IDETC-CIE 2022

International Design Engineering Technical Conferences & Computers and Information in Engineering Conference

Program

CONFERENCE
August 14–17, 2022

EXHIBITION
August 15–17, 2022

St. Louis Union Station Hotel, St. Louis, Missouri

https://event.asme.org/IDETC-CIE

The American Society of Mechanical Engineers®
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SETTING THE STANDARD

Welcome to IDETC-CIE 2022!

It is my great pleasure as Chair of the 2022 IDETC-CIE Conference Organizing Committee to welcome all of you to St. Louis! We are back in person after the COVID pandemic, and we are returning to the location where we would have been before the pandemic occurred. Design is inherently a social activity, and so it seems to be appropriate that we will be renewing the face-to-face relationships that makes the ASME design community a special place to attend.

This year's conference will be a smaller gathering than in recent years. However, in our planning we have made every effort to make the conference a successful and memorable event, incorporating events from the pre-COVID era, as well as benefits developed in response to COVID. On behalf of the Organizing Committee, I would like to extend our gratitude to the individual conference organizing committees for their efforts over the last year to restart IDETC-CIE, and to those authors and attendees for bringing the meeting to reality.

The city of St. Louis is known as the Gateway City for its role as the starting point for many expeditions to the west. It is fitting that, not only is our conference coming to the Gateway City as we begin new explorations into the future of design and design technologies, but also that the conference is being held at the St. Louis Union Station. This historical site was a grand transportation hub within the United States, hosting more than 100,000 travelers each day on their journeys from the past into the future. So too will we walk in their footsteps as we journey into the future of the design community.

On behalf of the Organizing Committee, Welcome to St. Louis! Welcome to IDETC-CIE2022! Welcome to the starting point of our journey into the future of design research!

Sincerely,

Cameron J. Turner
Associate Professor of Mechanical Engineering
Clemson University
Chair, IDETC-CIE 2022 Conference Organizing Committee

Yan Wang
Professor of Mechanical Engineering
Georgia Institute of Technology
IDETC-CIE 2022 Conference Organizing Committee

Jitesh Panchal
Professor of Mechanical Engineering
Purdue University
IDETC-CIE 2022 Conference Organizing Committee

Contents

Conference Information

REGISTRATION INFORMATION

Midway West

Registration Hours:

Saturday, August 13
1:00PM–5:00PM

Sunday, August 14
7:00AM–5:00PM

Monday, August 15
7:00AM–5:00PM

Tuesday, August 16
7:00AM–5:00PM

Wednesday, August 17
7:00AM–12:00PM

AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

All technical sessions are equipped with one LCD projector and one screen. Laptops will NOT be provided in the sessions. Presenters MUST bring their own or make arrangements in advance with the session chairs to share theirs. Please bring your presentation on a thumb drive 15 minutes prior to the session start time.

BADGE REQUIRED FOR ADMISSION

All conference attendees must wear the official ASME 2022 IDETC-CIE badge at all times in order to gain admission to special sessions, technical sessions, exhibits, meals, and other conference events. Without a badge, you will NOT be allowed to attend any conference activities.

TICKETED FUNCTIONS

Access to workshops, tutorials, receptions, and awards luncheons will be confirmed by your badge code. If you wish to bring a guest to an awards luncheon or reception, you must purchase an additional ticket accordingly. Guests are NOT permitted to attend technical sessions, workshops, tutorials, or committee meetings. For questions regarding any possible ticketed items, you can ask a conference representative located in the registration area.

CONFERENCE APP

IDETC-CIE will utilize a mobile event app in place of a printed program to enhance the conference experience for attendees, speakers, exhibitors, and sponsors; whether you are attending in-person or virtually.

You will be able to:

- Connect with Attendees
- View Speaker Profiles
- Access Session Information
- Watch On-Demand Content
- Download Final Papers
- And More!

*All features may not be available at all events.

Keep an eye on your email for more information on how to access and navigate the ASME Conference App!

INTERNET ACCESS IN THE HOTEL

Wi-Fi is included in your guest room and in the meeting space:

- Please go to the registration desk for details

CONFERENCE PROCEEDINGS

Each attendee will receive an email with a unique code to access digital copies of all the papers accepted for presentation at the conference. The official conference archival proceedings will be published after the conference and will not include accepted papers that were not presented at the conference. The official conference proceedings are registered with the Library of Congress and are submitted for abstracting and indexing. The proceedings are published on the ASME Digital Library. You will be provided with an individual link to the online papers via email. In the event you do not receive the email, send a request to conferencepubs@asme.org.

SPEAKER PRACTICE ROOM

Missouri Pacific on the 2nd Floor of the hotel will serve as the Author Practice/Speaker Ready Room from 7:00AM to 5:00PM on Monday and Tuesday. An LCD projector and screen will be available for authors to practice their presentations. All necessary connecting cables will be provided. Please bring your own laptop.

PRESENTER ATTENDANCE POLICY

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

Food Functions & Networking

Breakfasts

Please join our sponsors, exhibitors, conference organizers, and division leadership each morning at 7:00AM in Midway West. Network with your fellow attendees and discuss new ideas, programs, and activities. Badges Required. Guests not permitted.

Awards Luncheons

One Division Awards Luncheon is included in each Full Conference Registration. Attendees have preselected a specific luncheon during the registration process. For those who would like to attend both luncheons, additional tickets may be purchased at the registration desk as well as guest tickets.

Computers & Information in Engineering (CIE) Awards Luncheon
Monday, August 15, 12:10PM–2:10PM
Location: Grand DEF
Tickets Required. Additional or guest tickets may be purchased for $65.

Design Engineering Division (DED) Awards Luncheon
Tuesday, August 16t 12:10PM–2:10PM
Location: Grand DEF
Tickets Required. Additional or guest tickets may be purchased for $65.

Opening Reception Sponsored by The McKelvey School of Engineering at Washington University in St. Louis

IDETC/CIE Conference Opening Reception
Monday, August 15, 7:00PM–9:00PM
Location: Midway West
Tickets Required. Included in each Full Conference Registration. Additional or guest tickets may be purchased for $85.

THANK YOU TO OUR SPONSORS

PLATINUM SPONSOR

Washington University in St. Louis - James McKelvey School of Engineering

The McKelvey School of Engineering at Washington University in St. Louis promotes independent inquiry and education with an emphasis on scientific excellence, innovation and collaboration without boundaries. McKelvey Engineering has top-ranked research and graduate programs across departments, particularly in biomedical engineering, environmental engineering and computing, and has one of the most selective undergraduate programs in the country. We are working to solve some of society's greatest challenges; to prepare students to become leaders and innovate throughout their careers; and to be a catalyst of economic development for the St. Louis region and beyond.

EXHIBITORS

Springer

Springer is the leading book publisher in engineering, with strengths including design engineering, manufacturing and industrial engineering, mechanics and automotive engineering. We publish textbooks for undergraduate and graduate students, books for professionals in industry and research-oriented book titles at the cutting edge of current knowledge.

Come to the Springer booth to browse a selection of our books and also journals. Experts considering writing a book should come to the booth to meet Springer executive editor for engineering, Anthony Doyle, who will be in attendance at the booth throughout the exhibition and will be delighted to hear your publishing ideas and explain the publishing process

The Springer website is: www.springer.com

Schedule at a Glance

SATURDAY, AUGUST 13			
ROOMS	**1:00PM–12:00PM**		
Illinois Central (2nd FL)	Student Hackathon		
New York Central (2nd FL)	Student Hackathon		
SUNDAY, AUGUST 14			
ROOMS	**12:00AM–8:00PM**		
Illinois Central (2nd FL)	Student Hackathon		
New York Central (2nd FL)	Student Hackathon		
ROOMS	**9:00AM–1:00PM**	**1:00PM–5:00PM**	**5:00PM–7:00PM**
Grand A		DED Executive Committee Meeting (Closed)	
Grand B		CIE Executive Committee Meeting (Offsite)	Pre-conference Special Session on ASME DEI Strategy and initiatives
Grand C	Workshop 5: A Computational and Physical Framework for Mechanisms and Robot Motion Design	Tutorial 1: Tutorial on Topology Optimization with Geometric Components	
Regency A	Tutorial 2: Getting the right model of your robot in an easy way using modern geometric methods		
Regency B		Workshop 2: ASME Robotics Roadmapping Workshop (invited sesison)	
Regency C	8AM START: Workshop 2: ASME Robotics Roadmapping Workshop		
Midway Suites 1		Workshop 6: Engineering Sustainable Product Development, and Optimization	
Midway Suites 3	Workshop 3: Bridging the Gap between Sustainable Design Intention and Practice	Workshop 4: Trends in Human-AI Teaming for Engineering and Design	

Schedule at a Glance

MONDAY, AUGUST 15											
ROOMS	**7:00AM–7:50AM**	**8:00AM–9:00AM**	**9:10AM–10:30AM**	**10:30AM–10:50AM**	**10:50AM–12:10PM**	**12:10PM–2:10PM**	**2:10PM–3:50PM**	**3:50PM–4:10PM**	**4:10PM–5:50PM**	**6:00PM–7:00PM**	**7:00PM–9:00PM**
Midway West	Attendee Breakfast			Refreshment Break				Refreshment Break			Opening Reception
Grand DEF						CIE Award Lunch					
Grand A			MR-10: Keynote		MR-01-01		MR-02-02		MR-05-01		
Grand B					MR-02-01		MR-03-02		MR-06-01		
Grand C					MR-03-01		MR-04-01		MR-07-01		
Regency A			AVT-05-01		AVT-06/02-01		AVT-03-01				
Regency B		MSNDC-11-01 - Keynote	MSNDC-01-01		MSNDC-05-01		MSNDC-09-01- Student Paper Competition				
Regency C					MSNDC-02-01				DED General Meeting (5pm Start)		
Midway Suites 1		MNS Keynote	MNS-1-1		MNS-2-1		MNS-1-2		MNS-4-1		
Midway Suites 2			DEC-01-01		DEC-01-02				DEC Mentorship program	DEC TC Meeting	
Midway Suites 3			DFMLC 01		DFMLC 02		DFMLC 03		DFMLC 05	DFMLC TC Meeting	
Midway Suites 5		DTM-02-02	DTM-04-01		DTM-01-02		DTM-01-01		DTM-02-01		
Midway Suites 6		DAC-01	DAC-04-1		DAC-09-1		DAC-12		DAC-07-1		
Midway Suites 7		DAC-05	DAC-03-1		DAC-03-2		DAC-22		DAC-02		
Midway Suites 8		DAC-16	DAC-15-1		DAC-14-1		DAC-11-1		DAC-15-2		
Midway Suites 9		CIE-18-2	CIE-18-1				CIE-13-1			CIE Student Poster Session & Reception	
Midway Suites 10		CIE-3-1	CIE-1-1		CIE Keynote		CIE-4-1		CIE SEIKEM HACKATHON PANEL		
Midway Suites 11		CIE-24-1	CIE-7-1				CIE-7-2				
Illinois Central (2nd FL)		VIB-04-01	VIB-03-01						VIB-14-01		
New York Central (2nd FL)		VIB-02-01	VIB-13-01			JVA Journal Spotlight			VIB-15-01		
Burlington Route 2nd FL)							NSF-NASA Extreme Design and Wicked Problems Workshop		NSF-NASA Extreme Design and Wicked Problems Workshop		
Frisco (2nd FL)							NSF-NASA Extreme Design and Wicked Problems Workshop		NSF-NASA Extreme Design and Wicked Problems Workshop		

Schedule at a Glance

TUESDAY, AUGUST 16											
Rooms	**7:00AM–7:50AM**	**8:00AM–9:00AM**	**9:10AM–10:30AM**	**10:30AM–10:50AM**	**10:50AM–12:10PM**	**12:10PM–2:10PM**	**2:10PM–3:50PM**	**3:50PM–4:10PM**	**4:10PM–5:50PM**	**6:00pm - 7:00pm**	**7:00PM–8:00PM**
Midway West	Attendee Breakfast			Refreshment Break				Refreshment Break	DTM-06-01 - B-Part Fellowship - NSF Design Poster Session		
Grand DEF						DED Award Lunch					
Grand A			MR-01-02		MR-01-03		MR-9 Special Early Career Session			MR Committee	
Grand B			MR-03-03		MR-04-02				JMR Journal Spotlight		
Grand C			MR-07-02								
Regency A		AVT-04-01	AVT-05-02		AVT Milliken Lecture		AVT-08-01				
Regency B		MSNDC-11-02 - Keynote	MSNDC-10-01- D'Alembert Award Lecture		MSNDC-01-02		MSNDC-03-01		MSNDC-04-01	MSNDTC Meeting	
Regency C					MSNDC-07-01		MSNDC-06-01		MSNDC-08-01		
Midway Suites 1		MNS-4-2	MNS-3-1		MNS TC Meeting						
Midway Suites 2			DEC-06-01		DEC-03-01						
Midway Suites 3		What's New at NSF	DFMLC 04		DFMLC 06		DFMLC Keynote		DFMLC 08		
Midway Suites 4	Diversity, equity and inclusion Workshop										
Midway Suites 5		DTM-03-01	DTM-01-03		DTM-05-02 - DTM Idea Accelerator		DTM-02-03			DTM TC Meeting	
Midway Suites 6		DAC-09-2	DAC-04-2				DAC Signature Event		DAC-07-2		
Midway Suites 7		DAC-19-1	DAC-19-2	JMD Journal Spotlight					DAC-06		DAC TC Meeting
Midway Suites 8		DAC-14-2	DAC-11-2						DAC-17	VES TC Meeting	
Midway Suites 9					CIE 16-1				CIE-14-1	AMS TC Meeting	
Midway Suites 10			CIE Panel		CIE 23 -1		JCISE Journal Spotlight		CIE-23 -2	CAPPD TC Meeting	CIE General Meeting
Midway Suites 11					CIE-10-1				CIE-8-1	SEIKM TC Meeting	
Illinois Central (2nd FL)		VIB-04-02	VIB-05-01		VIB-01-02: Keynote		VIB-03-02		VIB-15-02	TCVS Networking Event - Offsite	
New York Central (2nd FL)		VIB-08-01	VIB-06-01				VIB-09-01				

Schedule at a Glance

WEDNESDAY, AUGUST 17								
Rooms	**7:00AM–7:50AM**	**8:00AM–9:40AM**	**9:40AM–10:00AM**	**10:00AM–11:40AM**	**11:40AM–1:15PM**	**1:15PM–2:55PM**	**2:55PM–3:15PM**	**3:15PM–4:55PM**
Midway West	Attendee Breakfast		Refreshment Break		Refreshment Break			
Grand A				MR-03-04		MR-07-04		MR-8 Students Competition
Grand B				MR-07-03		MR-04-03		
Regency B		MSNDC-06-02		MSNDC-04-02				
Midway Suites 1	IDETC.CIE 2023 Committee Meeting (Closed)							
Midway Suites 3		DFMLC 07		DFMLC Discussion Panel				
Midway Suites 5		DTM-03-02		DTM-05-01 - Lightning Talks		DTM-04-02		
Midway Suites 9				CIE 15-1				
Midway Suites 10		VES Panel		CIE-24 -2		CIE-24-3		
Midway Suites 11				CIE-22-1				
Illinois Central (2nd FL)		VIB-11-01		VIB-01-03: CD Mote Jr. Early Career Award		VIB-03-03		
New York Central (2nd FL)		VIB-12-01		DAC-21		VIB-08-02		

Conference Chair Welcomes

24th International Conference on Advanced Vehicle Technologies (AVT)

The Vehicle Design Committee (VDC) promotes innovative analytical, computational, and experimental investigations in the dynamics, control, and design of full vehicle systems, subsystems, and components. With the increasing demands on driving safety and autonomy, the human-vehicle interaction, advanced driver assistance systems, and connected vehicles are included also in the spectrum of topics addressed by VDC. Our members perform fundamental and applied research, and they implement technology for light/heavy vehicle design, modeling, and validation.

The VDC is pleased to welcome you to the 24th International Conference on Advanced Vehicle Technologies, held as a part of the 2022 ASME IDETC-CIE. This year the AVT conference will consist of eight symposia for a total of eight sessions in the areas of: Ground Vehicles Dynamics and Controls; Modeling and Testing Tire-Terrain Interaction; Methods for Ground Vehicle Systems Design; Ground Vehicle Safety and Ergonomics, Vehicle Electrification and Powertrain Design; Light Vehicles Design; Military and Commercial Ground Vehicle Design; and Intelligent Vehicles. We sincerely appreciate the time and services of these symposium organizers.

This Year the VDC is especially honored to host Professor J.Y. Wong, Professor Emeritus of the Carleton University in Ontario, Canada, for the William Milliken Lecture. Professor Wong has contributed extensively to the field of ground vehicles, particularly on the study of terramechanics and the response of off-road vehicles.

A Best Paper and a Student Best Paper (for papers authored and submitted by a student as the primary author) are awarded for conference papers that best exemplify the research advances in ground vehicle engineering based on peer reviews and the award committee's ranking.

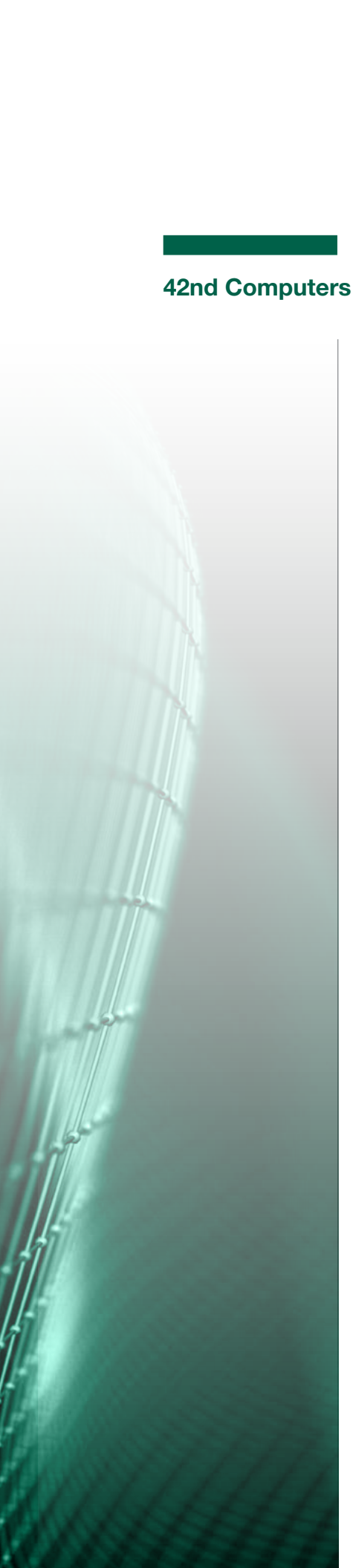
We truly hope that this year's AVT Conference will provide you with an exciting, enriching, and rewarding experience!

Costin Untaroiu
Conference Chair

Luis Munoz
Conference Co-Chair

Ole Balling
Conference Program Chair

42nd Computers and Information in Engineering Division Conference (CIE)



Greetings Attendees!

The Computers and Information in Engineering Division of ASME welcomes all IDETC-CIE Conference participants to the 42nd Annual Computers and Information in Engineering Conference (CIE). The CIE conference is a premier venue for the international exchange of technical, scientific, and application knowledge related to the theory and practice of computing to support engineering activities. It provides a forum for researchers, practitioners, educators, and students from industry, academia, and government research labs to share their latest findings and challenges with the broader research community, foster collaborations, and build a sustainable research and education community.

After a two-year virtual hiatus, we are excited to return in person in St. Louis, Missouri! This year, we are pleased to report that there will be over 100 technical presentations in the following technical and special topic sessions, organized around the four Technical Committees of the CIE Division, namely: Advanced Modeling and Simulation, Computer-Aided Product and Process Design, Systems Engineering and Information Knowledge Management, and Virtual Environments and Systems.

Advanced Modeling and Simulation (AMS)

- Inverse Problems in Science and Engineering
- Computational Multiphysics Applications
- Uncertainty Quantification in Simulation and Model Verification & Validation
- Simulation in Advanced Manufacturing
- Material Characterization Methods and Applications

Computer-Aided Product and Process Development (CAPPD)

- Human-In-the Loop for Product Design, Training, and Manufacturing
- Digital Human Modeling for Design and Manufacturing
- Product and Process Design Automation for Industry 4.0
- Computational Fabrication for Product Design and Development

Systems Engineering Information Knowledge Management (SEIKM)

- Design Informatics
- Smart Manufacturing Informatics
- Systems Engineering and Complex Systems
- Knowledge Capture, Reuse, and Management
- Human System Integration
- Smart Product-Service System

Conference Chair Welcomes

Virtual Environments and Design Visualization (VES)

- Technologies for VR, AR, and MR (Methods, Processes, and Applications)
- Video Presentation Exhibit: Visualization and Virtual Demonstration of Prototypes and Simulations

Joint Sessions

- Digital Twin: Advanced Human Modeling and Simulation
- Design, Simulation and Optimization for Additive Manufacturing
- Artificial Intelligence and Machine Learning in Design and Manufacturing

In addition to the technical presentations, we will host several specialized events. Accompanying a Keynote Talk, three panels of leading experts from industry, government, and academia will convene to discuss topics related to the future of Computers and Information in Engineering. The Journal of Computing and Information Science in Engineering Spotlight session will highlight top articles published over the past year. At the graduate student poster session, select graduate students, each the recipient of an award stipend, will showcase their excellent works. And of course, as usual, we will use the CIE Luncheon to recognize conference best paper awards and the CIE Division awards. We invite you all to join us at the CIE Awards Ceremony Luncheon to recognize some of the outstanding research being conducted by peers, colleagues, and students alike.

As always, this year's conference would not be possible without the outstanding contributions from ASME volunteers. This year's Technical Committee meetings and Division meeting will be held on the evening of Tuesday, August 16. It is at these meetings where we acknowledge contributors from the past year while setting the stage for the upcoming year's activities. Please plan to join one of these meetings to become further involved in CIE activities.

We would like to thank and recognize the Technical Committee leadership this year for their hard work and contributions:

Advanced Modeling and Simulation (AMS)

- **Seung-Kum Choi**, Chair
- **Piyush Pandita**, Vice Chair

Computer Aided Product and Process Design (CAPPD)

- **Ehsan T. Esfahani**, Chair
- **Anand Balu Nellippallil**, Vice Chair

Systems Engineering and Information Knowledge Management (SEIKM)

- **Zhuo Yang**, Chair
- **Dazhong Wu**, Vice Chair

Virtual Environments and Systems (VES)

- **Marina Carulli**, Chair
- **Vinayak Krishnamurthy**, Vice Chair

Conference Chair Welcomes

We would like to use this opportunity to thank our symposium organizers, including Ahn Tran, James Yang, Ashish M. Chaudhari, John Michopoulos, Brian Dennis, Athanasios Iliopoulos, Valeria Krzhizhanovskaya, Yan Wang, Zhimin Xi, Chao Hu, Gaurav Ameta, Bjorn Johansson, Chiradeep Sen, Tsz-Ho Kwok, Giorgio Colombo, Daniele Regazzoni, Marco Rossoni, Lorenzo Failla, Jida Huang, Yayue Pan, Jun Wang, Yunbo Zhang, Zhuo Yang, Douglas Van Bossuyt, Ying Liu, Pai Zheng, Yuqian Lu, Xin Guo, Kuo-Yi Lin, Hyunwoong Ko, Bryan O'Halloran, Farhad Ameri, Chris Hoyle, Pai Zheng, Xinyu Li, Tao Peng, Yu Zheng, Wenyan Song, Andrea Vitali, Christian Lopez Bencosme, Yujiang Xiang, Xianlian Alex Zhou, Zhenghui Sha, and Yan Lu for their efforts and hard work in paper review coordination and recommendation. We would like to thank all reviewers for their time to provide valuable feedback and help maintain high standards and improve the quality of the conference. Last but not the least, we thank all authors for submitting and sharing their latest work to shape the research directions in this community.

Again, we thank you for your participation in the various activities of our community. We look forward to seeing you all again next year!

Paul Witherell
Conference Chair

Caterina Rizzi
Conference Program Chair

Conference Chair Welcomes

48th ASME Design Automation Conference (DAC)

Dear Colleagues,

On behalf of the DAC Executive Committee, welcome to the 4**8th ASME Design Automation Conference (DAC)**!

After two years of holding our conference virtually, we are very excited to meet you in person again. Despite the challenges brought by the COVID-19 pandemic, our community remains resilient and vibrant, as the following highlights of our conference show.

Following a rigorous review process, this year's DAC technical program consists of 96 accepted papers in 23 active research areas (corresponding approximately to an acceptance rate of 85%). These papers will be presented in technical sessions from Monday, August 15 to Wednesday, August 17.

Complementing our technical sessions, we will host a keynote event on "Remanufacturing and Design for Remanufacturing in the Global Transition to a Circular Economy," featuring our invited keynote speaker, Jena Holtberg-Benge, General Manager at John Deere Reman. The keynote will also include lightning talks from prominent researchers in our community who are conducting exciting research on this topic, including:

- **Sarah Behdad**, Associate Professor, University of Florida
- **Jeremy Faludi**, Assistant Professor, TU Delft
- **Junfeng Ma**, Assistant Professor, Mississippi State University
- **Paul Whitherell**, Mechanical Engineer, NIST

The keynote and lightning talks will be followed by a panel discussion that will be open to questions from the audience. We will also present the DAC Young Investigator Award winner and the DAC Best Paper Award winner during this keynote event.

Please join us for the DAC committee meeting on the evening of Tuesday, August 16. We look forward to having our community come together, meet old friends, and make new ones.

From the accepted papers, nine were identified as "Papers of Distinction." These papers are listed below (ordered by paper number and including the assigned session):

- **DETC2022-87653**: T-Metaset: Task-Aware Generation of Metamaterial Datasets by Diversity-Based Active Learning, by Doksoo Lee, Yu-Chin Chan, Wei (Wayne) Chen, Liwei Wang, and Wei Chen
- **DETC2022-89318**: Does Design Proficiency Matter in Engineering Design Teams? A Computational Model and Experiments, by Ethan Brownell, Jonathan Cagan, and Kenneth Kotovsky
- **DETC2022-89740**: Self Learning Design Agent (SLDA): Enabling Deep Learning and Tree Search in Complex Action Spaces, by Ayush Raina, Jonathan Cagan, and Christopher McComb
- **DETC2022-90065**: Mean Squared Error May Lead You Astray When Optimizing Your Inverse Design Methods, by Shai Bernard, Jun Wang, and Mark Fuge
- **DETC2022-90252**: Dynamically Weighted Ensemble of Diverse Learners for Remaining Useful Life Prediction, by Venkat Namani, Adam Thelen, Chao Hu, and Steve Daining

- **DETC2022-90601**: Topology Optimization of Permanent Magnets for Generators Using Level Set Methods, by Jiawei Tian, Ran Zhuang, Juan Cilia, Arvind Rangarajan, Fang Luo, Jon Longtin, and Shikui Chen
- **DETC2022-90683**: Systematic Review and Classification of Design Tools and Methods in the Engineering for Global Development Literature, by Andrew Armstrong, Hailie Suk, Christopher S. Mabey, Christopher Mattson, John Hall, and John L. Salmon
- **DETC2022-90836**: An Information-Decision Framework to Support Cooperative Decision Making in the Top-Down Design of Cyber-Physical Manufacturing Systems, by Mathew Bab and Anand Balu Nellippallil
- **DETC2022-91112**: Multiobjective Surrogate Feasibility Robust Design Optimization Utilizing Expected Pareto Improvement with Relaxation, by Randall Kania and Shapour Azarm

Authors from our community will present these and many other excellent papers throughout the conference. We encourage you to support your colleagues by attending their presentations and participating in the discussions.

Finally, organizing the conference requires the generous effort contributions of many individuals. We are particularly grateful to all session organizers and paper review coordinators:

Faez Ahmed, Janet K. Allen, Jesse Austin-Breneman, A. Emrah Bayrak, Morad Behandish, Bill Bernstein, Amy Bilton, Ramin Bostanabad, Wei (Wayne) Chen, Souma Chowdhury, Daniel Cooper, Xiaoping Du, Bryony DuPont, Paul Egan, Ehsan Esfahani, Cong Feng, Payam Ghassemi, Joshua Hamel, Jia Hao, Daniel Herber, Steven Hoffenson, Christopher Hoyle, Zhen Hu, Horea Ilies, Chen Jiang, Namwoo Kang, Leifur Leifsson, Mian Li, Xingchen Liu, Yuanzhi Liu, Nordica MacCarty, Ali Mehmani, Nicholas Meisel, Zhenjun Ming, Farrokh Mistree, Seung Ki Moon, Beshoy Morkos, Saigopal Nelaturi, Venkat Nemani, Julián Norato, Philip Odonkor, Herschel Pangborn, Rahul Renu, Daniel Selva, Eun Suk Suh, Andres Tovar, Zequn Wang, Kate Whitefoot, Natasha Wright, Zhimin Xi, Hongyi Xu, Zhibo Zhang, Jie Zhang, Fiona Zhao, and Yuqing Zhou

On behalf of the entire DAC community, we welcome you to another enjoyable and thought-provoking Design Automation Conference.

We look forward to seeing you in St. Louis.

Julián Norato
Conference Chair

Christopher McComb
Program Chair

Conference Chair Welcomes

19th International Conference on Design Education

The Design Education Committee welcomes you to the 19th annual International Conference on Design Education. The focus of this conference is on design education among educators, practitioners, and researchers. This year's DEC Program consists of four technical symposia: (DEC-1) *Implementation, Assessment, and Research Methods Across the Curriculum*; (DEC-3) *Innovative Practices in Design Education;* (DEC-5) *Timely Response to Design Education Challenges*; and (DEC-6) *Demos and Presentation Only.* Please refer to the conference Technical Program for the times and locations of the technical sessions.

In addition to the technical symposia, we are also excited to host the DEC Mentorship Program. This session is intended to provide a networking opportunity for early career researchers and graduate and undergraduate students.

The Best Paper Award for the 2022 Design Education Conference has been awarded to:

- **IDETC2022-88161**: Evaluation of Students Learning Through Reflection of Doing Based on Sentiment Analysis, Authors: Zhenjun Ming, Farrokh Mistree, Janet K. Allen, and Yupeng Wu

In addition to the best paper awardee, we would like to recognize the two additional papers nominated for the DEC Best Paper Award this year:

- **IDETC2022-89412**: Influences of External Factors on Engineering Student Conceptions of Product Design, Authors: Steven Hoffenson, Nicole Pitterson, and Adam Corby
- **IDETC2022-89901**: Examining a Trajectory of Complex System Design Processes: Airport Eco-System Case Studies by Novice Student Teams, Authors: Euiyoung Kim, Barend Klitsie, Bart Bluemink, Vivek Rao, and Sicco Santema

We extend special appreciation to our technical session Review Coordinators: Mohammad Fazelpour, Rahul Renu, and Rohan Prabhu. We also give our sincerest thanks to all the reviewers of technical papers; they have ensured the quality of this year's conference.

The DEC technical committee meeting will be posted in the Technical Program. At the meeting, we present the DEC Awards and plan for next year's conference. All IDETC-CIE attendees are invited to join!

Elizabeth Starkey
Conference Chair

Nicholas Meisel
Conference Program Chair

27th Design for Manufacturing and the Life Cycle Conference (DFMLC)

The ASME Design for Manufacturing and the Life Cycle Committee welcomes participants to the 27th Annual Design for Manufacturing and the Life Cycle Conference. The ASME Design for Manufacturing and the Life Cycle Conference is the main international forum for the exchange of technical and scientific information on the theory and practice of Integrated Product and Process Development, Sustainable Design and Manufacturing, Product Lifecycle Management (PLM), and Design for X (DFX) Methods. This conference provides a forum for researchers, practitioners, and educators from academia, government organizations, and industry to share their latest results and challenges with the research community.

We are happy to report that this year's conference continues to feature many new and exciting results and methods to be presented as part of the conference technical sessions. This year's DFMLC conference includes 27 technical papers and six technical presentations in eight sessions, as follows:

- Session 1: Life Cycle Decision Making
- Session 2: Modeling and Optimization for Sustainable Design and Manufacturing
- Session 3: Design for Supply Chain and End of Life Recovery
- Session 4: Design for Manufacturing and Assembly
- Session 5: Design for Additive Manufacturing 1
- Session 6: Design for Additive Manufacturing 2
- Session 7: Design of Product-Service and Energy Systems
- Session 8: Special Session: Design Tool Showcase

We would like to thank all the authors for submitting papers, the paper reviewers for sharing their time and expertise, and the session chairs/co-chairs for their participation. Special thanks go to the DFMLC Special Session Chair, Paul Egan, and the paper review coordinators/co-coordinators for managing the papers through the review process: Steven Hoffenson, Albert E. Patterson, Bryony L. DuPont, Sara Behdad, Yongxian Zhu, Fiona Yaoyao Zhao, William Bernstein, Kijung Park, Amin Mirkouei, Abigail Clarke-Sather, Astrid Layton, and Paul Egan. Your participation and hard work have been vital for the success of the DFMLC conference!

This year, Dr. Sudarsan Rachuri, Technology Manager of the Advanced Manufacturing Office, EERE, and DOE, will present the DFMLC keynote lecture titled, "Revisiting DfX with Smart Manufacturing Technologies – Can We Realize Roundtrip Engineering across Lifecycle."

The 2022 DFMLC Conference also features a special presentation session. The "Design Tool Showcase" features new design tools developed by the members of the ASME Design community in both digital and physical forms.

Conference Chair Welcomes

This year's DFMLC Discussion panel will feature prior DFMLC Best Paper Authors, Professors David Rosen, Sara Behdad, and Harrison Kim. The panel will discuss key research contributions that have defined DFMLC in past years and how the DFMLC community may incorporate emerging perspectives and technologies for future growth and continued strengthening of relationships with ASME and external communities.

The DFMLC technical committee meeting will take place after the DFMLC Prior Best Paper panel session. The DFMLC Awards, including Best Paper Award for 2022 DFMLC conference will be presented in this meeting, and the technical committee will plan for next year's conference. Everyone is welcome to attend.

On behalf of the entire DFMLC community, we welcome you to the 27th Design for Manufacturing and the Life Cycle conference at the St. Louis Union Station Hotel, St. Louis, Missouri, August 14–17, 2022!

Junfeng Ma
Conference Chair

Daniel Cooper
Conference Program Chair

34th International Conference on Design Theory and Methodology (DTM)

On behalf of the ASME Design Theory and Methodology Committee, we would like to welcome you to the 34th International Conference on Design Theory and Methodology (DTM). Our conference focuses on fundamental design theory and methodologies, and to apply them in an engineering context, with contributions provided by both researchers and practitioners.

This 2022 DTM conference includes 49 technical paper presentations and five lightning talks. Thematically, the conference includes contributions associated with our four broad foci: Design Theory, Design Methods, Design People, and Design Practice. This year's conference features a student poster session where selected Ph.D. students showcase their dissertation proposals. We also have a special session with NSF CMMI program director, Kathryn Jablokow.

There were 60 papers submitted and reviewed by an incredible cohort of review coordinators and reviewers. A total of 201 reviews were completed by 116 different reviewers. The review coordinators for this year's conference include: Paul Grogan, Maha Haji, George Hazelrigg, Ethan Hilton, Dongwook Hwang, Ting Liao, Julie Linsey, Chris McComb, Beshoy Morkos, Alexander Murphy, Robert Nagel, Alison Olechowski, Aprurva Patel, Cyril Picard, Vivek Rao, Zhenghui Sha, Jinjuan She, and Srinivasan Venkataraman. It is through the service of these individuals that we are able to maintain the high-quality expectations of the DTM conference.

We are excited to welcome you to this year's conference and hope that you find it engaging, informative, and beneficial.

Conference Chair
Dr. Joshua D. Summers
The University of Texas at Dallas

Program Chair
Dr. Vimal K. Viswanathan
San Jose State University

46th Mechanisms and Robotics Conference (MR)

The Mechanisms and Robotics Technical Committee of the ASME Design Engineering Division would like to warmly welcome you to the 46th Mechanisms and Robotics Conference, the premier international forum for the exchange of technical and scientific information on the theory and application of mechanical systems, mechanisms, and robotics. It is exciting to have the first in-person conference since the start of COVID-19.

The first conference, as The Conference on Mechanisms, was held at Purdue University, West Lafayette, Indiana, in 1953. ASME took over the conference and formed the ASME Biennial Mechanisms Conference in 1964. The conference was renamed the ASME Biennial Mechanisms and Robotics Conference in 2000. Starting in 2005, the conference became an annual conference, the ASME Mechanisms and Robotics Conference. Nowadays, the Mechanisms and Robotics Conference is held annually as a part of the ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference.

This year we have assembled an exciting conference program and a slate of activities for the attendees, with 89 peer-reviewed technical papers organized into seven technical symposia, a keynote speech, an early career invited talk session, and the Student Mechanisms and Robot Design Competition. Paper topics range throughout areas central to the design of mechanical, mechatronic, and robotic systems, including kinematics, dynamics, design, analysis and validation, compliant mechanisms, origami-based design, metamaterials for mechanisms, novel mechanisms and robots, mobile robots, and various applications. Our Keynote Address will be given by Prof. Zhong You, Department of Engineering Science, University of Oxford, with his speech entitled: “Compact Folding of Flat Arrays Composed of Panels with Uniform Thickness.”

Submitted papers were eligible for several awards, including the Mechanisms and Robotics Best Paper award, Freudenstein Young Investigator award, A.T. Yang Memorial award, and Compliant Mechanisms award. The authors of selected papers of the Mechanisms and Robotics Conference are invited to submit enhanced archival versions of their papers to an IDETC Special Issue of the ASME Journal of Mechanisms and Robotics. We would like to thank Soh Gim Song, Chair of the MR Awards Committee, for coordinating the selection of the awards. Please attend our award session preceding the MR Keynote speech for the presentation of these awards and the announcement of the winners of the Student Mechanism and Robot Design Competition.

The conference and program chairs would like to extend special thanks to all the volunteers who participated in the peer-review process to produce this high-quality program, especially the symposium organizers who coordinated the process:

- MR-1: Mechanisms Synthesis & Analysis: Ketao Zhang, Latifah Nurahmi
- MR-2: Theoretical & Computational Kinematics (A.T. Yang Symposium): Jose Rico, Hongliang Shi
- MR-3: Compliant Mechanisms: Hongzhe Zhao, Jovana Jovanova, Giovanni Berselli
- MR-4: Origami-Based Engineering Design: Shikui Chen, Suyi Li, Jared Butler

- MR-5: Motion Planning, Dynamics, and Control of Robots: Joo Kim, Damien Chablat, Andreas Muller
- MR-6: Medical and Rehabilitation Robotics: Carl Nelson, Abbas Fattah
- MR-7: Novel Mechanisms, Robots, and Applications: Reza Fotouhi, Guowu Wei
- MR-8: Student Mechanism and Robot Design Competition: Yu She, Mark Plecnik, Gaurav Singh, Long Wang, Haiyang Li
- MR-9: Special Early Career Session of Invited Presentations: Mark Plecnik

We extend special thanks to all authors, reviewers, presenters, symposium organizers, session chairs, and other volunteers who have contributed to the overall success of the conference. We trust that you will enjoy the conference and look forward to your continued support to our future Mechanisms and Robotics Conferences.

46th MR Conference Organizers

Guangbo Hao

Guimin Chen

Dongming Gan

Conference Chair Welcomes

16th International Conference on Micro- and Nanosystems (MNS)

Welcome to the16th International Conference on Micro- and Nanosystems (MNS) with the topic of "The Next Advances in MEMS." We would like to welcome you and thank you for participating. This conference, sponsored by the Technical Committee of Micro- and Nano-systems, an integral part of the ASME Design Engineering Division, will provide researchers in industry, academia, and government a forum to exchange scientific and technical information related to recent developments and emerging issues in the design, mechanics, dynamics, control, and fabrication of micro- (MEMS) and nanoscale (NEMS) systems.

This conference is organized around six technical sessions, one of which is jointly offered with the 34th Conference on Mechanical Vibration and Noise:

- Keynote Lecture: Professor Philip Feng, University of Florida
- MNS-1: Micro/Nano Dynamics
  - Organizers: Najib Kacem, Hanna Cho, Jian Zhao
- MNS-2: Micro/Nano Bioengineering
  - Organizers: Dumitru Caruntu, Brian Jensen, Chu-Yu Huang
- MNS-3: Micro/Nano Robotics and Functional Materials
  - Organizers: Irene Fassi, Yu Liu, Hoe Joon Kim, Mohammad H. Hasan, Longquiu Li
- MNS-4: Micro/Nano IoT, Sensors and Digital Computing
  - Organizers: Muhammad Raziuddin A. Khan, Fadi Alsaleem, Pourkamali Anaraki Siavash
- MNS-5: Micro/Nano Power Sources and Storage
  - Organizers: Oliver M. Barham, Muhammad Raziuddin A. Khan, Marc Litz
- VIB-1: Dynamics of MEMS and NEMS (Joint session with VIB)
  - Organizers: Najib Kacem, Hanna Cho

This conference provides a forum for researchers, practitioners, educators, and students from industry, academia, and government research labs to share their latest findings and challenges with the broader research community, foster collaborations, and build a sustainable research community.

We are pleased to have Professor Philip Feng as the MNS keynote speaker. Dr. Feng and his group research emerging semiconductor devices and related materials and systems, and he has received numerous awards, including the prestigious NSF CAREER Award. He is an associate editor for *IEEE Transactions on Ultrasonics, Ferroelectrics & Frequency Control* (T-UFFC). He has served on Technical Program Committees (TPCs) and as Track/Session Chairs for IEEE IFCS & EFTF, IEDM, MEMS, Transducers, SENSORS, etc. He served as a chair for IEEE MEMS 2021.

We would like to thank all the authors for submitting papers and talks and sharing their work in our conference. We would also like to thank the reviewers for providing valuable feedback to help improve the reporting and the quality of the conference, and finally the session chairs and co-chairs that worked on coordinating the paper review process.

Conference Chair Welcomes

We welcome conference participants to become involved with our technical committee. If you are interested in becoming involved in helping to organize our conference, please contact a conference organizer to inquire and feel free to attend the technical committee meeting, which will be held on Tuesday evening, August 16th, from 6:00PM to 7:00PM in Midway Suite #1. This meeting is open to all. Our community will continue to grow and flourish with your active participation as we work to define our vision for future events.

We welcome you to the16th International Conference on Micro- and Nanosystems (MNS)!

Sincerely,

Oliver, Najib, Jian, and the entire 2022 MNS Conference team.

Conference Chair:
Dr. Oliver M.Barham, Ph.D.
U.S. Navy, NSWC Indian
Head Division, USA
oliver@olivermbarham.com

Program Chair:
Prof. Najib Kacem, Ph.D.,
FEMTO-ST Institute, France
najib.kacem@femto-st.fr

Program Chair:
Prof. Jian Zhao, Ph.D.,
Dalian University of Technology, China
jzhao@dlut.edu.cn

Conference Chair Welcomes

18th MSNDC Conference

On behalf of the ASME Technical Committee on Multibody Systems and Nonlinear Dynamics, we extend a wholehearted welcome to the attendees of the 18th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC). Consisting of eight symposia, the conference features more than 50 presentations covering traditional and emerging topics in the broad areas of multibody systems and nonlinear dynamics. This event presents a unique opportunity for researchers, practitioners, educators, and students to report their accomplishments, exchange ideas, and become familiar with emerging trends in the field. The conference is organizing competitions for two awards—Best Paper and Best Student Paper. A special issue of the ASME Journal of Computational and Nonlinear Dynamics will be dedicated to our event.

This year, we are honored to recognize Professor Parviz Nikravesh as the recipient of the D'Alembert award for his seminal contributions in theoretical and application works on the use of multibody dynamics in vehicle dynamics, biomechanics, tire mechanics, contact mechanics and flexible multibody dynamics. Established in 2005, the D'Alembert Award recognizes lifelong contributions to the field of multibody system dynamics. Previous recipients include Thomas R. Kane, Werner Schiehlen, Edward Haug, Javier García de Jalón, Ahmed Shabana, Olivier Bauchau, Jens Wittenburg, and Friedrich Pfeiffer.

The annual keynote lectures are a highlight of our event. This year, we are honored to host lectures by Professor Josep Maria Font-Llagunes and Professor Darryl Thelen.

Professor Josep Maria Font-Llagunes is Full Professor of Mechanical Engineering at Universitat Politècnica de Catalunya (UPC) and the Director of the UPC Doctoral School and the Biomechanical Engineering Lab (BIOMEC). Professor Font-Llagunes' lab develops computational methods for the analysis and prediction of human movement, innovative robotic exoskeletons for gait assistance, and wearable monitoring technology for rehabilitation. His work has led to the development of a co-founded company, ABLE Human Motion, which develops exoskeleton technology for people with mobility impairments. Professor Font-Llagunes' work has been recognized by several awards, such as the Agustín de Betancourt y Molina Medal awarded by the Spanish Royal Academy of Engineering, the OpenSim Outstanding Researcher Award, the Leonardo Grant by the BBVA Foundation, and the UPC Award for Social Commitment.

Our second keynote speaker, Professor Darryl Thelen is the Weideman Professor of Mechanical Engineering at the University of Wisconsin-Madison. He is also the Bollinger Chair of the Department of Mechanical Engineering. Professor Thelen's neuromuscular biomechanics lab develops computational models, novel sensor technologies, and dynamic imaging protocols to investigate the structure, mechanics, and behavior of musculoskeletal tissues within the human body. His research has been supported by the NIH, NSF, DOD, and several private companies and foundations.

Last but not least, we would like to acknowledge the all-important effort and contribution made by the symposium organizers as well as manuscript reviewers—thank you very much indeed, your help has been essential. We would also like to thank all contributors for choosing this conference as the venue for sharing the outcomes of their intellectual pursuits.

We are looking forward to another successful MSNDC Conference and connecting with you.

Pierpaolo Belardinelli
Polytechnic University of Marche

James Chagdes
Miami University

Antonio Martin Recuero
Idaho National Laboratory

Radu Serban
University of Wisconsin-Madison

Conference Chair Welcomes

34th Conference on Mechanical Vibration and Noise

On behalf of the Technical Committee on Vibration and Sound (TCVS), we cordially welcome you to the 34th Conference on Vibration and Noise (VIB). The conference covers a broad spectrum of topics related to vibratory systems including those at emerging frontiers of science and engineering as well as traditional fields where mechanical vibrations are essential. VIB is the showcase technical forum for researchers and practitioners around the world. It provides a setting for dissemination and discussion of the state of the art of modeling, analysis, and experimentation in all aspects of vibration and noise research. This year VIB received 62 submissions comprised of 39 technical paper proceedings and 23 technical presentations. This conference is paired with MNS and MSNDC conferences to cross-list complimentary symposia. VIB symposia include:

- VIB-1 Dynamics of MEMS and NEMS
- VIB-2 Dynamics of Soft Media and Robotics
- VIB-3 Dynamics & Waves in Solids and Metamaterials
- VIB-4 Energy Harvesting
- VIB-5 Fluid-Induced Vibrations
- VIB-6 Industrial Applications of Vibration & Acoustics
- VIB-7 Jointed Structures, Contact, and Friction
- VIB-8 Nonlinear Systems & Phenomena
- VIB-9 Rotating Systems and Rotor Dynamics
- VIB-10 Structural Damage Detection and Diagnostics
- VIB-11 Time-Delay Systems and Discontinuous Dynamical Systems
- VIB-12 Vibration and Stability of Mechanical Systems
- VIB-13 Passive and Active Control of Vibration, Shock, and Noise
- VIB-14 Vibration of Continuous Systems
- VIB-15 Machine Learning Applications in Vibrations and Dynamics

VIB is highlighted by a keynote lecture called, “Instability and Oscillations in Cilia and Flagella,” from Prof. Philip Bayly at Washington University in Saint Louis. The 2022 ASME N. O. Myklestaad Award and 2022 C.D. Mote, Jr. Early Career Award will be presented.

We gratefully acknowledge the efforts of VIB symposium organizers, reviewers, and authors. It is your efforts that make this conference vibrant.

Peter Coffin
Sandia National Laboratories
Conference Chair

Christopher G. Cooley
Oakland University
Technical Program Chair

AVT

TUESDAY, AUGUST 16
10:50AM–12:10PM **REGENCY A**

ASME VEHICLE DESIGN COMMITTEE W. MILLIKEN LECTURE

Professor J.Y. Wong
Professor Emeritus, Department of Mechanical and Aerospace Engineering, Carleton University, Ottawa, Ontario, Canada

Off-Road Mobility and Terramechanics – Theory into Practice

ABSTRACT: A wide range of human endeavors, such as farming, natural resources exploration and exploitation, and defense operations, involve locomotion over unprepared terrain and wheeled or tracked off-road vehicles are commonly used. On highly deformable terrain, the thrust generated by the wheels or tracks may not be able to overcome the motion resistance and this would lead to immobilization. To predict off-road mobility, the understanding of the mechanics of vehicle-terrain interaction, which has now become known as terramechanics, is essential.

There are three basic issues in terramechanics: the measurement and characterization of terrain behavior; the elucidation of the mechanics of vehicle-terrain interaction; and the establishment of the relationships among mobility, vehicle design, and terrain characteristics. The aim of terramechanics is to provide guiding principles for the rational development and design of terrestrial off-road vehicles and extraterrestrial rovers in various operating environments. This lecture reviews the current status and future prospects of terramechanics.

A common technique for measuring the response of terrain to vehicular loadings uses a device known as the bevameter (conceived by Dr. M.G. Bekker, a pioneer in terramechanics). From measurements, parameters for characterizing terrain behavior are derived and they have become known as the Bekker-Wong (B-W) terrain parameters. They are adopted in the 2020 Standards of the International Society for Terrain-Vehicle Systems.

Using the B-W parameters to characterize terrain behavior, the mechanics of vehicle running gear (wheel or track)-terrain interaction is elucidated. As a result, an analytical framework has been established and computer simulation models for performance and design evaluation of wheeled and tracked vehicles have been developed. A representative model for tracked vehicles is presented. Its basic features have been substantiated with field test data. The model has been employed to assist off-road vehicle manufacturers in many countries in the development of new products, as well as governmental agencies in the evaluation of vehicle candidates from the procurement perspective. An example of the applications of the model to the development of a high-mobility version of a tracked armored vehicle is presented.

With mankind's increasing interest in the exploration of the universe, manned or unmanned rovers have been deployed to the Moon and Mars for surface exploration. To assess the potential of a simulation model originally developed for terrestrial wheeled vehicles for evaluating the mobility of future generations of extraterrestrial rovers with flexible wheels, a study was conducted to use the model for predicting the performance of a wire-mesh, flexible wheel for the manned Lunar Roving Vehicle used in the NASA Apollo Program, and the results are encouraging. Methods have also been developed for predicting the performances of rovers and their wheels on extraterrestrial surfaces under various gravities from the test results obtained on earth under earth's gravity. The basic features of these methods have been substantiated with test data.

Prospects for further developments of terramechanics are discussed. Applications of computational methods, such as the discrete element method (DEM) and the finite element method (FEM) to the analysis of the mechanics of vehicle-terrain interaction are reviewed. Challenges and opportunities in the field are indicated.

BIOGRAPHY: Dr. J.Y. Wong is Professor Emeritus, Department of Mechanical and Aerospace Engineering, Carleton University, Ottawa, Canada. He received the degrees of Ph.D. and D.Sc. from the University of Newcastle upon Tyne, England. He has been engaged in research and development of ground vehicle technologies for several decades. Many of his research findings have found wide applications in the industry. In recognition of his significant contributions to the field, he has been presented with many awards by learned societies, including the George Stephenson Prize and Starley Premium Award (twice) of the Institution of Mechanical Engineers, United Kingdom.

Dr. Wong has published extensively in this field and is the author of two widely recognized books. One is Theory of Ground Vehicles, and its 1st edition was published by Wiley in 1978. Its 5th edition is currently in press. The Russian and Chinese translations of the book have been published in Moscow and Beijing, respectively. The other is *Terramechanics and Off-Road Vehicle Engineering*, currently in its 2nd edition, published by Elsevier. He is currently on the editorial/advisory boards of several international journals, including *Vehicle System Dynamics, Journal of Terramechanics, International Journal of Heavy Vehicle Systems*, and International *Journal of Vehicle Performance*. He has also been a member of the editorial board of the Journal of Automobile Engineering, Part D of the Proceedings of the Institution of Mechanical Engineers. He is a Fellow of the American Society of Mechanical Engineers, Institution of Mechanical Engineers, Canadian Society for Mechanical Engineering, and International Society for Terrain-Vehicle Systems.

Dr. Wong has been a consultant to the vehicle industry and governmental agencies in North America, Europe, Asia, and Africa. He has lectured on ground vehicle technologies in many countries around the world. At the invitations of Glenn Research Center, National Aeronautics and Space Administration, U.S.A.; European Space Research and Technology Centre, European Space Agency; and Canadian Space Agency, he has presented special professional development programs on extraterrestrial rover mobility to their staff members.

Keynotes

CIE

MONDAY, AUGUST 15
10:50AM–12:10PM **MIDWAY SUITE 10**

Azad M. Madni, Ph.D., NAE
University Professor of Astronautical Engineering
Northrop Grumman Foundation Fred O'Green Chair in Engineering
Executive Director, Systems Architecting and Engineering Program
Professor, Aerospace and Mechanical Engineering
Professor, Civil and Environmental Engineering
Director, Distributed Autonomy and Intelligent Systems Laboratory
Professor, Keck School of Medicine and Rossier School of Education, USC

Transdisciplinary Systems Engineering: Exploiting Convergence of Systems Engineering with Other Disciplines

ABSTRACT: With ever-increasing systems complexity and the growing emphasis on sociotechnical systems, systems engineering is undergoing a significant transformation to increase both methodological rigor and flexibility of modeling methods. However, there is another trend that is equally important – the growing convergence of systems engineering with other disciplines. This trend is a key enabler of transdisciplinary systems engineering, which I define as a meta-discipline that exploits the convergence of systems engineering with other disciplines to frame and solve problems that appear intractable when viewed solely through an engineering lens. To illustrate the application of transdisciplinary systems engineering, my talk will focus on exploiting the synergy of Model Based Systems Engineering and Entertainment Arts. Specifically, I will show that by transforming system models into stories that can be executed in virtual worlds, it becomes possible to increase the understanding and participation of all stakeholders, especially in upfront engineering. I will illustrate the use of this approach within the context of a campus security system. I will conclude by reviewing key concepts from other disciplines that can also be exploited in systems engineering to increase system life cycle coverage and enhance system modeling and verification.

BIOGRAPHY: Dr. Azad Madni is a University Professor of Astronautical Engineering, holder of the Northrop Grumman Fred O'Green Chair in Engineering. He is the Executive Director of University of Southern California's Systems Architecting and Engineering Program. He is also the Founding Director of the Distributed Autonomy and Intelligent Systems Laboratory. He has joint appointments in the Department of Aerospace and Mechanical Engineering and Sonny Astani Department of Civil and Environmental Engineering. He has courtesy appointments in the Rossier School of Education and Keck School of Medicine where he is a faculty affiliate of the Ginsberg Institute for Medical Therapeutics. He is a member of the National Academy of Engineering and Life Fellow/Fellow of several professional societies including AAAS, IEEE, AIAA, INCOSE, IISE, IETE, AAIA, SDPS, and the WAS. His research focus is on transdisciplinary systems engineering, adaptive cyber-physical-human systems, augmented intelligence, AI and machine learning in complex systems modeling, Model Based Systems Engineering for Advanced Manufacturing, and Digital Twin Technologies for industrial and biomedical applications. He has received in excess of $100M from research sponsors in government, aerospace, and automotive industries. He serves on the research councils of two DOD centers, DOD's Digital Engineering Body of Knowledge Governance Board, IISE Body of Knowledge Steering Committee.

He is the founder and CEO of Intelligent Systems Technology, Inc., a high-tech company which specializes in model-based and AI approaches to addressing scientific and societal problems of national and global significance. He co-founded and currently chairs the IEEE SMC award-winning technical committee on Model Based Systems Engineering. He specializes in model-based systems engineering and digital twin development approaches for industrial, aerospace, automotive, biomedical, and medical applications (including medical devices).

He defined the field of transdisciplinary systems engineering to address problems that appear intractable when viewed solely through an engineering lens. He is the creator of the TRASEE™ educational paradigm which combines storytelling with the Science of Learning principles to make learning enjoyable while enhancing retention and recall. He is currently engaged in bringing together members of the engineering communities to contribute to advances in transdisciplinary systems engineering, and in conducting humanitarian projects that exploit transdisciplinary systems engineering methods. With respect to the former, he has created a Digital Twin Community of Interest portal. With respect to the latter, he is currently leading SARW, a humanitarian initiative to address river rejuvenation problems in the tropical parts of the world with collaborators from the U.S. and India. The focus is on bringing transdisciplinary systems engineering approaches to bear on this problem.

He is the author of the highly acclaimed book, *Transdisciplinary Systems Engineering: Exploiting Convergence in a Hyper-Connected World* (Springer 2018) and the co-author of *Tradeoff Decisions in System Design* (Springer, 2016). He is the Co-Editor-in-Chief of three proceedings from the Conference on Systems Engineering. He is the Co-Editor-in-Chief (with Norm Augustine) of the *Handbook on Model Based Systems Engineering* (Springer, 2022). He received his Ph.D., M.S., and B.S. degrees in Engineering from University of California, Los Angeles. He is a graduate of AEA/Stanford Executive Institute.

DAC SIGNATURE EVENT

TUESDAY, AUGUST 16
2:10PM–3:50PM **MIDWAY SUITES 6**

LIGHTNING TALKS AND KEYNOTE

Jena L Holtberg-Benge
General Manager, John Deere Reman Business
Power Systems Group
Deere & Company

Sara Behdad
Associate Professor at the University of Florida

Junfeng Ma
Associate Professor at Mississippi State University

Paul W. Witherell
Mechanical Engineer at NIST

Jeremy Faludi
Assistant Professor at Delft University of Technology (Tu Delft)

Remanufacturing and Design for Remanufacturing in the Global Transition to a Circular Economy

BIOGRAPHY: Jena Holtberg-Benge is responsible for John Deere's remanufacturing strategy, sourcing and production with facilities in Springfield, MO and distribution globally. John Deere remanufactures engine, drivetrain, hydraulic, fuel, and electronic components, as well as sources rotating electrical, AC compressors and turbos. Jena is a strong believer in the value of remanufacturing to provide quality products to customers while executing on sustainability goals.

Holtberg-Benge joined Deere in 2001 and subsequently held roles in marketing, customer support, quality, operations, strategic planning and business development in the U.S., India, and China. In 2014 as Director, John Deere WorkSight™, she was responsible for the strategy and execution of technology and innovation for construction and forestry equipment. Prior to Deere she was instrumental in the start up of Laura Mercier Cosmetics and the development of a management designate program for HQ Global Workplaces. Jena holds a bachelor's degree in International Studies from Vassar College and an MBA (International Business) from Thunderbird, the School of Global Management.

DFMLC

TUESDAY, AUGUST 16
2:10PM–3:50PM **MIDWAY SUITES 3**

Sudarsan Rachuri
Technology Manager of the Advanced Manufacturing Office, EERE, and DOE

Revisiting DfX with Smart Manufacturing Technologies – Can We Realize Roundtrip Engineering across Lifecycle

ABSTRACT: Smart manufacturing essentially is about smartly extracting information from the manufacturing system to improve the overall efficiency of networked enterprises. Smart manufacturing provides an effective and secure cyber-physical system platform for better decision-making and improving the overall productivity and efficiency of manufacturing across the networked enterprise. Smart manufacturing has the potential to fundamentally change how products are designed, manufactured, supplied, used, remanufactured, and eventually retired. The talk will describe how smart manufacturing can be an innovation engine for enabling round-trip engineering for product and process lifecycle across the networked enterprise. The talk will also present how these technologies can be a vehicle for industrial decarbonization, disruptive technologies, industry best practices, verification and validation of systems, and more importantly workforce and skills development.

BIOGRAPHY: Dr. Sudarsan Rachuri is a Technology Manager in the Advanced Manufacturing Office, EERE, and DOE. He is the Federal Program Manager for the CESMII. Before joining DOE, he was the program manager at the National Institute of Standards and Technology (NIST) and also a research professor at George Washington University and worked in the CAD/CAE/PLM software industry.

Dr. Rachuri is the Editor-in-Chief of the *ASTM Smart and Sustainable Manufacturing Systems* journal. Rachuri is the founding member and was the vice-chair of the ASTM subcommittee on sustainable manufacturing (E60.13) and a member of the ASTM Smart Manufacturing Advisory Committee. He is the founding member and the Chair of the standards committee on ASME V&V 50 Verification and Validation of Computational Modeling for Advanced Manufacturing. Dr. Rachuri was a member of many ISO and ASME standards committees. He is a Fellow of ASME and AAAS (American Association for the Advancement of Science) and received the 2016 ASTM International President's Leadership Award. Dr. Rachuri won first prize in the 2017 World Standards Day (WSD) Paper Competition, awarded by The Society for Standards Professionals. Dr. Sudarsan Rachuri was recently honored with the Excellence in Research Award by the American Society of Mechanical Engineers (ASME) Computers and Information in Engineering (CIE) Division.

Keynotes

MNS

MONDAY, AUGUST 15
8:00AM–9:00AM **MIDWAY SUITES 1**

Philip Feng
Department of Electrical & Computer Engineering, University of Florida

Atomically Thin Dynamical Nanomechanical Systems

ABSTRACT: Emerging 2D semiconductors (such as transition metal dichalcogenides (TMDCs) and black phosphorus), along with their heterostructures (particularly with graphene and hexagonal boron nitride (h-BN) layers), offer compelling platforms for creating new resonant nanoelectromechanical systems (NEMS) for multiphysics transducers, where the unconventional properties of these crystals can be harnessed for engineering both classical and quantum signal processing and sensing schemes. In this presentation, I will describe some of my research group's latest endeavors and results on advancing resonant NEMS based on 2D materials and van der Waals heterostructures. I will first review the important fundamentals of resonant 2D NEMS with their linear and nonlinear dynamic characteristics. I shall then demonstrate examples of how the special properties of these 2D structures have led to new device functions and performance beyond conventional NEMS. Toward quantum engineering, atomistic defects in ultrawide-bandgap h-BN crystal support intriguing quantum emitters (QEs). Built upon our earlier attainments in SiC photonics and 2D devices, we explore these platforms and their hybrid integration, toward developing quantum transduction and information processing functions in chip-scale integrated systems.

BIOGRAPHY: Philip Feng is a Professor in ECE at University of Florida. His research is primarily focused on emerging semiconductor devices and integrated micro/nanosystems, especially those in advanced semiconductors, 2D materials and heterostructures, and their heterogeneous integration with mainstream technologies. Feng received his Ph.D. in EE from Caltech. His awards include the NAE Grainger Foundation Frontiers of Engineering Award, the NSF CAREER Award, the Presidential Early Career Award for Scientists and Engineers (PECASE), and several Best Paper Awards (with his students) at IEEE and other international conferences. He has served for IEEE IEDM/MEMS/Transducers/IFCS and was a chair for IEEE MEMS 2021.

MR

MONDAY, AUGUST 15
9:10AM–10:30AM **GRAND A**

Zhong You (BS, MS, PHD)
Professor of Engineering Science, University of Oxford

Compact Folding of Flat Arrays Composed of Panels with Uniform Thickness

ABSTRACT: Dr. Zhong You obtained his Ph.D. from Cambridge University in 1994 and is currently a Professor of Engineering Science at the Department of Engineering Science, University of Oxford. He is a Fellow of Magdalen College, University of Oxford and serves on the editorial board of some renowned journals, including *ASME Journal of Mechanisms and Robotics* (Associate Editor) and *IMechE Journal of Mechanical Engineering Science Part C*. Dr You's research is concerned with the design and realisation of novel deployable and origami structures, a type of unconventional structures capable of large shape changes. Dr. You has published many ground-breaking research papers in prestigious journals including Science and PNAS. His work was selected for the Science Day Exhibition at Buckingham Palace in 2007, organised by the Royal Society. Science introduced Zhong's research work in their "profile" section. He developed a flow diversion stent to treat cerebral aneurysms. Oxford Endovascular, a university spin-off company, was founded to commercialise this technology.

BIOGRAPHY: Many aerospace arrays have large flat profiles composed of regular polygonal panels. They need to be packaged into small volumes for launch, and subsequently deployed to seamless flat surfaces once in orbit. Examples of such structures include solar arrays and reflectarray antennas, which are made from rigid thick panels. It is always very challenging to package such arrays compactly without any voids, especially when they are composed of panels with uniform thickness and are designed to have bi-directional deployment with a small number of degrees of freedom. In this talk, I shall demonstrate a kirigami based approach that enables compact folding of such arrays without any voids.

Origami and kirigami have great advantages in folding large thin sheets into compact volumes. However, when thick panels are involved, origami based approaches often lead to large gaps along the hinges or uneven surfaces in deployed states. In the newly proposed approach, a thick-panel deployable kirigami element is first introduced using the Hamiltonian circuit in which eight panels with shapes of isosceles triangles and parallelograms are connected together by revolute joints. It is effectively an eight-link closed kinematic chain, named as an 8R element, that can be folded compactly without any voids. After that, four such elements are coupled together to form a deployable structure with a single degree-of-freedom. More 8R elements can be added to tessellate a plane. Although slits are introduced in the tessellation to accommodate thick panels during the folding process, they are completely closed in the fully deployed states. Therefore, a completely flat array made from thick panels with uniform thickness is obtained that retains the compact folding property of its constituent elements.

MSNDC

MONDAY, AUGUST 15
8:00AM–9:00AM **REGENCY B**

Josep Maria Font-Llagunes,
Full Professor of Mechanical Engineering, Universitat Politècnica de Catalunya (UPC)

Biomechanics of Human Movement: From Multibody Dynamic Simulation to Clinical Practice

ABSTRACT: In the last decade, there has been an exponential growth in the number of rehabilitation and assistive technologies for people with neuromuscular impairments. Such technologies range from wearable human movement monitoring devices to exoskeletons and rehabilitation robots aimed at maximizing motor function recovery. Most of these technologies require a comprehension of mechanical aspects of the human neuromusculoskeletal system and its interaction with the device, which can be modelled by means of multibody dynamics techniques. This keynote lecture will explore how multibody human models could be used in clinical practice to improve diagnosis and treatment of patients with movement disorders. Particularly, the lecture will discuss the different steps and challenges involved in the development of personalized neuromusculoskeletal models. Moreover, attention will be paid on how these models can be used to predict physically-consistent novel motions. Finally, two application examples that could potentially be used in real clinical practice will be presented. The first example is a computational approach to personalize controller parameters for a knee-powered lower limb exoskeleton that actively assists walking in people with spinal cord injury. The proposed method could be a better choice compared to the current trial-and-error approach based on the therapist experience. The second example is an IMU-based wearable system to capture arm kinematics in real-life conditions for pediatric patients with muscular dystrophy. This device runs a multibody kinematic model to quantify objective

BIOGRAPHY: Josep M. Font-Llagunes is Full Professor of Mechanical Engineering at Universitat Politècnica de Catalunya (UPC). He is also the Director of the UPC Doctoral School and the Biomechanical Engineering Lab (BIOMEC). Prof. Font-Llagunes' lab develops computational methods for the analysis and prediction of human movement, innovative robotic exoskeletons for gait assistance, and wearable monitoring technology for rehabilitation. He has published more than 40 articles in indexed journals, 130 conference papers, and has supervised or co-supervised seven PhD theses. He is Editorial Board member of the journal *Multibody System Dynamics*, and currently chairs the Technical Committee for Multibody Dynamics of IFToMM. Prof. Font-Llagunes also co-founded the company ABLE Human Motion, which develops exoskeleton technology for people with mobility impairments. His work has been recognized by several awards, such as the Agustín de Betancourt y Molina Medal awarded by the Spanish Royal Academy of Engineering, the OpenSim Outstanding Researcher Award, the Leonardo Grant by the BBVA Foundation, and the UPC Award for Social Commitment.

TUESDAY, AUGUST 16
8:00AM–9:00AM REGENCY B

Darryl Thelen
Weideman Professor of Mechanical Engineering, University of Wisconsin-Madison

Gauging Force by Tapping Tendons

ABSTRACT: Muscle-tendon units are the actuators that drive human movement. However, despite many decades of work, we still cannot readily assess the forces that muscles transmit within the human body. Direct measurement approaches are invasive and modeling approaches require many assumptions. We have been investigating both imaging and wearable sensor approaches to characterize in vivo kinetics of muscle-tendon units. In this seminar, we will first review our use of shear wave elastography to probe spatial and load-dependent variations in tendon tissue elasticity. We then show both analytically and experimentally that, under loading, shear wave propagation in tendon increases directly with axial stress. The complexity of the relationship between wave propagation, fibrous structure, elasticity, and loading is explored through computational models of multi-layered tissues. Based on this work, we have introduced a wearable shear wave tensiometer that uses micron-scale taps and skin-mounted accelerometers to track tendon wave speeds, and hence loading, during dynamic movements. We will discuss the application of the tensiometers for investigating the biomechanics and motor control of movement, and the potential to use the technology to enhance the surgical and conservative treatment of musculoskeletal injuries and movement disorders.

BIOGRAPHY: Darryl Thelen is the Weideman Professor of Mechanical Engineering at the University of Wisconsin-Madison. He is also the Bollinger Chair of the Department of Mechanical Engineering. Prof. Thelen's neuromuscular biomechanics lab develops computational models, novel sensor technologies and dynamic imaging protocols to investigate the structure, mechanics and behavior of musculoskeletal tissues within the human body. Current projects are aimed at improving orthopedic treatments of gait disorders in children, enhancing rehabilitation following tendon rupture and disease, and investigating the modulation of muscle loading with exosuit devices. His research has been supported by the NIH, NSF, DOD and several private companies and foundations. Dr. Thelen received his bachelor's degree in mechanical engineering from Michigan State University in 1987 and his MSE and PhD degrees in mechanical engineering from the University of Michigan in 1988 and 1992, respectively. He has been on the faculty of the University of Wisconsin-Madison since 2002.

Keynotes

TUESDAY, AUGUST 16
9:10AM–10:30AM **REGENCY B**

Parviz E. Nikravesh
Professor in the Aerospace and Mechanical Engineering, University of Arizona

D'ALEMBERT AWARD

Determination of Effective Mass for Continuous Contact Models in Multibody Dynamics

ABSTRACT: Collision between bodies could occur in some applications of multibody systems. To include a precise and accurate representation of impact or contact in the equations of motion of a system, we must consider the deformation, shape, and possibly other features of the contacting bodies. However, in multibody dynamics, we need to combine all of these attributes into a very simple and therefore approximate representation. For such a simplified representation, two different approaches are mostly considered. In one approach, known as the piecewise or intermittent analysis, it is assumed that the impact results in an instantaneous change in the velocities. A classical method to determine the change in the velocities considers balancing the system's momenta before and after an impact based on a given coefficient-of-restitution. In the other approach, known as the continuous analysis, it is assumed that the impact causes the contacting bodies to have local deformation in the contact region.

Either of the two methods is suitable for computational impact analysis in multibody dynamics. Either method requires accurate determination of the exact times of contact and loss of contact between impacting bodies. However, since the piecewise method requires special attention to several computational issues related to the discontinuities in the velocities, it is more common to apply the continuous method.

In the continuous analysis, it is assumed that when two bodies collide, although the contact period is very small, the change in the velocities is not discontinuous—the velocities vary continuously during the period of contact as the contacting bodies undergo local deformations. The deformation is represented as a logical linear or nonlinear spring-damper element that applies a pair of resistive forces on the two bodies during the period of contact. The parameters of this logical element that need to be determined are the effective mass, stiffness, damping coefficient, and the form of the nonlinearity.

In the past half-century, various models have been proposed that consider the force of the spring to be a nonlinear function of the deformation, where the stiffness could be adjusted based on the material properties of the contacting bodies. The models differ on whether the damping force, besides being a function of the deformation speed, should also be a function of the deformation or not. For these models, different formulas have been reported relating the damping coefficient to a desired value of the coefficient-of-restitution. Another parameter that needs to be determined for all of these models is the effective mass. This parameter can be determined for simple systems based on the kinetic energy of the bodies. However, for multibody systems containing kinematic joints or other constraints, and for systems having more than one degree-of-freedom, determination of the effective mass using the kinetic energy becomes more complicated.

In this presentation an overview of several continuous contact models is provided. Then simple formulas to compute the effective mass are derived based on the concept of impulse–momentum. The formulas are applicable to both constrained and unconstrained multibody equations of motion regardless of the number of degrees-of-freedom. Several examples are presented to clarify the use of these formulas.

TUESDAY, AUGUST 16
10:50AM–12:10PM **ILLINOIS CENTRAL (2ND FL)**

Philip Bayly
Mechanical Engineering and Materials Science,
Washington University in Saint Louis

Instability and Oscillations in Cilia and Flagella

ABSTRACT: Cilia and flagella are slender organelles that beat rhythmically to move fluid (such as mucus in human airways) or to propel cells (such as motile sperm). Despite their ubiquity and importance, the mechanism that produces the autonomous, propulsive oscillations of cilia and flagella remains mysterious. The common cytoskeletal structure of these organelles is the "9+2" axoneme, which comprises nine outer doublet microtubules and a central pair of microtubules, all connected by radial spokes and circumferential links. Motion is driven by molecules of the motor protein dynein, which form cross-bridges between pairs of microtubule doublets, exerting active forces on each doublet. Mathematical models of axoneme mechanics, assuming steady, distributed axial "follower" forces (generated by dynein molecules) acting in opposite directions on coupled beams (arrays of microtubule doublets) in viscous fluid, exhibit oscillatory, wavelike motion under a wide range of realistic parameters. This phenomenon, which we call "viscoelastic flutter," is related to the well-known flutter phenomena that occurs in aircraft wings above a critical speed and in flexible pipes conveying fluid. Thus dynamic instability provides an intriguing theoretical explanation of ciliary and flagellar beating.

BIOGRAPHY: Phil Bayly is The Lee Hunter Distinguished Professor of Mechanical Engineering and Chair of the Department of Mechanical Engineering and Materials Science at Washington University in St. Louis. Dr. Bayly earned an A.B. in Engineering Science from Dartmouth College, an M.S. in Engineering from Brown University, and a Ph.D. in Mechanical Engineering from Duke University. He has been a member of the faculty at Washington University since 1993. His research involves the study of waves, instability, and oscillations in mechanical and biological systems, and exploits novel imaging methods to understand the mechanics of cells and biological tissues. Dr. Bayly's research in biomechanics and biophysical oscillations has been funded by the National Science Foundation, the National Institutes of Health, and the Office of Naval Research.

WEDNESDAY, AUGUST 17
10:00AM–11:40AM **ILLINOIS CENTRAL (2ND FL)**

Suyi Li
Associate Professor in Mechanical Engineering,
Virginia Tech

C.D. MOTE, JR. EARLY CAREER AWARD

Dynamics Under the Fold – Using the Origami Principle to Architect Meta-Structures, Soft Robots, and Mechano-Intelligence

ABSTRACT: Since its creation, origami has undergone explosive evolutions in its beauty and complexity, and it is now a popular subject of study among artists, mathematicians, educators, and engineers. The seemingly infinite possibilities of developing 3D geometries via cutting and folding have inspired many deployable structures and devices, shaping our modern life. However, origami's potential extends beyond geometry, and there has been a paradigm shift from just using the kinematics of folding to harnessing its mechanics and dynamics. This talk will highlight our current efforts to accelerate this shift, focusing on how to exploit origami folding to generate unique dynamic and vibrational functionalities. For example, we can manipulate origami (or kirigami) to architect geometric periodicity, creating meta-structures with programmable elastic wave propagation bandgaps. We can exploit the multi-stability in origami to sequence robotic crawling locomotion gaits without any electronics. We can also harness the reservoir computing power hidden in origami's nonlinear vibration to develop intelligence in the mechanical domain. There are still many untapped potentials from exploiting the origami dynamics and vibrations, ensuring vibrant research activities for years to come.

BIOGRAPHY: Dr. Suyi Li is an associate professor in mechanical engineering at Virginia Tech. He received his Ph.D. from the University of Michigan in 2014. After spending two additional years at Michigan as a postdoctoral fellow, he moved to Clemson University as an assistant professor and established a research program on origami-inspired meta-structures and robotics. He held that position until 2022. Dr. Li has secured close to two million dollars of research funding, including the prestigious NSF CAREER award. He is also the recipient of the ASME Freudenstein Young Investigator Award, ASME Gary Anderson Early Career Award, and Clemson CECAS Junior Researcher of the Year Award. His research has generated close to 80 journal and conference publications.

Special Sessions & Panels

SUNDAY, AUGUST 14

PRE-CONFERENCE SPECIAL SESSION ON ASME DEI STRATEGY AND INITIATIVES

5:00PM–7:00PM **GRAND B**

DESCRIPTION: ASME is an organization committed to increasing diversity, equity, and inclusion in the field of engineering. As such, please join Tom Costabile, ASME Executive Director/CEO, Chandra Clouden, ASME Sr. Managing Director, HR & Organizational Development and Tim Graves, ASME Managing Director, Technical Conferences & Member Communities, will hold a special session on the organization's DEI Strategy and initiatives. Following the presentation and at the request of the IDETC-CIE members, the panel will be available for Q&A. This session will be held on **Sunday, August 14th, from 5 to 7 pm at Grand B**. We are working to have remote access to this meeting for those unable to travel to St. Louis.

MONDAY, AUGUST 15

DTM-01-02 - SPECIAL SESSION: DISCUSSIONS ON THE FUTURE DIRECTIONS OF DTM

10:50AM–12:10PM **MIDWAY SUITES 5**

DESCRIPTION: This special session will revisit themes identified from IDETC 2021's Agenda Setting panel session for the Design Theory and Methodology research community. The findings from the panel session revealed five new agenda items that have the potential to further strengthen research on Design Theory and Methodology: 1) Ethics, Equity, and Justice-focused design research; 2) Design for Sustainability research programs; 3) Research on Computational Agents as team members in the design process; 4) Building new theories from research conducted on Design Theory and Methodology; and 5) Focus on inclusive excellence in the review process of new and cross-disciplinary research. These agenda items as well as reflections on the history and legacy of the Design Theory and Methodology research community on the evolution of design research more broadly will be shared and discussed in this year's interactive discussion session with the 2021 panelists.

Organizer:
Christine Toh
University of Nebraska at Omaha

NSF-NASA EXTREME DESIGN AND WICKED PROBLEMS WORKSHOP

2:10PM–5:50PM **BURLINGTON ROUTE/FRISCO (2ND FL)**

Participation is limited to the first 50 attendees

DESCRIPTION: To what extent can our existing design theories and methodologies be used to solve the most extreme challenges and wicked problems? Are our current approaches enough, or do we need to create new methods, tools, and figures of merit – and if so, what would they look like? What changes are required in our thinking and problem framing when we are faced with challenges that push familiar variables to extreme values or significant redefinition? And to what degree do our product-based frameworks need to adjust to consider more complex systems, societal, and market-based perspectives? How can we clearly delineate the key aspects of multi-faceted problems that go beyond the purely technical to include economic, societal, industrial, environmental, political, and other factors?

NSF and NASA invite conference participants to an interactive workshop to explore these and other questions surrounding the most difficult problems within and beyond design engineering. Participants will engage with examples of extreme design challenges and wicked problems – some provided by the speakers and others of their own invention. Both agencies will describe current programs and projects related to the workshop themes and will invite discussion on the latest research, key challenges, and emerging opportunities.

Speakers:
Kathryn W. Jablokow, Ph.D.
Program Director, Engineering Design & Systems Engineering, National Science Foundation

Anna-Maria R. McGowan, Ph.D.
NASA Senior Executive for Complex Systems Design

MSNDC-09-01- STUDENT PAPER COMPETITION

2:10PM–3:50PM **REGENCY B**

DESCRIPTION: Presentations by Student Paper Competition finalists—Come learn about the latest research in multibody systems, nonlinear dynamics, and control conducted by your student peers.

DEC MENTORSHIP PROGRAM

4:10PM–5:50PM **MIDWAY SUITES 2**

DESCRIPTION: This year's mentorship program will be structured as a speed-networking session and is intended to provide students and early career researchers with an opportunity to build their network. After the speed-networking, we will continue with group or individual discussions based on topics derived from our survey. Prior sign-up is encouraged.

Organizer:
Rohan Prabhu
Rahul Renu, and Elizabeth Starkey

CIE - SEIKEM HACKATHON PANEL

4:10PM–5:50PM **MIDWAY SUITES 10**

The Role of Hackathon Mechanism in Promoting Data Science in Mechanical Engineering Research and Education: Perspectives from Academia and Industry

Organizers:
Hyunwoong Ko
Assistant Professor, Arizona State University

Zhuo Yang
Research Associate, National Institute of Standards and Technology

Panelists:
Yan Lu
Information Modeling and Testing Group Leader, NIST –SEIKM Award Chair

Zhenghui Sha
Assistant Professor, UT Austin – ASME SEIKM TC Chair from 2018–2019, ASME CIE Hackathon Chair in 2020, and Co-Chair in 2021 and 2022

Judges or problem contributors:
Sang Joon Park, MedicalIP

Ye Wang, Autodes

Nikhil Gupta, NYU

TUESDAY, AUGUST 16

A DIALOG ON DIVERSITY, EQUITY, AND INCLUSION IN SCHOLARLY PUBLICATIONS

7:00AM–7:50AM **MIDWAY SUITES 4**

DESCRIPTION: The ASME Journal of Mechanical Design (JMD) and The Journal of Computing and Information Science in Engineering (JCISE) are committed to ethical practices for publishing that support diversity, equity, and inclusion (DEI) in the full community of journal stakeholders, such as authors, reviewers, associate editors, editors, and publisher. To that end, JMD and JCISE are hosting the inaugural workshop to explore best practices, opportunities for improvement, and broadly solicit input from stakeholders to ensure diversity, equity, inclusion, and prevent bias in the process of archival scholarly publication. The workshop will consist of brief opening remarks from the organizing team addressing best practices and current strategies to ensure DEI, panel Q&A and open floor discussion, individual table level discussions, and a closing survey. We encourage the attendance from the broad ASME journal community.

Organizers:
Dr. Dan McAdams
Diversity Advocate, the ASME Journal of Mechanical Design

Dr. Wei Chen
Editor-in-Chief, the ASME Journal of Mechanical Design

Dr. Satyandra K. Gupta
Former Editor-in-Chief, the ASME Journal of Computing and Information Science in Engineering

WHAT'S NEW AT NSF

8:00AM–9:00AM **MIDWAY SUITES 3**

DESCRIPTION: The National Science Foundation is entering an exciting new era of science and engineering innovation, headlined by the creation of the new Technology, Innovation and Partnerships (TIP) Directorate and the creation of new cross-cutting programs and initiatives across NSF. In this session, CMMI Division Director Rob Stone and EDSE Program Director Kathryn Jablokow will highlight NSF opportunities and activities of particular interest to the design research community, including the Engineering Research Initiation (ERI) program, the ETAUS (Engineering Technologies to Advance Underwater Sciences) Ideas Lab, key programs in the TIP Directorate, the CMMI Game Changer Academy, and more! Time for Q&A will also be provided.

Organizers:
Kathryn W. Jablokow
Ph.D. Program Director, Engineering Design & Systems Engineering, National Science Foundation

Robert B Stone
NSF Division Director

Special Sessions & Panels

CIE PANEL

9:10AM–10:30AM **MIDWAY SUITES 10**

Education for Modeling and Simulation: Emerging Needs and Recent Trends

DESCRIPTION: Modeling and simulation (M&S) are becoming increasingly pervasive across multidisciplinary areas of mechanical engineering, design engineering and data science, whilst offering methods and tools for rapid design and modeling, cost-saving simulation, effective visualization, robust analysis, and communication across technical boundaries.

The landscape of this emerging field has been undergoing major changes as we transition from M&S of systems in the current era (e.g., internal combustion engines, planes, etc.) to modern systems (e.g., digital twins, robotics, additive manufacturing, quadcopters, drones, etc.) of the present and future. The complexity of models, model usage, and work environment has changed radically over these years. This raises the question of whether the educators are adequately preparing the engineering graduates with the proper M&S skills and academic requirements of the next generation.

In this panel, we will hear from experts in the industry, academia, and government about how the digital and advanced technology trends and needs are changing the educational of M&S. Is the new workforce is properly skilled and trained for M&S adoption, integration, and application? What are the respective revisions and interventions to be incorporated into the teaching and learning curricula at the undergraduate and graduate levels?

Furthermore, the panel will discuss the advancement of remote teaching, hybrid learning, and on-line education in the event of potential outbreak of airborne diseases, pandemics, or prevention of disease transmission.

DTM IDEA ACCELERATOR

10:50AM–12:10PM **MIDWAY SUITES 5**

DESCRIPTION: This interactive, hands-on, special session will be led by Kathryn Jablokow, program director of the NSF EDSE. This will be an opportunity for the DTM community to get together and brainstorm ideas for future funding opportunities.

Organizer:
Kathryn W. Jablokow, Ph.D.
Program Director, Engineering Design & Systems Engineering, National Science Foundation

MR-09: SPECIAL EARLY CAREER SESSION OF INVITED PRESENTATIONS

2:10PM–3:50PM **GRAND A**

Invited Speakers :
Laura Blumenschein
Purdue University

Jared Butler
Penn State University

Dongming Gan
Purdue University

Mark Plecnik
University of Notre Dame

DTM-06-01 - DTM & B-PART FELLOWSHIP POSTER SESSION RECEPTION

4:10PM–5:50PM **MIDWAY WEST**

DESCRIPTION: This poster session will feature winners of the DTM Junior Ph.D. student poster competition and the posters from B-Part Fellowship Program winners.

DTM Junior Ph.D. student posters:

This poster session will highlight up-and-coming students in the Design Theory and Methods community. Junior Ph.D. students who may not have enough research for a full IDETC paper will present their work in a poster format. This competition is organized by Jessica Menold.

- Yinshuang Xiao: Socio-Technical Systems Engineering and Design: A Meso-Level Network-Based Approach
- Hossein Basereh Taramsari: Exploring the Integration of Design Structure Matrix (DSM) and Life Cycle Assessment (LCA) Tools to Improve Design for Sustainability (DfS)
- Alkim Avsar: Collaborative Systems Design with the Social Interaction Triangle: Risk, Trust, and Control
- Noah Bagazinski: Many-Objective Systems Design Optimization of Marine Vessels Using Interpretable Reinforcement Learning
- Jake Hunter: Towards the Design of Socially Relevant Automated Mobilities
- Ghazi Alonayni: Process Planning for Five-Axis 3D Printing
- Xingang Li: Human-Supervised Deep Generative Design Framework for Conceptual Design of Product Shapes
- Cole Jetton: Applying Bayesian Optimization to User-Guided Design Using Surrogate Models of Feasible Design Space
- Kristoffer Sjolund: Forecasting Performance of Technological Ecosystems via Lotka-Volterra Equations and Ecological Ecosystem Analogies
- Yefeng Liang: The Real-Time Empathetic Chatbot Research for Improving User Engagement Work

B-Part Fellowship and Mentorship Winners

The session will also feature winners of the B-Part Fellowship and Mentorship Program. This new program is designed to uplift early-career graduate students who are members of underrepresented groups within the DED (e.g., women, black and Latinx individuals, transgender individuals, and people with disabilities). The goal of this fellowship program is to create support systems (mentorship and financial) that enable graduate students who are not part of the dominant group in engineering to find in-roads and connections with the design engineering research community. This year's program is organized by Christine Toh, University of Nebraska at Omaha; Ada-Rhodes Short, University of Nebraska at Omaha; Kate Fu, University of Wisconsin Madison. The winners are:

- Anne Arzberger - *Technical University of Delft*
- Rafaela Louis - *ETH Zurich*
- Zihan Wang - *University of Connecticut*
- Olivia Murphy - *Cornell University*
- Yakira Mirabito - *University of California, Berkley*

NSF/ASME STUDENT DESIGN ESSAY COMPETITION CHALLENGES IN THE DESIGN OF COMPLEX SYSTEMS

4:10PM–5:50PM **MIDWAY WEST**

DESCRIPTION: Students are invited to write essays on their vision for the future of design and manufacturing. These essays are then judged by a panel of faculty from across the United States. This contest has been going on since 1998 and at least ten previous winners have gone on to become faculty members. Essay winners receive funding to attend IDETC and present their work in the form of a poster. We gratefully acknowledge support from NSF Grant Number CMII-1835957.

TUESDAY, AUGUST 17

CIE - VES PANEL

8:00AM–9:40AM **MIDWAY SUITES 10**

Virtual Environments and Systems for Makers

DESCRIPTION: Recent years have seen a significant academic, industrial, entrepreneurial, and public interest in virtual environments and systems as well as making. On the one hand, the rise of maker culture has led to heavy investment in additive manufacturing, digital fabrication, and prototyping-based design. On the other hand, novel technologies in extended (virtual/augmented/mixed) reality have started becoming integral to industrial as well as entertainment applications. The purpose of this panel discussion is to explore: (1) where these two domains (VES and making) meet, (2) how they will give rise to new research and development opportunities, (3) what intellectual challenges lie ahead in operationalizing VES for makers, (4) how such a combination may impact innovation in design and manufacturing, and (5) what steps we should take as researchers to investigate this exciting avenue. We will seek views and arguments from a panel of experts coming from a wide range of areas, including computer-aided product design, digital fabrication, design education, and virtual environments and systems.

Organizers:

Vinayak R. Krishnamurthy
Assistant Professor and Morris E. Foster Faculty Fellow II
J. Mike Walker '66 Department of Mechanical Engineering
Department of Computer Science and Engineering (By Affiliation)
Texas A&M University

Panelists:

Julie Linsey
Professor
School of Mechanical Engineering
Georgia Institute of Technology, USA

Jessica Menold
Hartz Family Career Development Assistant Professor
School of Engineering Design, Technology and Professional Programs
Engineering Design
Mechanical Engineering
Industrial and Manufacturing Engineering
Law, Policy, and Engineering
The Learning Factory
Pennsylvania State University

Marco Rossini
Assistant Professor
Department of Mechanical Engineering
Politecnico di Milano

Special Sessions & Panels

DTM-05-01- LIGHTNING TALKS: NEW AND REVISITING DIRECTIONS OF DTM

10:00AM–11:40AM **MIDWAY SUITES 5**

DESCRIPTION: This special session will feature six back-to-back presentations in rapid-fire style. Each presenter will talk for five minutes. After all the presentations, there will be a panel of all the authors and the audience will get a chance to discuss all the papers.

DFMLC DISCUSSION PANEL

10:00AM–11:40AM **MIDWAY SUITES 3**

Foundations and Emerging Perspectives in Design for Manufacturing and the Life-Cycle

Panelists:

Sara Behdad
Associate Professor
Engineering School of Sustainable Infrastructure and Environment
University of Florida

David Rosen
Professor
Georgia Institute of Technology

Harrison Hyung Min Kim
Professor and Donald Biggar Willett Scholar
Department of Industrial and Enterprise Systems Engineering (ISE)
Grainger College of Engineering
Beckman Institute
Carle Illinois College of Medicine
Academic Co-Director, Hoeft Technology and Management (T&M) Program
University of Illinois at Urbana-Champaign

STUDENT MECHANISMS AND ROBOT DESIGN COMPETITION

3:15PM–4:45PM **GRAND A**

DESCRIPTION: The ASME Student Mechanisms and Robotics Design Competition (SMRDC) highlights the innovation of undergraduate and graduate students to design and build a working mechanism and/or robot. Everyone is invited to see the spectacular ideas and realizations devised by students from across the globe. After the initial presentations, join for an interactive poster session segment.

MONDAY, AUGUST 15

JOURNAL OF VIBRATION AND ACOUSTICS (JVA)
2:10PM–3:50PM **NEW YORK**

Editor-in-Chief:
Christopher D. Rahn
Pennsylvania State University

Session Chair:
Kiran D'Souza
Ohio State University

Bilinear Systems With Initial Gaps Involving Inelastic Collision: Forced Response Experiments and Simulations

Presenting Author:
Kiran D'Souza

Authors:
Kohei Noguchi, Akira Saito, Meng-Hsuan Tien, Kiran D'Souza

DOI: https://doi.org/10.1115/1.4051493

Resonant Ultrasound Spectroscopy: Sensitivity Analysis for Anisotropic Materials With Hexagonal Symmetry

Presenting Author:
Onome E. Scott-Emuakpor

Authors:
Christopher L. Sevigney, Onome E. Scott-Emuakpor, Farhad Farzbod

DOI: https://doi.org/10.1115/1.4053263

Interrogating the Lead-Up to a Critical Speed in Rotordynamics

Presenting Author:
Lawrie Virgin

DOI: https://doi.org/10.1115/1.4053190

Locally Resonant Effective Phononic Crystals for Subwavelength Vibration Control of Torsional Cylindrical Waves

Presenting Author:
Katie Matlack

Authors:
Ignacio Arretche, Kathryn H. Matlack

DOI: https://doi.org/10.1115/1.4052748

Online Signal Denoising Using Adaptive Stochastic Resonance in Parallel Array and Its Application to Acoustic Emission Signals

Presenting Author:
Jinki Kim

Authors:
Jinki Kim, Ryan L. Harne, K. W. Wang

DOI: https://doi.org/10.1115/1.4052639

TUESDAY, AUGUST 16

JOURNAL OF MECHANICAL DESIGN (JMD)
10:50AM– 12:10PM **MIDWAY SUITES 7**

Editor-in-Chief:
Christopher D. Rahn
Pennsylvania State University

Session Chair:
Wei Chen
Northwestern University

Scalable Set-Based Design Optimization and Remanufacturing for Meeting Changing Requirements

Presenting Author:
Khalil Al Handawi, McGill University

Authors:
Khalil Al Handawi, Petter Andersson, Massimo Panarotto, Ola Isaksson, Michael Kokkolaras

DOI: https://doi.org/10.1115/1.4047908

Data-Driven Topology Optimization With Multiclass Microstructures Using Latent Variable Gaussian Process

Presenting Author:
Liwei Wang, Shanghai Jiao Tong University

Authors:
Liwei Wang, Siyu Tao, Ping Zhu, Wei Chen

DOI: https://doi.org/10.1115/1.4048628

Journal Spotlights

Confidence-Based Design Optimization for a More Conservative Optimum Under Surrogate Model Uncertainty Caused by Gaussian Process

Presenting Author:
Ikjin Lee, Korea Advanced Institute of Science and Technology

Authors: **Yongsu Jung, Kyeonghwan Kang, Hyunkyoo Cho, Ikjin Lee**

DOI: https://doi.org/10.1115/1.4049883

PaDGAN: Learning to Generate High-Quality Novel Designs

Presenting Author:
Wei (Wayne) Chen, Northwestern University

Authors:
Wei Chen, Faez Ahmed

DOI: https://doi.org/10.1115/1.4048626

Particle Swarm Optimization-Based Metaheuristic Design Generation of Non-Trivial Flat-Foldable Origami Tessellations With Degree-4 Vertices

Presenting Author:
Yao Chen, Southeast University

Authors:
Yao Chen, Jiayi Yan, Jian Feng, Pooya Sareh

DOI: https://doi.org/10.1115/1.4047437

JOURNAL OF COMPUTING AND INFORMATION SCIENCE IN ENGINEERING (JCISE)

2:10PM–3:50PM **MIDWAY SUITES 10**

Editor-in-Chief:
Satyandra K. Gupta
University of Southern California

Session Chair:
Satyandra K. Gupta
University of Southern California

Yan Wang
Georgia Institute of Technology

Emergence of Human-Centered AI, Machine Learning, and Automation

Presenting Author:
Satyandra K. Gupta, University of Southern California

A Recommender System for the Additive Manufacturing of Component Inventories Using Machine Learning

Presenting Author:
Seyedeh Elaheh Ghiasian, University at Buffalo

Authors:
Seyedeh Elaheh Ghiasian, Kemper Lewis

DOI: https://doi.org/10.1115/1.4051342

A Machine Learning Approach to Solve the Alt–Burmester Problem for Synthesis of Defect-Free Spatial Mechanisms

Presenting Author:
Anurag Purwar, Stony Brook University

Authors:
Shashank Sharma, Anurag Purwar

DOI: https://doi.org/10.1115/1.4051913

Engineering Knowledge Graph From Patent Database

Presenting Author:
Jianxi Luo, Singapore University of Technology and Design

Authors:
L. Siddharth, Lucienne T.M. Blessing, Kristin L. Wood, Jianxi Luo

DOI: https://doi.org/10.1115/1.4052293

Knowledge Acquisition of Self-Organizing Systems With Deep Multiagent Reinforcement Learning

Presenting Author:
Yan Jin, University of Southern California

Authors:
Hao Ji, Yan Jin

DOI: https://doi.org/10.1115/1.4052800

JOURNAL OF MECHANISMS AND ROBOTICS (JMR)
4:10PM–5:50PM **GRAND B**

Editor-in-Chief:
Venkat Krovi
Clemson University

Session Chair:
Venkat Krovi
Clemson University

Modeling Large Spatial Deflections of Slender Beams of Rectangular Cross Sections in Compliant Mechanisms

Presenting Author:
Guimin Chen, Xi'an Jiaotong University

Authors:
Ruiyu Bai, Guimin Chen

DOI: https://doi.org/10.1115/1.4048753

Multi-Loop Rover: A Kind of Modular Rolling Robot Constructed by Multi-Loop Linkages

Presenting Author:
Xilun Ding, Beihang University

Authors:
Yaobin Tian, Xianwen Kong, Kun Xu, Xilun Ding

DOI: https://doi.org/10.1115/1.4048225

Compliant Mechanisms That Use Static Balancing to Achieve

Presenting Author:
J.B. Hopkins, University of California, Los Angeles

Authors:
P.R. Kuppens, M.A. Bessa, J.L. Herder, J.B. Hopkins

DOI: https://doi.org/10.1115/1.4049438

SATURDAY AUGUST 13–SUNDAY, AUGUST 14

ASME CIE STUDENT HACKATHON
1:00PM AUGUST 13–8:00PM AUGUST 14 — **ILLINIOS CENTRAL/ NEW YORK CENTRAL**

DESCRIPTION: The Computer & Information in Engineering (CIE) Division of the American Society of Mechanical Engineers (ASME) held two hackathon events at the IDETC/CIE 2020 and 2021 Conferences. These 24-hour hackathon events provide students and engineering practitioners with a unique opportunity to learn how data science and machine learning techniques can be leveraged to solve real-world engineering problems.

ounding successes, the CIE Division will hold the ASME-CIE Hackathon again at the IDETC/CIE 2022 Conference, for the first time in-person, as a pre-conference event from Aug. 13-14, 2022.

Organizers:
Hyunwoong Ko

Zhenghui Sha

Yan Lu

SUNDAY, AUGUST 14

WORKSHOP 2
8:00AM–12:30PM — **REGENCY C**
1:45PM–6:00PM — **REGENCY B (INVITATION ONLY SESSION)**

ASME Robotics Roadmapping Workshop

DESCRIPTION: The ASME Robotics Technology Group (RTG) invites interested individuals and subject matter experts to participate in a morning of thought-provoking speakers and panel discussions. The program will consist of keynote speakers/panelists on different topics. The morning session will be followed by an afternoon, invitation-only workshop to develop a Robotics Roadmap that aims to embody mechanical and physical necessities and bridge the gaps between AI and integration challenges. The workshop includes facilitated, topical breakout sessions. The goal of the Workshop is to create a Robotics Roadmap by forming working groups that will brainstorm and do concept mapping during the workshop, and then will continue to work virtually to generate their topic's content. Collectively, the groups will arrive at a roadmap and set of implementable recommendations, published in a co-authored ASME open-access publication. For more information, download the Workshop flyer. If you have questions, contact Gloria Wiens, Chair, Robotics Technology Group (gwiens@ufl.edu) or Barbara Zlatnik, ASME Sr. Manager, TEC Operations (zlatnikb@asme.org).

Organizer:
Robotics Technology Group

WORKSHOP 3
9:00AM–1:00PM — **MIDWAY SUITES 3**

Bridging the Gap between Sustainable Design Intention and Practice

DESCRIPTION: The ASME Robotics Technology Group (RTG) invites interested individuals and subject matter experts to participate in a morning of thought-provoking speakers and panel discussions. The program will consist of keynote speakers/panelists on different topics. The morning session will be followed by an afternoon, invitation-only workshop to develop a Robotics Roadmap that aims to embody mechanical and physical necessities and bridge the gaps between AI and integration challenges. The workshop includes facilitated, topical breakout sessions. The goal of the Workshop is to create a Robotics Roadmap by forming working groups that will brainstorm and do concept mapping during the workshop, and then will continue to work virtually to generate their topic's content. Collectively, the groups will arrive at a roadmap and set of implementable recommendations, published in a co-authored ASME open-access publication. For more information, download the Workshop flyer. If you have questions, contact Gloria Wiens, Chair, Robotics Technology Group (gwiens@ufl.edu) or Barbara Zlatnik, ASME Sr. Manager, TEC Operations (zlatnikb@asme.org).

Organizers:
Ye Wang,
Autodesk

Nicole Damen
University of Nebraska–Omaha

WORKSHOP 4

1:00PM–4:00PM **MIDWAY SUITES 3**

Trends in Human-AI Teaming for Engineering and Design

DESCRIPTION: The practice of design is rapidly changing. The increasingly digital footprint of design and the growing prevalence of high-powered computing introduces new opportunities for making use of advanced computation. Simultaneously, the rise of complicated cyberphysical systems presents designers with challenges that are unprecedented in terms of scale, multi-disciplinarity, and complexity. In this way, human-AI teaming is not only an exciting opportunity for engineering design, but it is also quickly becoming a necessity. This workshop brings together leading researchers in AI/ML, formal methods, design science, human-computer interaction, and other fields to discuss emerging trends and future opportunities in human-AI teaming for engineering and design.

Organizers:
Christopher McComb
Carnegie Mellon University

Susmit Jha
SRI International

WORKSHOP 5

9:00AM–1:00PM **GRAND C**

A Computational and Physical Framework for Mechanisms and Robot Motion Design

DESCRIPTION: This workshop will introduce attendees to a new computational framework for mechanism and robot motion design and a physical robot prototyping kit that which students and practitioners can use to design one- and multiple-degrees of freedom mechanisms and physically realize them. The computational framework brings together machine learning with machine design to solve motion generation and path synthesis problem for mechanism design. Attendees will get hands-on exposure to a web-based motion design software tool called MotionGen Pro and a robot hardware called SnappyXO Design, both developed at Stony Brook University to support the needs of students in classes, such as Freshman Design Innovation, Kinematics of Machinery, Mechatronics, and Robotics. While the hardware serves as a reference hardware, the software also allows exporting robot part geometry for laser-cutting or 3D printing.

Organizer:
Anurag Purwar
Stony Brook University

WORKSHOP 6

1:00PM–5:00PM **MIDWAY SUITES 1**

Engineering Sustainable Product Development, and Optimization

DESCRIPTION: The design and manufacturing of products need close study of materials used, manufacturing, use and discarding of products at end of life. The environmental impact such as use of materials, pollution, global warming, acidification, and creation of waste including the recycling, and reuse of these products and processes are essential during the product development. Today these issues are essential requirements of all sustainable manufacturing.

The basic principles of industrial ecology for product developments minimizing the use of materials and energy, the selection of materials with better environmental, and recycling and reuse of materials must be embedded.

During the material selection the energy and water requirements of different materials are quite different. The embodied energy, CO2footprint, and eco-indicators should be essential criteria in selection of materials. The Life Cycle analysis (LCA) of the product needs to be included, such as design, manufacturing, use, including end-of-life considerations need to be considered.

Organizer:
Nand K Jha
Manhattan College

Workshops & Tutorials

TUTORIAL 1
1:00PM–5:00PM **GRAND C**

Tutorial on Topology Optimization with Geometric Components

DESCRIPTION: Prevalent topology optimization techniques produce organic designs that are highly efficient but often difficult to manufacture. This difficulty arises from the field representations of the structure employed by these methods, which provide great freedom and readily accommodate shape and topological changes but at the same time make it very difficult to incorporate high-level geometric requirements. To address these shortcomings, several topology optimization methods have been formulated in the last decade to design structures made exclusively of geometric components with high-level parameterizations such as those used in solid modeling systems. These methods can render structures made exclusively of, e.g., stock material such as bars and plates or B-spline-shaped holes.

In this tutorial we will review the main techniques used by these methods, with a particular emphasis on the formulations to map the high-level geometric features onto a fixed finite element mesh for analysis. The tutorial will also discuss and demonstrate applications of topology optimization with geometric components. Emphasis will be given to the geometry projection method, one of the leading techniques in this family of approaches. Participants will use a freely available geometry projection code to examine the inner workings of the geometry projection method and perform some numerical experiments.

Organizer:
Julián Norato
University of Connecticut

TUTORIAL 2
9:00AM–5:00PM **REGENCY A**

Getting the Right Model of Your Robot in an Easy Way Using Modern Geometric Methods

DESCRIPTION: A fundamental prerequisite for control and design of dexterous robots, such as serial and parallel manipulators, humanoids, and space robots, is kinematics and dynamics models with sufficient level of fidelity and complexity. Four decades of research on multibody dynamics has led to systematic modeling approaches for complex systems. Recent research elevated these results to a more concise level by means of Lie group methods. These “modern” approaches make use of the differential geometry of rigid body motions, i.e., screw motions. The coordinate invariance of such formulations not only makes the modeling extremely handy but also leads to computationally efficient formulations. This is true for robotic systems with arbitrary topology. Moreover, the geometric approach allows for compact relations for higher-order derivatives of the kinematics and dynamics model, which is necessary for flatness based control of robots actuated with serial elastic actuators and soft robots. A salient feature of geometric modeling approaches is their ease of use, which allows for straightforward manual implementation for specific robots as well as for the programing of general purpose simulators.

In this tutorial, modern modeling approach are introduced to a wider audience in the form of a hands-on introduction. The tutorial is interactive and accompanied with computer exercises. Attendees are requested to bring their own computer with installed Mathematics or Maple.

Organizer:
Andreas Mueller
Johannes Kepler University

Committee Meetings

ROOM	Sunday, August 14	
Grand A	DED Executive Committee Meeting (Closed)	1:00PM–5:00PM
Offsite	CIE Executive Committee Meeting (Closed)	1:00PM–5:00PM
ROOM	**Monday, August 15**	
Regency C	Design Engineering Division General Committee Meeting	5:00PM–7:00PM
Midway Suites 2	DED - Design Education (DEC)	6:00PM–7:00PM
Midway Suites 3	DED - Design for Manufacturing and the Life Cycle Conference (DFMLC)	6:00PM–7:00PM
ROOM	**Tuesday, August 16**	
Midway Suites 1	DED - Micro- and Nano systems (MNS)	10:50AM–11:50PM
Regency B	DED - Multibody Systems, Nonlinear Dynamics, and Control (MSNDC)	6:00PM–7:00PM
Midway Suites 5	DED - Design Theory and Methodology (DTM)	6:00PM–7:00PM
Midway Suites 8	CIE – Virtual Environments and Systems (VES)	6:00PM–7:00PM
Midway Suites 9	CIE – Advanced Modeling & Simulation (AMS)	6:00PM–7:00PM
Midway Suites 10	CIE – Computer-Aided Product and Process Development (CAPPD)	6:00PM–7:00PM
Midway Suites 11	CIE – Systems Engineering, Info. & Knowledge Management (SEIKM)	6:00PM–7:00PM
Grand A	DED – Mechanisms and Robotics (MR)	6:00PM–8:00PM
Midway Suites 10	Computers and Information in Engineering General Committee Meeting	7:00PM–8:00PM
Midway Suites 7	DED – Design Automation (DAC)	7:00PM–8:00PM
ROOM	**Wednesday, August 17**	
Midway Suites 1	IDETC.CIE 2023 Committee Meeting (Closed)	7:00AM–7:50AM

MONDAY, AUGUST 15, 2022

VIB-02-01: DYNAMICS OF SOFT MEDIA AND ROBOTICS
8:00AM–9:00AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Hongbin Fang** - *Fudan University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Suyi Li** - *Clemson University*
Chair: **Peter Coffin** - *Sandia National Laboratories*

Data-Driven Modeling of a Pneumatic Yoshimura-Origami Structure With Tunable Dynamics

Technical Paper Publication: IDETC2022-90225

Qiwei Zhang - *Tongji University,* **Hongbin Fang** - *Fudan University,* **Jian Xu** - *Tongji University,* **Suyi Li** - *Clemson University*

Nonlinear Vibration of Dielectric Elastomer Membranes Excited by Small Nominal Voltages With Large Fluctuations

Technical Presentation: IDETC2022-97969

Christopher Cooley - *Oakland University,* **Robert Lowe** - *University of Dayton*

VIB-04-01: ENERGY HARVESTING I
8:00AM–9:00AM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Wei-Che Tai** - *Michigan State University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Serife Tol** - *University of Michigan*
Chair: **Peter Coffin** - *Sandia National Laboratories*

Vibration Energy Harvester With Piecewise Linear Nonlinear Oscillator and Controllable Gap Size

Technical Paper Publication: IDETC2022-89948

Jacob Veney - *The Ohio State University,* **Kiran D'Souza** - *The Ohio State University*

The Effect of the Hydrodynamic Center Location on the Hydraulic Efficiency of an Axial-Flow Water Turbine

Technical Presentation: IDETC2022-90687

Hsing-Nan Wu - *Virginia Tech,* **Shanab Belal** - *Virginia Tech/National Sun Yat-sen University,* **Eric Cysper** - *Virginia Tech,* **Jiajun Zhang** - *Virginia Tech,* **Bang-Fuh Chen** - *National Sun Yat-sen University,* **Lei Zuo** - *Virginia Tech*

Preliminary Modeling of Angle of Attack in Self-Rectifying Turbine Under High Rotational Speed

Technical Paper Publication: IDETC2022-91199

Xian Wu - *Virginia Tech,* **Lei Zuo** - *Virginia Tech*

DTM-02-02 - REPRESENTATIONS IN DESIGN
8:00AM–9:00AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Jinjuan She** - *Miami University*
Chair: **Bradley Camburn** - *Oregon State University*

A Proposal for a Prototyping Method Focused on Communication That Increases Economies of Prototyping

Technical Paper Publication: IDETC2022-88231

Keita Mitomi - *Keio University,* **Tomoko Ikenoue** - *General Incorporated Association Players, Japan,* **Keita Takizawa** - *General Incorporated Association Players, Japan,* **Toshiharu Mitsuhashi** - *Center for Innovative Clinical Medicine*

Tablets, Pens, and Pencils: The Influence of Tools on Sketching in Early Stage Design

Technical Paper Publication: IDETC2022-89154

Madhurima Das - *Massachusetts Institute of Technology,* **May Huang** - *Massachusetts Institute of Technology,* **Maria Yang** - *Massachusetts Institute of Technology*

Exploring Partitioning in Subsystem Prototyping

Technical Paper Publication: IDETC2022-90247

Zachariah Connor - *Oregon State University,* **Bradley Camburn** - *Oregon State University*

Investigating the Roles of Expertise and Modality in Designers' Search for Inspirational Stimuli

Technical Paper Publication: IDETC2022-90638

Elisa Kwon - *University of California, Berkeley,* **Vivek Rao** - *University of California, Berkeley,* **Kosa Goucher-Lambert** - *University of California, Berkeley*

CIE-18-02 - VES: TECHNOLOGIES FOR VR, AR, AND MR

8:00AM–9:00AM **MIDWAY SUITES 9**

Chair: **Christian Lopez** - *Lafayette College*
Chair: **Chih-Hsing Chu** - *National Tsing Hua University*

Human-Centric Facility Layout and Production Planning in Mixed Reality

Technical Paper Publication: IDETC2022-90962

Dawi Baroroh - *National Tsing Hua University,* **Chih-Hsing Chu** - *National Tsing Hua University*

Quickprobe: Quick Physical Prototyping-in-Context Using Physical Scaffolds in Digital Environments

Technical Paper Publication: IDETC2022-91023

Abhijeet Singh Raina - *Texas A&M University,* **Shantanu Vyas** - *Texas A&M University,* **Matthew Ebert** - *Texas A&M University,* **Vinayak Krishnamurthy** - *Texas A&M University*

Exploring the Perceived Complexity of 3d Shapes: Towards a Spatial Visualization VR Application

Technical Paper Publication: IDETC2022-91212

Angela Busheska - *Lafayette College,* **Christian Lopez** - *Lafayette College*

Designing Mindfulness Practice System Based on Biofeedback in VR Environment

Technical Paper Publication: IDETC2022-91254

Shuo Li - *Shanghai Jiaotong University,* **Hongtao Zheng** - *Shanghai JiaoTong University,* **Yang Ge** - *Shanghai JiaoTong University,* **Wenyu Yuan** - *Shanghai JiaoTong University,* **Ting Han** - *Shanghai JiaoTong University*

DAC-01-01-CONTROL CO-DESIGN

8:00AM–9:00AM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Daniel Herber** - *Colorado State University*

Control Co-Design Under Uncertainties: Formulations

Technical Paper Publication: IDETC2022-89507

Saeed Azad - *Colorado State University,* **Daniel R. Herber** - *Colorado State University*

A Constraint-Handling Technique for Parametric Optimization and Control Co-Design

Technical Paper Publication: IDETC2022-89957

Ying-Kuan Tsai - *Texas A&M University,* **Richard Malak Jr.** - *Texas A&M University*

Control Co-Design Optimization of Natural Gas Power Plants With Carbon Capture and Thermal Storage

Technical Paper Publication: IDETC2022-90021

Roberto Vercellino - *Colorado State University,* **Ethan Markey** - *Colorado State University,* **Braden Limb** - *Colorado State University,* **Maxwell Pisciotta** - *University of Pennsylvania,* **Joseph Huyett** - *Colorado State University,* **Shane Garland** - *Colorado State University,* **Todd Bandhauer** - *Colorado State University,* **Jason Quinn** - *Colorado State University,* **Peter Psarras** - *University of Pennsylvania,* **Daniel Herber** - *Colorado State University*

DAC-05-01-DECISION MAKING IN ENGINEERING DESIGN

8:00AM–9:00AM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Jesse Austin-Breneman** - *University of Michigan*
Chair: **Venkat Nemani** - *Iowa State University*

Does Narrative Play a Role in Engineering Decision-Making and Design? A Preliminary Study

Technical Paper Publication: IDETC2022-89949

Scott Ferguson - *North Carolina State University,* **Kenneth Bryden** - *Iowa State University*

Aircraft Maintenance Schedule Design Optimization During a Pandemic

Technical Paper Publication: IDETC2022-90686

Elizabeth Jordan - *University of Maryland,* **Shapour Azarm** - *University of Maryland, College Park*

An Information-Decision Framework to Support Cooperative Decision Making in the Top-Down Design of Cyber-Physical Manufacturing Systems

Technical Paper Publication: IDETC2022-90836

Mathew Baby - *Florida Institute of Technology,* **Anand Balu Nellippallil** - *Florida Institute of Technology*

DAC-16-01-PLATFORM ARCHITECTURE AND PRODUCT FAMILY DESIGN

8:00AM–9:00AM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Steven Hoffenson** - *Stevens Institute of Technology*

Two-Dimensional Lineup Design of Intermediate Functional Products With Enumerative Optimization of Combinatorial Mini-Max Optimality

Technical Paper Publication: IDETC2022-90899

Kikuo Fujita - *Osaka University,* **Naoki Ono** - *Osaka University,* **Yutaka Nomaguchi** - *Osaka University*

Patent Mining to Understand Functional Evolution of Engineered Products

Technical Paper Publication: IDETC2022-89405

Hyeonik Song - *Texas A&M University,* **Daniel Selva** - *Texas A&M University,* **Daniel Mcadams** - *Texas A&M University*

Requirements Mapping of a High-Powered Rocket System to Explain Solution Similarities Across Generations

Technical Paper Publication: IDETC2022-91348

Lindsey Jacobson - *North Carolina State University,* **Scott Ferguson** - *North Carolina State University*

CIE-03-01 - COMPUTATIONAL MULTIPHYSICS

8:00AM–9:00AM **MIDWAY SUITES 10**

Chair: **John Michopoulos** - *U.S. Naval Research Laboratory*
Chair: **Piyush Pandita** - *GE Research*

Reinforcement Learning Based Sequential Batch-Sampling for Bayesian Optimal Experimental Design

Technical Paper Publication: IDETC2022-87995

Yonatan Ashenafi - *University of Alberta,* **Piyush Pandita** - *GE Research,* **Sayan Ghosh** - *GE Research*

Incorporating Performance Portability and Data-Oriented Design in Phase-Field Modeling

Technical Paper Publication: IDETC2022-89513

Caleb Yenusah - *Mississippi State University,* **Tonya Stone** - *Mississippi State University,* **Nathaniel Morgan** - *Los Alamos National Laboratory,* **Robert Robey** - *Los Alamos National Laboratory,* **Yucheng Liu** - *South Dakota State University,* **Lei Chen** - *University of Michigan-Dearborn*

Elasto-Plasticity, Damage and Multiphysics Effects on the Behavior of Adhesive Step Lap Joints

Technical Paper Publication: IDETC2022-90996

John Michopoulos - *U.S. Naval Research Laboratory,* **Nicoleta Apetre** - *U.S. Naval Research Laboratory* **Athanasios Iliopoulos** - *U.S. Naval Research Laboratory,* **John Steuben** - *U.S. Naval Research Laboratory*

Controlling Microwave Energy Deposition Using Active Plasma Elements for Material Processing Applications

Technical Paper Publication: IDETC2022-91096

Benjamin Graber - *U.S. Naval Research Laboratory,* **Athanasios Iliopoulos** - *U.S. Naval Research Laboratory,* **John Michopoulos** - *U.S. Naval Research Laboratory,* **John Steuben** - *U.S. Naval Research Laboratory,* **Nicole Apetre** - *U.S. Naval Research Laboratory,* **George Petrov** - *U.S. Naval Research Laboratory,* **Luke Johnson** - *U.S. Naval Research Laboratory (former employee),* **Richard Fischer** - *U.S. Naval Research Laboratory,* **Edward Gorzkowski** - *U.S. Naval Research Laboratory,* **Eric Patterson** - *U.S. Naval Research Laboratory*

CIE-24-01 - AMS-CAPPD-SEIKEM: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN DESIGN AND MANUFACTURING

8:00AM–9:00AM **MIDWAY SUITES 11**

Chair: **Douglas Van Bossuyt** - *Naval Postgraduate School*
Chair: **Omey Manyar** - *University of Southern California*

Reinforcement Learning As an Alternative for Parameter Prediction In Design for Sheet Bulk Metal Forming

Technical Paper Publication: IDETC2022-89073

Fabian Dworschak - *Friedrich-Alexander-Universität Erlangen-Nürnberg,* **Christopher Sauer** - *Friedrich-Alexander-Universität Erlangen-Nürnberg,* **Benjamin Schleich** - *Friedrich-Alexander-Universität Erlangen-Nürnberg,* **Sandro Wartzack** - *Friedrich-Alexander-Universität Erlangen-Nürnberg*

Manufacturing Process Classification Based on Distance Rotationally Invariant Convolutions

Technical Paper Publication: IDETC2022-89307

Zhichao Wang - *Georgia Institute of Technology,* **David Rosen** - *Georgia Institute of Technology*

Synthetic Image Assisted Deep Learning Framework for Detecting Defects During Composite Sheet Layup

Technical Paper Publication: IDETC2022-90084

Omey Manyar - *University of Southern California,* **Junyan Cheng** - *University of Southern California,* **Reuben Levine** - *University of Southern California,* **Vihan Krishnan** - *University of Southern California,* **Jernej Barbic** - *University of Southern California,* **Satyandra Gupta** - *University of Southern California*

Multi-Mission Engineering With Zero Trust: A Modeling Methodology and Application to Contested Offshore Wind Farms

Technical Paper Publication: IDETC2022-90067

Douglas L. Van Bossuyt - *Naval Postgraduate School,* **Britta Hale** - *Naval Postgraduate School,* **Ryan Arlitt** - *Technical University of Denmark,* **Nikolaos Papakonstantinou** - *VTT Technical Research Centre of Finland*

VIB-13-01: PASSIVE AND ACTIVE CONTROL OF VIBRATION, SHOCK, AND NOISE

9:10AM–10:30AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Kai Zhou** - *Michigan Technological University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*

On the Effect of Nonlinear Energy Sink Damping in Seismic Vibration Attenuation

Technical Paper Publication: IDETC2022-89205

Eliot Motato - *University of Indianapolis,* **Fabio Guerrero** - *Universidad del Valle*

Multi-Input Shaping for a Multi-Mode Vibratory Structure Using Deadbeat Control Theory

Technical Paper Publication: IDETC2022-89788

Alok Sinha - *Pennsylvania State University*

Parametric Analysis of Negative Capacitance Circuit for Enhanced Vibration Suppression Through Piezoelectric Shunt

Technical Paper Publication: IDETC2022-90616

Ting Wang - *University of Connecticut,* **Jiong Tang** - *University of Connecticut*

Memetic Optimizer for Structural Damage Identification Using Electromechanical Admittance

Technical Paper Publication: IDETC2022-91039

Yang Zhang - *University of Connecticut,* **Kai Zhou** - *Michigan Technological University,* **Jiong Tang** - *University of Connecticut*

MNS-01-01: DYNAMICS OF MEMS/NEMS 1ST SESSION

9:10AM–10:30AM **MIDWAY SUITES 1**

Chair: **Hanna Cho** - *The Ohio State University*
Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*

Numerical Investigation of Soft-Pad Self-Molding Stamping of Bistable Circular Micro Shells

Technical Presentation: IDETC2022-97855

Mark M. Kantor - *Ariel University,* **Asaf Asher** - *Tel Aviv University,* **Rivka Gilat** - *Ariel University,* **Slava Krylov** - *Tel Aviv University*

Hysteresis Suppression in Coupled Resonators Under Simultaneous Primary and Superharmonic Excitations

Technical Paper Publication: IDETC2022-90565

Ming Lyu - *Dalian University of Technology,* **Jian Zhao** - *Dalian University of Technology,* **Najib Kacem** - *University of Bourgogne Franche-Comté, FEMTO-ST Institute,* **Jiahao Song** - *Dalian University of Technology,* **Rongjian Sun** - *Dalian University of Technology,* **Pengbo Liu** - *Dalian University of Technology*

Experimental Analysis of Flexural-Torsional Forced Vibrations of a Piezoelectric Double-Cantilever

Technical Paper Publication: IDETC2022-89969

Anahita Zargarani - *The University of Alabama,* **John O'Donnell** - *The University of Alabama,* **Nima Mahmoodi** - *The University of Alabama*

Bistability Condition for Electrostatically Actuated Initially Curved Micro-Beams in the Presence of Curved Electrodes

Technical Paper Publication: IDETC2022-89669

Lior Medina - *Tel-Aviv University*

DEC-01-01-IMPLEMENTATION AND ASSESSMENT

9:10AM–10:30AM **MIDWAY SUITES 2**

Chair: **Elizabeth Starkey** - *The Pennsylvania State University*

Can We Get an Intervention, Please? The Utility of Teaming Interventions on Engineering Design Student Psychological Safety

Technical Paper Publication: IDETC2022-90009

Samantha Scarpinella - *The Pennsylvania State University,* **Courtney Cole** - *The Pennsylvania State University,* **Sarah Ritter** - *The Pennsylvania State University,* **Susan Mohammad** - *The Pennsylvania State University,* **Kathryn Jablokow** - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University*

Let's Role Play! The Impact of Video Frequency and Role Playing on the Utility of a Psychological Safety Team Intervention

Technical Paper Publication: IDETC2022-90848

Ava Drum - *The Pennsylvania State University,* **Courtney Cole** - *The Pennsylvania State University,* **Sarah Ritter** - *The Pennsylvania State University,* **Susan Mohammed** - *The Pennsylvania State University,* **Kathryn Jablokow** - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University*

Evaluating the Effect of Project Frame on Communicative Patterns in Capstone Design Pitches

Technical Paper Publication: IDETC2022-91229

Samantha Link - *The Pennsylvania State University,* **Sandeep Krishnakumar** - *The Pennsylvania State University,* **Jessica Menold** - *The Pennsylvania State University*

MSNDC-01-01: COMPUTATIONAL METHODS AND SOFTWARE TOOLS IN MULTIBODY SYSTEMS AND NONLINEAR DYNAMICS

9:10AM–10:30AM **REGENCY B**

Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Francisco Gonzalez** - *University of A Coruña*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **James Chagdes** - *Miami University*
Chair: **Alexander Humer** - *Johannes Kepler University*
Chair: **Alessandro Tasora** - *University of Parma*

Real-Time Simulation of Ground Vehicles on Deformable Terrain

Technical Paper Publication: IDETC2022-89470

Radu Serban - *University of Wisconsin-Madison,* **Jay Taves** - *University of Wisconsin-Madison,* **Zhenhao Zhou** - *University of Wisconsin-Madison*

A Pnh -Adaptive Refinement Procedure for Numerical Optimal Control Problems

Technical Paper Publication: IDETC2022-89376

Lorenzo Bartali - *Università di Pisa,* **Marco Gabiccini** - *Università di Pisa,* **Massimo Guiggiani** - *Università di Pisa*

Modeling Large Deformable Terrain With Material Point Method for Off-Road Mobility Simulation

Technical Paper Publication: IDETC2022-89632

Guanchu Chen - *The University of Iowa,* **Hiroki Yamashita** - *The University of Iowa,* **Yeefeng Ruan** - *U.S. Army GVSC,* **Paramsothy Jayakumar** - *U.S. Army GVSC,* **David Gorsich** - *U.S. Army GVSC,* **Kenneth Leiter** - *U.S. Army Research Laboratory,* **Jaroslaw Knap** - *U.S. Army Research Laboratory,* **Xiaobo Yang** - *Oshkosh Corporation,* **Hiroyuki Sugiyama** - *The University of Iowa*

Dynamic Characterization of Miura-Ori Structures

Technical Paper Publication: IDETC2022-90491

Bart Boom - *University of Washington,* **Sam Suidgeest** - *Twente University,* **Ed Habtour** - *NA*

VIB-03-01: DYNAMICS & WAVES IN SOLIDS AND METAMATERIALS I

9:10AM–10:30AM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Michael Leamy** - *Georgia Institute of Technology*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Serife Tol** - *University of Michigan*
Chair: **Pai Wang** - *University of Utah*

Experimental Verification of Pulse Shaping in Elastic Metamaterials Under Impact Excitation

Technical Paper Publication: IDETC2022-89402

Greg Dorgant - *Georgia Institute of Technology,* **Michael Leamy** - *Georgia Institute of Technology,* **Washington Delima** - *Kansas City National Security Campus*

Dynamics of Interface Relocation in an Electroacoustic Su-Schrieffer-Heeger Topological Lattice

Technical Paper Publication: IDETC2022-89422

Sai Aditya Raman Kuchibhatla - *Georgia Institute of Technology.* **Michael Leamy** - *Georgia Institute of Technology*

Dispersion Morphing in Highly-Reconfigurable Rotator Lattices

Technical Paper Publication: IDETC2022-89745

Lezheng Fang - *Georgia Institute of Technology,* **Michael Leamy** - *Georgia Institute of Technology*

Topological Properties and Localized Vibration Modes in Quasiperiodic Metamaterials With Electromechanical Local Resonators

Technical Paper Publication: IDETC2022-90025

Joshua LeGrande - *Virginia Polytechnic Institute and State University,* **Mohammad Bukhari** - *Virginia Polytechnic Institute and State University,* **Oumar Barry** - *Virginia Polytechnic Institute and State University*

DTM-04-01 - INCLUSIVE DESIGN

9:10AM–10:30AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Alison Olechowski** - *University of Toronto*
Chair: **Maria Yang** - *Massachusetts Institute of Technology*

What Do We Mean When We Write About Ethics, Equity, and Justice in Engineering Design?

Technical Paper Publication: IDETC2022-87373

Madhurima Das - *Massachusetts Institute of Technology,* **Gillian Roeder** - *Massachusetts Institute of Technology,* **Anastasia Ostrowski** - *Massachusetts Institute of Technology,* **Maria Yang** - *Massachusetts Institute of Technology,* **Aditi Verma** - *University of Michigan*

Evaluating the Potential for a Novel Irrigation System Controller to Be Adopted by Medium-Scale Contract Farmers in East Africa

Technical Paper Publication: IDETC2022-88328

Georgia Van de Zande - *Massachusetts Institute of Technology,* **Carolyn Sheline** - *Massachusetts Institute of Technology,* **Amos G. Winter V** - *Massachusetts Institute of Technology*

Universal Design Analysis for Improving the Usability of Fused Filament Fabrication 3D Printers

Technical Paper Publication: IDETC2022-91011

Rebecca Grey - *Penn State Erie,* **Swapnil Sinha** - *Penn State,* **Charlotte De Vries** - *Penn State Erie*

Proposal of Defining Exploration and Exploitation in Engineering Design and Evaluating the Degree of Exploration by Natural Language Processing

Technical Paper Publication: IDETC2022-88344

Masahiro Okamoto - *The University of Tokyo,* **Tamotsu Murakami** - *The University of Tokyo*

Does Empathising With Users Contribute to Better Need Finding?

Technical Paper Publication: IDETC2022-89413

Jie Li - *Aalto University,* **Katja Hölttä-Otto** - *The University of Melbourne Parkville*

CIE-18-01 - VES: TECHNOLOGIES FOR VR, AR, AND MR

9:10AM–10:30AM **MIDWAY SUITES 9**

Chair: **Vinayak Krishnamurthy** - *Texas A&M University*
Chair: **Marco Rossoni** - *Politecnico di Milano*

A Predictive Approach to Geometry Preparation for AR/VR Applications

Technical Paper Publication: IDETC2022-88321

Maximilian Peter Dammann - *Technische Universität Dresden,* **Wolfgang Steger** - *Technische Universität Dresden,* **Kristin Paetzold** - *Technische Universität Dresden*

Topology Optimization Realization of a Spatially Parallel Compliant Mechanism With Constant Motion Transmission Characteristics

Technical Paper Publication: IDETC2022-88605

Kaixian Liang - *Guangzhou University,* **Dachang Zhu** - *Guangzhou University,* **Jie Liu** - *Guangzhou University*

Concept Maps in Augmented Reality to Improve the Learning Process and the Retrieval of Information

Technical Paper Publication: IDETC2022-89964

Marina Carulli - *Politecnico di Milano,* **Monica Bordegoni** - *Politecnico di Milano,* **Elena Spadoni** - *Politecnico di Milano,* **Marco Rossoni** - *Politecnico di Milano*

Virtual Reality for Delivering Swimming Practice Through Water-Free Immersive Training System

Technical Paper Publication: IDETC2022-90553

Shuo Li - *Shanghai JiaoTong University ,* **Hongtao Zheng** - *Shanghai JiaoTong University,* **Wenyu Yuan** - *Shanghai JiaoTong University,* **Ting Han** - *Shanghai Jiaotong Unversity*

DAC-03-01-NOVEL AI OR ML FRAMEWORKS FOR DESIGN OR SYSTEMS SCIENCE

9:10AM–10:30AM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Daniel Selva** - *Texas A&M University*
Chair: **Wei (Wayne) Chen** - *Northwestern University*

Automated and Customized Cad Drawings by Utilizing Machine Learning Algorithms: A Case Study

Technical Paper Publication: IDETC2022-88971

Javier Villena Toro - *Linköping University,* **Mehdi Tarkian** - *Linköping University*

Does Design Proficiency Matter in Engineering Design Teams? A Computational Model and Experiments

Technical Paper Publication: IDETC2022-89318

Ethan Brownell - *Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University,* **Kenneth Kotovsky** - *Carnegie Mellon University*

Hierarchical Deep Generative Models for Design Under Free-Form Geometric Uncertainty

Technical Paper Publication: IDETC2022-89707

Wei (Wayne) Chen - *Northwestern University,* **Doksoo Lee** - *Northwestern University,* **Oluwaseyi Balogun** - *Northwestern University,* **Wei Chen** - *Northwestern University*

Self Learning Design Agent (SLDA): Enabling Deep Learning and Tree Search in Complex Action Spaces

Technical Paper Publication: IDETC2022-89740

Ayush Raina - *Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University,* **Christopher Mccomb** - *Carnegie Mellon University*

DAC-04-01-DATA-DRIVEN DESIGN

9:10AM–10:30AM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Souma Chowdhury** - *University of Buffalo*
Chair: **Faez Ahmed** - *Massachusetts Institute of Technology*

t-METASET: Task-Aware Generation of Metamaterial Datasets by Diversity-Based Active Learning

Technical Paper Publication: IDETC2022-87653

Doksoo Lee - *Northwestern University,* **Yu-Chin Chan** - *Siemens Corporate Technology,* **Wei (Wayne) Chen** - *Northwestern University,* **Liwei Wang** - *Shanghai Jiao Tong University,* **Wei Chen** - *Northwestern University*

Classification-Directed Conceptual Structure Design Based on Topology Optimization, Deep Clustering, and Logistic Regression

Technical Paper Publication: IDETC2022-88548

Ryo Tsumoto - *Osaka University,* **Kikuo Fujita** - *Osaka University,* **Yutaka Nomaguchi** - *Osaka University,* **Shintaro Yamasaki** - *Osaka University,* **Kentaro Yaji** - *Osaka University*

LINKS: A Dataset of a Hundred Million Planar Linkage Mechanisms for Data-Driven Kinematic Design

Technical Paper Publication: IDETC2022-89798

Amin Heyrani Nobari - *MIT,* **Akash Srivastava** - *MIT-IBM Watson AI Lab,* **Dan Gutfreund** - *MIT-IBM Watson AI Lab,* **Faez Ahmed** - *MIT*

Data Driven Integrated Design Space Exploration Using Isom

Technical Paper Publication: IDETC2022-89895

Rashmi Rama Sushil - *Indian Institute of Technology, Madras,* **Mathew Baby** - *Florida Institute of Technology,* **Gehendra Sharma** - *Center for Advanced Vehicular Systems,* **Anand Balu Nellippallil** - *Florida Institute of Technology,* **Palaniappan Ramu** - *Indian Institute of Technology, Madras*

DAC-15-01-MULTIDISCIPLINARY DESIGN OPTIMIZATION, MULTIOBJECTIVE OPTIMIZATION, AND SENSITIVITY ANALYSIS

9:10AM–10:30AM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Zhen Hu** - *University of Michigan*

Experimental Investigation of Topology Optimized Beams With Isotropic and Anisotropic Base Material Assumptions

Technical Paper Publication: IDETC2022-89001

Hajin Kim - *Massachusetts Institute of Technology,* **Josephine Carstensen** - *Massachusetts Institute of Technology*

Optimization of Self-Heated Vacuum Membrane Distillation Using Response Surface Methodology

Technical Paper Publication: IDETC2022-89491

Shaneza Fatma Rahmadhanty - *National Taiwan University of Science and Technology,* **Subrahmanya T. M.** - *National Taiwan University of Science and Technology,* **Wei-Song Hung** - *National Taiwan University of Science and Technology,* **Po Ting Lin** - *National Taiwan University of Science and Technology*

Holistic Optimal Design of Face-Milled Hypoid Gearsets

Technical Paper Publication: IDETC2022-89598

Eugeniu Grabovic - *Università di Pisa,* **Alessio Artoni** - *University of Pisa,* **Marco Gabiccini** - *University of Pisa*

Ship Deck Object Placement Optimization Using a Many-Objective Bilevel Approach

Technical Paper Publication: IDETC2022-89797

Noah Bagazinski - *Massachusetts Institute of Technology,* **Faez Ahmed** - *Massachusetts Institute of Technology*

DFMLC-01-01-LIFE CYCLE DECISION MAKING

9:10AM–10:30AM **MIDWAY SUITES 3**

Chair: **William Bernstein** - *Air Force Research Laboratory*
Chair: **Daniel Cooper** - *University of Michigan*

A Quantitative Approach and an Open-Source Tool for Social Impacts Assessment

Technical Paper Publication: IDETC2022-89196

Justin Walters - *University of Idaho,* **Amin Mirkouei** - *University of Idaho-Idaho Falls,* **Georgios Michail Makrakis** - *University of Idaho*

Disassembly Analysis of Gas Cooktops: Towards a Definition of Eco-Design Rules for Product Repairability

Technical Paper Publication: IDETC2022-89860

Núria Boix Rodríguez - *University of Parma,* **Claudio Favi** - *University of Parma*

Exploring the Integration of DSM and LCA Tools to Improve Design for Sustainability

Technical Paper Publication: IDETC2022-90492

Michael Carter - *Stevens Institute of Technology,* **Hossein Basereh Taramsari** - *Stevens Institute of Technology,* **Steven Hoffenson** - *Stevens Institute of Technology*

Reducing Greenhouse Gas Emissions From u.s. Light-Duty Transport in Line With the 2 Degrees Celsius Target

Technical Presentation: IDETC2022-97879

Yongxian Zhu - *University of Michigan Ann Arbor,* **Steven Skerlos** - *University of Michigan,* **Ming Xu** - *University of Michigan,* **Daniel Cooper** - *University of Michigan*

CIE-01-01 - AMS: ADVANCED MODELING AND SIMULATION

9:10AM–10:30AM **MIDWAY SUITES 10**

Chair: **Seung-Kyum Choi** - *Georgia Institute of Technology*
Chair: **Andrew Gillman** - *Air Force Research Laboratory*

A Focused Regions Identification Method for Nonlinear Least Squares Curve Fitting Problems

Technical Paper Publication: IDETC2022-88146

Guanglu Zhang - *Carnegie Mellon University,* **Douglas Allaire** - *Texas A&M University,* **Jonathan Cagan** - *Carnegie Mellon University*

Comparative Study of First-Order Moving Asymptotes Optimizers for the Moving Morphable Components Topology Optimization Framework

Technical Paper Publication: IDETC2022-88722

Thomas Rochefort-Beaudoin - *Polytechnique Montréal,* **Aurelian Vadean** - *Polytechnique Montréal,* **Jean-François Gamache** - *Kinova Robotics,* **Sofiane Achiche** - *Polytechnique Montréal*

Swage: A 3d Arbitrary-Order Element Mesh Library to Support Diverse Numerical Methods

Technical Paper Publication: IDETC2022-89562

Nathaniel R. Morgan - *Los Alamos National Laboratory,* **Jacob Moore** - *Los Alamos National Laboratory,* **Jan Kiviaho** - *Los Alamos National Laboratory,* **Adrian Diaz** - *Los Alamos National Laboratory*

Digital Twin Modeling Method for Container Terminal in Port

Technical Paper Publication: IDETC2022-89833

Yan Wang - *School of mechanical engineering, Shanghai Jiao Tong University,* **Wenqiang Yang** - *School of mechanical engineering, Shanghai Jiao Tong University,* **Yu Zheng** - *School of mechanical engineering, Shanghai Jiao Tong University,* **Lei Zhang** - *Qingdao Port International Co., Ltd.,* **Ziqing Zhang** - *Shandong Port Technology Group Qingdao Co., Ltd.*

Localized Dielectric Sintering With Magnetron for Microwave Material Processing

Technical Paper Publication: IDETC2022-91132

Benjamin Graber - *US. Naval Research Laboratory,* **Athanasios Iliopoulos** - *US. Naval Research Laboratory,* **John Michopoulos** - *US. Naval Research Laboratory,* **John Steuben** - *US. Naval Research Laboratory,* **Andrew Birnbaum** - *US. Naval Research Laboratory,* **Edward Gorzkowski** - *US. Naval Research Laboratory,* **Eric Patterson** - *US. Naval Research Laboratory,* **Richard Fischer** - *US. Naval Research Laboratory,* **George Petrov** - *US Naval Research Laboratory,* **Luke Johnson** - *US. Naval Research Laboratory (former employee)*

CIE-07-01 - CAPPD: COMPUTER-AIDED PRODUCT AND PROCESS DEVELOPMENT

9:10AM–10:30AM **MIDWAY SUITES 11**

Chair: **Gaurav Ameta** - *Siemens*
Chair: **Chiradeep Sen** - *Florida Institute of Technology*

A System Approach to Contact Fatigue Life Estimation of Right-Angled Geared System

Technical Paper Publication: IDETC2022-87433

Srikumar C Gopalakrishnan - *American Axle Manufacturing,* **Abhijit Nilangekar** - *American Axle Manufacturing,* **Jerry Chung** - *American Axle Manufacturing,* **Yogesh Mehta** - *American Axle Manufacturing,* **Bhushan Kanade** - *American Axle Manufacturing*

Optimal Position of Cameras Design in a 4D Foot Scanner

Technical Paper Publication: IDETC2022-89145

Farzam Tajdari - *Delft University of Technology,* **Christiaan Eijck** - *Delft University of Technology,* **Felix Kwa** - *Delft University of Technology,* **Christiaan Versteegh** - *BATA Industrials,* **Toon Huysmans** - *Delft University of Technology,* **Yu Song** - *Delft University of Technology*

On the Influence of Mean Value on Random Fatigue Damage Computation

Technical Paper Publication: IDETC2022-89868

Michele Sgamma - *Università di Pisa,* **Francesco Bucchi** - *Università di Pisa,* **Francesco Frendo** - *Università di Pisa*

Toward Formal Qualitative Reasoning to Support Functional Decomposition

Technical Paper Publication: IDETC2022-89940

Xiaoyang Mao - *Nanjing University of Science & Technology,* **Chiradeep Sen** - *Florida Institute of Technology*

Automated CAD Modelling of Cam Profiles and FEA Fatigue Analysis of Cam-Follower Mechanisms

Technical Paper Publication: IDETC2022-90235

Krishnajith Theril - *Purdue University Northwest,* **Shengyong Zhang** - *Purdue University Northwest*

AVT-05-01 ADVANCES IN VEHICLE ELECTRIFICATION AND POWERTRAIN DESIGN

9:10AM–10:30AM **REGENCY A**

Chair: **Ole Balling** - *Aarhus University*
Chair: **Venkat Ramakrishnan** - *FCA Group*
Chair: **Angelo Bonfitto** - *Politecnico di Torino*
Chair: **Joel Anstrom** - *Penn State University*

Assessment of State of Charge Estimation Methods Based on Neural Networks and Support Vector Machine for Lithium-Ion Batteries Used in Vehicular Applications

Technical Paper Publication: IDETC2022-89454

Sara Luciani - *Politecnico di Torino,* **Stefano Feraco** - *Politecnico di Torino,* **Mario Silvagni** - *Politecnico di Torino,* **Angelo Bonfitto** - *Politecnico di Torino,* **Nicola Amati** - *Politecnico di Torino,* **Andrea Tonoli** - *Politecnico di Torino*

Artificial Intelligence Based State of Health Estimation With Short-Term Current Profile in Lead-Acid Batteries for Heavy-Duty Vehicles

Technical Paper Publication: IDETC2022-89512

Sara Luciani - *Politecnico di Torino,* **Stefano Feraco** - *Politecnico di Torino,* **Angelo Bonfitto** - *Politecnico di Torino,* **Nicola Amati** - *Politecnico di Torino,* **Andrea Tonoli** - *Politecnico di Torino,* **Maurizio Quaggiotto** - *IVECO Group*

Compact Time Domain Nmr Design for the Determination of Hydrogen Content in Gas Turbine Fuels

Technical Paper Publication: IDETC2022-90023

Jacob Martin - *University of South Carolina - Columbia,* **Austin Downey** - *University of South Carolina - Columbia,* **Sang Hee Won** - *University of South Carolina - Columbia*

MNS-02-01: MICRO/NANO BIOENGINEERING

10:50AM–12:10PM **MIDWAY SUITES 1**

Chair: **Brian Jensen** - *Brigham Young University*
Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*
Chair: **Chu-Yu Huang** - *National Chung Hsing University*
Chair: **Dumitru Caruntu** - *The University of Texas Rio Grande Valley*

Development of a Novel Three-Dimensional Parallel-Plate Biochemical Sensor for Electrochemical Impedance Spectroscopy (EIS)

Technical Paper Publication: IDETC2022-90378

Negar Rafiee - *Southern Illinois University, Edwardsville,* **Brian Huffman** - *Southern Illinois University, Edwadrdsville,* **Mohammad Shavezipur** - *Southern Illinois University, Edwardsville*

Relationships Among Band Tension, Sensor Pressure, Patient Comfort, and Puslatile Signal Quality for Wrist Worn Health Monitoring Devices

Technical Paper Publication: IDETC2022-90637

Thomas Naylor - *Brigham Young University,* **Roger Black** - *Brigham Young University,* **Cameron Hernandez** - *Brigham Young University,* **Brian Jensen** - *Brigham Young University*

Frequency Response of Parametric Resonance of Electrostatically Actuated Bio-Mems Circular Membranes

Technical Paper Publication: IDETC2022-91044

Marcos Alipi - *University of Texas Rio Grande Valley,* **Dumitru Caruntu** - *University of Texas Rio Grande Valley*

MSNDC-02-01: FLEXIBLE MULTIBODY DYNAMICS
10:50AM–12:10PM **REGENCY C**

Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **James Chagdes** - *Miami University*
Chair: **Johannes Gerstmayr** - *University of Innsbruck*
Chair: **Andreas Zwölfer** - *Technical University of Munich*

Modeling of the Weave and Wobble Eigenmodes of Motorcycles Using Flexible Multibody Simulation

Technical Paper Publication: IDETC2022-89945

Francesco Passigato - *Technical University of Munich,* **Achim Gordner** - *BMW Group,* **Frank Diermeyer** - *Technical University of Munich*

On the Combination of Geometrically Nonlinear Models and Substructuring for Multibody Simulation of Wind Turbine Blades

Technical Paper Publication: IDETC2022-90948

Christian Sigurd L. Jensen - *Aarhus University,* **Rasmus B.E. Pedersen** - *Aarhus university,* **Blas Blanco** - *Aarhus University,* **José L. Escalona** - *Aarhus university,* **Ole Balling** - *Aarhus University*

Adjoint Method for Time-Optimal Control of Flexible Multibody Systems Using the Absolute Nodal Coordinate Formulation

Technical Presentation: IDETC2022-97837

Daniel Lichtenecker - *Technical University of Munich,* **Philipp Eichmeir** - *University of Applied Sciences Upper Austria,* **Karin Nachbagauer** - *University of Applied Sciences Upper Austria*

MR-01-01 - MECHANISMS SYNTHESIS & ANALYSIS
10:50AM–12:10PM **GRAND A**

Chair: **Andreas Mueller** - *Johannes Kepler University Linz*
Chair: **Stephane Caro** - *LS2N, France*

On the Kinematic Analysis of an Orthogonal Bricard 6r Mechanism

Technical Paper Publication: IDETC2022-89534

Pierluigi Rea - *University of Cagliari,* **Maurizio Ruggiu** - *University of Cagliari,* **Andreas Muller** - *Johannes Kepler University, Institute of Robotics*

Design and Kinetostatic Modeling of a Cable-Driven Schönflies-Motion Generator

Technical Paper Publication: IDETC2022-89384

Giuseppe Sciarra - *Nantes Université, Centrale Nantes,* **Tahir Rasheed** - *CNRS - LS2N,* **Valentina Mattioni** - *University of Bologna,* **Philippe Cardou** - *Université Laval,* **Stephane Caro** - *CNRS - LS2N*

MR-03-01 - COMPLIANT MECHANISMS (A. MIDHA SYMPOSIUM)
10:50AM–12:10PM **GRAND C**

Chair: **Larry L. Howell** - *Brigham Young University*
Chair: **Giovanni Berselli** - *University of Genova*
Chair: **Dongming Gan** - *Purdue University*

A Novel Variable Stiffness Compliant Robotic Link Based on Discrete Variable Stiffness Units for Safe Human-Robot Interaction

Technical Paper Publication: IDETC2022-89825

Jiaming Fu - *Purdue University,* **Han Lin** - *Purdue University,* **Wei Xu** - *Purdue University,* **Dongming Gan** - *Purdue University*

Design and Modeling of a New Variable Stiffness Robotic Finger Based on Reconfigurable Beam Property Change for Flexible Grasping

Technical Paper Publication: IDETC2022-89856

Wei Xu - *Purdue University,* **Jiaming Fu** - *Purdue University,* **Dongming Gan** - *Purdue University*

Design of a Single-Input Morphing Compliant Mechanism With Separate Gripping and Retraction Modes

Technical Paper Publication: IDETC2022-90939

Patrick Mcgowan - *University College Cork,* **Guangbo Hao** - *University College Cork*

A Variable Stiffness End-of-Arm Mechanism for Safe Operation in Industrial Environments

Technical Paper Publication: IDETC2022-91310

Sri Sadhan Jujjavarapu - *University at Buffalo,* **Ehsan Tarkesh Esfahani** - *University at Buffalo*

MSNDC-05-01 MOTION PLANNING, DYNAMICS, AND CONTROL OF ROBOTS

10:50AM–12:10PM **REGENCY B**

Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Andreas Muller** - *Johannes Kepler University*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Damien Chablat** - *CNRS Nantes*
Chair: **Joo H. Kim** - *New York University*
Chair: **James Chagdes** - *Miami University*
Chair: **Jeffrey Herrmann** - *University of Maryland*
Chair: **Ashu Sharma** - *Auburn University*

Evaluation and Modification of Kinetic Gas Collision Theory as Applied to Encounter Rate Dynamics for Multi-Robot Groups and Robot Swarms

Technical Paper Publication: IDETC2022-88465

Adam Schroeder - *University of Toledo,* **Mark Rooney** - *University of Toledo,* **Glenn Lipscomb** - *University of Toledo*

Nonlinear Oscillations in Delayed Collocated Control of Pendulum on Trolley

Technical Paper Publication: IDETC2022-89838

Bence Mate Szaksz - *Budapest University of Technology and Economics,* **Gabor Stepan** - *Budapest University of Technology and Economics*

Stability Analysis of a One Degree-of-Freedom Robot Model With Sampled Digital Acceleration Feedback Controller in Turning

Technical Paper Publication: IDETC2022-90937

Andras Bartfai - *Budapest University of Technology and Economics,* **Asier Barrios** - *IDEKO,* **Zoltan Dombovari** - *Budapest University of Technology and Economics*

A Local Constraint Resolution Approach for Dynamics Modeling of Parallel Kinematic Manipulators With Single-Loop Complex Limbs

Technical Paper Publication: IDETC2022-90877

Andreas Muller - *Johannes Kepler University, Institute For Robotics*

MR-02-01 - THEORETICAL & COMPUTATIONAL KINEMATICS (A.T. YANG SYMPOSIUM)

10:50AM–12:10PM **GRAND B**

Chair: **Pierre Larochelle** - *South Dakota School of Mines & Technology*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Daniel Condurache** - *Technical University of Iasi*

Higher-Order Kinematics of Lower-Pair Chains With Hyper-Multidual Algebra

Technical Paper Publication: IDETC2022-88781

Daniel Condurache - *Technical University of Iasi*

Numerical Identification of Freedom Spaces Using the Canonical Basis

Technical Paper Publication: IDETC2022-89822

Nigel Archer - *University of California, Los Angeles,* **Jonathan Hopkins** - *University of California, Los Angeles*

Interactive Visualization of Spatial Triangles

Technical Paper Publication: IDETC2022-90056

Pierre Larochelle - *South Dakota School of Mines & Technology*

A Unified Approach for the Determination of Instantaneous Screw Axes for Linkages Associated With the Euclidean Group and Its Subgroups

Technical Paper Publication: IDETC2022-90782

Jose Rico - *Universidad de Guanajuato,* **Juan Ignacio Valderrama-Rodríguez** - *Independent researcher,* **J. Jesús Cervantes-Sanchez** - *Universidad de Guanajuato,* **Fernando Tomás Pérex-Zamudio** - *Universidad de Guanajuato*

DTM-01-02 - SPECIAL SESSION: DISCUSSIONS ON THE FUTURE DIRECTIONS OF DTM

10:50AM–12:10PM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Christine Toh** - *University of Nebraska at Omaha*

Dtm Past, Present, and Future: Reflections on and by the Design Theory and Methodology Research Community

Technical Paper Publication: IDETC2022-90003

Christine Toh - *University of Nebraska at Omaha,* **Jonathan Cagan** - *Carnegie Mellon University,* **Kate Fu** - *University of Wisconsin-Madison,* **Dan Mcadams** - *Texas A&M University,* **Christopher Mccomb** - *Carnegie Mellon University,* **Warren Seering** - *Massachusetts Institute of Technology,* **Deborah Thurston** - *University of Illinois at Urbana-Champaign,* **Kristin Wood** - *University of Colorado Denver*

DEC-01-02-IMPLEMENTATION AND ASSESSMENT BEST PAPER

10:50AM–12:10PM **MIDWAY SUITES 2**

Chair: **Elizabeth Starkey** - *Pennsylvania State University*

Examining a Trajectory of Complex System Design Processes: Airport Eco-System Case Studies by Novice Student Teams

Technical Paper Publication: IDETC2022-89901

Euiyoung Kim - *Technical University of Delft,* **Vivek Rao** - *University of California, Berkeley,* **Bart Bluemink** - *Technical University of Delft,* **Barend Klitsie** - *PA Consulting,* **Sicco Santema** - *Technical University of Delft*

Influences of Engineering Student Backgrounds and Experiences on Conceptions of Product Design

Technical Paper Publication: IDETC2022-89412

Adam Corby - *Stevens Institute of Technology,* **Steven Hoffenson** - *Stevens Institute of Technology,* **Nicole Pitterson** - *Virginia Tech*

Evaluation of Students' Learning Through Reflection on Doing Based on Sentiment Analysis

Technical Paper Publication: IDETC2022-88161

Yupeng Wu - *Beijing Institute of Technology,* **Zhenjun Ming** - *Beijing Institute of Technology,* **Janet K. Allen** - *University of Oklahoma,* **Farrokh Mistree** - *University of Oklahoma*

DAC-03-02-NOVEL AI OR ML FRAMEWORKS FOR DESIGN OR SYSTEMS SCIENCE

10:50AM–12:10PM **MIDWAY SUITES 7**

Chair: **Christopher McComb -** *Carnegie Mellon University*
Chair: **Souma Chowdhury** - *University of Buffalo*
Chair: **Daniel Selva** - *Texas A&M University*

Generative Adversarial Design Analysis of Non-Convexity in Topology Optimization

Technical Paper Publication: IDETC2022-89997

Nathan Hertlein - *Air Force Research Laboratory,* **Andrew Gillman** - *Air Force Research Laboratory,* **Philip Buskohl** - *Air Force Research Laboratory*

A Scalable Graph Learning Approach to Capacitated Vehicle Routing Problem Using Capsule Networks and Attention Mechanism

Technical Paper Publication: IDETC2022-90123

Steve Paul - *University at Buffalo,* **Souma Chowdhury** - *University at Buffalo*

Design Target Achievement Index: A Differentiable Metric to Enhance Deep Generative Models in Multi-Objective Inverse Design

Technical Paper Publication: IDETC2022-91344

Lyle Regenwetter - *Massachusetts Institute of Technology,* **Faez Ahmed** - *Massachusetts Institute of Technology*

DAC-09-01-DESIGN FOR RESILIENCE AND FAILURE RECOVERY

10:50AM–12:10PM **MIDWAY SUITES 6**

Chair: **Christopher McComb -** *Carnegie Mellon University*
Chair: **Zequn Wang** - *Michigan Technological University*
Chair: **Zhimin Xi** - *Rutgers University*

A Computational Framework for the Evaluation of Resilience in Deep Space Habitat Systems

Technical Paper Publication: IDETC2022-89132

Amir Behjat - *Purdue University,* **Roman Ibrahimov** - *Purdue University,* **Ali Lenjani** - *Purdue University,* **Aaron Behrkat** - *Purdue University,* **Kathleen Martinus** - *Purdue University,* **Amin** Maghareh - *Purdue University,* **Dawn** Whitaker - *Purdue University* ,**Illias Bilionis** - *Purdue University,* **Shirley Dyke** - *Purdue University*

Analytic Velocity Obstacle for Efficient Collision Avoidance

Technical Paper Publication: IDETC2022-89615

Zhimin Xi - *Rutgers University,* **Elnaz Asghari Torkamani** - *Rutgers University*

Collision-Free Dynamic Window Approach for Moving Obstacles

Technical Paper Publication: IDETC2022-89613

Zhimin Xi - *Rutgers University*

Generative Design for Resilience of Interdependent Network Systems

Technical Paper Publication: IDETC2022-89622

Jiaxin Wu - *University of Illinois at Urbana-Champaign,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign*

DAC-14-01-METAMODEL-BASED DESIGN OPTIMIZATION

10:50AM–12:10PM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Payam Ghassemi** - *University of Buffalo*
Chair: **Yuanzhi Liu** - *University of Texas at Dallas*

Surrogate Models and Time Series for Flow Prediction on the Red River Dam Network

Technical Paper Publication: IDETC2022-88163

Reza Alizadeh - *University of Oklahoma,* **Janet K. Allen** - *Univ of Oklahoma,* **Farrokh Mistree** - *University of Oklahoma*

Hierarchical Surrogate Modeling With Multiple Order Partially Observed Information

Technical Paper Publication: IDETC2022-89655

Yanwen Xu - *University of Illinois at Urbana-Champaign,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign*

An Algorithm for Multi-Objective Efficient Parametric Optimization

Technical Paper Publication: IDETC2022-88567

Jonathan Weaver-Rosen - *Texas A&M University,* **Richard Malak** - *Texas A&M University*

DFMLC-02-01-MODELING AND OPTIMIZATION FOR SUSTAINABLE DESIGN AND MANUFACTURING

10:50AM–12:10PM **MIDWAY SUITES 3**

Chair: **Bryony L DuPont** - *Oregon State University*
Chair: **Daniel Cooper** - *University of Michigan*
Chair: **Albert Patterson** - *Texas A&M Engineering*

Trade-Off Characterization Between Social and Environmental Impacts Using Agent-Based Models and Life-Cycle Assessment

Technical Paper Publication: IDETC2022-89975

Joseph Liechty - *Brigham Young University,* **Christopher Mabey** - *Brigham Young University,* **Christopher Mattson** - *Brigham Young University,* **John Salmon** - *Brigham Young University,* **Jason Weaver** - *Brigham Young University*

Thermal Modeling of Novel Firefighting Gloves With Phase Change Material

Student Poster Presentation: IDETC2022-95105

Susan Xu - *NIOSH,* **Jonisha Pollard** - *NIOSH,* **Weihuan Zhao** - *University of North Texas*

Adapting Modern Product Design to the Circular Economy

Technical Paper Publication: IDETC2022-89542

Vincenzo Ferrero - *NIST,* **K.C. Morris** - *NIST,* **Buddhika Hapuwatte** - *NIST*

AVT-06/02-01 ADVANCES IN LIGHT VEHICLES DESIGN + MODELING AND TEST OF TIRES

10:50AM–12:10PM **REGENCY A**

Chair: **Alberto Doria** - *University of Padova*
Chair: **Luis Munoz** - *Universidad de los Andes*
Chair: **Ole Balling** - *Aarhus University*
Chair: **Huda Mousavi** - *Virginia Tech*

Vibration Energy Harvesting in Light Vehicles: Road Tests and Interpretative Models

Technical Paper Publication: IDETC2022-89093

Domenico Tommasino - *University of Padova, DII,* **Alberto Doria** - *University of Padova, DII,* **Federico Moro** - *University of Padova, DII*

Design of Customized Noncircular Chainrings for Cycling

Technical Paper Publication: IDETC2022-89204

Alejandra Polanco - *Pontificia Universidad Javeriana,* **Jose Duran** - *Universidad de los Andes,* **Luis Munoz** - *Universidad de los Andes,* **Santiago Sabogal** - *Universidad de los Andes*

Development of an Instrumented Rear Suspension to Measure the Tire Forces of a Race Car During Track Driving

Technical Presentation: IDETC2022-96785

Davide Cortivo - *Università degli Studi di Padova,* **Giovanni Meneghetti** - *Università degli Studi di Padova,* **Luigi Dindo** - *Michelotto Engineering S.p.A.,* **Mattia Vendramin** - *Michelotto Engineering S.p.A.*

MNS-01-02: DYNAMICS OF MEMS/NEMS 2ND SESSION

2:10PM–3:50PM **MIDWAY SUITES 1**

Chair: **Jian Zhao** - *Dalian*
Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*
Chair: **Najib Kacem** - *Femto*

Anisotropic Approach to Control Viscous Fingering Pattern Generated in Lifting Plate Hele-Shaw Cell

Technical Paper Publication: IDETC2022-89600

Kiran Bhole- *Sardar Patel College of Engineering, Mumbai,* **Bharatbhushan Kale** - *Datta Meghe College of Engineering,* **Sachin Mastud** - *Veermata Jijabai Technological Institute Mumbai,* **Nilesh Raykar** - *Sardar Patel College of Engineering Mumbai,* **Chetna Sharma** - *Sardar Patel College of Engineering Mumbai,* **Prashant Deshmukh** - *New Horizon Institute of Technology and Management*

A Novel Mass Sensor Based on Parametrically Excited Mode-Localized Resonators

Technical Paper Publication: IDETC2022-90568

Jiahao Song - *Dalian University of Technology,* **Jian Zhao** - *Dalian University of Technology,* **Najib Kacem** - *University of Bourgogne Franche-Comté, FEMTO-ST Institute,* **Ming Lyu** - *Dalian University of Technology,* **Rongjian Sun** - *Dalian University of Technology,* **Pengbo Liu** - *Dalian University of Technology*

Frequency-Dependent Photothermal Forcing of AFM Microcantilevers

Technical Presentation: IDETC2022-95319

Akshay Deolia - *Purdue University,* **Ryan Wagner** - *Purdue University,* **Arvind Raman** - *Purdue University*

Necessary and Sufficient Criteria for Bistability in Electrostatically Actuated Initially Curved Pre-Stressed Micro-Plates

Technical Presentation: IDETC2022-97497

Lior Medina - *Tel-Aviv University,* **Rivka Gilat** - *Ariel University,* **Slava Krylov** - *Tel-Aviv University*

Mode Coupling and Operating Regimes in Bimodal Atomic Force Microscopy

Technical Presentation: IDETC2022-97842

Ryan Wagner - *Purdue University,* **Uidam Jung** - *Purdue University,* **Anil Bajaj** - *Purdue University,* **Arvind Raman** - *Purdue University*

MR-03-02 - COMPLIANT MECHANISMS (A. MIDHA SYMPOSIUM)

2:10PM–3:50PM **GRAND B**

Chair: **Brian Jensen** - *Brigham Young University*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Long Wang** - *Stevens Institute of Technology*

A Neutrally Stable Quasi-Compliant Spherical Joint With a Remote Center of Rotation

Technical Paper Publication: IDETC2022-89903

Dion Hogervorst - *TU Delft,* **Giuseppe Radaelli** - *TU Delft,* **Just Herder** - *TU Delft*

Design and Analysis of a Piezo-Driven Precision Positioning Stage Suitable for Xbpm

Technical Paper Publication: IDETC2022-88448

Xuefeng Yang - *China University of Mining and Technology,* **Xu Cui** - *China University of Mining and Technology,* **Mengchen Zhang** - *China University of Mining and Technology,* **Jian Zhuang** - *Spallation Neutron Source Science Center (SNSSC)*

Using Compliant Implants to Reduce Post-Operative Pain in Pectus Excavatum Correction

Technical Paper Publication: IDETC2022-89965

Clark Roubicek - Brigham Young University, **Brandon Sargent** - *Brigham Young University,* **Victor Garcia** - *Cincinnati Children's Hospital Medical Center,* **Larry Howell** - *Brigham Young University*

Design of Constant-Force Wristbands for a Wearable Health Device

Technical Paper Publication: IDETC2022-90632

Thomas Naylor - *Brigham Young University,* **Roger Black** - *Brigham Young University,* **Cameron Hernandez** - *Brigham Young University,* **Paul Mcmullin** - *Brigham Young University,* **Brian Jensen** - *Brigham Young University*

A Modular Continuum Manipulator for Aerial Manipulation and Perching

Technical Paper Publication: IDETC2022-90595

Qianwen Zhao - *Stevens Institute of Technology,* **Guoqing Zhang** - *Stevens Institute of Technology,* **Hamidreza Jafarnejadsani** - *Stevens Institute of Technology,* **Long Wang** - *Stevens Institute of Technology*

MR-04-01 - ORIGAMI-BASED ENGINEERING DESIGN

2:10PM–3:50PM **GRAND C**

Chair: **Suyi Li** - *Clemson University*
Chair: **Zhong You** - *Oxford University*

Designing Multistable Mechanisms Using Quadrilateral Boundary Rigid Origami

Technical Paper Publication: IDETC2022-89035

Yuki Miyajima - *The University of Tokyo,* **Munkyun Lee** - *The University of Tokyo,* **Tomohiro Tachi** - *The University of Tokyo*

Applications of Origami Principles in Deployable Childcare Furniture

Technical Paper Publication: IDETC2022-89996

Daniel Ames - *Brigham Young University,* **Aliya Mittelman** - *Brigham Young University,* **Jaxon Jones** - *Brigham Young University,* **Denise** Halverson - *Brigham Young University,* **Terri Bateman** - *Brigham Young University,* **Spencer Magleby** - *Brigham Young University,* **Larry Howell** - *Brigham Young University*

Experimental Validation of Origami's Reservoir Computing Power and an Mechano-Intelligent Task of Payload Identification

Technical Paper Publication: IDETC2022-89501

Jun Wang - *Clemson University,* **Suyi Li** - *Clemson University*

Deployable Space-Filling Mechanisms: Asymmetric Zipper-Coupled Tubes and Smooth Sheet Attachments

Technical Paper Publication: IDETC2022-90045

Dylan C. Webb - *Brigham Young University,* **Elissa Reynolds** - *Brigham Young University,* **Denise Halverson** - *Brigham Young University,* **Larry Howell** - *Brigham Young University*

Multi-Mode Deformation of Origami Spring: Theoretical Modeling and Experimental Verification

Technical Paper Publication: IDETC2022-90408

Zian Zhang - *Fudan University,* **Zuolin Liu** - *Fudan University,* **Suyi** Li - *Clemson University,* **Hongbin Fang** - *Fudan University*

MR-02-02 - THEORETICAL & COMPUTATIONAL KINEMATICS (A.T. YANG SYMPOSIUM)

2:10PM–3:50PM **GRAND A**

Chair: **Qiaode Jeffrey Ge** - *Stony Brook University*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Mark Plecnik** - *University of Notre Dame*

Explore the Beauty of Cam Geometry: The Necessary and Sufficient Design Conditions for the Cam Mechanism With Flat Face Follower

Technical Paper Publication: IDETC2022-89644

Yen-Nien Chen - *National Taiwan University,* **Kuan-Lun Hsu** - *National Taiwan University*

Task Modification Scheme for a Collaborative Robot

Technical Paper Publication: IDETC2022-89720

Hardeep Singh - *Addverb Technologies,* **Rajesh Kumar** - *Addverb Technologies,* **Subir Kumar Saha** - *Indian Institute of Technology, Delhi*

On the Computation of the Average of Spatial Displacements

Technical Paper Publication: IDETC2022-90156

Qiaode Jeffrey Ge - *Stony Brook University,* **Zihan Yu** - *Stony Brook University,* **Mona Arbab** - *Indiana University,* **Mark Langer** - *Indiana University*

Transforming Hand-Drawn Sketches of Linkage Mechanisms Into Their Digital Representation

Technical Paper Publication: IDETC2022-90495

Anurag Purwar - *Suny Stony Brook,* **Anar Nurizada** - *Stony Brook University (SUNY)*

Ellipse Synthesis of a Five-Bar Linkage,

Technical Paper Publication: IDETC2022-91341

Mark Plecnik - *University of Notre Dame*

DTM-01-01 - NEW MODELS, CONSTRUCTS, AND EXPLANATIONS IN DTM

2:10PM–3:50PM **MIDWAY SUITES 5**

Chair: **Julie Linsey** - *Georgia Institute of Technology*
Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Vivek Rao** - *University of California at Berkeley*

Investigation of Mechanical Engineering Students' Perceptions of Design Process Models

Technical Paper Publication: IDETC2022-88445

Kelley Dugan - *University of Michigan,* **Shanna R. Daly** - *University of Michigan*

Identifying Potentials of Product Personalization

Technical Paper Publication: IDETC2022-88463

Juliane Kuhl - *Hamburg University of Technology,* **Dieter Krause** - *Hamburg University of Technology*

TRIZ Mapping and Novelty Detection of Engineering Design Patents Using Machine Learning

Technical Paper Publication: IDETC2022-89746

Sawyer Hall - *Oakland University,* **Calahan Mollan** - *Oakland University,* **Vijitashwa Pandey** - *Oakland University,* **Zissimos Mourelatos** - *Oakland University*

The Cognitive Costs of Design Tasks: The Evolution of Cognitive Load in Design and Its Relationship With Design Outcomes

Technical Paper Publication: IDETC2022-89995

Nicole Calpin - *The Pennsylvania State University,* **Jessica Menold** - *The Pennsylvania State University*

The Effects of Representation Modality on Subsystem Clustering

Technical Paper Publication: IDETC2022-90104

Alexander Murphy - *The University of Texas at Dallas,* **Apurva Patel** - *The University of Texas at Dallas,* **Chiradeep Sen** - *Florida Institute of Technology,* **Joshua Summers** - *The University of Texas at Dallas*

Design-Engineers' Selection of Agency: Harm Mitigation in Ambient Intelligent Environments

Technical Paper Publication: IDETC2022-91063

Caseysimone Ballestas - *TU Delft,* **Euiyoung Kim** - *TU Delft,* **Jusuël Lanoy** - *TU Delft,* **Jules Janssens** - *TU Delft*

DAC-22-01-MULTI-FIDELITY MODELING UNDER UNCERTAINTY

2:10PM–3:50PM **MIDWAY SUITES 7**

Chair: **Ramin Bostanabad** - *University of California, Irvine*
Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Leifur Leiffson** - *Purdue University*

Iterative Uncertainty Calibration for Modeling Metal Additive Manufacturing Processes Using Statistical Moment-Based Metric

Technical Paper Publication: IDETC2022-89511

Mostafa Rahmani Dehaghani - *Simon Fraser University,* **Yifan Tang** - *Simon Fraser University,* **Gary Wang** - *Simon Fraser University*

A Multi-Fidelity Approach for Reliability Assessment Based on the Probability of Model Inconsistency

Technical Paper Publication: IDETC2022-90115

Bharath Pidaparthi - *University of Arizona,* **Samy Missoum** - *University of Arizona*

Data Fusion as a Latent Space Learning Problem

Technical Paper Publication: IDETC2022-90233

Jonathan Eweis-Labolle - *University of California, Irvine,* **Nick Oune** - *University of California, Irvine,* **Ramin Bostanabad** - *University of California, Irvine*

Multi-Fidelity Reduced-Order Models for Multiscale Damage Analyses With Automatic Calibration

Technical Paper Publication: IDETC2022-90163

Shiguang Deng - *University of California, Irvine,* **Carlos Mora** - *University of California, Irvine,* **Diran Apelian** - *University of California, Irvine,* **Ramin Bostanabad** - *University of California, Irvine*

DAC-12-01-ENGINEERING FOR GLOBAL DEVELOPMENT

2:10PM–3:50PM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Christopher Mattson** - *Brigham Young University*
Chair: **Natasha Wright** - *University of Minnesota*

The Need for Desalination in Humanitarian Emergencies

Technical Paper Publication: IDETC2022-89713

Jonathan Bessette - *Massachusetts Institute of Technology,* **Amos Winter** - *Massachusetts Institute of Technology*

Exploring the Usefulness of Agent-Based Product Social Impact Modeling Through a Systematic Literature Review

Technical Paper Publication: IDETC2022-90001

Christopher Mabey - *Brigham Young University,* **Christopher Mattson** - *Brigham Young University,* **John Salmon** - *Brigham Young University*

Am I Right? Investigating the Influence of Trait Empathy and Attitudes Towards Sustainability on the Accuracy of Concept Evaluations in Sustainable Design

Technical Paper Publication: IDETC2022-90029

Mohammad Alsager Alzayed - *Kuwait University,* **Elizabeth Starkey** - *The Pennsylvania State University,* **Sarah C. Ritter** - *The Pennsylvania State University,* **Rohan Prabhu** - *Lafayette College*

Systematic Review and Classification of the Engineering for Global Development Literature Based on Design Tools and Methods for Social Impact Consideration

Technical Paper Publication: IDETC2022-90683

Andrew Armstrong - *Brigham Young University,* **Hailie Suk** - *University of Buffalo,* **Christopher Mabey** - *Brigham Young University,* **Christopher Mattson** - *Brigham Young University,* **John Hall** - *University of Buffalo,* **John Salmon** - *Brigham Young University*

DAC-11-01-DESIGN OF ENGINEERING MATERIALS AND STRUCTURES

2:10PM–3:50PM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Andres Tovar** - *Indiana University–Purdue University Indianapolis*
Chair: **Xingchen Liu** - *University of California, Berkeley*

Automated Design of Packaging Cushions for Withstanding Drop Tests

Technical Paper Publication: IDETC2022-87728

David So - *Oregon State University,* **Lisa Hildebrand** - *Oregon State University,* **Matthew Campbell** - *Oregon State University*

Periodic Composite Function-Based Designing of Microstructures With Programmable Poisson Ratio

Technical Paper Publication: IDETC2022-89374

Yilong Zhang - *Xiamen University,* **Yuxuan Du** - *Xiamen University,* **Ye Qiao** - *Xiamen University,* **Shu Wang** - *Xiamen University,* **Cunfu Wang** - *Xiamen University*

Design of Three-Dimensional Bi-Continuous Silicon Based Electrode Materials for High Energy Density Batteries

Technical Paper Publication: IDETC2022-89652

Zhuoyuan Zheng - *University of Illinois at Urbana-Champaign,* **Zheng Liu** - *University of Illinois at Urbana-Champaign,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign,* **Yumeng Li** - *University of Illinois at Urbana-Champaign*

Efficient Design of Acoustic Metamaterials With Design Domains of Variable Size Using Graph Neural Networks

Technical Paper Publication: IDETC2022-89722

Tyler Wiest - *The University of Texas at Austin,* **Carolyn Seepersad** - *The University of Texas at Austin,* **Michael Haberman** - *The University of Texas at Austin*

On Spiral Folding of Planar Membranes With Finite Thickness and Curved Creases

Technical Paper Publication: IDETC2022-90145

Victor Parque - *Waseda University,* **Tomoyuki Miyashita** - *Waseda University*

DFMLC-03-01-DESIGN FOR SUPPLY CHAIN AND END OF LIFE RECOVERY

2:10PM–3:50PM **MIDWAY SUITES 3**

Chair: **Sara Behdad** - *University of Florida*
Chair: **Daniel Cooper** - *University of Michigan*
Chair: **Yongxian Zhu** - *University of Michigan*

Design Recommendations for Reducing the Environmental Impact of Battery Packs

Technical Paper Publication: IDETC2022-89725

Felipe Quijano-Ortiz - *The University of Texas at Austin,* **Carolyn Seepersad** - *The University of Texas at Austin*

Exploring the Effects of Partnership and Inventory for Supply Chain Resilience Using an Ecological Network Analysis

Technical Paper Publication: IDETC2022-89936

Tyler Wilson - *Texas A&M University,* **Abheek Chatterjee** - *Texas A&M University,* **Astrid Layton** - *Texas A&M University*

Utilizing Bayesian Inference to Optimization Manufacturing Facility Configuration and Task Sequencing in Product Remanufacturing

Technical Paper Publication: IDETC2022-91294

Toluwalase Olajoyegbe - *University of Georgia,* **Beshoy Morkos** - *University of Georgia*

The Clean Sheet Project: A Potential Template for Increasing End-of-Life Recycled Contents Across Material Systems

Technical Presentation: IDETC2022-97922

Daniel Cooper - *University of Michigan*

Expert Elicitation and Data Noise Learning for Supply Chain Material Flow Analysis Using Bayesian Inference

Technical Presentation: IDETC2022-97923

Daniel Cooper - *University of Michigan*

CIE-04-01 - AMS: UNCERTAINTY QUANTIFICATION IN SIMULATION AND MODEL VERIFICATION & VALIDATION

2:10PM–3:50PM **MIDWAY SUITES 10**

Chair: **Anh Tran** - *Sandia National Laboratories*
Chair: **John Michopoulos** - *U.S. Naval Research Laboratory*

Integrated Computational Materials Engineering With Monotonic Gaussian Processes

Technical Paper Publication: IDETC2022-89213

Anh Tran - *Sandia National Laboratories,* **Kathryn Maupin** - *Sandia National Laboratories,* **Theron Rodgers** - *Sandia National Laboratories*

Digital Twin Approach to Build Predictive Maintenance Model and Its Case Study

Technical Paper Publication: IDETC2022-89357

Wenqiang Yang - *Shanghai Jiao Tong University,* **Xiangyu Bao** - *Shanghai Jiao Tong University,* **Yu Zheng** - *Shanghai Jiao Tong University*

A Comparative Study of Surrogate Modeling of Nonlinear Dynamic Systems

Technical Paper Publication: IDETC2022-90027

Ying Zhao - *University of Michigan-Dearborn,* **Chen Jiang** - *University of Michigan-Dearborn,* **Manuel Vega** - *Los Alamos National Laboratory,* **Michael Todd** - *University of California, San Diego,* **Zhen Hu** - *University of Michigan-Dearborn*

Physics-Constrained Bayesian Neural Network to Quantify Uncertainty in Physics-Informed Machine Learning

Technical Presentation: IDETC2022-97788

Luka Malashkhia - *Georgia Institute of Technology,* **Dehao Liu** - *State University of New York at Binghamton,* **Yan Wang** - *Georgia Institute of Technology*

X-Ray Marching for the Computational Modeling of Tomographic Systems Applied to Materials Applications

Technical Paper Publication: IDETC2022-91129

John Steuben - *U.S. Naval Research Laboratory,* **Benjamin Graber** - *U.S. Naval Research Laboratory,* **Athanasios Iliopoulos** - *U.S. Naval Research Laboratory,* **John Michopoulos** - *U.S. Naval Research Laboratory*

A Parallel Multi-Constraint Topology Optimization Solver

Technical Paper Publication: IDETC2022-89514

Adrian Diaz - *Los Alamos National Laboratory,* **Nathaniel Morgan** - *Los Alamos National Laboratory,* **John Bernardin** - *Los Alamos National Laboratory*

CIE-07-02 - CAPPD: COMPUTER-AIDED PRODUCT AND PROCESS DEVELOPMENT

2:10PM–3:50PM **MIDWAY SUITES 11**

Chair: **Ehsan T Esfahani** - *University at Buffalo*
Chair: **Chenxin Wang** - *University of Utah*

Concurrent Shape and Topology Optimization of Metamaterials Based on Periodic Surface Modeling

Technical Paper Publication: IDETC2022-91214

Yanglong Lu - *Georgia Institute of Technology,* **Yan Wang** - *Georgia Institute of Technology*

Polymer Strain Wave Gear Pilot Study Based on Finite Element Analysis

Technical Presentation: IDETC2022-97542

Zhiyuan Yu - *Miami University*

Compact Mechanical Logic Gates Using Connected, Pinned-Pinned, Shallow Arches

Technical Presentation: IDETC2022-97864

Priyabrata Maharana - *Indian Institute of Science, Bengaluru,* **G.K. Ananthasuresh** - *Indian Institute of Science, Bengaluru*

Dynamic Self-Offloading Footwear Using Compliant Pinned-Pinned Arches

Technical Presentation: IDETC2022-97888

Priyabrata Maharana - *Indian Institute of Science, Bengaluru,* **G.K. Ananthasuresh** - *Indian Institute of Science, Bengaluru*

CIE-13-01 - SEIKEM: DESIGN INFORMATICS

2:10PM–3:50PM **MIDWAY SUITES 9**

Chair: **Ying Liu** - *Cardiff University*
Chair: **Joseph Thekinen** - *University of Calgary*

A Multi-Domain Knowledge Transfer Method for Conceptual Design Combine With FBS and Knowledge Graph

Technical Paper Publication: IDETC2022-89700

Bing Lai - *Sichuan University,* **Wu Zhao** - *Sichuan University,* **Zeyuan Yu** - *Sichuan University,* **Xin Guo** - *Sichuan University,* **Kai Zhang** - *Sichuan University*

Review of Human-Machine Interaction Towards Industry 5.0: Human-Centric Smart Manufacturing

Technical Paper Publication: IDETC2022-89711

Jialu Yang - *Cardiff University,* **Tianyuan Liu** - *Cardiff University,* **Ying Liu** - *Cardiff University,* **Phillip Morgan** - *Cardiff University*

An Innovative Method for Lightweight Design Based on FBS and Conflict Resolution

Technical Paper Publication: IDETC2022-89993

Shuang Liu - *Sichuan University,* **Xin Guo** - *Sichuan University,* **Xiwen Yang** - *Sichuan University,* **Huicong Hu** - *Harbin Institute of Technology, Shenzhen*

A Data-Driven Design Approach for Carbon Emission Prediction of Machining

Technical Paper Publication: IDETC2022-90465

Yuxuan Chen - *Wuhan University of Science and Technology,* **Wei Yan** - *Wuhan University of Science and Technology; Cardiff University,* **Hua Zhang** - *Wuhan University of Science and Technology,* **Ying Liu** - *Cardiff University,* **Zhigang Jiang** - *Wuhan University of Science and Technology,* **Xumei Zhang** - *Wuhan University of Science and Technology*

Natural Language Processing for Content Analysis of Communication in Collaborative Design

Technical Paper Publication: IDETC2022-90895

Sachin Lokesh - *Plaksha University,* **Ashish Chaudhari** - *Massachusetts Institute of Technology,* **Joseph Thekinen** - *University of Calgary,* **Jitesh Panchal** - *Purdue University*

Effects of Augmented Information System on Design Communication: A Human-Subject Study Using Aircraft Design Studio

Technical Paper Publication: IDETC2022-91086

Joseph Thekinen - *University of Calgary,* **Paul Grogan** - *Stevens Institute of Technology*

AVT-03-01 ADVANCES IN METHODS FOR GROUND VEHICLE SYSTEMS DESIGN

2:10PM–3:50PM **REGENCY A**

Chair: **Massimiliano Gobbi** - *Politecnico di Milano*
Chair: **Lei Zuo** - *Virginia Tech*
Chair: **Lin Xu** - *Wuhan University of Technology*
Chair: **Ole Balling** - *Aarhus University*

Operational Considerations for Active Electromagnetic Suspension Systems

Technical Paper Publication: IDETC2022-89393

Renato Galluzzi - *Tecnologico de Monterrey,* **Ricardo A. Ramirez-Mendoza** - *Tecnologico de Monterrey,* **Salvatore Circosta** - *Politecnico di Torino,* **Angelo Bonfitto** - *Politecnico di Torino,* **Nicola Amati** - *Politecnico di Torino,* **Andrea Tonoli** - *Politecnico di Torino*

A Driving Simulator for UN157 Homologation Activities

Technical Paper Publication: IDETC2022-89909

Massimiliano Gobbi - *Politecnico di Milano,* **Giampiero Mastinu** - *Politecnico di Milano,* **Stefano Melzi** - *Politecnico di Milano,* **Giorgio Previati** - *Politecnico di Milano,* **Luca Ronconi** - *Vita-Salute San Raffaele University,* **Edoardo Sabbioni** - *Politecnico di Milano*

Comparison of Multi-Objective Optimisation Methods for the Design of Electric Motors,

Technical Paper Publication: IDETC2022-89930

Dario Barri - *Politecnico di Milano,* **Federico Soresini** - *Politecnico di Milano,* **Massimiliano Gobbi** - *Politecnico di Milano,* **Giampiero Mastinu** - *Politecnico di Milano*

Transient Simulation of Power Loss and Heat Transfer for a Dual Clutch Transmission

Technical Presentation: IDETC2022-89063

Deng-Fang Ruan - *Chongqing University,* **Tao Li** - *Chongqing University,* **Yong Song** - *Chongqing University*

MNS-04-01: MICRO/NANO IOT, SENSORS, DIGITAL COMPUTING AND POWER

4:10PM–5:50PM **MIDWAY SUITES 1**

Chair: **Fadi Alsaleem** - *University of Nebraska-Lincoln*
Chair: **Muhammad Khan** - *NSWC, IHD*
Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*
Chair: **Siavash Pourkamali** - *UT Dallas*

Novel MEMS Capacitive Sensor Excited at Electrical Resonance for Detecting Helium Based on Changes in Air Electrical Properties

Technical Paper Publication: IDETC2022-90015

Sulaiman Mohaidat - *University of Nebraska-Lincoln,* **Fadi Alsaleem** - *University of Nebraska-Lincoln*

Design and Simulation of a MEMS Capacitive Pressure Sensor With Corrugated Membrane and Linear Capacitance-Pressure Response

Technical Paper Publication: IDETC2022-90093

Mohammad Shavezipur - *Southern Illinois University, Edwardsville*

Alpha-Photovoltaics for Milliwatt Applications

Technical Paper Publication: IDETC2022-91306

Muhammad Khan - *NSWC, IHEODTD,* **Marc Litz** - *U.S. Army Combat Capabilities Development Command.,* **Johnny Russo** - *U.S. Army Combat Capabilities Development Command* **Randy Tompkins** - *U.S. Army Combat Capabilities Development Command*

Nuclear Batteries Enable Decades of Uninterrupted Life for Microelectronic Systems

Technical Paper Publication: IDETC2022-89291

Oliver Barham - *US Navy, NSWC Indian Head Division*

VIB-14-01: VIBRATION OF CONTINUOUS SYSTEMS

4:10PM–5:50PM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Dumitru Caruntu** - *The University of Texas Rio Grande Valley*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Weidong Zhu** - *University of Maryland*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Sichen Yuan -** *Lawrence Technological University*

Frequency-Amplitude Response of Parametric Resonance of Electrostatically Actuated MEMS Cantilever Beams Driven by Fringe Effect

Technical Paper Publication: IDETC2022-89962

Miguel Martinez - *The University of Texas Rio Grande Valley,* **Dumitru Caruntu** - *The University of Texas Rio Grande Valley*

Considerations for the Testing and Validation of a Mobile Damping Robot for Overhead Power Lines

Technical Paper Publication: IDETC2022-88415

Andrew Choi - *Virginia Tech,* **Paul-Camille Kakou** - *Virginia Tech,* **Oumar Barry** - *Virginia Tech*

Nonlocal Forced Vibration of an Axially Moving Micro/nano-Beam by Combining Heat Sources and External Forces

Technical Paper Publication: IDETC2022-90679

Xiang Zhao - *Southwest Petroleum University,* **Chunfa Wang** - *Southwest Jiaotong University,* **Weidong Zhu** - *University of Maryland, Baltimore County*

Sympathetic Resonance

Technical Presentation: IDETC2022-94648

Lawrence Virgin - *Duke University*

A New Dynamic Model of Tensegrity Structures for Vibration Analysis

Technical Presentation: IDETC2022-97713

Sichen Yuan - *Lawrence Technological University,* **Weidong Zhu** - *University of Maryland, Baltimore County*

VIB-15-01: MACHINE LEARNING APPLICATIONS IN VIBRATIONS AND DYNAMICS

4:10PM–5:50PM **NEW YORK CENTRAL - 2ND FL**

Chair: **Carianne Martinez** - *Sandia National Laboratories*
Chair: **Adam Brink** - *Sandia National Laboratories*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **David A. Najera-Flores** - *ATA Engineering*

A Deep Long Short-Term Memory Network for Bearing Fault Diagnosis Under Time-Varying Conditions

Technical Paper Publication: IDETC2022-88808

Kai Zhou - *Michigan Technological University*

Progress Towards Data-Driven High-Rate Structural State Estimation on Edge Computing Devices

Technical Paper Publication: IDETC2022-90118

Joud Satme - *University of South Carolina,* **Daniel Coble** - *University of South Carolina,* **Braden Priddy** - *University of South Carolina,* **Austin Downey** - *University of South Carolina,* **Jason Bakos** - *University of South Carolina,* **Gurcan Comert** - *Benedict College*

A Multi-Scale Convolutional Network With Attention Mechanism for Fault Diagnosis of Rotating Machines

Technical Presentation: IDETC2022-88881

Hyeongmin Kim - *Seoul National University,* **Chan Hee Park** - *Seoul National university,* **Chaehyun Suh** - *Seoul National University,* **Minseok Chae** - *Seoul National university,* **Heonjun Yoon** - *Soongsil University,* **Byeong D. Youn** - *Seoul National University*

MR-05-01 - MOTION PLANNING, DYNAMICS, AND CONTROL OF ROBOTS

4:10PM–5:50PM **GRAND A**

Chair: **Andreas Muller** - *Johannes Kepler University*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Joo H. Kim** - *New York University*

Maneuvering Control of a Planar Snake Robot Locomotion Using a Combined Heading-Velocity-Shape Strategy

Technical Paper Publication: IDETC2022-87984

Mahdi Haghshenas-Jaryani - *New Mexico State University*

Metareasoning Approaches for Thermal Management During Image Processing

Technical Paper Publication: IDETC2022-88459

Michael Dawson - *University of Maryland, College Park,* **Jeffrey Herrmann** - *University of Maryland, College Park*

Stapler Design With Stacked Tensegrity Mechanisms for Surgical Procedures

Technical Paper Publication: IDETC2022-89714

Dhruva Khanzode - *BioMedical Application Division, CSIR Central Scientific Instruments Organisation,* **Ranjan Jha** - *BioMedical Application Division, CSIR Central Scientific Instruments Organisation,* **Damien Chablat** - *Laboratoire des Sciences du Numérique de Nantes,* **Emilie Duchalais** - *Centre Hospitalier Universitaire de Nantes*

Partition-Aware Stability Control for Humanoid Robot Push Recovery

Technical Paper Publication: IDETC2022-89751

Hyunjong Song - *New York University,* **William Peng** - *New York University,* **Joo H. Kim** - *New York University*

Automated Weld Path Generation Using Random Sample Consensus and Iterative Closest Point Workpiece Localization

Technical Paper Publication: IDETC2022-90082

Tristan Hill - *Tennessee Technological University,* **Stephen Canfield** - *Tennessee Technological University,* **Robert Shelton** - *Tennessee Technological University*

"On the Edge" Obstacle Surmounting Method Using Hybrid Locomotion

Technical Paper Publication: IDETC2022-90206

Alper Yeldan - *Singapore University of Technology and Design,* **Abhimanyu Arora** - *Singapore University of Technology and Design,* **Gim Song Soh** - *Singapore University of Technology and Design*

MR-06-01 - MEDICAL AND REHABILITATION ROBOTICS

4:10PM–5:50PM **GRAND B**

Chair: **Carl Nelson** - *University of Nebraska-Lincoln*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Bogdan Gherman** - *Technical University of Cluj-Napoca*

Trust in Human-Robot Interaction Within Healthcare Services: A Review Study

Technical Paper Publication: IDETC2022-89607

Dedra Townsend - *Old Dominion University,* **AmirHossein MajidiRad** - *University of North Florida*

Design of a Soft Cable-Driven Active Leg Exoskeleton (SC-ALEX) With Continuous Assistive Control

Technical Paper Publication: IDETC2022-89735

Rand Hidayah - *Columbia University,* **Mohit Relhan** - *Columbia University,* **Kalpana Ganeshan** - *Columbia University,* **Winnie Chan** - *Columbia University,* **Sunil Agrawal** - *Columbia University*

Gait Prediction for Prosthesis Design Evaluation

Technical Paper Publication: IDETC2022-89739

Tyler Morrison - *The Ohio State University,* **Hai-Jun Su** - *The Ohio State University*

Application Oriented Modelling and Simulation of an Innovative Parallel Robot for Single Incision Laparoscopic Surgery

Technical Paper Publication: IDETC2022-89968

Doina Pisla - *CESTER, Technical University of Cluj-Napoca,* **Bogdan Gherman** - *CESTER, Technical University of Cluj-Napoca,* **Paul Tucan** - *CESTER, Technical University of Cluj-Napoca,* **Iosif Birlescu** - *CESTER, Technical University of Cluj-Napoca,* **Alexandru Pusca** - *CESTER, Technical University of Cluj-Napoca,* **Gabriela Rus** - *CESTER, Technical University of Cluj-Napoca,* **Adrian Pisla** - *CESTER, Technical University of Cluj-Napoca,* **Calin Vaida** - *CESTER, Technical University of Cluj-Napoca*

Design, Kinematics, and Control of a Modular Robotic Suit as an Exercise System to Prevent Muscle Atrophy of Astronauts During Long-Duration Space Missions

Technical Paper Publication: IDETC2022-91274

Jay Chae - *University of Nebraska-Lincoln,* **Carl Nelson** - *University of Nebraska-Lincoln,* **José Baca** - *Texas A&M Corpus Christi ,***Mukul Mukherjee** - *University of Nebraska Omaha*

Integration of EMG-Based Learning and Sliding Mode Control for an Exoskeleton Assist-as-Needed Support System

Technical Paper Publication: IDETC2022-91305

Pablo Delgado - *Wichita State University,* **Nathan Gonzalez** - *Wichita State University,* **Yimesker Yihun** - *Wichita State University*

MR-07-01 - NOVEL MECHANISMS, ROBOTS, AND APPLICATIONS

4:10PM–5:50PM **GRAND C**

Chair: **Brian Slaboch** - *Milwaukee School of Engineering*
Chair: **Pierre M. Larochelle** - *South Dakota Mines University*

Mechanical Design and Experimental Validation of a Novel Five-Bar Mechanism With Variable Topology

Technical Paper Publication: IDETC2022-89138

Tanner Vaculik - *Milwaukee School of Engineering,* **Brian Slaboch** - *Milwaukee School of Engineering,* **Luis Rodriguez** - *Milwaukee School of Engineering*

Design of Decoupled and Dynamically Isotropic Parallel Manipulators With Five Degrees of Freedom

Technical Paper Publication: IDETC2022-89173

Yogesh Pratap Singh - *Indian Institute of Science,* **Ashitava Ghosal** - *Indian Institute of Science, Bangalore*

Design, Analysis, and Prototyping of a Novel Single Degree-of-Freedom Index Finger Exoskeleton Mechanism

Technical Paper Publication: IDETC2022-89625

Wenda Xu - *Virginia Tech,* **Yujiong Liu** - *Virginia Tech,* **Pinhas Ben-Tzvi** - *Virginia Tech*

Towards Creating Robust Walking Multi-Legged Robots for Traversing Different Terrains

Technical Paper Publication: IDETC2022-90614

Nina Robson - *California State University,* **Vanessa Audrey** - *University of California, Irvine*

Control Design and Simulation Framework for an Autonomous Paramotor UAV

Technical Paper Publication: IDETC2022-91283

Sangram Redkar - *Arizona State University,* **Brett Fiedler** - *Arizona State University*

DTM-02-01 - DISCUSSIONS ON DESIGN CREATIVITY & IDEATION

4:10PM–5:50PM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Ting Liao** - *Stevens Institute of Technology*
Chair: **Christopher McComb** - *Carnegie Mellon University*

Visual Reasoning for Design by Analogy: Fuse Visual and Semantic Knowledge

Technical Paper Publication: IDETC2022-89723

Yan Jin - *University of Southern California,* **Zijian Zhang** - *University of Southern California*

A Study of the Exploratory Creativity Performance Between Machine and Human Designers

Technical Paper Publication: IDETC2022-87505

Yuan Yin - *Imperial College London,* **Kaitong Qin** - *Zhejiang University,* **Huiting Liu** - *Zhejiang University,* **Lingyun Sun** - *Zhejiang University,* **Peter** Childs - *Imperial College London,* **Liuqing Chen** - *Zhejiang University*

Reconfigurable Robot Design Aided With Design Cards

Technical Paper Publication: IDETC2022-89862

Manivannan Kalimuthu - *Singapore University of Technology and Design,* **Abdullah Aamir Hayat** - *Singapore University of Technology and Design,* **Mohan Rajesh Elara** - *Singapore University of Technology and Design,* **Kris Wood** - *Design and Computing University of Colorado Denver*

Aerial Robot Design Principles in Creative Idea Generation and Evolution

Technical Paper Publication: IDETC2022-90024

Chee How Tan - *Singapore University of Technology and Design,* **Katja Hölttä-Otto** - *The University of Melbourne,* **Shaohui Foong** - *Singapore University of Technology and Design*

Investigating Priming Effects of Sketch Evaluation Instructions on Idea Generation Productivity

Technical Paper Publication: IDETC2022-91313

Morgan Weaver - *Georgia Institute of Technology,* **Jacob Buck** - *Georgia Institute of Technology,* **Hillary Merzdorf** - *Purdue University,* **Denis Dorozhkin** - *Georgia Institute of Technology,* **Kerrie Douglas** - *Purdue University,* **Julie Linsey** - *Georgia Institute of Technology*

Generative Pre-Trained Transformers for Biologically Inspired Design

Technical Paper Publication: IDETC2022-90366

Qihao Zhu - *Singapore University of Technology and Design,* **Xinyu Zhang** - *Tsinghua University,* **Jianxi Luo** - *Singapore University of Technology and Design*

DAC-02-01-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR CHALLENGING REAL-WORLD PROBLEMS IN DESIGN AUTOMATION

4:10PM–5:50PM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Payam Ghassemi** - *University of Buffalo*
Chair: **Philip Odonkor** - *Stevens Institute of Technology*

Material Prediction for Design Automation Using Graph Representation Learning

Technical Paper Publication: IDETC2022-88049

Shijie Bian - *University of California, Los Angeles,* **Daniele Grandi** - *Autodesk Inc.,* **Kaveh Hassani** - *Autodesk Inc.,* **Elliot Sadler** - *California State University Northridge,* **Bodia Borijin** - *University of California, San Diego,* **Axel Fernandes** - *California State University Northridge,* **Andrew Wang** - *Portola High School,* **Thomas Lu** - *California Institute of Technology,* **Richard Otis** - *California Institute of Technology,* **Nhut Ho** - *California State University Northridge,* **Bingbing Li** - *California State University Northridge*

Automatic Power Plane Generation With Genetic Optimization and Multilayer Perceptron

Technical Paper Publication: IDETC2022-90046

Haiguang Liao - *Carnegie Mellon University,* **Vinay Patil** - *Carnegie Mellon University,* **Xuliang Dong** - *Carnegie Mellon University,* **Devika Shanbhag** - *Carnegie Mellon University,* **Elias Fallon** - *Cadence Design Systems,* **Taylor Hogan** - *Cadence Design Systems,* **Mirko Spasojevic** - *Cadence Design Systems,* **Levent Burak Kara** - *Carnegie Mellon University*

A Study of Machine Learning Framework for Enabling Early Defect Detection in Wire Arc Additive Manufacturing Processes

Technical Paper Publication: IDETC2022-89164

Nowrin Akter Surovi - *Singapore University of Technology and Design,* **Shaista Hussain** - *Institute of High Performance Computing, Agency for Science, Technology and Research ,* **Gim Song Soh** - *Singapore University of Technology and Design*

Mean Squared Error May Lead You Astray When Optimizing Your Inverse Design Methods

Technical Paper Publication: IDETC2022-90065

Shai Bernard - *University of Maryland, College Park,* **Jun Wang** - *University of Maryland, College Park,* **Mark Fuge** - *University of Maryland, College Park*

Effect of Optimal Geometries and Performance Parameters on Airfoil Latent Space Dimension

Technical Paper Publication: IDETC2022-90068

Alec Van Slooten - *University of Maryland,* **Mark Fuge** - *University of Maryland*

DAC-07-01-DESIGN FOR ADDITIVE MANUFACTURING

4:10PM–5:50PM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Nicholas Meisel** - *The Pennsylvania State University*
Chair: **Yaoyao Zhao** - *McGill University*

Direct 4D Printing of a Deployable Polymer Wave Spring

Technical Paper Publication: IDETC2022-88327

Joël Chapuis - *ETH Zurich,* **Andrin Widmer** - *ETH Zurich,* **Kristina Shea** - *ETH Zurich*

Automatic Shape Modification for Self-Supporting Structures in Additive Manufacturing

Technical Paper Publication: IDETC2022-89054

Jiangce Chen - *University of Connecticut,* **Matt Patterson** - *PARC, a Xerox Company,* **Amir Mirzendehdel** - *PARC, a Xerox Company,* **Morad Behandish** - *PARC, a Xerox Company*

Deep Ensembles for Modeling Uncertain Phase Constraints In Compositionally Graded Alloy Design

Technical Paper Publication: IDETC2022-89091

Marshall Allen - *Texas A&M University,* **Raymundo Arroyave** - *Texas A&M University,* **Richard Malak** - *Texas A&M University*

Toward a Comprehensive Framework for Preliminary Design Evaluation in Additive Manufacturing

Technical Paper Publication: IDETC2022-90058

Alexander Cayley - *Penn State,* **Jayant Mathur** - *Penn State,* **Nicholas Meisel** - *Penn State*

Concurrent Build Direction, Part Segmentation, and Topology Optimization for Additive Manufacturing Using Neural Networks

Technical Paper Publication: IDETC2022-90050

Hongrui Chen - *Carnegie Mellon University,* **Kate Whitefoot** - *Carnegie Mellon University,* **Levent Burak Kara** - *Carnegie Mellon University*

DAC-15-02-MULTIDISCIPLINARY DESIGN OPTIMIZATION, MULTIOBJECTIVE OPTIMIZATION, AND SENSITIVITY ANALYSIS

4:10PM–5:50PM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Chao Hu** - *Iowa State University*
Chair: **Hongyi Xu** - *University of Connecticut*

Topology Optimization of Permanent Magnets for Generators Using Level Set Methods

Technical Paper Publication: IDETC2022-90601

Jiawei Tian - *State University of New York at Stony Brook,* **Ran Zhuang** - *State University of New York at Stony Brook,* **Juan Cilia** - *GE Renewable Energy,* **Arvind Rangarajan** - *GE Renewable Energy,* **Fang Luo** - *State University of New York at Stony Brook,* **Jon Longtin** - *State University of New York at Stony Brook,* **Shikui Chen** - *State University of New York at Stony Brook*

Bi-Objective Surrogate Feasibility Robust Design Optimization Utilizing Expected Non-Dominated Improvement With Relaxation

Technical Paper Publication: IDETC2022-91112

Randall Kania - *University of Maryland,* **Shapour Azarm** - *University of Maryland*

Multi-Objective Bayesian Optimization Supported by Gaussian Process Classifiers and Conditional Probabilities

Technical Paper Publication: IDETC2022-91343

Homero Valladares - *Purdue University,* **Andres Tovar** - *Indiana University–Purdue University Indianapolis*

Design Optimization of Pelvic Prosthesis for Type-1 Resection

Technical Paper Publication: IDETC2022-89854

Rajaraman S - *Indian Institute of Technology Madras,* **Sourav Rakshit** - *Indian Institute of Technology Madras*

Generalization of Manufacturability Algorithms for Fabricated Assemblies Based on Topology Optimization

Technical Paper Publication: IDETC2022-90110

Satchit Ramnath - *The Ohio State University,* **Jami Shah** - *The Ohio State University, Duane Detwiler - Honda Development & Manufacturing of America, LLC*

DFMLC-05-01-DESIGN FOR ADDITIVE MANUFACTURING 1

4:10PM–5:50PM **MIDWAY SUITES 3**

Chair: **Yaoyao Zhao** - *McGill University*
Chair: **Daniel Cooper** - *University of Michigan*
Chair: **Paul Egan** - *Texas Tech University*

Additive Manufacturing Strategy for Ultra-Lightweight High Value-Added Components

Technical Paper Publication: IDETC2022-88458

Louis Catar - *ETS Montréal,* **Ilyass Tabiai** - *ETS Montréal,* **David St-Onge** - *ETS Montréal*

Identifying the Effects of Immersion on Design for Additive Manufacturing Evaluation of Designs of Varying Manufacturability

Technical Paper Publication: IDETC2022-90063

Jayant Mathur - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University,* **Timothy Simpson** - *The Pennsylvania State University,* **Nicholas Meisel** - *The Pennsylvania State University*

Design Opportunities Using High-Density Extrusion-Based Additive Manufacturing for Impact Problems

Technical Presentation: IDETC2022-88612

Albert Patterson - *Texas A&M University*

Effect of Varied Additives on the Texture and Shape Stability of 3D Printed Mashed Potato and Pumpkin

Technical Paper Publication: IDETC2022-89415

Stefania Chirico Scheele - *Texas Tech University,* **Paul F. Egan** - *Texas Tech University*

Incorporating Truck-Drone Bimodal Delivery System Into Mobile Additive Manufacturing Considering Preferred Delivery Time-Window and Optimal Printing Sequence

Technical Paper Publication: IDETC2022-90597

Junfeng Ma - *Mississippi State University*

CIE-25-01 - GRADUATE STUDENT POSTER SYMPOSIUM AND RECEPTION

6:00PM–7:00PM **MIDWAY SUITES 10**

Chair: **Jida Huang** - *University of Illinois at Chicago*

An Experimental Framework for Implementing an Ethical Cyber-Physical-Social System

Student Poster Presentation: IDETC2022-90866

Xiaoou Yang - *University of Georgia*

Prediction of the Acceleration Applied to Driver's Upper Body During Driving Using Narx Algorithm

Student Poster Presentation: IDETC2022-91258

Soonmoon Jung - *Korea University,* Hyeyeong Song - *Korea University,* Yeeun Kang - *Korea University,* Junghwa Hong - *Korea University*

Exploring Mechanical Property Space by Developing Novel Multi-Material Filled Cellular Structures

Student Poster Presentation: IDETC2022-97834

Sina Rastegarzadeh - *University of Illinois at Chicago*

Natural Language Processing to Model Based Systems Engineering in the Architecture Analysis and Design Language (AADL)

Student Poster Presentation: IDETC2022-97938

Parth Ganeriwala - *Florida Institute of Technology*

Heterogeneous Porous Biomedical Scaffold Design With Functional Representation-Based Microstructures

Student Poster Presentation: IDETC2022-97844

Ashutosh Mishra - *University of Illinois at Chicago*

Decision Support in the Design of Robust and Resilient Manufacturing Supply Networks

Student Poster Presentation: IDETC2022-97991

Mathew Baby - *Florida Institute of Technology*

Designing for Excess: An Examination of Requirement Excess Potential

Student Poster Presentation: IDETC2022-98105

Logan Smith - *University of Georgia*

TUESDAY, AUGUST 16, 2022

MNS-04-02: MICRO/NANO IOT, SENSORS, DIGITAL COMPUTING AND POWER

8:00AM–9:00 AM **MIDWAY SUITES 1**

Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*
Chair: **Siavash Pourkamali** - *UT Dallas*
Chair: **Jian Zhao** - *Dalian*

A Three Degree of Freedom Model Approach to Enable a MEMS-Based Neural Computing Unit

Technical Paper Publication: IDETC2022-90498

Mohammad Megdadi - *University of Nebraska-Lincoln,* Hamed Nikfarjam - *University of Texas at Dallas,* Mohammad Okour - *University of Nebraska-Lincoln,* Siavash Pourkamali - *University of Texas at Dallas,* Fadi Alsaleem - *University of Nebraska-Lincoln*

A Small MEMS Neural Network to Classify Human Sitting and Standing Activities

Technical Paper Publication: IDETC2022-91236

Mohammad Okour - *University of Nebraska-Lincoln,* Mohammad Megdadi - *University of Nebraska-Lincoln,* Hamed Nikfarjam - *University of Texas at Dallas,* Siavash Pourkamali - *University of Texas at Dallas,* Fadi Alsaleem - *University of Nebraska-Lincoln*

VIB-08-01: NONLINEAR SYSTEMS & PHENOMENA

8:00AM–9:00AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Mohammad A. Al-Shudeifat** - *Khalifa University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*

Wave-Based Approaches for the Nonlinear Forced Response and Stability Analysis of Jointed 1D Structures

Technical Presentation: IDETC2022-90221

Nidish Narayanaa Balaji - *Rice University,* Matthew R.W. Brake - *Rice University,* Michael J. Leamy - *Georgia Institute of Technology*

Parametric Analysis of the Nonlinear Dynamics of Cracked Cantilever Beams

Technical Paper Publication: IDETC2022-90884

Chia-Ling Hsu - *National Tsing Hua University,* **Meng-Hsuan Tien** - *National Tsing Hua University*

Predicting Modal Properties of Nonlinear Oscillators by Measuring Free Vibration Response

Technical Presentation: IDETC2022-97516

Shih-Chun Huang - *National Tsing Hua University,* **Hao-Wen Chen** - *National Tsing Hua University,* **Meng-Hsuan Tien** - *National Tsing Hua University*

DTM-03-01- TRENDS AND MODELS IN COLLABORATIVE DESIGN

8:00AM–9:00AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Alexander Murphy** - *University of Texas at Dallas*
Chair: **James Righter** - *The Citadel*

Comparing Nominal and Interacting Sub-Structured Teams in an Interdisciplinary Engineering Design Task

Technical Paper Publication: IDETC2022-89623

Joshua T. Gyory - *Carnegie Mellon University,* **Nicolás F. Soria Zurita** - *Pennsylvania State University,* **Jonathan Cagan** - *Carnegie Mellon University,* **Christopher Mccomb** - *Carnegie Mellon University*

Does Synchronous Collaboration Improve Collaborative Computer-Aided Design Output: Results From a Large-Scale Competition

Technical Paper Publication: IDETC2022-89731

Yuanzhe Deng - *University of Toronto,* **Tucker Marion** - *Northeastern University,* **Alison Olechowski** - *University of Toronto*

Measuring Risk Attitudes for Strategic Decision-Making in a Collaborative Engineering Design Process

Technical Paper Publication: IDETC2022-90216

Alkim Avsar - *Stevens Institute of Technology,* **Jordan Stern** - *Stevens Institute of Technology,* **Paul Grogan** - *Stevens Institute of Technology*

Triggered: Using Human-AI Dialogue for Problem Understanding in Collaborative Design

Technical Paper Publication: IDETC2022-89273

Anne Arzberger - *Delft University of Technology,* **Vera Van Der Burg** - *Delft University of Technology,* **Senthil Chandrasegaran** - *Delft University of Technology,* **Peter Lloyd** - *Delft University of Technology*

VIB-04-02: ENERGY HARVESTING II

8:00AM–9:00AM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Wei-Che Tai** - *Michigan State University*
Chair: **Serife Tol** - *University of Michigan*

Modelling, Characterization and Testing of an Ocean Wave Powered Desalination System

Technical Paper Publication: IDETC2022-91285

Jia Mi - *Virginia Tech,* **Xian Wu** - *Virginia Tech,* **Joseph Capper** - *Virginia Tech,* **Xiaofan Li** - *Virginia Tech,* **Ahmed Shalaby** - *Stevens Institute of Technology,* **Uihoon Chung** - *Stevens Institute of Technology,* **Raju Datla** - *Stevens Institute of Technology,* **Muhammad Hajj** - *Stevens Institute of Technology,* **Lei Zuo** - *Virginia Tech*

A Self-Reactive Ocean Wave Energy Converter With Winch-Based Power Take-Off: Design, Prototype, and Experimental Evaluation

Technical Paper Publication: IDETC2022-91303

Mingyi Liu - *Virginia Tech,* **Adam Bennett** - *E-wave,* **Junhui Lou** - *E-wave,* **Jia Mi** - *Virginia Tech,* **Fujun Ruan** - *Virginia Tech,* **Xiaofan Li** - *Virginia Tech,* **Lei Zuo** - *Virginia Tech*

Ocean Wave Energy Conversion of a Spar Platform Using a Nonlinear Inerter Pendulum Vibration Absorber

Technical Paper Publication: IDETC2022-91322

Wei Che Tai - *Michigan State University,* **Aakash Gupta** - *Michigan State University*

DAC-19-01-HUMAN-ARTIFICIAL INTELLIGENCE COLLABORATION IN ENGINEERING SYSTEM DESIGN

8:00AM–9:00AM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Emrah Bayrak** - *Stevens Institute of Technology*
Chair: **Namwoo Kang** - *KAIST*

The Impact of a Strategy of Deception About the Identity of an Artificial Intelligence Teammate on Human Designers

Technical Paper Publication: IDETC2022-88535

Guanglu Zhang - *Carnegie Mellon University,* **Ayush Raina** - *Carnegie Mellon University,* **Ethan Brownell** - *Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University*

Improving Designer Learning in Design Space Exploration by Adapting to the Designer's Learning Goals

Technical Paper Publication: IDETC2022-89207

Antoni Virós-i-Martin - *Texas A&M University,* **Daniel Selva** - *Texas A&M University*

A Real-Time Artificial Intelligence Process Manager for Engineering Design

Technical Paper Publication: IDETC2022-88609

Joshua T. Gyory - *Carnegie Mellon University,* **Nicolás F. Soria Zurita** - *Pennsylvania State University,* **Jay D. Martin** - *Pennsylvania State University,* **Corey M. Balon** - *Pennsylvania State University,* **Christopher McComb** - *Carnegie Mellon University, Kenneth Kotovsky - Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University*

DAC-09-02-DESIGN FOR RESILIENCE AND FAILURE RECOVERY

8:00AM–9:00AM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Zhimin Xi** - *Rutgers University*
Chair: **Daniel Hulse** - *NASA*

Uncertainty Quantification for Dissimilar Material Joints Under Corrosion Environment

Technical Paper Publication: IDETC2022-89654

Parth Bansal - *University of Illinois at Urbana-Champaign,* **Zhuoyuan Zheng** - *University of Illinois at Urbana-Champaign,* **Yumeng Li** - *University of Illinois at Urbana-Champaign*

Synthetic Failure Mode Generation for Resilience Analysis and Failure Mechanism Discovery

Technical Paper Publication: IDETC2022-90072

Daniel Hulse - *NASA Ames Research Center,* **Lukman Irshad** - *NASA Ames Research Center (KBR, Inc.)*

Dynamically Weighted Ensemble of Diverse Learners for Remaining Useful Life Prediction

Technical Paper Publication: IDETC2022-90252

Venkat Nemani - *Iowa State University,* **Adam Thelen** - *Iowa State University,* **Chao Hu** - *Iowa State University,* **Steve Daining** - *Vermeer Corporation*

DAC-14-02-METAMODEL-BASED DESIGN OPTIMIZATION TYPE

8:00AM–9:00AM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Payam Ghassemi** - *University of Buffalo*
Chair: **Yuanzhi Liu** - *University of Texas at Dallas*

Modeling and Optimizing Multi-Stage Design With Gaussian Process Based on Surrogate Model Chain

Technical Paper Publication: IDETC2022-89859

Siyu Yang - *Beijing Institute of Technology,* **Liangyue Jia** - *Beijing Institute of Technology,* **Jia Hao** - *Beijing Institute of Technology,* **Reza Alizadeh** - *Systems Realization Laboratory University of Oklahoma,*

Conceptual Design of Cellular Auxetic Systems With Passive Adaptation to Loading

Technical Paper Publication: IDETC2022-90132

Joshua Prendergast - *University at Buffalo,* **Manaswin Oddiraju** - *University at Buffalo,* **Mostafa Nouh** - *University at Buffalo,* **Souma Chowdhury** - *University at Buffalo*

Hall Effect Sensor Design Optimization With Multi-Physics Informed Gaussian Process Modeling

Technical Paper Publication: IDETC2022-91196

Yanwen Xu - *University of Illinois at Urbana-Champaign,* **Zhuoyuan Zheng** - *University of Illinois at Urbana-Champaign,* **Kanika Arora** - *Stanford University,* **Debbie G Senesky** - *Stanford University,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign*

AVT-04-01 ADVANCES IN GROUND VEHICLE SAFETY AND ERGONOMICS

8:00AM–9:00AM **REGENCY A**

Chair: **Ole Balling** - *Aarhus University*
Chair: **Costin Untaroiu** - *Virginia Tech*
Chair: **Alan Mayton** - *CDC/NIOSH/PMRD*

The Amount of Warning Stimulus Time Required to Prepare for a Hard-Breaking Event

Technical Paper Publication: IDETC2022-88067

Gabe Lenneman - *Miami University,* **John Lenneman** - *Toyota Motor North America,* **James Chagdes** - *Miami University*

Biodynamic Response of Seated Human Body to Random and 1 Hz Lateral-Roll Dual-Axis Vibration

Technical Paper Publication: IDETC2022-89664

Zefeng Lin - *Tianjin University,* **Junhong Zhang** - *Tianjin University,* **Meng Li** - *Tianjin University,* **Guangjian Ni** - *Tianjin University,* **Jiewei Lin** - *Tianjin University*

A Finite Element Model of an Electric Scooter for Simulating Traffic Accidents

Technical Paper Publication: IDETC2022-90669

Rafael Chontos - *Virginia Tech,* **Daniel Grindle** - *Virginia Tech,* **Alexandrina Untaroiu** - *Virginia Tech,* **Zachary Doerzaph** - *Virginia Tech,* **Costin Untaroiu** - *Virginia Tech*

MNS-03-01: MICRO/NANO ROBOTICS AND FUNCTIONAL MATERIALS

9:10AM–10:30AM **MIDWAY SUITES 1**

Chair: **Hoe Joon Kim** - *DGIST*
Chair: **Irene Fassi** - *CNR*
Chair: **Oliver Barham** - *US Navy, NSWC Indian Head Division*
Chair: **Najib Kacem** - *Femto*
Chair: **Yu Liu** - *Jiangnan University*
Chair: **Longqiu Li** - *Harbin Institute of Technology*
Chair: **Jian Zhao** - *Dalian*
Chair: **Mohammad Hasan** - *University of Nebraska-Lincoln*

Carbon/PEEK/Zirconia Hybrid Composite for High-Performance Applications

Technical Paper Publication: IDETC2022-89906

Claudia Pagano - *CNR-STIIMA,* **Vito Basile** - *CNR-STIIMA,* **Rossella Surace** - *CNR-STIIMA,* **Roberto Terzi** - *ENEA,* **Monica Schioppa** - *ENEA,* **Barbara Palazzo** - *ENEA,* **Irene Fassi** - *CNR-STIIMA*

Electric Field Assisted One-Step Manufacturing of Locally Conductive Functional Microstructures Using Stereolithography

Technical Presentation: IDETC2022-90639

Zhongwei Yu - *Harbin Institute of Technology,* **Longqiu Li** - *Harbin Institute of Technology*

A Multi-Asperity Adhesive Contact Model for Catheter and Vascular Artery Contact in Endovascular Surgery

Technical Presentation: IDETC2022-97710

Yang Xu - *Stevens Institute of Technology,* **Sundeep Mangla** - *Neurointerventional Medicine, PLLC,* **Paul Gschneidner** - *Stevens Institute of Technology,* **Yong Shi** - *Stevens Institute of Technology*

Fabrication of a Perfusable Artificial Microvascular Chip

Technical Presentation: IDETC2022-87594

Gou-Jen Wang - *National Chung Hsing University,* **Ying-Ting Lin** - *National Chung Hsing University,* **Chi-Fu Huang** - *National Chung Hsing University*

VIB-05-01: FLUID-INDUCED VIBRATIONS

9:10AM–10:30AM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Mark Jankauski** - *Montana*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*

Vibration of a Suspended Beam for Liquid-Level Measurement

Technical Presentation: IDETC2022-91046

Shuai Ju - *University of North Texas,* **Muhammad Aslam** - *University of North Texas,* **Liping Cai** - *University of North Texas,* **Haifeng Zhang** - *University of North Texas*

Analytical Periodic Oscillations in a Harmonically Excited Single-Degree-of-Freedom Aerodynamical Oscillator

Technical Paper Publication: IDETC2022-91195

Bo Yu - *University of Wisconsin Platteville,* **Albert c.j. Luo** - *Southern Illinois University Edwardsville*

System-Level Modeling of the Coupled Wing-Thorax in Flapping Wing Insects

Technical Presentation: IDETC2022-97838

Braden Cote - *Montana State University,* **Sam Weston** - *Montana State University,* **Mark Jankauski** - *Montana State University*

A Quasi-Three-Dimensional Model for Investigating Fluid-Structure Interaction in Flexible Flapping Wings

Technical Presentation: IDETC2022-97846

Joseph Reade - *Montana State University,* **Ryan Schwab** - *Montana State University,* **Mark Jankauski** - *Montana State University*

VIB-06-01: INDUSTRIAL APPLICATIONS OF VIBRATION & ACOUSTICS

9:10AM–10:30AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Ryan Monroe** - *Oakland University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Brian Olson** - *The Johns Hopkins University Applied Physics Laboratory*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Bruce Geist** - *NA*
Chair: **Ronald Couch** - *Johns Hopkins University Applied Physics Laboratory*

Separation and Identification of Diesel Engine Noise Sources Based on Adaptive Variational Mode Extraction

Technical Paper Publication: IDETC2022-90660

Junhong Zhang - *State Key Laboratory of Engines, Tianjin University,* **Gengyi Lin** - *Tianjin University,* **Xiaozhen Li** - *Weichai Power Co., Ltd.,* **Qidi Zhou** - *State Key Laboratory of Engines, Tianjin University,* **Jiewei Lin** - *State Key Laboratory of Engines, Tianjin University*

Noise Robust Frequency Band Selection for Bearing Diagnosis Using Acoustic Emission Signals

Technical Presentation: IDETC2022-97898

Su J. Kim - *Seoul National University,* **Sungjong Kim** - *Seoul National University,* **Seungyun Lee** - *Seoul National University,* **Taejin Kim** - *Jeonbuk National University,* **Byeng Dong Youn** - *Seoul National University*

MR-01-02 - MECHANISMS SYNTHESIS & ANALYSIS

9:10AM–10:30AM **GRAND A**

Chair: **Phil Voglewede** - *Marquette University*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Matthew Campbell** - *Oregon state University*

Systematic Generation of 5-Axis Manufacturing Machines

Technical Paper Publication: IDETC2022-87874

Cole Jetton - *Oregon State University,* **Liam Rudd** - *Oregon State University,* **Matthew Campbell** - *Oregon State University*

Sensitivity Study With Sobol' Indices in Planar Multistable Mechanisms

Technical Paper Publication: IDETC2022-89414

Edward Dold - *Marquette University,* **Philip Voglewede** - *Marquette University*

On the Effectiveness and Optimal Performance of Gravity Compensation Design of an Inverted Slider-Crank Mechanism Using Realistic Springs

Technical Paper Publication: IDETC2022-89695

Xiangxian Zeng - *University of Wollongong,* **Chin-Hsing Kuo** - *University of Wollongong*

Self-Aligning Rotational Latching Mechanisms

Technical Paper Publication: IDETC2022-89801

Gabriel Fernandez - *University of California, Los Angeles,* **Samuel Gessow** - *University of California, Los Angeles,* **Justin Quan** - *University of California, Los Angeles,* **Dennis Hong** - *University of California, Los Angeles*

MR-03-03 - COMPLIANT MECHANISMS (A. MIDHA SYMPOSIUM)

9:10AM–10:30AM **GRAND B**

Chair: **Patrick McGowan** - *University College Cork, Irland*
Chair: **Jared Butler** - *Penn State University*

Accommodating Irregular Panel Profiles and Thicknesses in Let Joint Arrays

Technical Paper Publication: IDETC2022-88822

Sam Smith - *Redwire,* **Spencer Magleby** - *Brigham young university,* **Larry Howell** - *Brigham Young University*

Machine Learning Models for Predicting Deflection and Shape of 2D Cantilever Beams

Technical Paper Publication: IDETC2022-89694

Yi Jin - *The Ohio State University,* **Hai-Jun Su** - *The Ohio State University*

Conceptual Design of Foldable Truck Trailer

Technical Paper Publication: IDETC2022-89724

Sjors Temmerman - *Delft University of Technology,* **Saurav Sharma** - *Delft University of technology,* **Siddhant Kumar** - *Delft University of Technology,* **Jovana Jovanova** - *Delft University of Technology*

Modeling and Validation of Compliant Mechanisms and Soft Robots in Matlab Simscape

Technical Paper Publication: IDETC2022-89749

Andrea Contreras- Esquen - *Kennesaw State University,* **Jose Bonilla Martinez** - *Kennesaw State University,* **Martin Garcia** - *Kennesaw State University,* **Amir Ali Amiri Moghadam** - *Kennesaw State University,* **Ayse Tekes** - *Kennesaw State University*

MR-07-02 - NOVEL MECHANISMS, ROBOTS, AND APPLICATIONS

9:10AM–10:30AM **GRAND C**

Chair: **Reza Fotouhi** - *Univ Of Saskatchewan*
Chair: **Carl Nelson** - *University of Nebraska-Lincoln*
Chair: **Dongming Gan** - *Purdue University*

Extending and Bending Robotic Limbs Using Tape Springs for Mobility and Manipulation: Preliminary Investigations

Technical Paper Publication: IDETC2022-89431

Justin Quan - *University of California, Los Angeles,* **Dennis Hong** - *University of California, Los Angeles*

Design and Modeling of a Robot for De-Icing Overhead Power Lines

Technical Paper Publication: IDETC2022-89554

Carl Nelson - *University of Nebraska*

Particle Swarm Optimization / PID-Computed Torque Control for a Manipulator

Technical Paper Publication: IDETC2022-89769

Hedieh Badkoobehhezaveh - *University of Saskatchewan,* **Reza Fotouhi** - *University of Saskatchewan,* **Qianwei Zhang** - *University of Saskatchewan*

Rolling Locomotion of Hexagonal Kinematic Chain Robot

Technical Paper Publication: IDETC2022-89978

Joshua Stanley - *The University of Toledo,* **Adam Schroeder** - *The University of Toledo,* **Brian Trease** - *The University of Toledo*

A Soft Wearable Elbow Skeleton for Safe Motion Assistance by Variable Stiffness

Technical Paper Publication: IDETC2022-90320

Juan Yi - *Southern University of Science and Technology,* **Xiaojiao Chen** - *The University of Hong Kong,* **Zhonggui Fang** - *Southern University of Science and Technology,* **Yujia Liu** - *Southern University of Science and Technology,* **Dehao Duanmu** - *The University of Hong Kong,* **Yinyin Su** - *The University of Hong Kong,* **Chaoyang Song** - *Southern University of Science and Technology,* **Sicong Liu** - *Southern University of Science and Technology,* **Zheng Wang** - *Southern University of Science and Technology*

DTM-01-03 - BEST OF DTM 2022

9:10AM–10:30AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Joshua Summers** - *University of Texas at Dallas*

Collaborative Design Decision-Making With Artificial Intelligence: Exploring the Evolution and Impact of Human Confidence in AI and in Themselves

Technical Paper Publication: IDETC2022-88574

Leah Chong - *Carnegie Mellon University,* **Ayush Raina** - *Carnegie Mellon University,* **Kosa Goucher-Lambert** - *University of California, Berkeley,* **Kenneth Kotovsky** - *Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University*

Objects of Collaboration: Roles of Objects in Spanning Knowledge Boundaries in a Design Company

Technical Paper Publication: IDETC2022-89388

Eric Brubaker - *Stanford University,* **Sheri Sheppard** - *Stanford University,* **Pamela Hinds** - *Stanford University,* **Maria Yang** - *Massachusetts Institute of Technology*

Hit, Miss, or Error? Predicting Errors in Design Decision Making for Radically Innovative Ideas Using Individual Attributes

Technical Paper Publication: IDETC2022-89708

Aoran Peng - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University*

The Impact of Gender on Individual Perceptions and Team Psychological Safety in Engineering Design Teams

Technical Paper Publication: IDETC2022-89910

Courtney Cole - *The Pennsylvania State University,* **Kathryn Jablokow** - *The Pennsylvania State University,* **Susan Mohammed** - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University*

Towards Characterizing Cognitive Style Coping Behavior in Engineering Design

Technical Paper Publication: IDETC2022-91148

Noriana Radwan - *The Pennsylvania State University,* **Jessica Menold** - *The Pennsylvania State University,* **Jesse McTernan** - *The Pennsylvania State University,* **Kathryn Jablokow** - *The Pennsylvania State University,* **Christopher McComb** - *Carnegie Mellon University*

DEC-06-01-SHORT PAPERS AND DEMOS

9:10AM–10:30AM **MIDWAY SUITES 2**

Chair: **Elizabeth Starkey** - Pennsylvania State University

Short Paper: An Initial Investigation of the Correlations Between the Quality of Engineering Assignments and Task-Independent Features

Technical Paper Publication: IDETC2022-91031

Wanyu Xu - *Texas A&M University,* **Daniel A. Mcadams** - *Texas A&M University,* **Andreas A. Polycarpou** - *Texas A&M University*

Sketchtivity: Teaching Engineers to Sketch and Measuring Impacts for Engineering Design

Technical Presentation: IDETC2022-97883

Morgan Weaver - *Georgia Institute of Technology,* **Samantha Ray** - *Texas A&M University,* **Hillary Merzdorf** - *Purdue University,* **Donna Jaison** - *Texas A&M University,* **Vimal Viswanathan** - *San Jose State University,* **Vinayak Krishnamurthy** - *Texas A&M University,* **Kerrie Douglas** - *Purdue University,* **Tracy Hammond** - *Texas A&M University,* **Julie Linsey** - *Georgia Institute of Technology*

Investigating Creativity in Engineers: A Temporal Approach

Technical Presentation: IDETC2022-97932

Tess Hartog - *University of Oklahoma,* **Md Tanvir Ahad** - *University of Oklahoma,* **Megan Marshall** - *University of Oklahoma,* **Zahed Siddique** - *University of Oklahoma*

A Difference of Milliseconds: How Providing Feedback During Design Is Heavily Dependent on Time Delay

Technical Presentation: IDETC2022-97872

Matthew Campbell - *Oregon State University*

DAC-19-02-HUMAN-ARTIFICIAL INTELLIGENCE COLLABORATION IN ENGINEERING SYSTEM DESIGN

9:10AM–10:30AM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Emrah Bayrak** - *Stevens Institute of Technology*
Chair: **Namwoo Kang** - *KAIST*

Evaluating Designer Learning and Performance in Interactive Deep Generative Design

Technical Paper Publication: IDETC2022-90477

Ashish M. Chaudhari - *Massachusetts Institute of Technology,* **Daniel Selva** - *Texas A&M University*

Agent-Based Simulation of Optimal Trust in a Decision Support System in One-on-One Collaboration

Technical Paper Publication: IDETC2022-90770

Mostaan Lotfalian Saremi - *Stevens Institute of Technology,* **Alparslan Emrah Bayrak** - *Stevens Institute of Technology*

Are You Feeling Happy? the Effect of Emotions on People's Interaction Experience Toward Empathetic Chatbots

Technical Paper Publication: IDETC2022-91059

Ting Liao - *Stevens Institute of Technology,* **Bei Yan** - *Stevens Institute of Technology*

DAC-04-02-DATA-DRIVEN DESIGN

9:10AM–10:30AM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Ali Mehmani** - *Prescriptive Data*
Chair: **Faez Ahmed** - *Massachusetts Institute of Technology*

Customer Journey Mapping Using Stochastic Models

Technical Paper Publication: IDETC2022-90000

Yiqing Ding - *Stanford University,* **Erin Macdonald** - *Stanford University*

Data Augmentation of Engineering Drawings for Data-Driven Component Segmentation

Technical Paper Publication: IDETC2022-91043

Wentai Zhang - *Carnegie Mellon University,* **Quan Chen** - *Carnegie Mellon University,* **Can Koz** - *Carnegie Mellon University,* **Liuyue Xie** - *Carnegie Mellon University,* **Amit Regmi** - *Carnegie Mellon University,* **Soji Yamakawa** - *Carnegie Mellon University,* **Tomotake Furuhata** - *Carnegie Mellon University,* **Kenji Shimada** - *Carnegie Mellon University,* **Levent Burak Kara** - *Carnegie Mellon University*

Scalar Field Prediction on Topologically-Varying Graphs Using Spectral Shape Encoding

Technical Paper Publication: IDETC2022-91209

Kevin Ferguson - *Carnegie Mellon University,* **James Hardin** - *Air Force Research Laboratory,* **Andrew Gillman** - *Air Force Research Laboratory,* **Levent Burak Kara** - *Carnegie Mellon University*

DAC-11-02-DESIGN OF ENGINEERING MATERIALS AND STRUCTURES

9:10AM–10:30AM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Andres Tovar** - *Indiana University–Purdue University Indianapolis*
Chair: **Hongyi Xu** - *University of Connecticut*

Phononic Metamaterial Design via Transfer Learning-Based Topology Optimization Framework

Technical Paper Publication: IDETC2022-89932

Zihan Wang - *University of Connecticut,* **Ran Zhuang** - *Stony Brook University,* **Weikang Xian** - *University of Connecticut,* **Jiawei Tian** - *Stony Brook University,* **Ying Li** - *University of Connecticut,* **Shikui Chen** - *Stony Brook University,* **Hongyi Xu** - *University of Connecticut*

Descriptor Aided Bayesian Optimization for Mixed Variable Materials Design With High Dimensional Qualitative Variables

Technical Paper Publication: IDETC2022-90177

Akshay Iyer - *Northwestern University,* **Suraj Yerramilli** - *Northwestern University,* **James Rondinelli** - *Northwestern University,* **Daniel Apley** - *Northwestern University,* **Wei Chen** - *Northwestern University*

Level-Set-Based Shape & Topology Optimization of Thermal Cloaks

Technical Paper Publication: IDETC2022-90726

Xiaoqiang Xu - *State University of New York at Stony Brook,* **Shikui Chen** - *State University of New York at Stony Brook*

Latent Variable Representations for Interactive Structural Design Exploration

Technical Paper Publication: IDETC2022-91076

Sofia Valdez - *The University of Texas at Austin,* **Nicholas Rodriguez** - *The University of Texas at Austin,* **Carolyn Seepersad** - *The University of Texas at Austin*

DFMLC-04-01-DESIGN FOR MANUFACTURING AND ASSEMBLY

9:10AM–10:30AM **MIDWAY SUITES 3**

Chair: **Soonjo Kwon** - *Kumoh National Institute of Technology*
Chair: **Daniel Cooper** - *University of Michigan*
Chair: **Steven Hoffenson** - *Stevens Institute of Technology*

Drive the Cobots Aright: Guidelines for Industrial Application of Cobots

Technical Paper Publication: IDETC2022-90777

Ali Ahmad Malik - *Oakland University,* **Vijitashwa Pandey** - *Oakland University*

Improved Method for Extracting Difficult-To-Machine Shapes Using Multiple Milling Simulation Results

Technical Paper Publication: IDETC2022-89579

Qi Chen - *Ibaraki University,* **Nobuyuki Umezu** - *Ibaraki University,* **Masatomo Inui** - *Ibaraki University*

Opportunities to Improve Automotive Manufacturing Process Yields to Reduce the Environmental Impacts of Vehicle Production

Technical Presentation: IDETC2022-97869

Seyed M Heidari - *University of Michigan,* **Daniel R. Cooper** - *University of Michigan*

Human Hand Motion Prediction in Disassembly Operations

Technical Paper Publication: IDETC2022-89967

Hao-Yu Liao - *University of Florida,* **Minghui Zheng** - *University at Buffalo, SUNY,* **Boyi Hu** - *University of Florida,* **Sara Behdad** - *University of Florida*

AVT-05-02 ADVANCES IN ELECTRIFICATION AND POWERTRAIN DESIGN

9:10AM–10:30AM **REGENCY A**

Chair: **Joel Anstrom** - *Penn State University*
Chair: **Ole Balling** - *Aarhus University*
Chair: **Venkat Ramakrishnan** - *FCA Group*
Chair: **Angelo Bonfitto** - *Politecnico di Torino*

Analytical Lumped-Parameter Model of Misaligned Gear Contacts for Efficient System Level Drivetrain Simulations

Technical Paper Publication: IDETC2022-88348

Jordi Marco I. Jordan - *KU Leuven,* **Bart Blockmans** - *KU Leuven,* **Wim Desmet** - *KU Leuven*

Crankshaft Decoupling Effects on Fuel Economy in HEV-P0

Technical Paper Publication: IDETC2022-90014

Shailesh Hegde - *Politecnico di Torino,* **Luis M. Castellanos Molina** - *Politecnico di Torino,* **Angelo Bonfitto** - *Politecnico di Torino,* **Renato Galluzzi** - *Tecnologico de Monterrey,* **Nicola Amati** - *Politecnico di Torino,* **Andrea Tonoli** - *Politecnico di Torino*

MSNDC-01-02: COMPUTATIONAL METHODS AND SOFTWARE TOOLS IN MULTIBODY SYSTEMS AND NONLINEAR DYNAMICS

10:50AM–12:10PM **REGENCY B**

Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Francisco Gonzalez** - *University of A Coruña*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **James Chagdes** - *Miami University*
Chair: **Alexander Humer** - *Johannes Kepler University*
Chair: **Alessandro Tasora** - *University of Parma*
Chair: **Ole Balling** - *Aarhus University*

Efficient Modelling of Wind Turbines Models Including Flexible Bodies Using the Articulated Body Algorithm

Technical Presentation: IDETC2022-89858

Ole Balling - *Aarhus University,* **Anton Dare** - *Aarhus University,* **Niclas Enrico Bøgedal Madsen** - *Aarhus University*

Multibody Model Simplification by Parameter Reduction

Technical Paper Publication: IDETC2022-90912

Javier Ros - *Public University of Navarre,* **Aitor Plaza** - *Public University of Navarre,* **Jose Fuentes** - *Public University of Navarre,* **Xabier Iriarte** - *Public University of Navarre*

A Boundary Value Problem for Covariance Analysis of Stochastically Perturbed Limit Cycles

Technical Paper Publication: IDETC2022-91153

Zaid Ahsan - *University of Illinois at Urbana-Champaign,* **Christian Kuehn** - *Technical University of Munich,* **Harry Dankowicz** - *University of Illinois at Urbana-Champaign*

Fast Data-Driven Model Reduction and Prediction for Non-Linearizable Dynamics

Technical Presentation: IDETC2022-97714

Joar Axås - *ETH Zürich,* **Mattia Cenedese** - *ETH Zürich,* **George Haller** - *ETH Zürich*

MSNDC-07-01 DYNAMICS OF SMART STRUCTURES AND SYSTEMS

10:50AM–12:10PM **REGENCY C**

Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Dumitru Caruntu** - *The University of Texas Rio Grande Valley*
Chair: **James Chagdes** - *Miami University*
Chair: **Andrea Arena** - *Sapienza University of Rome*

Non-Smooth Dynamics of Tapping Mode Atomic Force Microscopy

Technical Paper Publication: IDETC2022-88005

Pierpaolo Belardinelli - *UNIVPM,* **Abhilash Chandrashekar** - *TU Delft,* **Farbod Alijani** - *TU Delft,* **Stefano Lenci** - *UNIVPM*

Nonlinear Energy Sink and Targeted Energy Transfer in Smart Structures

Technical Paper Publication: IDETC2022-89608

Kevin Dekemele - *Ghent University,* **Patrick Van Torre** - *Ghent University,* **Mia Loccufier** - *Ghent University*

Comparison of the Hysteresis Response of Super-Coiled Polymer (SCP) Actuators

Technical Paper Publication: IDETC2022-90107

Josh Henry - *The University of the West Indies St. Augustine,* **Jacqueline Bridge** - *The University of the West Indies St. Augustine*

Characterization of Nonlinear Kirigami Springs Through Transient Response

Technical Paper Publication: IDETC2022-93913

Francesco Danzi - *Purdue University,* **Joshua Jenkins** – *DMC, Inc.,* **Hongcheng Tao** - *Purdue University,* **James Gibert** - *Purdue University*

MR-01-03 - MECHANISMS SYNTHESIS & ANALYSIS

10:50AM–12:10PM **GRAND A**

Chair: **Mark Plecnik** - *University of Notre Dame*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Craig Lusk** - *University of South Florida*

Design of Fourbar Linkages Using a Reinforcement Learning Optimization Method

Technical Paper Publication: IDETC2022-89953

Juan Gallego - *EAFIT University,* **Juan Munoz** - *EAFIT University,* **Jonathan Viquerat** - *PSL - Research University,* **Milton Aguirre** - *Purdue University*

Estimating the Complete Solution Set of the Approximate Path Synthesis Problem for Four-Bar Linkages Using Random Monodromy Loops

Technical Paper Publication: IDETC2022-90402

Aravind Baskar - *University of Notre Dame,* **Caroline Hills** - *University of Notre Dame,* **Mark Plecnik** - *University of Notre Dame,* **Jonathan Hauenstein** - *University of Notre Dame*

Design and Development of a Sit-to-Stand Device Using a Variational Autoencoder-Based Deep Neural Network

Technical Paper Publication: IDETC2022-90494

Zhijie Lyu - *Stony Brook University (SUNY),* **Anurag Purwar** - *Suny Stony Brook*

Forty-Two Watt I Indirect Cognates of a Four-Bar via Angular-Velocity Graph Coloring

Technical Paper Publication: IDETC2022-91339

Craig Lusk - *University of South Florida*

MR-04-02 - ORIGAMI-BASED ENGINEERING DESIGN

10:50AM–12:10PM **GRAND B**

Chair: **Jared Butler** - *Penn State University*
Chair: **Carl Nelson** - *University of Nebraska-Lincoln*
Chair: **Dongming Gan** - *Purdue University*

Origami-Inspired Closeouts for Starshade Inner Disk Optical Shields

Technical Paper Publication: IDETC2022-89515

Alexandra Haraszti - *California Institute of Technology,* **Manan Arya** - *Stanford University*

Dual-Purpose Lenticular Locking Hinges for Actuation and Stiffening of Deployable Origami Arrays

Technical Paper Publication: IDETC2022-89526

Nathan Brown - *Brigham Young University,* **Katie Varela** - *Brigham Young University,* **Collin Ynchausti** - *Brigham Young University,* **Larry Howell** - *Brigham Young University,* **Spencer Magleby** - *Brigham Young University*

Design of a Crawling Robot Based on Origami Structures

Technical Paper Publication: IDETC2022-89693

Shuiqing Yan - *Shanghai Jiao Tong University,* **Qi Wei** - *Second Aerospace Institute,* **Jiake Li** - *Second Institute of Aerospace,* **Zhe Ma** - *Second Aerospace Institute,* **Xiang Zhou** - *Shanghai Jiao Tong University*

Techniques for Designing Stable Flat-Foldable Wood Furniture

Technical Paper Publication: IDETC2022-89529

Bethany Parkinson - *Brigham Young University,* **Daniel Ames** - *Brigham Young University,* **David Andrews** - *Brigham Young University,* **David Morgan** - *Brigham Young University,* **Terri Bateman** - *Brigham Young University,* **Larry L. Howell** - *Brigham Young University,* **Spencer Magleby** - *Brigham Young University*

DEC-03-01-INNOVATIVE PRACTICES
10:50AM–12:10PM **MIDWAY SUITES 2**

Chair: **Elizabeth Starkey** - *Pennsylvania State University*

Teaching Machine Learning for Analysis and Design to Mechanical Engineering Students

Technical Paper Publication: IDETC2022-87482

Xiaoping Du - *Indiana University–Purdue University Indianapolis,* **Jianhua Yin** - *Indiana University–Purdue University Indianapolis*

An Exploration of Teachers' Competencies in Interdisciplinary Engineering Education

Technical Paper Publication: IDETC2022-88643

Xiaoqi Feng - *Aalto University,* **Katja Hölttä-Otto** - *University of Melbourne; Aalto University*

Now Is the Time! Exploring the Effects of Variations in the Timing of a Sustainable Design Educational Intervention

Technical Paper Publication: IDETC2022-90038

Mohammad Alsager Alzayed - *Kuwait University,* **Elizabeth Starkey** - *The Pennsylvania State University,* **Rohan Prabhu** - *Lafayette College*

An Integrative View of Teams: Team Feedback Dashboards

Technical Paper Publication: IDETC2022-91052

Nil Kilicay-Ergin - *Penn State University,* **Namratha Sri Mateti** - *Penn State University,* **Sri Harsha Chakrapani** - *Penn State University,* **Daniel Henderson** - *Penn State University,* **John Mitchell** - *Penn State University,* **Neeraj Sonalkar** - *Stanford University,* **Kathryn Jablokow** - *Penn State University*

DFMLC-06-01-DESIGN FOR ADDITIVE MANUFACTURING 2
10:50AM–12:10PM **MIDWAY SUITES 3**

Chair: **Paul Egan** - *Texas Tech University*
Chair: **Daniel Cooper** - *University of Michigan*
Chair: **Yaoyao Zhao** - *McGill University*

Adaptive Slicing Based on Accurately Assessing the Variations of the Model's Geometry for Staircase Effect and Dimensional Deviation Mitigation

Technical Paper Publication: IDETC2022-90764

Qinkai Yang - *Imperial College London,* **Connor Myant** - *Imperial College London*

Investigating the Relationship Between Geometric Features and Inspectability of Additive Manufactured Parts

Technical Paper Publication: IDETC2022-90787

Debrina Roy - *The Pennsylvania State University,* **Tanner Srbinovich** - *The Pennsylvania State University,* **Andrea P. Arguelles** - *The Pennsylvania State University,* **Jessica Menold** - *The Pennsylvania State University*

Design for Multi-Material Manufacturing Using Polyjet Printing Process: A Review

Technical Paper Publication: IDETC2022-91187

Charul Chadha - *University of Illinois at Urbana-Champaign,* **Gabriel Olaivar** - *University of Illinois at Urbana-Champaign,* **Albert E. Patterson** - *Texas A&M University, College Station,* **Iwona Jasiuk** - *University of Illinois at Urbana-Champaign*

Influence of Manufacturing Process Parameters on GRCop-42 Produced by Selective Laser Melting

Technical Paper Publication: IDETC2022-92015

Chris Sharp - George Fox University, **Joshua Herrick** - *George Fox University,* **Andrew Younglove** - *George Fox University*

CIE-10-01 - CAPPD: PRODUCT AND PROCESS DESIGN AUTOMATION AND COMPUTATIONAL FABRICATION

10:50AM–12:10PM **MIDWAY SUITES 11**

Chair: **Marco Rossoni** - *Politecnico di Milano*
Chair: **Jida Huang** - *University of Illinois at Chicago*

Challenges in Implementing Digital Twins: A Survey

Technical Paper Publication: IDETC2022-88786

Jakob Trauer - *Technical University of Munich,* **Michael Mutschler** - *Technical University of Munich,* **Markus Moertl** - *Technical University of Munich,* **Markus Zimmermann** - *Technical University of Munich*

Context-Aware Industrial Robot Testing: Low-Cost Virtual Prototyping Environment

Technical Paper Publication: IDETC2022-88794

Alessandro Pozzi - *Politecnico di Milano,* **Luca Puricelli** - *Politecnico di Milano,* **Marco Rossoni** - *Politecnico di Milano,* **Elena Spadoni** - *Politecnico di Milano,* **Marina Carulli** - *Politecnico di Milano,* **Monica Bordegoni** - *Politecnico di Milano,* **Giorgio Colombo** - *Politecnico di Milano*

Functional Module Identification in Product Digital Twins: A Preliminary Study

Technical Paper Publication: IDETC2022-91300

Maulik C. Kotecha - *Texas A&M University,* **Devesh Bhasin** - *Mathworks Inc.,* **David Staack** - *Texas A&M University,* **Daniel A. Mcadams** - *Texas A&M University*

Multi-Scale Topology Optimization With Neural Network-Assisted Optimizer

Technical Paper Publication: IDETC2022-89538

Sina Rastegarzadeh - *University of Illinois at Chicago,* **Jun Wang** - *University of Maryland,* **Jida Huang** - *University of Illinois At Chicago*

Normalization and Dimension Reduction for Machine Learning in Advanced Manufacturing

Technical Paper Publication: IDETC2022-89921

Jida Huang - *University of Illinois Chicago,* **Tsz Ho Kwok** - *Concordia University*

CIE-16-01 - SEIKM: KNOWLEDGE CAPTURE, REUSE, AND MANAGEMENT

10:50AM–12:10PM **MIDWAY SUITES 9**

Chair: **Yan Jin** - *University of Southern California*
Chair: **Hannah Walsh** - *NASA Ames Research Center*

Smart Standards: Modularization Approach for Engineering Standards

Technical Paper Publication: IDETC2022-88206

Janosch Luttmer - *University Duisburg-Essen,* **Dominik Ehring** - *University Duisburg-Essen,* **Robin Pluhnau** - *University Duisburg-Essen,* **Christine Kocks** - *University Duisburg-Essen,* **Arun Nagarajah** - *University Duisburg-Essen*

Semantic Search With Sentence-BERT for Design Information Retrieval

Technical Paper Publication: IDETC2022-89557

Hannah Walsh - *NASA Ames Research Center,* **Sequoia Andrade** - *HX5, LLC*

Decision Fusion Method for the Failure Form of Retired Parts Based on Cloud Model Optimization D-S Evidence Theory

Technical Paper Publication: IDETC2022-89657

Lei Wang - *Wuhan University of Science and Technology,* **Chengying Xu** - *Wuhan University of Science and Technology,* **Zelin Zhang** - *Wuhan University of Science and Technology,* **Xuhui Xia** - *Wuhan University of Science and Technology*

Design and Research of Intelligent QA System for Flight Crew Operating Manual

Technical Paper Publication: IDETC2022-90768

Xin Tan - *Shanghai Jiaotong University,* **Jingshu Zhong** - *Shanghai Jiaotong University,* **Yu Jin** - *Shanghai Aviation Industry(group) Co., Ltd.,* **Yan Liang** - *Expert IT Services,* **Yu Zheng** - *Shanghai Jiaotong University,* **Ying Liu** - *School of Engineering, Cardiff University*

Work Process Transfer Reinforcement Learning: Feature Extraction and Finetuning in Ship Collision Avoidance

Technical Paper Publication: IDETC2022-91145

Xinrui Wang - *University of Southern California,* **Yan Jin** - *University of Southern California*

CIE-23-01 - AMS-CAPPD-SEIKEM: DESIGN, SIMULATION AND OPTIMIZATION FOR ADDITIVE MANUFACTURING

10:50AM–12:10PM **MIDWAY SUITES 10**

Chair: **Zhuo Yang** - *Georgetown University*
Chair: **Gary Wang** - *Simon Fraser University*

Review of Transfer Learning in Additive Manufacturing Modeling

Technical Paper Publication: IDETC2022-89300

Yifan Tang - *Simon Fraser University,* **Mostafa Rahmani Dehaghani** - *Simon Fraser University,* **Gary Wang** - *Simon Fraser University*

Spatial-Temporal Modeling Using Deep Learning for Real-Time Monitoring of Additive Manufacturing

Technical Paper Publication: IDETC2022-91021

Hyunwoong Ko - *Arizona State University,* **Jaehyuk Kim** - *Pohang University of Science and Technology,* **Yan Lu** - *National Institute of Standards and Technology,* **Dongmin Shin** - *Hanyang University ERICA,* **Zhuo Yang** - *University of Massachusetts Amherst,* **Yosep Oh** - *Kyonggi University*

Using Coaxial Melt Pool Monitoring Image to Estimate Cooling Rate for Powder Bed Fusion Additive Manufacturing

Technical Paper Publication: IDETC2022-89934

Zhuo Yang - *University of Massachusetts Amherst,* **Brandon Lane** - *National Institute of Standards and Technology,* **Yan Lu** - *National Institute of Standards and Technology,* **Ho Yeung** - *National Institute of Standards and Technology,* **Jaehyuk Kim** - *National Institute of Standards and Technology,* **Yande Ndiaye** - *National Institute of Standards and Technology,* **Sundar Krishnamurty** - *University of Massachusetts Amherst*

Medial Axis Transformation Based Design and Process Planning Methodology for Discrete Multi-Material Additive Manufacturing

Technical Paper Publication: IDETC2022-89819

Madhanagopal Manoharan - *Indian Institute of Information Technology,* **Potnuru Hema Praneetha Naidu** - *Indian Institute of Information Technology,* **Midhun Joy** - *Indian Institute of Information Technology,* **Senthilkumaran Kumaraguru** - *Indian Institute of Information Technology*

GraMMaCAD: Interactively Defining Spatially Varying FGMs on BRep CAD Models

Technical Paper Publication: IDETC2022-89552

Thu Huong Luu - *TU Darmstadt,* **Christian Altenhofen** - *TU Darmstadt,* **André Stork** - *TU Darmstadt,* **Dieter Fellner** - *TU Darmstadt*

VIB-09-01: ROTATING SYSTEMS AND ROTOR DYNAMICS

2:10PM–3:50PM **NEW YORK CENTRAL - 2ND FL**

Chair: **Kiran D'Souza** - *The Ohio State University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Meng-Hsuan Tien** - *National Tsing Hua University*

Modal Synthesis Method for Inter-Blade Dry-Friction Surface Angle Design of Turbine Wheel for Vibration Suppression

Technical Paper Publication: IDETC2022-88382

Ludek Pesek - *Institute of Thermomechanics of the CAS, v.v.i.,* **Pavel Snabl** - *Institute of Thermomechanics of the CAS, v.v.i.,* **Chandra Shekar Prasad** - *Institute of Thermomechanics of the CAS, v.v.i.*

Rolling Bearing Sliding and Axial Cracking in Wind Turbine Gearboxes

Technical Presentation: IDETC2022-97655

Yi Guo - *National Renewable Energy Laboratory,* **Jonathan Keller** - *National Renewable Energy Laboratory,* **Shawn Sheng** - *National Renewable Energy Laboratory,* **Paul Veers** - *National Renewable Energy Laboratory*

Sector-Model-Based Subspace Iteration for Multi-Stage Bladed Disk Eigensolutions

Technical Presentation: IDETC2022-97877

Bin Dong - *University of Utah,* **Robert G. Parker** - *University of Utah*

MSNDC-06-01: NONLINEAR AND COMPUTATIONAL DYNAMICS ASPECTS IN BIOMECHANICS

2:10PM–3:50PM **REGENCY C**

Chair: **James Chagdes** - *Miami University*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Erik Chumacero-Polanco** - *University of Texas Rio Grande*
Chair: **Phil Voglewede** - *Marquette University*

The Foot in Walking - Developing a Constrained Model of Stance Phase Dynamics

Technical Paper Publication: IDETC2022-89185

Daniel Renjewski - *TU Munich,* **Michael Günther** - *Computational Biophysics and Biorobotics, Institute for Modelling and Simulation of Biomechanical Systems, University of Stuttgart,* **Susanne Lipfert** - *Betriebseinheit Angewandte Sportwissenschaft, Technische Universität München*

Identification of Motor Control Objectives in Human Locomotion via Multi-Objective Inverse Optimal Control

Technical Paper Publication: IDETC2022-89536

Matilde Tomasi - *Università di Pisa,* **Alessio Artoni** - *Università di Pisa*

Nonlinear Dynamics of Human Balancing

Technical Paper Publication: IDETC2022-89772

Rudolf R. Tóth - *Budapest University of Technology and Economics,* **Csenge A. Molnar** - *Budapest University of Technology and Economics,* **Gabor Stepan** - *Budapest University of Technology and Economics*

The Effect of the Balance Board Mass on the Stability, Equilibrium, and Robustness of the Human-Balance Board System

Technical Paper Publication: IDETC2022-90628

Erik Chumacero - *University of Texas Rio Grande,* **James Yang** - *Texas Tech University*

The Emergence of Limit Cycle Oscillations in Visual Manipulated Balance

Technical Presentation: IDETC2022-97909

Gabe Lenneman - *Miami University,* **James Chagdes** - *Miami University*

MSNDC-03-01: CONTACT AND INTERFACE DYNAMICS

2:10PM–3:50PM **REGENCY B**

Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Marco Morandini** - *Politecnico di Milano*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Dan Negrut** - *University of Wisconsin-Madison*
Chair: **James Chagdes** - *Miami University*

Modeling and Analysis of Uncertain Static Contact Characteristics for Revolute Clearance Joints

Technical Paper Publication: IDETC2022-88965

Sheng Liu - *Shanghai Jiao Tong University,* **Haidong Yu** - *Shanghai Jiao Tong Unversity,* **Bin Gu** - *Shanghai Jiao Tong University,* **Yong Zhao** - *Shanghai Jiao Tong Unversity*

On Practical Aspects of Variational Consistency in Contact Dynamics

Technical Paper Publication: IDETC2022-89152

Antonio Recuero - *Idaho National Laboratory,* **Alexander Lindsay** - *Idaho National Laboratory*

Mechanical Face Seal Dynamics Subjected to Machine Vibration and Noise

Technical Paper Publication: IDETC2022-91006

Itzhak Green - *Georgia Institute of Technology*

Dynamic Contact Analysis of Grosh Wheel Using Reduced Order System Approach

Technical Paper Publication: IDETC2022-91272

Akilesh G - *Indian Institute of Technology Madras,* **Manoj Pandey** - *Indian Institute of Technology Madras*

Towards Robust and Accurate Simulation of Contacts

Technical Presentation: IDETC2022-97882

Zachary Ferguson - *New York University*

VIB-03-02: DYNAMICS & WAVES IN SOLIDS AND METAMATERIALS II

2:10PM–3:50PM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Michael Leamy** - *Georgia Institute of Technology*
Chair: **Christopher G. Cooley** - *Oakland University*

Modular Design, Fabrication, and Experimental Exploration of Phononic Chains Incorporating Interchangeable, Nonlinear Unit Cells

Technical Paper Publication: IDETC2022-90043

Nehemiah Mork - *Georgia Institute of Technology,* **Matthew Fronk** - *United States Naval Academy,* **Michael Leamy** - *Georgia Institute of Technology*

Multi-Stop Band Wave Propagation in a Honeycomb Metamaterial With Embedded Resonators

Technical Paper Publication: IDETC2022-91070

Mauro Murer - *Sapienza University of Rome,* **Walter Lacarbonara** - *Sapienza University of Rome,* **Giovanni Formica** - *Roma Tre University*

Analysis of a Nonlinear Locally Resonant Metamaterial With Resistance-Inductance Shunt

Technical Paper Publication: IDETC2022-91109

Arun Malla - *Virginia Tech,* **Mohammad Bukhari** - *Virginia Polytechnic Institute,* **Oumar Barry** - *Virginia Polytechnic Institute*

Tunable Elastic Metasurfaces for Low-Frequency Reflected Wavefront Control

Technical Presentation: IDETC2022-95180

Zhenkun Lin - *University of Michigan,* **Serife Tol** - *University of Michigan*

DTM-02-03 - COMPUTATIONAL FRAMEWORKS IN DESIGN

2:10PM–3:50PM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Ethan Hilton** - *Louisiana Tech University*
Chair: **Apurva Patel** - *University of Texas at Dallas*

Deep Learning of Cross-Modal Tasks for Conceptual Design of Engineered Products: A Review

Technical Paper Publication: IDETC2022-90696

Xingang Li - *The University of Texas at Austin,* **Ye Wang** - *Autodesk, Inc.,* **Zhenghui Sha** - *The University of Texas at Austin*

Hey, Ai! Can You See What I See? Multimodal Transfer Learning-Based Design Metrics Prediction for Sketches With Text Descriptions

Technical Paper Publication: IDETC2022-91269

Binyang Song - *Massachusetts Institute of Technology,* **Scarlett Miller** - *The Pennsylvania State University,* **Faez Ahmed** - *Massachusetts Institute of Technology*

Role of Representation in Subsystem Clustering: Effects of Distance Between Elements

Technical Paper Publication: IDETC2022-91309

Apurva Patel - *Clemson University,* **Alexander Murphy** - *University of Texas at Dallas,* **Joshua Summers** - *University of Texas at Dallas,* **Chiradeep Sen** - *Florida Institute of Technology*

Computational Patterns of Team Interactions and Associations With Conflict Within New Product Development Teams

Technical Paper Publication: IDETC2022-88204

Shankaran Sitarama - *University of California at Berkeley,* **Alice M. Agogino** - *University of California at Berkeley*

Facial Expression Recognition as a Measure of User-Designer Empathy

Technical Paper Publication: IDETC2022-88924

Aleksi Salmi - *Aalto University,* **Jie Li** - *Aalto University,* **Katja Holtta-Otto** - *University of Melbourne*

Concreate: Using Data Physicalization to Increase the Understanding and Inspirational Use of Quantitative Data in Data-Driven Design Scenarios

Technical Paper Publication: IDETC2022-88844

Tiara Spalburg - *Delft University of Technology,* **Senthil Chandrasegaran** - *Delft University of Technology,* **Nicole Eikelenberg** - *Ford Research and Innovation Center Aachen,* **Milene Gonçalves** - *Delft University of Technology*

AVT-08-01 ADVANCES IN INTELLIGENT VEHICLES

2:10PM–3:50PM **REGENCY A**

Chair: **Ole Balling** - *Aarhus University*
Chair: **Liangyao Yu** - *Tsinghua University*
Chair: **Guangqiang Wu** - *Tongji University Shanghai*

Estimation of Vehicle Speed for Low Curvatures Assuming Ideal Steering Behaviour

Technical Paper Publication: IDETC2022-88919

Srikanth Kolachalama - *University of Michigan,* **Curtis L. Hay** - *General Motors Inc.,* **Hafiz Malik** - *University of Michigan*

Coupled Integral Sliding Mode Control for Bidirectional Automated Platoon With an Exponential Spacing Policy and Uncertainty Approximation

Technical Paper Publication: IDETC2022-90810

Natnael M. Negash - *Texas Tech University,* **James Yang** - *Texas Tech University*

Design of Low-Cost Mini Controller Area Network

Technical Paper Publication: IDETC2022-91261

Abdalla Makhlouf - *Military Technical College,* **Elsayed Ragab** - *Military Technical College,* **Bassam Abdelwahab** - *Military Technical College,* **Ahmed Qotb** - *Military Technical College,* **Mohamed Alaaeldin** - *Military Technical College,* **Aiman Mousa** - *Military Technical College,* **Mostafa Yacoub** - *Military Technical College*

Real Driving Route Simulation for Intelligent Traffic Modelling

Technical Paper Publication: IDETC2022-91316

Liangyao Yu - *Tsinghua University,* **Ruoqi Wang** - *Tsinghua University,* **Yiming Cheng** - *Tsinghua University*

Reducing Emissions and Noise at Airports Using Semi-Autonomous, Electric Aircraft Tugs

Technical Presentation: IDETC2022-97715

Brett Stone - *Utah Valley University,* **Matthew Jensen** - *Utah Valley University,* **John Salmon** - *Brigham Young University,* **Joshua Sachs** - *Utah Valley University,* **Josiah Mangum** - *Brigham Young University*

MSNDC-08-01 NONLINEAR ROTORDYNAMICS AND ROTATING SYSTEMS

4:10PM–5:50PM **REGENCY C**

Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Weidong Zhu** - *University of Maryland*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Pierangelo Masarati** - *Politecnico di Milano*
Chair: **Andrea Zanoni** - *Politecnico di Milano*
Chair: **James Chagdes** - *Miami University*
Chair: **Eduardo Okabe** - *University of Campinas*

A Generalized Torsional Dynamics Formulation for Multi-Mesh Gear Trains With Clearances and Torque Fluctuations

Technical Paper Publication: IDETC2022-88988

Ata Donmez - *The Ohio State University,* **Ahmet Kahraman** - *The Ohio State University*

Stability of Rotorcraft Ground Resonance by Estimating Lyapunov Characteristic Exponents From Multibody Dynamics

Technical Paper Publication: IDETC2022-88995

Gianni Cassoni - Politecnico di Milano, **Andrea Zanoni** - *Politecnico di Milano,* **Aykut Tamer** - *Imperial College London,* **Pierangelo Masarati** - *Politecnico di Milano*

Flexible Multibody Model of a Complete Tiltrotor for Aeroservoelastic Analysis

Technical Paper Publication: IDETC2022-89734

Alessandro Cocco - *Politecnico di Milano,* **Alberto Savino** - *Politecnico di Milano,* **Pierangelo Masarati** - *Politecnico di Milano*

Modeling, Simulation and Analysis of a Variable Inertia Reaction Wheel Assisting Device,

Technical Paper Publication: IDETC2022-89891

Eduardo Okabe - *Unicamp,* **José Luiz P. Brittes** - *University of Campinas,* **Daniel Miletto** - *University of Campinas*

Direct Torque Control of Electric Current Phase and Frequency in the Permanent-Magnet Synchronous Generator

Technical Paper Publication: IDETC2022-90635

Erik Chumacero - *The University of Texas Rio Grande,* **Aditya Akundi** - *The University of Texas Rio Grande Valley*

MSNDC-04-01 NONLINEAR DYNAMICS OF STRUCTURES

4:10PM–5:50PM **REGENCY B**

Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Richard Wiebe** - *University of Washington*
Chair: **James Chagdes** - *Miami University*
Chair: **Stefano Lenci** - *Polytechnic University of Marche*
Chair: **Ajeet Kumar** - *IIT Delhi*

Effect of the Impact Coefficient of Restitution on the Nonlinear Dynamics Phenomenon of Flat-Faced Follower With Polydyne Cam Mechanism With Clearance

Technical Paper Publication: IDETC2022-89430

Louay Yousuf - *San Diego State University*

Analysis of Energy Transfer Mechanisms in a Multi-DoF Nonlinear Oscillator With Multi-DoF Nonlinear Energy Sinks Subjected to Impulsive and Continuous Excitations

Technical Presentation: IDETC2022-89478

Bendeguz Dezso Bak - *Budapest University of Technology and Economics,* **Tamas Kalmar**-*Nagy* - *Budapest University of Technology and Economics*

Assessing the Sensitivity on State-Space Variables Through Isometric and Anisometric Integrity Measures

Technical Paper Publication: IDETC2022-89482

Pierpaolo Belardinelli - *UNIVPM,* **Stefano Lenci** - *UNIVPM*

Period-1 Motions to Homoclinic Orbits in the Rössler System

Technical Paper Publication: IDETC2022-91029

Siyuan Xing - *California Polytechnic State University,* **Albert Luo** - *Southern Illinois University Edwardsville*

Dynamics of a Nonlinear Absorber and Hand-Held Impact Machine

Technical Paper Publication: IDETC2022-91041

Oreoluwa Alabi - *Virginia Tech,* **Sunit Kumar Gupta** - *Virginia Tech,* **Oumar Barry** - *Virginia Tech*

VIB-15-02: MACHINE LEARNING APPLICATIONS IN VIBRATIONS AND DYNAMICS II

4:10PM–5:50PM **ILLINOIS CENTRAL - 2ND FL**

Chair: **David A. Najera-Flores** - *ATA Engineering*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Carianne Martinez** - *Sandia National Laboratories*

State Space Reconstruction From Partial Observables in Structural Dynamic Systems for Data-Driven Methods

Technical Presentation: IDETC2022-97801

David A. Najera-Flores - *ATA Engineering,* **Michael Todd** - *University of California, San Diego*

Anomaly Detection of a Steam Turbine by a Novel Auto-Encoder-Based Dynamic Threshold

Technical Presentation: IDETC2022-97851

Jin Uk Ko - *Seoul National University,* **Kyumin Na** - *Seoul National University,* **Byeng Dong Youn** - *Seoul National University*

Incorporating Machine Learning Models Within Structural Systems With Localized Nonlinearities

Technical Presentation: IDETC2022-97928

D. Dane Quinn - *The University of Akron,* **David Najera-Flores** - *ATA Engineering,* **Anthony Garland** - *Sandia National Laboratories,* **Vlachas Konstantinos** - *ETH Zurich,* **Carianne Martinez** - *Sandia National Laboratories,* **Eleni Chatzi** - *ETH Zurich,* **Michael Todd** - *University of California, San Diego*

DAC-06-01-DESIGN AND OPTIMIZATION OF ENERGY SYSTEMS

4:10PM–5:50PM **MIDWAY SUITES 7**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Jie Zhang** - *The University of Texas at Dallas*
Chair: **Cong Feng** - *National Renewable Energy Laboratory*

Optimizing Intentional Islanding Design Strategies for Enhanced Failure Resilience of Power Systems

Technical Paper Publication: IDETC2022-89619

Jiaxin Wu - *University of Illinois at Urbana-Champaign,* **Xin Chen** - *University of Illinois at Urbana-Champaign,* **Jie Zhang** - *The University of Texas at Dallas,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign*

Harnessing Operational Flexibility From Power to Hydrogen in a Grid-Tied Integrated Energy System

Technical Paper Publication: IDETC2022-89621

Jubeyer Rahman - *The University of Texas at Dallas,* **Roshni Anna Jacob** - *The University of Texas at Dallas,* **Jie Zhang** - *The University of Texas at Dallas*

Multidisciplinary Optimization to Reduce Cost and Power Variation of a Wave Energy Converter

Technical Paper Publication: IDETC2022-90227

Rebecca McCabe - *Cornell University,* **Olivia Murphy** - *Cornell University,* **Maha Haji** - *Cornell University*

Reliability-Based Optimization of Offshore Salt Caverns for CO2 Abatement

Technical Paper Publication: IDETC2022-90496

Zhuoyuan Zheng - *University of Illinois at Urbana-Champaign,* **Yanwen Xu** - *University of Illinois at Urbana-Champaign,* **Bayan Hamdan** - *University of Illinois at Urbana-Champaign,* **Sara Kohtz** - *University of Illinois at Urbana-Champaign,* **Pedro Vm Costa** - *MODECOM – Technology in Geomechanics and Computational Modeling,* **Alvaro M Costa** - *MODECOM – Technology in Geomechanics and Computational Modeling,* **Carlos Hb Morais** - *University of Sao Paulo,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign*

Exploring How the Heterogeneity of Building Types in Community Microgrids Impact Their Value Proposition

Technical Paper Publication: IDETC2022-90705

Philip Odonkor - *Stevens Institute of Technology*

DAC-07-02-DESIGN FOR ADDITIVE MANUFACTURING

4:10PM–5:50PM **MIDWAY SUITES 6**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Nicholas Meisel** - *The Pennsylvania State University*
Chair: **Josh Hamel** - *Seattle University*

Empirical Characterization of Lattice, Spring, and Non-Assembly Mechanisms Fabricated With Nylon Polymer Powder Bed Fusion

Technical Paper Publication: IDETC2022-90246

Nava Khatri - *Texas Tech University,* **Johnathan A. Smith** - *Texas Tech University,* **Paul F. Egan** - *Texas Tech University*

Analyzing Expert Design Cost Estimation for Additive Manufacturing

Technical Paper Publication: IDETC2022-90260

Glen Williams - *The Pennsylvania State University,* **Nicholas Meisel** - *The Pennsylvania State University,* **Timothy Simpson** - *The Pennsylvania State University,* **Christopher McComb** - *Carnegie Mellon University*

Design and Printability Evaluation of Heat Exchangers for Laser Powder Bed Fusion Process

Technical Paper Publication: IDETC2022-90533

Xuan Liang - *Carnegie Mellon University,* **Lisha White** - *Carnegie Mellon University,* **Jonathan Cagan** - *Carnegie Mellon University,* **Anthony D. Rollett** - *Carnegie Mellon University,* **Yongjie Jessica Zhang** - *Carnegie Mellon University*

Assessing the Manufacturability of Students' Early-Stage Designs Based on Previous Experience With Traditional Manufacturing and Additive Manufacturing

Technical Paper Publication: IDETC2022-91101

Seth Pearl - *Penn State,* **Nicholas Meisel** - *Penn State*

Computational Design of Additively Manufactured Curvilinear Scaffolds for Bone Repair

Technical Paper Publication: IDETC2022-90582

David Cohen - *University of Connecticut,* **Sohaila Aboutaleb** - *University of Illinois at Urbana-Champaign,* **Amy Wagoner Johnson** - *University of Illinois at Urbana-Champaign,* **Julian Norato** - *University of Connecticut*

DAC-17-01-DESIGN UNDER UNCERTAINTY
4:10PM–5:50PM **MIDWAY SUITES 8**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Xiaoping Du** - *Indiana University*
Chair: **Chao Hu** - *Iowa State University*

Uncertainty Quantification of Physics-Based Label-Free Deep Learning and Probabilistic Prediction of Extreme Events

Technical Paper Publication: IDETC2022-88277

Huiru Li - *Indiana University–Purdue University Indianapolis,* **Jianhua Liu** - *Indiana University–Purdue University Indianapolis,* **Xiaoping Du** - *Indiana University–Purdue University Indianapolis*

Envelope Method for Time- and Space-Dependent Reliability-Based Design

Technical Paper Publication: IDETC2022-89492

Hao Wu - *Indiana University–Purdue University Indianapolis,* **Xiaoping Du** - *Indiana University–Purdue University Indianapolis*

A New Framework for Efficient Sequential Sampling-Based RBDO Using Space Mapping

Technical Paper Publication: IDETC2022-89776

Jeong Woo Park - *KAIST,* **Ikjin Lee** - *KAIST*

Mobility Prediction of Off-Road Ground Vehicles Using a Dynamic Ensemble of Narx Models

Technical Paper Publication: IDETC2022-89928

Yixuan Liu - *University of Michigan-Dearborn,* **Dakota Barthlow** - *Oakland University,* **Zisimos Mourelatos** - *Oakland University,* **David Gorsich** - *U.S. Army CCDC Ground Vehicle Systems Center,* **Amandeep Singh** - *U.S. Army CCDC, Ground Vehicle Systems Center,* **Jice Zeng** - *University of Michigan-Dearborn,* **Zhen Hu** - *University of Michigan*

Long-Range Risk-Aware Path Planning for Autonomous Ships in Complex and Dynamic Environment

Technical Paper Publication: IDETC2022-89760

Chuanhui Hu - *University of Southern California,* **Yan Jin** - *University of Southern California*

DFMLC-08-01-SPECIAL SESSION-DESIGN TOOL SHOWCASE
4:10PM–5:50PM **MIDWAY SUITES 3**

Chair: **Paul Egan** - *Texas Tech University*
Chair: **Daniel Cooper** - *University of Michigan*

Medema Partanalyzer: Automated Cost and Runtime Estimation for Metals Manufacturing

Technical Presentation: IDETC2022-88075

Matthew Campbell - *Oregon State University*

Improved Method for Extracting Difficult-to Machine Shapes Using Multiple Milling Simulation Results

Technical Presentation: IDETC2022-97865

Masatomo Inui - *Ibaraki University,* **Qi Chen** - *Ibaraki University,* **Nobuyuki Umezu** - *Ibaraki University*

Design for Repair Tool

Technical Presentation: IDETC2022-97924

Núria Boix Rodríguez - *University of Parma,* **Claudio Favi** - *University of Parma*

Design Tool for Tissue Scaffold Design Evaluations Based on Human Design Decisions

Student Poster Presentation: IDETC2022-97942

Amit Arefin - *Texas Tech University,* **Paul Egan** - *Texas Tech University*

CIE-08-01 - CAPPD: HUMAN-IN-THE LOOP PRODUCT DESIGN AND AUTOMATION AND DIGITAL HUMAN MODELLING

4:10PM–5:50PM **MIDWAY SUITES 11**

Chair: **Tsz Ho Kwok** - *Concordia University*
Chair: **Anand Balu Nellippallil** - *Florida Institute of Technology*

Developing Requirements for a Manufacturing Training Platform: A Three-Pronged Approach

Technical Paper Publication: IDETC2022-89556

Rahul Sharan Renu - *Francis Marion University,* **James Righter** - *The Citadel,* **Jada Lytch** - *Francis Marion University*

Shaporator: Enabling Design Iteration for Young Designers Through Shape Verbalization

Technical Paper Publication: IDETC2022-90176

Shantanu Vyas - *Texas A&M University,* **Ting-Ju Chen** - *Texas A&M University,* **Jay Woodward** - *Texas A&M University,* **Vinayak Krishnamurthy** - *Texas A&M University*

Personalized Product Design Through Digital Fabrication

Technical Paper Publication: IDETC2022-91173

A. (Sander) L.M. Minnoye - *Delft University of Technology,* **Farzam Tajdari** - *Farzam,* **E. (Zjenja) L. Doubrovski** - *Delft University of Technology,* **Jun Wu** - *Delft University of Technology,* **Felix Kwa** - *Delft University of Technology,* **Willemijn S. Elkhuizen** - *Delft University of Technology,* **Toon Huysmans** - *Delft University of Technology,* **Yu (Wolf) Song** - *Delft University of Technology*

Quantifying Vision Obscuration of A-Pillar Concept Variants Using Digital Human Modeling

Technical Paper Publication: IDETC2022-89781

Sriram Srinivasan - *Oregon State University,* **H. Onan Demirel** - *Oregon State University*

A Morphological Evaluation of Shoulder Parameters: A Medical Support Tool for the Diagnosis

Technical Paper Publication: IDETC2022-89974

Anna Ghidotti - *University of Bergamo,* **Fabio Locatelli** - *University of Bergamo,* **Nicolò Belotti** - *University of Bergamo,* **Daniele Regazzoni** - *University of Bergamo,* **Caterina Rizzi** - *University of Bergamo*

Dynamic 3d Mesh Reconstruction Based on Nonrigid Iterative Closest-Farthest Points Registration

Technical Paper Publication: IDETC2022-90073

Farzam Tajdari - *Delft University of Technology,* **Felix Kwa** - *Delft University of Technology,* **Christiaan Versteegh** - *BATA Industrials,* **Toon Huysmans** - *Delft University of Technology,* **Yu Song** - *Delft University of Technology*

CIE-14-01 - SEIKEM: SMART MANUFACTURING INFORMATICS

4:10PM–5:50PM **MIDWAY SUITES 9**

Chair: **Hyunwoong Ko** - *Arizona State University*
Chair: **Matthew Sato** - *Stanford University*

Anomaly Detection of Laser Powder Bed Fusion Melt Pool Images Using Combined Unsupervised and Supervised Learning Methods

Technical Paper Publication: IDETC2022-88313

Matthew Sato - *Stanford University,* **Vivian Wen Hui Wong** - *Stanford University,* **Kincho Law** - *Stanford University,* **Ho Yeung** - *National Institute of Standards and Technology,* **Zhuo Yang** - *National Institute of Standards and Technology,* **Brandon Lane** - *National Institute of Standards and Technology,* **Paul Witherell** - *National Institute of Standards and Technology*

Knowledge and Data-Based Design and Dimensioning of Mechanical Joining Connections

Technical Paper Publication: IDETC2022-89172

Christoph Zirngibl - *Friedrich-Alexander-University Erlangen-Nürnberg,* **Christopher Sauer** - *Friedrich-Alexander-University Erlangen-Nürnberg,* **Benjamin Schleich** - *Friedrich-Alexander-University Erlangen-Nürnberg,* **Sandro Wartzack** - *Friedrich-Alexander-University Erlangen-Nürnberg*

Discovery of Customized Dispatching Rule for Single-Machine Production Scheduling Using Deep Reinforcement Learning

Technical Paper Publication: IDETC2022-89829

Ping Chong Chua - *Nanyang Technological University,* **Seung Ki Moon** - *Nanyang Technological University,* **Yen Ting Ng** - *Science and Engineering Research Council,* **Huey Yuen Ng** - *Singapore Institute of Manufacturing Technology,* **Manel Lopez** - *HP Inc.*

A Material Removal State Prediction Method Based on Multi-Scale Attention Mechanism

Technical Paper Publication: IDETC2022-90919

Zhihang Li - *Chongqing University,* **Qian Tang** - *Chongqing University,* **Ying Liu** - *Cardiff University,* **Xiao Li** - *Chongqing University*

In-Process Data Integration for Laser Powder Bed Fusion Additive Manufacturing

Technical Paper Publication: IDETC2022-91034

Milica Perisic - *National Institute of Standards and Technology,* **Yan Lu** - *National Institute of Standards and Technology,* **Albert Jones** - *National Institute of Standards and Technology*

Classification of Surface Defects on Galvanized Cold-Rolled Steel Sheets Using Data-Driven Faulty Model With Attention Mechanism

Technical Paper Publication: IDETC2022-91218

Hao Chen - *Tsinghua University,* **Zhenguo Nie** - *Tsinghua University,* **Qingfeng Xu** - *Tsinghua University,* **Jianghua Fei** - *Shanghai Baosight Software Co., Ltd.,* **Kang Yang** - *Shanghai Baosight Software Co., Ltd.,* **Yaguan Li** - *Taiyuan University of Technology,* **Wenhui Fan** - *Tsinghua University,* **Xin-Jun Liu** - *Tsinghua University*

CIE-23-02 - AMS-CAPPD-SEIKEM: DESIGN, SIMULATION AND OPTIMIZATION FOR ADDITIVE MANUFACTURING

4:10PM–5:50PM **MIDWAY SUITES 10**

Chair: **Yan Lu** - *National Institute of Standards and Technology*
Chair: **Fahad Milaat** - *National Institute of Standards and Technology*

STEP-NC Compliant Data Representations for Powder Bed Fusion in Additive Manufacturing

Technical Paper Publication: IDETC2022-90673

Fahad Milaat - *National Institute of Standards and Technology,* **Paul Witherell** - *National Institute of Standards and Technology,* **Martin Hardwick** - *STEP Tools, Inc.,* **Ho Yeung** - *National Institute of Standards and Technology,* **Vincenzo Ferrero** - *National Institute of Standards and Technology,* **Laetitia Monnier** - *National Institute of Standards and Technology,* **Matthew Brown** - *University of the District of Columbia*

Towards a Porosity Aware Stochastic Framework for Computing Apparent Mechanical Properties of Additively Manufactured Parts

Technical Paper Publication: IDETC2022-90992

Athanasios Iliopoulos - *U.S. Naval Research Laboratory,* **Colin Stewart** - *U.S. Naval Research Laboratory,* **Andrew Birnbaum** - *U.S. Naval Research Laboratory,* **John Steuben** - *U.S. Naval Research Laboratory,* **David Rowenhorst** - *U.S. Naval Research Laboratory,* **John Michopoulos** - *U.S. Naval Research Laboratory*

Design of a Bed Rotation Mechanism to Facilitate in Situ Photogrammetric Reconstruction of Printed Parts

Technical Paper Publication: IDETC2022-91106

Travis Roberts - *Clemson University,* **Sourabh Karmakar** - *Clemson University,* **Cameron Turner** - *Clemson University*

Assembly-Level Design for Additive Manufacturing Framework Supported by Axiomatic Design Theory

Technical Presentation: IDETC2022-94874

Ulanbek Auyeskhan - *Ulsan National Institute of Science and Technology,* **Clint Alex Steed** - *Ulsan National Institute of Science and Technology,* **Soohyung Park** - *Ulsan National Institute of Science and Technology,* **Dong-Hyun Kim** - *KITECH,* **Namhun Kim** - *Ulsan National Institute of Science and Technology*

Stress Trajectory Guided Structural Design and Topology Optimization

Technical Paper Publication: IDETC2022-89030

Junpeng Wang - *Technical University of Munich,* **Jun Wu** - *Delft University of Technology,* **Rüdiger Westermann** - *Technical University of Munich*

WEDNESDAY, AUGUST 17, 2022

VIB-11-01: TIME-DELAY SYSTEMS AND DISCONTINUOUS DYNAMICAL SYSTEMS

8:00AM–9:40AM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Zoltan Dombovari** - *Budapest University of Technology and Economics*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **David Lehotzky** - *Budapest University of Technology and Economics*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Ashu Sharma** - *Auburn University*

On the Modelling Bases of In-Motion Dynamic Characterization of Flexible Structures Subject to Friction and Position Control Delay

Technical Paper Publication: IDETC2022-90924

Zsolt Iklodi - *Budapest University of Technology and Economics,* **Xavier Beudaert** - *IDEKO,* **Zoltan Dombovari** - *Budapest University of Technology and Economics*

Evolution of Covid-19 Dynamics: Delay and Random Transmission Effects

Technical Presentation: IDETC2022-97804

B. Shayak - *University of Maryland,* **Mohit Manoj Sharma** - *Weill Cornell Medicine,* **Samarpan Chakraborty** - *University of Maryland,* **Balakumar Balachandran** - *University of Maryland*

Effects of Time Delay in Nonlinear Feedback-Enabled Bistable Resonators

Technical Presentation: IDETC2022-97965

Nikhil Bajaj - *University of Pittsburgh,* **Thomas Hinds** - *University of Pittsburgh,* **Joseph Mockler** - *University of Pittsburgh,* **George Chiu** - *Purdue University,* **Jeffrey Rhoads** - *Purdue University*

VIB-12-01: VIBRATION AND STABILITY OF MECHANICAL SYSTEMS

8:00AM–9:40AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Robert Parker** - *University of Utah*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*
Chair: **Bin Dong** - *University of Utah*
Chair: **Chenxin Wang** - *University of Utah*

Primary Resonance in a Weakly Forced Mathieu Equation With Parametric Damping

Technical Paper Publication: IDETC2022-91440

Jamal Ardister - *Michigan State University,* **Fatemeh Afzali** - *Michigan State University,* **Brian Feeny** - *Michigan State Univ*

Identification of Slowly Decaying Smooth Subspaces

Technical Presentation: IDETC2022-97920

Dalton Stein - *University of Rhode Island,* **Collin Treacy** - *University of Rhode Island,* **David Chelidze** - *University of Rhode Island*

Resolving Normal Modes From Full-Field Structural Response Using Smooth Mode Decomposition

Technical Presentation: IDETC2022-97954

Hewenxuan LI - *University of Rhode Island,* **David Chelidze** - *University of Rhode Island*

Mesh Phasing Effects on the Dynamics of Three-Dimensional Lumped-Parameter Planetary Gears

Technical Presentation: IDETC2022-97558

Chenxin Wang - *University of Utah,* **Bin Dong** - *University of Utah,* **Robert Parker** - *University of Utah*

MSNDC-06-02: NONLINEAR AND COMPUTATIONAL DYNAMICS ASPECTS IN BIOMECHANICS

8:00AM–9:40AM **REGENCY B**

Chair: **James Chagdes** - *Miami University*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Erik Chumacero-Polanco** - *University of Texas Rio Grande*
Chair: **Phil Voglewede** - *Marquette University*
Chair: **Sachin Goyal** - *University of California*

Simulation-Driven Analysis of Gait With Lower Limb Prosthesis

Technical Presentation: IDETC2022-97948

Jacques Ezechiel Nguessan - *University of California Merced,* **Muhammad Ahmed** - *University of California Merced,* **Sachin Goyal** - *University of California Merced,* **Matthew Leineweber** - *San José State University*

An Opensim Closed-Loop Forward-Dynamics Model to Simulate Pathological Hand Tremors

Technical Presentation: IDETC2022-97753

Wellington Pinheiro - *Federal University of Rio de Janeiro,* **Maria Claudia Castro** - *Centro Universitário FEI,* **Luciano Menegaldo** - *Federal University of Rio de Janeiro*

Muscle Force Estimation for a Simple Bicep Curl

Technical Presentation: IDETC2022-97951

Muhammad Hassaan Ahmed - *University of Califonia, Merced,* **Jacques-Ezechiel N'guessan** - *University of Califonia, Merced,* **Matthew Leineweber** - *San Jose State University,* **Sachin Goyal** - *University of Califonia, Merced*

Multi-Layered Finite Element Model Provides Insights Into the Influence of Adjacent Tissues on Shear Wave Propagation in the Achilles Tendon

Technical Presentation: IDETC2022-90693

Jonathon Blank - *University of Wisconsin-Madison,* **Lauren Welte** - *University of Wisconsin-Madison,* **Stephanie Cone** - *University of Wisconsin-Madison,* **Darryl Thelen** - *University of Wisconsin-Madison*

DTM-03-02 - HUMAN BEHAVIOR IN DESIGN

8:00AM–9:40AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Kosa Goucher-Lambert** - *University of California, Berkeley*
Chair: **Zhenghui Sha** - *The University of Texas at Austin*

Where Next?: Exploring Opportunity Areas and Tool Functions for Sustainable Product Design

Technical Paper Publication: IDETC2022-89638

Nicole Damen - *University of Nebraska Omaha,* **Ye Wang** - *Autodesk Research,* **Justin Matejka** - *Autodesk Research,* **Christine Toh** - *University of Nebraska Omaha*

Can I Get a Word In? the Impact of Turn-Taking and Gender on Engineering Design Students' Psychological Safety

Technical Paper Publication: IDETC2022-90010

Abby O'connell - *The Pennsylvania State University,* **Courtney Cole** - *The Pennsylvania State University,* **Susan Mohammed** - *The Pennsylvania State University,* **Kathryn Jablokow** - *The Pennsylvania State University,* **Scarlett Miller** - *The Pennsylvania State University*

An Empirical Study of the Impact of Task Expectation Framing on Design Decision Delegation

Technical Paper Publication: IDETC2022-90147

Richard Malak - *Texas A&M University,* **Rachel Smallman** - *Texas A&M University,* **Heather Lench** - *Texas A&M University*

Capturing Designers' Experiential Knowledge in Scalable Representation Systems: A Case Study of Knowledge Graphs for Product Teardowns

Technical Paper Publication: IDETC2022-90697

Nicole Goridkov - *University of Califonia, Berkeley,* **Vivek Rao** - *University of Califonia, Berkeley,* **Dixun Cui** - *University of Califonia, Berkeley,* **Daniele Grandi** - *Autodesk Research,* **Ye Wang** - *Autodesk Research,* **Kosa Goucher-Lambert** - *University of California, Berkeley*

Investigating How Engineers and Designers Communicate Design Rationale

Technical Paper Publication: IDETC2022-90833

Yakira Mirabito - *University of Califonia, Berkeley,* **Kosa Goucher-Lambert** - *University of Califonia, Berkeley*

Deriving Recommendations for the Use of Agent-Based Models in Engineering Design

Technical Paper Publication: IDETC2022-90961

Malena Agyemang - *Carnegie Mellon University,* **Noriana Radwan** - *The Pennsylvania State University,* **Sierra Hicks** - *The Pennsylvania State University,* **Fariha Azhar** - *The Pennsylvania State University,* **Ambrosio Valencia-Romero** - *Carnegie Mellon University,* **Christopher McComb** - *Carnegie Mellon University*

DFMLC-07-01-DESIGN OF PRODUCT-SERVICE AND ENERGY SYSTEMS

8:00AM–9:40AM **MIDWAY SUITES 3**

Chair: **Amin Mirkouei** - *University of Idaho*
Chair: **Daniel Cooper** - *University of Michigan*

Sustainability in an Age of Space Trash: Adapting Ion Thrusters for Use on Cubesats

Technical Paper Publication: IDETC2022-89955

Abigail Clarke-Sather - *University of Minnesota Duluth,* **Aaron Ashley** - *University of Minnesota Duluth*

Mixed Plastic Waste Conversion to Value-Added Products: Sustainability Assessment and a Case Study in Idaho

Technical Paper Publication: IDETC2022-89199

Galo Albor - *University of Idaho,* **Amin Mirkouei** - *University of Idaho-Idaho Falls,* **Ethan Struhs** - *University of Idaho*

Framing Evolving Market Structures Using a Business Model Canvas

Technical Paper Publication: IDETC2022-90367

Jacob Starks - *University of Oklahoma,* **Chandra Rai** - *University of Oklahoma,* **Deepak Devegowda** - *University of Oklahoma,* **Janet K. Allen** - *University of Oklahoma,* **Farrokh Mistree** - *University of Oklahoma*

MR-03-04 - COMPLIANT MECHANISMS (A. MIDHA SYMPOSIUM)

10:00AM–11:40AM **GRAND A**

Chair: **Just Herder** - *TU Delft*
Chair: **Jovana Jovanova** - *TU Delft*
Chair: **Dongming Gan** - *Purdue University*

Accuracy of Initially-Curved Cross-Axis Flexural Pivots

Technical Paper Publication: IDETC2022-88255

Simone Serafino - *University of Genoa,* **Pietro Fanghella** - *University of Genoa,* **Matteo Verotti** - *University of Genoa*

A Curved Compliant Differential Mechanism With Neutral Stability

Technical Paper Publication: IDETC2022-89406

Robin Mak - *TU Delft,* **Ali Amoozandeh Nobaveh** - *TU Delft,* **Giuseppe Radaelli** - *TU Delft,* **Just Herder** - *TU Delft*

Design and Nonlinear Analysis of an Overconstraint Based Constant Amplification Ratio Compliant Mechanism

Technical Paper Publication: IDETC2022-89555

Jiaxiang Zhu - *University College Cork,* **Guangbo Hao** - *University College Cork,* **Tinghao Liu** - *Universtiy College Cork,* **Haiyang Li** - *Dalian University of Technology*

A Stress-Deflection Model for Fixed-Clamped Flexures Using a Pseudo Rigid Body Approach

Technical Paper Publication: IDETC2022-89983

Connor Huxman - *The Pennsylvania State University,* **Jared Butler** - *The Pennsylvania State University*

Embedded Linear-Motion Developable Mechanisms on Cylindrical Developable Surfaces

Technical Paper Publication: IDETC2022-91288

Jacob Sheffield - *Brigham Young University,* **Brandon Sargent** - *Brigham Young University,* **Larry Howell** - *Brigham Young University*

MR-07-03 - NOVEL MECHANISMS, ROBOTS, AND APPLICATIONS

10:00AM–11:40AM **GRAND B**

Chair: **Giovanni Berselli** - *University of Genova, Italy*
Chair: **Mohammed El Kihal** - *Virginia Tech*

Jamming-Reinforced Inflatable Beams for Mobile Robotics

Technical Paper Publication: IDETC2022-89533

William Weston-Dawkes - *University of California, San Diego,* **Michael Tolley** - *University of California, San Diego*

Design and Modeling of a Biomimetic Robotic Wrist via Hybrid Mechanism

Technical Paper Publication: IDETC2022-89937

Mohammed El Kihal - *Virginia Tech,* **Jiamin Wang** - *Virginia Tech,* **Oumar Barry** - *Virginia Tech*

Design and Implementation of a Power-Dense, Modular, and Compact

Serpentine Articulated Tail

Technical Paper Publication: IDETC2022-90500

Isaac Pressgrove - *Virginia Tech,* **Yujiong Liu** - *Virginia Tech,* **Pinhas Ben-Tzvi** - *Virginia Tech*

Variable Resistance Suit (Vars) for Enhancing Resistance Training

Technical Paper Publication: IDETC2022-91042

Ibrahim Faith Kadhim - *University of Central Florida,* **Alvaro Andres Aracena Alvial** - *University of Central Florida,* **Eric Frankle** - *University of Central Florida,* **Gabriel Rios Carbonell** - *University of Central Florida,* **Saba M. Hosseini** - *University of Central Florida,* **David Fukuda** - *University of Central Florida,* **Jeffrey Stout** - *University of Central Florida,* **Joon-Hyuk Park** - *University of Central Florida*

Photometric Stereo Enhanced Light Sectioning Measurement for Microtexture Road Profiling

Technical Paper Publication: IDETC2022-91154

Siddharth Singh - *University of Virginia,* **Kallia Smith** - *University of Virginia,* **Tomonari Furukawa** - *University of Virginia*

MSNDC-04-02 NONLINEAR DYNAMICS OF STRUCTURES

10:00AM–11:40AM **REGENCY B**

Chair: **Pierpaolo Belardinelli** - *Polytechnic University of Marche*
Chair: **Antonio Recuero** - *Idaho National Laboratory*
Chair: **Radu Serban** - *University of Wisconsin-Madison*
Chair: **Richard Wiebe** - *University of Washington*
Chair: **James Chagdes** - *Miami University*
Chair: **Stefano Lenci** - *Polytechnic University of Marche*
Chair: **Ajeet Kumar** - *IIT Delhi*

Bifurcation Analysis of a PD Controlled Motion Stage With a Nonlinear Friction Isolator

Technical Paper Publication: IDETC2022-91125

Ehab Basta - *Virginia Polytechnic Institute and State University,* **Sunit Gupta** - *Virginia Polytechnic Institute and State University,* **Oumar Barry** - *Virginia Polytechnic Institute and State University*

Escape Times in Nonlinear Oscillators: An Experimental and Numerical Comparison of Responses to White and Pink Noise

Technical Presentation: IDETC2022-94983

Thomas Breunung - *University of Maryland, College Park,* **Balakumar Balachandran** - *University of Maryland, College Park*

Analysis of a Hysteretic Relay Oscillator Chain

Technical Presentation: IDETC2022-97326

Janos Lelkes - *Budapest University of Technology and Economics,* **Tamas Kalmar-Nagy** - *Budapest University of Technology and Economics*

Elongation Modeling for Elastic Flexible Cables Based on Passivity Theorem for Cable-Driven Parallel Robots

Technical Presentation: IDETC2022-97620

Vu N.D. Kieu - *Nguyen Tat Thanh University,* **Van Nam Giap** - *Hanoi University of Science and Technology,* **Shyh-Chour Huang** - *National Kaohsiung University of Science and Technology*

Stability Analysis of Stable Branches for a Stochastically Excited One Degree-of-Freedom System With Qubic Geometric Nonlinearity

Technical Presentation: IDETC2022-97895

Zoltan Gabos - *Budapest University of Technology and Economics,* **Zoltan Dombovari** - *Budapest University of Technology and Economics*

DTM-05-01-LIGHTNING TALKS: NEW AND REVISITING DIRECTIONS OF DTM

10:00AM–11:40AM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Maha Haji** - *Cornell University*
Chair: **Beshoy Morkos** - *University of Georgia*

Investigating the Effect of Design Representation Modality on Design Communication

Technical Presentation: IDETC2022-97961

Sandeep Krishnakumar - *The Pennsylvania State University,* **Grace Sibley** - *Pennsylvania State University,* **Jessica Menold** - *Pennsylvania State University*

Motivation and Value in Emergency Management Pre-Planning

Technical Presentation: IDETC2022-97779

Tera Maher - *University of Nebraska Omaha,* **Katelynn Kapalo** - *University of Nebraska at Omaha,* **Christine Toh** - *University of Nebraska at Omaha*

Between a Rock and a Hard Place: Investigating Cognitive Strategies for Prioritizing Complex Design Requirements

Technical Presentation: IDETC2022-97518

Nicole Damen - *University of Nebraska at Omaha,* **Christine Toh** - *University of Nebraska at Omaha*

Emerging Opportunities for Design Theories and Methods to Impact Healthcare

Technical Presentation: IDETC2022-88110

Paul Egan - *Texas Tech University*

Exploratory Study to Define Low, Medium and High-Fidelity Prototypes Within Product Design

Technical Presentation: IDETC2022-87840

Dane Hart - *University of Minnesota - Twin Cities,* **Carlye Lauff** - *University of Minnesota - Twin Cities*

DAC-21-01-EVOLVING CYBER-PHYSICAL-SOCIAL SYSTEMS

10:00AM–11:40AM **NEW YORK CENTRAL - 2ND FL**

Chair: **Christopher McComb** - *Carnegie Mellon University*
Chair: **Farrokh Mistree** - *The University of Oklahoma*
Chair: **Janet K. Allen** - *The University of Oklahoma*

Digital Engineering Platform for Synergistic Decision-Making In Manufacturing Plant Operations: Research Questions

Technical Paper Publication: IDETC2022-91277

BP Gautham - *TCS Research,* **Swaminathan Natarajan** - *TCS Research,* **Rishabh Shukla** - *TCS Research,* **Trinath Gaduparthi** - *TCS Research,* **Chetan Malhotra** - *TCS Research*

Generative Design of Cyber-Physical-Human System Families: Concepts and Research Issues

Technical Paper Publication: IDETC2022-91265

David Rosen - *Georgia Institute of Technology,* **Young Mi Choi** - *Georgia Institute of Technology*

A Design Framework for Evolving Cyber-Physical-Social System (CPSS) Based on Force Field

Technical Paper Publication: IDETC2022-89892

Ziqing Zhou - *Fudan University,* **Yanwei Sun** - *Beijing Institute of Technology,* **Chun Ouyang** - *Fudan University,* **Zhongxue Gan** - *Fudan University,* **Zhenjun Ming** - *Beijing Institute of Technology*

Designing Human-Centered Risk Frameworks for Cyber-Physical-Social Systems: The Case of Autonomous Vehicles and Bystander Privacy

Technical Paper Publication: IDETC2022-90958

Vivek Rao - *UC Berkeley,* **Ankita Joshi** - *UC Berkeley,* **Soo Min Kang** - *UC-Berkeley,* **Susan Lin** - *UC-Berkeley,* **Erin Junghyun Song** - *UC-Berkeley,* **Drew Miller** - *UC-Berkeley,* **Kosa Goucher-Lambert** - *UC-Berkeley,* **Alice Agogino** - *UC-Berkeley*

Group Value for Sustainable Evolving Cyber-Physical Social Systems

Technical Paper Publication: IDETC2022-90161

Anton van Beek - *University College Dublin*

Towards the Understanding of Nudging Strategies in Cyber-Physical-Social System In Manufacturing Environments

Technical Paper Publication: IDETC2022-90863

Xiaoou Yang - *University of Georgia,* **Ahreum Lim** - *University of Georgia,* **Aliki Nicolaides** - *University of Georgia,* **Beshoy Morkos** - *University of Georgia*

CIE-15-01 - SEIKEM: SYSTEMS ENGINEERING AND COMPLEX SYSTEMS

10:00AM–11:40AM **MIDWAY SUITES 9**

Chair: **Zhenghui Sha** - *The University of Texas at Austin*
Chair: **Astrid Layton** - *Texas A&M University*

A Comparison of Graph-Theoretic Approaches for Resilient System of Systems Design

Technical Paper Publication: IDETC2022-89939

Abheek Chatterjee - *Texas A&M University,* **Cade Helbig** - *Texas A&M University,* **Richard Malak** - *Texas A&M University,* **Astrid Layton** - *Texas A&M University*

Toward Generating System Architecture and Formal Functional Description in the Architecture Analysis and Design Language (AADL) With Structured Natural Language

Technical Paper Publication: IDETC2022-90002

Anshuman Chauhan - *Florida Institute of Technology,* **Parth Ganeriwala** - *Florida Institute of Technology,* **Chiradeep Sen** - *Florida Institute of Technology,* **Siddhartha Bhattacharyya** - *Florida Institute of Technology*

A Study on Hexapod Gait Adaptation by Enumerative Encoding and Particle Swarm Optimization

Technical Paper Publication: IDETC2022-90305

Victor Parque - *Waseda University*

Travel Links Prediction in Shared Mobility Networks Using Graph Neural Network Models

Technical Paper Publication: IDETC2022-90694

Yinshuang Xiao - *The University of Texas at Austin,* **Faez Ahmed** - *Massachusetts Institute of Technology,* **Zhenghui Sha** - *The University of Texas at Austin*

A Synthetic Tradespace Model for Tradespace Analysis and Exploration

Technical Paper Publication: IDETC2022-91080

Cameron Turner - *Clemson University,* **Nafiseh Masoudi** - *Clemson University,* **Hannah Stewart** - *Clemson University,* **Julia Daniels** - *Clemson University,* **David Gorsich** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Denise Rizzo** - *US. Army DEVCOM Ground Vehicle Systems Center,* **Rachel Agusti** - *U.S Army DEVCOM Ground Vehicle Systems Center,* **Annette Skowronska** - *US Army DEVCOM Ground Vehicle Systems Center,* **Matt Castanier** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Stephen H. Rapp** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Greg Hartman** - *U.S. Army DEVCOM Ground Vehicle Systems Center*

Tradespace Organizational Practices: A Case Study

Technical Paper Publication: IDETC2022-91091

Julia Daniels - *Clemson University,* **John Wagner** - *Clemson University,* **Cameron Turner** - *Clemson University,* **David Gorsich** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Denise Rizzo** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Greg Hartman** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Rachel Agusti** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Annette Skowronska** - *US Army DEVCOM Ground Vehicle Systems Center,* **Matt Castanier** - *U.S. Army DEVCOM Ground Vehicle Systems Center,* **Stephen H. Rapp** - *U.S. Army DEVCOM Ground Vehicle Systems Center*

CIE-22-01 - AMS-CAPPD: DIGITAL TWIN: ADVANCED HUMAN MODELING AND SIMULATION IN ENGINEERING

10:00AM–11:40AM **MIDWAY SUITES 11**

Chair: **James Yang** - *Texas Tech University*
Chair: **Yujiang Xiang** - *Oklahoma State University*

Assessments and Evaluation Methods for Upper Limb Exoskeleton - a Literature Survey

Technical Paper Publication: IDETC2022-88968

Seunghun Lee - *Texas Tech University,* **Yujiang Xiang** - *Oklahoma State University,* **Ting Xia** - *Northern Illinois University,* **James Yang** - *Texas Tech University*

Hybrid Predictive Model for Assessing Spinal Loads for 3d Asymmetric Lifting

Technical Paper Publication: IDETC2022-89127

Rahid Zaman - *Oklahoma State University,* **Joel Quarnstrom** - *Oklahoma State University,* **Yujiang Xiang** - *Oklahoma State University,* **Ritwik Rakshit** - *Texas Tech University,* **James Yang** - *Texas Tech University*

Resilience Modeling in Complex Engineered Systems With Human-Machine Interactions

Technical Paper Publication: IDETC2022-89531

Lukman Irshad - *KBR Inc. (NASA Ames Research Center),* **Daniel Hulse** - *NASA Ames Research Center*

Human Grasping Force Prediction, Measurement, and Validation for Human-Robot Lifting

Technical Paper Publication: IDETC2022-89752

Asif Arefeen - *Oklahoma State University,* **Joel Quarnstrom** - *Oklahoma State University,* **Shahbaz Peeran Qadri Syed** - *Oklahoma State University,* **He Bai** - *Oklahoma State University,* **Yujiang Xiang** - *Oklahoma State University*

Upper Extremity Joint Torque Estimation Through an EMG-Driven Model

Technical Paper Publication: IDETC2022-89952

Shadman Tahmid - *Texas Tech University,* **Josep Maria Font Llagunes** - *Universitat Politècnica de Catalunya,* **James Yang** - *Texas Tech University*

Framework Design of a Digital Twin of an XY Compliant Parallel Manipulator Based on Non-Negative Matrix Factorization

Technical Paper Publication: IDETC2022-89187

Xueguan Song - *Dalian University of Technology,* **Kunpeng Li** - *Dalian University of Technology,* **Shuo Wang** - *Dalian University of Technology,* **Ziyun Kan** - *Dalian University of Technology,* **Haiyang Li** - *Dalian University of Technology,* **Jiaxiang Zhu** - *University College Cork,* **Guangbo Hao** - *University College Cork*

CIE-24-02 - AMS-CAPPD-SEIKEM: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN DESIGN AND MANUFACTURING

10:00AM–11:40AM **MIDWAY SUITES 10**

Chair: **Dazhong Wu** - *University of Central Florida*
Chair: **Mohsen Moghaddam** - *Northeastern University*

Finding Optimal Sequence of Mobile Manipulator Placements for Automated Coverage Planning of Large Complex Parts

Technical Paper Publication: IDETC2022-90105

Rishi Malhan - *University of Southern California,* **Satyandra Gupta** - *University of Southern California*

Aspect-Sentiment-Guided Opinion Summarization for User Need Elicitation From Online Reviews,

Technical Paper Publication: IDETC2022-90108

Yi Han - *Northeastern University,* **Mohsen Moghaddam** - *Northeastern University,* **Meet Tusharbhai Suthar** - *Purdue University,* **Gaurav Nanda** - *Purdue University*

Knowledge Extraction Method to Support Domain Integrated Design Methodology

Technical Paper Publication: IDETC2022-90688

Siyuan Sun - *McGill University,* **Pavan Tejaswi Velivela** - *McGill University,* **Yong Zeng** - *Concordia University,***Yaoyao Fiona Zhao** - *McGill University*

Information Fusion-Based Meta-Learning for Few-Shot Fault Diagnosis Under Different Working Conditions

Technical Paper Publication: IDETC2022-90934

Tingli Xie - *Georgia Institute of Technology,* **Xufeng Huang** - *Huazhong University of Science & Technology,* **Seung-Kyum Choi** - *Georgia Institute of Technology*

Learning the Part Shape and Part Quality Generation Capabilities of Machining and Finishing Processes Using a Neural Network Model

Technical Paper Publication: IDETC2022-91115

Changxuan Zhao - *Georgia Institute of Technology,* **Shreyes Melkote** - *Georgia Institute of Technology*

Application of Transfer Learning in Metalworking Fluid Distinction

Technical Paper Publication: IDETC2022-89452

Xiao Wei - *University of Duisburg-Essen,* **Fabian Jochmann** - *University of Duisburg-Essen,* **Anna Lena Demmerling** - *Rhenus Lub GmbH & Co KG,* **Dirk Söffker** - *University of Duisburg-Essen*

MR-04-03 - ORIGAMI-BASED ENGINEERING DESIGN
1:15PM–2:55PM **GRAND B**

Chair: **Shikui Chen** - *Stony Brook University*
Chair: **Jovana Jovanova** - *TU Delft*

A Preliminary Approach to Select an Origami Source Pattern for Deployable Space Arrays

Technical Paper Publication: IDETC2022-90033

Diana Bolanos - *Brigham Young University,* **Collin Ynchausti** - *Brigham Young University,* **Spencer Magleby** - *Brigham Young University*

Programming Surfaces by Bistable Star Tiling Kirigami

Technical Paper Publication: IDETC2022-88761

Ryuya Toyoka - *Tachi Lab,* **Tomohiro Tachi** - *The University of Tokyo*

Origami Claw Tessellation and Its Stacked Structure

Technical Paper Publication: IDETC2022-88680

David Xing - *University of Oxford,* **Zhong You** - *University of Oxford*

Kinematics of an Origami Inspired Millipede Robot

Technical Paper Publication: IDETC2022-88998

Chenying Liu - *University of Oxford,* **Zhong You** - *University of Oxford,* **Perla Maiolino** - *University of Oxford*

MR-07-04 - NOVEL MECHANISMS, ROBOTS, AND APPLICATIONS
1:15PM–2:55PM **GRAND A**

Chair: **Girish Krishnan** - *University of Illinois at Urbana-Champaign*
Chair: **Dongming Gan** - *Purdue University*
Chair: **Andrew Sharp** - *NASA*

Practical End-Effector Development Through Task Interface Taxonomy Analysis

Technical Paper Publication: IDETC2022-89299

Andrew Sharp - *NASA,* **Austin Lovan** - *NASA,* **Eduardo Herrera** - *NASA,* **Evan Laske** - *NASA*

Multi-Axes Series Elastic Actuation: A Computer Model

Technical Paper Publication: IDETC2022-90117

Haohan Zhang - *University of Utah*

A Variable Stiffness Continuum Parallel Manipulator With 3D Printed Pneumatic Artificial Muscles

Technical Paper Publication: IDETC2022-91176

Zhujin Jiang - *Queen Mary University of London,* **Chen Liu** - *Queen Mary University of London,* **Ketao Zhang** - *Queen Mary University of London*

Experimental Characterization and Modeling of a Unit Soft Air Bladder

Technical Paper Publication: IDETC2022-91266

Sandra Edward - *University of Illinois at Urbana-Champaign,* **Mahshid Mansouri** - *University of Illinois at Urbana-Champaign,* **Elizabeth T. Hsiao-Wecksler** - *University of Illinois at Urbana-Champaign,* **Girish Krishnan** - *University of Illinois at Urbana-Champaign*

VIB-03-03: DYNAMICS & WAVES IN SOLIDS AND METAMATERIALS III

1:15PM–2:55PM **ILLINOIS CENTRAL - 2ND FL**

Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Serife Tol** - *University of Michigan*
Chair: **Michael Leamy** - *Georgia Institute of Technology*
Chair: **Pai Wang** - *University of Utah*

Band Gap Resonances in Finite Periodic Bilayer Beams

Technical Presentation: IDETC2022-97569

Sangwon Park - *University of Illinois at Urbana-Champaign,* **Kathryn Matlack** - *University of Illinois at Urbana-Champaign*

Conformal Gradient Index Phononic Crystal Lens Design for Elastic Wave Focusing in Curved Structures

Technical Presentation: IDETC2022-97712

Hrishikesh Danawe - *University of Michigan,* **Didem Ozevin** - *University of Illinois at Chicago,* **Serife Tol** - *University of Michigan*

Resonance-Based Mechanical Vibration Enhancement for Non-Contact Vibration Monitoring

Technical Presentation: IDETC2022-97930

Dajun Zhang - *University of Wisconsin-Madison,* **Chu Ma** - *University of Wisconsin-Madison*

Parity-Time Symmetric Dynamics in Counter-Rotating Gyroscopic Mechanical Systems

Technical Presentation: IDETC2022-97941

Bin Dong - *University of Utah,* **Chengzhi Shi** - *Georgia Institute of Technology,* **Robert G. Parker** - *University of Utah*

DTM -04-02 - TRENDS IN MANUFACTURABILITY & DESIGN OF COMPLEX SYSTEMS

1:15PM–2:55PM **MIDWAY SUITES 5**

Chair: **Vimal Viswanathan** - *San Jose State University*
Chair: **Daniel A. McAdams** - *Texas A&M University*
Chair: **Mahmoud Dinar** - *Sacramento State University*

Iterations in Design and Development Process Illustrated Using Reconfigurable Robot Case Study

Technical Paper Publication: IDETC2022-89857

Kristor Leong - *Singapore University of Technology and Design,* **Abdullah Aamir Hayat** - *Singapore University of Technology and Design,* **Lim Yi** - *Singapore University of Technology and Design,* **Mohan Elara** - *Singapore University of Technology and Design,* **Karthikeyan Elangovan** - *Technology Innovation Institute*

The Effect of Leveraging Function-Sharing on System Modularity

Technical Paper Publication: IDETC2022-90728

Devesh Bhasin - *MathWorks Inc.,* **Daniel McAdams** - *Texas A&M University*

Boone's Buddies: Design of a Prosthetic Rear Limb Set for Dogs With Severe Amputations

Technical Paper Publication: IDETC2022-90778

Scott Steinbrink - *Gannon University,* **Julia Baumgarner** - *Gannon University,* **Noah Cardella** - *Gannon University,* **Samantha Moretti** - *Gannon University,* **Emily Schweitzer** - *Gannon University,* **Davide Piovesan** - *Gannon University*

Additive Manufacturability Analysis of Multiscale Aperiodic Structures: a Statistical Mechanics Approach

Technical Paper Publication: IDETC2022-89741

Olivia Trautschold - *Oregon State University,* **Andy Dong** - *Oregon State University*

Exploring Rules of Sustainable Design With Compositional Manufacturing

Technical Paper Publication: IDETC2022-90183

Jacob Bjorni - *California State University Sacramento,* **Mahmoud Dinar** - *California State University Sacramento*

VIB-08-02: NONLINEAR SYSTEMS & PHENOMENA II

1:15PM–2:55PM **NEW YORK CENTRAL - 2ND FL**

Chair: **Mohammad A. Al-Shudeifat** - *Khalifa University*
Chair: **Christopher G. Cooley** - *Oakland University*
Chair: **Peter Coffin** - *Sandia National Laboratories*

Dispersion Properties of Nonlinear Metamaterial Beams Hosting Nonlinear Resonators

Technical Presentation: IDETC2022-97757

Yichang Shen - *Sapienza University of Rome,* **Walter Lacarbonara** - *Sapienza University of Rome*

Nonlinear Dynamics of Thermoelastic Structures to Resonant Excitations

Technical Presentation: IDETC2022-97841

Darshan Soni - *Purdue University,* **Anil Bajaj** - *Purdue University,* **Manoj Pandey** - *Indian Institute of Technology, Madras*

Modeling and Analysis of a Constrained Two-Rigid-Body System Using Nonholonomic Lagrange Equations

Technical Presentation: IDETC2022-97866

Jamal Ardister - *Michigan State University,* **Brian Feeny** - *Michigan State University*

Analytical Solutions for Dynamics of Lumped-Parameter Planetary Gears Having Degenerate Modes

Technical Presentation: IDETC2022-97593

Chenxin Wang - *University of Utah,* **Robert Parker** - *University of Utah*

CIE-24-03 - AMS-CAPPD-SEIKEM: ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN DESIGN AND MANUFACTURING

1:15PM–2:55PM **MIDWAY SUITES 10**

Chair: **Zhuo Yang** - *Georgetown University*
Chair: **Jiarui Xie** - *McGill University*

Multi-Fidelity Physics-Constrained Neural Networks With Minimax Architecture for Materials Modeling

Technical Paper Publication: IDETC2022-91219

Dehao Liu - *Binghamton University,* **Pranav Pusarla** - *Georgia Institute of Technology,* **Yan Wang** - *Georgia Institute of Technology*

Combining Feature Learning and Transfer Learning in Balancing Anomaly Detection for Gas Turbine Engine Vibration Analysis

Technical Paper Publication: IDETC2022-88223

Jiarui Xie - *McGill University,* **Katherine Schmidt** - *Siemens Energy,* **Nausica Budeanu** - *Siemens Energy,* **Vincent Letendre** - *Siemens Energy,* **Yaoyao Zhao** - *McGill University*

A Sequential Decision Making Approach to Learn Process Parameters by Conducting Experiments on Sacrificial Objects

Technical Paper Publication: IDETC2022-89810

Yeo Jung Yoon - *University of Southern California,* **Satyandra Gupta** - *University of Southern California*

Resource-Efficient Machining Through Physics-Informed Machine Learning

Technical Presentation: IDETC2022-97368

Máté Tóth - *The University of Sheffield,* **Elizabeth Cross** - *The University of Sheffield,* **Neil Sims** - *The University of Sheffield,* **Timothy Rogers** - *The University of Sheffield,* **Adam Brown** - *Advanced Manufacturing Research Centre*

A Robust Multi-Objective Parameter Optimization in Selective Laser Melting Using Unsupervised Learning

Technical Presentation: IDETC2022-97286

Adrian M. Chung Baek - *Ulsan National Institute of Science and Technology,* **Eunju Park** - *Ulsan National Institute of Science and Technology ,* **Namhun Kim** - *Ulsan National Institute of Science and Technology*

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AVT-02 Advances in Modelling and Testing of Tires and Tire-Terrain Interaction
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AVT-05-01 Advances in Vehicle Electrification and Powertrain Design
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Yan Lu - *NIST,* **Dazhong Wu** - *University of Central Florida*, **Douglas L. Van Bossuyt** - *Naval Postgraduate School*, **Zhuo Yang** - *University of Massachusetts Amhurst*

CIE-13 SEIKEM: SEIKM: Design Informatics
Ying Liu - *Cardiff University,* **Yuqian Lu** - *Department of Mechanical Engineering*, **Xin Guo** - *Sichuan University*, **Pai Zheng** - *The Hong Kong Polytechnic University*, **Kuo-Yi Lin** - *Tongji University*

CIE-14 SEIKEM: Smart Manufacturing Informatics
Ying Liu - *Cardiff University*, **Hyunwoong Ko** - *Arizona State University*

CIE-15 SEIKEM: Systems Engineering and Complex Systems
Bryan O'Halloran - *Naval Postgraduate School*, **Douglas Van Bossuyt** - *KTM Research*

CIE-16 SEIKM: Knowledge Capture, Reuse, and Management
Farhad Ameri - *Texas State University,* **Chris Hoyle** - *Oregon State University*

CIE-17 SEIKEM Special Session: Mission Engineering
Douglas Van Bossuyt - *KTM Research,* **Dazhong Wu** - *University of Central Florida*

CIE-18 SEIKM Special Session: Smart Product-Service System
Marina Carulli - *Politecnico Di Milano,* Tao Peng - *Zhejiang University,* Xin Guo - *Sichuan University,* Vinayak Krishnamurthy - *Texas A&M University,* Andrea Vitali - *Universitã Di Bergamo,* Ying Liu - *Cardiff University,* Christian Lopez - *Lafayette College,* Pai Zheng - *The Hong Kong Polytechnic University,* Zuoxu Wang - *Beihang University,* Wang - *Beihang University,* Wenyan Song - *Beihang University ,* Yu Zheng - *Shanghai Jiao Tong University ,* Xinyu Li - *Donghua University*

CIE-19 VES: Virtual Environments and Design Visualization (VES General)
Vinayak Krishnamurthy - *Texas A&M University,* Marina Carulli - *Politecnico Di Milano*, Andrea Vitali - *Universitã Di Bergamo*

CIE-20 VES: Technologies for VR, AR, and MR (Methods, Processes, and Applications)
Pai Zheng - *The Hong Kong Polytechnic University,* Tao Peng - *Zhejiang University,* Marina Carulli - *Politecnico Di Milano,* Andrea Vitali - *Universitã Di Bergamo,* Christian Lopez - *Lafayette College,* Xinyu Li - *Donghua University*

CIE-21 AMS-CAPPD: Digital Twin: Advanced Human Modeling and Simulation in Engineering
Vinayak Krishnamurthy - *Texas A&M University,* Tsz Ho Kwok - *Concordia University,* Marina Carulli - *Politecnico Di Milano,* Xianlian Zhou - *New Jersey Institute of Technology,* Yujiang Xiang - *Oklahoma State University,* James Yang - *Texas Tech University,* Zhenghui Sha - *The University of Texas at Austin*

CIE-22 SEIKM: Human System Integration
James Yang - *Texas Tech University,* Tsz Ho Kwok - *Concordia University,* Xianlian Zhou - *New Jersey Institute of Technology,* Yujiang Xiang - *Oklahoma State University,* Zhenghui Sha - *The University of Texas at Austin*

CIE-23 AMS-CAPPD-SEIKEM: Design, Simulation and Optimization for additive manufacturing
Hyunwoong Ko - *Arizona State University,* Yan Lu - *NIST*, Zhuo Yang - *University of Massachusetts Amhurst*

CIE-24 AMS-CAPPD-SEIKEM: Artificial Intelligence and Machine Learning in Design and Manufacturing
Yan Lu - *NIST*, Ehsan T Esfahani - *University at Buffalo,* James Yang - *Texas Tech University*, Zhuo Yang - *University of Massachusetts Amhurst*

CIE–25 Graduate Student Poster Symposium
Jida Huang , *University of Illinois at Chicago*

CIE-26 VES Video Presentation Exhibit: Visualization and Virtual Demonstration of Prototypes and Simulations
Christian Lopez - *Lafayette College*

DAC-01: Control Co-Design
Daniel Herber - *Colorado State University,* Herschel Pangborn - *Penn State University*

DAC-02: Artificial Intelligence and Machine Learning for Challenging Real-World Problems in Design Automation
Payam Ghassemi - *University of Buffalo,* Philip Odonkor - *Stevens Institute of Technology,* Zhibo Zhang - *University At Buffalo, SUNY*

DAC-03: Novel AI or ML Frameworks for Design or Systems Science
Daniel Selva - *Texas A&M University,* Souma Chowdhury - *University of Buffalo,* Wei (Wayne) Chen - *Northwestern University*

DAC-04: Data-Driven Design
Faez Ahmed - *Massachusetts Institute of Technology,* Souma Chowdhury - *University of Buffalo,* Ali Mehmani - *Prescriptive Data*

DAC-05: Decision Making in Engineering Design
Jesse Austin-Breneman - *University of Michigan,* Venkat Nemani - *Iowa State University*

DAC-06: Design and Optimization of Energy Systems
Jie Zhang - *University of Texas at Dallas,* Ali Mehmani - *Prescriptive Data,* Cong Feng - *UT Dallas*

DAC-07: Design for Additive Manufacturing
Nicholas Meisel - *The Pennsylvania State University,* Yaoyao Zhao - *McGill University,* Josh Hamel - *Seattle University*

DAC-08: Design for Market Systems
Steven Hoffenson - *Stevens Institute of Technology,* Kate Whitefoot - *Carnegie Mellon University*

DAC-09: Design for Resilience and Failure Recovery
Zequn Wang - *Michigan Technological University,* Zhimin Xi - *Rutgers University,* Chris Hoyle - *Oregon State University*

DAC-10: Design of Complex Systems
Beshoy Morkos - *University of Georgia,* Rahul Sharan Renu - *Francis Marion University*

DAC-11: Design of Engineering Materials and Structures
Yuqing Zhou - *Toyota,* Xingchen Liu - *ICSI,* Andres Tovar - *Indiana University–Purdue University Indianapolis,* Hongyi Xu - *University of Connecticut*

DAC-12: Engineering for Global Development
Natasha Wright - *University of Minnesota,* Amy Bilton - *University of Toronto,* Nordica MacCarty - *Oregon State University*

DAC-13: Geometric Modeling and Algorithms for Design and Manufacturing
Horea Ilies - *Univ Of Connecticut,* Saigopal Nelaturi - *Parc,* Morad Behandish - *PARC*

DAC-14: Metamodel-Based Design Optimization (MBDO)
Payam Ghassemi - *University of Buffalo,* Yuanzhi Liu - *University of Texas at Dallas*

DAC-15: Multidisciplinary Design Optimization, Multiobjective Optimization, and Sensitivity Analysis
Hongyi Xu - *University of Connecticut,* Mian Li - *Shanghi Jiao Tong University*, Jing Wang - *Shanghai Jiaotong University*

Topics Organizers

DAC-16: Platform Architecture and Product Family Design
Eun Suk Suh - *Seoul National University,* **Seung Ki Moon** - *Nanyang Technological University*

DAC-17: Design Under Uncertainty
Zhen Hu - *University of Michigan,* **Xiaoping Du** - *Indiana University,* **Chen Jiang** - *University of Michigan-Dearborn*

DAC-18: Computational Design for Biomedical Applications
Paul Egan - *Texas Tech University*

DAC-19: Human-Artificial Intelligence Collaboration in Engineering System Design
Emrah Bayrak - *Stevens Institute of Technology*, **Namwoo Kang** - *KAIST*

DAC-20: Design of Autonomous Systems
Souma Chowdhury - *University of Buffalo,* **Ehsan T Esfahani** - *University at Buffalo*

DAC-21: Evolving Cyber-Physical-Social Systems
Farrokh Mistree - *The University of Oklahoma,* **Jia Hao** - *Beijing Institute of Technology,* **Janet K. Allen** - *The University of Oklahoma,* **Zhenjun Ming**

DAC-22: Multi-fidelity Modeling Under Uncertainty
Ramin Bostanabad - *University of California, Irvine,* **Leifur Leiffson** - *Purdue University*

DEC-01 Implementation, Assessment and Research Methods Across the Curriculum
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DEC-02 Diversity and Inclusion in Design Education
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DEC-03 Innovative Practices in Design Education (Other Topics)
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DEC-04 Short Papers: Work in Progress
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DEC-05 Timely Response to Design Education Challenges
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DEC-06 Demos and Presentation Only
Jose Lugo - *University of Puerto Rico,* **Mohammad Fazelpour** - *University of Maryland,* **Rahul Sharan Renu** - *Francis Marion University,* **Rohan Prabhu** - *Penn State University*

DFMLC-1 Integrated Product and Process Development
Steven Hoffenson - *Stevens Institute of Technology,* **Albert Patterson** - *Texas A&M University*

DFMLC-2 Modeling and Optimization for Sustainable Design and Manufacturing (Joint Session with DAC)
Bryony DuPont - *Oregon State University*

DFMLC-3 Life Cycle Decision Making
Hao Zhang - *James Madison University*

DFMLC-4 Design for Supply Chain and End of Life Recovery
Sara Behdad - *University of Florida,* **Yongxian Zhu** - *University of Michigan*

DFMLC-5 Design for Manufacturing and Assembly
Soonjo Kwon - *Kumoh National Institute of Technology*

DFMLC-6 Design for Additive Manufacturing
Yaoyao Zhao - *McGill University*

DFMLC-7 Design for Quality, Reliability, and Cost
William Bernstein - *Air Force Research Laboratory*

DFMLC-8 Design of Product-Service Systems
Kijung Park - *Incheon National University*

DFMLC-9 Design of Thermal and Energy Systems
Amin Mirkouei - *University of Idaho*

DFMLC-10 Recent advances in Design for Manufacturing and the Life Cycle
Abigail Clarke-Sather - *University of Minnesota Duluth*

DFMLC-11 Design for Sustainable Product Use and User Behavior (Joint Session with DTM)
Astrid Layton - *Texas A&M University*

DFMLC-12 Special Session: Design Tool Showcase
Paul Egan - *Texas Tech University*

DTM-01: Design Theory: New Models, Constructs, and Explanations; New Impacting Trends Impacting
Julie Linsey - *Georgia Institute of Technology,* **Jessica Menold** - *The Pennsylvania State University,* **Vivek Rao** - *University of California at Berkeley*

DTM-02: Design Methods: Prototyping, Imagery, & Other Representations; Biologically Inspired Design; Creativity and Ideation
Dongwook Hwang - *Kwangwoon University,* **Cyril Picard** - *EPFL,* **Robert Nagel** - *James Madison University,* **Jessica Menold** - *The Pennsylvania State University,* **Jinjuan She** - *Miami University,* **Ethan Hilton** - *Louisiana Tech University,* **Ting Liao** - *Stevens Institute of Technology,* **Christopher Mccomb** - *Carnegie Mellon University*

DTM-03: Design People: Entrepreneurship & Teams; Designer/Human Behavior in Design; Design Decision Making
Srinivasan Venkataraman - *Indian Institute of Technology Delhi,* George Hazelrigg - *George Mason University,* Jessica Menold - *The Pennsylvania State University,* Alexander Murphy - *University of Texas at Dallas,* James Righter - *The Citadel,* Zhenghui Sha - *The University of Texas at Austin*

DTM-04: Design Practice: Design of Complex Systems; Inclusive Design; Engineering for Global Development
Paul Grogan - *Stevens Institute of Technology,* Jessica Menold - *The Pennsylvania State University,* Alison Olechowski - *University of Toronto,* Apurva Patel - *Clemson University,* Apurva Patel - *University of Texas at Dallas*

DTM-05: SPECIAL SESSION: Lightning Talks on New & Revisiting Directions
Beshoy Morkos - *University of Georgia,* Maha Haji - *Cornell University,* Jessica Menold - *The Pennsylvania State University*

DTM-06: DTM Student Poster Session
Jessica Menold - *The Pennsylvania State University,* Ethan Hilton

DTM-05-02 - Special sesssion: DTM Idea Accelerator
Jessica Menold - *The Pennsylvania State University*

MR-01: Mechanisms Synthesis & Analysis
Ketao Zhang - *King's College London,* Latifah Nurahmi - *Department of Mechanical Engineering, Institut Teknologi Sepuluh Nopember*

MR-02: Theoretical & Computational Kinematics (A.T. Yang Symposium)
Jose Rico - *NA,* Hongliang Shi - *SLAC National Accelerator Laboratory, Stanford University*

MR-03: Compliant Mechanisms (A. Midha Symposium)
Hongzhe Zhao - *Beihang University,* Jovana Jovanova - *T U Delft,* Giovanni Berselli - *University of Genova*

MR-04: Origami-Based Engineering Design
Shikui Chen - *Stony Brook University,* Suyi Li - *Clemson University,* Jared Butler - *Penn State University*

MR-05: Motion Planning, Dynamics, and Control of Robots
Andreas Muller - *Johannes Kepler University,* Damien Chablat - *CNRS Nantes,* Joo H. Kim - *New York University,* Jeffrey Herrmann - *University of Maryland*

MR-06: Medical and Rehabilitation Robotics
Carl Nelson - *University of Nebraska-Lincoln,* Abbas Fattah - *Widener University*

MR-07: Novel Mechanisms, Robots, and Applications
Reza Fotouhi - *Univ Of Saskatchewan,* Guowu Wei - *University of Salford*

MR-08: Student Mechanism and Robot Design Competition
Yu She - *Purdue,* Haiyang Li - Mark Plecnik - *University of Notre Dame,* Gaurav Singh - *Yale University,* Long Wang - *Stevens Institute of Technology*

MR-09: Special Early Career Session of Invited Presentations
Mark Plecnik - *University of Notre Dame*

MNS-02-01: Micro/Nano Bioengineering
Brian Jensen - *Brigham Young University,* Chu-Yu Huang - *National Chung Hsing University,* Dumitru Caruntu - *University of Texas - Rio Grande Valley*

MNS-03-01: Micro/Nano Robotics and Functional Materials
Hoe Joon Kim - *DGIST,* Irene Fassi - *CNR,* YU LIU - *School of Mechanical Eng., Jiangnan University,* Longqiu Li - *Harbin Institute of Technology,* Mohammad Hasan - *University of Nebraska - Lincoln*

MNS-04-01: Micro/Nano IoT, Sensors, Digital Computing and Power
Fadi Alsaleem - *University of Nebraska - Lincoln,* Muhammad Khan - *NSWC, IHD,* Siavash Pourkamali - *UT Dallas*

MNS-04-02: Micro/Nano IoT, Sensors, Digital Computing and Power
Siavash Pourkamali - *UT Dallas*

MSNDC-01: Computational Methods and Software Tools in Multibody Systems and Nonlinear Dynamics
Francisco Gonzalez - *University of A Coruña,* Alexander Humer - *Johannes Kepler University,* Alessandro Tasora - *University of Parma*

MSNDC-02: Flexible Multibody Dynamics
Johannes Gerstmayr - *University of Innsbruck,* Andreas Zwã¶Lfer - *Technical University of Munich*

MSNDC-03: Contact and Interface Dynamics
Marco Morandini - *Politecnico di Milano,* Dan Negrut - *University of Wisconsin-Madison*

MSNDC-04-01: Nonlinear Dynamics of Structures
Ajeet Kumar - *IIT Delhi,* Richard Wiebe - *University of Washington,* Stefano Lenci - *Polytechnic University of Marche*

MSNDC-05-01: Motion Planning, Dynamics, and Control of Robots
Paramsothy Jayakumar - *US Army GVSC,* Hiroyuki Sugiyama - *The University of Iowa,* Robert Seifried - *Hamburg University of Technology*

MSNDC-04-02: Nonlinear Dynamics of Structures
Ole Balling - *Aarhus University,* Aarhus, Jozsef Kovecses - *NA,* Blas Blanco - *Aarhus University*

MSNDC-07: Time-Varying and Delay Systems
Zoltan Dombovari - *Budapest University of Technology and Economics,* David Lehotzky - *Budapest University of Technology and Economics, Department of Applied Mechanics,* Ashu Sharma - *Auburn University*

MSNDC-08: Motion Planning, Dynamics, and Control of Robots
Andreas Muller - *JOHANNES KEPLER UNIVERSITY,* Damien Chablat - *CNRS Nantes,* Joo H. Kim - *New York University,* Jeffrey Herrmann - *University of Maryland*

MSNDC-09: Student Paper Competition
Daniel Dopico - *Univ De La Coruna,* Corina Sandu - *Virginia Polytech Institute and State University*

Topics Organizers

MSNDC-10: D'Alembert Award Lecture
Erik Chumacero-Polanco - *University of Texas Rio Grande,* **Phil Voglewede** - *Marquette University,* **Matthew Leineweber** - *San Jose State University*

MSNDC-11: Invited Keynote Lectures
Andrea Arena - *Sapienza University of Rome,* **Dumitru Caruntu** - *University of Texas - Rio Grande Valley*

VIB-01: Dynamics of MEMS and NEMS
Hanna Cho - *OU,* **Najib Kacem** - *Femto,* **Jian Zhao** - *Dalian*

VIB-02-01: Dynamics of Soft Media and Robotics
Hongbin Fang - *Fudan University,* **Suyi Li** - *Clemson University*

VIB-03: Dynamics & Waves in Solids and Metamaterials
Michael Leamy - *Georgia Tech,* **Serife Tol** - *University of Michigan,* **Pai Wang** - *University of Utah*

VIB-04-01: Energy Harvesting I
Wei-Che Tai - *Michigan State University,* **Serife Tol** - *University of Michigan*

VIB-05-01: Fluid-Induced Vibrations
Mark Jankauski - *Montana*

VIB-06-01: Industrial Applications of Vibration & Acoustics
Ryan Monroe - *Oakland University,* **Brian Olson** - *The Johns Hopkins Univ Applied Physics Lab,* **Bruce Geist, Ronald Couch** - *Johns Hopkins University Applied Physics Laboratory*

VIB-07: Jointed Structures, Contact, and Friction
Aabhas Singh - *Sandia National Laboratories*

VIB-08-01: Nonlinear Systems & Phenomena
Mohammad A. Al-Shudeifat - *Khalifa University*

VIB-09-01: Rotating Systems and Rotor Dynamics
Kiran D'souza - *OSU,* **Meng-Hsuan Tien** - *National Tsing Hua University*

VIB-10: Structural Damage Detection and Diagnostics
Weidong Zhu - *University of Maryland,* **Yongfeng Xu**

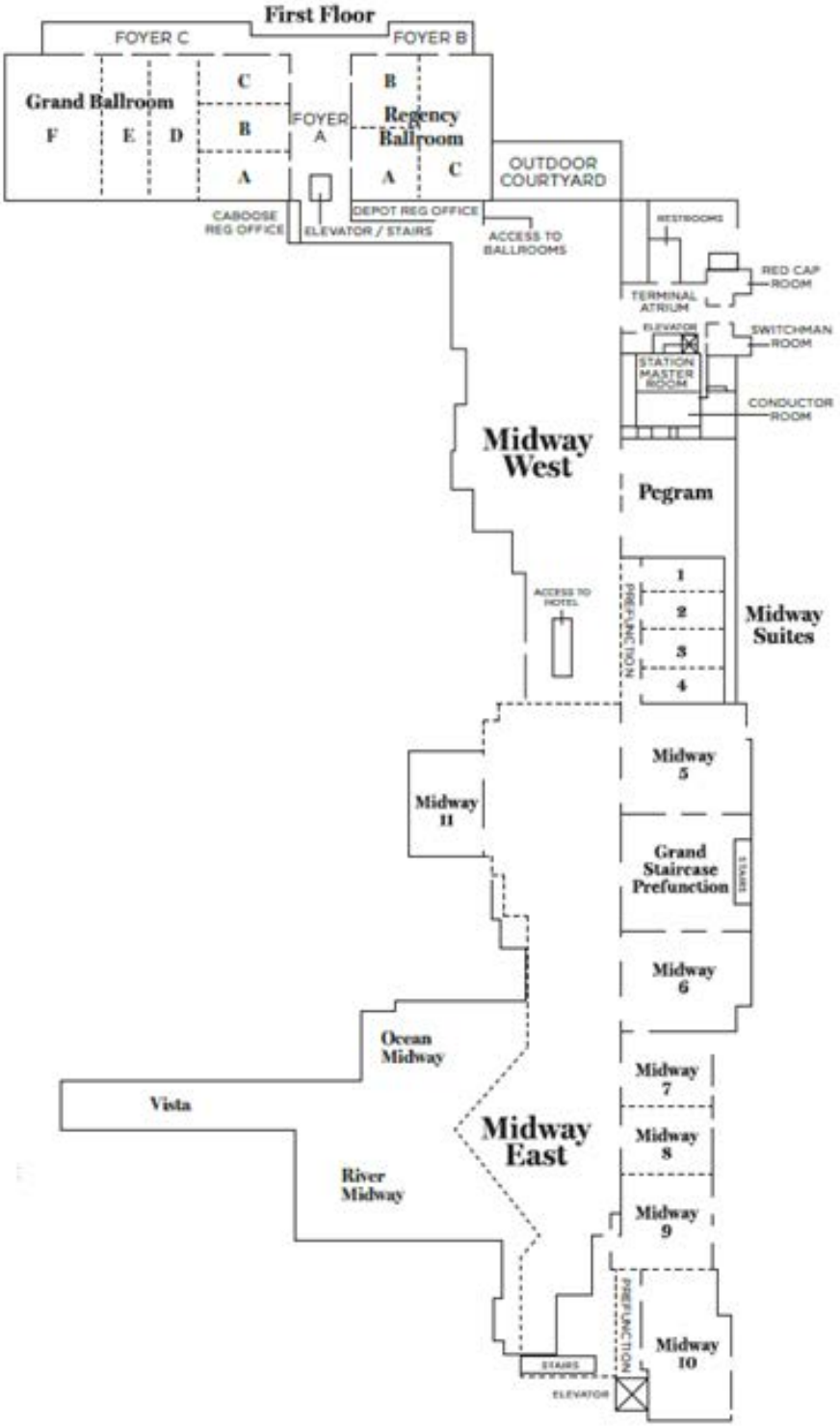
VIB-11-01: Time-delay Systems and Discontinuous Dynamical Systems
Zoltan Dombovari - *Budapest University of Technology and Economics,* **David Lehotzky** - *Budapest University of Technology and Economics, Department of Applied Mechanics,* **Ashu Sharma** - *Auburn University*

VIB-12-01: Vibration and Stability of Mechanical Systems
Robert Parker - *University of Utah,* **Bin Dong** - *University of Utah,* **Chenxin Wang** - *University of Utah*

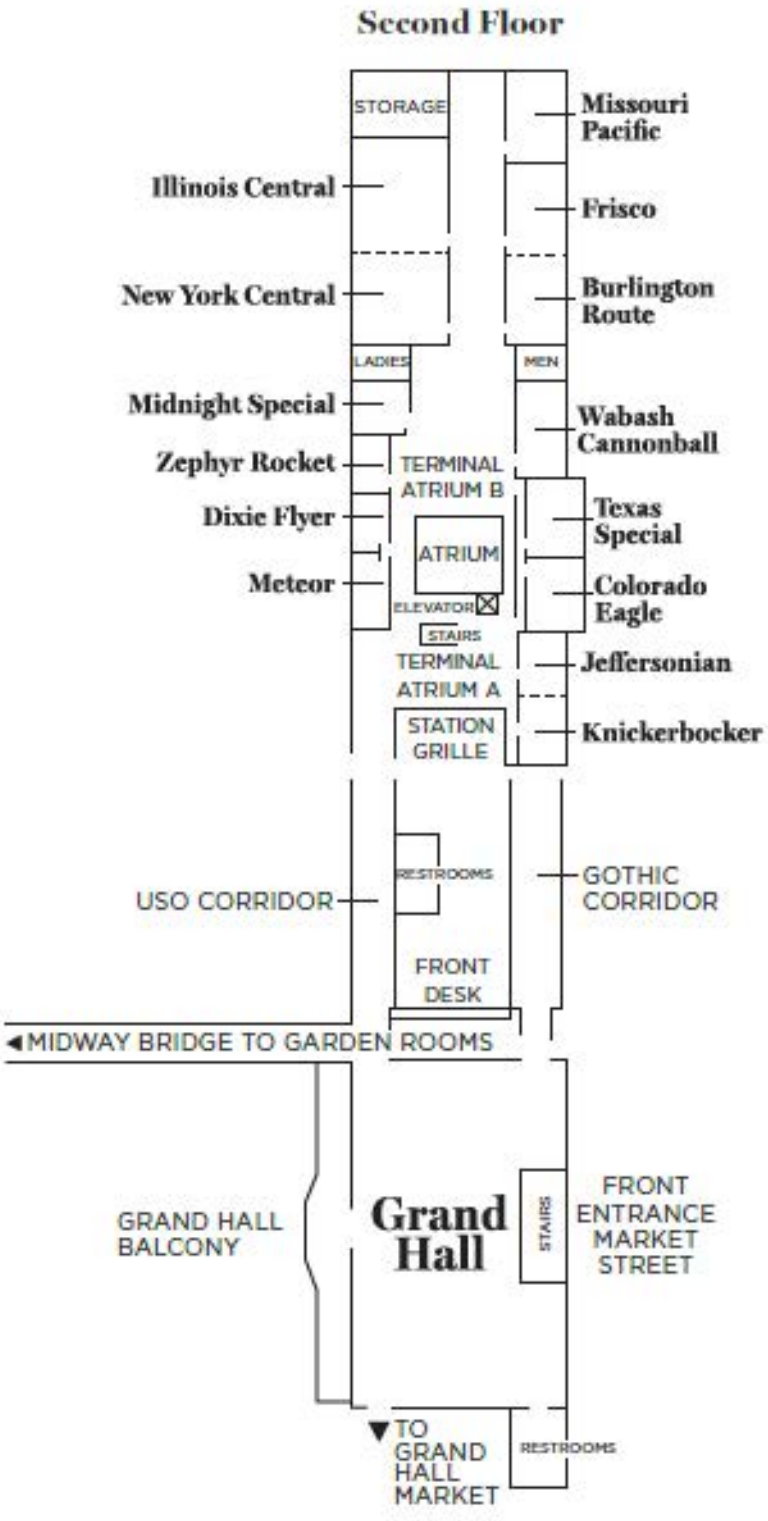
VIB-13-01: Passive and Active Control of Vibration, Shock, and Noise
Kai Zhou - *Michigan Technological University*

VIB-14-01: Vibration of Continuous Systems
Dumitru Caruntu - *University of Texas - Rio Grande Valley,* **Weidong Zhu** - *University of Maryland,* **Sichen Yuan** - *Lawrence Technological University*

VIB-15-01: Machine Learning Applications in Vibrations and Dynamics
Carianne Martinez - *Sandia National Labs,* **Adam Brink** - *Sandia National Laboratories,* **David A. Najera-Flores** - *ATA Engineering*


First Floor
FOYER C
FOYER B
Grand Ballroom
F
E
D
C
B
A
FOYER A
Regency Ballroom
B
A
C
OUTDOOR COURTYARD
CABOOSE REG OFFICE
ELEVATOR / STAIRS
DEPOT REG OFFICE
ACCESS TO BALLROOMS
RESTROOMS
RED CAP ROOM
TERMINAL ATRIUM
ELEVATOR
SWITCHMAN ROOM
STATION MASTER ROOM
CONDUCTOR ROOM
Midway West
Pegram
ACCESS TO HOTEL
PREFUNCTION
1
2
3
4
Midway Suites
Midway 5
Midway 11
Grand Staircase Prefunction
STAIRS
Midway 6
Ocean Midway
Vista
River Midway
Midway East
Midway 7
Midway 8
Midway 9
PREFUNCTION
Midway 10
STAIRS
ELEVATOR

Hotel Floor Plan



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