IDETC-CIE 2024

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

CONFERENCE
August 25–28, 2024

JW Marriot Washington
Washington, DC, USA

Program

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

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SETTING THE STANDARD

Welcome to IDETC-CIE 2024!

It is our great pleasure and honor as Chairs of the 2024 IDETC-CIE Conference Organizing Committee to welcome all of you to the JW Marriott Washington to attend this year's conferences!

The International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE) is widely recognized as one of the premier ASME conferences. The response to our calls for papers and presentations has exceeded our expectations, and we are grateful for the enthusiasm and dedication demonstrated by our community. This year includes 11 parallel conferences and a number of special sessions spanning a wide range of engineering topics on advances in fundamental and applied research as well as innovations in education and technology. We will offer a variety of special events, including student poster sessions, networking events, proposal writing workshops, and the introduction of the Science Tech Buzz Summit. We have the privilege to host outstanding keynote speakers who will address cutting-edge technologies related to key conference topics, serving also as representatives from industry, government, and academic institutions. This year will also mark the first year that each of the 15 workshops and tutorials on Sunday will be offered free of charge with registration.

Located in Washington, D.C., the 2024 IDETC-CIE Conference is readily accessible to participants around the world. Once in D.C., there are many activities available to attendees and their families alike. You will find the White House right next door to the conference venue and the National Mall within a short walk. ASME has worked with local organizations to offer local walking tours as well as tours to the Steven F. Udvar-Hazy Center, part of the National Air and Space Museum. This conference week promises to be an exceptional experience. We hope that each of you will take full advantage of this opportunity to share knowledge and expertise, collaborate, establish new collaborations within our community, and enlarge your network at ASME IDETC-CIE 2024!!

To conclude, a special thank goes to all the eleven conferences organizing committees, the technical committees, all volunteers, and ASME staff for their contribution to organize, promote, and support this event. Without your hard work, patience, and commitment, the event success would not have been possible! We also would like to thank all the authors and presenters for their valuable contributions and every one of you for making IDETC-CIE 2024 successful with your expertise, commitment, and active engagement.

You are warmly welcome to enjoy the conference and your time in Washington, D.C.

Sincerely,

Caterina Rizzi
University of Bergamo
Department of Management, Information and Production Engineering
Chair, ASME IDETC-CIE 2024 Conference Organizing Committee

Paul Witherell
NIST - National Institute of Standards and Technology
Chair, ASME IDETC-CIE 2024 Conference Organizing Committee

Contents

Conference Information

REGISTRATION INFORMATION

Ballroom Level; Three Floors Below the Lobby Level

Registration Hours:

Sunday, Aug 25, 7:00AM–5:00PM

Monday, Aug 26, 7:00AM–6:00PM

Tuesday, Aug 27, 7:00AM–5:00PM

Wednesday, Aug 28, 7:00AM–12:00PM

EXHIBIT INFORMATION

California Ballroom Foyer, Ballroom Level, Second Floor

Hours

Monday, August 26, 7:00AM–5:00PM

Tuesday, August 27, 7:00AM–5:00PM

Wednesday, August 28, 7:00AM–2:00PM

AMERICAN SOCIETY OF MECHANICAL ENGINEERS INTERNATIONAL

ASME MISSION STATEMENT:

ASME's mission is to advance engineering for the benefit of humanity.

ASME VISION STATEMENT:

ASME's vision is to be the premier resource for the engineering community globally.

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's start time.

BADGE REQUIRED FOR ADMISSION

All conference attendees must wear the official ASME 2024 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 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.

SWAPCARD 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
- View Final Papers
- And More!

*All features may not be available at all events.

INTERNET ACCESS IN THE HOTEL

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

- Please go to the registration desk and app 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.

QUIET ROOM

Penn Ave A, Lobby Level, will serve as a Quiet Room from **7:00AM to 5:00PM on Monday and Tuesday, and 7:00AM to 3:00PM on Wednesday.**

NURSING ROOM

Independence, Ballroom Level (Three floors below Lobby level) is a private room available on a first-come, first-saved basis as a comfortable space for nursing mothers.

SPEAKER PRACTICE ROOM

Penn Ave B, Lobby Level, will serve as the Speaker Practice/Speaker Ready Room from **7:00AM to 5:00PM on Monday and Tuesday, and 7:00AM to 3:00PM on Wednesday**. An LCD projector and screen will be available for speakers 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 Salon 2/3 (Ballroom Level)**. Network with your fellow attendees and discuss new ideas, programs, and activities. Badges Required. Guests not permitted.

Tuesday, August 27, will be the Networking Breakfast (Details are in the special sessions section). Table topics and hosts will be available to engage in discussion.

Awards Luncheons

One Division Awards Luncheon is included in each Full Conference Registration. Attendees have pre-selected 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. Badges will be scanned to verify the lunch selection.

- Computers & Information in Engineering (CIE) Awards Luncheon
    - Monday, August 26, 12:10PM–2:10PM
    - Location: Salon 2/3 (Ballroom Level)
    - Advanced Selection or Purchase Required

- Design Engineering Division (DED) Awards Luncheon
    - Tuesday, August 27, 12:20PM–2:20PM
    - Location: Salon 1/2/3 (Ballroom Level)
    - Advanced Selection or Purchase Required

Opening Reception

- IDETC-CIE Conference Opening Reception
    - Monday, August 26, 7:00PM–9:00PM
    - Location: Grand Foyer & Salon 2/3 (Ballroom Level)
    - Included in each Full Conference Registration.
    - Additional or Guest Tickets may be purchased.

Conference Sponsors

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Schedule at a Glance

SUNDAY, AUGUST 25				
Rooms	**9:00am - 6:00pm**			
Salon F	Student Hackathon			
Salon K				
Rooms	**9:00am - 1:00pm**	**2:00pm - 5:00pm**	**5:30pm - 6:30pm**	
Congressional		DED Executive Committee Meeting (Closed) - 1:30pm start		
Cannon		CIE Executive Committee Meeting (Closed)		
Salon E	Workshop: From Data to Design: Challenges and Opportunities across Industry and Academia			
Longworth	Understanding and Mitigating Bias Risks in the Use of Generative AI for Design	Collecting Design Knowledge for Generative AI Systems		
Dirksen	3rd Workshop on Trends in Human-AI Teaming for Engineering and Design	The Trove of CAD Informatics: Acquiring and Analyzing CAD Data for Design Process Insights and AI Applications		
Rayburn	Planar Linkage Synthesis using Pole and Rotation Angle Constraints	Computer-Aided Design and Prototyping of Mechanical Movements		
Hart	Racism Untaught			
Russell	Multi-axis Hybrid Manufacturing Automation, Process Control and Human in-the-loop Interaction	Data Management and Digital Twin for Advanced Manufacturing		
Treasury	ADVANCED DESIGN, SIMULATION, AND FINITE ELEMENT ANALYSIS OF GEAR DRIVES	Learn to Drive and Race Autonomously with F1TENTH and AutoDRIVE Ecosystem		
State	Solver-Aware Systems Architecting (SASA): Fundamentals, Heuristics, and Theory Grounded Guidelines	Design for Manufacturing (DFM): Practical Strategies for Engineering Success		
Penn Ave Terrace			Student Activities	

Schedule at a Glance

MONDAY, AUGUST 26											
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**
Grand/Capitol Foyer	Attendee Breakfast			Refreshment Break				Refreshment Break			Opening Reception
Salon 2/3						CIE Award Lunch					
Salon 1									Science Tech Buzz	CIE Poster Session	
Salon 4		MSNDC MD Keynote	CIE-01-02		CIE Keynote		CIE-02/03/04				
Salon H		CIE-07-01	CIE-11-01				CIE08/09-01		DED General Meeting (5pm-5:50pm)		
Salon J		CIE-07-02	CIE-01-03				CIE-09-02				
Salon C		DAC-13-1	DAC-6-1		DAC-12-1		DAC-8-1		DAC-16-1		
Salon E		DAC-18-1	DAC-1-1		DAC-5-1		DAC-25-1: Early Career Research		DAC-10-2		
Salon B		DAC-4-1	DAC-24-1		DAC-14-1		DAC-10-1		DAC-4-2		
Salon F		CIE-01-01	MR-2-1		MR Keynote				MR-9 SMRDC		
Salon K		MR-1-1	MR-1-2				MR-7-1				
Salon A		MR-3-1	MR-3-2				MR-3-3				
Longworth			MSNDC 4		MSNDC D'Alembert Award		MSNDC-13/MR-5-1		MSNDC - 15 SBPA		
Dirksen			VIB 9/MSNDC 3 - 01				VIB 7/MSNDC 6		VIB 9/MSNDC 3 - 02		
Cannon			VIB 8/MSNDC 2		VIB 4 - 01		VIB 2/MSNDC 10 -01		VIB 2/MSNDC 10 -02		
Hart/Russell		VIB Keynote	VIB 5/MSNDC 1 - 01		VIB 10-01		VIB 1/MSNDC 8 - 01		VIB 1/MSNDC 8 - 02		
Commerce		PTG-05-01	PTG-03-01:		PTG-02-01		PTG-01-01:		PTG-06-01		
Treasury					DFMLC-05		DFMLC-01		DFMLC-02	DFMLC TC Meeting	
State			AVT-01-01		AVT-02-01		AVT-04-01		AVT-06-01	AVT TC Meeting	
Congressional		DTM-01	DTM-02		DTM-03		DTM-04		DTM-05: DTM SPECIAL SESSION 1		
Senate					DEC-03-01		DEC-04-01		DEC Mentorship Session	DEC TC Meeting	
Penn Ave Terrace							NSF Design Funding			DAC Networking Event	

Schedule at a Glance

TUESDAY, AUGUST 27											
Rooms	**7:00am - 8:00am**	**8:10am - 9:10am**	**9:20am - 10:40am**	**10:40am - 11:00am**	**11:00am - 12:20pm**	**12:20pm - 2:20pm**	**2:20pm - 4:00pm**	**4:00pm - 4:20pm**	**4:20pm - 6:00pm**	**6:10pm - 7:10pm**	**7:10pm - 8:10pm**
Grand/Capitol Foyer	Networking Breakfast			Refreshment Break				Refreshment Break	Design Tool Showcase/ Poster Sessions (BPART, NSF)		
Salon 1/2/3						DED Award Lunch					
Salon 4		MSNDC ND Keynote	CIE Keynote		CIE Keynote		CIE-18-01		Mary Baker Industry Achievement Award	CIE TC Meeting	CIE General Meeting
Salon H		CIE-16-02					CIE-10-01		CIE-10-02	CIE TC Meeting	
Salon J		CIE-09-03					CIE-19		CIE-20	CIE TC Meeting	
Salon C		DAC-8-2	DAC-6-2		DAC-3-1		DAC-19-1		CIE-17	CIE TC Meeting	
Salon E		DAC-2-1	DAC-5-2		DAC-1-2		DAC-11-1		DAC-Signature Event		
Salon B		DAC-4-3	DAC-24-2		DAC-9-1		DAC-14-2				
Salon F		CIE-16-01	MR-2-2		MR-7-2		MR-10 SEC-sess		MR Keynote	MR TC Meeting	
Salon K		MR-1-3	MR-4-1		MR-4-2		VES Panel		CIE-12	CIE TC Meeting	
Salon A		MR-8-1	MR-6-1		MR-3-4						
Longworth			MSNDC 5		JCND BPA		VIB 6/MSNDC 11 -01		MSNDC 14	MSNDC TC Meeting	
Dirksen							Approaches to Sustainability Panel				
Rayburn		MNS Keynote	MNS-02		MNS-03		VIB 14/MSNDC 9/ MNS 1 -01		MNS-04	MNS TC Meeting	
Cannon		VIB 11-01			VIB 4 -02		VIB 2/MSNDC 10 -03				
Hart/Russell		VIB 10-02	VIB Mykelstadt Award		VIB 13 - UG		VIB 5/MSNDC 1 - 02				
Commerce		PTG-04-01	PTG-03-02		PTG-02-02:		PTG-07-01		PTG-03-03	PTG TC Meeting	
Treasury			DFMLC-03		DFMLC Keynote		DFMLC-04				
State		AVT-07-01	AVT-07-02		AVT Milliken Award		AVT-05-01				
Congressional		DTM-06: DTM SPECIAL SESSION 2			DTM-07		DTM-08		DTM -09		DTM TC meeting
Senate			DEC-05-01		DEC-01-01		DEC-02-01		NSF Proposal Writing		
Penn Ave Terrace							Inter-Agency Panel			DAC TC Meeting	

Schedule at a Glance

WEDNESDAY, AUGUST 28								
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**
Grand/Capitol Foyer	Attendee Breakfast		Refreshment Break		Lunch on Own		Refreshment Break	
Salon 4		CIE-18-02		CIE-28/29/30-01		CIE-28/29/30-02		CIE-28/29/30-03
Salon H		CIE-21		CIE-22		CIE-23		CIE-24
Salon J		CIE AMS/SEIKM Panel		CIE-14/15-01		CIE-14/15-02		CIE-27 VES JCISE
Salon C		DAC-10-4		DAC-3-2		DAC-2-2		CIE-13-01
Salon E		DAC-5-3		DAC-11-2		DAC-11-3		
Salon B		DAC-24-3		DAC-10-3		DAC-9-2		
Salon F		CIE-11-02		JMR Spotlight				
Salon K		MR-4-3		CIE-09-04		CIE-13-02		
Salon A		MR-7-3				MR-7-4		
Longworth		MSNDC-13/MR-5-2		MSNDC 12		MSNDC-13/MR-5-3		VIB 6/MSNDC 11 -02
Dirksen				VIB 3/MSNDC 7 - 01		VIB 3/MSNDC 7 - 02		VIB 14/MSNDC 9/ MNS 1 -02
Cannon				VIB 2/MSNDC 10 -04		VIB 1/MSNDC 8 - 03		VIB 9/MSNDC 3 - 03
Hart/Russell		VIB Mote Award		VIB 11 - 02		VIB 10-03		VIB 4-03
Congressional		DTM-10: DTM SPECIAL SESSION 3		DTM-11		DTM-12		
Penn Ave Terrace				NSF Office Hours				

See more special session details here: https://event.asme.org/IDETC-CIE/Keynotes-Special-Sessions

Conference Chair Welcomes

50th ASME Design Automation Conference (DAC)

Dear Colleagues,

On behalf of the DAC Executive Committee, welcome to the 50th ASME Design Automation Conference (DAC)!

Following a rigorous review process, this year's DAC technical program consists of 104 accepted papers in 25 active research areas (corresponding approximately to an acceptance rate of 87%). This year, we also solicited and accepted 46 presentation-only submissions for the second time at DAC. The technical program will be presented from Monday, August 26 to Wednesday, August 28.

Complementing our technical sessions, we will host the DAC 50th Anniversary Signature Event on "Panel on: Successes, Aspirations and Opportunities for Design Automation," consisting of a panel of five senior members of and long-term contributors to DAC:

- Dr. Carolyn Seepersad (Georgia Institute of Technology)
- Dr. Kristina Shea (ETH Zurich)
- Dr. Vadim Shapiro (International Computer Science Institute)
- Dr. Shapour Azarm (University of Maryland)
- Dr. Yan Fu (Ford Motor Company)

Please join us for the DAC Technical Committee Meeting on the evening of Tuesday, August 27. During that meeting, we will also present the Design Automation Dissertation Award (a newly introduced award) winner, the Design Automation Young Investigator Award winner, the Design Automaton Award winner, and the DAC Best Paper Award winner. We look forward to our community coming together, meeting old friends, and making new ones.

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

- DETC2024-143495: Modeling and Control Co-Design of a Floating Offshore Vertical-Axis Wind Turbine System, by Yong Hoon Lee, Saeid Bayat, James T. Allison, Md Sanower Hossain, D. Todd Griffith
- DETC2024-143593: Drivaernet: A Parametric Car Dataset for Data-Driven Aerodynamic Design and Graph-Based Drag Prediction, by Mohamed Elrefaie, Angela Dai, Faez Ahmed
- DETC2024-143179: Integrated Design for Wave Energy Converter Farms: Assessing Plant, Control, Layout, and Site Selection Coupling in the Presence of Irregular Waves, by Saeed Azad, Suraj Khanal, Daniel R. Herber, Gaofeng Jia
- DETC2024-143204: Studying Changes to the Additive Manufacturability of Design Solutions When Prepared and Simulated in Immersive Virtual Reality, by Jayant Mathur, Scarlett R. Miller, Timothy W. Simpson, Nicholas A. Meisel
- DETC2024-143636: Augmenting Bayesian Inference-Based Damage Diagnostics of Miter Gates Based on Image Translation, by Yichao Zeng, Jice Zeng, Michael D. Todd, Zhen Hu
- DETC2024-143524: Developing Heuristics for Resource Allocation and Utilization in Systems Design: A Hierarchical Reinforcement Learning Approach, by Vikranth S. Gadi, Zoe Szajnfarber, Jitesh H. Panchal

- DETC2024-143810: Increasing Accessibility of 3D-Printed Customized Prosthetics in Resource-Constrained Communities, by Junghun Lee, Chukwuemeka Nkama, Hadiza Yusuf, Joseph Maina, Jean Ikuzwe, Jean Byiringiro, Moise Busogi, Conrad Tucker
- DETC2023-142477: A Hybrid Simulation-Gaussian Process Regression Approach for Performance Prediction and Reconfiguration of Production Layout, by Jongsuk Lee, Seung Ki Moon
- DETC2024-142959: Gaussian Processes for Non-Differentiable Functions With Jump Discontinuities, by Anton van Beek
- DETC2024-143583: Enhancing Long-Term Decision Making in Trajectory Planning: Deep Reinforcement Learning With Knowledge Transfer and Online Demonstrations, by Chuanhui Hu, Yan Jin

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 of many individuals. We are particularly grateful to all session organizers and paper review coordinators:

Faez Ahmed, Janet K Allen, A. Emrah Bayrak, Amir Behjat, Bill Bernstein, Amy Bilton, Ramin Bostanabad, Grace Burleson, Wei (Wayne) Chen, Wei Wayne Chen, Souma Chowdhury, Daniel Cooper, Xiaoping Du, Bryony DuPont, Paul Egan, Ehsan Esfahani, Cong Feng, Vincenzo Ferrero, Yan Fu, Payam Ghassemi, Joshua Hamel, Daniel Herber, Zhen Hu, Horea Ilies, Roshni Anna Jacob, Namwoo Kang, Leifur J Leifsson, Mian Li, Ketki Lichade, Xingchen Liu, Yuanzhi Liu, Hemanth Manjunatha, Ali Mehmani, Ali Mehmani, Zhenjun Ming, Farrokh Mistree, Seung Ki Moon, Beshoy Morkos, Venkat Nemani, Julián Norato, Philip Odonkor, Herschel Pangborn, Cyril Picard, Rahul Renu, Daniel Selva, Ada-Rhodes Short, Binyang Song, Eun Suk Suh, Andres Tovar, Anh Tran, Zequn Wang, Kate Whitefoot, Natasha Wright, Zhimin Xi, Hongyi Xu, Nita Yodo, Chen Zeng, Fiona Zhao, 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 Washington, DC!

Chao Hu
Conference Chair

Zhimin Xi
Program Chair

Conference Chair Welcomes

26th 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, connected vehicles as well as electrification and emerging technologies for sustainable propulsion systems and their coupling with the driver/vehicle system are included 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, simulation, and validation.

The VDC is pleased to welcome you to the 26th International Conference on Advanced Vehicle Technologies, held as a part of the 2024 ASME IDETC-CIE. This year the AVT conference will consist of six symposia for a total of seven sessions in the areas of: Ground Vehicles Dynamics and Controls; Methods for Ground Vehicle Systems Design; Vehicle Electrification and Powertrain Design; Light and Energy Efficient Vehicles; Off-Road Agriculture, Military and Commercial Ground Vehicle Design and Testing; and Intelligent Vehicles. We sincerely appreciate the time and services of these symposium organizers.

This year the VDC is especially honored to host Professor Donald Margolis from the Department of Mechanical and Aerospace Engineering, University of California, Davis for the William Milliken Lecture, which is entitled “Low Order Modeling of Vehicle Dynamics Incorporating Actuators for Understanding, Design, and Control of System Behavior.” In this lecture Professor Margolis will take the audience on a ride of the effectiveness of active system control based on bond graph modeling with applications to vehicle systems.

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!

Ole Balling
Conference Chair

Angelo Bonfitto
Program Chair

21st International Conference on Design Education (DEC)

On behalf of the Design Education Committee, we welcome you to the 21st 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 – Design Across the Curriculum, Creativity and Engagement in Design Education, Cognition in Design Education, and Demos and Presentation Only. The Demos and Presentation Only session will include presentations and provide ample opportunity for discussion with the presenters to give feedback on emerging design education research. Refer to the conference Technical Program for the times and locations of the technical sessions.

In addition to our technical symposia, we are hosting a special session with four invited speakers. We will also be continuing our mentorship program for graduate students with a special focus on career pathways post graduate school.

We extend special appreciation to our technical session Review Coordinators: Nicholas Meisel, Rohan Prabhu, and Elizabeth Starkey. 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 many of the DEC Awards and plan for next year's conference, which includes the election of new committee leadership members. Everyone is welcome to attend, including new attendees and graduate students. Our meeting is streamlined to respect members' participation in other committees.

Rahul S. Renu
Conference Chair

Elizabeth Starkey
Conference Program Chair

Conference Chair Welcomes

36th 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 36th International Conference on Design Theory and Methodology (DTM). Our conference focuses on fundamental design theory and methodologies, and their application in engineering contexts, with contributions provided by both researchers and practitioners.
This 2024 DTM conference includes 35 technical paper presentations and 26 presentation-only talks. Thematically, the conference includes contributions associated with our four broad foci: Design Theory, Design Methods, Design People, and Design Practice. In addition, this year, we have piloted three Special Sessions that highlight topics of growing interest and importance in our community. These Special Sessions are led by emerging leaders in the DTM community and feature unique and engaging formats such as panel sessions and facilitated discussions. Our aim is to showcase research topics that are at the forefront of design scholarship and to lead the emerging discourse surrounding these important themes. For 2024, these Special Sessions span all three days of the conference and include:

1. Qualitative Research in Design Theory and Methodology (Monday, 2:10PM–3:50PM). Led by Grace Burleson and Anastasia Ostrowski, this special session provides a space for the DTM community to engage with theoretical and methodological considerations of qualitative research and our ability to create knowledge using these methods. This session will feature current applications of qualitative research in design and engineering and will explore important methodological considerations for design research via a panel session and facilitated discussions.
2. Design Justice in Design Theory and Methodology and Design Education (Tuesday, 8:10AM–10:40AM). Led by Sita Syal and Julia Kramer, this session highlights innovative research and practice in Design Justice and provides a space for researchers and practitioners to discuss priorities in Design Justice going forward. This session includes a panel discussion with presenters and a discussion on how engineers and designers can play critical roles in creating and studying products, services, technologies, and policies that can aim to address social injustices.
3. Opportunities at the Boundaries Between Systems Engineering and Design Theory (Wednesday, 8:00AM–9:40AM). Led by Alex Murphy and Bryan Watson, this panel presentation will feature academic faculty and industry professionals discussing their experiences with unique design challenges that cannot be fully addressed by design theory or system engineering practices alone. This panel serves as a roadmap for systems engineering and design theory researchers to address contemporary challenges.

There were 57 papers submitted and reviewed by an incredible cohort of review coordinators and reviewers. A total of 156 reviews were completed. The review coordinators for this year's conference include: Ting Liao, Yiqing Ding, Hyeonik Song, Yunjian Qiu, Yutaka Nomaguchi, Kenton "Blane" Fillingim, Vimal Viswanathan, Vivek Rao, Jinjuan She, Zhenghui Sha, Chris Mabey, Euiyoung Kim, Sita Syal, Julia Kramer, Grace Burleson, and Anastasia Ostrowski. It is through the service of these individuals that we are able to maintain the high-quality expectations of the DTM conference.

Notably, this year's program includes a record number of presentations focusing on Artificial Intelligence in design (20% of presentations), reflecting the healthy growth of relevant and important developments in design research. In addition, the proportion of presentation-only talks in DTM has grown substantially (43% up from 16% in 2023), demonstrating how the evolving format of the conference is supporting the needs of the community.
We are excited to welcome you to this year's conference and hope that you find it engaging, informative, and beneficial.

Dr. Rahul Renu
Conference Chair
Austin College

Dr. Christine Toh
Program Chair
University of Nebraska at Omaha

Conference Chair Welcomes

18th International Conference on Micro- and Nanosystems (MNS)

Welcome to the18th International Conference on Micro- and Nano-systems (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 nano-scale (NEMS) systems.

This conference is organized around four technical sessions, one of which is jointly offered with the 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control and the 36th Conference on Mechanical Vibration and Noise:

- Keynote Lecture: Professor Shaurya Prakash
- MNS-1: Nonlinear Dynamics and Vibrations of MEMS and NEMS (joint session with MSNDC and VIB)
- Organizers: Najib Kacem (najib.kacem@femto-st.fr), Hanna Cho (cho.867@osu.edu)
- MNS-2: Micro/Nano Bioengineering
- Organizers: Dumitru Caruntu (Dumitru.Caruntu@utrgv.edu), Brian Jensen (bdjensen@byu.edu), Chu-Yu Huang (tomhuang@nchu.edu.tw)
- MNS-3: Micro/Nano Robotics and Functional Materials
- Organizers: Irene Fassi (Irene.Fassi@stiima.cnr.it), Mohammad H. Hasan (hhasan_mohammad@columbusstate.edu), Longquiu Li (longqiuli@hit.edu.cn)
- MNS-4: Micro/Nano IoT, Sensors and Computing
- Organizers: Muhammad Raziuddin A. Khan (muhammad.khan@navy.mil), Fadi Alsaleem (falsaleem2@unl.edu), Pourkamali Anaraki Siavash (Siavash.Pourkamali@utdallas.edu)

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.

Conference Chair Welcomes

We are pleased to offer Prof. Shaurya Prakash as the MNS keynote speaker. At Ohio State, Prof. Shaurya Prakash directs the Microsystems and Nanosystems Laboratory, where his team develops novel technologies for applications in healthcare for cancer, wound healing, and infectious disease; and in water purification. He is also a co-director for Ohio State's Infectious Diseases Institute focusing on Microbial Communities. Therefore, his group addresses fundamental scientific questions towards enabling new technologies that solve problems critical to modern societal needs.

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.

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 27, from 6:00PM to 7:00PM. This meeting is open to all. Room locations are announced in the program. 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 the18th International Conference on Micro- and Nanosystems (MNS)!
Sincerely,

Najib, Jian, Sun, and the entire 2024 MNS Conference team.

Prof. Jian Zhao
Conference Chair
University of Technology, China
jzhao@dlut.edu.cn

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

Prof. Hongwei Sun
Program Chair
Northeastern University, USA
ho.sun@northeastern.edu

Conference Chair Welcomes

ASME 2024 Power Transmission and Gearing Conference (PTG)

On behalf of the ASME Technical Committee on Power Transmission and Gearing (PTG), it is our distinct pleasure to welcome you to the 2024 International Conference on Power Transmission and Gearing. This premier event brings together global leading experts, researchers, and practitioners in the field of power transmission and gearing to share the latest advancements and innovations. We extend our sincere gratitude to all the authors for presenting their latest research findings and to everyone who has chosen to participate in this conference. We hope you will seize this unique opportunity to explore the latest research, familiarize yourself with emerging trends, and engage in valuable networking.

PTG 2024 features outstanding full research papers and presentations covering a wide range of topics on power transmission and gearing, which include:

- Gear Geometry
- Gear Analysis, Materials, Fatigue
- Gear Dynamics and Noise
- Gearbox Design, Reliability, and Diagnostics
- Gear Manufacturing
- Lubrication and Efficiency
- Bearings, Clutches, Couplings, and Splines
- Transmission Systems Including Novel Concepts

We acknowledge and thank all the topic organizers and reviewers for their support and assistance and all the following members of the PTG Committee for their dedicated service and efforts in organizing this conference:

Christopher Cooley, Oakland University
Brian Dykas, U.S. Army Research Laboratory
Qi Fan, The Gleason Works
Alfonso Fuentes, Rochester Institute of Technology
Robert Giachetti, Exponent
Robert Handschuh, NASA Glenn Research Center
Adrian Hood, U.S. Army Research Laboratory
Mohammad Hotait, General Motors
Don Houser, The Ohio State University
Murat Inalpolat, University of Massachusetts Lowell
Ahmet Kahraman, The Ohio State University
Mark Klein, Honda Motor Company

Mohsen Kolivand, Meritor
Timothy Krantz, NASA Glenn Research Center
Sheng Li, Wright State University
Teik C. Lim, New Jersey Institute of Technology
Kenneth Nowaczyk, Ford Motor Company
Robert Parker, The University of Utah
Alfred Pettinger, Engineering Systems Inc.
Steve Siegert, Borg Warner
Avinash Singh, General Motors
David Talbot, The Ohio State University
Jeremy Wagner, John Deere Product Engineering Center
Yawen Wang, The University of Texas at Arlington
Jon Williams, Hilliard Corporation
Brian Wilson, Advanced Drivetrain Engineering
Carlos Wink, Eaton Vehicle Group
Hai Xu, General Motors Company

Once again, welcome to the 2024 Power Transmission and Gearing Conference. We look forward to your active participation and hope you have a productive and enjoyable experience.

Hai Xu
General Motors
Conference Chair

Alfonso Fuentes Aznar
Rochester Institute of Technology
Program Chair

36th Conference on Mechanical Vibration and Noise (VIB)

On behalf of the Technical Committee on Vibration and Sound (TCVS), we cordially welcome you to the 36th Conference on Vibration and Noise (VIB). This 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 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's conference includes close collaborations with other IDETC tracks to bring together researchers with similar interests, enhance the technical program, and improve the attendee experience. The following symposia make up this year's VIB:

VIB-1: General Dynamics, Vibration, and Acoustics
VIB-2: Nonlinear Dynamics of Systems and Nonlinear Phenomena
VIB-3: Contact Dynamics and Jointed Structures
VIB-4: Dynamics & Waves in Solids, Acoustic Metamaterials, and Architected Materials
VIB-5: Machine Learning Applications in Vibrations and Dynamics
VIB-6: Dynamics and Control of Smart Structures and Systems
VIB-7: Dynamics of Biological, Bio-Inspired, and Biomimetic Systems
VIB-8: Time-Delay, Time-Varying, and Discontinuous Dynamical Systems
VIB-9: Industry Applications of Vibration, Shock, Acoustics, and Dynamics
VIB-10: Energy Harvesting
VIB-11: Vibration Measurement, Signal Processing, and Structural Damage Detection
VIB-14: Nonlinear Dynamics and Vibrations of MEMS and NEMS

VIB is excited to announce several keynote lectures by prestigious researchers in the field of dynamics and vibration. Professor Norbert Hoffmann from Hamburg University of Technology will deliver a talk titled, "Complexity in Vibrations and Dynamics – Phenomena and Methods," focused on broadly on dynamic phenomena in engineered systems. Professor Jiong Tang from the University of Connecticut is the recipient of N.O. Myklestad Award for his major contributions in vibration engineering. His keynote talk is titled, "Engineering of vibratory systems through piezoelectric circuitry: the 4th dimension exploration," where he will discuss his innovations in piezoelectric systems. Professor Serife Tol from the University of Michigan is the recipient of C.D. Mote, Jr. Early Career award for her transformative work in metamaterials, phononic crystals, and metasurfaces. Her keynote talk is titled, "Harnessing Structural Periodicity for Wave Control Toward Sensing, Harvesting, and Space Applications." Lastly, we are excited to announce the awardee of the inaugural Mary Baker Industry Achievement Award, Flight Director at the NASA Johnson Space Center Diana Trujillo. Diana will deliver a keynote speech on space exploration titled, "Us as One: Leading Teams and Exploring Space Together." This talk will be of broad interest to all tracks at IDETC! In addition to these excellent keynote speakers, VIB will host invited speakers to kick off each technical session area.

As part of VIB, TCVS sponsors a student paper competition and student travel support program. This year's conference also includes an undergraduate research symposium on dynamics, vibration, and acoustics. We thank the ASME Design Engineering Division and TCVS for their support of this initiative. We gratefully acknowledge the efforts of the VIB symposium organizers, reviewers, and authors. It is your efforts that make this conference vibrant.

Mark Jankauski
Montana State University
Conference Chair

Neda Maghsoodi
University of Southern California
Technical Program Chair

Keegan Moore
University of Nebraska-Lincoln
Technical Program Chair

Conference Chair Welcomes

20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC)

On behalf of the ASME Technical Committee on Multibody Systems and Nonlinear Dynamics, we extend a wholehearted welcome to the attendees of the 20th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC). The conference includes 14 symposia and features nearly 60 contributions on both traditional and emerging topics in the broad areas of multibody systems and nonlinear dynamics. Moreover, selected symposia are cross-listed with the 48th Mechanisms and Robotics Conference (MR), the 18th International Conference on Micro- and Nanosystems (MNS), and the 36th Conference on Mechanical Vibration and Noise (VIB), adding over 50 relevant contributions for the MSNDC community. 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 the MSNDC Best Paper and Best Student Paper competitions.

This year, we are honored to recognize Professor Kurt S. Anderson as the recipient of the d'Alembert Award, established in 2005, for his seminal contributions in the fields of multibody dynamics, space vehicle design, and advanced algorithm development. He is a Professor and Associate Dean for Undergraduate Studies in the Department of Mechanical, Aerospace, and Nuclear Engineering at Rensselaer Polytechnic Institute (RPI). Prof. Anderson has developed influential computational methods for simulating complex dynamic systems, including the Divide-and-Conquer Algorithm (DCA). Prof. Anderson is a prolific author with over 100 indexed publications and has made significant contributions to the aerospace industry through his work with TRW Space and Technology.

We are also honored to host three keynote lectures featuring distinguished speakers Olivier Bauchau and Balakumar Balachandran, as well as the winners of the ASME Journal of Computational and Nonlinear Dynamics Best Paper Award 2024.

Dr. Olivier Bauchau is the Igor Sikorsky Distinguished Professor in Rotorcraft at the University of Maryland, College Park. Prof. Bauchau's expertise lies in finite element methods for structural and multibody dynamics, rotorcraft analysis, and flexible multibody dynamics. He developed the DYMORE multibody dynamics code, widely used in aerospace. He has authored two textbooks and numerous papers, and his book, Flexible Multibody Dynamics, won the 2012 Textbook Excellence Award. Bauchau is a Fellow of ASME and received the 2015 ASME d'Alembert Award for his contributions to multibody system dynamics.

Dr. Balakumar Balachandran is a Distinguished University Professor and Minta Martin Professor at the University of Maryland, College Park. He specializes in nonlinear dynamics, control, and system identification. His research addresses a wide range of systems, including rotating machinery and space structures. His numerous awards include the 2023 Pendray Literature Award and the 2021 ASME J.P. Den Hartog and Lyapunov Awards. Prof. Balachandran is a Fellow of ASME, AIAA, and the Royal Aeronautical Society.

The winners of the ASME Journal of Computational and Nonlinear Dynamics Best Paper Award 2024 are Chantal Hutchison (McGill University), Joseph Hewlett (CM Labs Simulations), and József Kövecses (McGill University). Their award-winning paper, titled “Wavelet-Based Methods to Partition Multibody Systems with Contact in Dynamic Simulation,” demonstrates that enhancing a topology-based substructuring scheme with dynamic information can eliminate redundancy and significantly speed up computations for large-scale structures in multibody simulations.

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, 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.

Conference Co-Chairs:
Kiran X. D’Souza, *Ohio State University*
Grzegorz Orzechowski, *LUT University*

Program Co-Chairs:
Andreas Zwölfer, *Technical University of Munich*
Andrea Arena, *Sapienza University of Rome*

Conference Chair Welcomes

44th Computers and Information in Engineering Division Conference (CIE)

Greetings All Attendees!

The Computers and Information in Engineering Division of ASME welcomes all IDETC-CIE 2024 Conference participants to the 44th Annual Computers and Information in Engineering Conference (CIE) in Washington, D.C. (USA). The CIE conference is a premier venue for the international exchange of technical, scientific, innovative, 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 academia, industry, and government research labs to discover new research ideas, share their latest findings and challenges with the broader research community, foster collaborations, multi-disciplinary dissemination and build a sustainable research network and education community.

This year we are pleased to report that there will be over 117 technical paper presentations and 21 technical presentations only in the following technical and special topic sessions, organized around the five Technical Committees of the CIE Division, namely: Advanced Modeling and Simulation; Computer-Aided Product and Process Design; Systems Engineering and Information Knowledge Management; Virtual Environments and Systems; and AIML Approaches for Engineering.

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
- Digital Twin: Advanced Human Modeling and Simulation in Engineering

Computer-Aided Product and Process Development (CAPPD):
- Human-In-the Loop for Product Design and Automation
- Digital Human Modeling for Design and Manufacturing
- Product and Process Design Automation for Industry 4.0
- Data-Driven Product Design and Fabrication
- Graduate Student Poster Symposium

Systems Engineering Information Knowledge Management (SEIKM):
- Design Informatics
- Systems Engineering and Complex Systems
- Knowledge Capture, Reuse, and Management
- Smart Manufacturing Informatics
- Advanced Manufacturing for Bioeconomy and Circular Economy
- Digital Twin Modeling and Analytics for Advanced Manufacturing
- Physics-Informed Machine Learning for Advanced Design and Manufacturing
- Artificial Intelligence and Machine-Learning in Design and Manufacturing
- Design, Simulation, and Optimization for Additive Manufacturing
- Smart Manufacturing Informatics

Virtual Environments and Systems (VES):
- Designing User Experiences for Virtual Environments
- Virtual Systems for Engineering Applications

• AR/VR for Manufacturing Systems
• VR/AR Hardware and Accessibility
• Industrial Metaverse for Supply Chain and Logistics
• VES Show-and-Tell

AIML Approaches for Engineering (AI/ML):
• AI/ML General Session
• AI/ML Best Practices & Data Management
• AI/ML Engineering-Informed Approaches

Joint Sessions:
• Physics-Informed Machine Learning for Design and Advanced Manufacturing
• Artificial Intelligence and Machine Learning in Design and Manufacturing
• Design, Simulation, and Optimization for Additive Manufacturing
• Digital Twin: Advanced Human Modeling and Simulation in Engineering

In addition to the technical presentations, we will host a series of specialized events. Accompanying three CIE Keynote Talks, our first Science Tech Buzz Summit (STB), two 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 (JCISE) Spotlight panel 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.

In addition, we will use the CIE Luncheon to present and recognize conference best paper awards and the CIE Division awards. We invite you all to join us at the CIE Awards Ceremony Luncheon on Monday, August 21, to acknowledge 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 efforts and contributions from ASME volunteers.

This year's CIE Technical Committee meetings and Division meeting will be held on the evening of Tuesday, August 22. It is at these meetings where we recognize contributors from the past year, whilst setting the stage for the upcoming year's activities. Please plan to attend and/or join one of these meetings to become further involved in CIE activities. You are very welcome!

We would like to thank and recognize the Technical Committee leadership this year for their hard work and contributions:
Advanced Modeling and Simulation (AMS)
• Ahn Tran, Chair
• James Yang, Vice Chair
Computer Aided Product and Process Design (CAPPD)
• Jida Huang, Chair
• Jun Wang, Vice Chair
Systems Engineering and Information Knowledge Management (SEIKM)
• Hyunwoong Ko, Chair
• Shengyen Li, Vice Chair
Virtual Environments and Systems (VES)
• Yunbo "WILL" Zhang, Chair
• Marco Rossoni, Vice Chair
AI + ML Approaches for Engineering (AI/ML)
• John Steuben, Chair

Conference Chair Welcomes

We would like to use this opportunity to thank our symposium organizers, including Ahn Tran, Ashish Chaudari, Piyush Pandita, James Yang, Seung-Kyum Choi, Dehao Liu, John Michopoulos, Brian Dennis, Athanious Iliopoulos, Valeria Krzhizhanovskaya, Yan Wang, Zhimin Xi, Chao Hu, Gaurav Ameta, Bjorn Johansson, Yujiang Xiang, Xianlian Zhou, Tsz Ho Kwok, Hyunwoong Ko, Yanglong Lu, Jiarui Xie, Yaoyao Fiona Zhao, Jaehyuk Kim, Zhuo Yang, Fahad Milaat, Jida Huang, Jun Wang, Anand Balu Nellipallil, Chiradeep Sen, Ehsan Esfahani, Giorgio Colombo, Daniele Regazzoni, Lin Guo, Marco Rossoni, Giovanni Berselli, Miri Weiss Cohen, Satchit Ramnath, Guoxin Fang, Zipeng Guo, Yanlong Lu, Douglas Van Bossuyt, Zhuo Yang, Dazhong Wu, Ying Liu, Zhenghui Sha, Xin Guo, Shengyen Li, Yu Zheng, Boonserm Kulvatunyou, Farhad Ameri, Vincenzo Ferrero, Abheek Chatterjee, Wei Xie, Evan Wallace, Chris Hoyle, Mutahar Safdar, Senthil Chandrasegaran, Rebecca Friesen, Vinayak Krishnamurthy, Junfeng Ma, Jinjuan She, Shana Smith, Chih-Hsing Chu, Pietro Piazzolla, Yunbo “WILL” Zhang for their efforts, perspiration, and hard work in paper review coordination, dealing with the ASME webtool, and making 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, webtools, and overall event organization. Last but not the least, we thank all authors for submitting and sharing their latest work to shape the research, interaction, and innovation directions in this community.

Thanks to all CIE Executive Committee members for their efforts and perseverance in making this year’s conference a lasting success.

Special thanks to Dr. Caterina Rizzi and Dr. Paul Witherell from the organizing committee for their hard work and efforts in their support of the Design Engineering Division (DED) and Computers and Information in Engineering Division (CIE) for IDETC 2024.

Moreover, we thank you for your participation in the various activities of our CIE community. We look forward to seeing you all again next year at IDETC CIE 2025!

Robert Wendrich
CIE Conference Chair

Krishnanand Kaipa
CIE Conference Program Chair

29th Design for Manufacturing and the Life Cycle Conference (DFMLC)

The ASME Design for Manufacturing and the Life Cycle Committee welcomes participants to the 29th 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's technical sessions. This year's DFMLC conference includes 23 full technical papers and eight technical presentations across five regular sessions, and one special event, as follows:

- DFMLC-01: Life Cycle, Human Factors, Supply Chain, and Circular Economy
- DFMLC-02: Design for Manufacturing, Assembly, and Integration
- DFMLC-03: Design for Additive Manufacturing
- DFMLC-04: Design for Large and Distributed Systems and Life Cycle Assessment
- DFMLC-05: Design for Remanufacturing, Sustainment, and Multiple Life Cycles
- Special Event: Design Tool & Commercialization 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, Abigail Clarke-Sather, and the paper review coordinators/co-coordinators for managing the papers through the review process: Sara Behdad, William Z. Bernstein, Abigail Clarke-Sather, Daniel Cooper, Bryony Dupont, Paul Egan, Vincenzo Ferrero, Yong Hoon Lee, Junfeng Ma, Amin Mirkouei, Vijitashwa Pandey, Albert Patterson, Satya R.T. Pedadda, Chad Peterson, Deverajan, Ramanujan, Xinyi Xiao, Hao Zhang, Fiona Zhao, and Yongxian Zhu. Your participation and hard work have been vital for the success of the DFMLC conference! This year, Dr. Kathryn Jablokow, Distinguished Professor at Penn State University, will present the DFMLC keynote lecture. Professor Jablokow has built a highly successful research program that spans the engineering design domain, from robotics and manufacturing to design cognition, design education, and high performance engineering design teams.

There will be a presentation of the 2024 DFMLC Conference Kos Ishii-Toshiba Award for sustained and meritorious contributions to design for manufacturing and the life cycle awarded to Dr. Karl Haapala at the DED luncheon on Tuesday, August 27.

Conference Chair Welcomes

The 2024 DFMLC Conference also features a special presentation session. The “Design Tool & Commercialization Showcase” highlights new design tools developed by the members of the ASME Design community in both digital and physical forms Tuesday afternoon.

The DFMLC technical committee meeting will include a review of DFMLC activities during the 2023–2024 cycle. The DFMLC Awards, including the Best Paper Award for the 2024 DFMLC conference, in addition to two Papers of Distinction, will also be presented in this meeting, as well as 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 29th Design for Manufacturing and the Life Cycle virtual conference!

Paul Egan
Conference Chair

Albert Patterson
Conference Program Chair

The Mechanisms and Robotics Technical Committee of the ASME Design Engineering Division (MR)

The Mechanisms and Robotics Technical Committee of the ASME Design Engineering Division would like to warmly welcome you to the 48th 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.

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, including 22 technical sessions, eight technical symposia, two keynote speeches, a Special Early Career session (SEC-sess), and a Student Mechanism & Robot Design Competition (SMRDC). 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. The SMRDC will hold its final round which includes demonstrations of mechanisms and robots by the finalists. SEC-sess speakers include Inigo Sanz Pena (The City University of New York), Debkalpa Goswami (Case Western Reserve University), and Kaushik Jayaram (University of Colorado Boulder). Our keynote speakers are Diann Brei (University of Michigan) and Sunil Agrawal (Columbia University).

Submitted papers were eligible for several awards, including the Mechanisms and Robotics Best Paper Award, A.T. Yang Memorial Award in Theoretical Kinematics, and Ashok Midha Memorial Award in Compliant Mechanisms. We would like to thank Jian Dai, Chair of the Awards Committee, for coordinating the selection of the awards. 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.

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

- MR-1: Mechanisms Synthesis & Analysis: Kuan-Lun Hsu, Jieyu Wang, Vu Linh Nguyen
- MR-2: Theoretical & Computational Kinematics (A.T. Yang Symposium): Carl Nelson, Hongliang Shi
- MR-3: Compliant Mechanisms (A. Midha Symposium): Jonathan Hopkins, G. K. Ananthasuresh, Alberto Parmiggiani
- MR-4: Origami-Based Engineering Design: Suyi Li, Shikui Chen, Jared Butler
- MR-5: Motion Planning, Dynamics, and Control of Robots: Joo Kim, Damien Chablat,

Conference Chair Welcomes

Andreas Müller, Jeffrey W. Herrmann

- MR-6: Medical & Rehabilitation Robotics: Carlotta Mummolo, Elena De Momi
- MR-7: Novel Mechanisms, Robots, and Applications: Guowu Wei, Reza Fotouhi, Haohan Zhang, Abbas Fattah
- MR-8: Soft & Continuum Mechanisms: Vishesh Vikas, Girish Krishnan, Sree Kalyan Patiballa
- MR-9: Student Mechanism and Robot Design Competition (SMRDC): Long Wang, Gaurav Singh, Haiyang Li, Huijuan Feng, Colette Abah
- MR-10: Special Early Career Session (SEC-sess): Jared Butler, Sree Kalyan Patiballa

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.

Mark Plecnik
University of Notre Dame

Giovanni Berselli
Università di Genova

Yu She
Purdue University

AVT

TUESDAY, AUGUST 27, 11:00AM–12:20PM
STATE

LOW ORDER MODELING OF VEHICLE DYNAMICS INCORPORATING ACTUATORS FOR UNDERSTANDING, DESIGN, AND CONTROL OF SYSTEM BEHAVIOR

Prof. Donald Margolis
Department of Mechanical and Aerospace Engineering
University of California

Abstract: Fundamental vehicle dynamics is very well understood thanks to people like William Milliken, for which this award is named. Over the decades, tire models have been developed that are used in conjunction with multi-degree-of-freedom vehicle models resulting in very sophisticated commercial programs for simulating and displaying vehicle response. Car companies even refer to these programs as the "real" vehicle. The problem with these programs is that they are not very useful for design. In fact, the vehicle pretty much already exists in order to determine the parameters needed for the program inputs.

In the past 20 years active control of vehicle dynamics has become practical. For active control we need sensors, signal processing, control algorithms and philosophies, and actuators. The actuators are typically electro-mechanical, electro-hydraulic, or perhaps electro-pneumatic, meaning that we will probably control an electrical signal in order to produce a force or torque on the vehicle. In order to incorporate such multi-energy domain devices into vehicle models one needs a modeling procedure that allows, first, the modeling of such devices and, second, the incorporation of these actuator models into the vehicle system model. The end result would be a low order model that allows realistic controller development along with actuator specifications, power requirements, and more.

Bond graph modeling is a perfect candidate for such multi-energy domain modeling. Some background will be given on bond graph modeling along with its application to several vehicle systems.

Biography: Donald Margolis received his B.S. in Mechanical Engineering in 1967 from Virginia Polytechnic Institute and State University. He did his graduate work at MIT, receiving an M.S., M.E., and Ph.D. in Mechanical Engineering in 1972. Upon graduation from MIT, Dr. Margolis joined the faculty of Mechanical Engineering at the University of California at Davis where he is currently Professor of Mechanical Engineering.

Professor Margolis is an expert in the area of physical system modeling and control of engineering systems. He is a principal developer of the bond graph modeling method for interacting multi-energy domain systems. These have come to be called "mechatronic" systems. He is co-author of the most comprehensive text in this area of modeling, titled, System Dynamics: Modeling, Simulation, and Control of Mechatronic Systems, published by Wiley and Sons of NY. This book is in its 5th edition. He is also co-author of the text, Engineering Applications of Dynamics. This book is also published by Wiley and Sons.

Professor Margolis has done research and development in the general area of physical system understanding with particular application to vibration control and vehicle dynamics and control. He has published over 150 articles in these areas and holds several patents for devices that required in depth physical system understanding for their invention. Professor Margolis is a Fellow of ASME and the Director of the Hyundai Center of Excellence in Vehicle Dynamic Systems and Control. He is a teacher, researcher, and consultant to industry and national laboratories throughout the U.S., Asia, and Europe.

CIE

MONDAY, AUGUST 26, 10:50AM–12:10PM,
SALON 4

DIGITAL TWINS — THE UNDERLYING PREMISE OF PRODUCT LIFECYCLE MANAGEMENT

Dr. Michael Grieves
Executive Director and Chief Scientist
Digital Twin Institute

Abstract: From its introduction in 2002, Digital Twins have been the underlying premise for Product Lifecycle Management (PLM). This year's conference is highlighting "emerging technologies that impact critical engineering issues of product design and development, manufacturing, and the management and integration of information systems throughout the product life-cycle." Dr. Grieves, who originated the concept of Digital Twin and authored the seminal book on PLM, will present his perspectives of Digital Twins, their types, technologies, and use throughout the product lifecycle, and their evolution as intelligent and interoperable entities with AI into platforms and metaverses.

Biography: Dr. Michael Grieves is an internationally renowned expert on digital twins, a concept he originated, and Product Lifecycle Management (PLM), a discipline he wrote the seminal book for. Dr. Grieves has over five decades of executive, board, and technical experience in both global and entrepreneurial technology and manufacturing companies. He has consulted and done research at some of the top global organizations (NASA, Boeing, GM, Unilever) and has served as a senior executive and board member at both Fortune 1000 companies and entrepreneurial organizations.

Academically, he has had appointments and has done research and/or taught at the University of Michigan, Purdue University, and University of Iowa. Dr. Grieves has a B.S. Computer Engineering from Michigan State, and MBA from Oakland University, and his doctorate from Case Western Reserve University.

Keynotes

TUESDAY, AUGUST 27 **9:20AM–10:40AM**
SALON 4

CONVENING ECOSYSTEMS FOR U.S. GLOBAL LEADERSHIP IN ADVANCED MANUFACTURING

Mike Molnar
NIST / Manufacturing USA

The Office of Advanced Manufacturing (OAM) serves as the headquarters for the interagency Advanced Manufacturing National Program Office to coordinate Manufacturing USA, a network of manufacturing innovation institutes across the country that brings together industry, academia, and the public sector to advance American manufacturing.

Abstract: Manufacturing USA exists to secure U.S. global leadership in advanced manufacturing through large-scale public-private collaboration on technology, supply chain, and workforce development. The institutes in the Manufacturing USA network convene business competitors, academic institutions, and other stakeholders to test applications of new technology, create new products, reduce cost and risk, and enable the manufacturing workforce with the skills of the future. This keynote will highlight two new manufacturing institute opportunities that further help improving our way of life, strengthen our economy, ensure our national security, all while empowering the current and next generation.

The Manufacturing USA network is operated by the interagency Advanced Manufacturing National Program Office, which is headquartered in the National Institute of Standards and Technology (NIST), in the Department of Commerce. The office operates in partnership with the Department of Defense, the Department of Energy, NASA, the National Science Foundation, and the Departments of Education, Agriculture, Health and Human Services (HHS), and Labor.

Biography: Mike Molnar is the founding director of the Advanced Manufacturing National Program Office, the interagency team responsible for the Manufacturing USA program. Mike also leads the NIST Office of Advanced Manufacturing and serves as co-chair of the National Science and Technology Council, Subcommittee on Advanced Manufacturing—the team responsible for the National Strategic Plan for Advanced Manufacturing.

Prior to joining federal service in 2011 Mike had a successful industry career, including 25 years leading manufacturing and technology development at Cummins, a U.S. based global company that designs, manufactures, and distributes engines and power generation products. Midcareer he served as the first Manufacturing Policy Fellow in the White House Office of Science and Technology Policy. He earned a Bachelor's in Mechanical Engineering and Master's in Manufacturing Systems Engineering from the University of Wisconsin, and an Executive MBA from the University of Notre Dame. He is a licensed Professional Engineer, Certified Manufacturing Engineer, and was elected a Fellow of SME and a Fellow and Honorary Member of ASME.

TUESDAY, AUGUST 27 **11:00AM–12:20PM**
SALON 4

DEMOCRATIZING OPTIMIZATION AND ANOMALY DETECTION IN PRODUCT DEVELOPMENT

Ken Leisenring
Chief Engineer, Powertrain Calibration
Ford Motor Company

Abstract: This conversation addresses the challenge of creating robust optimization and anomaly detection systems for product development. We aim to achieve optimal solutions that are resistant to noise and variability, while ensuring these solutions can be demonstrably proven as correct. The ultimate goal is to create a system capable of replicating the decision-making process of expert engineers, eliminating human error, and enabling continuous operation. To address these needs, the tactical objectives include advanced optimization algorithms, anomaly detection, and the development of synthetic sensors and models. Strategically, there is a recognition that many advanced capabilities have not yet been democratized for use directly by product development engineers. This focus on leveraging readily available solutions would allow us to address a wider range of problems and support a larger user base, rather than solely focusing on solving the most complex challenges. This involves creating tools that can be widely used by engineers to achieve repeatable and predictable results, without relying solely on AI experts for large-scale implementation.

Biography: Ken Leisenring is Chief Engineer, Vehicle Propulsion Systems Engineering at Ford Motor Company. He is an accomplished engineering professional with a strong foundation in mechatronics, holding degrees in Electrical Engineering from Michigan Technological University and Mechanical Engineering from Ohio State University. Ken has extensive experience in powertrain calibration, controls, emissions, on-board diagnostics, fuel economy, and new technology development. His leadership has driven successful projects related to Ford launches of EcoBoost engines, gasoline particulate filters, tri-metal catalysts, and adaptive cruise control. Ken is known for developing strategic visions and innovative approaches, consistently pushing the boundaries of automotive technology and driving efficiency.

DAC 50TH ANNIVERSARY SIGNATURE EVENT

TUESDAY, AUGUST 27 **4:20PM–6:00PM**
SALON E

SUCCESSES, ASPIRATIONS, AND OPPORTUNITIES FOR DESIGN AUTOMATION

Host/Chair:
Souma Chowdhury
University at Buffalo

Panelists:

Carolyn Seepersad
Georgia Institute of Technology

Carolyn Conner Seepersad is the Woodruff Professor of Mechanical Engineering at the Georgia Institute of Technoloy. She is the Editor-in-Chief of the ASME Journal of Mechanical Design. Her research interests include design for additive manufacturing, simulation-based design of materials and structures, and process innovation in additive manufacturing. She is a member of the organizing committee of the annual Solid Freeform Fabrication Symposium and a member of SME's Additive Manufacturing Technical Leadership Committee. She is the author of more than 150 peer-reviewed conference and journal publications.

Prof. Kristina Shea
ETH Zurich

Prof. Kristina Shea is a Full Professor for Engineering Design and Computing in Mechanical and Processing Engineering at ETH Zürich since 2012. Her lab's research combines engineering design, computation and fabrication to design and prototype creative engineering systems with new functionalities that help to achieve sustainable development goals. Current research topics include computational design, design for Additive Manufacturing (AM), multi-material AM and 4D printing, as well as new research in development engineering. Her lab investigates a wide variety of application areas across a number of industries, including consumer products, space, automotive, built environment and biomedical. Kristina Shea graduated in Mechanical Engineering (B.S. 1993; M.S. 1995; Ph.D. 1997) from Carnegie Mellon University. She has held academic positions at EPFL (Switzerland) where she was a post-doc, University of Cambridge (UK) where she was a tenured Lecturer (Assistant Professor), and TU München (Germany) where she was a tenured Associate Professor. She is a Fellow of ASME and member of the Design Society.

Vadim Shapiro
International Computer Science Institute

Vadim Shapiro is the Co-Founder & CTO of Intact Solutions, providing advanced modeling and simulation solutions for generative design and advanced manufacturing. He is also a Distinguished Research Fellow at the International Computer Science Institute in Berkeley, CA, and Bernard A. and Frances M. Weideman Professor Emeritus at the University of Wisconsin – Madison. Shapiro holds Bachelor's degrees in Mathematics and in Computer Science from NYU, M.S. in Computer Science from UCLA, as well as M.S. and Ph.D. degrees in Mechanical Engineering from Cornell University. Prior to his academic career he was on the research staff at the General Motors R&D Center. He is Fellow of ASME, and his technical contributions have been recognized by a number of awards, including the ASME Design Automation Award, and the Pierre Bézier Award. He currently serves as the Editor-in-Chief of the Computer-Aided Design (Elsevier) journal.

Shapour Azarm
University of Maryland

Shapour Azarm received his Ph.D. in Mechanical Engineering from the University of Michigan, Ann Arbor. He then joined the University of Maryland, College Park, where he is a Professor of Mechanical Engineering. His research interest is centered on design optimization of engineered systems. His current research is focused on (i) predictive maintenance of unmanned systems using machine learning and optimization techniques, (ii) multi-objective robust optimization under uncertainty, (iii) reduced-order modeling with applications in additive manufacturing and reliability-based optimization, and (iv) multi-vehicle routing considering multiple recharging stations and vehicle failure. He is a Senior Advisor of Structural and Multidisciplinary Optimization, was Editor-in-Chief of ASME Journal of Mechanical Design, and served as associate editor, guest editor, and editorial board member of many other journals. He is currently serving as Vice-Chair of the ASME Technical Committee on Publications and Communications. In the past, he served as Chair of the ASME Design Engineering Division, Chair of the ASME Design Automation Committee, Conference and Paper Review Chair of the ASME Design Automation Conference. He has received the Procter & Gamble paper awards, ASME/Ford Best Paper Award, ASME Design Automation Award, ASME Robert E. Abbott Award, and ASME Machine Design Award. He is a Fellow and Life Member of the ASME.

Keynotes

Yan Fu
Ford Motor Company

Dr. Yan Fu is the Senior Director of Strategy and Enterprise Analytics at Ford Motor Company, where she leads the development of data-driven solutions for strategic decision-making. Leveraging cutting-edge technologies like Gen AI, machine learning, and optimization, her team enhances profitability, ensures regulatory compliance, and supports key initiatives such as electrification. A prolific innovator, Dr. Fu holds 7 U.S. patents and has authored over 150 publications. Her distinguished career at Ford has earned her numerous accolades, including the SAE Henry Ford II Distinguished Award, three Henry Ford Technology Awards, and the Women of Color STEM DTX Conference Technology All-Star Award. Dr. Fu is a Fellow of both the American Society of Mechanical Engineers and the Society of Automotive Engineers.

DFMLC

TUESDAY, AUGUST 27 **11:00AM–12:20PM**
TREASURY

EXTREME DESIGN AND THE PERFECT LIFECYCLE

Dr. Kathryn Jablokow
Deputy Division Director
Division for Research, Innovation, Synergies, and Education
Directorate for Geosciences
National Science Foundation

Abstract: Extreme Design (XD) is an emerging field of design research that is, by its nature, focused on exceptional situations and conditions, from designing for extreme environments to designing systems of extremely high complexity to designing for situations of extreme disruption. One aim of Extreme Design is to reveal new design principles, methods, processes, and tools by looking at extreme variations within a given context, and then to transfer those results back to the non-extreme parts of that same context—or to a different context altogether. Extreme Design is more than simply considering extreme users, which may shift a particular product into new territory, but which may not change the deeper design principles themselves. Done right, Extreme Design should keep us connected to the normal while we consider the highly unusual, so the pathway remains complete. Similarly, when we design for manufacturing and lifecycle, we are thinking about the end even as we think about the beginning, questioning every design decision on the basis of its anticipated downstream effects and maintaining a clear sustainable path from planning to prototyping to production to maintenance. In this presentation, we will consider how the search for extreme design principles and the search for the perfect integration of design and manufacturing can inform and challenge each other and our creativity as engineers.

Biography: Dr. Jablokow's professional experience spans academia and the public sector. In her 34 years at Penn State University, she has served as an educator, researcher, and administrator at multiple campuses. Dr. Jablokow has built a highly successful research program that spans the engineering design domain, from robotics and manufacturing to design cognition, design education, and high performance engineering design teams. Her funding sources include NSF and other Federal agencies, as well as industry, and she is the recipient of many teaching and research honors and awards, including ASME Fellow and the ASME Ruth and Joel Spira Outstanding Design Educator Award. Dr. Jablokow served as Program Director for the Engineering Design and Systems Engineering (EDSE) program at the National Science Foundation (2019–2024), where she guided the design research community in new directions while overseeing a $40M portfolio of projects. Dr. Jablokow's service has extended across multiple professional organizations, including ASME, ASEE, IEEE, and the Design Society. She served as an ASME ABET Accreditation Evaluator for Mechanical Engineering programs (2000–2008), as well as Chair of ASME's Technology and Society Division (2009–2011). In 2023, Dr. Jablokow was elected to the ASME Board of Governors and serves as Board Liaison to the Committee on Sustainability. Dr. Jablokow earned her B.S., M.S., and Ph.D. degrees in electrical engineering from The Ohio State University, and an Executive Certificate in Public Leadership from Harvard's John F. Kennedy School of Government.

MARY BAKER INDUSTRIAL ACHIEVEMENT AWARD

TUESDAY, AUGUST 27 **4:20PM–6:00PM**
SALON 4

PRESENTATION TITLE: US AS ONE: LEADING TEAMS AND EXPLORING SPACE TOGETHER

Diana Trujillo
Flight Director at NASA

Abstract: The space exploration industry is changing and growing at a faster pace than ever before. A new generation of space engineers and teams now find ourselves evolving the way we approach challenges from what can we do next? to what is the right thing to do now? More than ever before, we are a species in motion, with human spaceflight and robotic missions expanding our understanding of the unknown at an unprecedented rate, pushing us to ask over and over again, are we doing the right thing?

As missions become more complex and time becomes more precious, explorers around the world find ourselves trying to figure out how to effectively lead multidisciplinary teams in the unknown environment of space, where the scope of the problem is an ever-evolving story. In this keynote, NASA Flight Director Diana Trujillo will share what she has learned about leading multidisciplinary teams at the cutting edge of exploration on the surface of Mars (the Curiosity, Perseverance, Ingenuity robotic mission) and in Low Earth Orbit (International Space Station).

Bio: Diana Trujillo is a Flight Director at NASA's Johnson Space Center near Houston, TX. As the 108th Flight Director in NASA's history -- and the first born in a Spanish-speaking country -- Trujillo is one of a small cadre who lead the Mission Control Center during all of NASA's human spaceflight missions, including ongoing operations of the International Space Station, the Artemis missions returning humans to the Moon and onward to Mars, and key flights of the Dragon, Cygnus, and Starliner orbital vehicles.

Prior to her current position, Trujillo played a key role in three landmark robotic missions to Mars: Curiosity and Perseverance, the most advanced Mars rovers ever built; and Ingenuity, the first helicopter to fly on another planet. Over the course of fourteen years at NASA's Jet Propulsion Laboratory, she held a number of leadership roles on those missions, including Flight Director, Mission Lead, Deputy Project System Engineer, Deputy Team Chief of Engineering, and Robotic Arm Science phase lead.

Born and raised in Colombia, Trujillo immigrated to the United States at the age of 17 to pursue what she had been told was an impossible dream: working for NASA. She enrolled in English as a Second Language courses, working full-time to support her studies at Miami-Dade Community College, where her academic performance provided her the opportunity to earn a B.S. in Aerospace Engineering from the University of Maryland, with additional studies at the University of Florida. While an undergrad, Trujillo also participated in the NASA Academy at Goddard Space Flight Center, NASA's premiere leadership training and research program for graduate and undergraduate students.

After graduating, she worked at Orbital Sciences Corporation (now part of Northrop Grumman), helping the company win a $170 million contract from NASA to develop the Cygnus cargo spacecraft -- a vehicle that has now successfully conducted twenty missions to resupply the International Space Station.

In addition to her technical roles at JPL, Trujillo also created and hosted #JuntosPerseveramos, NASA's first ever Spanish-language live broadcast of a major mission milestone. The #JuntosPerseveramosprogram was viewed live by millions in the United States, and was broadcast on television throughout Latin America.

Trujillo has previously served on the non-profit boards of the Brooke Owens Fellowship, the Columbia Memorial Space Center, and the Children's Center at Caltech. She is also a passionate advocate for diversity in STEM, having pushed for more inclusion of the Latinx community in venues ranging from the White House Initiative on Educational Excellence for Hispanics to the educational program Plaza Sésamo (Sesame Street).

In 2017, Trujillo was named one of "Los 22 Más," the 22 Colombians who best represent Colombia and all Colombians in the USA. In 2021, she was honored with the Cruz de Boyacá and named a Comendador of the Orden de Boyacá by the President of Colombia, the highest honors Colombia awards to civilians.

Trujillo lives near Houston, TX with her husband and their two children.

MNS

TUESDAY, AUGUST 27 **8:10AM–9:10AM**
RAYBURN

IMPROVING CANCER DIAGNOSTICS THROUGH INNOVATIVE MICRO- AND NANOSYSTEMS

Shaurya Prakash
Department of Mechanical and Aerospace Engineering
The Ohio State University

Abstract: Cancer continues to be a challenging disease to diagnose early and treat, despite the many advances enabled since the establishment of the National Cancer Institute, which has seen well over $40B investment by the U.S. federal government alone. To advance the science and technology for enabling better care and provide earlier diagnosis, our lab has focused on developing technologies that rely on both microelectromechanical (MEMS) technologies and microfluidics. In this talk, I will share our team's work in developing a unique impedance mapping system that can potentially allow real-time imaging of tissues to determine surgical margins. The impedance mapping system showed the need for rapid fluid analysis and allowed our creative team to consider developing microfluidic tools for potential point-of-care diagnostics through biomarker identification and use of liquid biopsies. I will close this talk by describing an emerging, blood-vessel-on-chip technology from our group that tackles the fundamental question in cancer biology for how tumors grow and how this technology can transcend disease boundaries and potentially be applied to pathologies beyond cancer.

Biography: Shaurya Prakash graduated with a Ph.D. in Mechanical Engineering from the University of Illinois at Urbana-Champaign in 2007. Following his brief stint as an Assistant Professor at Rutgers University, he joined the faculty in the Department of Mechanical and Aerospace Engineering at The Ohio State University in 2009. He is a Fellow of the American Society of Mechanical Engineers (ASME). At Ohio State, he directs the Microsystems and Nanosystems Laboratory, where his team develops novel technologies for applications in healthcare for cancer, wound healing, and infectious disease; and in water purification. He is also a co-director for Ohio State's Infectious Diseases Institute focusing on Microbial Communities. Therefore, his group addresses fundamental scientific questions towards enabling new technologies that solve problems critical to modern societal needs. Prof. Prakash has published over 100 peer-reviewed articles, holds multiple patents, and has authored a book titled, Nanofluidics and Microfluidics: Systems and Applications. He is an Associate Editor for Microfluidics and Nanofluidics and Scientific Reports, both part of the SpringerNature journal collection. His multi-disciplinary research is funded by diverse government and industry sponsors.

MR

MONDAY, AUGUST 26 **10:50AM–12:10PM**
SALON F

SMART TECHNOLOGY DESIGN IN A TRANSFORMATIVE WORLD

Dr. Diann Brei
Professor of Mechanical Engineering
University of Michigan

Abstract: All around us our world is undergoing rapid transformative technological change, from energy to mobility to health sectors. To meet volatile needs, there is a growing demand for integrative thinking. Integrative thinking is systematically integrating disparate disciplines to effectively tackle complex engineering problems. For decades, the field of Smart Materials and Structures has fostered an integrative mindset – it is in our DNA. While emerging technologies based upon smart materials hold many benefits for industry, it has been a long journey to transition research advancements into real products. The field of smart materials and structures is viewed as "enabling" or "emerging" spanning either a) new markets where the products are first generation without a clear application and there is an absence of design models present so empirical developmental methods must be employed, or b) developing markets where there are a few guiding models/methods but the products are not optimized and not reaching their full commercial potential. Even though the fundamental science is present, the technology and industrial infrastructure is limited. Specifically, there are little workable design models and tools, engineering data related to material uniformity/reliability and the effect of environmental factors, and use history. Most importantly, the workforce is unfamiliar with the field and how to incorporate and utilize the distinct responses of smart materials to provide competitive products with unique properties. There needs to be a clearer path to transition all the progress made during the past twenty-five years of research into fruitful commercial products, especially within high-volume, low-cost markets. This talk will discuss these efforts from a technological design and development perspective with application examples from several industries, such as 1) Medical industry with Liftware spoon to counteract hand tremor and FDA fast track MENDD treatment for bowel growth, and 2) Automotive industry with Soft Adaptive Structures for deployable

interior and exterior features in autonomous vehicles. The importance of collaborative, synergistic mission-driven relationships spanning from basic research to device design into system integration will be highlighted as crucial for successful transition from emerging smart material research of today to competitive commercial products of tomorrow. Highlighting several integrative smart systems from the past to the future, this talk is designed to provoke a conversation within the community with the hopes to inspire the advocacy of integrative thinking beyond our field to empower solutions to the most pressing problems of today.

Biography: Dr. Diann Brei is a Professor of Mechanical Engineering at the University of Michigan. She received her PhD (1993) in Mechanical Engineering and her BSE (1988) in Computer Systems Engineering (1988) from Arizona State University. She served at University of Michigan in the past as Chair of the Integrative Systems + Design Division, Mechanical Engineering Associate Chair for Undergraduate Education and as the Director of the Design Science Graduate Program. She was the co-director of the General Motors/University of Michigan Smart Materials and Structures Collaborative Research Laboratory (SMS CRL) for close to two decades with a range of projects focused on smart material maturity, product innovation utilizing smart materials, mechamatronic design tools leading teams of academic and industrial experts with thrust in Multi-functional Interactive Knits, NeuroTech, Multi-functional Active System Technologies, and The Technology Incubator.

Her research is focused on the underling design science for device innovation using smart materials. Her smart material architectural models along with her multi-domain, multi-stage design methods have set the foundation for a successful translational research and development paradigm adopted by industries in the automotive, medical and aerospace sectors. This has led to transformative technological approaches for emerging products based upon smart materials and structures. She has written over 125 referred journal and conference publications. Apart from her publications, she has 29 patents, several with exclusive licenses. Dr. Brei who is an ASME Fellow and AIAA Associate Fellow, has been an active leader in the design and smart materials/structures community recognized by the ASME Machine Design Award, ASME Adaptive Structures and Material Systems Award, SPIE Lifetime Achievement Award SSM, and the ASME Distinguished Service Award.

TUESDAY, AUGUST 27 **4:20PM–6:20PM**
SALON F

REHABILITATION ROBOTICS: IMPROVING EVERYDAY HUMAN FUNCTIONS & SHORT HIGHLIGHT: A TRIBUTE TO PROF. ASHOK MIDHA, 1946–2023

Sunil K. Agrawal, Ph.D., Professor
Department of Mechanical Engineering, Department of Rehabilitation
and Regenerative Medicine, Columbia University

Presnted by Larry Howell (BYU): Prof. Ashok Midha is recognized as the "Father of Compliant Mechanisms" and the Ashok Midha Compliant Mechanisms Symposium at the ASME Mechanisms & Robotics Conference is named in his honor. Prof. Midha passed away in late 2023 and this tribute recognizes his lifelong contributions to the mechanisms research community, his passion for design education, and the positive impact he had on those he interacted with.

Abstract: Neural disorders, old age, and traumatic brain injury limit activities of daily living. Robotics can be used in novel ways to characterize human neuromuscular responses and retrain human functions. Columbia University Robotics and Rehabilitation (ROAR) Laboratory designs innovative mechanisms/robotics with these goals and performs scientific studies to improve human functions such as standing, walking, stairclimbing, trunk control, head turning, and others. Human experiments have targeted individuals with stroke, cerebral palsy, Parkinson's disease, spinal cord injury, ALS, and elderly subjects. The talk will provide an overview of these robotic technologies and scientific studies performed with them to demonstrate strong potential of rehabilitation robotics to improve human functions and quality of life of people.

Biography: Sunil Agrawal received a Ph.D. degree in Mechanical Engineering from Stanford University in 1990. He is currently a Professor and Director of Robotics and Rehabilitation (ROAR) Laboratory at Columbia University, located both in engineering and medical campuses of the university. Dr. Agrawal has published more than 500 journal and conference papers, 19 U.S. patents, and 3 books. He is a Fellow of the ASME and AIMBE. His honors include a NSF Presidential Faculty Fellowship from the White House in 1994, a Bessel Prize from Germany in 2003, and a Humboldt US Senior Scientist Award in 2007. He is a recipient of 2016 Machine Design Award from ASME for "seminal contributions to design of robotic exoskeletons for gait training of stroke patients" and 2016 Mechanisms and Robotics Award from the ASME for "cumulative contributions and being an international leading figure in mechanical design and robotics." He is a 2023 recipient of a Paintal Chair from Indian National Science Academy. He was a Plenary Speaker at the 2024 IEEE International Conference in Robotics and Automation in Yokohama. He has successfully directed 40+ PhD student theses and has received Best Paper awards in ASME and IEEE sponsored robotics conferences. He is the founding Editor-in-Chief of the journal, Wearable Technologies, published by Cambridge University Press. He organized the IEEE BioRob 2020 conference in New York City and served as its conference chair.

MSNDC

MONDAY, AUGUST 26 **8:00AM–9:00AM**
SALON 4

MULTIBODY DYNAMICS KEYNOTE: GEOMETRIC ALGEBRA FOR MULTIBODY DYNAMICS

Olivier A. Bauchau
University of Maryland

Biography: Dr. Bauchau earned his B.S. degree in engineering from the State University at Liège, Belgium, and M.S. and Ph.D. degrees from the Massachusetts Institute of Technology. He is the Igor Sikorsky Professor of Rotorcraft at the Department of Aerospace Engineering of the University of Maryland, College Park. His fields of expertise include finite element methods for structural and multibody dynamics, rotorcraft and wind turbine comprehensive analysis, and experimental mechanics and dynamics. He is a Fellow of the American Society of Mechanical Engineers, a Technical Fellow of the American Helicopter Society, and Fellow of the American Institute of Aeronautics and Astronautics. He is associate editor for the Journal of Computational and Nonlinear Dynamics, Multibody System Dynamics, the Journal of Multibody Dynamics, and the Journal of the American Helicopter Society. He has authored a book entitled, Flexible Multibody Dynamics, which has won the 2012 Textbook Excellence Award from the Text and Academic Authors Association.

MONDAY, AUGUST 26 **10:50AM–12:10PM**
LONGWORTH

D'ALEMBERT AWARD LECTURE TITLE: ADAPTIVE MULTIBODY DYNAMICS FORMULATIONS FOR APPLICATIONS FROM COMPLEX SPACECRAFT, TO BIOPOLYMERS, TO SPACE DEBRIS

Kurt S. Anderson
RPI

Biography: After receiving his B.S. degree in mechanical engineering from the University of California at Berkeley in 1982, Dr. Anderson went on to earn a M.S. in the area of dynamic systems and control from the same institution. He then spent the next few years working in the areas of dynamics, structural dynamics, and controls for TRW Space and Technology in Redondo Beach, California. After this period, he entered the Ph.D. program in Applied and Computational Mechanics at Stanford University, earning his degree in 1990. Dr. Anderson then accepted a position as researcher and principal dynamics engineering at TRW where he was associated with various spacecraft and research programs. In late 1991, Dr. Anderson was invited to Germany for a two-year period as a visiting scholar, lecturer, and research fellow at the Technische Hochscule – Darmstadt. In 1993, he joined the faculty of the Department of Aerospace Engineering, Applied Mechanics, and Aviation at The Ohio State University, in Columbus where he remained until coming to RPI as faculty member in August 1995.

Keynotes

TUESDAY, AUGUST 27 **8:00AM–9:10AM**
SALON 4

NONLINEAR DYNAMICS KEYNOTE: NOISE-INFLUENCED DYNAMICS

Dr. Balakumar Balachandra
University of Maryland

Biography: Dr. Balachandran received his B. Tech (Naval Architecture) from the Indian Institute of Technology, Madras, India, M.S. (Aerospace Engineering) from Virginia Tech, Blacksburg, VA and Ph.D. (Engineering Mechanics) from Virginia Tech. Currently, he is a Distinguished University Professor and a Minta Martin Professor at the University of Maryland, where he has been since 1993. His research interests include applied physics, applied mechanics, applied mathematics, nonlinear phenomena, dynamics and vibrations, and control. The publications that he has authored/co-authored include a Wiley textbook entitled Applied Nonlinear Dynamics: Analytical, Computational, and Experimental Methods (1995, 2004), a Thomson/Cengage textbook (2004, 2009) and a Cambridge University Press textbook (2018) entitled Vibrations, and a co-edited Springer book entitled Delay Differential Equations: Recent Advances and New Directions (2009). He holds four U.S. patents and one Japan patent, three related to fiber optic sensors and two related to atomic force microscopy. He has served as the Editor of the ASME Journal of Computational and Nonlinear Dynamics, a Contributing Editor of the International Journal of Non-Linear Mechanics, and a Deputy Editor of the AIAA Journal. He is an ASME Fellow, an AIAA Fellow, a Fellow of the Royal Aeronautical Society, an ASA full member, and an IEEE Senior Member. He is a recipient of the ASME Melville Medal, the Den Hartog Award, & the Lyapunov Award, the ASCE Engineering Mechanics Institute Robert Scanlan Medal, and the AIAA Pendray Aerospace.

TUESDAY, AUGUST 27 **11:00AM–12:20PM**
LONGWORTH

ASME JOURNAL OF COMPUTATIONAL AND NONLINEAR DYNAMICS BEST PAPER AWARD TITLE: WAVELET-BASED METHODS TO PARTITION MULTIBODY SYSTEMS WITH CONTACT IN DYNAMIC SIMULATION

Dr. József Kövecses
University of Maryland

Biography: Dr. Kövecses is a Mechanical Engineering Professor at McGill University and director of the Applied Dynamics Group at the Centre for Intelligent Machines. His research focuses on dynamics, robotics, and multibody systems, with applications in space robotics and heavy machinery simulation. He received the 2018 NSERC Synergy Award for Innovation for his work with CM Labs Simulations on virtual prototyping and training simulators. Prof. Kövecses has published extensively and received several awards for his contributions to mechanical engineering.

VIB

MONDAY, AUGUST 26 **8:00AM–9:00AM**
HART/RUSSELL

COMPLEXITY IN VIBRATIONS AND DYNAMICS – PHENOMENA AND METHODS

Prof. Norbert Hoffmann
Hamburg University of Technology

Abstract: This talk puts mechanical vibrations and dynamics in engineering and technology into the context of system complexity. The term complexity seems rather loosely defined at first. Still, I will exploit it for pointing to some of the key limitations of how vibrations and dynamics are viewed and approached in present engineering. From this I hope to sketch some directions in which novel and potentially more powerful perspectives on real-world vibration phenomena and related engineering methods might emerge or be developed.

TUESDAY, AUGUST 27 **9:20AM–10:40AM**
HART/RUSSELL

MYKLESTAD AWARD KEYNOTE TITLE: ENGINEERING OF VIBRATORY SYSTEMS THROUGH PIEZOELECTRIC CIRCUITRY: THE 4TH DIMENSION EXPLORATION

Prof. Jiong Tang
School of Mechanical, Aerospace, and Manufacturing Engineering
University of Connecticut

Abstract: Piezoelectric transducers feature two-way electromechanical coupling that can seamless join the mechanical and electrical domains together. One can directly integrate circuitry elements to piezoelectric transducers embedded in the host structure to favorably alter the structural dynamic behaviors for control, sensing, and system identification purposes. In this talk, the concept of piezoelectric circuitry is briefly reviewed first, followed by illustrative examples in passive and active vibration controls in which the challenges and progresses of mechatronic design and synthesis schemes are highlighted. Subsequently, the utilization of piezoelectric circuitry for active interrogation of structural damage identification through impedance measurement is presented in

detail, which features two fronts of explorations. From the algorithmic aspect, a multi-objective optimization framework is formulated that can adequately utilize the measurement information to facilitate diagnosis. From the measurement circuitry aspect, it is demonstrated that the tunability of the piezoelectric circuitry can effectively narrow down the search results of damage identification.

Biography: Jiong Tang is the Pratt & Whitney Professor in School of Mechanical, Aerospace, and Manufacturing Engineering, University of Connecticut. Dr. Tang's principal teaching and research interests are in the general areas of dynamics and vibrations, control, sensing and automation. He received the B.S. and M.S. degrees in Applied Mechanics from Fudan University, China, in 1989 and 1992, respectively, and the Ph.D. degree in Mechanical Engineering from the Pennsylvania State University in 2001. Prior to joining UConn in 2002, he worked in GE Research Center as a research engineer. Dr. Tang has studied a series of research subjects including smart materials, motion and vibration controls, sensing and signal processing, design optimization, computational intelligence, and modeling and analysis of multi-physics systems and processes. Dr. Tang's research has been supported extensively by federal agencies including NSF, DOD, NASA, DOT, etc., and by industries.

WEDNESDAY, AUGUST 28 **8:00AM–9:40AM**
HART/RUSSELL

CD MOTE EARLY CAREER AWARD KEYNOTE TITLE: HARNESSING STRUCTURAL PERIODICITY FOR WAVE CONTROL TOWARD SENSING, HARVESTING, AND SPACE APPLICATIONS

Dr. Serife Tol
Associate Professor, Mechanical Engineering
University of Michigan, Ann Arbor

Abstract: The study of structural periodicity in engineered materials, such as metamaterials, phononic crystals, and metasurfaces, has opened new frontiers in wave control. Our research group explores the fundamental principles and advanced techniques for harnessing structural periodicity to manipulate wave propagation for diverse applications in sensing, energy harvesting, and space technology. By leveraging the unique properties of these periodic structures, we demonstrate how they can be used to enhance ultrasonic sensing and nondestructive testing, improve the efficiency of energy harvesters, and develop innovative solutions for space applications. The first part of my talk will focus on gradient index phononic crystal (GRIN-PC) lenses conforming pipe-like structures. Conformal GRIN-PC lenses are designed by tailoring unit cell geometry according to a specific refractive index profile. We explore the focusing of multi-mode guided waves at the desired locations (i.e., sensor nodes) along the pipe structure to address the attenuation problem in long-range pipelines. Then, I will explain how we exploit the negative refraction property of phononic crystals for designing a super lens. Unlike GRIN-PC lenses, which have at least minimum wavelength resolution as their natural limit, negative refraction-based PC lenses can potentially overcome the diffraction limit, which is highly favorable in medical imaging or other applications requiring localized wave intensity in areas smaller than a square wavelength. The second part of my talk will deal with reconfigurable metasurfaces for full wavefront control with an emphasis on energy harvesting of low frequency elastic waves. We fully analyze and design the elastic metasurfaces by tailoring the phase gradient of individual unit structures for different wave functions and present theoretical findings along with experimental validation. The last part of my talk will highlight the potential of metamaterials in space applications, such as novel in-space manufacturable extended solar arrays and antennas with high precision and mass efficiency.

Biography: Dr. Serife Tol is an Associate Professor in the Department of Mechanical Engineering at the University of Michigan (UM), Ann Arbor. She earned her Ph.D. from the Georgia Institute of Technology in 2017, following her M.S. (2012) and B.S. (2009) degrees from Middle East Technical University (METU) in Ankara, Turkey. Between 2009 and 2012, she worked as a Test and Analysis Engineer in the Defense Systems Technologies Business Sector at ASELSAN (Turkey, Ankara). Prior to her appointment at UM in 2018, she was a visiting scholar in the Civil and Materials Engineering Department at the University of Illinois at Chicago. Dr. Tol's research interests centered around advanced smart materials and dynamical systems with a particular focus on phononic crystals, metamaterials, and metasurfaces. Her interdisci¬plinary research spans applications in energy harvesting, sensing, vibration mitigation, waveguiding, and space designs. She has developed a robust research program funded by the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), the Department of Energy (DoE), and the Department of Defense Office of Naval Research (ONR). To date, Dr. Tol has successfully secured over $2.5 million in research funding for her program. She also received 2023 John F. Ullrich Education Excellence Award which recognizes sustained excellence in curricular development, instruction, and guidance at all levels, impacting the experience of undergraduate and graduate students.

Special Sessions & Panels

STUDENT HACKATHON

SUNDAY, AUGUST 25 **9:00AM–6:00PM**
SALON F & K

Description: The Computer & Information in Engineering (CIE) Division of the American Society of Mechanical Engineers (ASME) held past hackathon events at the IDETC/CIE 2020, 2021, 2022, and 2023 Conferences. These 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.

DAC-25, EARLY CAREER RESEARCH: LIGHTNING TALKS

MONDAY, AUGUST 26 **2:10PM–3:50PM**
SALON E

Speakers

Jie Chen, *Virginia Tech*

Title: Multicriteria Bayesian Optimization for High-Dimensional Adaptive Catalyst Discovery Using Uncertainty-Aware Pointnet

Yanwen Xu, *University of Texas at Dallas*

Title: Digital Twin Modeling and Analytics for Design

Ketki Lichade, *University at Buffalo*

Title: Fast and Rapid Manufacturing of Particle-Polymer Composites

Hemanth Manjunatha, *Oklahoma State University*

Title: Designing Ensemble Deep Learning Networks for Autonomous Vehicles

Wei (Wayne) Chen, *Texas A&M University*

Title: Generative Inverse Design to Achieve Functional Responses Using Forward Machine Learning Models

NSF DESIGN AND DESIGN RELATED FUNDING OPPORTUNITIES

MONDAY, AUGUST 26 **2:10PM–3:50PM**
PENN AVE TERRACE

Description: In this session, NSF Program Directors will discuss a range of funding opportunities of interest to the design research community, including the ERI, BRITE, GOALI, and CAREER solicitations, as well as the new BioDesign DCL. Best practices for unsolicited proposals submitted to the EDSE program will also be discussed. The session will also cover Robotics funding opportunities through NSF's Foundational Research in Robotics (FRR) flagship robotics program, and NSF's EPSCoR program major funding investment strategies to achieve its goal of improving the R&D competitiveness of researchers and institutions within EPSCoR jurisdictions. Opportunities from the new TIP Directorate will be covered, and ample time for Q&A will be provided.

Alex Leonessa - *NSF Program Director*

Dan Linzell - *Division Director for CMMI*

Dan McAdams - *NSF Program Director*

Janis Terpenny - *NSF Program Director*

Jitesh Panchal - *NSF Program Director for EDSE*

SCIENCE TECH BUZZ

MONDAY, AUGUST 26 **4:10PM–7:00PM**
SALON 1

Description: The CIE ScienceTec Buzz (STB) summit serves as a pivotal gathering within the IDETC-CIE (DED) community, aimed at fostering collaboration, communication, and breakthrough thinking in design, innovation and engineering. It provides a unique forum for participants to share not only scientific and technological ideas but also creative and unconventional concepts. The summit encourages the exploration of wild and crazy ideas, recognizing that such ideas often lead to innovation and novel pathways.

One of the key objectives of STB is to facilitate research collaboration, recognizing that collaboration drives innovation and the generation of new ideas. By bringing together individuals from diverse backgrounds and disciplines, STB aims to spark serendipitous events and enrich discovery. Through open and encouraging discussions, participants have the opportunity to present complex issues and high-stakes ideas in a supportive and welcoming environment.

STB serves as a platform for participants to lean forward and convey their thinking rapidly, engaging with others who offer diverse perspectives and insights. Whether in physical or virtual settings, the summit encourages interdisciplinary dialogue, transference and collaboration, recognizing that breakthroughs often emerge at the intersection of different fields.

In general, the CIE STB summit plays a crucial role in fostering

connections, sharing innovative ideas, and exploring unconventional approaches in design and engineering. By creating a space for open dialogue, engagement and collaboration, STB aims to inspire participants to push the boundaries of what is possible and drive forward transformative research endeavors and creation of novel perspectives.

The STB summit is not only about collaboration and innovation, but also about engaging and educating participants, particularly students, faculty, industry (leaders, partners), government and researchers from academic institutes (nationally and internationally), to spur creativity and innovation in design and engineering education. It seeks to redirect and rethink educational curricula to align with the needs of the age of hybrid learning and sustainability. Involving public / citizens science and research would be a recommendation for next editions.

For students, faculty, and researchers, the summit offers opportunities to explore new pedagogical and educational approaches and conceptual models that foster entrepreneurship, collaboration, and innovation. It emphasizes creating rich learning environments where students can actively create, collaborate, and innovate, preparing them for the challenges of the future.

Transparency, equity, and uninhibited sharing of ideas and resources are central to the STB summit's ethos. It aims to enhance community cohesion and foster empathic understanding within the IDETC-CIE context and environment. All participants are encouraged to actively participate or simply observe and listen, ensuring that everyone feels included, respected and valued.

Overall, the STB summit is designed to generate new thinking and identify future directions for education and scientific research in design engineering (e.g., innovation, technology, sustainability, biodiversity, biophilia, renewables, transitions, space exploration). By fostering collaboration, innovation, and inclusivity, it aims to drive forward progress in the field and prepare the next generation of thinkers and creators.

Speakers:

Dr. Robert Wendrich, *Rawshaping Technology RBSO*

Dr. Krishna Kaipa, *Old Dominion University*

Marc Halpern, *Gartner*

CIE STUDENT POSTER SESSION & RECEPTION

MONDAY, AUGUST 26 **4:10PM - 7:00PM**
SALON 1

Description: Join the CIE community in celebrating and viewing these student posters in a networking setting to wrap up day 1 of sessions within the Science Tech Buzz!

STUDENT MECHANISM & ROBOT DESIGN COMPETITION (SMRDC)

MONDAY, AUGUST 26 **4:10PM - 5:50PM**
SALON F

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.

FINALISTS:

Project: Chiral Origami Robot with Wheeled and Quadcopter Modes

Graduate Student: **Jiang Lin**, **Lizi Deng, Zhongqi Miao, Weihao Wang**

Faculty Advisor: **Huijuan Feng**

Southern University of Science and Technology, China

Project: TransaBot: A Dexterous Multi-Arm Robotic System for Transanal Endoscopic Microsurgery

Graduate Student: **Jichen Li**

Faculty Advisor: **Chaoyang Shi**

Tianjin University, China

Project: A Novel Metamorphic Robot with Multiple Locomotion Modes

Graduate Student: **Shouyu Lai, Bin Wang, Buyue Xu, Zhengyi Li, Ziyu Wang**

Faculty Advisor: **Yaobin Tian, Kun Xu, Xilun Ding**

Beihang University, China

Special Sessions & Panels

Project: The Synthesis of a Biomimetic Hummingbird Flapping Mechanism Through Complete Solutions for Approximate Spherical Four-Bar Rigid Body Guidance

Graduate Student: **Sam O'Connor**

Faculty Advisor: **Mark Plecnik**

University of Notre Dame, USA

Project: Novel General Single-Translation Constraint and the Resulting Spherical Joints

Graduate Student: **Jiaxiang Zhu**

Faculty Advisor: **Guangbo Hao,**

University College Cork, Ireland

Project: Design of a Single-Piece In-Plane-Motion Compliant Mechanism for Storing and Releasing Energy

Graduate Student: **Jared Hunter**

Faculty Advisor: **Larry Howell**

Brigham Young University, USA

Project: Manta Ray-Inspired Robot

Undergraduate Students: **Aihu Jia, Xinyu Liu, Yichi Gu, Yongxi Liu, Jingtao Wang**

Faculty Advisors: **Jian S. Dai**, *Southern University of Science and Technology, China*

Rongjie Kang, *Tianjin University, China*

Project: A Novel Geometrical Structure Robot Hand for Linear-parallel Pinching and Coupled Self-adaptive Hybrid Grasping

Undergraduate Students: **Shi Chen, Bihao Zhang, Kehan Feng, Yizhou Wang**

Faculty Advisor: **Wenzeng Zhang**

X-Institute, China

Project: General Purpose Dexterous Hand With Underactuated Soft-Pad Fingers

Undergraduate Student: **Zubin Kremer Guha**

Faculty Advisor: **Aaron Dollar**

Yale University, USA

Project: Design and Control of a Quadruped Robot With 5r Linkage Leg Mechanisms

Undergraduate Students: **Faizan Khan, Qemal Gjashi, Lendrit Bycmeti, Mostafa Ghonemi, Janeban Selvamohan, Shayek Uddin Ahmed**

Faculty Advisor: **Ketao Zhang**

Queen Mary University of London, UK

Project: Orbot: Hexapedal Robot

Undergraduate Student: **Eric Campbell**

Faculty Advisor: **Mark Plecnik**

University of Notre Dame, USA

Project: Wearable Roller Rings to Enable Robot Dexterous In-Hand Manipulation Through Active Surfaces

Undergraduate Student: **Hayden Webb**

Faculty Advisors: **Kaiyu Hang, Shenli Yuan**

Rice University, USA

MSNDC STUDENT BEST PAPER COMPETITION

MONDAY, AUGUST 26 **4:10PM–5:50PM**
LONGWORTH

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.

VIB/MSNDC INDUSTRY PANEL

MONDAY, AUGUST 26 **4:10PM–5:50PM**
DIRKSEN

Description: Join us to learn about the various career paths of professionals who work in the field applying principles of acoustics, sound, and vibrations (signal processing, cavitation, ultrasound, vibration mitigation to mechanical systems, etc.). They will share how they got to where they are today, their current research efforts, and discuss problems facing the worlds regarding acoustics, hearing health, and more!

This panel is intended for students, early career engineers, and those looking to learn more about industry practitioners and their day-to-day work. The panel will also discuss challenges that they currently face and the future of their fields.

Goal: Introduce students, ECEs, and other professionals to experiences and challenges faced by engineers working across various industries, all fundamentally related to acoustics and sound!

DTM SPECIAL SESSION 1- QUALITATIVE METHODS IN DTM

MONDAY, AUGUST 26 **4:10PM–5:50PM**
CONGRESSIONAL

Description: This special session provides a space for the DTM community to engage with theoretical and methodological considerations of qualitative research and our ability to create knowledge using these methods. Attendees of this session will gain a deeper understanding of the current applications of qualitative research in design and engineering, and will have the opportunity to contribute to conversation via facilitated discussions. This session includes six presentations organized across two panels: (1) “Generating Design Knowledge through Qualitative Design Research” and (2) “Fostering Knowledge Transfer through Qualitative Design Research.” Panel 1 will showcase presentations aimed at supporting the larger DTM community in conducting and reporting qualitative research. Panel 2 will highlight areas of growth for the design research community, building upon work in spaces such as human-computer interaction, public engagement, and industry—bridging both design practice and research. This special session will combine paper and abstract presentations with panels and open discussions with the community to explore how DTM can further support qualitative design research.

DEC MENTORSHIP SESSION

MONDAY, AUGUST 26 **4:10PM–5:50PM**
SENATE

Description: The ASME Design Education Committee is organizing a mentorship program as part of IDETC 2024. This year’s mentorship session is intended to give graduate students and postdocs the opportunity to explore various career pathways. Mentees will have the opportunity to explore 1) tenure-track careers at research-intensive institutions, 2) teaching-track careers, 3) tenure-track careers at primarily undergraduate institutions, and 4) careers in industry.

This will be followed by an open networking session for further open-ended discussions in small groups.

NETWORKING BREAKFAST

TUESDAY, AUGUST 27 **7:00AM–8:00AM**
SALON 2/3

Description: This breakfast will be open to all attendees. Each table will have a theme (e.g., “Challenges for international attendees”) with a mentor/moderator.

Roundtable Topics:

1. Collaboration Establishment Strategies for Junior Faculties

2. Challenges for International Attendees

3. Being a Faculty Member at a Teaching-Focused Institution

4. Government Labs: Opportunities for Students and Faculty

5. Incorporating Life Cycle Assessment in Teaching and Research

6. Emerging Topics in Circular Economy Research

7. Design for Sustainability

8. Working at a Federal Government Military University

9. On Designing Cyber-Physical-Social Systems – Research Issues

10. NSF Programs: Engineering Research Initiation (ERI) and Manufacturing Systems Integration (MSI)

11. Established Program to Stimulate Competitive Research (EPSCoR)

12. How Should We Prepare Ourselves for the Transition From Domain Knowledge to AI Architectures?

13. Leverating NSF I-Corps and PFI/SBIR/STTR Programs for Funding Research in Your Lab

14. Enabling Effective Industry-University Collaborations

15. Research Opportunities for Undergraduate Engineering Students in Capstone Senior Desing Projects

DTM SPECIAL SESSION 2- DESIGN JUSTICE

TUESDAY, AUGUST 27 **8:10AM–10:40AM**
CONGRESSIONAL

Description: Society faces increasingly complex social justice challenges, from educational inequity to insufficient provision of social services, from climate change to disparities in global health services and outcomes. Engineers and designers play critical roles in creating and studying products, services, technologies, and policies that can aim to address social injustices. There is a growing priority in the engineering and design research communities to meaningfully incorporate justice into design, and there has been an increasing amount of energy regarding justice in design in prior years of IDETC. This year, we look forward to an exciting and expansive special session on Design Justice, bringing together perspectives from researchers and practitioners inside and outside of academic institutions. We will begin the session with researchers and practitioners presenting their work in Design Justice. We will then hold a panel discussion with presenting researchers and practitioners to discuss current and future work in the field of Design Justice, focusing on how justice relates to design outcomes, processes, participants, and pedagogy. This special session aims to highlight innovative research and practice in Design Justice, and to provide space for researchers and practitioners to discuss priorities in Design Justice going forward.

ASME DED UNDERGRADUATE RESEARCH SYMPOSIUM ON DYNAMICS, VIBRATION, & ACOUSTICS

TUESDAY, AUGUST 27 **11:00AM–12:20PM**
HART/RUSSELL

TCVS and ASME DED are excited to host the ASME DED Undergraduate Research Symposium on Dynamics, Vibrations, & Acoustic. At this symposium, undergraduate researchers will present six-minute lightning talks on a broad range of topics in dynamics, including vibration absorption, micro air vehicles and human biomechanics. Session participants are eligible for “Judge’s Choice” and “Audience Choice” awards. We look forward to seeing you at this special session!

Organizer: **Mark Jankauski** - *Montana State University*

Presenters:

Advancements In Stretchable and Washable Energy-Storage Devices

Addison Pressly – *University of North Florida*

Integrated VR Animation of Mechanical System Dynamics

Grant Courtney – *University of St. Thomas*

Computational Analysis of Vibration Mitigation Methods in Turbomachinery Blisks

Alexander Kripfgans – *University of Michigan, Ann Arbor*

Compact, Implantable Ultrasound Flow Probe for Real-Time Blood Flow Measurement

Philip Acatrinei – *George Mason University*

Origami-Based Miura-Ori Metamaterial for Wave Propagation Control

Enrico Corradini – *Sapienza University of Rome*

SPECIAL EARLY CAREER SESSION (SEC-SESS)

TUESDAY, AUGUST 27 **2:20PM–4:00PM**
SALON F

Invited Speakers:

Kaushik Jayaram
Assistant Professor, Robotics
Paul M. Rady Department of Mechanical Engineering
University of Colorado Boulder

Presentation Title: Shape Morphing Insect-Scale Origami Robots for Locomotion in Cluttered Terrain

Biography: Dr. Kaushik Jayaram is presently an Assistant Professor in Robotics at the Paul M Rady Department of Mechanical Engineering at the University of Colorado Boulder. Previously, he was a post-doctoral scholar in Prof. Rob Wood’s Microrobotics lab at Harvard University. He obtained his doctoral degree in Integrative Biology in 2015 from the University of California Berkeley mentored by Prof. Bob Full and undergraduate degree in Mechanical Engineering from the Indian Institute of Technology Bombay in 2009, with interdisciplinary research experiences at the University of Bielefeld, Germany, and Ecole Polytechnique Federale de Lausanne, Switzerland. Dr. Jayaram’s research combines biology and robotics to uncover the principles of robustness that make animals successful at locomotion in natural environments, and, in turn, inspire the design of the next generation of novel robots for effective real-world operation. His work has been published in a number of prestigious journals and gained significant popular media attention. Besides academic research, Dr. Jayaram’s group is actively involved in several outreach activities that strive toward achieving diversity, equity, and inclusivity in STEM.

Inigo Sanz-Pena, Ph.D.
Department of Mechanical Engineering
City College of New York CUNY

Presentation Title: Personalized Design in Wearable Assistive Devices Through Additive Manufacturing

Biography: Dr. Inigo Sanz-Pena is an Assistant Professor at the Department of Mechanical Engineering at The City College of New York CUNY. His research in biomimetic wearable assistive robots investigates embedded sensing using additive manufacturing and metamaterials, involving experimental gait biomechanics and computational design using lattice structures. Before joining CCNY, he held postdoctoral research appointments at the University of Illinois at Chicago and Imperial College London. He received his Ph.D. with from Universidad de La Rioja, Spain, in collaboration with New York University (NYU), and was a research associate at the NYU Langone Orthopedic Hospital.

Debkalpa Goswami, Ph.D.
Assistant Professor, Cleveland Clinic Lerner College of Medicine
Case Western Reserve University

Presentation Title: Multimodal Implantable Soft Robotic Actuators for Enhanced Drug Delivery

Biography: Debkalpa Goswami is an Assistant Professor at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University. He also serves as the Director of Biomechanics of the Cleveland Clinic's Cardiovascular Innovation Research Center. Debkalpa received his Ph.D. from Purdue University and completed postdoctoral training in Medical Engineering at the Massachusetts Institute of Technology. He has held full-time research positions at ETH Zurich, Switzerland, and the University of Bremen, Germany, before starting as a faculty at Cleveland Clinic and Case Western Reserve in 2023. His research group combines soft robotics, 3D printing, biosensing tools, and computational modeling to build advanced physical and digital biomechanical models of disease.

CIE VES PANEL

TUESDAY, AUGUST 27 **2:20PM–4:00PM**
SALON K

VES FOR HUMAN-ROBOT COLLABORATION – UNDERSTANDING, COMMUNICATION, AND TRUST BETWEEN HUMANS AND ROBOTS

Moderators:

Yunbo Zhang, *Rochester Institute of Technology*

Marco Rossoni, *Politecnico Milano*

Description: Modern manufacturing systems are expected to evolve into highly automated and intelligent systems for handling complex tasks. However, certain manual operations persist on the shop floor that are either impractical or unattainable without human involvement. Industry 5.0 has emerged as a practical approach that complements the existing Industry 4.0 paradigm by emphasizing the transition toward sustainable, human-centric, and resilient manufacturing. Human-robot collaboration (HRC) is considered pivotal in this transition, wherein robots collaborate with human partners to automate physically demanding tasks and integrate humans' high-level cognition and decision-making. Unfortunately, current HRC methods have seen limited deployment in industries, facing challenges related to understanding, communication, building trust between humans and robots, effective interfaces, task division, allocation, and optimization. There are several specific research questions to ask: How should the interfaces and interactions be designed to support human operators in communicating with robots effectively, efficiently, and intuitively? How should trust between humans and robots be built and the safety of humans be ensured? How should human operators' high-level decision-making ability be leveraged to improve the efficiency and flexibility of the HRC? How should Artificial Intelligence (AI) be designed to improve robots' cognitive abilities so that they are able to understand human operators' intentions and learn from human partners?

Objectives: The objective of this panel is to bring together a group of experts in robotics, manufacturing, computer science, ergonomics and human factors, human-computer interaction, social sciences in engineering, and digital technologies for a cross-disciplinary discussion on the past, present, and future of Human-robot Collaboration in virtual environments, with an emphasis on understanding, communication, and trust. The panel discussion will explore: (1) where we stand in HRC research regarding understanding, communication, and trust between humans and robots; (2) what the challenges are and what the potential key enablers might be; (3) what intellectual challenges lie ahead; and (4) what steps we, as researchers, should take to investigate this exciting avenue.

APPROACHES TO SUSTAINABILITY: VIEWS FROM EUROPE AND NORTH AMERICA PANEL

TUESDAY, AUGUST 27 **2:20PM–4:00PM**
DIRKSEN

Minimizing impacts on the environment through clean energy, sustainability, and similar topics continues to grow and be critical topics in engineering. It is a topic that attracts significant interest in both communities and benefits from diverse regional perspectives. In this special session, leading researchers from Europe and North America will present their perspectives on current needs, research approaches, cutting-edge research, and differing viewpoints. This session will feature 5–7 minute short, thought-provoking presentations followed by panelist discussions and questions. The focus will be on bringing diverse perspectives and cutting-edge research from both communities together, thereby building greater connections between the European Design Society community and the North American ASME IDETC community.

Speakers: **Dr. Astrid Layton,** *Texas A&M University, US*; **Dr. Devarajan Ramanujan**, *Aarhus University, Denmark;* and more leading researchers in this area.

INTERAGENCY WORKING GROUP (IAWG) PANEL

TUESDAY, AUGUST 27 **2:20PM–4:00PM**
PENN AVE TERRACE

ENGINEERING COMPLEX SYSTEMS: DISCUSSION ON CROSSCUTTING TOPICS

The IAWG on Engineering Complex Systems will present an overview of this multi-government agency working group and its efforts to identify and address cross-cutting engineering complex systems that can impact governmental engineering operations. Additionally, the IAWG will present and discuss three specific topics that have been targeted for inter-agency collaboration to identify best practices and lessons learned. Those identified topics are: Certifying Additively Manufactured Parts, Supply Chain Risk Reduction Approaches during Acquisition and Digital Twins to Predict Failure.

Moderators:

Anna-Maria R. McGowan, Ph.D.
NASA ST
Agency Senior Engineer for Complex Systems Design

Dr. Kathryn Jablokow
Deputy Division Director
Division for Research, Innovation, Synergies, and Education
Directorate for Geosciences
National Science Foundation

Panelists

Kent T. Jones
Assistant Deputy Administrator,
Systems Engineering and Integration, Defense Programs
National Nuclear Security Administration
Department of Energy

Kent T. Jones, a member of the Senior Executive Service, is Assistant Deputy Administrator for Systems Engineering and Integration, Defense Programs, at the Department of Energy's National Nuclear Security Administration. He is responsible for the development and integration of policies, processes, requirements, plans, and SE&I assessments within NNSA's Defense Programs. He is also responsible for providing direct systems engineering and acquisition program management support for Defense Program's designated enhanced management portfolio, which includes weapons life extension, enabling science, infrastructure, and warhead sustainment activities.

Kerry D. Wilson
Director, Systems Engineering and Standards Division
Department of Homeland Security (DHS) Science & Technology (S&T) Directorate

Kerry D. Wilson currently holds the position of Director within the Systems Engineering and Standards Division, which operates under the umbrella of the Department of Homeland Security (DHS) Science and Technology (S&T) Directorate. In this capacity, Mr. Wilson assumes the pivotal role of overseeing the development, promotion, and facilitation of a comprehensive systems engineering process throughout the DHS.

Joseph Pellicciotti
Chief Engineer
NASA

Joseph Pellicciotti was named NASA's Chief Engineer in April 2023. In this role, he provides policy direction, oversight, and assessment for the agency's engineering communities and serves as a principal advisor to the NASA administrator and other senior officials on matters pertaining to the technical readiness and execution of agency programs and projects.

Vijay Srinivasan
Senior Advisor
NIST

Dr. Vijay Srinivasan is a Senior Advisor in the Engineering Laboratory at the National Institute of Standards Technology. He leads several standardization activities related to manufacturing both nationally and internationally. He chairs the U.S. Technical Advisory Group for ISO/TC 213. His current research interests include coordinate metrology, digital twins, biotechnology, and biomanufacturing. He is a Fellow of ASME and AAAS.

Dr. Daniel G. Linzell, P.E., F.ASCE, F.SEI
Division Director, CMMI Division, Engineering Directorate
National Science Foundation

Dr. Daniel G. Linzell, P.E., F.ASCE, F.SEI is the Associate Dean for Graduate and International Programs and the Leslie D. Martin Professor of Civil and Environmental Engineering at the University of Nebraska-Lincoln (UNL). He is currently on loan to the National Science Foundation where he is Directing the Division of Civil, Mechanical and Manufacturing Innovation (CMMI) in the Directorate for Engineering (ENG). CMMI's annual budget is approximately $240M and the Division is charged with advancing the future of manufacturing, the design of innovative materials and building technologies, infrastructure resilience and sustainability, and tools and systems for decision-making, robotics and controls.

From August of 2013 to September of 2018, Dr. Linzell was the Voelte-Keegan Professor and Chair of UNLs Department of Civil Engineering. He was an Assistant, Associate and the inaugural John A. and Harriette K. Shaw Professor of Civil Engineering at the Pennsylvania State University from 1999-2013.

B-PART FELLOWSHIP POSTER SESSION RECEPTION

TUESDAY, AUGUST 27 **4:20PM–6:00PM**
CAPITOL FOYER

Description: The session will also feature winners of the BPart Fellowship and Mentorship Program. This 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.

NSF/ASME STUDENT DESIGN ESSAY COMPETITION

TUESDAY, AUGUST 27 **4:20PM–6:00PM**
CAPITOL FOYER

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.

DED/CIE DESIGN TOOL AND COMMERCIALIZATION SHOWCASE

TUESDAY, AUGUST 22 **4:20 PM–6:00PM**
CAPITOL FOYER

Description: Sponsored by the DED Special Initiatives Committee, the DED/CIE Design Tool and Commercialization Showcase provides an alternative pitch-style, demonstration-rich session wherein participants showcase their physical and digital design tools. This year, the Showcase will feature contributions from industry, government, and academia. Supported by DAC, DEC, VES, DTM, and DFMLC, the DED/CIE Design Tool and Commercialization Showcase is a booth-style exposition of interactive tools, including demonstrations of virtual and augmented reality applications, virtual environments, and simulations software to enable design exploration. The session will also feature a live competition to honor the top student-led demonstrations.

NSF PROPOSAL WRITING WORKSHOP

TUESDAY, AUGUST 27 **4:20PM–6:00PM**
SENATE

Description: In this workshop, the fundamentals of grant proposal writing for the National Science Foundation (NSF) will be covered. Participants will learn about key topics, including the components of a successful proposal and finding the right home for the research. Critical aspects of the merit review process will be presented. This workshop is geared towards early career and aspiring investigators at U.S. institutions seeking to understand the NSF merit review process, although the information provided will be valuable to principal investigators in any stage of their career seeking to learn more about proposal writing.

Speakers

Alex Leonessa – *NSF Program Director*

Dan Linzell – *Division Director for CMMI*

Dan McAdams – *NSF Program Director*

Janis Terpenny – *NSF Program Director*

Jitesh Panchal – *NSF Program Director for EDSE*

CIE AMS-SEIKM PANEL

WEDNESDAY, AUGUST 28 **8:00AM–9:40AM**
SALON J

SCIENTIFIC MACHINE LEARNING FOR ADVANCED MANUFACTURING AND DESIGN

Speaker: **Dr. Hyunwoong Ko**, *Arizona State University*

Description: This panel session explores the intersection of scientific machine learning (SciML) with advanced manufacturing and design, emphasizing the transformative potential of integrating domain-specific scientific knowledge with machine learning algorithms. The focus will be on how SciML can drive innovation in manufacturing processes, product design, and material science, leading to enhanced performance, efficiency, and sustainability. Highlight cutting-edge research and applications of SciML in the field of advanced manufacturing and design.

DTM SPECIAL SESSION 3: OPPORTUNITIES AT THE BOUNDARIES BETWEEN SYSTEMS ENGINEERING & DESIGN THEORY

WEDNESDAY, AUGUST 28 **8:00AM–9:40AM**
SALON J

Description: In this panel presentation, we will hear from academic faculty and industry professionals discussing their experiences with unique design challenges that cannot be fully addressed by design theory or system engineering practices alone. This panel is comprised of those with experience in academia, private industry, and on federally funded projects. Each panelist will provide insight into specific challenges faced within these various contexts and will describe their efforts to address them.

Topics may include biologically inspired design, developments in computer-aided design tools, how personnel and project scale impact process, or how the context of stakeholders constrains the design space. Ultimately, this panel serves as a call to action for systems engineering and design theory researchers to address these contemporary challenges.

Panelists:

Dr. Astrid Layton is an assistant professor and Donna Walker Faculty Fellow at Texas A&M University in the Mechanical Engineering department. She served on ASME's DTM technical committee from 2020 to 2023 and is currently an Associate Editor for ASME's Journal of Mechanical Design. She is the recipient of several awards, including a 2024 NSF CAREER Award from the EDSE program and a 2021 ASME IDETC-CIE best paper award in SEIKM. Her research focuses on the use of biological ecosystems as inspiration for achieving sustainability and resilience in the design of complex human systems and systems of systems.

Matthew Mueller is the manager of Education Innovation at PTC where he is the product manager for Onshape's education features and leads academic research collaborations. He completed his Ph.D. in Mechanical Engineering at Tufts University where his research focused on engineering education. His current research focuses on how CAD can be used to understand and improve design.

Diarny Fernandes is a mechanical engineer at the Johns Hopkins Applied Physics Laboratory working on the Dragonfly mission as part of NASA's New Frontiers program. He earned a master's degree in mechanical engineering from MIT and is completing a second master's degree in space systems engineering at Johns Hopkins. Diarny is the lead engineer on the Dragonfly thermal development test module (DTM), which is a full-scale thermal model of the Dragonfly lander for thermal design testing and analysis.

NSF OFFICE HOURS

WEDNESDAY, AUGUST 27 **10:00AM–11:40AM**
PENN AVE TERRACE

Description: This sessions will provide a forum for in-person, open discussions with NSF Program Directors. Attendees will have the chance to ask questions pertaining to NSF funding opportunities, discuss their proposal ideas in relevant subjects, ask questions about the NSF merit review process, and even ask questions and solicit advice about navigating their career paths in academia.

CIE VES JCISE PANEL

WEDNESDAY, AUGUST 27 **3:15PM–4:55PM**
SALON J

JCISE SPOTLIGHT TALKS ON HUMAN-ROBOT COLLABORATION IN INDUSTRY 5.0

Speakers:

Dr. Yunbo "WILL" Zhang, *Rochester Institute of Technology*

Professor Chih-Hsing Chu, *National Tsing Hua University*

Description: Human-robot collaboration (HRC) is considered a pivotal element of Industry 4.0 and 5.0, wherein robots work alongside human partners to automate repetitive, physically demanding tasks and replace humans in hazardous or extreme working environments. Unfortunately, existing HRC methods mostly remain in laboratories and have not been extensively deployed in industries. They face challenges related to understanding, communication, and trust between humans and robots, effective interactions and interfaces, integration of robots with human cognition, task division, allocation, and optimization, as well as environmental sensing and perception and ensuring safety. This special session will invite papers accepted to the JCISE special issue on "Human-Robot Collaboration in Industry 5.0." This special issue of JCISE seeks to explore and compile the forefront of research and innovation in HRC within the context of Industry 5.0. We welcome contributions that present state-of-the-art methodologies, tools, systems, models, and case studies aimed at facilitating the advancement and realization of HRC in the foreseeable future.

INVITED TECHNICAL SESSION SPEAKERS

DEC-04-01: Invited Talks on Design Education – Monday, August 26; 2:10PM, Senate

Joshua Summers, *UT Dallas*

- Teaching Design to Preservice Engineers vs. Preservice Teachers

Christopher McComb, *Carnegie Mellon University*

- Computation, Automation, and Artificial Intelligence in the Design Classroom

VIB-01/MSNDC-08-01 – Monday, August 26, 2:10PM, Hart/Russell

Shima Shahab, *Virginia Polytechnic Institute and State University*

- Ultrasonic Solution to Wireless Power Transfer Systems

VIB-02/MSNDC-10-02 – Monday, August 26; 4:10PM, Cannon

Andres Arrieta, *Purdue University (Myungwon Hwang, Sneha Srikanth, Yeongeun Ki)*

- Soliton-Driven Nonlinear Dynamics in Multistable Metastructures

VIB-03/MSNDC-07-01 – Wednesday, August 28, 10:00AM, Dirkson

Paolo Tiso, *ETH Zurich (Ahmed Morsy, Mariella Kast, Zhenwei Xu, George Haller)*

- Reduced Order Modeling for Structures With Joints

VIB-04-02 – Tuesday, August 27, 11:00AM, Cannon

Christina Naify, *Applied Research Laboratories, University of Texas at Austin (Colby Cushing)*

- Measurement and Prediction of 3D Printed Polymer Sound Speeds With Variable Infill Using Homogenization Techniques

VIB-06/MSNDC-11-01 – Tuesday, August 27, 2:20PM, Longworth

Alper Erturk, *Georgia Institute of Technology*

VIB-09/MSNDC-03-01 – Monday, August 26, 9:10AM, Dirkson

Bruce Geist, *Oakland University*

- Stability and Performance Benefits of System Tautochrones for Vibration Control

VIB-10-01 – Monday, August 26, 10:50AM, Hart/Russell

Tian-Bing Xu; *Old Dominion University*

- Review of Breakthroughs on Piezoelectric Energy Harvesting Technology Developments

VIB-11-02 – Wednesday, August 28, 10:00AM, Hart/Russell

Daniel Rixen, *Technical University of Munich*

- Experimental Substructuring: A Simple Idea Needing Clever Techniques

VIB-14/MSNDC-09/MNS-1-01 – Tuesday, August 27, 2:20PM, Rayburn

Chuyi Chen, *North Carolina State University*

- Harnessing Acoustofluidics for Biomedical Advancements

Workshops & Tutorials

All workshops and tutorials will be held Sunday, August 25.

3RD WORKSHOP ON TRENDS IN HUMAN-AI TEAMING FOR ENGINEERING AND DESIGN

9:00AM–1:00PM

Organizers: Christopher McComb, *Carnegie Mellon University;* **Susmit Jha,SRI International; Leah Chong** *Massachusetts Institute of Technology*; **Ting Liao**,*Stevens Institute of Technology*

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.

ADVANCED DESIGN, SIMULATION, AND FINITE ELEMENTS OF ANALYSIS OF GEAR DRIVES

9:00AM–1:00PM

Organizer: Alfonso Fuentes-Aznar, *Rochester Institute of Technology*

Description: Participants will learn the principles of advanced gear design and simulation and will interact with state-of-the-art computational tools for the virtual generation of gear drives and the application of tooth contact and finite element analysis (TCA & FEA) to evaluate their mechanical performance. Topics covered in this tutorial include the application of micro-geometry modifications to avoid edge contacts and absorb errors of alignment, the free-form design of gear tooth surfaces, the evaluation of the loaded functions of transmission errors and mesh stiffness as root-cause of noise and vibration, the compensation of errors of alignment caused by shaft deflections, and the advanced design of spiral bevel gear drives.

COLLECTING DESIGN KNOWLEDGE FOR GENERATIVE AI SYSTEMS

2:00PM–5:00PM

Organizers: Ye Wang, *Autodesk;* **Nicole Damen**, *Autodesk Research;* **Voho Seo,** *Hyundai Motor Company*

Description: Generative AI relies heavily on substantial and high-quality datasets to address domain-specific challenges. However, acquiring hand-crafted design knowledge proves challenging, particularly due to the time constraints faced by designers. Designers often hesitate to invest additional time in documenting and organizing explicit design knowledge, such as sketches, models, and inspirational images. Additionally, tacit knowledge, such as trade-offs and prioritization, is typically shared informally among designers working on the same project, lacking proper documentation.

1. Sorting Challenge: Sorting design documents becomes a formidable task due to the varied and abstract design workflows, shaped by individual designers with diverse perspectives.

2. Processing Challenge: Handling car design documentation proves to be intricate, given the complex nature of the product comprising over 20,000 parts and employing diverse data formats throughout various developmental stages.

3. Collecting Challenge: The imperative of confidentiality and the preservation of originality in car design results in a decentralized and somewhat closed design process, presenting difficulties in gathering comprehensive and openly accessible documentation.

The process of designing products is influenced by a range of factors, spanning from clear specifications to personal experiences. Assuming a structured design process, we can categorize these factors impacting the workflow and outcomes.

This workshop aims to explore innovative interaction methods and techniques to address the difficulty of collecting design knowledge. Using a practical case study focused on designing a new car, the workshop will delve into various dimensions of design knowledge, such as metacognition (Lawrie, Hay, & Wodehouse, 2022), tacit and explicit (Tsoukas, 2012; Grandinetti, 2014), scientific and emotional Bratianu (2014), and confidential and public (Ahmad, Bosua, & Scheepers 2014).

COMPUTER-AIDED DESIGN AND PROTOTYPING OF MECHANICAL MOVEMENTS

2:00PM–5:00PM

Organizer: Anurag Purwar, *Stony Brook University*

Description: This workshop will introduce attendees to a new computational and physical prototyping framework for innovating and inventing mechanical motions using a web-based motion design software tool and a home-grown hardware kit to support the needs of students in classes, such as Freshman Design, 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.

DATA MANAGEMENT AND DIGITAL TWIN FOR ADVANCED MANUFACTURING

2:00PM–5:00PM

Organizers: Shengyen Li, *NIST*; **Joshua Lubell,** *NIST*; **Guodong Shao**, *NIST*; **Zhuo Yang**, *NIST*; **Yan Lu**, *NIST*

Description: The advanced manufacturing (AM) paradigm is to create products using innovative technologies, but the technology adopted often fails to achieve the desired result. Digital twins (DTs), employing advanced data analytics and simulations, have the potential to break this logjam. For example, artificial intelligence algorithms can enable a DT to "understand" the spatial relationships needed to control an AM process. The DT technology can help address issues at each stage of the product development lifecycle, including design, manufacturing planning, process control, and product qualification. However, the development of DTs requires large amounts of trustworthy and secure data and an advanced integration infrastructure for combining digital information from multiple sources. Additionally, statistical tools and machine learning models are needed to ensure data quality and consistency efficiently and effectively. Thus, a data management infrastructure is critical to help realize DTs for AM.

This workshop contains three main topics:

1. Overview of the digital twin concept and its role in AM

2. Data management infrastructure for DTs in AM

3. Relevant standards for DT implementations and AM cyber security

Who should attend:
The workshop is intended for students, engineers, and enthusiasts interested in AM, data management, and digital twin technologies wishing to learn more about state-of-the-art frameworks and software tools. A hands-on tutorial will showcase a NIST-developed software toolkit and a sample dataset for metal-based laser powder bed fusion additive manufacturing.

DESIGN FOR MANUFACTURING (DFM): PRACTICAL STRATEGIES FOR ENGINEERING SUCCESS

2:00PM–4:00PM

Organizers: Khosro Shirvani, *SUNY Farmingdale*; **Said Jahanmir**; *NIST*

Description: From design conceptualization to production perfection, the Design for Manufacturing (DFM) workshop will guide participants through the entire manufacturing lifecycle, equipping them with the tools needed to navigate the complexities of modern engineering. The workshop is a set of principles and it is the culmination of years of hands-on engineering experience and educational expertise. The workshop is a scenario-based learning workshop, where participants will explore two scenarios for each topic: one where the engineer lacks knowledge of DFM principles and another where they are well-versed in DFM. Through practical exercises, participants will gain a comprehensive under¬standing of DFM concepts and their practical applications in real-world engineering scenarios. The sessions will cover the DFM role in various phases of manufacturing a part from design to production/¬assembly to quality control.

FROM DATA TO DESIGN: CHALLENGES AND OPPORTUNITIES ACROSS INDUSTRY AND ACADEMIA

9:00AM–5:00PM

Organizers: Faez Ahmed, *MIT Mechanical Engineering*; **Daniele Grandi,** *Autodesk Research;* **Cyril Picard**, *MIT*; **Akash Srivastava**, *IBM*

Description: The D2D workshop is a full-day event that will bring together professionals and academics to discuss the latest trends, challenges, and opportunities in the field of data-driven engineering design. The workshop will feature invited speakers from both industry and academia who will share their experiences, insights, and best practices in using cutting-edge data-driven machine learning methods to drive engineering design topics. Attendees will also have the opportunity to engage in discussions about the challenges and opportunities associated with data-driven engineering design and to network with other professionals and academics in the field. Additionally, the workshop will include a half-day hands-on activity, allowing participants to gain practical experience working with real-world data sets and engineering design problems. By the end of the workshop, attendees will have a comprehensive under¬standing of the latest trends and best practices in data-driven engineering design, as well as practical experience applying these concepts. The workshop promises to be a valuable opportunity for profess¬sionals and academics in the field to learn from each other, collaborate, and drive innovation forward.

LEARN TO DRIVE AND RACE AUTONOMOUSLY WITH F1TENTH AND AUTODRIVE ECOSYSTEM

2:00PM–6:00PM

Organizers: Venkat Krovi, *CU-ICAR;* **Tanmay Samak**, *CU-ICAR;* **Chinmay Samak,** *CU-ICAR;* **Ajinkya Joglekar,** *CU-ICAR*

Description: Embark on the essentials of autonomous driving in this four-hour workshop, immersing yourself in the fundamentals of perception, motion planning, control theory, and applied machine learning. With a core focus on the F1TENTH and AutoDRIVE Ecosystem, this workshop offers practical insights to start your engines and get going. With a vibrant community comprising 60+ universities, F1TENTH offers a dynamic environment for learning and racing 1/10th scaled autonomous vehicles. AutoDRIVE Ecosystem expands the opportunities for digital-twinning thereby streamlining the hardware-software co-development, and effectively bridging the gap between simulation and reality. It further offers Nigel, a 1/14th scaled autonomous vehicle with independent all-wheel drive and indepen¬dent all-wheel steering architecture, which can be a useful platform for tackling the "autonomy chal¬lenge" from a mechanical engineering lens. This workshop serves as a scaffolded framework, enhancing the understanding of engineering and computer science students in deploying real-time end-to-end autonomous systems. Covering fundamental aspects of autonomous driving (and racing), the workshop delves into the pivotal roles of perception, planning, and control components, emphasizing state-of-the-art methods for each. It also motivates the need for an integrated autonomy deployment framework and elucidates its efficacy through the deployment of on-road as well as off-road autonomy algorithms across diverse vehicular platforms.

MULTI-AXIS HYBRID MANUFACTURING AUTOMATION, PROCESS CONTROL, AND HUMAN IN-THE-LOOP INTERACTION

9:00AM–1:00PM

Organizers: Xinyi Xiao, *University of North Texas;* **Thomas A. Feldhausen,** *Oak Ridge National Laboratory, University of Texas at El Paso;* **Kenton Blane Fillingim,** *Oak Ridge National Laboratory*

Description: Multi-axis hybrid manufacturing stands as a transformative force poised to revolutionize current manufacturing processes across diverse industries. The integration of additive and subtractive processes in a single machine platform offers a myriad of technical advantages, making it a compelling choice for manufacturers seeking enhanced efficiency, precision, and versatility. The adoption of multi-axis hybrid manufacturing can represent a paradigm shift in the industry, offering a holistic approach to production that marries the best aspects of additive and subtractive technologies. Its impact spans across industries, from aerospace and automotive to medical and beyond, promising enhanced efficiency, cost-effectiveness, design freedom, and quality in manufacturing processes. As manufacturers strive for competitiveness and innovation, the integration of multi-axis hybrid manufacturing is poised to be a cornerstone of the future manufacturing landscape.

PLANAR LINKAGE SYNTHESIS USING POLE AND ROTATION ANGLE CONSTRAINTS

9:00AM–1:00PM

Organizers: Ron Zimmerman, *Magna Seating*

Description: Recent developments in the 2D sketcher capabilities of modern CAD systems allow the creation of dynamic or moveable constrained geometry. Dynamic geometry is a new tool for the design of planar linkages and provides the opportunity for new synthesis methods. One method exploiting the advantages of this is Pole and Rotation angle Constraints (PRC). It has the intuitive, visual advantages of graphical methods and the fast and accurate advantages of analytical methods. PRC provides a single approach for every planar four bar linkage synthesis problem that is not overconstrained. Since CAD tools are commonplace in academia and industry there is direct carryover from education to industrial practice. Learn this breakthrough method to solve linkage synthesis problems faster and minimize trial and error since you can easily see thousands of possible solutions. The class will focus on the exact synthesis of linkages for rigid body guidance, point path, function generation and any combination of these tasks.

RACISM UNTAUGHT

9:00AM–1:00PM

Organizers: Terresa Moses, *University of Minnesota;* **Lisa E. Mercer,** *University of Illinois Urbana-Champaign*

Description: This workshop uses the interactive Racism Untaught toolkit and is focused on methods for understanding and dismantling racialized and oppressive design. It starts with an exercise on power and privilege in a variety of systemic oppression. We then move to the first step in the toolkit, Context, where participants are given the cards that outline over 150 different elements of racism, sexism, ableism, and capitalism. This allows participants to analyze an artifact, system, or experience and learn how we perpetuate racism and oppression in our everyday lives and then how to break down racialized design. Then, participants further examine a system, artifact, or experience with step two, Define, used to understanding theories and methods that define the oppressive societal problem further. Lastly, participants move to step three, Ideate, walk away from this workshop with ideas on re-imagining a form of racialized and oppressive design specific to their field.

SOLVER-AWARE SYSTEMS ARCHITECTING (SASA): FUNDAMENTALS, HEURISTICS, AND THEORY GROUNDED GUIDELINES

9:00AM–1:00PM

Organizers: Taylan G. Topcu, *Virginia Tech;* **Zoe Szajnfarber,** *The George Washington University;* **Jitesh Panchal**, *Purdue University*

Description: The purpose of this workshop is to disseminate the findings of NSF CMMI funded research on "Theory-Grounded Guidelines for Solver-Aware System Architecting (SASA)" through an information session and a collaborative multi-player educational game. Systems engineering aims to architect complex systems such that subtasks can be completed efficiently in parallel, and later integrated to form a system that delivers value. Traditionally, complex system development programs assume that inter¬disciplinary nature of these problems require expertise with domain specific knowledge. Hence the goal is to formulate the best technical architecture given operational needs, without considering who is solving different parts of the design problem and how they are engaging in the design process. Then, resulting subproblems are assigned to experts within traditional organizations (e.g., NASA, Lockheed, Ford). This view constrains the potential trajectory of design activities while simultaneously overlooking the potential benefits of engaging non-expert solvers. Consequently, complex system development processes are notoriously over budget and schedule; while technical innovations are constrained within the boundary of subsystems. However, improvements in sharing platforms, the rise of "gig" work and broader adoption of open innovation tools call into question the efficacy of traditional approaches to architecting. In fact, the joint consideration of problem decomposition and solver assignment decisions could simultaneously improve design process outcomes in terms of performance, cost, and schedule; while enabling opportunities for novel solutions to be identified and realized.

The purpose of this workshop is to illustrate the fundamentals of SASA, along with the heuristics and design strategies enabled by this perspective, through an information session that is supported by a collaborative multiplayer educational game. The multiplayer game will first illustrate these concepts in a simple golf setting; then demonstrate how these ideas apply to an interdisciplinary robotics design problem. By the end of this workshop, the participants will have an improved understanding of SASA principles, along with heuristics and strategies to leverage SASA for tackling complex real-world design problems. The workshop promises a fun and engaging opportunity for industry professionals and academics to better utilize the human capital at their disposal, innovate, and gain the competitive edge in complex system development.

THE TROVE OF CAD INFORMATICS: ACQUIRING AND ANALYZING CAD DATA FOR DESIGN PROCESS INSIGHTS AND AI APPLICATIONS

2:00PM–5:00PM

Organizers: Matthew Shields, *PTC*; **Alison Olechowski,** *University of Toronto;* **Jessica Menold,** *The Pennsylvania State University,* **Matthew Mueller,** *PTC*

Description: Recent advances in design tools have transformed CAD model—and the processes by which they are created—into rich data troves for researchers investigating collaborative design processes and developing the next generation of AI driven design tools. This workshop will feature presentations from researchers from a few different fields doing informatics research with CAD data, as well as a panel discussion about the future of design tools. The hands-on portion of the workshop will allow participants to work in focus groups to explore a few shared CAD data sets, brainstorming research questions and analysis methods that could provide insight into design processes or inform the next generation of CAD tools. Participants will walk away with an understanding of how to acquire CAD data from models and processes, as well as ideas for future research projects and collaborations.

Attendees are encouraged to bring a laptop to participate fully in the hands-on portion.

UNDERSTANDING AND MITIGATING BIAS RISKS IN THE USE OF GENERATIVE AI FOR DESIGN

9:00AM–1:00PM

Organizers: Ye Wang, *Autodesk Research*; **Jiwon Jun,** *Autodesk Research*

Description: As AI tools gain popularity, designers are actively integrating them into diverse design workflows, including user research, idea generation, and design variations. Despite their widespread use, there's a lack of awareness regarding biases in outputs, such as demographic and cultural biases, and potential harm could arise when these biases are incorporated into designs without careful consideration. Especially with generative AI tools such as ChatGPT and Midjourney being rapidly integrated not only into professional design practice but also education, there is a pressing need to raise awareness about bias risks and establish guidelines to evaluate and mitigate their impact in the use of the tools in design. This workshop aims to foster discussions on identifying, measuring, and mitigating biases in generative AI tools. After introducing existing biases found in the outputs from the tools, participants will engage in structured activities to experience the design process using the tools. Through reflective discussions, they will brainstorm a framework to measure bias impact and strategies to mitigate them. Based on the outcomes, we will collaboratively develop guidelines on how to use generative AI tools for design with an awareness of bias.

Committee Meetings

ROOM	EVENT	TIME
SUNDAY, AUGUST 25		
Congressional	DED Executive Committee Meeting (Closed)	1:30PM–5:00PM
Cannon	CIE Executive Committee Meeting (Closed)	2:00PM–5:00PM
MONDAY, AUGUST 26		
Salon H	Design Engineering Division General Committee Meeting	5:00PM–5:50PM
State	DED – Advanced Vehicle Technologies (AVT)	6:00PM–7:00PM
Senate	DED – Design Education (DEC)	6:00PM–7:00PM
Treasury	DED – Design for Manufacturing and the Life Cycle Conference (DFMLC)	6:00PM–7:00PM
TUESDAY, AUGUST 27		
Salon 4	CIE – Virtual Environments and Systems (VES)	6:10PM–7:10PM
Salon H	CIE – Advanced Modeling & Simulation (AMS)	6:10PM–7:10PM
Salon J	CIE – Computer-Aided Product and Process Development (CAPPD)	6:10PM–7:10PM
Salon C	CIE – Systems Engineering, Info., & Knowledge Management (SEIKM)	6:10PM–7:10PM
Salon K	CIE – Systems Engineering, Info., & Knowledge Management (AML)	6:10PM–7:10PM
Longworth	DED – Multibody Systems, Nonlinear Dynamics, and Control (MSNDC)	6:10PM–7:10PM
Rayburn	DED – Micro- and Nano Systems (MNS)	6:10PM–7:10PM
Commerce	DED – Micro- and Nano Systems (PTG)	6:10PM–7:10PM
Salon F	DED – Mechanisms and Robotics (MR)	6:10PM–8:10PM
Congressional	DED – Design Theory and Methodology (DTM)	7:10PM–8:10PM
Penn Ave Terrace	DED – Design Automation (DAC)	6:10 PM–8:10PM
Salon 4	Computers and Information in Engineering General Committee Meeting	7:10PM–8:10PM

Division Leadership

Many thanks to our dedicated conference organizers who have worked incredibly hard to develop the many facets of this event.

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Conference Co-Chair

Paul W. Witherell
National Institute of Standards and Technology
Conference Co-Chair

Beshoy Morkos
University of Georgia
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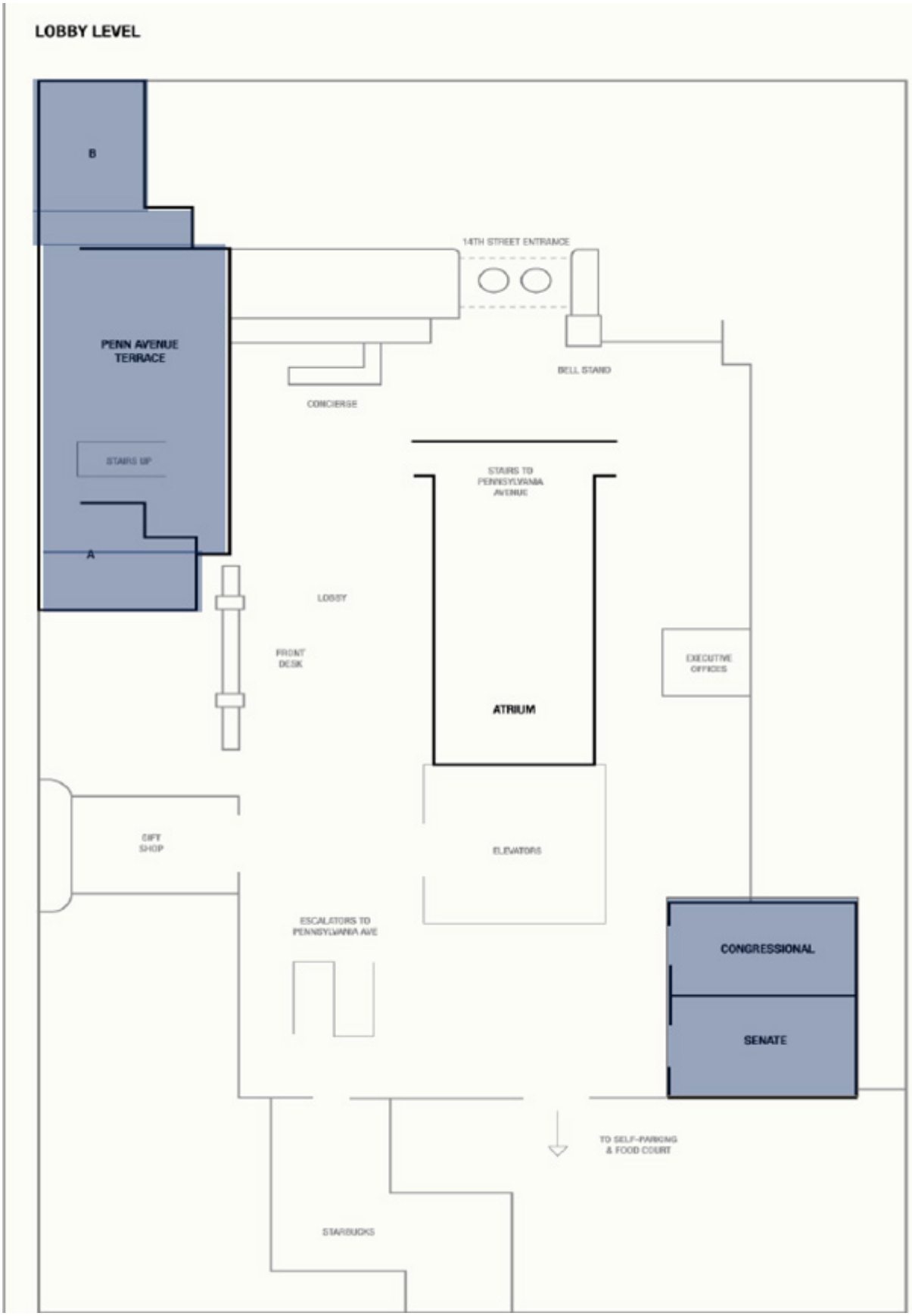
Publications: Michael Kokkolaras, *McGill University*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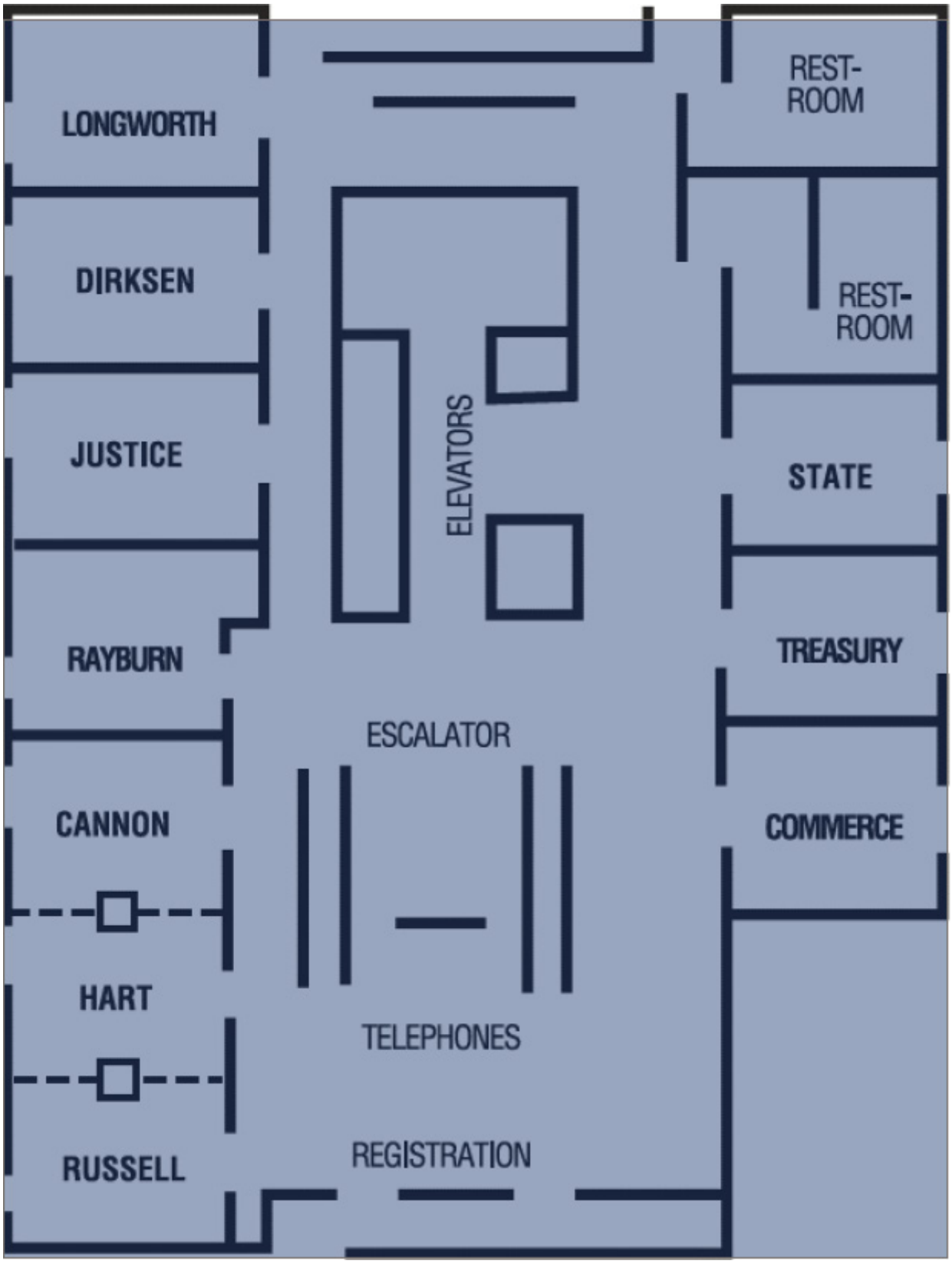

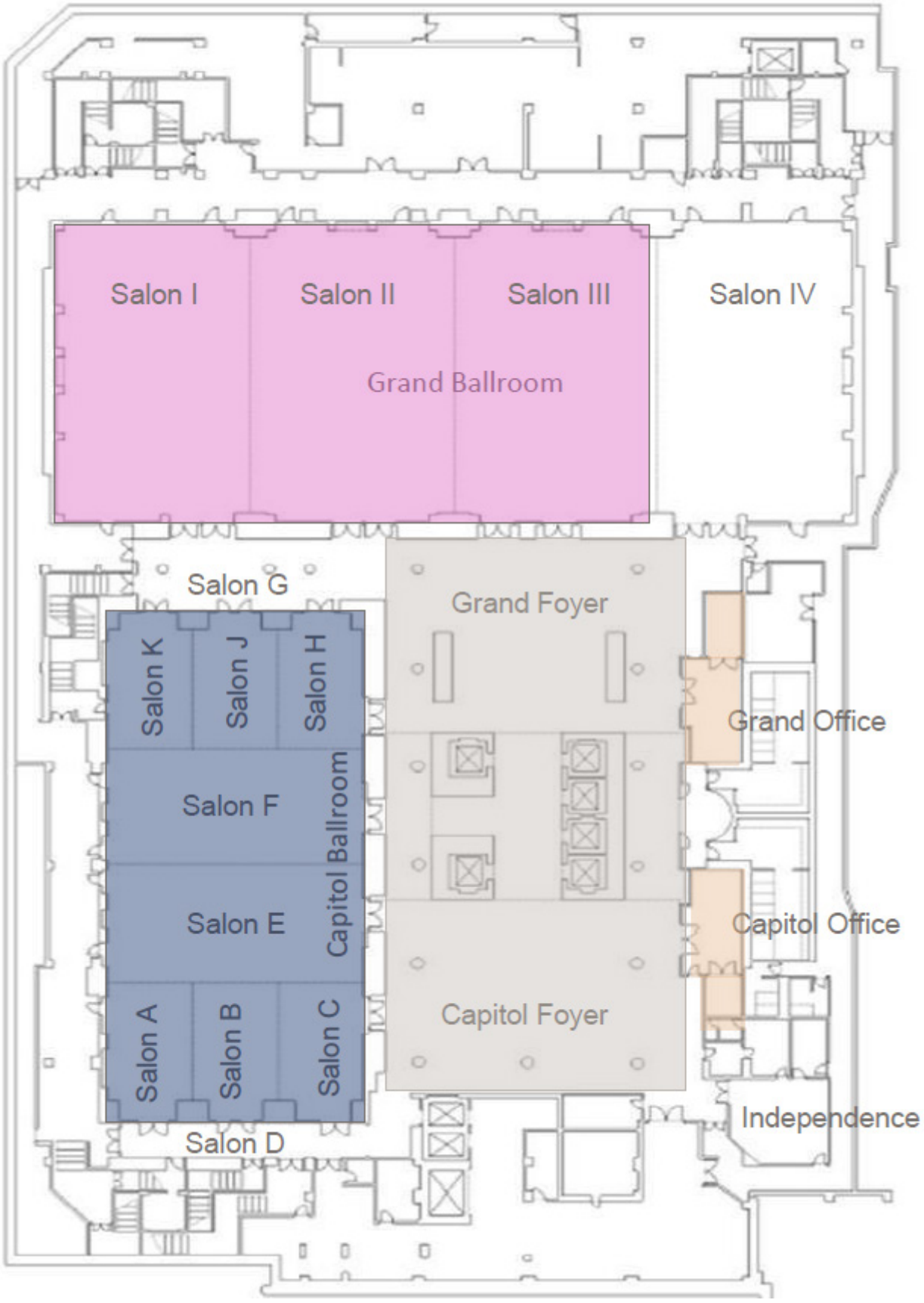
Salon I
Salon II
Salon III
Salon IV
Grand Ballroom
Salon G
Grand Foyer
Salon K
Salon J
Salon H
Grand Office
Salon F
Capitol Ballroom
Salon E
Capitol Office
Capitol Foyer
Salon A
Salon B
Salon C
Independence
Salon D

See you in 2025 at the Hilton Anaheim Anaheim, CA! August 17–20, 2025

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