Md Farhad Hassan,** The Univ. of Southern California (United States)

12948-46 • 09:10 AM - 09:30 AM
Towards sun-powered sweat sensing: a flexible perovskite solar cell approach
Author(s): **Jihong Min, Wei Gao,** Caltech (United States)

12948-47 • 09:30 AM - 09:50 AM
Detecting impaired movements of stroke patients in bimanual training from motion sensor data
Author(s): **Roni Barak Ventura**, **Ligao Ruan, Maurizio Porfiri,** NYU Tandon School of Engineering (United States)

Coffee Break 09:50 AM - 10:10 AM

SESSION 11: BIOMEDICAL APPLICATIONS III

28 March 2024 • 10:10 AM - 12:10 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Heung Soo Kim**, Dongguk Univ. (Korea, Republic of)

12948-48 • 10:10 AM - 10:40 AM
Wearable self-powered personal thermal management *(Invited Paper)*
Author(s): **Hyung Wook Park,** Ulsan National Institute of Science and Technology (Korea, Republic of)

12948-40 • 10:40 AM - 11:00 AM
Automating the assessment of wrist motion in telerehabilitation with haptic devices
Author(s): **Roni Barak Ventura**, **Angelo Catalano**, **Rayan Succar, Maurizio Porfiri,** NYU Tandon School of Engineering (United States)

12948-50 • 11:00 AM - 11:30 AM
Soft rubbery bioelectronics *(Invited Paper)*
Author(s): **Cunjiang Yu,** The Pennsylvania State Univ. (United States)

12948-51 • 11:30 AM - 11:50 AM
Effect of polymers on nitrogen doped multiwalled carbon nanotube for the detection of chemical warfare agent simulant
Author(s): **Sanjeeb Lama**, **Hyeong Seon Choi**, **Hee-chan Jang**, **Young-Jun Lee, Joo-Hyung Kim,** Inha Univ. (Korea, Republic of)

12948-52 • 11:50 AM - 12:10 PM
Silver nanoflower-incorporated nanocomposite strain sensors with high reversibility for human motion detection
Author(s): **Yongjun Kim**, **Faseela K. P.**, **Sang Yul Yang**, **Kihyeon Kim**, **Heeju Yu,** Sungkyunkwan Univ. (Korea, Republic of); **Ji Young Lim,** Konyang Univ. (Korea, Republic of); **Jong Geol Do,** SAMSUNG Medical Ctr. (Korea, Republic of); **Hyouk Ryeol Choi**, **Jihye Hwang, Seunghyun Baik,** Sungkyunkwan Univ. (Korea, Republic of)

Lunch Break 12:10 PM - 01:30 PM

SESSION 12: FUNCTIONAL MATERIALS AND CONVERGENCE TECH

28 March 2024 • 01:30 PM - 03:00 PM | Hilton, International Ballroom IV (2nd Floor)
Session Chair(s): **Jung Woo Sohn**, Kumoh National Institute of Technology (Korea, Republic of)

12948-53 • 01:30 PM - 02:00 PM
Highly conductive, leakage-free, healable, phase-change thermal interface materials *(Invited Paper)*
Author(s): **Seunghyun Baik**, **Shabas Ahammed Abdul Jaleel, Taehun Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-81 • 02:00 PM - 02:20 PM
A leaf-patchable reflectance meter for in situ continuous monitoring of chlorophyll content
Author(s): **Kaiyi Zhang,** Nanyang Technological Univ. (Singapore)

12948-56 • 02:20 PM - 02:40 PM
The effect of bending deformation on the performance of solid-state polymer electrolyte
Author(s): **Liya Napollion, Kwang Jin Kim,** Univ. of Nevada, Las Vegas (United States)

12948-58 • 02:40 PM - 03:00 PM
Single-electron driven chip size near infrared free-electron laser
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Prabir Garu,** National Tsing Hua Univ. (Taiwan)

CONFERENCE 12949

Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems 2024

25 - 28 March 2024 | Hilton, Pacific I (2nd Floor)

Conference Chair(s): **Branko Glisic,** Princeton Univ. (United States)

Conference Co-Chair(s): **Maria Pina Limongelli,** Politecnico di Milano (Italy); **Ching Tai Ng,** The Univ. of Adelaide (Australia)

Program Committee: **Hiroshi Asanuma,** Chiba Univ. (Japan); **Tommy H. T. Chan,** Queensland Univ. of Technology (Australia); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Benjamin L. Grisso,** Naval Surface Warfare Ctr. Carderock Div. (United States); **Ryan L. Harne,** The Pennsylvania State Univ. (United States); **Jung-Wuk Hong,** KAIST (Korea, Republic of); **Neil A. Hoult,** Queen's Univ. (Canada); **Haiying Huang,** The Univ. of Texas at Arlington (United States); **Ying Huang,** North Dakota State Univ. (United States); **Mohammad Reza Jahanshahi,** Purdue Univ. (United States); **Robin James,** General Motors Co. (United States); **Gi-Woo Kim,** Inha Univ. (Korea, Republic of); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Hui Li,** Harbin Institute of Technology (China); **Jian Li,** The Univ. of Kansas (United States); **Jun Li,** Curtin Univ. (Australia); **Suyi Li,** Virginia Polytechnic Institute and State Univ. (United States); **Weibin Li,** Xiamen Univ. (China); **Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Chin-Hsiung Loh,** National Taiwan Univ. (Taiwan); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **Norbert G. Meyendorf,** Univ. of Dayton (United States); **Isabel M. Morris,** New Mexico Institute of Mining and Technology (United States); **Rebecca Napolitano,** The Pennsylvania State Univ. (United States); **Hae Young Noh,** Carnegie Mellon Univ. (United States); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States); **Donghyeon Ryu,** New Mexico Institute of Mining and Technology (United States); **Fabio Semperlotti,** Purdue Univ. (United States); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Tyler N. Tallman,** Purdue Univ. (United States); **Jiong Tang,** Univ. of Connecticut (United States); **Marco Torbol,** Ulsan National Institute of Science and Technology (Korea, Republic of); **Enrico Tubaldi,** Univ. of Strathclyde (United Kingdom); **Chun H. Wang,** The Univ. of New South Wales (Australia); **Ming L. Wang,** Northeastern Univ. (United States); **Xingwei Wang,** Univ. of Massachusetts Lowell (United States); **Ya Wang,** Texas A&M Univ. (United States); **Yang Wang,** Georgia Institute of Technology (United States); **Rosalind M. Wynne,** Villanova Univ. (United States); **Fuh-Gwo Yuan,** North Carolina State Univ. (United States); **Daniele Zonta,** Univ. degli Studi di Trento (Italy)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: APPLICATIONS OF SENSORY SYSTEMS AND SMART STRUCTURES I

25 March 2024 • 10:30 AM - 12:10 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-1 • 10:30 AM - 10:50 AM
UAS-based photogrammetry to identify building damages induced by tornado
Author(s): **Siqi Chen,** Purdue Univ. (United States)

12949-2 • 10:50 AM - 11:10 AM
Experimental study of heat damage evaluation using nonlinear ultrasonic guided waves
Author(s): **Ching-Tai Ng, Ahmed Aseem,** The Univ. of Adelaide (Australia)

12949-3 • 11:10 AM - 11:30 AM
Integrating Piezoelectric Sensors for Enhanced Failure Prediction of Residential Buildings in Hurricane
Author(s): **Abolghassem Zabihollah,** Tarleton State Univ. (United States); **Syed Ali Ghorshi**, **Ali Fedaa**, **Leila Donyaparastlivari**, **Alwathiqbellah Ibrahim, Mena I. Souliman,** The Univ. of Texas at Tyler (United States)

12949-4 • 11:30 AM - 11:50 AM
Research on real-time laser targeting through calibration of laser mirror scanner and LiDAR camera
Author(s): **Mu Seung Jeon, Jung-Ryul Lee,** KAIST (Korea, Republic of)

MOVED TO DIGITAL POSTER: 12949-5, Identification of the geometric and spatial complexity in pipeline using combined neural network and ultrasonics • 11:50 AM - 12:10 PM

Lunch Break 12:10 PM - 01:40 PM

SESSION 2: SENSOR AND SMART STRUCTURE DESIGN, FABRICATION, AND IMPLEMENTATION I

25 March 2024 • 01:40 PM - 03:30 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-6 • 01:40 PM - 02:10 PM
Advancing seismic monitoring of masonry structures with smart bricks: recent developments and future prospects *(Invited Paper)*
Author(s): **Filippo Ubertini,** Univ. degli Studi di Perugia (Italy)

12949-7 • 02:10 PM - 02:30 PM
Characterization of surface parallel mirror actuation using preloaded commercial PZT stacks
Author(s): **Stewart Sherrit**, **Eric M. Guevara**, **Turner M. Bumbary,** Jet Propulsion Lab. (United States); **George L. Lamb,** Jet Propulsion Lab. (United States), Technische Univ. München (Germany); **Diego W. Camacho**, **Carey L. Weisberg**, **Carlos M. Gross Jones**, **Will E. Krieger**, **Brian Monacelli**, **Scott A. Basinger**, **Erkin Sidick**, **David W. Miller, Keith Coste,** Jet Propulsion Lab. (United States)

12949-8 • 02:30 PM - 02:50 PM
Multi-frequency MEMS sensor for single-point source localization in dispersive media using modal acoustic emission and wavelet transformation
Author(s): **Raguez Taha**, **Tonghao Zhang**, **Talha Khan, Didem Ozevin,** Univ. of Illinois at Chicago (United States)

12949-9 • 02:50 PM - 03:10 PM
Mitigation of radiation-induced attenuation of optical fibers through photobleaching: study of power dependence at cryogenic temperatures
Author(s): **Fernando Solis Fernandez**, **Bart Ludbrook**, **Shahna Haneef**, **Dominic Moseley**, **Rod Badcock**, **Joe Schuyt,** Paihau-Robinson Research Institute (New Zealand); **Bill Trompetter,** Te Pū Ao - Instiute of Geological and Nuclear Sciences (New Zealand)

12949-10 • 03:10 PM - 03:30 PM
Experimental study for nondestructive evaluation of steel rods in ground anchor using an EMI sensor: optimal design of EMI sensor through finite element simulation
Author(s): **Dongyoung Ko**, **Jooyoung Park**, **Yuntae Jeon**, **Taeheon Kim, Seunghee Park,** Sungkyunkwan Univ. (Korea, Republic of)

Coffee Break 03:30 PM - 04:00 PM

SESSION 3: ADVANCES IN SENSING AND SMART STRUCTURE TECHNOLOGIES I

25 March 2024 • 04:00 PM - 06:00 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-11 • 04:00 PM - 04:20 PM
Optimizing transmission of acoustic signals to monitor internal conditions of canisters for dry storage of commercial spent nuclear fuel
Author(s): **Bozhou Zhuang,** The Univ. of Southern California (United States); **Anton Sinkov**, **Morris Good,** Pacific Northwest National Lab. (United States); **Ryan Meyer,** Oak Ridge National Lab. (United States); **Bora Gencturk, Assad Oberai,** The Univ. of Southern California (United States)

12949-12 • 04:20 PM - 04:40 PM
Bridge scour depth prediction using ensemble machine learning models
Author(s): **Peter D. Ogunjinmi, Genda Chen,** Missouri Univ. of Science and Technology (United States)

12949-13 • 04:40 PM - 05:00 PM
Towards hydrogen fueled aircraft: metal hydrides for optical hydrogen sensors operating above room temperature
Author(s): **Handika Sandra Dewi**, **Kasun P. W. Dissanayake**, **Herman Schreuders**, **Lars J. Bannenberg, Roger M. Groves,** Technische Univ. Delft (Netherlands)

12949-14 • 05:00 PM - 05:20 PM
Multi-modal AI-based water pipeline data accumulation and leakage prediction research using image and ultrasound data
Author(s): **Yuntae Jeon**, **Byoungjoon Yu,** Sungkyunkwan Univ. (Korea, Republic of); **Dongyoung Ko**, **Dai Quoc Tran,** Sungkyunkwan University (Korea, Republic of); **Seunghee Park,** Sungkyunkwan Univ. (Korea, Republic of)

12949-15 • 05:20 PM - 05:40 PM
A development of a new lateral shearing wavefront analyzer
Author(s): **Sin-Ruei Lin**, **Jiun-Woei Huang,** National Taiwan Univ. (Taiwan); **Shu-Sheng Lee,** National Taiwan Ocean Univ. (Taiwan); **Hsiang-Chieh Lee, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

12949-44 • 05:40 PM - 06:00 PM
Laser scanning and computer vision-based bridge deformation measurement for digital shape management of bridge structures
Author(s): **Gichun Cha**, **Changjun Lee**, **Pa Pa Win Aung**, **Mingeon Cho**, **Byoungjoon Yu, Seunghee Park,** Sungkyunkwan Univ. (Korea, Republic of)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: ADVANCES IN SENSING AND SMART STRUCTURE TECHNOLOGIES II

26 March 2024 • 10:30 AM - 11:50 AM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-65 • 10:30 AM - 10:50 AM
Piezoelectric motor for cryogenic applications
Author(s): **Mircea Badescu**, **Yoseph Bar-Cohen**, **Stewart Sherrit**, **Hyeong Jae Lee**, **Nareg Shirajian,** Jet Propulsion Lab. (United States); **Justin J. Scheidler,** NASA Glenn Research Ctr. (United States)

12949-17 • 10:50 AM - 11:10 AM
Fungal circuitry: mycelium as a living sensor for smart structures
Author(s): **Sophia Ganzeboom**, **Eleni Chatzi**, **Bao Zhao, Vasilis Dertimanis,** ETH Zurich (Switzerland)

12949-18 • 11:10 AM - 11:30 AM
Structural Health Monitoring of Civil Infrastructures Using Smart Sensor Networks
Author(s): **Marc Abdel Nour**, **Pier Francesco Giordano, Maria Pina Limongelli,** Politecnico di Milano (Italy)

12949-19 • 11:30 AM - 11:50 AM
Control of a multi-direction piezoelectric linear motor using a gyroscopic feedback control
Author(s): **Han-Kun Guo**, **Chih-Kung Lee, Yu-Hsiang Hsu,** National Taiwan Univ. (Taiwan)

Lunch Break 11:50 AM - 01:40 PM

SESSION 5: PHYSICS-BASED AND DATA-DRIVEN ANALYSIS OF SENSORY SYSTEMS AND SMART STRUCTURES I

26 March 2024 • 01:40 PM - 03:00 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-24 • 01:40 PM - 02:20 PM
Bayesian Data Fusion Approach for InSAR and Topographic Bridge Displacement Monitoring (Keynote Presentation)
Author(s): **Daniel Tonelli**, **Mattia Zini**, **Lucia Simeoni,** Univ. degli Studi di Trento (Italy); **Alfredo Rocca**, **Daniele Perissin,** EO59 (United States); **Carlo Costa**, **David Quattrociocchi,** Autostrada del Brennero SpA – Brennerautobahn AG (Italy); **Daniele Zonta,** Univ. degli Studi di Trento (Italy)

12949-21 • 02:20 PM - 02:40 PM
Structural condition assessment of concrete beams utilizing unmanned aerial vehicles and computer vision
Author(s): **Hadi Salehi,** Louisiana Tech Univ. (United States)

12949-22 • 02:40 PM - 03:00 PM
Acoustic scattering simulations via physics-informed neural network
Author(s): **Siddharth Nair,** Purdue Univ. (United States); **Timothy F. Walsh**, **Greg Pickrell,** Sandia National Labs. (United States); **Fabio Semperlotti,** Purdue Univ. (United States)

Coffee Break 03:00 PM - 03:30 PM

SESSION 6: APPLICATIONS OF SENSORY SYSTEMS AND SMART STRUCTURES II

26 March 2024 • 03:30 PM - 05:00 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-62 • 03:30 PM - 04:00 PM
Acoustics and RF communication thru deep ice for application to ocean worlds *(Invited Paper)*
Author(s): **Yoseph Bar-Cohen**, **Hyeong Jae Lee**, **Mircea Badescu**, **Stewart Sherrit**, **Scott Bryant**, **Samuel M. Howell**, **Elodie Lesage**, **Benjamin Hockman**, **Joseph Vizcarra**, **Diego Camacho, Miles Smith,** Jet Propulsion Lab. (United States)

12949-25 • 04:00 PM - 04:20 PM
A Non-contact Method for Robotic Measurement of Warping in Steel Girders: Case Study of I-95 Overpass After Fire
Author(s): **Ali Ghadimzadeh Alamdari, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

12949-26 • 04:20 PM - 04:40 PM
Analysis of thermal behavior of prestressed "double T" beam made of sustainable carbon-capturing concrete
Author(s): **Yitian Liang, Branko Glišic,** Princeton Univ. (United States)

12949-28 • 04:40 PM - 05:00 PM
Applications of a magnetorheological damper to vibration suppression of a three-story building
Author(s): **Yong-Lin Kuo, Yong-Zhi Lin,** National Taiwan Univ. of Science and Technology (Taiwan)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 7: PHYSICS-BASED AND DATA-DRIVEN ANALYSIS OF SENSORY SYSTEMS AND SMART STRUCTURES II

27 March 2024 • 10:30 AM - 12:10 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-50 • 10:30 AM - 10:50 AM
Advancing precision in multi-agent systems: a neuromorphic approach with spiking neural network-modified sliding innovation filter
Author(s): **Reza Ahmadvand**, **Sarah Safura Sharif, Yaser Mike Banad,** The Univ. of Oklahoma (United States)

12949-29 • 10:50 AM - 11:10 AM
Harnessing deep learning for hierarchical sensor anomaly detection in structure health monitoring of pressure vessel
Author(s): **Qianyu Zhou**, **Yang Zhang, Jiong Tang,** Univ. of Connecticut (United States)

12949-30 • 11:10 AM - 11:30 AM
Cold water saturation and vacuum saturation porosity comparison for in situ ground penetrating radar measurement in mature concrete
Author(s): **Isabel M. Morris, Nicholas Hutt,** New Mexico Institute of Mining and Technology (United States)

12949-31 • 11:30 AM - 11:50 AM
Gear health monitoring using smart gears with printed sensor/antenna circuits by running tests
Author(s): **Naoya Fujita**, **Daisuke Iba**, **Asobu Sakai**, **Hitoshi Shimasaki,** Kyoto Institute of Technology (Japan); **Junichi Hongu,** Tottori Univ. (Japan); **Hiroshi Kimura,** Tsubakimoto Chain Co. (Japan); **Atsuhide Nishikawa,** Kyoto Institute of Technology (Japan)

MOVED TO DIGITAL POSTER: 12949-32, The volumetric ultrasound imaging strategy for quantifying the concrete • 11:50 AM - 12:10 PM

Lunch Break 12:10 PM - 01:40 PM

SESSION 8: SENSOR AND SMART STRUCTURE DESIGN, FABRICATION, AND IMPLEMENTATION II

27 March 2024 • 01:40 PM - 03:20 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-33 • 01:40 PM - 02:20 PM
The inherent resilience of large cities to natural hazards: records, evidence, and predictions (Keynote Presentation)
Author(s): **Nicos Makris**, **Georgios Chatzikyriakidis**, **Gholamreza Moghimi**, **Tue Vu, Eric Godat,** Southern Methodist Univ. (United States)

12949-35 • 02:20 PM - 02:40 PM
Evaluating the survivability of polymer-based passive corrosion sensors in pipeline environments
Author(s): **Shuomang Shi**, **Luyang Xu, Ying Huang,** North Dakota State Univ. (United States)

12949-36 • 02:40 PM - 03:00 PM
Multiphysics characterization of light intensity and wavelength of mechanoluminescent ZnS:Cu-PDMS micro-composites using machine-learning and image processing
Author(s): **Donghyeon Ryu**, **Matthew Moore, Cason Jones,** New Mexico Institute of Mining and Technology (United States)

12949-37 • 03:00 PM - 03:20 PM
Material health monitoring for concrete structure using electrical impedance tomography
Author(s): **Panji Darma, Moe Pourghaz,** North Carolina State Univ. (United States)

Coffee Break 03:20 PM - 03:50 PM

SESSION 9: ADVANCES IN SENSING AND SMART STRUCTURE TECHNOLOGIES III

27 March 2024 • 03:50 PM - 05:20 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-38 • 03:50 PM - 04:20 PM
Sensing skin technology for structural health monitoring: from proof-of-concept to field validation *(Invited Paper)*
Author(s): **Simon Laflamme, Han Liu,** Iowa State Univ. of Science and Technology (United States)

12949-39 • 04:20 PM - 04:40 PM
A novel passive embeddable RF sensor for structural health monitoring
Author(s): **Mauricio Pereira,** Princeton Univ. (United States); **Abeer Ahmad**, **Yang Xie**, **Yuanqing Song**, **Xiao Sha**, **Petar Djuric**, **Milutin Stanacevic**, **Samir Das**, **Emre Salman,** Stony Brook Univ. (United States); **Branko Glišic,** Princeton Univ. (United States)

12949-40 • 04:40 PM - 05:00 PM
Passive monitoring of structures using deconvolution-reconstructed waves
Author(s): **Ali Zare Hosseinzadeh**, **Georgios Tsampras, Francesco Lanza di Scalea,** Univ. of California, San Diego (United States)

12949-42 • 05:00 PM - 05:20 PM
Active control of a planner piezoelectric rotational motor using hall sensors and magnetic array
Author(s): **Chao Ting Tseng**, **Chih-Kung Lee, Yu-Hsiang Hsu,** National Taiwan Univ. (Taiwan)

POSTER SESSION - WEDNESDAY

27 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Wednesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12949-57 • 06:00 PM - 07:30 PM
Aerial inspection of physical structures with restricted access using a computer vision platform applied in drone
Author(s): **Andre F. S. Guedes**, **Patrick Freitas,** Univ. Estácio de Sá (Brazil); **Simone Tartari,** INTELLECTOS (Brazil)

12949-58 • 06:00 PM - 07:30 PM
Design and fabrication of a wideband cymbal hydrophone
Author(s): **Yongrae Roh, Donghyun Kim,** Kyungpook National Univ. (Korea, Republic of)

12949-59 • 06:00 PM - 07:30 PM
Smart autonomous crack detection in concrete structures
Author(s): **Arya Prakash Padhi,** Indian Institute of Technology Roorkee (India)

12949-61 • 06:00 PM - 07:30 PM
Empowering tribal mobility in emergencies: closing the knowledge gap for safer transportation in tribal areas
Author(s): **Mingwei Guo**, **Ying Huang, Pan Lu,** North Dakota State Univ. (United States)

12949-53 • 06:00 PM - 07:30 PM
Investigating the synergistic effects of dynamic impact loads and corrosion on epoxy-coated steel via Fiber Bragg grating sensors: an experimental approach
Author(s): **Luyang Xu**, **Shuomang Shi, Ying Huang,** North Dakota State Univ. (United States)

Thursday 28 March 2024

SESSION 10: ADVANCES IN SENSING AND SMART STRUCTURE TECHNOLOGIES IV

28 March 2024 • 08:30 AM - 10:10 AM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-43 • 08:30 AM - 08:50 AM
Performance evaluation of flexible capacitive sensors on non-uniform surfaces
Author(s): **Emmanuel A. Ogunniyi,** Univ. of South Carolina (United States); **Han Liu,** Iowa State Univ. of Science and Technology (United States); **John White**, **Austin R. J. Downey,** Univ. of South Carolina (United States); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Jian Li**, **Caroline Bennett**, **William Collins,** The University of Kansas (United States); **Hongki Jo,** University of Arizona (United States); **Paul Ziehl,** Univ. of South Carolina (United States)

12949-45 • 08:50 AM - 09:10 AM
Acoustic Emission Monitoring of Piping System for Advanced Nuclear Reactors
Author(s): **Chenxi Xu,** Univ. of Illinois at Chicago (United States); **Muhammad S. Khan,** Univ. of Illinois (United States); **Matthew Daly,** Univ. of Illinois at Chicago (United States); **Alexander Heifetz**, **Derek Kultgen,** Argonne National Lab. (United States); **Miguel Gonzalez-Nunez**, **Edward P. Lowenhar,** MISTRAS Group, Inc. (United States); **Didem Ozevin,** Univ. of Illinois at Chicago (United States)

12949-46 • 09:10 AM - 09:30 AM
Determining ultrasound attenuation parameter from fringe spectrum of ultrasound Fabry-Pérot Resonator for sensitization detection
Author(s): **Songwei Wang, Haiying Huang,** The Univ. of Texas at Arlington (United States)

12949-47 • 09:30 AM - 09:50 AM
Realizing bonded ultrasound Fabry-Perot resonator (UFPR) using an optical fiber as the ultrasound waveguide
Author(s): **Vahid Jafarpour, Haiying Huang,** The Univ. of Texas at Arlington (United States)

12949-48 • 09:50 AM - 10:10 AM
Adopt digital micromirror devise (DMD) for Wavefront correction and Wavefront sensing in adaptive optical system
Author(s): **Hong-Je Liu**, **Jiun-Woei Huang**, **Shu-Sheng Lee**, **Hsiang-Chieh Lee, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

Coffee Break 10:10 AM - 10:40 AM

SESSION 11: PHYSICS-BASED AND DATA-DRIVEN ANALYSIS OF SENSORY SYSTEMS AND SMART STRUCTURES III

28 March 2024 • 10:40 AM - 11:50 AM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-49 • 10:40 AM - 11:10 AM
Robust Personalized Gait Health Monitoring Through Footstep-Induced Structural Vibrations *(Invited Paper)*
Author(s): **Yiwen Dong**, **Haochen Sun**, **Ruizhi Wang, Hae Young Noh,** Stanford Univ. (United States)

12949-51 • 11:10 AM - 11:30 AM
A network model for piezoelectric flexure actuators
Author(s): **Stewart Sherrit**, **George L. Lamb, Diego W. Camacho,** Jet Propulsion Lab. (United States)

12949-52 • 11:30 AM - 11:50 AM
Optimizing stimuli-based 4D printed structures: a paradigm shift in programmable material response
Author(s): **Liuchao Jin,** The Chinese Univ. of Hong Kong (Hong Kong, China); **Xiaoya Zhai,** Univ. of Science and Technology of China (China); **Jiangchao Jiang**, **Kang Zhang, Wei-Hsin Liao,** The Chinese Univ. of Hong Kong (Hong Kong, China)

SESSION 12: APPLICATIONS OF SENSORY SYSTEMS AND SMART STRUCTURES III

28 March 2024 • 11:50 AM - 12:50 PM | Hilton, Pacific I (2nd Floor)
Session Chair(s): **Branko Glišic**, Princeton Univ. (United States)

12949-60 • 11:50 AM - 12:10 PM
Cable-stayed bridge model updating based on response surface method
Author(s): **Lei Wang, Xintong Huo,** Univ. of Jinan (China)

12949-55 • 12:10 PM - 12:30 PM
Low-cost and compact piezoelectric energy harvesting floor tile for battery-free Bluetooth smart pavement
Author(s): **Gongwei Wang,** ShanghaiTech Univ. (China); **Guobiao Hu,** Hong Kong Univ. of Science and Technology (China); **Junrui Liang,** ShanghaiTech Univ. (China)

MOVED TO DIGITAL POSTER: 12949-56, Characterization of tensile damage in half grouted sleeves with internal defects by acoustic emission • 12:30 PM - 12:50 PM

DIGITAL POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + NDE 2024.

12949-63
Design of auxiliary drive mechanism for folding wing structure
Author(s): **Chenxiao Li**, **Li Zhou, Tao Qiu,** Nanjing Univ. of Aeronautics and Astronautics (China)

12949-64
A classification method of flutter test signals based on CNN and HHT
Author(s): **Guanghang Xu, Li Zhou,** Nanjing Univ. of Aeronautics and Astronautics (China)

CONFERENCE 12950

Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVIII

25 - 27 March 2024 | Hilton, Pacific II (2nd Floor)

Conference Chair(s): **Andrew L. Gyekenyesi,** Ohio Aerospace Institute (United States)

Conference Co-Chair(s): **Peter J. Shull,** The Pennsylvania State Univ. (United States); **H. Felix Wu,** U.S. Dept. of Energy (United States); **Tzuyang Yu,** Univ. of Massachusetts Lowell (United States)

Program Committee: **Holger Böse,** Fraunhofer Institute for Silicate Research (ISC) (Germany); **Christopher C. Bowland,** Oak Ridge National Lab. (United States); **Genda Chen,** Missouri Univ. of Science and Technology (United States); **Chih-Hung Chiang,** Chaoyang Univ. of Technology (Taiwan); **Bill Davids,** The Univ. of Maine (United States); **Pei Dong,** George Mason Univ. (United States); **Reinhard Ebert,** Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung IOSB (Germany); **Benjamin L. Ervin,** MIT Lincoln Lab. (United States); **Jung-Wuk Hong,** KAIST (Korea, Republic of); **Tsung-Chin Hou,** National Cheng Kung Univ. (Taiwan); **Dryver R. Huston,** The Univ. of Vermont (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China); **Kenneth J. Loh,** Univ. of California, San Diego (United States); **Jerome P. Lynch,** Duke Univ. (United States); **Oliver J. Myers,** Clemson Univ. (United States); **Piotr Omenzetter,** Univ. of Aberdeen (United Kingdom); **Didem Ozevin,** Univ. of Illinois at Chicago (United States); **Akira Sasamoto,** National Institute of Advanced Industrial Science and Technology (Japan); **Caesar Singh,** U.S. Dept. of Transportation (United States); **Yu-Min Su,** National Kaohsiung Univ. of Science and Technology (Taiwan); **Jiong Tang,** Univ. of Connecticut (United States); **Edward Zhou,** AECOM (United States)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:

- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

SESSION 1: NDE OF ADVANCED MATERIALS I

25 March 2024 • 10:30 AM - 12:10 PM | Hilton, Pacific II (2nd Floor)

Session Chair(s): **Andrew L. Gyekenyesi**, Ohio Aerospace Institute (United States)

12950-1 • 10:30 AM - 10:50 AM
A recyclable self-healing composite with advanced sensing property
Author(s): **Sargun S. Rohewal**, **Amit K. Naskar**, **Christopher C. Bowland, Sumit Gupta,** Oak Ridge National Lab. (United States)

12950-2 • 10:50 AM - 11:10 AM
Assessment of segmentation-induced deviations of porosity metrics in powder bed fusion additively manufactured components
Author(s): **Peter W. Spaeth**, **Erik Frankforter**, **Samuel J. Hocker, Joesph N Zalameda,** NASA Langley Research Ctr. (United States)

12950-3 • 11:10 AM - 11:30 AM
Introducing electrochemical induction magnetic field spectroscopy and applications in battery manufacturing
Author(s): **Farshid Roumi, Mahshid Roumi,** Parthian Energy, Inc. (United States)

12950-5 • 11:30 AM - 11:50 AM
Enhancing electromechanical properties of a lignin-based multifunctional composite through chemical reactive blending with functionalized carbon nanotubes
Author(s): **Nihal Kanbargi**, **Sargun S. Rohewal**, **Yawei Gao**, **Logan Kearney**, **Jan Michael Carrillo**, **Christopher C. Bowland**, **Amit K. Naskar, Sumit Gupta,** Oak Ridge National Lab. (United States)

12950-4 • 11:50 AM - 12:10 PM
Determining a number of x-ray shots for inspection of welds in cylindrical parts
Author(s): **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States)

Lunch Break 12:10 PM - 01:40 PM

SESSION 2: SHM/NDE OF TRANSPORTATION INFRASTRUCTURE I

25 March 2024 • 01:40 PM - 03:20 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Tzuyang Yu**, Univ. of Massachusetts Lowell (United States)

12950-6 • 01:40 PM - 02:00 PM
Damage detection of a bridge model under traffic loading using short time Fourier transform and wavelet transform
Author(s): **Ritham Batchu**, **Koosha Raisi, TzuYang Yu,** Univ. of Massachusetts Lowell (United States)

12950-9 • 02:00 PM - 02:20 PM
Application of remote ground-penetrating radar for condition assessment of wooden crossties
Author(s): **Koosha Raisi**, **Ritham Batchu**, **Tiana Robinson, Tzuyang Yu,** Univ. of Massachusetts Lowell (United States)

12950-8 • 02:20 PM - 02:40 PM
Identification of mechanical properties of portland cement concrete specimens using synthetic aperture radar, ultrasonic pulse velocity, and a rebound hammer
Author(s): **Maryam Abazarsa**, **Koosha Raisi, Tzuyang Yu,** Univ. of Massachusetts Lowell (United States)

MOVED TO DIGITAL POSTER: 12950-7, Identification of tensile damage in the half grouted sleeves with defects by acoustic emission signals clustering • 02:40 PM - 03:00 PM

MOVED TO DIGITAL POSTER: 12950-10, The acoustic emission signatures of damage progress in the prestressed anchor cables with the artificial defects • 03:00 PM - 03:20 PM

Coffee Break 03:20 PM - 03:50 PM

SESSION 3: NDE OF ADVANCED MATERIALS II

25 March 2024 • 03:50 PM - 05:30 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Peter J. Shull**, The Pennsylvania State Univ. (United States)

12950-11 • 03:50 PM - 04:10 PM
LSTM-based fatigue monitoring of fiberglass composites using laser-induced graphene
Author(s): **Boyang Chen**, **Adam Childress,** Univ. of Michigan (United States); **Jalal Nasser,** Intel Corp. (United States); **Michael Fisher, Henry A. Sodano,** Univ. of Michigan (United States)

12950-12 • 04:10 PM - 04:30 PM
Characterization of anisotropic mechanical properties of injection molded fiber reinforced polymer composites using X-ray computer tomography
Author(s): **Nikhil Garg**, **Brittany Rodriguez**, **Subhabrata Saha**, **Veronica Gurrola**, **Vipin Kumar**, **Deepak Kumar Pokkalla**, **Ahmed A. Arabi Hassen**, **Seokpum Kim, Bhagyashree Prabhune,** Oak Ridge National Lab. (United States)

12950-14 • 04:30 PM - 04:50 PM
Applicability of carbon nanotube-incorporated cement-based composites as a sensor for measuring the carbonation front: an overview
Author(s): **Jihoon Park**, **Jisoo Kim**, **Joonho Seo,** KAIST (Korea, Republic of); **Daeik Jang,** Univ. of Pittsburgh (United States); **Haengki Lee,** KAIST (Korea, Republic of)

12950-15 • 04:50 PM - 05:10 PM
Elastic wave propagation in polycrystalline materials at different texture intensities
Author(s): **Himanshu Gupta**, **Srinivasan Gopalakrishnan, S. Suwas,** Indian Institute of Science, Bengaluru (India)

12950-36 • 05:10 PM - 05:30 PM
Off-axis digital image correlation using projected speckles for damage imaging with minimal surface preparation
Author(s): **Trenton B. Abbott, Fuh-Gwo Yuan,** North Carolina State Univ. (United States)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

SESSION 4: COMPUTATIONAL DATA ANALYSIS I

26 March 2024 • 10:30 AM - 11:50 AM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Denvid Lau**, City Univ. of Hong Kong (Hong Kong, China)

12950-16 • 10:30 AM - 10:50 AM
Data-driven approach for material properties characterization of 3D-printed aluminum
Author(s): **Hadi Salehi,** Louisiana Tech Univ. (United States)

12950-17 • 10:50 AM - 11:10 AM
Real-time state estimation using recurrent neural network and topological data analysis
Author(s): **Arman Razmarashooli**, **Daniel A. Salazar Martinez,** Iowa State Univ. of Science and Technology (United States); **Yang Kang Chua,** Univ. of Connecticut (United States); **Simon Laflamme,** Iowa State Univ. of Science and Technology (United States); **Chao Hu,** Univ. of Connecticut (United States)

12950-18 • 11:10 AM - 11:30 AM
GPU-accelerated data-driven framework of hybrid ReaxFF
Author(s): **Xing Quan Wang, Denvid Lau,** City Univ. of Hong Kong (Hong Kong, China)

12950-19 • 11:30 AM - 11:50 AM
Physics-informed neural networks for inverse problems in structural dynamics
Author(s): **Rafael Teloli**, **Mael Bigot**, **Lucas Coelho**, **Emmanuel Ramasso**, **Roberta Tittarelli,** SUPMICROTECH-ENSMM, Univ. de Franche-Comté, FEMTO-ST, CNRS (France); **Patrice Le Moal,** SUPMICROTECH-ENSMM (France); **Morvan Ouisse,** SUPMICROTECH-ENSMM, Univ. de Franche-Comté, FEMTO-ST, CNRS (France)

Lunch Break 11:50 AM - 01:40 PM

SESSION 5: ULTRASONIC TECHNOLOGIES

26 March 2024 • 01:40 PM - 03:20 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Kenneth J. Loh**, Univ. of California, San Diego (United States)

12950-21 • 01:40 PM - 02:00 PM
Development of elastic wave analyzer for icy sub-surfaces (EWAIS) in water-bearing worlds
Author(s): **Hyeong Jae Lee**, **Yoseph Bar-Cohen**, **Mircea Badescu**, **Stewart Sherrit**, **Mark Panning**, **Steven D. Vance, Shyh-Shiuh Lih,** Jet Propulsion Lab. (United States)

12950-22 • 02:00 PM - 02:20 PM
Fully non-contact ultrasonic nondestructive inspection on thick stainless steel plates in nuclear facilities
Author(s): **Andrew Campbell**, **Yuh-Jin Chao,** Univ. of South Carolina (United States); **Daniel Foley**, **Thanh-Tam Truong,** Savannah River National Lab. (United States); **Lingyu Yu,** Univ. of South Carolina (United States)

12950-25 • 02:20 PM - 02:40 PM
Advancing spatially resolved acoustic spectroscopy (SRAS) from microstructure to elasticity imaging
Author(s): **Rikesh Patel**, **Wenqi Li**, **Richard J. Smith, Matt S. Clark,** The Univ. of Nottingham (United Kingdom)

12950-24 • 02:40 PM - 03:00 PM
The impact of underwater acoustic noise using conventional and shear-horizontal sensor in acoustic emission testing
Author(s): **Chenxi Xu,** Univ. of Illinois at Chicago (United States); **Cody Borigo,** Guidedwave (FBS. Inc) (United States); **Didem Ozevin,** Univ. of Illinois at Chicago (United States)

12950-23 • 03:00 PM - 03:20 PM
Imaging the microstructure and elasticity of aerospace materials
Author(s): **Richard J. Smith**, **Wenqi Li**, **Rikesh Patel,** The Univ. of Nottingham (United Kingdom); **Paul Dryburgh,** King's College London (United Kingdom); **Matt S. Clark,** The Univ. of Nottingham (United Kingdom)

Coffee Break 03:20 PM - 03:50 PM

SESSION 6: COMPUTATIONAL DATA ANALYSIS II

26 March 2024 • 03:50 PM - 05:10 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Arvin Ebrahimkhanlou**, Drexel Univ. (United States)

12950-28 • 03:50 PM - 04:10 PM
Detection of cracking mechanism transition on reinforced concrete shear walls using graph theory
Author(s): **Pedram Bazrafshan, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

12950-27 • 04:10 PM - 04:30 PM
Pedestrian footstep localization using a deep convolutional network for time difference of arrival estimation
Author(s): **Aaron Appelle**, **Liming W. Salvino, Jerome P. Lynch,** Duke Univ. (United States)

12950-29 • 04:30 PM - 04:50 PM
Automated AI-DIC marker-less technique for tracking displacements of large structures
Author(s): **Sneha Prasad,** Indian Institute of Technology Jodhpur (India); **Chih H. Chiang,** Chaoyang Univ. of Technology (Taiwan); **David Kumar,** Indian Institute of Technology Madras (India); **Sumit Kalra, Arpit Khandelwal,** Indian Institute of Technology Jodhpur (India)

12950-30 • 04:50 PM - 05:10 PM
Building health monitoring with different thermal infrared cameras
Author(s): **Yishuo Huang**, **Pin-Hsuan Kuo, Chih-Hung Chiang,** Chaoyang Univ. of Technology (Taiwan)

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:50 AM

SESSION 7: SHM/NDE OF TRANSPORTATION INFRASTRUCTURE II

27 March 2024 • 10:50 AM - 12:10 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Tzuyang Yu**, Univ. of Massachusetts Lowell (United States)

12950-32 • 10:50 AM - 11:10 AM
Local resonances for rail neutral temperature estimation: simulation and experiment
Author(s): **Yuning Wu**, **Keping Zhang**, **Peng Zhang,** The Univ. of Utah (United States); **John S. Popovics,** Univ. of Illinois (United States); **Xuan Zhu,** The Univ. of Utah (United States)

12950-31 • 11:10 AM - 11:30 AM
Corrosion detection of steel-reinforced concrete specimens using synthetic aperture radar
Author(s): **Koosha Raisi**, **Maryam Abazarsa, Tzuyang Yu,** Univ. of Massachusetts Lowell (United States)

12950-34 • 11:30 AM - 11:50 AM
Effects of moisture and chloride content on critical contour area in synthetic aperture radar images
Author(s): **Tzuyang Yu, Ahmed Alzeyadi,** Univ. of Massachusetts Lowell (United States)

12950-35 • 11:50 AM - 12:10 PM
Multi-scale robotic scanning of surface cracks in concrete structures
Author(s): **Ali Ghadimzadeh Alamdari, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

Lunch Break 12:10 PM - 01:40 PM

SESSION 8: NDE OF ADVANCED MATERIALS III

27 March 2024 • 01:40 PM - 03:00 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Sumit Gupta**, Oak Ridge National Lab. (United States); **Christopher C. Bowland**, Oak Ridge National Lab. (United States)

12950-37 • 01:40 PM - 02:00 PM
Multiscale modeling-enabled design of multifunctional composites
Author(s): **Sumit Gupta**, **Tanvir Sohail**, **Amit K. Naskar, Christopher C. Bowland,** Oak Ridge National Lab. (United States)

12950-38 • 02:00 PM - 02:20 PM
Investigating the mechanical failure mechanisms of a novel CFRP composite to inform computational models
Author(s): **Guillaume Lostec,** Univ. of Colorado Boulder (United States); **Louis Corcoran,** RockyTech Ltd. (United States); **Hongxuan Chen**, **Wei Zhang**, **Rong Long,** Univ. of Colorado Boulder (United States); **Yinghua Jin,** RockyTech Ltd. (United States)

12950-39 • 02:20 PM - 02:40 PM
Heat transfer analysis through hybrid FRP composite for self-sensing lithium-ion battery enclosure
Author(s): **Tymon B. Nieduzak**, **Eleonora M Tronci**, **Tianyi Zhou**, **Luke B. Demo, Maria Q. Feng,** Columbia Univ. (United States)

12950-40 • 02:40 PM - 03:00 PM
Mapping surface stress of automotive glass by non-contact polarimetric scans
Author(s): **Felix Müller**, **Hainer Wackerbarth, Georgios Ctistis,** Institut für Nanophotonik Göttingen e.V. (Germany)

Coffee Break 03:00 PM - 03:30 PM

SESSION 9: SHM/NDE OF TRANSPORTATION INFRASTRUCTURE III

27 March 2024 • 03:30 PM - 05:30 PM | Hilton, Pacific II (2nd Floor)
Session Chair(s): **Christopher C. Bowland**, Oak Ridge National Lab. (United States); **Sumit Gupta**, Oak Ridge National Lab. (United States)

12950-41 • 03:30 PM - 03:50 PM
A non-destructive technique to evaluate neutral temperature in welded rails based on impact-driven vibrations
Author(s): **Alireza Enshaeian**, **Matthew Belding, Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

12950-42 • 03:50 PM - 04:10 PM
Influence of changing environmental conditions on ground penetrating radar reflection amplitudes of structural concrete assets
Author(s): **Wael Zatar,** Marshall Univ. (United States)

12950-43 • 04:10 PM - 04:30 PM **(CANCELLED)**
An expert system for pavement condition evaluation using crowdsourced RGB-D pavement surface data
Author(s): **Yu-Ting Huang**, **Mohammad R. Jahanshahi, Nikkhil Vijaya Sankar,** Purdue Univ. (United States)

12950-44 • 04:30 PM - 04:50 PM
Static and dynamic testing of 3D-printed beams for structural design and construction applications
Author(s): **Tzuyang Yu, Koosha Raisi,** Univ. of Massachusetts Lowell (United States); **Koosha Raisi, Tiana Robinson,** Univ. of Massachusetts Lowell (United States)

12950-45 • 04:50 PM - 05:10 PM
Evaluation of concrete quality through estimation of absorbed water and water penetration depth using electromagnetic wave radar
Author(s): **Ahmad Rafi Faqiri,** Nagoya Univ. (Japan)

12950-51 • 05:10 PM - 05:30 PM
Considerations for qualifying reliable eddy current array technique for detection of backwall cracks
Author(s): **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States)

POSTER SESSION - WEDNESDAY

27 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Wednesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12950-47 • 06:00 PM - 07:30 PM
Damage localization in large-area FRP composites using a parallel array of self-sensing carbon fiber tows
Author(s): **Luke B. Demo**, **Eleonora M. Tronci**, **Tymon B. Nieduzak, Maria Q. Feng,** Columbia Univ. (United States)

12950-48 • 06:00 PM - 07:30 PM
Structural health monitoring of defects and internal imaging of thick-walled carbon fiber overwrapped pressure vessels via EMICA
Author(s): **Kevin Finch,** TDA Research, Inc. (United States); **Brad Spatafore**, **David Long, Joshua R. Biller,** TDA Research (United States)

12950-49 • 06:00 PM - 07:30 PM
Development of innovative biosensors for monitoring the packaged food lifespan using hybrid 3D printing techniques
Author(s): **Dimitrios A. Exarchos,** Univ. of Ioannina (Greece); **Panagiota T. Dalla**, **Spyridoula Farmaki,** Univ. of Ioannina (Greece), Hellenic Institute for Packaging and Agrifood Safety (Greece); **Anastasios Vasileiadis,** University of Ioannina, (Greece), Hellenic Institute for Packaging and Agrifood Safety (Greece); **Theodore E. Matikas,** University of Ioannina (Greece), Hellenic Institute for Packaging and Agrifood Safety (Greece)

12950-50 • 06:00 PM - 07:30 PM
Shaking table test of GFRP reinforced concrete frame structure with masonry-filled wall
Author(s): **Shikang Zhang**, **Xinsheng Xu, Lei Wang,** Univ. of Jinan (China)

12950-52 • 06:00 PM - 07:30 PM
Wire corrosion level identification from a single image using explainable AI
Author(s): **Shibin Parameswaran**, **Sara Wheeland, Ivan Febus-Rivera,** Naval Information Warfare Ctr. Pacific (United States)

12950-53 • 06:00 PM - 07:30 PM
Effect of fiber type on the fiber orientation distribution in the injection molded parts using X-ray computed tomography
Author(s): **Subhabrata Saha**, **Brittany Rodriguez**, **Nikhil Garg**, **Ahmed A. Hassen**, **Nikolaos Tsiamis,** Oak Ridge National Lab. (United States); **Marc-Henry Wakim**, **Steve Ouendag**, **Oskar Sjogren,** Avient Corp. (United States); **Vipin Kumar, Bhagyashree Prabhune,** Oak Ridge National Lab. (United States)

DIGITAL POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + NDE 2024.

12950-46
Structural finite element modeling and static analysis of the bridge modular expansion joint under vehicle load
Author(s): **Haoyu Zhang**, **Linren Zhou, Lan Chen,** South China Univ. of Technology (China)

CONFERENCE 12951

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RDI TECHNOLOGIES

Health Monitoring of Structural and Biological Systems XVIII

25 - 28 March 2024 | Hilton, International Ballroom I/II (2nd Floor)

Conference Chair(s): **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Conference Co-Chair(s): **Kara J. Peters,** North Carolina State Univ. (United States); **Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy); **Piervincenzo Rizzo,** Univ. of Pittsburgh (United States)

Program Committee: **Sourav Banerjee,** Univ. of South Carolina (United States); **Yoseph Bar-Cohen,** Jet Propulsion Lab. (United States); **Fu-Kuo Chang,** Stanford Univ. (United States); **Anthony J. Croxford,** Univ. of Bristol (United Kingdom); **Erik L. Frankforter,** NASA Langley Research Ctr. (United States); **Paul Fromme,** Univ. College London (United Kingdom); **Victor Giurgiutiu,** Univ. of South Carolina (United States); **Srinivasan Gopalakrishnan,** Indian Institute of Science, Bengaluru (India); **Guoliang Huang,** Univ. of Missouri (United States); **Robin James,** General Motors Co. (United States); **Xiaoning Jiang,** North Carolina State Univ. (United States); **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States); **Sridhar Krishnaswamy,** Northwestern Univ. (United States); **Tribikram Kundu,** The Univ. of Arizona (United States); **Francesco Lanza di Scalea,** Univ. of California, San Diego (United States); **Paweł H. Malinowski,** The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland); **Zhu Mao,** Worcester Polytechnic Institute (United States); **Ernesto Monaco,** Univ. degli Studi di Napoli Federico II (Italy); **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States); **Mostafa A. Nouh,** Univ. at Buffalo (United States); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland); **Xinlin Qing,** Xiamen Univ. (China); **Henrique L. Reis,** Univ. of Illinois at Urbana-Champaign (United States); **Alessandro Sabato,** Univ. of Massachusetts Lowell (United States); **Christoph Schaal,** California State Univ., Northridge (United States); **Fabio Semperlotti,** Purdue Univ. (United States); **Yanfeng Shen,** Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China); **Hoon Sohn,** KAIST (Korea, Republic of); **Wieslaw J. Staszewski,** AGH Univ. of Science and Technology (Poland); **Jinkyu Yang,** Univ. of Washington (United States); **Lingyu Yu,** Univ. of South Carolina (United States); **Andrei N. Zagrai,** New Mexico Institute of Mining and Technology (United States)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

MONDAY KEYNOTE

25 March 2024 • 10:30 AM - 11:10 AM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Zhongqing Su**, The Hong Kong Polytechnic Univ. (Hong Kong, China)

12951-1 • 10:30 AM - 11:10 AM
Microscale actuation using acoustofluidics for rapid micromanipulation, and 3D printing (Keynote Presentation)
Author(s): **David Collins,** The Univ. of Melbourne (Australia)

SESSION 1: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE I

25 March 2024 • 11:10 AM - 12:30 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Paul Fromme**, Univ. College London (United Kingdom)
Sessions 1-3 run concurrently with sessions 4-6

12951-2 • 11:10 AM - 11:30 AM
Effect of bending modes on failure analysis of adhesively bonded composite structures
Author(s): **Yang Zhang**, **Maciej Radzienski, Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

12951-3 • 11:30 AM - 11:50 AM
Flow-coating of adhesively bonded optical fiber acoustic couplers
Author(s): **Cameron Marashi, Kara J. Peters,** North Carolina State Univ. (United States)

12951-4 • 11:50 AM - 12:10 PM
Laser ultrasonic inspection of lithium-ion battery wire welding
Author(s): **Kiyoon Yi**, **Minwoo Kang**, **Hoon Sohn,** KAIST (Korea, Republic of); **Dongho Kim, Seungjae Yoo,** Elentec Co., Ltd. (Korea, Republic of)

12951-5 • 12:10 PM - 12:30 PM
Damage detection in structures using SH waves sensed with FBG sensors
Author(s): **Rohan N. Soman,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Fuh Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

Lunch Break 12:30 PM - 02:00 PM

SESSION 2: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE II

25 March 2024 • 02:00 PM - 04:00 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Christoph Schaal**, California State Univ., Northridge (United States)
Sessions 1-3 run concurrently with sessions 4-6

12951-6 • 02:00 PM - 02:20 PM
Guided ultrasonic wave measurement in plates using low-cost equipment
Author(s): **Paul Fromme,** Univ. College London (United Kingdom); **Philip Loveday,** Univ. of the Witwatersrand, Johannesburg (South Africa)

12951-7 • 02:20 PM - 02:40 PM
Identification of local debonding in bolted panels using nonlinear pseudo-forces
Author(s): **Wei Xu**, **M. Ji**, **Maosen Cao,** Hohai Univ. (China); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (China); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

12951-8 • 02:40 PM - 03:00 PM
"Totally-additive-manufacturing"-driven in situ integrity monitoring of carbon fiber-reinforced polymer composites
Author(s): **Qingqing Wang,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Yiyin Su,** Zhejiang Lab. (China); **Limin Zhou,** Southern Univ. of Science and Technology (China); **Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

12951-9 • 03:00 PM - 03:20 PM
Studying the elastic wave mode propagation in D-shaped optical fibers
Author(s): **Rohan N. Soman,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Cameron Marashi,** North Carolina State Univ. (United States); **Adam Filipkowski**, **Ryszard Buczynski,** Univ. of Warsaw (Poland); **Kara J. Peters,** North Carolina State Univ. (United States)

12951-10 • 03:20 PM - 03:40 PM
Towards a FRF-based parametric surrogate for guided wave-based evaluation in multiple defect scenarios
Author(s): **Paul Sieber,** ETH Zurich (Switzerland); **Konstantinos Agathos,** Univ. of Exeter (United Kingdom); **Rohan Soman**, **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Eleni Chatzi,** ETH Zurich (Switzerland)

12951-11 • 03:40 PM - 04:00 PM
Wave propagation analysis in composite plate with clapping delamination based on spectral element method
Author(s): **Rohan N. Soman**, **Piotr Fiborek**, **Pawel Kudela,** The Szewalski Institute of Fluid-Flow Machinery (Poland); **Eleni Chatzi,** ETH Zurich (Switzerland); **Wieslaw M. Ostachowicz,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

Coffee Break 04:00 PM - 04:30 PM

SESSION 3: SPECIAL SESSION: GUIDED WAVES FOR SHM AND NDE III

25 March 2024 • 04:30 PM - 06:10 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Wieslaw M. Ostachowicz**, The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland)
Sessions 1-3 run concurrently with sessions 4-6

12951-12 • 04:30 PM - 04:50 PM
Decoupling propagating and non-propagating guided modes in structural components
Author(s): **Peng Zhang**, **Pai Wang, Xuan Zhu,** The Univ. of Utah (United States)

12951-13 • 04:50 PM - 05:10 PM
Residual stress evaluation of multilayer viscoelastic composites using guided wave and electromechanical impedance signal feature variations
Author(s): **Houfu Jiang**, **Yanfeng Shen,** Shanghai Jiao Tong Univ. (China); **Tao Zhang,** The 41st Institute of China Aerospace Science & Industry Corp., Ltd. (China)

12951-14 • 05:10 PM - 05:30 PM
Distinctive trembling features following resonance peaks at zero group velocity frequencies in harmonic analysis
Author(s): **Runye Lu, Yanfeng Shen,** Shanghai Jiao Tong Univ. (China)

12951-15 • 05:30 PM - 05:50 PM
A hybrid PZT-FBG sensing-based damage detection
Author(s): **Tomasz Wandowski**, **Pawel Malinowski**, **Sultan Ahamad, Rohan N. Soman,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

12951-16 • 05:50 PM - 06:10 PM
An approach to extract dispersion curves from small plate samples
Author(s): **Isabella Wells, Andrei Zagrai,** New Mexico Institute of Mining and Technology (United States)

SESSION 4: ADDITIVE MANUFACTURING AND AI-DRIVEN SHM I

25 March 2024 • 11:10 AM - 12:10 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Fabio Semperlotti**, Purdue Univ. (United States)
Sessions 1-3 run concurrently with sessions 4-6

12951-17 • 11:10 AM - 11:30 AM
Dynamic shape memory alloy driven magnetic latch system
Author(s): **Wei-Chih Wang**, **Chileung Tsui,** Univ. of Washington (United States); **Jonathan Thorn,** Phoenix-Micron, Inc. (United States)

12951-18 • 11:30 AM - 11:50 AM
Digital twin in the real-time ultrasonic assessment of additively manufactured PLA parts
Author(s): **Mariya Pozhanka, Andrei Zagrai,** New Mexico Institute of Mining and Technology (United States)

12951-42 • 11:50 AM - 12:10 PM
Inspection of wind turbine blades using image deblurring and deep learning segmentation
Author(s): **Jiale Lu,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Qingbin Gao,** Harbin Institute of Technology (China); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

Lunch Break 12:10 PM - 01:40 PM

SESSION 5: SPECIAL SESSION: NDE AND SHM OF BATTERY MATERIALS, STRUCTURES, AND SYSTEMS

25 March 2024 • 01:40 PM - 03:20 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Erik L. Frankforter**, NASA Langley Research Ctr. (United States); **Robin James**, General Motors Co. (United States)
Sessions 1-3 run concurrently with sessions 4-6

12951-20 • 01:40 PM - 02:00 PM
Ultrasonic detection of pre-existing thermal abuse in lithium-ion pouch cells
Author(s): **Tyler M. McGee**, **Barrett Neath**, **Sam Matthews**, **Ofodike A. Ezekoye, Michael R. Haberman,** The Univ. of Texas at Austin (United States)

12951-21 • 02:00 PM - 02:20 PM
Elastic-poroelastic simulation of locally resonant ultrasound inspection for aging lithium metal batteries
Author(s): **Erik L. Frankforter**, **Matthew R. Webster**, **Daniel Perey,** NASA Langley Research Ctr. (United States); **Andrew Campbell,** Univ. of South Carolina (United States); **Yi Lin,** NASA Langley Research Ctr. (United States)

12951-22 • 02:20 PM - 02:40 PM
Characterizing the structure of lithium metal batteries using local ultrasonic resonance spectroscopy
Author(s): **Matthew R. Webster**, **Daniel Perey**, **Yi Lin, Erik Frankforter,** NASA Langley Research Ctr. (United States)

12951-23 • 02:40 PM - 03:00 PM
High-throughput terahertz scanning for quality assessment of battery electrode manufacturing
Author(s): **Nezih Yardimci**, **Ali Charkhesht,** Lookin, Inc. (United States); **Mona Jarrahi,** Univ. of California, Los Angeles (United States)

12951-25 • 03:00 PM - 03:20 PM
Exploratory investigation of early detection for high-C discharge-induced failure in 18650 lithium-ion batteries
Author(s): **Goerge Anthony**, **Connor Madden**, **Emmanuel A. Ogunniyi**, **Austin R. J. Downey**, **Ryan Limbaugh**, **Jarret Peskar**, **Jingjing Bao, Xinyu Huang,** Univ. of South Carolina (United States)

Coffee Break 03:20 PM - 03:50 PM

SESSION 6: SPECIAL SESSION: PHONONIC CRYSTALS AND ACOUSTIC/ELASTIC METAMATERIALS

25 March 2024 • 03:50 PM - 05:50 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Zhu Mao**, Worcester Polytechnic Institute (United States)
Sessions 1-3 run concurrently with sessions 4-6

12951-26 • 03:50 PM - 04:10 PM
Acoustic spin and topological bulk state in metamaterials
Author(s): **Sourav S. Banerjee, Mustahseen M. Indaleeb,** Univ. of South Carolina (United States)

12951-27 • 04:10 PM - 04:30 PM
An inversely designed acoustic meta-lens for broadband and tunable ultrasound focusing in solids with coupled soft tissues
Author(s): **Ming Ma**, **He Gao, Zhongqing Su,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

12951-28 • 04:30 PM - 04:50 PM
Acoustic computing exploiting Dirac-like cone
Author(s): **Sourav S. Banerjee, Mustahseen M. Indaleeb,** Univ. of South Carolina (United States)

12951-29 • 04:50 PM - 05:10 PM
Boundary effect on in-gap edge states in nonlocal Su-Schrieffer-Heeger model
Author(s): **Amir Rajabpoor Alisepahi, Jihong Ma,** The Univ. of Vermont (United States)

12951-30 • 05:10 PM - 05:30 PM
An overview of geometric phases in elastic systems and their connection to topological invariants of elastic metamaterials
Author(s): **Mohit Kumar, Fabio Semperlotti,** Purdue Univ. (United States)

12951-31 • 05:30 PM - 05:50 PM
Direction-dependent elastic wave scattering and mode coupling in elastic plates
Author(s): **Samuel D. Parker, Michael R. Haberman,** The Univ. of Texas at Austin (United States)

Tuesday 26 March 2024

TUESDAY PLENARY

26 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/tuesday-plenary

8:15 AM - 8:30 AM: Welcome and opening remarks
SPIE Fellow recognition:
- **Jae-Hung Han**, KAIST (Korea, Republic of)
- **Oliver Myers**, Clemson Univ. (United States)

12951-501 • 08:30 AM - 09:15 AM
Acoustic-optical interactions in fibers for ultrasonic inspection of structures (Plenary Presentation)
Author(s): **Kara J. Peters,** North Carolina State Univ. (United States)

12950-501 • 09:15 AM - 10:00 AM
The division of labor for in situ sensing in additive manufacturing (Plenary Presentation)
Author(s): **John R. Middendorf,** The Ohio State Univ. (United States)

Coffee Break 10:00 AM - 10:30 AM

TUESDAY KEYNOTE

26 March 2024 • 10:30 AM - 11:10 AM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Kara J. Peters**, North Carolina State Univ. (United States)

12951-32 • 10:30 AM - 11:10 AM
Passive ultrasonic sensing for NDT and SHM (Keynote Presentation)
Author(s): **Francesco Lanza di Scalea,** Univ. of California, San Diego (United States); **Chengyang Huang,** Univ. of California (United States); **Ali Zare Hosseinzadeh,** Univ. of California, San Diego (United States)

SESSION 7: RECENT ADVANCES IN SHM I

26 March 2024 • 11:10 AM - 12:30 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Kara J. Peters**, North Carolina State Univ. (United States)
Sessions 7-8 run concurrently with sessions 9-10

12951-33 • 11:10 AM - 11:30 AM
Numerical simulation of fast multiple acoustic sources localization on a spherical surface
Author(s): **Zixian Zhou,** Jilin Univ. (China); **Shougou Yan,** State Key Laboratory of Acoustics, Institute of Acoustics, Chinese Academy of Sciences (China); **Zhiwen Cui,** Jilin Univ. (China); **Tribikram Kundu,** The Univ. of Arizona (United States)

12951-34 • 11:30 AM - 11:50 AM
Enhancing dynamics measurement from moving cameras through sensor-fusion motion compensation approaches
Author(s): **Lorenzo Peretto,** Politecnico di Torino (Italy), Univ. of Massachusetts Lowell (United States); **Marco Civera**, **Cecilia Surace,** Politecnico di Torino (Italy); **Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

12951-35 • 11:50 AM - 12:10 PM
Physics-guided data-driven failure identification of underwater mooring systems in offshore infrastructures
Author(s): **Yixuan Liu,** The Hong Kong Polytechnic Univ. (China); **Shangyan Zou,** Michigan Technological Univ. (United States); **Qingbin Gao,** Harbin Institute of Technology (China); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China)

12951-53 • 12:10 PM - 12:30 PM
Damage detection in 3D-printed plate using the electromechanical impedance method with surface bonded and embedded sensors
Author(s): **Shishir K. Singh**, **Artur Andrearczyk, Pawel H. Malinowski,** The Szewalski Institute of Fluid-Flow Machinery (Poland)

Lunch Break 12:30 PM - 01:40 PM

SESSION 8: RECENT ADVANCES IN SHM II

26 March 2024 • 01:40 PM - 03:40 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Paweł H. Malinowski**, The Szewalski Institute of Fluid-Flow Machinery, Polish Academy of Sciences (Poland)
Sessions 7-8 run concurrently with sessions 9-10

12951-36 • 01:40 PM - 02:00 PM
A signal energy-based acoustic source localization technique for composite laminates
Author(s): **Chenning Ma**, **Zixian Zhou**, **Zhiwen Cui,** Jilin Univ. (China); **Tribikram Kundu,** The Univ. of Arizona (United States)

12951-37 • 02:00 PM - 02:20 PM
Assessing structural health via measurements of attractor deformation
Author(s): **Andrew R. Sloboda,** Bucknell Univ. (United States)

12951-38 • 02:20 PM - 02:40 PM
Interaction of Lamb waves and sensors in structural health monitoring of carbon fiber composite
Author(s): **Md Raf E Ul Shougat**, **Joseph Alonso**, **Waliur Rahman, Kara J. Peters,** North Carolina State Univ. (United States)

12951-39 • 02:40 PM - 03:00 PM
Non-probabilistic reliability model for structural damage identification under uncertainty with reduced model
Author(s): **Yang Zhang,** Univ. of Connecticut (United States); **Kai Zhou,** The Hong Kong Polytechnic Univ. (Hong Kong, China); **Jiong Tang,** Univ. of Connecticut (United States)

12951-40 • 03:00 PM - 03:20 PM
Experimental validation of guided wave mode-conversion at part-thickness defects in metal plates
Author(s): **Lijian Li, Paul Fromme,** Univ. College London (United Kingdom)

12951-83 • 03:20 PM - 03:40 PM
Automated transducer deployment for Lamb wave-based nondestructive evaluation of plates
Author(s): **Christoph Schaal,** California State Univ., Northridge (United States), Univ. of California, Los Angeles (United States); **Ruben Granados**, **Morgan Barrett, Kathryn Davis,** California State Univ., Northridge (United States)

Coffee Break 03:40 PM - 04:10 PM

SESSION 9: BIOMEDICAL APPLICATIONS AND DEVICES I

26 March 2024 • 11:10 AM - 12:10 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Francesco Lanza di Scalea**, Univ. of California, San Diego (United States)
Sessions 7-8 run concurrently with sessions 9-10

12951-45 • 11:10 AM - 11:30 AM
Using acoustic emissions to enhance rodent locomotion analysis in an open field
Author(s): **Shivashankar Peruvazhuthi**, **Laura Agee**, **Nathaniel Nocera**, **Nathan Wilson**, **Michael Drew, Salvatore Salamone,** The Univ. of Texas at Austin (United States)

12951-48 • 11:30 AM - 11:50 AM
Time-of-flight photoplethysmography offers accurate and robust monitoring of heart rate
Author(s): **Vinh Nguyen Du Le,** The Univ. of Alabama in Huntsville (United States)

12951-49 • 11:50 AM - 12:10 PM
Thickness measurement of metal components using guided waves and fully non-contact PL-SLDV system
Author(s): **Andrew Campbell**, **Wenfeng Xiao,** Univ. of South Carolina (United States); **Kathryn E. Metzger**, **Jorie L. Walters,** Westinghouse Electric Co., LLC (United States); **Lingyu Yu,** Univ. of South Carolina (United States)

Lunch Break 12:10 PM - 02:00 PM

SESSION 10: BIOMEDICAL APPLICATIONS AND DEVICES II

26 March 2024 • 02:00 PM - 03:20 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States); **Erik L. Frankforter**, NASA Langley Research Ctr. (United States)
Sessions 7-8 run concurrently with sessions 9-10

12951-46 • 02:00 PM - 02:20 PM
Enhancing rodent behavior analysis in an open field arena with acoustic emissions: the setup and scope
Author(s): **Shivashankar Peruvazhuthi**, **Laura Agee**, **Nathaniel Nocera**, **Nathan Wilson**, **Michael Drew, Salvatore Salamone,** The Univ. of Texas at Austin (United States)

12951-47 • 02:20 PM - 02:40 PM
Predicting intraocular pressure utilizing highly nonlinear solitary waves as inputs to a CNN
Author(s): **Madison Hodgson**, **Piervincenzo Rizzo**, **Samuel J. Dickerson, Ian Sigal,** Univ. of Pittsburgh (United States)

12951-50 • 02:40 PM - 03:00 PM
Design and fabrication of innovative tone burst interdigitated transducer (TB-IDT): a possible approach for a highly sensitive point-of-care (POC) biosensor
Author(s): **Debdyuti Mandal, Sourav Banerjee,** Univ. of South Carolina (United States)

MOVED TO DIGITAL POSTER: 12951-51, The feasibility study of the real-time evaluating the total hip replacement (THR) by using acoustic emission • 03:00 PM - 03:20 PM

Coffee Break 03:20 PM - 04:10 PM

HEALTH MONITORING OF STRUCTURAL AND BIOLOGICAL SYSTEMS BEST STUDENT PAPER SESSION

26 March 2024 • 04:10 PM - 06:10 PM | Hilton, International Ballroom I (2nd Floor)

Session Chair(s): **Alessandro Sabato**, Univ. of Massachusetts Lowell (United States); **Paul Fromme**, Univ. College London (United Kingdom)

The Health Monitoring of Structural and Biological Systems Best Student Paper Award finalists will present their papers and answer questions.

12951-59
Acoustic streaming effects on collagen self-assembly
Presenter: Yingshan Du, Virginia Polytechnic Institute and State Univ. (United States)
26 March 2024 • 4:10 PM - 4:30 PM PDT | Hilton, International Ballroom I (2nd Floor)

12951-62
Design and investigation of polymer-based terahertz nearfield imaging probes for the high-resolution nondestructive imaging applications
Presenter: Karthickraj Muthuramalingam, National Tsing Hua Univ. (Taiwan)
26 March 2024 • 4:30 PM - 4:50 PM PDT | Hilton, International Ballroom I (2nd Floor)

12951-63
Improvements on focused tactile feedback using time reversal mirror
Presenter: Chengyang Huang, Univ. of California, San Diego (United States)
26 March 2024 • 4:50 PM - 5:10 PM PDT | Hilton, International Ballroom I (2nd Floor)

12951-77
All-printed multifunctional sensors for structural health monitoring of inflatable habitats
Presenter: Matt Zuzelski, Boise State Univ. (United States)
26 March 2024 • 5:10 PM - 5:30 PM PDT | Hilton, International Ballroom I (2nd Floor)

12951-89
An entropy-based probabilistic model for acoustic emission RA value-average frequency data
Presenter: Pedram Bazrafshan, Drexel Univ. (United States)
26 March 2024 • 5:30 PM - 5:50 PM PDT | Hilton, International Ballroom I (2nd Floor)

12951-90
Time integration with proper generalized decomposition for efficient time response analysis in nonlinear dynamical systems
Presenter: Daeguen Lim, KAIST (Korea, Republic of)
26 March 2024 • 5:50 PM - 6:10 PM PDT | Hilton, International Ballroom I (2nd Floor)

Awards are sponsored by RDI Technologies.

Wednesday 27 March 2024

WEDNESDAY PLENARY

27 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/wednesday-plenary

8:15 - 8:30 AM: Welcome and Opening Remarks
- EAP-in-Action Demonstration Awards
- Craig F. Bohren Best Student Presentation Award
- Health Monitoring of Structural and Biological Systems Best Student Paper Award

12949-501 • 08:30 AM - 09:15 AM
Digital twin: the future of aircraft health monitoring (Plenary Presentation)
Author(s): **Fuh-Gwo Yuan,** North Carolina State Univ. (United States), National Cheng Kung Univ. (Taiwan)

12945-501 • 09:15 AM - 10:00 AM
Electroactive polymer, dielectric elastomer, bistable actuation, and modulation (Plenary Presentation)
Author(s): **Qibing Pei,** Univ. of California, Los Angeles (United States)

Coffee Break 10:00 AM - 10:30 AM

WEDNESDAY KEYNOTE

27 March 2024 • 10:30 AM - 11:10 AM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Fabrizio Ricci**, Univ. degli Studi di Napoli Federico II (Italy)

12951-52 • 10:30 AM - 11:10 AM
From defect imaging to microstructure characterization using ultrasonic waves (Keynote Presentation)
Author(s): **Zheng Fan,** Nanyang Technological Univ. (Singapore)

SESSION 11: ADDITIVE MANUFACTURING AND AI-DRIVEN SHM II

27 March 2024 • 11:10 AM - 12:10 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Kara J. Peters**, North Carolina State Univ. (United States)
Sessions 11-13 run concurrently with sessions 14-16

12951-43 • 11:10 AM - 11:30 AM
Deep learning-based prediction of interfacial conditions in coated plates using guided waves
Author(s): **Junzhen Wang,** Stevens Institute of Technology (United States); **Maximilian Schmitz**, **Laurence J. Jacobs,** Georgia Institute of Technology (United States); **Jianmin Qu,** Stevens Institute of Technology (United States)

12951-44 • 11:30 AM - 11:50 AM
Identifying scatterers in solids using convolutional neural networks and surfacial elastic wave measurements
Author(s): **Boyoung Kim**, **Jinho Hahn**, **Salma Abdelgawad, Chanseok Jeong,** Central Michigan Univ. (United States)

12951-101 • 11:50 AM - 12:10 PM
Condition monitoring of intelligent tires utilizing 1D CNN and vibration measurement
Author(s): **Junho Kim**, **Daeguen Lim**, **Wonho Jung,** KAIST (Korea, Republic of); **Hojong Lee,** Hankook Technology Group Co., Ltd. (Korea, Republic of); **Yong-Hwa Park,** KAIST (Korea, Republic of)

Lunch Break 12:10 PM - 01:40 PM

SESSION 12: RECENT ADVANCES IN SHM III

27 March 2024 • 01:40 PM - 03:40 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Zheng Fan**, Nanyang Technological Univ. (Singapore)
Sessions 11-13 run concurrently with sessions 14-16

12951-54 • 01:40 PM - 02:00 PM
Comparison between a novel compressed sensing-based neural network and traditional neural network approaches for electrical impedance tomography reconstruction
Author(s): **Damond M. Li,** California Polytechnic State Univ., San Luis Obispo (United States); **Marco G Araiza,** California Polytechnic State Univ. (United States); **Long Wang,** California Polytechnic State Univ., San Luis Obispo (United States)

12951-55 • 02:00 PM - 02:20 PM
Piezoelectric Impedance-based robust mass sensing with temperature decoupling
Author(s): **Jiawen Xu,** Southeast Univ. (China)

12951-56 • 02:20 PM - 02:40 PM
Comparative study of AI-enabled damage detection strategies based on story drifts and stiffness reductions for seismically-excited building
Author(s): **Chieh Yu Liu, Chia-Ming Chang,** National Taiwan Univ. (Taiwan)

12951-58 • 02:40 PM - 03:00 PM
A non-destructive method for underwater material flexural modulus measurement
Author(s): **Shuai Ju**, **Masoud Naghdi**, **Sreejith Sreedharan**, **Mitali H. Desai**, **Sai K. Chinka, Haifeng Zhang,** Univ. of North Texas (United States)

12951-59 • 03:00 PM - 03:20 PM
Acoustic streaming effects on collagen self-assembly
Author(s): **Yingshan Du**, **Zhe Pei**, **Liang Shen**, **Jiali Li,** Virginia Polytechnic Institute and State Univ. (United States); **Bowen Cai,** Mississippi State Univ. (United States); **Teng Li**, **Luyu Bo, Zhenhua Tian,** Virginia Polytechnic Institute and State Univ. (United States)

12951-60 • 03:20 PM - 03:40 PM
Electro-mechanical impedance measurements in space environment with miniaturized hardware
Author(s): **Funmilola Nwokocha**, **David Hunter**, **Matthew Rue, Andrei Zagrai,** New Mexico Institute of Mining and Technology (United States)

Coffee Break 03:40 PM - 04:00 PM

SESSION 13: SIGNAL AND IMAGING PROCESSING

27 March 2024 • 04:00 PM - 06:00 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Yanfeng Shen**, Univ. of Michigan-Shanghai Jiao Tong Univ. Joint Institute (China)
Sessions 11-13 run concurrently with sessions 14-16

12951-61 • 04:00 PM - 04:20 PM
Passive ultrasonic beamforming for fast and efficient imaging
Author(s): **Francesco Lanza di Scalea**, **Chengyang Huang, Ali Z. Hosseinzadeh,** Univ. of California, San Diego (United States)

12951-62 • 04:20 PM - 04:40 PM
Design and investigation of polymer-based terahertz nearfield imaging probes for the high-resolution nondestructive imaging applications
Author(s): **Karthickraj Muthuramalingam,** National Tsing Hua Univ. (Taiwan); **Wei-Chih Wang,** Univ. of Washington (United States)

12951-63 • 04:40 PM - 05:00 PM
Improvements on focused tactile feedback using time reversal mirror
Author(s): **Chengyang Huang,** Univ. of California, San Diego (United States); **Heng Xu,** CVTE Research (China)

12951-64 • 05:00 PM - 05:20 PM
Edge computing-based imagery data preprocessing strategy
Author(s): **Shufan Liu,** Purdue Univ. (United States)

12951-65 • 05:20 PM - 05:40 PM
Integrating recurrent neural network (RNN) and Navier-Stokes equations for noncontact blood pressure assessment
Author(s): **Zheng-Yu Luo**, **Ting-Yu Chiang**, **Chen-Li Lin**, **Jiun-Woei Huang,** National Taiwan Univ. (Taiwan); **Shu-sheng Lee,** National Taiwan Ocean Univ. (Taiwan); **Hsiang-Chieh Lee, Chih-Kung Lee,** National Taiwan Univ. (Taiwan)

12951-66 • 05:40 PM - 06:00 PM
Scan-specific ensemble of pretrained vision transformers for multimodal medical imaging disease diagnosis
Author(s): **Partha Kaushik**, **Hemkant Nehete, Brajesh Kumar Kaushik,** Indian Institute of Technology Roorkee (India)

SESSION 14: SPECIAL SESSION: RECENT ADVANCES IN NONLINEAR ULTRASONICS-BASED NDE AND SHM

27 March 2024 • 11:10 AM - 12:10 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Tribikram Kundu**, The Univ. of Arizona (United States)
Sessions 11-13 run concurrently with sessions 14-16

12951-67 • 11:10 AM - 11:30 AM
Impact damage detection utilizing nonlinear scattering features of ultrasonic guided waves
Author(s): **Yanfeng Shen**, **Houfu Jiang,** Shanghai Jiao Tong Univ. (China); **Flora Hervin, Paul Fromme,** Univ. College London (United Kingdom)

12951-68 • 11:30 AM - 11:50 AM
Numerical modeling with experimental verification investigating the effects of nonlinearities on the sideband peak count-index technique and topological acoustic sensing
Author(s): **Guangdong Zhang,** The Univ. of Arizona (United States), Central South Univ. (China); **Bo Hu,** The Univ. of Arizona (United States); **Hamad Alnuaimi,** Qatar Univ. (Qatar); **Umar Amjad,** Qatar Univ. (Qatar), Pacific Waves (United States); **Pierre A Deymier**, **Keith Runge, Tribikram Kundu,** The Univ. of Arizona (United States)

12951-69 • 11:50 AM - 12:10 PM
Modulation transfer technique for damage detection of structures
Author(s): **Andrzej P. Klepka**, **Kajetan Dziedziech, Jakub Gorski,** AGH Univ. of Krakow (Poland)

Lunch Break 12:10 PM - 01:40 PM

SESSION 15: SENSORS AND ENERGY HARVESTING

27 March 2024 • 01:40 PM - 03:00 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Sridhar Krishnaswamy**, Northwestern Univ. (United States)
Sessions 11-13 run concurrently with sessions 14-16

12951-70 • 01:40 PM - 02:00 PM
Development of a compact magnetically levitated energy harvesting design
Author(s): **Wei-Chih Wang,** Univ. of Washington (United States); **Chiu-Chih Tsao,** National Tsing Hua Univ. (Taiwan); **Joe Ho,** Univ. of Washington (United States)

12951-71 • 02:00 PM - 02:20 PM
Development and testing of graphene nanofilled sensors applied on composite aerospace structural items for structural dynamic and SHM applications
Author(s): **Ernesto Monaco,** Univ. degli Studi di Napoli Federico II (Italy); **Pietro Russo,** Istituto per i Polimeri, Compositi e Biomateriali, Consiglio Nazionale delle Ricerche (Italy); **Fabrizio Ricci, Massimo Viscardi,** Univ. degli Studi di Napoli Federico II (Italy)

12951-72 • 02:20 PM - 02:40 PM
Dynamic deployment sensing of thin-shell composite structures with fiber Bragg gratings
Author(s): **Jacob Daye**, **Cameron Marashi**, **Andrew Lee, Kara J. Peters,** North Carolina State Univ. (United States)

12951-73 • 02:40 PM - 03:00 PM
Automated real-time satellite docking monitoring using piezoelectric wafer transducers
Author(s): **Lukas A. Peterson**, **Isabella Wells**, **Andrei Zagrai,** New Mexico Institute of Mining and Technology (United States); **Seth Kessler, Khoi Nguyen,** Metis Design Corp. (United States)

Coffee Break 03:00 PM - 03:30 PM

SESSION 16: SPECIAL SESSION: 3D-PRINTED SENSORS

27 March 2024 • 03:30 PM - 04:50 PM | Hilton, International Ballroom II (2nd Floor)
Session Chair(s): **Fabrizio Ricci**, Univ. degli Studi di Napoli Federico II (Italy); **Robin James**, General Motors Co. (United States)
Sessions 11-13 run concurrently with sessions 14-16

12951-75 • 03:30 PM - 03:50 PM
Two-photon 3D printed active polymer ring resonators on the tip of optical fibers for ultrasound sensing
Author(s): **Akhilesh K. Pathak, Sridhar Krishnaswamy,** Northwestern Univ. (United States)

12951-76 • 03:50 PM - 04:10 PM
Fiber-optic temperature sensor based on embedded rare-earth luminescent nanoparticles
Author(s): **Akhilesh K. Pathak, Sridhar Krishnaswamy,** Northwestern Univ. (United States)

12951-77 • 04:10 PM - 04:30 PM
All-printed multifunctional sensors for structural health monitoring of inflatable habitats
Author(s): **Matt Zuzelski**, **Isaac Little**, **Jun Zhuang, Zhangxian Deng,** Boise State Univ. (United States)

12951-100 • 04:30 PM - 04:50 PM
A flexible reconfigurable sensor based on metamaterial and superhydrophobic biomimetic surface
Author(s): **Nan Li**, **Liwu Liu**, **Yanju Liu, Jinsong Leng,** Harbin Institute of Technology (China)

POSTER SESSION - WEDNESDAY

27 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Wednesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Wednesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12951-91 • 06:00 PM - 07:30 PM
Spatial imaging for impact-induced damages in $LiFePO_4$ battery via active sensing network
Author(s): **Jaewon Lee**, **Dael Na, Ho-Wuk Kim,** Inha Univ. (Korea, Republic of)

12951-92 • 06:00 PM - 07:30 PM
Micro-size damage detection of multilayer ceramic capacitors based on Hilbert-Huang transform of electromechanical responses
Author(s): **Dael Na**, **Jaewon Lee,** Inha Univ. (Korea, Republic of); **Minkyu Choi**, **Eunchong Baek,** SAMSUNG Electro-Mechanics (Korea, Republic of); **Ho-Wuk Kim,** Inha Univ. (Korea, Republic of)

12951-93 • 06:00 PM - 07:30 PM
From structure health monitoring to forensics: adapting computer vision to support victims of violence
Author(s): **Kiyarash Aminfar**, **Katherine Scafide**, **Janusz Wojtusiak, David Lattanzi,** George Mason Univ. (United States)

12951-94 • 06:00 PM - 07:30 PM
Synthesis and characterization of water soluble conductive polymer PANI:PSS as drug carrier
Author(s): **Rawita Morarad, Anuvat Sirivat,** Chulalongkorn Univ. (Thailand)

12951-95 • 06:00 PM - 07:30 PM
Modifications of the screen-printed carbon electrode of non-enzymatic glucose sensor based on different conductive polymers
Author(s): **Nuttha Ariyasajjamongkol, Anuvat Sirivat,** Chulalongkorn Univ. (Thailand)

12951-96 • 06:00 PM - 07:30 PM
Multimodal NDT inspection and characterization of composite honeycomb sandwich samples with programmed flaws
Author(s): **Veronica Vespini**, **Sara Coppola**, **Fabiana Graziano**, **Simonetta Grilli**, **Pietro Ferraro**, **Massimo Rippa,** Istituto di Scienze Applicate e Sistemi Intelligenti "Eduardo Caianiello" (Italy); **Pietro Russo,** Istituto per i Polimeri, Compositi e Biomateriali (Italy); **Valerio Dentico**, **Giuseppe DelPrete**, **Nicola Gallo,** Leonardo Spa (Italy); **Vittorio Memmolo**, **Ernesto Monaco, Fabrizio Ricci,** Univ. degli Studi di Napoli Federico II (Italy)

12951-97 • 06:00 PM - 07:30 PM
Muscle monitoring system based on dry type electromyography electrode and strain sensing yarn
Author(s): **Ji Hwan Moon**, **Gyu Hyeon Song**, **Dong Yeop Lee**, **Seongjun Kim**, **Yongwoo Jang, Seon Jeong Kim,** Hanyang Univ. (Korea, Republic of)

12951-19 • 06:00 PM - 07:30 PM
Nondestructive evaluation of metal additively manufactured heat exchangers
Author(s): **Matthew Keef**, **Shant Sassounian**, **Changyu Ma**, **Bingbing Li,** California State Univ., Northridge (United States); **Christoph Schaal,** California State Univ., Northridge (United States), Univ. of California, Los Angeles (United States)

Thursday 28 March 2024

SESSION 17: SPECIAL SESSION: OPTICAL SENSING AND MACHINE LEARNING FOR SHM AND NDE

28 March 2024 • 08:30 AM - 09:50 AM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Alessandro Sabato**, Univ. of Massachusetts Lowell (United States); **Zhu Mao**, Worcester Polytechnic Institute (United States)

12951-79 • 08:30 AM - 08:50 AM
Natural pattern tracking for 3D-digital image correlation measurements
Author(s): **Fabio Bottalico, Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

12951-80 • 08:50 AM - 09:10 AM
Parametric study on the accuracy of full-field reconstruction from sparse measurements using autoencoders
Author(s): **Nitin Nagesh Kulkarni, Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

12951-81 • 09:10 AM - 09:30 AM
A laser-based quality control of screw penetration in mass timber connections
Author(s): **Ali Ghadimzadeh Alamdari**, **Arvin Ebrahimkhanlou, Abieyuwa Aghayere,** Drexel Univ. (United States)

12951-82 • 09:30 AM - 09:50 AM **(CANCELLED)**
Reinforcement learning for Lamb wave-based nondestructive evaluation of plates
Author(s): **Kathryn Davis,** California State Univ., Northridge (United States); **Chanseok Jeong,** Central Michigan Univ. (United States); **Christoph Schaal,** California State Univ., Northridge (United States)

Coffee Break 09:50 AM - 10:20 AM

SESSION 18: RECENT ADVANCES IN SHM IV

28 March 2024 • 10:20 AM - 11:20 AM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Zhongqing Su**, The Hong Kong Polytechnic Univ. (Hong Kong, China)

12951-57 • 10:20 AM - 10:40 AM
Notch characterization in pipes from the scattering of helical guided ultrasonic waves
Author(s): **Shivashankar Peruvazhuthi**, **Junghoon Sohn**, **Stylianos Livadiotis, Salvatore Salamone,** The Univ. of Texas at Austin (United States)

12951-99 • 10:40 AM - 11:00 AM
Normal data-based motor fault diagnosis using stacked time-series imaging method
Author(s): **Wonho Jung**, **Daeguen Lim,** KAIST (Korea, Republic of); **Bum-Hyun Lim,** Autonomous Ship Research Ctr., SAMSUNG Heavy Industries Co., Ltd. (Korea, Republic of); **Yong-Hwa Park,** KAIST (Korea, Republic of)

12951-85 • 11:00 AM - 11:20 AM
Feature-based template approach for optimizing digital image correlation on complex deformations
Author(s): **Sneha Prasad,** Indian Institute of Technology Jodhpur (India); **David Kumar,** Indian Institute of Technology Madras (India); **Sumit Kalra, Arpit Khandelwal,** Indian Institute of Technology Jodhpur (India)

Lunch Break 11:20 AM - 12:50 PM

SESSION 19: ADVANCED MODELING

28 March 2024 • 12:50 PM - 02:10 PM | Hilton, International Ballroom I (2nd Floor)
Session Chair(s): **Ajay M. Koshti**, NASA Johnson Space Ctr. (United States)

12951-87 • 12:50 PM - 01:10 PM
Transfer function models for using empirical and physics-based simulation signal response data
Author(s): **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States)

12951-88 • 01:10 PM - 01:30 PM
Mapping reliably detectable dye penetrant crack size at external corners with fillet radii
Author(s):

12951-89 • 01:30 PM - 01:50 PM
An entropy-based probabilistic model for acoustic emission RA-value-average frequency data
Author(s): **Pedram Bazrafshan, Arvin Ebrahimkhanlou,** Drexel Univ. (United States)

12951-90 • 01:50 PM - 02:10 PM
Time integration with proper generalized decomposition for efficient time response analysis in nonlinear dynamical systems
Author(s): **Daeguen Lim,** KAIST (Korea, Republic of); **Gil-Yong Lee,** Korea Atomic Energy Research Institute (Korea, Republic of); **Kang-Jae Park**, **Wonho Jung**, **Jun-Ho Kim, Yong-Hwa Park,** KAIST (Korea, Republic of)

DIGITAL POSTERS

The posters listed below are available exclusively for online viewing during the week of SPIE Smart Structures + NDE 2024.

12951-86
Temperature simulation method for tower tube of an offshore wind turbine support structure
Author(s): **Linren Zhou**, **Zewu Zheng, Shrestha Sparsh,** South China Univ. of Technology (China)

CONFERENCE 12952

NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE II

25 March 2024 | Hilton, Gallerie III (1st Floor)

Conference Chair(s): **Christopher Niezrecki,** Univ. of Massachusetts Lowell (United States)

Conference Co-Chair(s): **Saman Farhangdoust,** Stanford Univ. (United States); **Norbert G. Meyendorf,** Fraunhofer IKTS (Germany)

Program Committee: **Ali Abdul-Aziz,** Kent State Univ. (United States); **Nicolas P. Avdelidis,** Cranfield Univ. (United Kingdom); **Nasrin Azari,** Floodlight Software (United States); **Frank Brueckner,** Fraunhofer IWS (Germany); **Patrick Hon Man Chan,** Armstrong Flight Research Ctr. (United States); **Kerrie Gath,** Consultant (United States); **Sven Gondrom-Linke,** Volume Graphics GmbH (Germany); **Nathan Ida,** The Univ. of Akron (United States); **Robin James,** General Motors Co. (United States); **Daniel Kanzler,** Applied Validation (Germany); **Jung-Ryul Lee,** KAIST (Korea, Republic of); **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Theodore E. Matikas,** Univ. of Ioannina (Greece); **Michele Meo,** Univ. of Southampton (United Kingdom); **Piotr Omenzetter,** Univ. of Aberdeen (United Kingdom); **Martin Oppermann,** TU Dresden, Center of Microtechnical Manufacturing (Germany); **Gyuhae Park,** Chonnam National Univ. (Korea, Republic of); **Stefano Sfarra,** Univ. of L'Aquila (Italy); **Christian Wunderlich,** Fraunhofer IKTS (Germany); **Yuan Yao,** National Tsing Hua Univ. (Taiwan); **Dong-Jin Yoon,** Korea Research Institute of Standards and Science (Korea, Republic of)

Monday 25 March 2024

MONDAY PLENARY

25 March 2024 • 08:15 AM - 10:00 AM | Hilton, International Ballroom III (2nd Floor)

View Full Details: spie.org/ssn/monday-plenary

8:15 AM - 8:20 AM: Welcome and Opening Remarks

8:20 AM - 8:30 AM:
- 2024 SSM Lifetime Achievement Award presentation
- 2024 NDE Lifetime Achievement Award presentation

12946-501 • 08:30 AM - 09:15 AM
Acoustic and mechanical metamaterials for energy and sensing applications and beyond (Plenary Presentation)
Author(s): **Miso Kim,** Sungkyunkwan Univ. (Korea, Republic of)

12948-501 • 09:15 AM - 10:00 AM
Soft actuators for wearable robotics (Plenary Presentation)
Author(s): **Herbert R. Shea,** Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Coffee Break 10:00 AM - 10:30 AM

KEYNOTE SESSION

25 March 2024 • 10:30 AM - 11:10 AM | Hilton, Gallerie III (1st Floor)
Session Chair(s): **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States)

12952-1 • 10:30 AM - 11:10 AM
Monitoring of flight state and battery health with embedded piezoelectric sensor/actuator networks for eVTOL applications (Keynote Presentation)
Author(s): **Fu-Kuo Chang,** Stanford Univ. (United States)

SESSION 1: NDE 4.0: PREDICTIVE MAINTENANCE AND MONITORING

25 March 2024 • 11:10 AM - 12:50 PM | Hilton, Gallerie III (1st Floor)
Session Chair(s): **Saman Farhangdoust**, Stanford Univ. (United States)

12952-2 • 11:10 AM - 11:30 AM
Considerations for supplier nondestructive evaluation qualification and certification for inspecting fracture critical parts
Author(s): **Ajay M. Koshti,** NASA Johnson Space Ctr. (United States)

12952-3 • 11:30 AM - 11:50 AM
Silicone sealant defect detection via 3D image reconstruction from multiple ultrasonic sensors
Author(s): **Wei-Yang Chung,** National Tsing Hua Univ. (Taiwan); **Stefano Sfarra,** Univ. degli Studi dell'Aquila (Italy); **Yuan Yao,** National Tsing Hua Univ. (Taiwan)

12952-4 • 11:50 AM - 12:10 PM
Thick crack width calculating method using chalk-marks in low-contrast 2D images acquired during high-speed traveling
Author(s): **Yushi Moko,** Tokyo Univ. of Science (Japan); **Tomohiko Hayakawa,** The Univ. of Tokyo (Japan), Tokyo Univ. of Science (Japan); **Yuka Hiruma,** The Univ. of Tokyo (Japan); **Yushan Ke,** Tokyo Univ. of Science (Japan); **Yuriko Ezaki,** The Univ. of Tokyo (Japan); **Yoshimasa Onishi,** Central Nippon Expressway Co., Ltd. (Japan); **Masatoshi Ishikawa,** Tokyo Univ. of Science (Japan)

12952-5 • 12:10 PM - 12:30 PM
Computed radiography for nondestructive imaging applications of aircraft structures
Author(s): **Muzibur Khan, Trent Gillis,** National Research Council Canada (Canada)

12952-6 • 12:30 PM - 12:50 PM
Aeronautics failure: a prognostic methodology based on the physics of failure and statistical approaches for predictive maintenance
Author(s): **Shuai Fu, Nicolas P. Avdelidis,** Cranfield Univ. (United Kingdom)

Lunch Break 12:50 PM - 02:20 PM

SESSION 2: NDE 4.0 AND SHM OF ENERGY SYSTEMS I

25 March 2024 • 02:20 PM - 04:00 PM | Hilton, Gallerie III (1st Floor)
Session Chair(s): **Christopher Niezrecki**, Univ. of Massachusetts Lowell (United States)

12952-7 • 02:20 PM - 02:40 PM
Infrared-based point cloud reconstruction for heat loss detection in a virtual reality environment
Author(s): **Nitin Nagesh Kulkarni**, **Lorenzo Peretto**, **Fabio Bottalico**, **Christopher Niezrecki, Alessandro Sabato,** Univ. of Massachusetts Lowell (United States)

12952-8 • 02:40 PM - 03:00 PM
Efficient community building energy load forecasting through federated hypernetwork
Author(s): **Rui Wang,** The Univ. of British Columbia (Canada); **Rakiba Rayhana**, **Ling Bai, Zheng Liu,** The Univ. of British Columbia Okanagan (Canada)

12952-9 • 03:00 PM - 03:20 PM
Importance of predictive maintenance in developing and maintaining sustainable energy systems
Author(s): **Yashwant Sinha,** Rowan Univ. (United States)

12952-10 • 03:20 PM - 03:40 PM
IoT acoustic sensor design and antenna selection for a wind turbine structural health monitoring system
Author(s): **Calvin Alexander Ng**, **Connor Pozzi**, **Sage Lyon**, **Murat Inalpolat**, **Christopher Niezrecki, Yan Luo,** Univ. of Massachusetts Lowell (United States)

12952-11 • 03:40 PM - 04:00 PM
Towards next-generation NDE: predictive analysis of pipeline integrity using machine learning
Author(s): **Rakiba Rayhana**, **Jiatong Ling**, **Ling Bai**, **Zheng Liu,** The Univ. of British Columbia Okanagan (Canada); **Min Liao**, **Chunsheng Yang,** National Research Council Canada (Canada); **Andreas Schnabel, Sebastian Sonntag,** Fraunhofer-Institut für Keramische Technologien und Systeme IKTS (Germany)

Coffee Break 04:00 PM - 04:30 PM

SESSION 3: NDE 4.0 AND SHM OF ENERGY SYSTEMS II

25 March 2024 • 04:30 PM - 05:50 PM | Hilton, Gallerie III (1st Floor)
Session Chair(s): **Robin James**, General Motors Co. (United States)

12952-12 • 04:30 PM - 04:50 PM
Reconstruction of 3-D pipeline corrosion defect profile from MFL signals with deep learning approach
Author(s): **Jiatong Ling,** The Univ. of British Columbia Okanagan (Canada); **Xiang Peng**, **Kevin Siggers**, **Matthias Peussner,** ROSEN Technology Canada Ltd. (Canada); **Rakiba Rayhana, Zheng Liu,** The Univ. of British Columbia Okanagan (Canada)

12952-14 • 04:50 PM - 05:10 PM
Federated autoML learning for community building energy prediction
Author(s): **Rui Wang,** The Univ. of British Columbia (Canada); **Ling Bai**, **Rakiba Rayhana, Zheng Liu,** The Univ. of British Columbia Okanagan (Canada)

12952-15 • 05:10 PM - 05:30 PM
Improving in-line quality management in EV cell manufacturing with ultrasound inspection and machine learning
Author(s): **Ruimin Qiao,** Liminal Insights Inc. (United States)

12952-16 • 05:30 PM - 05:50 PM
Application of the multifunctional energy storage composites for electric vehicle body structures
Author(s): **Saman Farhangdoust**, **Shabbir Ahmed**, **Pu Xie**, **Alexander Strange**, **Jeigyeong Jeon, Fu-Kuo Chang,** Stanford Univ. (United States)

Tuesday 26 March 2024

POSTER SESSION - TUESDAY

26 March 2024 • 06:00 PM - 07:30 PM | Hilton, Catalina (2nd Floor)
Conference attendees are invited to attend the poster session on Tuesday evening. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions.

Poster Setup: Tuesday 12:00 PM - 4:00 PM
Poster authors, view poster presentation guidelines and set-up instructions at http://spie.org/SS/poster-presentation-guidelines.

12952-17 • 06:00 PM - 07:30 PM
Highly efficient hydrogen conversion enabled by NiFeCo-OOH nanosheets via solar-powered AEM electrolyzer
Author(s): **Bongkyun Kang,** Soonchunhyang Univ. (Korea, Republic of); **Yang Soo Lee,** Korea Association of Machinery Industry (Korea, Republic of); **Yoo Sei Park,** Chungbuk National Univ. (Korea, Republic of)

SPIE EVENT POLICIES

Acceptance of policies and registration conditions

The following policies and conditions apply to all SPIE events, both online and in person. As a condition of registration, you will be required to acknowledge and accept the SPIE policies and conditions contained herein.

SPIE has established a confidential reporting system for all SPIE event participants to raise concerns about possible unethical or inappropriate behavior within our community. When at an SPIE event, you may contact any SPIE staff with concerns. If you feel that you are in immediate danger, please dial the local emergency number for police intervention.

Agreement to hold harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Be well agreement

You acknowledge that attending an event involves some risk of exposure to COVID-19 or other communicable diseases. You voluntarily assume this risk and agree not to hold SPIE or any of its affiliates liable for any illness you may contract. You also agree not to attend the event if you feel ill or have had recent exposure to a COVID-19 case.

SPIE will provide hand sanitizer locations and disposable face masks upon request.

Anti-harassment policy

It is SPIE policy that all employees, volunteers, and participants are entitled to respectful treatment. Any form of bullying, discrimination, harassment, sexual or otherwise, is unacceptable and will not be tolerated. This policy applies to all locations and situations where SPIE business is conducted and to all SPIE-sponsored activities and events.

Read complete policy:
https://spie.org/about-spie/the-society/policies-and-reporting

SPIE Conferences app messaging policy

The SPIE Conferences app supports attendee-to-attendee messaging to facilitate professional networking among meeting participants. This feature should not be used to push high-volume solicitations, and messaging will be disabled for attendees who exceed reasonable use or are in violation of other SPIE event policies. Attendees should report inappropriate use via the app reporting feature. SPIE will also monitor for high-volume patterns suggesting improper use.

SPIE Conferences app connect feature

The connect feature in the SPIE Conferences app is a personal networking tool that allows individuals to share their contact information with other attendees via their phones while using the SPIE app. This tool should not be used for systematic scanning of badges for managing sales leads. Inappropriate use is a violation of event policy.

SPIE Conferences app lead retrieval feature

The lead retrieval feature in the SPIE Conferences app is a lead generation tool that allows attendees to share their contact information with SPIE exhibitors. Exhibitor representatives using the lead retrieval app may scan attendee badges in the exhibition or supporting company events after receiving permission from an attendee. It should not be used in the technical conference area. The lead retrieval feature will be disabled for exhibitor representatives who exceed reasonable use or are in violation of other SPIE event policies. Attendees should report inappropriate use by notifying staff or contacting support via the help link in the app.

Attendee registration and admission policies

SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry of or to remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, whose conduct is not in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to anyone who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

Capture and use of a person's image

By registering for an SPIE event, you grant full permission to SPIE to capture, store, use, and/or reproduce your image or likeness, including incidental capture of any individuals in your household or workplace, by any audio and/or visual recording technique and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE purpose. By registering for an SPIE event, you waive any right to inspect or approve the use of the images or recordings or of any written copy. You also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, you release, defend, indemnify, and hold harmless SPIE from and against any claims, damages, or liability arising from or related to the use of the images, recordings, or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion, or use in composite form that may occur or be produced in taking, processing, reduction, or production of the finished product, its publication or distribution.

Code of conduct

SPIE is committed to providing a harassment- and discrimination-free experience for everyone at our events, an experience that embraces the richness of diversity where participants may exchange ideas, learn, network, and socialize in the company of colleagues in an environment of mutual respect.

Read complete code:
https://spie.org/about-spie/the-society/policies-and-reporting

Event and course cancellation by SPIE

If for some unforeseen reason, SPIE should have to cancel a course or an entire event, processed registration fees for the canceled activity will be refunded to registrants. Registrants will be responsible for the cancellation of travel arrangements or housing reservations and the applicable fees.

Family-friendly policy

CONFERENCE EVENTS: all conference technical and networking events require a badge for admission. Registered attendees may bring children with them if they have been issued a badge. Registration badges for children under 18 are free and available at the SPIE registration desk onsite. Children under 14 years of age must be accompanied by an adult at all times, and guardians are asked to help maintain a professional, disturbance-free conference environment.

EXHIBITION HALL: everyone who attends the exhibition must be registered and have a badge. Badges for children are free and available onsite at the registration desk. Children under 14 years of age must be accompanied by an adult at all times. Guardians are asked to help maintain a professional, disturbance-free exhibition environment. Children under 18 are not allowed in the exhibition area during exhibition move-in and move-out.

Identification requirement

To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued photo identification at registration to collect registration materials. Individuals are not allowed to pick up badges for other attendees. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

For online events, SPIE requires individuals to register with their legal identity.

Laser-pointer safety policy

SPIE events are subject to the applicable laser safety rules and regulations of the host location. SPIE supplies industry-standard Class 2 presentation laser pointers for all conference and other meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers. The use of a personal laser pointer represents the user's acceptance of liability for any damage or injuries to the presenter or others.

No smoking policy

Attendees will observe all non-smoking regulations that are publicly posted by the facilities used by the event.

Online commenting policy

SPIE moderates all comments posted in an online event. We encourage robust discussion, the exchange of scientific ideas, and the sharing of multiple, diverse perspectives. We expect the discussion to be consistent with the norms of scholarly research community interactions at events. Online event participants should report any comments or content that falls short of those community norms. We will remove comments, content, or people that are considered inappropriate by SPIE standards or that:

- are defamatory, libelous, obscene, indecent, abusive, or threatening to others
- infringe the copyright, trademark, or other rights of a third party
- upload viruses or are a cybersecurity hazard
- are off-topic or inappropriately commercial in nature
- are in violation of any applicable laws or regulations

Payment policy

Registrations must be fully paid before access to the conference is allowed. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks, and wire transfers. Onsite registrations can also be paid with cash.

Recording policy

CONFERENCES AND POSTER SESSIONS: audio and video recordings are prohibited without prior written consent of SPIE and the presenter. Consent forms are available at Speaker Check-in, SPIE Registration, or the Chair Services Desk. Individuals not complying with this policy will be asked to surrender their recording media and leave the conference room. Refusal to comply with such requests is grounds for expulsion from the event. Please see the SPIE code of conduct.

COURSES: audio and video recordings are prohibited without explicit permission from SPIE and the instructor. Individuals not complying with this policy will be asked to surrender their recording media and leave the classroom. Refusal to comply with such requests is grounds for expulsion from the event.

EXHIBITION: attendees may not record interviews on the exhibition floor nor record or photograph exhibitor booth displays and/or products without explicit permission from SPIE and on-site company representatives. Consent forms are available at Exhibitor Assistance. Individuals not complying with this policy will be asked to surrender their recording media and leave the exhibition hall. Refusal to comply with such requests is grounds for expulsion from the event.

Unauthorized solicitation

Unauthorized solicitation in the exhibition hall is prohibited. Any non-exhibiting organization observed to be distributing information or soliciting business in the aisles, or in another company's booth, will be asked to leave immediately.

Unsecured items

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless internet service

At most events, SPIE provides wireless access for attendees. Properly secure your computer before accessing the public wireless network. SPIE is not responsible for computer viruses or other kinds of computer damage.

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17–20 March 2025
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