IDETC-CIE 2021

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

CONFERENCE
Aug 17–19, 2021

Virtual, Online

Program

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Welcome to IDETC-CIE 2021!

On behalf of the ASME Design Engineering Division (DED) and the Computers and Information in Engineering Division (CIE), we welcome you to the 2021 ASME International Design Engineering Technical Conferences & Computers and Information Engineering Conference (IDETC/CIE). The 2021 IDETC/CIE consists of the following 11 conferences organized by the respective Technical Committees of the DED and CIE:

- 23rd International Conference on Advanced Vehicle Technologies (AVT)
- 41st Computers and Information in Engineering Conference (CIE)
- 47th Design Automation Conference (DAC)
- 18th International Conference on Design Education (DEC)
- 26th Design for Manufacturing and the Life Cycle Conference (DFMLC)
- 33rd International Conference on Design Theory and Methodology (DTM)
- 45th Mechanisms and Robotics Conference (MR)
- 15th International Conference on Micro- and Nanosystems (MNS)
- 17th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC)
- 33rd Conference on Mechanical Vibration and Noise (VIB)
- 17th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA)

Because of the ongoing COVID-19 pandemic, the 2021 IDETC/CIE will unfold virtually. Despite this, our community has continued its march forward. The conference will feature more than 675 technical presentations, accompanied by 550 technical papers. There will be approximately one dozen technical keynote and award lectures as well as special sessions highlighting recent articles published in DED- and CIE-sponsored journals. Moreover, our technical program has been designed to promote interaction and community. Author-submitted technical presentations will be available prior to the conference, leaving more time for interaction as we come together. Without the physical constraints of a conference space, we hope that you will take advantage of a wider variety of topics and areas than might have been possible in past years. We look forward to gathering again in person, but for now hope to take advantage of the possibilities of our virtual format.

The success of this conference ultimately comes from the efforts of the individual conference and program chairs, as well as the symposium organizers and all of those that participated in the review process. We are grateful for all of the time and work given by so many in our community, from authors to organizers, as well as the efforts of ASME staff in this most unique time. Finally, on a personal note, we extend our condolences to those that have lost loved ones in the last 18 months and those that have otherwise suffered at the hands of COVID-19. One of the strongest aspects of our community lies in the friendships and personal relationships that have been made through the years, and not even a pandemic can come between those.

While the conference looks different, if you are a long-time participant, we hope that it will be as rewarding as any past experience. If you are new to the IDETC/CIE, we welcome you and hope that you find this a stimulating experience and join us again. Please take advantage of all the opportunities offered by our community. We hope that you enjoy your experience at the 2021 IDETC/CIE!

Donald D. Quinn — *General Chair*

Jeff F. Rhoads — *General Chair*

General Information

Conference Presentations

All technical presentation videos that were received and scheduled are available on the conference platform for viewing before, during, and after the event (for up to 90 days). The live sessions will be summary presentations of the work leading into a questions and answer period with the authors.

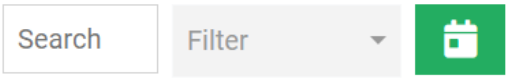
Registered attendees will receive an email from ASME Publications prior to the start of the conference. This email includes a link to the online access for all scheduled presentations for IDETC/CIE. The official 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference proceedings will be produced at the conclusion of the conference.

Navigating the Conference Platform

Once logging into the Conference Platform, you'll enter the virtual lobby. Most options will be located on the left-hand panel.

Account: Update settings and profile information, even adding documents to help with networking.

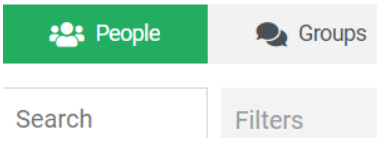
Sessions: IDETC.CIE 2021 sessions and content are located here. Targeted viewing options are at the top:



- **Filter** by Day, Session Type, Presenting Author, or Personal Schedule.
    - Create a personal schedule by clicking the + sign next to any session title.
    - **Search** by Live, Session Title, Keyword in a Session Title, or Session Number.
    - The **Calendar Icon** will display the days schedule in several formats (Grid, List, or Calendar) by switching at the top right once in the calendar view.
        - Sessions can be directly accessed through these views as well.

- **Video viewing** – All videos will be available to view through the platform several days before the official kickoff and 90 days post.
    - Click into a session and see the video options under additional sessions below the main screen.
- **Q&A functions** – While in a live session, attendees can use the **Raise Hand Function** during the Q&A portion. The moderator will unmute to hear the question. Attendees can also **Type** questions for the moderator to relay to the authors.

Networking: Scroll, search, or filter through all attendees.



- View profiles and start chats by clicking their name.
- Create your own individual video chat from a private message.
- Search the Group Tab for existing groups or create one.
- See someone in a session; click their name and private message them directly.

ASME IDETC-CIE 2021
International Design Engineering Technical Conferences & Computers and Information in Engineering Conference

Schedule At-A-Glance *(all times are in U.S. EDT)*

Start time	Duration	Tuesday, August 17, 2021 (All Times in US EDT)											
Time	Minutes	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7	Room 8	Room 9	Room 10	Room 11	Room 12
10:00 AM	50	AVT Keynote	CIE-03-01	CIE-22-01	DAC-03-01	DTM-01	MESA-13-01	MR-01-03	MR-04-01	MR-08-01	MSNDC-02-01	VIB-01-01	
10:50 AM	20	Break											
11:10 AM	80	MR Keynote	(JCISE) Journal of Computing and Information Science in Engineering	DFMLC Panel - Kos-Ishii Award Winners	AVT-01-01	DAC-18-01	DEC-01-01	DTM-02	MESA-01-01	MNS-1	MSNDC-04-01	MSNDC-12-01	VIB-02-01
12:30 PM	30	Break											
1:00 PM	50	VIB Keynote	(JMD) Journal of Mechanical Design	DTM Retrospective (Linda Schmidt)	AVT-01-02/AVT-03-02	CIE-03-02	CIE-30-01	DAC-11-01	DFMLC-01-01	MESA-06-01	MR-06-01	MR-09-03	MSNDC-03-01
1:50 PM	20	Break		Break									
2:10 PM	50	MESA Keynote		DEC Mentorship Program	SEC-sess (MR)	CIE-03-03	CIE-31-01	DAC-11-02	DFMLC-02-01	DTM-04	MSNDC-03-02	MSNDC-04-02	VIB-02-02
3:00 PM	20	Break				Break							
3:20 PM	80	CIE Keynote & Awards	DAC-12-01			DTM-05	MESA-14-01	MNS-2-01	MR-03-01	MR-08-02	MSNDC-04-03	MSNDC-09-01	VIB-03-01
Start time	**Duration**	**Wednesday, August 18, 2021 (All Times in US EDT)**											
Time	**Minutes**	**Room 1**	**Room 2**	**Room 3**	**Room 4**	**Room 5**	**Room 6**	**Room 7**	**Room 8**	**Room 9**	**Room 10**	**Room 11**	**Room 12**
10:00 AM	50	DAC-13-01	DAC-16-01	CIE Poster Session	DTM-11	MR-01-02	MR-02-01	MR-06-02	MSNDC-01-01	MSNDC-05-01	VIB-04-01		
10:50 AM	20	Break			Break								
11:10 AM	80	DFMLC Keynote	(JVA) Journal of Vibration and Acoustics		DAC Student Posters	AVT-08-03	DAC-07-01	DEC-03-01	DTM-12	MESA-03-01	MR-04-02	MR-08-03	
12:30 PM	30	Break											
1:00 PM	50	MNS Keynote	(JMR) Journal of Mechanisms and Robotics	CIE-CAPPD Panel	AVT-05-04	DAC-06-01	DTM-13	MESA-02-01	MSNDC-01-02	MSNDC-05-02	VIB-05-01		
1:50 PM	20	Break		Break									
2:10 PM	50	AVT-02-05/AVT-07-05		CIE-04-01	CIE-32-01	DAC-05-01	DAC-16-02	DFMLC-03-01	DTM-14	MESA-11-01	MSNDC-06-01	MSNDC-07-01	
3:00 PM	20	Break											
3:20 PM	80	MSNDC Keynote (Lyapuanov Award)	DAC Signature Event	AVT-04-06/AVT-06-06	CIE-04-02	CIE-33-01	DEC-03-02	DTM-15	MESA-14-02	MNS-2-02	MR-03-02	MR-09-02	
Start time	**Duration**	**Thursday, August 19, 2021 (All Times in US EDT)**											
Time	**Minutes**	**Room 1**	**Room 2**	**Room 3**	**Room 4**	**Room 5**	**Room 6**	**Room 7**	**Room 8**	**Room 9**	**Room 10**	**Room 11**	**Room 12**
10:00 AM	50	VIB Keynote - Mote Award	NSF/ASME Student Design Essay Competition	CIE-10-01	CIE-34-01	DAC-01-01	DFMLC-04-01	DTM-21	MR-02-02	MR-05/MSNDC-08-01	MSNDC-09-02	MSNDC-10-01	
10:50 AM	20	Break											
11:10 AM	80	MSNDC Keynote (D'Alembert Award lecture)	(JAVS) Journal of Autonomous Vehicles and Systems	DTM Awardee Panel	CIE Collaboration with Digitalization Tech Group (DTG)	DAC-02-01	DFMLC-05-01	MESA-14-03	MNS-4	MR-01-01	MR-05/MSNDC-08-02	VIB-06-01	
12:30 PM	30	Break											
1:00 PM	50	(JCND) Journal of Computational and Nonlinear Dynamics	Student Mechanisms and Robot Design Competition	CIE-10-02	CIE-40-01	DAC-09-01	DFMLC-06-01	DTM-23	MESA-12-01	MNS-5	MR-03-03	MR-05/MSNDC-08-03	
1:50 PM	20			Break									
2:10 PM	50			CIE-20-01	CIE-41-01	DAC-14-01	DFMLC-07-01/DTM-06-01	DTM-24	MESA-15-01	MR-03-04	MR-05/MSNDC-08-04	VIB-07-01	
3:00 PM	20	Break											
3:20 PM	80	NSF EDSE: Forging New Directions in Design Research	CIE-21-01	CIE-41-02	DAC-04-01	DFMLC-08-01/DAC-20-01	MR-04-03	MR-09-01	MSNDC-11-01	MSNDC-13-01	VIB-08-01		

Conference Organizers & Welcome Letters

https://event.asme.org/IDETC-CIE/About/Conference-List

23rd International Conference on Advanced Vehicle Technologies (AVT)

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

The VDC is pleased to welcome you to the 23rd International Conference on Advanced Vehicle Technologies held as a part of the 2021 ASME–IDETC/CIE. This year the AVT conference will consist of 8 symposia in the area of: Ground Vehicles Dynamics and Controls; Modelling and Testing Tire-Terrain Interaction; Methods for Ground Vehicle Systems Design; Ground Vehicle Safety and Ergonomics; Vehicle Electrification and Powertrain Design; Light Vehicles Design; 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 Peter Wright, expert in motor sport, former technical adviser for FIA, and director of R&D at F1 Team Lotus, for the William Milliken Lecture.

A Best Paper Award and a Student Best Paper Award (for papers authored and submitted by 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 award committee's ranking.

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

Liangyao Yu	Costin Untaroiu	Luis Munoz
Conference Chair	*Conference Co-Chair*	*Conference Program Chair*

41st Computers and Information in Engineering Division Conference (CIE)

Greetings CIE Attendees!

The Computers and Information in Engineering Division of ASME welcomes all IDETC/CIE Conference participants to the 41st Annual Computers and Information in Engineering Conference (CIE). The CIE conference is a premier venue for the international exchange of technical, scientific, and application knowledge related to the theory and practice of computing to support engineering activities. It provides a forum for researchers, practitioners, educators, and students from industry, academia, and government research labs to share their latest findings and challenges with the broader research community, foster collaborations, and build a sustainable research and education community.

This year, we are pleased to report that there are 91 accepted papers and technical presentations submitted through the following technical and special topic sessions, organized around the four Technical Committees of the CIE Division, namely: Advanced Modeling and Simulation, Computer-Aided Product and Process Design, Systems Engineering and Information Knowledge Management, and Virtual Environments and Systems.

Advanced Modeling and Simulation (AMS)

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

Computer-Aided Product and Process Development (CAPPD)

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

Systems Engineering and Information Knowledge Management (SEIKM)

- Design Informatics
- Systems Engineering
- Knowledge Capture, Reuse, and Management
- Smart Manufacturing Informatics
- Complex Systems Engineering and Design
- Human System Integration
- Enabling Digital Technologies for Smart Product-Service System Development

Virtual Environments and Design Visualization (VES)

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

Special Sessions

- Cybersecurity in Design and Manufacturing
- Artificial Intelligence and Machine Learning in Design and Manufacturing
- Design, Simulation, and Optimization for Additive Manufacturing

In addition to the technical presentations, we will have panels of leading experts from industry, government, and academia to discuss topics related to the future of Computers and Information in Engineering. We would also like to invite you to attend the virtual graduate student poster session where we have 23 graduate students this year showcasing their work. We also have a special symposium, “Video Presentation Exhibit: Visualization and Virtual Demonstration of Prototypes and Simulations,” where you can witness the demonstrations of the latest modeling, simulation, and visualization software tools that researchers recently developed.

At this conference, as usual we will also present the conference best paper awards and the CIE Division awards. We invite you all to join us at the CIE Awards Ceremony to recognize some of the outstanding research being conducted by peers, colleagues, and students alike.

As always, this year's conference would not be possible without the outstanding contributions from ASME volunteers. We would like to thank and recognize the Technical Committee leadership this year for their hard work and contributions:

- Advanced Modeling and Simulation (AMS)
  - Seung-Kum Choi, Chair
  - Piyush Pandita, Vice Chair
- Computer Aided Product and Process Design (CAPPD)
  - Tsz Ho Kwok, Chair
  - Ehsan T. Esfahani, Vice Chair
- Systems Engineering and Information Knowledge Management (SEIKM)
  - Yan Lu, Chair
  - Zhuo Yang, Vice Chair
- Virtual Environments and Systems (VES)
  - Marina Carulli, Chair
  - Christian E. Lopez Bencosme, Vice Chair

We would like to use this opportunity to thank our symposium organizers, including Caterina Rizzi, Jitesh Panchal, Yan Wang, Bryan O'Halloran, Douglas Van Bossuyt, Amir Mirzendehdel, Namhun Kim, Seung Ki Moon, Korhan Sevenler, Marc Halpern, Anand Balu Nellippallil, Gaurav Ameta, Ravi Burla, James Yang, Athanasios Iliopoulos, Brian Dennis, John Michopoulos, Anh Tran, Valeria Krzhizhanovskaya, Chao Hu, Zhimin Xi, Björn Johansson, Xianlian Zhou, Yujiang Xiang, Jida Huang, Jun Wang, Yayue Pan, Yunbo Zhang, Lorenzo Failla, Marco Rossoni, Giorgio Colombo, Chiradeep Sen, Dazhong Wu, Kuo-Yi Lin, Xin Guo, Ying Liu, Yuqian Lu, Zheng Pai, Douglas Allaire, David Jensen, Ashis Banerjee, Ian Grosse, Farhad Ameri, Chris Hoyle, Zhenghui Sha, Christopher McComb, Li Xinyu, Tao Peng, Yu Zheng, Andrea Vitali, and Vinayak Krishnamurthy for their efforts and hard work in paper review coordination and recommendation. We would like to thank all reviewers for their time to provide valuable feedback and help to maintain high standards and improve the quality of the conference. Last but not the least, we thank all authors for submitting and sharing their latest work to shape the research directions in this community.

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

Mahesh Mani
Conference Chair

Paul Witherell
Conference Program Chair

47th Design Automation Conference (DAC)

Dear Colleagues,

On behalf of the DAC Executive Committee, welcome to the 47th ASME Design Automation Conference (DAC)!
The COVID-19 pandemic has had a profound impact on our conference and on each of us in the DAC community. While we continue to navigate through these difficult times, we are proud of our community for their work, while recognizing that the ongoing pandemic disproportionately affects students, women researchers, those with caretaker responsibilities, researchers from low socio-economic areas and those with precarious employment, and especially researchers of color. We are immensely grateful for your efforts to continue advancing design automation research despite these countless, difficult challenges.

The dedicated efforts by each of us in the community have ensured that this year's conference will be another successful and impactful one. In this letter, we'd like to highlight a few of the excellent research highlights and people involved that make DAC successful.

The DAC technical program spans the breadth and depth of design automation research, and after a rigorous peer review process, 105 papers in 20 active research areas were accepted (an approximate acceptance rate of 88%). These papers will be presented in technical sessions from Tuesday, August 17 to Friday, August 20.

Complementing our technical sessions, we will host a highly anticipated panel session (now called the *DAC Signature Event*), titled "***The Future of Human-AI Collaboration for Engineering Design***," featuring prominent voices on this timely topic:

- Sandeep Neema, *Program Manager, Information Innovation Office, Defense Advanced Research Projects Agency*
- Conrad Tucker, *Professor, Department of Mechanical Engineering, Carnegie Mellon University*
- Anita Woolley, *Associate Professor, Tepper School of Business, Carnegie Mellon University*
- Emrah Bayrak, *Assistant Professor, School of Systems and Enterprises, Stevens Institute of Technology*
- Alison Olechowski, *Assistant Professor, Department of Mechanical & Industrial Engineering, University of Toronto*
- Daniel Selva, *Assistant Professor, Department of Aerospace Engineering, Texas A&M University*

The keynote will be followed by a panel Q&A where the audience can interact with the speakers for in-depth discussion on the emergent topic of Human-AI Collaboration. We will also be presenting the DAC Award winners and announcing the DAC Best Paper Award at the beginning of the keynote.

Also, please join us for our DAC committee meeting on Thursday evening. We look forward to having our community come together, meet old friends, and make new ones. Zoom information for this meeting is forthcoming.

From the accepted papers, eleven were identified as "Papers of Distinction." These papers are listed below:

- DETC2021-67958: *A Bayesian Approach to Recovering Missing Component Dependence for System Reliability Prediction via Synergy Between Physics and Data*, by Huiru Li and Xiaoping Du.
- DETC2021-71570: *Data-Driven Design via Scalable Gaussian Processes for Multi-Response Big Data with Qualitative Factors*, by Liwei Wang, Danial Apley, Ping Zhu, Akshay Iyer, Suraj Yerramilli, and Wei Chen
- DETC2019-69058: *A Repeated Urban Driving Cycle Dataset with Application to Short-Term Velocity Forecasting*, by Yuanzhi Liu and Jie Zhang
- DETC2021-68836: *A Subspace-Inclusive Sampling Method for the Computational Design of Compositionally Graded Alloys*, by Marshall Allen, Raymundo Arroyave, Richard Malak, and Tanner Kirk
- DETC2021-70036: *Data-Driven Customer Segmentation Based on Online Review Analysis and Customer Network Construction*, by Seyoung Park and Harrison M. Kim
- DETC2021-71187: *Robust Design of Coupled Engineered Systems*, by Janet K. Allen, Gehendra Sharma, and Farrokh Mistree
- DETC2021-67499: *Topology Optimization with Locally Evaluable Complement Space Connectivity*, by Clinton B. Morris, Amir M. Mirzendehdel, and Morad Behandish
- DETC2021-67734: *Shared Autonomous Vehicle System Design for Battery Electric Vehicle (Bev) and Fuel Cell Electric Vehicle (Fcev),* by Ungki Lee, Sunghyun Jeon, and Ikjin Lee
- DETC2021-68426: *Integrating Sales, Design and Production: A Configuration System for Automation in Mass Customization*, by Mehdi Tarkian, Camilla Wehlin, Leon Poot, and Olle Vidner
- DETC2019-71733: *Gradient Based Design of Periodic Rectilinear Scaffolds Using Mechanobiological Simulations*, by David O. Cohen, Sohaila M. G. Aboutaleb, Amy Wagoner Johnson, and Julian A. Norato
- DETC2021-70990: *A Probabilistic Approach for Estimating the Environmental Impact of Novel Product Concepts*, by Vincenzo Ferrero, Chris Hoyle, and Bryony DuPont

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

Last but surely not least, organizing the conference requires the assistance of a number of individuals. We are particularly grateful to all session organizers and paper review coordinators:

Faez Ahmed, Michael Alexander-Ramos, Janet Allen, James Allison, Jesse Austin-Breneman, Emrah Bayrak, Morad Behandish, Souma Chowdhury, Xiaoping Du, Bryony DuPont, Diego Garzon-Alvarado, Payam Ghassemi, Dipanjan Ghosh, Joshua Hamel, Daniel Herber, Steven Hoffenson, Chao Hu, Zhen Hu, Mian Li, Ali Mehmani, Nicholas Meisel, Beshoy Morkos, Julian Norato, Matt Parkinson, Rahul Renu, Carolyn Seepersad, Daniel Selva, Tim Simpson, Nicolas Soria Zurita, Eun Suk Suh, Zequn Wang, Kate Whitefoot, Natasha Wright, Zhimin Xi, Hongyi Xu, Jie Zhang, Fiona Zhao, and Yuqing Zhou

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

Thank you,

Bryony DuPont
Conference Chair

Julián Norato
Program Chair

18th International Conference on Design Education (DEC)

On behalf of the Design Education Committee, we welcome you to the 18th annual International Conference on Design Education, which is going to be held virtually. The focus of this conference is on design education among educators, practitioners, and researchers.

This year's DEC Program consists of four technical symposia – (DEC-1) *Implementation, Assessment and Research Methods Across the Curriculum,* (DEC-3) *Innovative Practices in Design Education,* (DEC-5) *Timely Response to Design Education Challenges*, and (DEC-6) *Demos and Presentation Only*. 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.

The DEC Best Paper for the 2021 Conference is IDETC2021-71780: **Examining Goal Congruence on Engineering Design and Innovation Student Teams** by Sara Beckman, Alan Jian, Ahan Sabharwal, and Kosa Goucher-Lambert

In addition to the best paper winner for 2021, we would like to recognize the three additional papers nominated for the DEC Best Paper Award this year:

IDETC2021-68461: **Sustainability and Design Education: The Current Status of Product Design Higher Education in the UK** by Emelia Delaney and Wei Liu

IDETC2021-71667: **Analysis of the Knowledge Gain and Cognitive Load Experienced Due to the Computer-Aided Instruction of Additive Manufacturing Processes** by Jayant Mathur, Scarlett R. Miller, Timothy W. Simpson, and Nicholas A. Meisel

IDETC2021-71702: **Break It Down: Comparing the Effects of Lecture- and Module-Style Design for Additive Manufacturing Educational Interventions on Students' Learning and Creativity** by Rohan Prabhu, Timothy W. Simpson, Scarlett R. Miller, and Nicholas A. Meisel

We extend special appreciation to our technical session Review Coordinators: Andrew Olewnik, José E. Lugo, Nicholas Meisel, and Rohan Prabhu. We also give our sincerest thanks to all the reviewers of technical papers; they have ensured the quality of this year's conference.

The DEC technical committee meeting will be posted in the Technical Program. At the meeting we present many of the DEC Awards and plan for next year's conference. Everyone is welcome to attend. Our meeting is streamlined to respect members' participation in other committees.

Mohammad Fazelpour
Conference Chair

Elizabeth Starkey
Conference Program Chair

26th Design for Manufacturing and the Life Cycle Conference (DFMLC)

The ASME Design for Manufacturing and the Life Cycle Committee welcomes participants to the 26th Annual Design for Manufacturing and the Life Cycle Conference. The ASME Design for Manufacturing and the Life Cycle Conference is the main international forum for the exchange of technical and scientific information on the theory and practice of Integrated Product and Process Development, Sustainable Design and Manufacturing, Product Lifecycle Management (PLM), and Design for X (DFX) Methods. This conference provides a forum for researchers, practitioners, and educators from academia, government organizations, and industry to share their latest results and challenges with the research community.

We are happy to report that this year's conference continues to feature many new and exciting results and methods to be presented as part of the conference technical sessions. This year's DFMLC conference includes 31 technical papers and 7 technical presentations in 8 sessions, as follows:

- Session 1: Life Cycle Decision Making
- Session 2: Modeling and Optimization for Sustainable Design and Manufacturing
- Session 3: Design for Additive Manufacturing
- Session 4: Design for Manufacturing, Assembly, and Product Service Systems
- Session 5: Design of Thermal and Energy Systems
- Session 6: Special Session: Design Tool Showcase & DFMLC in response to COVID-19
- Session 7: Design for Sustainable Product Use and User Behavior
- Session 8: Design for Service, Operation, and Quality

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, Daniel Cooper, and the paper review coordinators/co-coordinators for managing the papers through the review process: Sara Behdad, Abigail Clarke-Sather, Byrony DuPont, Steven Hoffenson, Astrid Layton, Junfeng Ma, Amin Mirkouei, Li Shu, Fu Zhao, Peter Sandborn, Daniel Cooper, William Bernstein, Devarajan Ramanujan, Gul Okudan Kremer, and Yaoyao Fiona Zhao. Your participation and hard work have been vital for the success of the DFMLC conference!

The best paper for the 2021 DFMLC Conference is *Product Development Using Perceived Correlations Between the United Nations Sustainable Development Goals and Social Impact Categories*, authored by *Gabrielle E. Johnson, Marin J. Fisher, John L. Salmon, and Christopher A. Mattson*. The paper will be presented in session DFMLC 2-1.

This year, Dr. Nabil Nasr, CEO of the Manufacturing USA REMADE Institute and Director of Golisano Institute for Sustainability at Rochester Institute of Technology, will present the DFMLC keynote lecture titled *Innovation in Reducing Embodied Energy and Decreasing Emission through Circular Economy*.

The 2021 DFMLC Conference also features a special presentation session. The *Design Tool Showcase* features new design tools developed by the members of the ASME Design community in both digital and physical forms. The *DFMLC in response to COVID-19* presents innovative solutions that address new challenges presented by the ongoing COVID-19 pandemic.

This year's Kos-Ishii awardees panel will feature Professors David Kazmer, Gul Kremer, Peter Sandborn, and Karthik Ramani. The panel will reflect on the contributions made by the DFMLC research community toward advancing design and manufacturing over the past decade as well as envisioning the future role of the DFMLC community over the coming decade and its relationship with other ASME and external communities.

The DFMLC technical committee meeting will take place after the Kos-Ishii awardees panel session. The DFMLC Awards will be presented in this meeting, and the technical committee will plan for next year's conference. Everyone is welcome to attend.

On behalf of the entire DFMLC community, we welcome you to the 26th Design for Manufacturing and the Life Cycle virtual conference!

Devarajan Ramanujan
Conference Chair

Junfeng Ma
Conference Program Chair

33rd 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 33rd International Conference on Design Theory and Methodology (DTM). Our conference focuses on fundamental design theory and methodologies, and to apply them in an engineering context, with contributions provided by both researchers and practitioners.

This 2021 DTM conference includes 57 technical paper presentations and five lightning talks. Thematically, the conference includes contributions associated with our four broad foci: Design Theory, Design Methods, Design People, and Design Practice. Two jointly organized special sessions are included: Design for Sustainable Product Use and User Behavior with DFMLC and Intelligence Augmentation for Human Systems Integration with SEIKM.

There were 74 papers submitted and reviewed by an incredible cohort of review coordinators and reviewers. A total of 225 reviews were completed by 133 different reviewers. The review coordinators for this year's conference include Jinjuan She, Kosa Goucher-Lambert, Christopher McComb, Ying Liu, Ting Liao, Douglas Van Bossuyt, Alison Olechowski, K. Blane Fillingim, Paul Grogan, Ali Yassine, Scarlett Miller, Ashish Chaudhari, James Righter, Apurva Patel, Noe Vargas-Hernandez, Carl Sorensen, Christine Toh, Jesse Austin-Breneman, Bradley Camburn, Jessica Menold, Astrid Layton, Li Shu, Rahul Renu, Kristin Wood, Vivek Rao, and Greg Mocko. It is through the service of these individuals that we are able to maintain the high-quality expectations of the DTM conference.

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

Dr. Tahira Reid
Conference Chair

Dr. Joshua D. Summers
Program Chair

45th Mechanisms and Robotics Conference (MR)

The Mechanisms and Robotics Technical Committee of the ASME Design Engineering Division welcomes you to the 45th 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, with more than 100 peer-reviewed technical papers and more than 20 abstract-only presentations organized into 9 technical symposia, a keynote speech, an early career invited talk session, and the Student Mechanisms and Robot Design Competition. Paper topics range throughout areas central to the design of mechanical, mechatronic, and robotic systems, including kinematics, dynamics, design, analysis and validation, compliant mechanisms, origami-based design, metamaterials for mechanisms, novel mechanisms and robots, mobile robots, and various applications. Our Keynote Address will be given by Dr. Marcia K. O'Malley, Thomas Michael Panos Family Professor in Mechanical Engineering, Computer Science, and Electrical and Computer Engineering at Rice University, with her speech entitled, *Designing Wearable Robots for Physical Human-Robot Interaction*.

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

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

- MR-1 Mechanism Synthesis & Analysis: Dongming Gan, Latifah Nurahmi
- MR-2 Theoretical & Computational Kinematics: Jose Rico, Hongliang Shi
- MR-3 Compliant Mechanisms: Guimin Chen, Hongzhe Zhao
- MR-4 Origami-Based Engineering Design: Shikui Chen, Suyi Li
- MR-5 Motion Planning, Dynamics, and Control of Robots: Joo H. Kim, Damien Chablat, Andreas Mueller
- MR-6 Medical & Rehabilitation Robots: Nina Robson, Abbas Fattah
- MR-7 Mobile Robotics: Mahdi Haghshenas-Jaryani, Dave Myszka
- MR-8 Novel Mechanisms, Robots & Applications: Reza Fotouhi, Ketao Zhang
- MR-9 Mechanism-based Metamaterials: Jonathan Hopkins, Damiano Pasini

- MR-10 Student Mechanisms and Robot Design Competition: Mark Plecnik, Yu She, Gaurav Singh, Long Wang, Haiyang Li
- MR-12 Special Early Career Session of Invited Presentations: Mark Plecnik

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

Chin-Hsing Kuo	Just Herder	Leila Notash	Guangbo Hao
Conference Chair	*Conference Co-Chair*	*Program Chair*	*Program Co-Chair*

15th International Conference on Micro- and Nanosystems (MNS)

On behalf of the Organizing Committee of Micro- and Nanosystems (MNS) Conference, it is our great pleasure to invite you to join in the ASME 15th International Conference on Micro- and Nanosystems (MNS), one of the eleven conferences of IDETC/CIE 2021, on August 17–20, 2021 held in virtual format.

This conference is sponsored by the MNS Technical Committee, an integral part of the ASME Design Engineering Division, and 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 manufacturing of micro- and nanoscale systems. The 15th MNS Conference will start on August 17 with Keynote lecture, Best paper awards, and Committee meeting. Scheduled symposia in 2021 include:

MNS-1 Keynote Lecture: *Dr. Mohammad Younis*
MNS-2 Dynamics of M/NEMS
MNS-3 Bio M/NEMS
MNS-4 Micro/Nano Robotics and Manufacturing
MNS-5 Functional Materials and Surface Engineering
MNS-6 M/NEMS IoT, Sensors and Actuators
MNS-7 M/NEMS AI, Neural and Digital Computing
MNS-8 Flexible MEMS/NEMS
MNS-9 Power Sources and Storage for M/NEMS

This conference would not have been made possible without the dedicated efforts of the symposia organizers. Thus, big appreciations go to Fadi Alsaleem, Siavash Pourkamali Anaraki, Dumitru Caruntu, Irene Fassi, Chu-Yu Huang, Nizar Jaber, Brian Jensen, Hoe Joon Kim, Muhammad Raziuddin A. Khan, Longqiu Li, Marc Litz, Yu Liu, Yong Shi, Gloria Wiens, and Xian Zhang for organizing the MNS symposia.

The Technical Committee of MNS and the Organizing Committee of the 15th MNS Conference hope to make the conference an exciting and memorable scientific event. We look forward to seeing you in our virtual sessions in August 2021.

Prof. Hanna Cho	Prof. Kamran Shavezipur	Dr. Oliver Barham	Prof. Najib Kacem
Conference Co-Chair	*Conference Co-Chair*	*Program Co-Chair*	*Program Co-Chair*

17th 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 17th International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC). Consisting of 12 symposia, the conference features more than 90 presentations covering traditional and emerging topics in the broad areas of multibody systems and nonlinear dynamics. This event presents a unique opportunity for researchers, practitioners, educators, and students to report their accomplishments, exchange ideas, and become familiar with emerging trends in the field. The conference is organizing competitions for two awards—Best Paper, and Best Student Paper. A special issue of the *ASME Journal of Computational and Nonlinear Dynamics* will be dedicated to our event. Additionally, we will have a special nonlinear dynamics session dedicated to the memory of Prof. Ilinca Stanciulescu, who passed away earlier this year.

This year, we are also honored to recognize two award winners who will be giving our Keynote presentations:

Professor Balakumar Balachandran is the recipient of the Lyapunov award for his seminal contributions in nonlinear resonance and modal interactions, milling process and drill-string problem, and nonlinear dynamics of microsystems. Established in 2003, the Lyapunov Award recognizes lifelong contributions to the field of nonlinear dynamics. Previous recipients of this award are Ali H. Nayfeh, Francis C. Moon, Philip Holmes, Earl Dowell, J. Michael T. Thompson, Stuart S. Antman, Guiseppe Riga, and Peter Hagedorn.

Professor Friedrich Pfeiffer is the recipient of the D'Alembert Award for seminal contributions in frictional contact phenomena in multibody dynamics. Established in 2005, D'Alembert Award recognizes lifelong contributions to the field of multibody system dynamics. Previous recipients include Thomas R. Kane, Werner Schiehlen, Edward Haug, Javier García de Jalón, Ahmed Shabana, Olivier Bauchau, and Jens Wittenburg.

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

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

Johannes Gerstmayr — *Conference Chair*
Sachin Goyal — *Conference Co-Chair*
Richard Wiebe — *Conference Co-Chair*

José Escalona — *Program Chair*
James Chagdes — *Program Co-Chair*

33rd Conference on Mechanical Vibration and Noise (VIB)

On behalf of the Technical Committee on Vibration and Sound (TCVS), we cordially welcome the attendees of the 33rd ASME Conference on Mechanical Vibration and Noise (VIB). The VIB Conference is sponsored by the TCVS and supported by the Technical Committee on Multibody Systems and Nonlinear Dynamics (MSND). The conference covers a broad spectrum of topics in the general area of vibrations, encompassing academic investigations on fundamental theories and emerging forefronts as well as industrial applications. It is the showcase technical forum for researchers around the world and provides a focused and intimate setting for dissemination and discussion of the state of the art of various subjects in vibration and noise. This year, the VIB conference received 47 abstract submissions, among which 29 were accepted as papers in proceedings and 17 were accepted as technical presentations only without papers. The VIB also co-sponsored one symposia in the MSNDC conference. These VIB papers and presentations were organized in 14 symposia. The symposia and their organizers are:

VIB-2 Dynamics of Soft Media and Robotics by Hongbin Fang
VIB-3 Dynamics & Waves in Solids and Metamaterials by Mike Leamy and Serife Tol
VIB-4 Energy Harvesting by Serife Tol, Lei Zuo and Wei-Che Tail
VIB-6 Industrial Applications of Vibration and Acoustics by Ryan Monroe
VIB-7 Jointed Structures, Contact, and Friction by Rob Kuether
VIB-8 Nonlinear Systems & Phenomena by Biagio Carboni
VIB-9 Rotating Systems and Rotor Dynamics by Meng-Hsuan (Mark) Tien, Akira Saito and Wei-Che Tai
VIB-12 Vibration and Stability of Mechanical Systems by Chris Cooley
VIB-13 Passive and Active Control of Vibration, Shock and Noise by Haifeng Zhang
VIB-14 Vibration of Continuous Systems by Dumitru Caruntu and Weidong Zhu
VIB-15 Machine Learning Applications in Vibrations and Dynamics by Adam Brink and David Najera-Flores

The VIB 2021 conference is highlighted by keynote lectures from three eminent researchers:

- Professor Hannah Cho, Ohio State University, recipient of the 2021 C.D. Mote Jr. early career award in recognition of research excellence in the field of vibration and acoustics.
- Professor Eleni Chatzi, ETH Zurich, researcher in structural mechanics and monitoring.

Adam Brink
Conference Chair

Peter Coffin
Technical Program Chair

MESA 2021 – 17th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications

We are pleased to welcome everyone to the 17th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA 2021). The goal of MESA 2021 is to bring together experts from the fields of mechatronics and embedded systems, disseminate the recent advances in the area, discuss future research directions and exchange application experience.

We have assembled an exciting conference program with more than 60 peer-reviewed technical papers organized into 10 symposia and a keynote talk from Professor Shane Xie.

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

Po Ting Lin, Ching-Yuan Chang, Massimo Callegari, Matteo-Claudio Palpacelli, Marina Paolanti, Emanuele Frontoni, Tapio Heikkilä, Luca Romeo, Tim Giffney, Binsen Qian, Peng Yan, Zhen Zhang, YangQuan Chen, Primo Zingaretti, Adriano Mancini, Changpin Li, Yongguang Yu, Youmin Zhang, Wencen Wu.

We look forward to a successful conference and hope that you find it stimulating and rewarding.

Chris Petty
Conference and Program Chair

Abhijit Nagchaudhuri
Program Chair

Keynotes

https://event.asme.org/IDETC-CIE/Program/Keynotes-Special-Sessions

AVT Keynote Speaker: Peter Wright, Independent Motorsport Consultant:
Tuesday, August 17 at 10:00AM EDT

Keynote Title: Half a Century in Motorsport: From Speed to Safety

Abstract: From an early interest in motorsport the 1950's, Peter Wright joined the Grand Prix team, British Racing Motors (BRM) in 1967 at the age of 21 years. In a career spanning over half a century, he has experienced the golden age of Formula 1 technical development. After 21 years with the Lotus Group, including the roles of Technical Director of Team Lotus, Managing Director of Lotus Engineering, and a Director of Group Lotus, his career spanned the eras of the aerodynamic development of racing cars, including the development of Ground Effect and Active Suspension, during which he worked with and formed a lasting friendship with Bill Milliken.

In 1994, following the death of Ayrton Senna, Wright joined the international motorsport sanctioning body, the FIA as Technical Adviser, working on motorsport regulation, motorsport safety R&D, and road car safety. In 25 years with the FIA, projects included the introduction of Accident Data Recorders, the development of HANS, flying Le Mans sports cars, High Speed Barriers, Advanced Frontal Protection (Halo),the prevention of spinal injuries in frontal impacts, and research into motorsport concussion, as well as the development of a Balance of Performance system for GT cars, and the F1 hybrid powertrain regulations. As President of the FIA Safety Commission, he was responsible for introducing numerous safety regulations, and chaired the Jules Bianchi accident investigation. Today, nearly retired, he is responsible for the drawing up of Sporting and Technical Regulations for the recently launched eSkootr Championship.

CIE Keynote & Awards Speaker: Dr. Raju Mattikalli, Boeing Research & Technology**: Tuesday, August 17 at 3:20PM EDT**

Keynote Title: Design of Networked Systems

Abstract: Data is revolutionizing how physical systems operate. To enable data gathering and processing, computers and sensors are increasingly being built into appliances, homes, cars, airplanes and factories. Algorithmic design of such cyber-physical systems needs to address the integration of sensing, computational and communication sub-systems into the physical design. In the aerospace industry, we have unique challenges associated with the design of such networked systems arising from their scale and complexity. In this talk I will highlight some design challenges and will describe algorithmic solutions as it applies to aerospace products including airplanes, real-time avionics and perimeter defense systems.

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DFMLC Keynote: Nabil Z. Nasr, Ph.D. Associate Provost for Academic Affairs. Director, Golisano Institute for Sustainability Rochester Institute of Technology. CEO, REMADE Institute Rochester, New York: **Wednesday, August 18 at 11:10AM EDT**

Keynote Title: Innovation in Reducing Embodied Energy and Decreasing Emission Through Circular Economy

Abstract: In response to growing challenges of expanding energy consumption and emissions in manufacturing there is a need to develop a strategy at the national level with clear goals and objectives to address those challenges. In 2017 the REMADE Institute was formed as a public/private partnership focused on developing transformational technologies to accelerate the transition to a Circular Economy for plastics, metals, fibers and e-waste. The institute is funded through a cooperative agreement with the Department of Energy with $70 Million in Federal funding and $70 Million in private funding for the first 5 years. This presentation will provide an overview of the REMADE Institute and its objectives and technology strategy. REMADE seeks to enable early stage applied research and development of key industrial platform technologies that could dramatically reduce the embodied energy, emissions, and waste and increase material availability associated with industrial-scale materials production and processing. Eliminate and/or mitigate technical and economic barriers that prevent greater material recycling, recovery, remanufacturing, and reuse.

MSEA Keynote: Shane Xie, Ph.D. Chair of Robotics and Autonomous Systems and Director of the Rehabilitation Robotics Lab at the University of Leeds: **Tuesday, August 17 at 2:10PM EDT**

Keynote Title: Innovative Robotic Technology for the Future of Healthcare

Abstract: Stroke and neurological diseases have significant impact on our society. This talk will discuss the key societal challenges, robotic technologies for delivering effective care and opportunities for the healthcare industry. The keynote will cover the recent development of robotics for stroke rehabilitation, the research gaps and the need for new technologies in neuroscience, robotics and artificial intelligence. The talk will introduce a EPSRC-funded project on intelligent reconfigurable exoskeletons tailored to meet patients' needs, deliver effective diagnosis and personalized treatment, and monitored remotely by rehabilitation therapists. The talk will also briefly introduce the Leeds Centre for Assistive/Rehabilitation Robotics and our work on ankle robot, gait exoskeleton, gait upper limb bilateral robot, neuromuscular and brain computer interfaces. The focus is on the enabling technologies for those whose strength and coordination have been affected by amputation, stroke, spinal cord injury, cerebral palsy and ageing.

MNS Keynote: Mohammad I. Younis, Ph.D. Physical Sciences and Engineering Division, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia; Department of Mechanical Engineering, State University of New York at Binghamton: **Tuesday, August 18 at 1:00PM EDT**

Keynote Title: Dynamic-Based Micro and Nano Devices and Phenomena

Abstract: Miniature structures and devices have captured the attention of the scientific community for several decades for their unprecedented attractive features. Today, several micro-electro-mechanical systems (MEMS) devices are being used in our everyday life, ranging from accelerometers and pressure sensors in automobiles, radio-frequency (RF) switches and microphones in cell phones, and inertia sensors in video games. Due to the quest to boost sensitivity, reduce power consumption, and increase integration density, the past two decades have witnessed the emergence of Nano-electro-mechanical systems NEMS. With the increasing demand to embed more intelligence into various applications, MEMS and NEMS continue to play key role on advancing innovation.

Along with their great promise, micro and nano devices have brought new challenges and a wide spectrum of unexplained and less-understandable mechanical behaviors and phenomena. Because these devices employ moveable compliant structures and due to the interaction with short-range forces, many of these challenges are related to their dynamical behavior, which is mostly nonlinear.

In this talk, we demonstrate that by developing a proper understanding and deep insight into the dynamics and nonlinear mechanics phenomena at the micro and nano scale, new technological solutions and innovative ideas can be realized leading to new generations of superior devices. The talk will overview some of the recent revealed intriguing phenomena at the micro and nano scale including internal resonances and modes veering. Then, we discuss the realization of smart resonant sensing platforms utilizing multi-modal vibration excitation of structures to achieve multiple functionalities. These include boosting sensitivity, compensating for temperature drift, and combining sensing and actuation on a single device. In one application, active switches triggered by the detection of gas will be demonstrated. Then we discuss the static and dynamic behavior of actively tunable structures, which can be tuned using electrostatic and or/electrothermal actuation. We will discuss the potential of implementing such structures for logic, memory, and filtering applications. The talk will end on future directions and perspectives.

MR Keynote: Marcia K. O'Malley, Ph.D. Thomas Michael Panos Family Professor in Mechanical Engineering, Computer Science and Electrical and Computer Engineering, Rice University: **Monday, August 17 at 11:10AM EDT**

Keynote Title: Designing Wearable Robots for Physical Human-Robot Interaction

Abstract: Robots are increasingly transitioning from factories to human environments: today we use robots in healthcare, households, and social settings. I'm particularly interested in the potential for improving human performance with wearable robotic devices. Physical interactions between robots and humans offer an opportunity for the human and robot to implicitly communicate. For example, a rehabilitation robot exoskeleton can guide and train human movements, or a wearable haptic device can be used to convey informative tactile cues to the user. As engineers, we must consider the unique design and control constraints that are introduced when we design robots that are to be worn by the human, such as the complex degrees of freedom of human joints, the limitations of our human perceptual capabilities, and the necessity for compliant control algorithms to ensure user safety. This talk will feature recent research from my lab and will highlight these design challenges and the unique approaches that we have taken to ensure that the wearable robot and human achieve more together than either can achieve alone.

MSNDC Keynote (Lyapunov Award): B. Balachandran, Ph.D. Minta Martin Professor of Engineering, University of Maryland: **Wednesday, August 18 at 3:20PM EDT**

Keynote Title: Lyapunov's Contributions and Some Applied Nonlinear Dynamics

Abstract: Aleksandr Mikhailovich Lyapunov's contributions have had a significant influence on studies of nonlinear dynamics of a range of systems within engineering and outside engineering. These contributions, which are related to the stability of motion, include the Lyapunov function, Lyapunov vectors, and Lyapunov exponents. In the spirit of these contributions, applied nonlinear dynamics in the context of ship crane-load oscillations, underwater vehicle systems, and growth and decay of nonlinear waves will be addressed in this talk.

MSNDC Keynote (D'Alembert Award): Friedrich Pfeiffer, Ph.D.
Institute of Applied Mechanics, Department of Mechanical Engineering, Technical University Munich: **Thursday, August 19 at 11:10AM EDT**

Keynote Title: Steps Towards Non-Smooth Multibody Dynamics

Abstract: Multibody dynamics theories including non-smooth effects came up not before the second half of the last century. In my previous Institute we had quite a number of industry problems requiring urgently new solution ideas, for example gear rattling, turbine blade dampers, roller coasters and automotive drive trains, all with contact problems influencing dynamics, for some cases dominating it. We started, as many other colleagues working in the field, with a description of such problems applying time-varying sets of equations of motion due to the fact, that contact, events like impacts or friction reduce the number of degrees of freedom of the system as long as the contact is active, and generate additional degrees of freedom when contacts are passive and open. This works for small systems, but fails for larger ones. Introducing the complementarity idea solved this problem, but generated new numerical ones. They were avoided by an idea of Alart, Curnier (1991), replacing complementarity by a set theoretical method, the prox-functions. Including these advancements into multibody system theory made successful treatment of large dynamical systems possible.

The lecture will focus on evolution of the theoretical fundament and on typical industry applications, typical also for the author's academic life during the last decades.

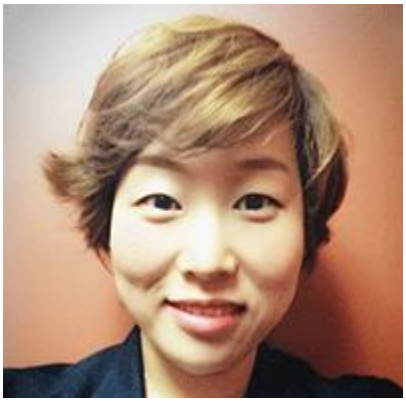
VIB Keynote: Eleni Chatzi, Ph.D. Associate Professor and Chair of Structural Mechanics and Monitoring, Department of Civil, Environmental and Geomatic Engineering of ETH Zürich: **Monday, August 17 at 1:00PM EDT**

Keynote Title: On the Fusion of Data and Models: The Hybrid Path to Diagnosis and Prognosis of Monitored Systems

Abstract: The monitoring of the condition of engineered systems operating under diverse dynamic loads involves the tasks of simulation (forward engineering), identification (inverse engineering) and maintenance/control actions. The efficient and successful implementation of these tasks is however non-trivial, due to the ever-changing nature of these systems, the variability in their interactive environments, and the polymorphic uncertainties involved. Structural Health Monitoring (SHM) attempts to tackle these challenges by exploiting information stemming from sensor networks.

SHM comprises a hierarchy across levels of increasing complexity aiming to i) detect damage, ii) localize and iii) quantify damage, and iv) finally offer a prognosis over the system's residual life. When considering higher levels in this hierarchy, including damage assessment and even performance prognosis, purely data-driven methods are

found to be lacking. For higher-level SHM tasks, or for furnishing a virtualization of a monitored system, it is necessary to integrate the knowledge stemming from physics-based representations, relying on the underlying mechanics and dynamics principles. This talk discusses implementation of such a hybrid approach to SHM for tackling the aforementioned challenges with examples across diverse systems including civil structures and transport infrastructure, as well as wind turbine facilities.



VIB Keynote (C.D. Mote Jr. Early Career Award): Hanna Cho, Ph.D.
Associate Professor, Department of Mechanical and Aerospace Engineering, The Ohio State University: **Thursday, August 19 at 10:00AM EDT**

Keynote Title: Constructive Utilization of Nonlinear Dynamics in Micro-scale Systems

Abstract: During the last decades, we have witnessed that various micro systems revolutionized fundamental and applied science. Due to their small size and low damping, these devices often exhibit significant nonlinearity and thus the operational range of these impressive applications shrinks. Therefore, understanding the mechanisms leading to nonlinearity in such systems will not only eliminate obstacles to their further development but also significantly enhance their performance. Motivated by the need to advance current capabilities of various micro-systems, my research has been focused on the implementation of intentional nonlinearity in the design of micro resonators to exploit various nonlinear phenomena, not attainable in linear settings, such as broadband resonances, dynamic instabilities, nonlinear hysteresis, and passive targeted energy transfers. We developed a comprehensive analytical, numerical, and experimental methodology to consider structural nonlinearity as a main design factor enabling to tailor mechanical resonances and achieve targeted performance. Our more recent works focus on exploiting nonlinearity and multimodality simultaneously by internally coupling two or more modes through the mechanism of internal resonance. This talk will introduce various types of nonlinearity realized in micro-systems and discuss their unique behavioral features that can be exploited in the field of MEMS and AFM.

Special Sessions and Panels

https://event.asme.org/IDETC-CIE/Program/Keynotes-Special-Sessions

DFMLC Panel - Kos-Ishii Award Winners: Tuesday, August 17 at 11:10AM EDT

Please join us for an interactive DFMLC panel discussion with several past Kos-Ishii Award Winners. In this discussion, we will reflect on the contributions made by the DFMLC research community to advancing design and manufacturing over the past decade as well as envisioning the future role of the DFMLC community over the coming decade and its relationship with other ASME and external communities.

DTM Retrospective (Linda Schmidt): Tuesday, August 17 at 1:00PM EDT

Please join us in a scholarly celebration of the contributions of our colleague and friend, Dr. Linda Schmidt. In this session, contributors will present reflections on her work, ranging from recasting the past work in current context to situating how their own work has been impacted by hers. These brief presentations will serve as a backdrop for general discussion and reflection on her scholarly work.

SEC-sess (MR): Tuesday, August 17 at 2:10PM EDT

- **Kathleen Fitzsimons:** Assistant Professor of Mechanical Engineering, Pennsylvania State University
- **Kuan-Lun Hsu:** Assistant Professor of Mechanical Engineering, National Taiwan University
- **Monroe Kennedy III:** Assistant Professor, Stanford University
- **Carlotta Mummolo:** Assistant Professor, Department of Biomedical Engineering, New Jersey Institute of Technology
- **Jungwon Seo:** Assistant Professor of Mechanical and Aerospace/Electronic and Computer Engineering, The Hong Kong University of Science and Technology
- **Yu She:** Adjunct Assistant Professor, Purdue University, and a postdoctoral researcher at MIT Computer Science & Artificial Intelligence Laboratory. Assistant Professor, Purdue University School of Industry Engineering Fall 2021
- **Cynthia Sung:** Gabel Family Term Assistant Professor, Department of Mechanical Engineering and Applied Mechanics and a member of the General Robotics, Automation, Sensing & Perception Lab, University of Pennsylvania
- **Vishesh Vikas:** Assistant Professor, Department of Mechanical Engineering, University of Alabama, Tuscaloosa and Director of the Agile Robotics Lab, University of Alabama
- **Yujiang (Mike) Xiang:** Assistant Professor, Mechanical and Aerospace Engineering Department, Oklahoma State University

DEC Mentorship Program: Tuesday, August 17 at 1:00PM EDT

CIE-CAPPD Panel: Generative Design: Succeed or Fail in Product Development? Wednesday, August 18 at 1:00PM EDT

- **Dr. Charlie C.L. Wang**, Professor, The University of Manchester
- **Dr. Timothy W. Simpson**, Professor, The Pennsylvania State University
- **Mr. Blake Courter**, CTO, nTopology
- **Dr. Hyunmin Cheong**, Principal Research Scientist, Autodesk Research

DAC Signature Event - The Future of Human-AI Collaboration for Engineering Design: Wednesday, August 18 at 3:20PM EDT

- **Sandeep Neema:** Program Manager, Information Innovation Office, Defense Advanced Research Projects Agency
- **Conrad Tucker:** Professor, Department of Mechanical Engineering, Carnegie Mellon University
- **A. Emrah Bayrak:** Assistant Professor, School of Systems and Enterprises, Stevens Institute of Technology
- **Alison Olechowski:** Assistant Professor, Department of Mechanical & Industrial Engineering, University of Toronto
- **Daniel Selva**: Assistant Professor, Department of Aerospace Engineering, Texas A&M University

NSF/ASME Student Design Essay Competition: Thursday, August 19 at 10:00AM EDT

- GRADUATE STUDENT CATEGORY:
  - **Matthew Baby:** Decision Support for Design of Smart and Connected Products, Processes and Systems of the Future
  - **Bhavika Jain and Vatsal Shah:** A Turnkey Solution to Unlock the Power Future of Manufacturing
  - **Sachin Lokesh:** Challenges in the Design of Complex Systems
- UNDERGRADUATE STUDENT CATEGORY:
  - **Jacob Starks:** Energy Industry Success for the Future — Investment in People and Their Ideas

DTM Awardee Panel: Thursday, August 19 at 11:10AM EDT

Digitalizing the Engineering Organization: The Next Steps: Thursday, August 19 at 11:10AM EDT

- **Marc Halpern- Gartner:** (Overview/General)
- **Michael Grieves**: FIT (Background/Digital Twin)
- **Raju S. Mattikalli**: Boeing (Aerospace)
- **David Cheng:** (Oil and Gas)
- **Yan Fu:** (Automotive)

Student Mechanisms & Robot Design Competition: Thursday, August 19 at 1:00PM EDT

- After the initial presentations, join for an interactive poster session segment: https://spatial.chat/s/ASME-SMRDC2021

NSF EDSE: Forging New Directions in Design Research: Thursday, August 19 at 3:20PM EDT

Join NSF Program Director, Dr. Kathryn Jablokow, to learn how the Engineering Design and Systems Engineering (EDSE) program is forging new, forward-looking directions for design research focused on responding to key societal needs and expanding the impact of emerging technologies. Practical strategies for submitting successful EDSE proposals will also be offered, along with time for Q&A. Come prepared to challenge your thinking, as we reflect on lessons learned over the past 18 months and how design research might play a role in expanding our vision of the "new *future* normal". To help facilitate discussion and to better tailor the contents of the webinar to registrants, please fill out this brief survey by Tuesday, August 17th 2021: https://forms.gle/E6f6EuMDcapbwXjU7

Journal Sessions

(JCISE) *Journal of Computing and Information Science in Engineering*:
Tuesday, August 17 at 11:10AM EDT

- **Charlie C.L. Wang**: Memory-Efficient Modeling and Slicing of Large-Scale Adaptive Lattice Structures
- **Eun Suk Suh**: Simulation-based Hybrid Optimization Method for the Digital Twin of Garment Production Lines
- **Anurag Purwar**: An Image-based Approach to Variational Path Synthesis of Linkages
- **Xiaoping Du**: Physics-Based Gaussian Process Method for Predicting Average Product Lifetime in Design Stage

(JMD) *Journal of Mechanical Design*:
Tuesday, August 17 at 1:00PM EDT

- **Haijun Su:** A Comparative Study on the Effect of Mechanical Compliance for a Safe Physical Human–Robot Interaction
- **Zhimin Xi:** Calibration and Validation Framework for Selective Laser Melting Process Based on Multi-Fidelity Models and Limited Experiment Data
- **Daniel A. McAdams:** Research Opportunities and Challenges in Engineering System Evolution
- **Nicholas Meisel:** Evaluating the Use of Virtual Reality to Teach Introductory Concepts of Additive Manufacturing
- **Zoe Szajnfarber:** Revisiting Flexibility in Design: An Analysis of the Impact of Implementation Uncertainty on the Value of Real Options
- **Bradley Camburn:** Machine Learning-Based Design Concept Evaluation

(JVA) *Journal of Vibration and Acoustics*:

Wednesday, August 18 at 11:10AM EDT

- **Zhenkun Lin:** Elastic Metasurfaces for Full Wavefront Control and Low-Frequency Energy Harvesting
- **Ke Yuan:** Modeling of Welded Joints in a Pyramidal Truss Sandwich Panel Using Beam and Shell Finite Elements
- **Joseph Cusumano:** An Energy Closure Criterion for Model Reduction of a Kicked Euler-Bernoulli Beam
- **Brian Feeny:** The Effects of Gravity on the Response of Centrifugal Pendulum Vibration Absorbers
- **Amr Baz:** Brake Squeal: A Control Strategy Using Shunted Piezoelectric Pads

(JMR) *Journal of Mechanisms and Robotics*:

Wednesday, August 18 at 1:00PM EDT

- **Enrico Ferrentino:** On the Optimal Resolution of Inverse Kinematics for Redundant Manipulators Using a Topological Analysis
- **Hossein Habibi:** A Lumped-Mass Model for Large Deformation Continuum Surfaces Actuated by Continuum Robotic Arms
- **Yu She:** Design and Modeling of a Continuously Tunable Stiffness Arm for Safe Physical Human–Robot Interaction
- **Clément Gosselin:** Forward Kinematic Analysis of Kinematically Redundant Hybrid Parallel Robots
- **Tuhin Das:** Bio-Inspired Locomotion of Circular Robots With Diametrically Translating Legs
- **Rongjie Kang:** A Mechanically Intelligent Crawling Robot Driven by Shape Memory Alloy and Compliant Bistable Mechanism
- **Stéphane Caro:** Wrench-Feasible Workspace of Mobile Cable-Driven Parallel Robots

(JAVS) *Journal of Computational and Nonlinear Dynamics*:

Thursday August 19 at 11:10AM EDT

- **Asher Elmquist & Dan Negrut**: A Sensor Simulation Framework for Training and Testing Robots and Autonomous Vehicles
- **Ivan Cvok:** Analytical and Experimental Evaluation of Various Active Suspension Alternatives for Superior Ride Comfort and Utilization of Autonomous Vehicles
- **Edward Schwalb:** Analysis of Hazards for Autonomous Driving
- **Samantha Hoang:** Effects of High Fidelity Modeling of Multirotor Drones

(JCND) *Journal of Computational and Nonlinear Dynamics*:

Thursday August 19 at 1:00PM EDT

- **Edward J. Haug:** Multibody Dynamics on Differentiable Manifolds
- **Brian Tinsley:** Convergence Characteristics of Geometrically Accurate Spatial Finite Elements
- **Harry Dankowicz:** Multidimensional Manifold Continuation for Adaptive Boundary-Value Problems
- **Jozsef Kovecses:** Co-Simulation of Multibody Systems With Contact Using Reduced Interface Models
- **Tian Mi:** Vehicle Shimmy Modeling With Pacejka's Magic Formula and the Delayed Tire Model
- **Mohammad Bukhari:** Exact Nonlinear Dynamic Analysis of a Beam With a Nonlinear Vibration Absorber and With Various Boundary Conditions
- **Jan Kraft:** Co-Simulation: Error Estimation and Macro-Step Size Control

Workshops

IDETC-CIE WORKSHOPS (Monday, August 16, 1:00PM–5:00PM EDT)

https://event.asme.org/IDETC-CIE-2021/Program/Workshops-Tutorials

The following six workshops will be offered concurrently the day before the official conference kickoff. These workshops are included with your conference registration.

Workshop 1: Planar Linkage Synthesis Using Pole and Rotation Angle Constraints

Presenter: Ron Zimmerman, Product Engineering Specialist, Magna Seating

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 new tool 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 over-constrained. 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 four bar linkages for rigid body guidance, point path, function generation and any combination of these tasks.

Workshop 2: Establishing a Digital Presence

Presenters: Nicole Damen, University of Nebraska at Omaha and Murtuza Shergadwala, Purdue University

The goal of the workshop on Digital Presence is to provide a professional development experience and opportunity for community and networking within the Design Engineering Division (DED) of ASME that supports and mentors underrepresented groups. The workshop is designed to provide graduate students and faculty members with professional development activities and to give them the opportunity to make connections with an international network of supportive researchers in their field. This workshop will be the twelfth annual workshop event of the Broadening Participation Committee of the ASME DED.

The focus of this three to four hour workshop is to help attendees establish or improve their digital presence. Digital presence refers to how people appear online and includes content that can be personally controlled, such as social media profiles and personal websites, and content that is not personally controlled, such as online reviews. Attendees will learn how to improve their discoverability online and how to set up and tailor their online profiles to better showcase their personality, research interests, publications, and other achievements. Special attention will be given to LinkedIn, Google Scholar, and ORCID profiles, but the information provided can also apply to other social media and personally managed websites for professional purposes.

Workshop 3: Engineering Optimization and Sustainability: Theory and Practice

Presenter: Professor Nand K. Jha, Mechanical Engineering Department, Manhattan College

The workshop is intended for those interested in applications of sustainability and optimization of engineering products and processes. The theory and practice of sustainability indicators are interlinked to optimization principles. The challenges of sustainable engineering are multidisciplinary in nature and no simple engineering discipline is capable of dealing with. Therefore, the topics are presented with examples from all fields of engineering including, Mechanical, Electrical, Civil, and Chemical.

It is hoped these examples with theory and practice will encourage inclusion of sustainability principles along with optimization in all fields of engineering. The topics presented also include the environment, sustainability, and engineering interlinkage for sustainable development of the human society (may be all on the planet earth). While doing some research work on these topics, it appeared to me that solutions of some of the challenges are not only multidisciplinary but transdisciplinary and show how much we need to integrate sustainability and optimization for engineering products and processes.

Workshop 4: Innovating Mechanical Motion Generating Devices using MotionGen Pro

Presenter: Anurag Purwar, PhD, Department of Mechanical Engineering, Stony Brook University

This workshop will demonstrate a state-of-the-art web-based app called MotionGen Pro for designing and simulating planar for virtual prototyping of the robot motions and structures. This app is an outcome of several years of NSF funded research in bringing together rigid body kinematics and machine learning. The app is being used in Freshman Design Innovation, undergraduate and graduate Kinematics class at Stony Brook University and at several other colleges and universities.

Workshop Outline

- Motivation and Background
- Introduction to MotionGen Pro
- Design and Simulate Planar Linkages: Demo
- Participant Exercise 1: Design a “mecha-vtar”
- Participant Exercise 2: Design a Straight-Line Mechanism
- Participant Exercise 3: Design a Walking Robot Mechanism
- Participant Exercise 4: Design an Elliptical Machine

Workshop 5: Topology Optimization with Geometric Components

Presenter: Julian Norato, Department of Mechanical Engineering, University of Connecticut

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

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

Workshop 6: Automatic Shape Retrieval and Geometric Modeling of Design for Additive Manufacturing

Presenter: Xinyi Xiao, Mechanical and Manufacturing Engineering Department, Miami University

The workshop introduces participants to how to retrieve 3D models accurately automatically without human perception and presents algorithms for designing the feature-based models for additive manufacturing (AM). We present the rationale of precisely search and retrieve 3D models in the current manufacturing industry, the importance of converting the current design of AM model formats to the feature-based models, and the solutions for both. Participants receive handouts describing reasoning, techniques for searching and designing new techniques.

The workshop proceeds in three sessions:

- The present significance of retrieval and design automation
- Demonstrating the algorithms/techniques
- Providing the demo of automatic retrieval and design tools for practice

The search and retrieval technique transforms the 3D objects to a 1D representation and generates significant signatures of individuals to enable a search function. The signatures do not require manual ad-justification, registration, and partial/full search of the targeted model. The success search will return a match index for sequentially sequencing the returned objects. The design for AM for light-weighting the geometry is typically STL format that is not editable. The models contain only triangle information, without the surface, plane, or feature information. Thus, the direct fabrication of these models cannot assure the print qualities in terms of shape, GD&T, and mechanical properties. The transform from the design for AM models to the parametric feature-based models is urgently needed. The workshop will provide the automatic modeling method for converting such models into parametric formats.

Technical Presentations

TUESDAY, AUGUST 17

MR-01-03 Mechanisms Synthesis & Analysis
8/17/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Anurag Purwar - SUNY Stony Brook***
Chair: ***Shoufei Wang - Shanghai Jiao Tong University***

Conceptual Configuration Synthesis of Line-Foldable Deployable Space Truss Structures Utilizing Graph Theory and Entropy
Technical Paper Publication: IDETC2021-68528
Shoufei Wang - Shanghai Jiao Tong University
Yong Zhao - Shanghai Jiao Tong University

Synthesis of Defect-Free Peaucellier Mechanism and Potential Implications for Energy Harvesting
Technical Paper Publication: IDETC2021-69279
Ali Almandeel - College of Technological Studies
Abdulaziz Aladwani - College of Technological Studies
Hessein Ali - University of Central Florida

Kinematic Design of Deployable Structures With Low Actuation Requirements Based on Pop-Up Folding
Technical Paper Publication: IDETC2021-70026
Eduardo Montano - University of California, Irvine
Edwin Peraza Hernandez - University of California, Irvine

Informed Latent Space Exploration for Image-Based Path Synthesis of Linkages
Technical Paper Publication: IDETC2021-71629
Anurag Purwar - Stony Brook University
Shrinath Deshpande - Stony Brook University
Zhijie Lyu - Stony Brook University

MSNDC-02-01 Flexible Multibody Dynamics
8/17/2021
10:00AM–10:50AM

Chair: ***Johannes Gerstmayr - Leopold-Franzens-Universität Innsbruck***
Chair: ***Antonio Recuero - Idaho National Lab***
Chair: ***Andreas Zwölfer - Technical University of Munich***

Absolute Nodal Coordinate Formulations for Aeroelastic Analysis of Next-Generation Aircraft Wings
Technical Paper Publication: IDETC2021-68162
Keisuke Otsuka - Tohoku University
Shuonan Dong - Tohoku University
Kanjuro Makihara - Tohoku University

Investigation of the Stability of Axially Moving Beams With Discrete Masses
Technical Paper Publication: IDETC2021-70302
Konstantina Ntarladima – University of Innsbruck
Michael Pieber - University of Innsbruck
Johannes Gerstmayr - University of Innsbruck

Dynamic Simulation of Reeving Systems With the Extension of the Modal Approach in the Axial Direction
Technical Paper Publication: IDETC2021-71078
Narges Mohammadi - University of Seville
José Luis Escalona - University of Seville

Modelling and Parameter Identification for a Flexible Rotor With_x000B_Periodic Impacts
Technical Paper Publication: IDETC2021-71417
Stefan Holzinger - University of Innsbruck
Manuel Schieferle - University of Innsbruck
Johannes Gerstmayr - University of Innsbruck
Manfred Hofer - STIHL Tirol GmbH
Christoph Gutmann - STIHL Tirol GmbH

Multibody Models for Tower Vibrations With an Unbalanced Rotor
Technical Paper Publication: IDETC2021-72182
Simon S. Pedersen - Aarhus University
Niclas B. Madsen - Aarhus University
José L. Escalona - Aarhus University
Ole Balling - Aarhus University

MESA-13-01 Micro-/Nano-Manipulation Technologies and Applications
8/17/2021
10:00AM–10:50AM

Chair: ***Peng Yan - Shandong University***
Chair: ***Zhen Zhang - Tsinghua University***
Chair: ***Chris Pretty - University of Canterbury***

Enhanced Multiple Surface Properties of Biometallic Materials by Laser Microprocessing
Technical Paper Publication: IDETC2021-67510
Bing Wang - Beijing University of Technology
Jiaru Zhang - Beijing University of Technology
Yingchun Guan - Beihang University

Design, Modeling, and Optimization of a Novel Asymmetrical Piezoelectrically Actuated Microgripper
Technical Paper Publication: IDETC2021-68787
Zekui Lyu - University of Macau
Qingsong Xu - University of Macau

A Larger Range Compliant Nano-Manipulator Supporting Electron Beam Lithography
Technical Paper Publication: IDETC2021-69770
Yijie Liu - Tsinghua University
Zhen Zhang - Tsinghua University

Disturbance Observer-Based Anti-Windup Control for Nanopositioning Systems Subjected to Actuator Saturations
Technical Paper Publication: IDETC2021-71990
Pengbo Liu - Qilu University of Technology
Huan Li - Qilu University of Technology
Peng Yan - Shandong University
Chuan Tian - AVICAS Generic Technology Center

Growth Behavior of SHSY5Y Cells on Hybrid Micro-Pit and Nano-Pillar Arrays
Technical Presentation: IDETC2021-73247
Xiaomin Wu - Changchun University of Science and Technology
Li Li - Changchun University of Science and Technology
Ri Liu - Changchun University of Science and Technology
Zuobin Wang - Changchun University of Science and Technology

MR-04-01 Origami-Based Engineering Design
8/17/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Suyi Li - Clemson University***
Chair: ***Evgueni Filipov - University of Michigan***

A Numerical and Experimental Study on the Energy Absorption Characteristics of Deployable Origami Tubes
Technical Paper Publication: IDETC2021-66723
Zhongyuan Wo - University of Michigan
Julia M. Raneses - University of Michigan
Evgueni T. Filipov - University of Michigan

Theoretical Study of Sound Insulation Simulations: About Attaching Effect of Sound Absorbing Material and Consideration of Sound Insulation Performance by Height of Origami Core
Technical Paper Publication: IDETC2021-68851
Aya Abe - Meiji University
Haruki Yashiro - Meiji University
Ichiro Hagiwara - Meiji University

Energy Absorption Characteristics of Passenger Car With Origami Structure
Technical Paper Publication: IDETC2021-69870
Yang Yang - Meiji University
Xilu Zhao - Saitama Institute of Technology
Ichiro Hagiwara - Meiji University

Earthworm-Like Planar Locomotion Robot Based on Yoshimura-Origami Structure
Technical Paper Publication: IDETC2021-71868
Qiwei Zhang - Tongji University
Jian Xu - Tongji University
Hongbin Fang - Institute of AI and Robotics

CIE-03-01 Artificial Intelligence and Machine Learning in Design and Manufacturing
8/17/2021
10:00AM–10:50AM

Chair: ***Douglas Van Bossuyt - Naval Postgraduate School***
Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Yan Lu - National Institute of Standards and Technology***

A Machine Learning Framework for Alleviating Bottlenecks of Projection-Based Reduced Order Models
Technical Presentation: IDETC2021-74009
Konstantinos Vlachas - ETH Zurich
Thomas Simpson - ETH Zurich
Carianne Martinez - Sandia National Laboratories
Adam R. Brink - Sandia National Laboratories
Eleni Chatzi - ETH Zurich

Sketch-Based Mechanism Simulation Using Machine Learning
Technical Paper Publication: IDETC2021-72149
Anar Nurizada - Stony Brook University
Anurag Purwar - Stony Brook University

Deep Learning-Based Surrogate Modeling via Physics-Informed Artificial Image (PIAI) for Strongly Coupled Multidisciplinary Engineering Systems
Technical Paper Publication: IDETC2021-72099
Sungkun Hwang - Georgia Institute of Technology
Seung-Kyum Choi - Georgia Institute of Technology

Design Form and Function Prediction From a Single Image
Technical Paper Publication: IDETC2021-71853
Kristen M. Edwards - Massachusetts Institute of Technology
Vaishnavi L. Addala - Massachusetts Institute of Technology
Faez Ahmed - Massachusetts Institute of Technology

Hybrid Modeling of Melt Pool Geometry in Additive Manufacturing Using Neural Networks
Technical Paper Publication: IDETC2021-71266
Kevontrez Jones - Northwestern University
Zhuo Yang - University of Massachusetts
Ho Yeung - National Institute of Standards and Technology
Paul Witherell - National Institute of Standards and Technology
Yan Lu - National Institute of Standards and Technology

DAC-03-01 Novel AI or ML Frameworks for Design or Systems Science
8/17/2021
10:00AM–10:50AM

Chair: ***Souma Chowdhury - University at Buffalo***
Chair: ***Daniel Selva - Texas A&M University***

Automating Design Requirement Extraction From Text With Deep Learning
Technical Paper Publication: IDETC2021-66898
Haluk Akay - Massachusetts Institute of Technology
Maria Yang - Massachusetts Institute of Technology
Sang-Gook Kim - Massachusetts Institute of Technology

Deep Reinforcement Learning Enhanced Convolutional Neural Networks for Robotic Grasping
Technical Paper Publication: IDETC2021-67225
Jianhao Fang - Zhejiang University
Weifei Hu - Zhejiang University
Chuxuan Wang - Zhejiang University
Zhenyu Liu - Zhejiang University
Jianrong Tan - Zhejiang University

SuperMeshing: A Deep Learning Method for Boosting Mesh Density in Numerical Computation Within 2D Domain
Technical Paper Publication: IDETC2021-68112
Handing Xu - Tsinghua University
Zhenguo Nie - Tsinghua University
Qingfeng Xu - University of Melbourne
Xinjun Liu - Tsinghua University

Range-GAN: Range-Constrained Generative Adversarial Network for Conditioned Design Synthesis
Technical Paper Publication: IDETC2021-69963
Amin Heyrani Nobari - Massachusetts Institute of Technology
Wei Chen - Siemens Technology
Faez Ahmed - Massachusetts Institute of Technology

Gradient-Enhanced Multifidelity Neural Networks for High-Dimensional Function Approximation
Technical Paper Publication: IDETC2021-70502
Jethro Nagawkar - Iowa State University
Leifur Leifsson - Iowa State University

CIE-22-01 CAPPD: Product and Process Design Automation for Industry 4.0
8/17/2021
10:00AM–10:50AM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Marco Rossoni - Università degli Studi di Bergamo***
Chair: ***Lorenzo Failla - Baker Hughes***

Computational Design and 3D Weaving of 2D-Printable Conformal Flexible Electronics Using Harmonic Foliation Theory
Technical Paper Publication: IDETC2021-67811
Qian Ye - State University of New York at Stony Brook
Yang Guo - State University of New York at Stony Brook
Xianfeng David Gu - State University of New York at Stony Brook
Shikui Chen - State University of New York at Stony Brook

Functionally Graded Non-Periodic Cellular Structure Design Using a Surrogate Model-Based Optimization Scheme
Technical Paper Publication: IDETC2021-71678
Jun Wang - University of Maryland
Jida Huang - University of Illinois at Chicago

Finding Features of Positioning Error for Large Industrial Robots Based on Convolutional Neural Network
Technical Paper Publication: IDETC2021-68237
Daiki Kato - Doshisha University
Kenya Yoshitugu - Doshisha University
Naoki Maeda - Doshisha University
Toshiki Hirogaki - Doshisha University
Eiichi Aoyama - Doshisha University
Kenichi Takahashi - IHI Corporation

Customized Product Design Information Feedback Technology Based on Tentative Design Chain Reconstruction
Technical Paper Publication: IDETC2021-67245
Lemiao Qiu - Zhejiang University
Huifang Zhou - Zhejiang University
Zili Wang - Zhejiang University
Shuyou Zhang - Zhejiang University
Longwu Pan - Zhejiang University

VIB-01-01 Rotating Systems and Rotor Dynamics
8/17/2021
10:00AM–10:50AM

Chair: ***Meng-Hsuan Tien - National Tsing Hua University***
Chair: ***Akira Saito - Meiji University***
Chair: ***Wei-Che Tai - Michigan State University***
Chair: ***Peter Coffin - Sandia National Lab***

Impact Dynamics in Four-Segment Tilting Pad Journal Bearings Subjected to Pad Fluttering
Technical Paper Publication IDETC2021-70457
Jan Rendl - University of West Bohemia
Luboš Smolík - University of West Bohemia
Štěpán Dyk - University of West Bohemia
Michal Hajžman - University of West Bohemia

Design of Band Gap Formation in Periodic Rotors via Optimization
Technical Paper Publication: IDETC2021-70405
Patrick B. Lamas - University of Sao Paulo
Rodrigo Nicoletti - University of Sao Paulo

Operational Modal Analysis of a Rotating Structure Subject to Random Excitation Using a Tracking Continuously Scanning Laser Doppler Vibrometer via an Improved Demodulation Method
Technical Paper Publication: IDETC2021-67674
Linfeng Lyu - University of Maryland
Weidong Zhu - University of Maryland

Application of Monte Carlo Analysis and Self-Organizing Maps to Compressor Rotordynamics
Technical Presentation: IDETC2021-67302
Greg Nelson - Frazer-Nash Consultancy

MR-08-01 Novel Mechanisms, Robots, and Applications
8/17/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Dongming Gan - Purdue University***
Chair: ***Damien Chablat - CNRS Nantes***

Delta Based Non-Anthropomorphic Hand
Technical Paper Publication: IDETC2021-67349
Rajesh Kumar - Indian Institute of Technology Delhi
Sachin Kansal - Indian Institute of Technology Delhi
Sudipto Mukherjee - Indian Institute of Technology

Actuation-Coordinated Mobile Parallel Robots With Hybrid Mobile and Manipulation Function
Technical Paper Publication: IDETC2021-70081
Dongming Gan - Purdue University
Jiaming Fu - Purdue University
Mo Rastgaar - Purdue University
Byung-Cheol Min - Purdue University
Richard Voyles - Purdue University

A New Robotic Hand Based on the Design of Fingers With Spatial Motions
Technical Paper Publication: IDETC2021-70233
Pol Hamon - Armor Meca & École Centrale de Nantes/LS2N
Damien Chablat - École Centrale de Nantes/LS2N
Franck Plestan - École Centrale de Nantes/LS2N

Kinematic Modeling of a Novel RR-RP Hybrid Serial-Parallel Mechanism With Variable Topology
Technical Paper Publication: IDETC2021-71189
Brian J. Slaboch - Milwaukee School of Engineering
Peter Holtzen - Milwaukee School of Engineering
Luis A. Rodriguez - Milwaukee School of Engineering

DTM-01 Design Methods: Linking Quality, Utility, and Customers
8/17/2021
10:00AM–10:50AM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Vimal Viswanathan - San Jose State University***
Chair: ***Ting Liao - Stevens Institute of Technology***

Improving Customer Attribute Management Within the House of Quality by Integrating the Non-User
Technical Paper Publication: IDETC2021-66868
Laura Augustin - Otto-von-Guericke-University
Andrea Wolffram - Otto-von-Guericke-University
Christiane Beyer - Otto-von-Guericke-University
Björn Kokoschko - Otto-von-Guericke-University
Peter Frilling - Otto-von-Guericke-University

Tolerancing for an Apple Pie
Technical Paper Publication: IDETC2021-67445
Joshua Roland Campbell - George Mason University
George A. Hazelrigg - George Mason University

Differential Utility: Accounting for Correlation in Performance Among Design Alternatives
Technical Paper Publication: IDETC2021-67944
Sahar Jolini - George Mason University
George A. Hazelrigg - George Mason University

Online Product Review Analysis to Automate the Extraction of Customer Requirements
Technical Paper Publication: IDETC2021-71555
Aashay Mokadam - San Jose State University
Shrikrishna Shivakumar - San Jose State University
Vimal Viswanathan - San Jose State University
Mahima Agumbe Suresh - San Jose State University

Recommended Methods Supporting Adoption of the Agile Philosophy for Hardware Development
Technical Paper Publication: IDETC2021-70621
Matthew Peterson - Clemson University
Joshua Summers - University of Texas at Dallas

DEC-01-01 Implementation, Assessment, and Research Methods Across the Curriculum
8/17/2021
11:10AM–12:30PM

Chair: ***Nicholas Meisel - Pennsylvania State University***
Chair: ***Mohammad Fazelpour - University of Maryland***

The Inspiration Design Toolkit: A Human-Centered Design Tool for a System Engineering Course
Technical Paper Publication: IDETC2021-66577
Sheng-Hung Lee - Massachusetts Institute of Technology
Maria C. Yang - Massachusetts Institute of Technology
Beatriz Carramolino - Massachusetts Institute of Technology
John Rudnik - Massachusetts Institute of Technology

Exploring Empathy in Student Design Teams
Technical Paper Publication: IDETC2021-67912
Meredith Apfelbaum - Oregon State University
Kendra Sharp - Oregon State University
Andy Dong - Oregon State University

The Missing Link Between Project and Prototype: Teaching Student Designers to Navigate the Prototyping Process
Technical Paper Publication: IDETC2021-68114
Camilla Arndt Hansen - Technical University of Denmark
Tobias Eifler - Technical University of Denmark
Michael Deininger - Technical University of Denmark

Break It Down: Comparing the Effects of Lecture- and Module-Style Design for Additive Manufacturing Educational Interventions on Students' Learning and Creativity
Technical Paper Publication: IDETC2021-71702
Rohan Prabhu - Pennsylvania State University
Timothy W. Simpson - Pennsylvania State University
Scarlett R. Miller - Pennsylvania State University
Nicholas A. Meisel - Pennsylvania State University

Examining Goal Congruence on Engineering Design and Innovation Student Teams
Technical Paper Publication: IDETC2021-71780
Sara Beckman - University of California, Berkeley
Alan Jian - University of California, Berkeley
Ahan Sabharwal - University of California, Berkeley
Kosa Goucher-Lambert - University of California, Berkeley

MSNDC-12-01 Lie Group Methods
8/17/2021
11:10AM–12:30PM

Chair: ***Johannes Gerstmayr - Leopold-Franzens-Universität Innsbruck***
Chair: ***Andreas Muller - Johannes Kepler University, Institute for Robotics***

Singularity-Free Lie Group Integration of Multibody System Models Described in Absolute Coordinates
Technical Paper Publication: IDETC2021-68186
Andreas Müller - Johannes Kepler University

Dwelling on the Connection Between SO(3) and Rotation Matrices in Rigid Multibody Dynamics: Part 1 — Description of an Index-3 DAE Solution Approach
Technical Paper Publication: IDETC2021-72057
Jay Taves - University of Wisconsin-Madison
Alexandra Kissel - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

Dwelling on the Connection Between SO(3) and Rotation Matrices in Rigid Multibody Dynamics: Part 2 — Comparison Against Formulations Using Euler Parameters or Euler Angles
Technical Paper Publication: IDETC2021-72076
Jay Taves - University of Wisconsin-Madison
Alexandra Kissel - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

Finite Element Modeling of Geometrically Exact Shell With Large Deformation and Rotation
Technical Paper Publication: IDETC2021-68429
Jielong Wang - Flexible Dynamics

Evaluation of Numerical Approaches on Flexible Body Motion With Time-Varying Length and Moving Boundary
Technical Presentation: IDETC2021-74754
Riko Ogawara - Sophia University
Yoshiaki Terumichi - Sophia University

MESA-01-01 Artificial Intelligence and Emerging Technologies for Mechatronics and Embedded Systems
8/17/2021
11:10AM–12:30PM

Chair: ***Po Ting Lin - National Taiwan University of Science and Technology***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***Ching-Yuan Chang - National Taiwan University of Science and Technology***

A Contactless Classification Method for Early Detection of Nematodes Using Deep Neural Networks (DNNs) and TensorFlow
Technical Paper Publication: IDETC2021-68557
Haoyu Niu - University of California, Merced
Andreas Westphal - Kearney Agricultural Research and Extension Center
Yangquan Chen - University of California, Merced

A Feature Encoding Approach and a Cloud Computing Architecture to Map Fishing Activities
Technical Paper Publication: IDETC2021-69799
A. Galdelli - Università Politecnica delle Marche
A. Mancini - Università Politecnica delle Marche
E. Frontoni - Università Politecnica delle Marche
A.N. Tassetti - Institute of Marine Biological Resources and Biotechnologies National Research Council

Digital Twin Technology for Modeling, Simulation and Control of a Mechatronic System
Technical Paper Publication: IDETC2021-68558
Mauricio Rafael Calderon Carrion - Universita degli Studi di Brescia
Jairo Viola - University of California
YangQuan Chen - University of California
Antonio Visioli - Universita degli Studi di Brescia

An Radio Frequency Impedance Matching Control Benchmark System for Advanced Control Strategies Evaluation
Technical Paper Publication: IDETC2021-70211
Carlos A. Rodríguez - Centro de Investigación Científica y de Educación Superior de Ensenada
Jairo Viola - University of California, Merced
YangQuan Chen - University of California, Merced

Edge Artificial Intelligence: A Multi-Camera Video Surveillance Application
Technical Paper Publication: IDETC2021-70738
Daniele Berardini - Università Politecnica delle Marche
Adriano Mancini - Università Politecnica delle Marche
Primo Zingaretti - Università Politecnica delle Marche
Sara Moccia - The BioRobotics Institute

Digital Twin Behavior Matching of Gas Plumes Using a Fixed Sensor Mesh and Dynamic Mode Decomposition
Technical Paper Publication: IDETC2021-70708
Derek Hollenbeck - University of California
YangQuan Chen - University of California

MSNDC-04-01 Nonlinear Dynamics of Structures
8/17/2021
11:10AM–12:30PM

Chair: ***Stefano Lenci - Polytechnic University of Marche***
Chair: ***Sachin Goyal - University of California***
Chair: ***Ajeet Kumar - Indian Institute of Technology, Delhi***

Boosting the Model Discovery of Hybrid Dynamical Systems in an Informed Sparse Regression Approach
Technical Paper Publication: IDETC2021-66831
Nico Novelli - Polytechnic University of Marche
Stefano Lenci - Polytechnic University of Marche
Pierpaolo Belardinelli - Polytechnic University of Marche

Post-Buckling Stability of a Cantilever Beam With Cubic Non-Linearity in Constitutive Laws
Technical Presentation: IDETC2021-71740
Soheil Fatehiboroujeni - Cornell University
Derek Hollenbeck - University of California, Merced
Anupam Mishra - University of California, Merced
Sachin Goyal - University of California, Merced

Slender Body Theory for Special Cosserat Rods
Technical Presentation: IDETC2021-73908
Mohit Garg - Indian Institute of Technology Delhi
Ajeet Kumar - Indian Institute of Technology Delhi

Harmonic Scattering of Elastic Wave From Nonlinear Contact Interfaces Separated by a Linear Material
Technical Presentation: IDETC2021-74766
Pravinkumar Ghodake - Indian Institute of Technology Bombay

Modeling Deformation of Unimorph Shape Memory Alloy Actuators Using Cosserat Theory
Technical Presentation: IDETC2021-69607
Scott Kennedy - North Carolina State University
Nicholas Vlajic - Pennsylvania State University
Edmon Perkins - North Carolina State University

Nonlinear Viscometer Based on a Cantilever Self-Excited in Rayleigh-Type Oscillation
Student Poster Presentation: IDETC2021-74420
Keyu Zhou - University of Tsukuba
Hiroshi Yabuno - University of Tsukuba

Linear Analysis of Self-Excited Oscillation in Cantilever Produced by Phase Shift
Student Poster Presentation: IDETC2021-74582
Linjun An - University of Tsukuba
Hiroshi Yabuno - University of Tsukuba

DAC-18-01 Design Under Uncertainty
8/17/2021
11:10AM–12:30PM

Chair: ***Zhen Hu - University of Michigan***
Chair: ***Xiaoping Du - Indiana University***

Reliability-Based Mission Planning of Off-Road Autonomous Ground Vehicles Using an Outcrossing Approach
Technical Paper Publication: IDETC2021-67887
Chen Jiang - University of Michigan-Dearborn
Yixuan Liu - University of Michigan-Dearborn
Zhen Hu - University of Michigan
Zissimos P. Mourelatos - Oakland University
David Gorsich - U.S. Army Combat Capabilities Development Command Ground Vehicle Systems Center
Yan Fu - Ford Motor Company

Sequentially Utility Maximizing Path Planning Using a Distributed Pool Architecture
Technical Paper Publication: IDETC2021-67946
Calahan Mollan - Oakland University
Vijitashwa Pandey - Oakland University
Christopher Slon - Oakland University
David Gorsich - U.S. Army GVSC

A Bayesian Approach to Recovering Missing Component Dependence for System Reliability Prediction via Synergy Between Physics and Data
Technical Paper Publication: IDETC2021-67958
Huiru Li - Indiana University–Purdue University Indianapolis
Xiaoping Du - Indiana University–Purdue University Indianapolis

Global Sensitivity Analysis for Field Response Based on the Manifold of Feature Covariance Matrix
Technical Paper Publication: IDETC2021-69086
Zhouzhou Song - Shanghai Jiao Tong University
Zhao Liu - Shanghai Jiao Tong University
Can Xu - Shanghai Jiao Tong University
Ping Zhu - Shanghai Jiao Tong University

Design of Path Tracking Controller for Autonomous Vehicles Through Bias Learning of Vehicle Dynamic Models Under Environmental Uncertainty
Technical Paper Publication: IDETC2021-69284
Lichuan Ren - Rutgers University - New Brunswick
Zhimin Xi - Rutgers University - New Brunswick

High-Dimensional Reliability Method Accounting for Important and Unimportant Input Variables
Technical Paper Publication: IDETC2021-70067
Jianhua Yin - Indiana University–Purdue University Indianapolis
Xiaoping Du - Purdue University

Uncertainty Quantification and Reduction Using Sensitivity Analysis and Hessian Derivatives
Technical Paper Publication: IDETC2021-71037
Josefina Sánchez - Aalto University
Kevin Otto - Aalto University

VIB-02-01 Nonlinear Systems and Phenomena
8/17/2021
11:10AM–12:30PM

Chair: ***Biagio Carboni - Sapienza University of Rome***
Chair: ***Peter Coffin - Sandia National Laboratories***
Chair: ***Ashu Sharma - Auburn University***

Vibration Suppression of a Harmonically Forced Oscillator via a Parametrically Excited Centrifugal Pendulum
Technical Paper Publication: IDETC2021-71431
Aakash Gupta - Michigan State University
Wei-Che Tai - Michigan State University

Model Order Reduction for a Piecewise Linear System Based on Dynamic Mode Decomposition
Technical Paper Publication: IDETC2021-70764
Akira Saito - Meiji University

Analytical Study of Dry Whip Phenomena During Rotor-Stator Rub
Technical Paper Publication: IDETC2021-70228
Aman K. Srivastava - Indian Institute of Technology Patna
Anurag Kumar - Indian Institute of Technology Patna
Mayank Tiwari - Indian Institute of Technology Patna
Akhilendra Singh - Indian Institute of Technology Patna

Non-Synchronous Vibration and Lock-in Regimes in Coupled Structures Using Reduced Models
Technical Paper Publication: IDETC2021-66815
Miroslav Byrtus - University of West Bohemia
Štěpán Dyk - University of West Bohemia
Michal Hajžman - University of West Bohemia

The Effect of Store-to-Store Energy Transfers on the Global Dynamics of Aircraft
Technical Presentation: IDETC2021-74498
Guilherme M. Eymael - University of Nebraska-Lincoln
Keegan J. Moore - University of Nebraska-Lincoln

AVT-01-01 Advances in Ground Vehicle Dynamics and Controls
8/17/2021
11:10AM–12:30PM

Chair: ***Vladimir Vantsevich - University of Alabama at Birmingham***
Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Corina Sandu - Virginia Tech***

A Mixed Sideslip Yaw Rate Stability Controller for Over-Actuated Vehicles
Technical Paper Publication: IDETC2021-68260
Alex Gimondi - Politecnico di Milano
Matteo Corno - Politecnico di Milano
Sergio M. Savaresi - Politecnico di Milano

Improved Anti-Lock Braking System With Real-Time Friction Detection to Maximize Vehicle Performance
Technical Paper Publication: IDETC2021-68431
Vincenzo Maria Arricale - University of Napoli Federico II
Antonio Mariorano - University of Napoli Federico II
Lorenzo Mosconi - University of Napoli Federico II
Guido Napolitano Dell'Annunziata - University of Napoli Federico II
Ernesto Rocca - University of Napoli Federico II
Nicola Albarella - University of Napoli Federico II

Design, Modeling and Ride Analysis of Energy-Harvesting Hydraulically Interconnected Suspension
Technical Paper Publication: IDETC2021-68650
Bonan Qin - Virginia Polytechnic Institute and State University
Yuzhe Chen - Virginia Polytechnic Institute and State University
Lei Zuo - Virginia Polytechnic Institute and State University

Direct Longitudinal Force Feedback for High-Performance Vehicle Dynamics Control Systems
Technical Paper Publication: IDETC2021-69432
Giorgio Riva - Politecnico di Milano
Luca Mozzarelli - Politecnico di Milano
Matteo Corno - Politecnico di Milano
Simone Formentin - Politecnico di Milano
Sergio M. Savaresi - Politecnico di Milano

Research on the Potential of Front Wheel Steering Control for Vehicle Dynamics Control
Technical Paper Publication: IDETC2021-69915
Sheng Zheng - Tsinghua University
Yiming Cheng - Tsinghua University
Liangyao Yu - Tsinghua University

DTM-02 Joint (DTM/SEIKM): Intelligence Augmentation for Human Systems Integration
8/17/2021
11:10AM–12:30PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Rahul Renu - Francis Marion University***
Chair: ***Jinjuan She - Miami University***

A Framework to Study Human-AI Collaborative Design Space Exploration
Technical Paper Publication: IDETC2021-67619
Antoni Viros-i-Martin - Texas A&M University
Daniel Selva - Texas A&M University

The Effect of Dynamic Speed Information and Timing of Displaying EHMI on Automated Vehicle and Pedestrian Interactions
Technical Paper Publication: IDETC2021-68319
Jinjuan She - Miami University
Marufa Islam - Miami University
Feng Zhou - University of Michigan

Human-Centric Design Requirements and Challenges for Enabling Human-AI Interaction in Engineering Design: An Interview Study
Technical Paper Publication: IDETC2021-69809
Murtuza N. Shergadwala - University of California, Santa Cruz
Magy Seif El-Nasr - University of California, Santa Cruz

Create Movement to Enjoy Life
Technical Presentation: IDETC2021-74855
Shuichi Fukuda - Keio University, System Design and Management Research Institute

A Survey of Important Factors in Human - Artificial Intelligence Trust for Engineering System Design
Technical Paper Publication: IDETC2021-70550
Mostaan Lotfalian Saremi - Stevens Institute of Technology
Alparsalan Emrah Bayrak - Stevens Institute of Technology

Orthopedic Bone-Drilling Assessment Through Laplacian-Based Trajectory Noise Characterization
Technical Paper Publication: IDETC2021-70654
Ronak R. Mohanty - Texas A&M University
Shantanu Vyas - Texas A&M University
Aman Nigam - Texas A&M University
Bruce L. Tai - Texas A&M University
Vinayak R. Krishnamurthy - Texas A&M University

MNS-01 MEMS/NEMS Power Sources, Sensors and Actuators, and Computing
8/17/2021
11:10AM–12:30PM

Chair: ***Brian Jensen - Brigham Young University***
Chair: ***Irene Fassi - STIIMA-CNR, Italy***
Chair: ***Oliver Barham – U.S. Navy***
Chair: ***Muhammad Khan - NSWC, IHEODTD***
Chair: ***Mohammad Shavezipur - Southern Illinois University, Edwardsville***

Multi-Modeshape Reservoir Computing Using a Continuous MEMS Microbeam
Technical Paper Publication: IDETC2021-71659
Mohammad H. Hasan - Columbus State University
Fadi Alsaleem - University of Nebraska-Lincoln
Mohammad H Hasan - Columbus State University

Power Density Comparison of Metal and Liquid Radioisotopes
Technical Paper Publication: IDETC2021-66795
Marc Litz - Army Research Laboratory
Randy Tompkins - Army Research Laboratory
Mohamed Doumbia - Army Research Laboratory
Muhammad Khan - Naval Surface Warfare Center

Comparing Nuclear and Chemical Power Sources for MEMS/NEMS Applications
Technical Paper Publication: IDETC2021-68110
Oliver M. Barham – U.S. Navy

Demonstration of a Radioisotope Power Source Using Promethium-147 Chloride and 4H-SiC Betavoltaic Cell
Technical Paper Publication: IDETC2021-69835
Johnny Russo - University of Maryland
Marc Litz - U.S. Army Research Laboratory
Brenda Smith - Oak Ridge National Laboratory

Betavolataic Power Sources for Low Power Electronics
Technical Presentation: IDETC2021-74406
Muhammad Khan - Naval Surface Warfare Center, IHD

InGaP Based Hybrid PV-BV Device Characterization
Technical Presentation: IDETC2021-74867
Mohamed Doumbia - ARL

Betavoltaic Power Sources
Technical Presentation: IDETC2021-75037
Thomas Adams - Naval Surface Warfare Center, Crane Division

DFMLC-01-01: Life Cycle Decision-Making
8/17/2021
1:00PM–1:50PM

Chair: ***Fu Zhao - Purdue University***
Chair: ***Junfeng Ma - Mississippi State University***
Chair: ***Devarajan Ramanujan - Aarhus University***

Generative Optimization for Automatic Creation of 3D CAD Platforms
Technical Paper Publication: IDETC2021-67488
William F. Quintero-Restrepo - Mississippi State University
Brian K. Smith - Mississippi State University
Junfeng Ma - Mississippi State University

Business Intelligence and Obsolescence Engineering: Prediction, Performance and Innovation, Linked Destinies
Technical Paper Publication: IDETC2021-66734
Kevin Boissie - Valeo CDA
Thomas Vigier - Valeo CDA
Marc Zolghadri - Supméca
Sid-Ali Addouche - IUT Montreuil

Optimal Modular Remanufactured Product Configuration and Harvesting Planning for End-of-Life Products
Technical Paper Publication: IDETC2021-69964
Jinju Kim - University of Illinois at Urbana-Champaign
Seyoung Park - University of Illinois at Urbana-Champaign
Harrison M. Kim - University of Illinois at Urbana-Champaign

Analysis of a Machine Tool Stand: Energy Tradeoff for Pump Elimination, Static and Dynamic Simulations
Technical Paper Publication: IDETC2021-70939
Ian C. Garretson - University of California, Davis
Qiuhao Guo - University of California, Davis
Barbara S. Linke - University of California, Davis

Is Expensive More Environment Friendly? Comparative LCA of Three Home Appliances
Technical Paper Publication: IDETC2021-71249
Hammad Masood - King Fahd University of Petroleum & Minerals
M. Mobeen Shaukat - King Fahd University of Petroleum & Minerals
Neçar Merah - King Fahd University of Petroleum & Minerals
Fadi Al-Badour - King Fahd University of Petroleum & Minerals

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MSNDC-03-01 Contact and Interface Dynamics
8/17/2021
1:00PM–1:50PM

Chair: ***Jose Escalona - University of Seville***
Chair: ***Marco Morandini - Politecnico di Milano***
Chair: ***Wei Hu - University of Wisconsin-Madison***
Chair: ***Dan Negrut - University of Wisconsin-Madison***

Chrono::gpu: A Discrete Element Simulation Package for Granular Dynamics Analysis
Technical Presentation: IDETC2021-74753
Luning Fang - University of Wisconsin-Madison
Ruochun Zhang - University of Wisconsin-Madison
Radu Serban - University of Wisconsin - Madison
Dan Negrut - University of Wisconsin - Madison

Reduced Isogeometric Analysis Models for Impact Simulations
Technical Paper Publication: IDETC2021-67417
Tobias Rückwald - Hamburg University of Technology
Alexander Held - Hamburg University of Technology
Robert Seifried - Hamburg University of Technology

Nonlinear Finite Element Based Contact Modeling for Bolted Joints in Composite Laminates
Technical Paper Publication: IDETC2021-68501
Jielong Wang - General Flexible Dynamics

Analysis and Evaluation of Piecewise Linear Systems With Coulomb Friction Using a Hybrid Symbolic-Numeric Computational Method
Technical Paper Publication: IDETC2021-69430
Amir Shahhosseini - Ohio State University
Meng-Hsuan Tien - National Tsing Hua University
Kiran D'Souza - Ohio State University

Energetic Contact Modeling for Rocking Block Structures Under Seismic Loading
Technical Presentation: IDETC2021-74548
Abhishek Chatterjee - INRIA
Rashi Jain - Purdue University
Alan Bowling - University of Texas at Arlington

MR-06-01 Medical and Rehabilitation Robotics
8/17/2021
1:00PM–1:50PM

Chair: ***Leila Notash - Queens University***
Chair: ***Carl Nelson - University of Nebraska***
Chair: ***Ping Zhao - Hefei University of Technology***

Fourier Analysis Guided Cable Actuator Design for Coordinated Walking Assistance
Technical Paper Publication: IDETC2021-67808
Chong Liu - Columbia University
Rand Hidayah - Columbia University
Sunil Agrawal - Columbia University

Kinematic Synthesis of Gait Correction for a Rehabilitation Machine
Technical Paper Publication: IDETC2021-68538
Zvonimir Pusnik - University of Nebraska-Lincoln
Carl A. Nelson - University of Nebraska-Lincoln
Judith M. Burnfield - Madonna Rehabilitation Hospitals
Thad W. Buster - Madonna Rehabilitation Hospitals

Autonomous Robotic Subcutaneous Injection Under Near-Infrared Image Guidance
Technical Paper Publication: IDETC2021-69087
Dingliang Huang - Tongji University
Bin Hu - Tongji University
Yinna Chen - Tongji University
Yu Chen - Tongji University
Liangchen Sui - Tongji University
Zhaoyang Wang - Imperial College London
Yijun Jiang - Tongji University
Zhongyuan Ren - Soochow University Medical College
Yuxuan Wang - Tongji University
Xu Cao - Tongji University
Peng Qi - Tongji University

Gait Prediction and Mechanism Design for 1-DOF Lower Limb Rehabilitation Devices Based on Machine Learning
Technical Paper Publication: IDETC2021-70009
Wanbing Song - Hefei University of Technology
Yating Zhang - Hefei University of Technology
Zhaojie Ge - Hefei University of Technology
Ping Zhao - Hefei University of Technology

MESA-06-01 Embedded Applications: Vision/Intelligence/Industry 4.0/Transportation
8/17/2021
1:00PM–1:50PM

Chair: ***Adriano Mancini - Polytechnic University of Marche***
Chair: ***Marina Paolanti - Polytechnic University of Marche***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***Emanuele Frontoni - Polytechnic University of Marche***
Chair: ***Primo Zingaretti - Università Politecnica delle Marche***

Design of a Self Balancing Vehicle as a Test Rig for Safety Control Strategies Investigations
Technical Paper Publication: IDETC2021-70305
Paolo Righettini - University of Bergamo
Roberto Strada - University of Bergamo
Jasmine Santinelli - University of Bergamo

Multibody Analysis of a Tensegral Servo-Actuated Structure for Civil Applications
Technical Paper Publication: IDETC2021-70662
Cecilia Scoccia - Universita Politecnica delle Marche
Giacomo Palmieri - Universita Politecnica delle Marche
Massimo Callegari - Universita Politecnica delle Marche
Marco Rossi - Universita Politecnica delle Marche
Luca Carbonari - Politecnico di Torino
Placido Munafò - Universita Politecnica delle Marche
Francesco Marchione - Universita Politecnica delle Marche
Gianluca Chiappini - eCampus telematic University

Automated Quantum Entanglement and Cryptography for Networks of Robotic Systems
Technical Paper Publication: IDETC2021-71653
Farbod Khoshnoud - California State Polytechnic University
Maziar Ghazinejad - University of California, San Diego

A Deep Learning Approach for Product Detection in Intelligent Retail Environment
Technical Paper Publication: IDETC2021-71462
Giulia Pazzaglia - Università Politecnica delle Marche
Marco Mameli - Università Politecnica delle Marche
Rocco Pietrini - Grottini Lab S.R.L.
Davide Manco - Grottini Lab S.R.L
Valerio Placidi - Grottini Lab S.R.L.
Emanuele Frontoni - Università Politecnica delle Marche
Primo Zingaretti - Università Politecnica delle Marche

Robotic Manipulation System for Multi-Layer Fabric Stitching
Technical Paper Publication: IDETC2021-70994
Marcel Lahoud - Istituto Italiano di Tecnologia
Gabriele Marchello - Istituto Italiano di Tecnologia
Haider Abidi - Istituto Italiano di Tecnologia
Mariapaola D'Imperio - Istituto Italiano di Tecnologia
Ferdinando Cannella - Istituto Italiano di Tecnologia

CIE-03-02 CIE Special Session: Artificial Intelligence and Machine Learning in Design and Manufacturing
8/17/2021
1:00PM–1:50PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Bryan O'Halloran - Naval Postgraduate School***

In-Situ Laser-Based Process Monitoring and In-Plane Surface Anomaly Identification for Additive Manufacturing Using Point Cloud and Machine Learning
Technical Paper Publication: IDETC2021-69436
Jiaqi Lyu - Stevens Institute of Technology
Javid Akhavan Taheri Boroujeni - Stevens Institute of Technology
Souran Manoochehri - Stevens Institute of Technology

Segmentation of Additive Manufacturing Defects Using U-Net
Technical Paper Publication: IDETC2021-68885
Vivian Wen Hui Wong - Stanford University
Max Ferguson - Stanford University
Kincho H. Law - Stanford University
Yung-Tsun Tina Lee - National Institute of Standards and Technology
Paul Witherell - National Institute of Standards and Technology

Data-Driven Design-by-Analogy: State of the Art
Technical Paper Publication: IDETC2021-68669
Shuo Jiang - Shanghai Jiao Tong University
Jie Hu - Shanghai Jiao Tong University
Jianxi Luo - Singapore University of Technology and Design

Evolutionary Discrete Multi-Material Topology Optimization Using CNN-Based Simulation Without Labeled Training Data
Technical Paper Publication: IDETC2021-68487
Xingtong Yang - Zhejiang University
Ming Li - Zhejiang University
Liangchao Zhu - Zhejiang University
Weidong Zhong - Zhejiang University

A Blockchain-Enabled Approach for Online Stream Sensor Data Protection in Cyber-Physical Manufacturing Systems
Technical Paper Publication: IDETC2021-72023
Zhangyue Shi - Oklahoma State University
Chenang Liu - Oklahoma State University
Chen Kan - University of Texas at Arlington
Wenmeng Tian - Mississippi State University
Yang Chen - Oak Ridge National Laboratory

MR-09-03 Mechanism-Based Metamaterials
8/17/2021
1:00PM–1:50PM

Chair: ***Leila Notash - Queens University***
Chair: ***Jonathan Hopkins – University of California, Los Angeles***
Chair: ***Damiano Pasini - McGill University***

Fostering Metamaterial Discovery Through Accessible Computational Exploration Tools
Technical Presentation: IDETC2021-73993
Alexandra Ion - Carnegie Mellon University

Defects for the Enhanced Performance of Mechanical Metamaterials
Technical Presentation: IDETC2021-74291
Zacharias Vangelatos - University of California, Berkeley
Costas Grigoropoulos - University of California, Berkeley

Mechanical Characterization of Planar Topologies of Modular Active Cell Robots (MACROs)
Technical Presentation: IDETC2021-74572
Gaurav Singh - Yale University
Aaron M. Dollar - Yale University

Soft Adaptive Mechanical Metamaterials
Technical Presentation: IDETC2021-74645
Romik Khajehtourian - ETH Zurich
Dennis M. Kochmann - ETH Zurich

Randomness in Mechanical Metamaterials
Technical Presentation: IDETC2021-74807
Helda Pahlavani - Delft University of Technology
Mohammad J. Mirzaali - Delft University of Technology
Amir A. Zadpoor - Delft University of Technology

Lockable Load-Bearing Origami
Technical Presentation: IDETC2021-74522
Amin Jamalimehr - McGill University
Morad Mirzajanzadeh - McGill University
Abdolhamid Akbarzadeh - McGill University
Damiano Pasini - McGill University

DAC-11-01 Design of Engineering Materials and Structures
8/17/2021
1:00PM–1:50PM

Chair: ***Carolyn Seepersad - University of Texas at Austin***
Chair: ***Xingchen Liu - International Computer Science Institute***

Multiscale Topology Optimization With Gaussian Process Regression Models
Technical Paper Publication: IDETC2021-66758
Joel C. Najmon - Purdue University
Homero Valladares - Purdue University
Andres Tovar - Indiana University-Purdue University, Indianapolis

A Gaussian Mixture Variational Autoencoder-Based Approach for Designing Phononic Bandgap Metamaterials
Technical Paper Publication: IDETC2021-67629
Zihan Wang - University of Connecticut
Weikang Xian - University of Connecticut
M. Ridha Baccouche - Ford Motor Company
Horst Lanzerath - Ford Motor Company
Ying Li - University of Connecticut
Hongyi Xu - University of Connecticut

A Subspace-Inclusive Sampling Method for the Computational Design of Compositionally Graded Alloys
Technical Paper Publication: IDETC2021-68836
Marshall Allen - Texas A&M University
Tanner Kirk - Texas A&M University
Richard Malak - Texas A&M University
Raymundo Arroyave - Texas A&M University

SDF-Based Inverse Process Design of Solar Cells Using Molecular Dynamics Simulations
Technical Paper Publication: IDETC2021-71595
Umar Farooq Ghumman - Northwestern University
Anton Von Beek - Northwestern University
Joydeep Munshi - Argonne National Laboratory
TeYu Chien - University of Wyoming
Ganesh Balasubramanian - Lehigh University
Wei Chen - Northwestern University

Proposal for an Adaptive Bone Screw Design Based on FEA Studies Exemplified by Pedicle Screw
Technical Paper Publication: IDETC2021-67768
Alexander Seidler - Technische Universität Dresden
Lars Mehlhorn - Fraunhofer Institute for Machine Tools and Forming Technology IWU
Philipp Sembdner - Technische Universität Dresden
Stefan Holtzhausen - Technische Universität Dresden
Ralph Stelzer - Technische Universität Dresden
Welf-Guntram Drossel - Fraunhofer Institute for Machine Tools and Forming Technology IWU

CIE-30-01 SEIKM: Systems Engineering Information Knowledge Management (SEIKM General)
8/17/2021
1:00PM–1:50PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Dazhong Wu - University of Central Florida***
Chair: ***Yan Lu - National Institute of Standards and Technology***

Systems Thinking Assessment: A Method Through Computer Simulation
Technical Paper Publication: IDETC2021-68180
Ross D. Arnold - Stevens Institute of Technology
Jon P. Wade - University of California, San Diego
Alparslan Emrah Bayrak - Stevens Institute of Technology

Engineering Document Summarization Using Sentence Representations Generated by Bidirectional Language Model
Technical Paper Publication: IDETC2021-70866
Yunjian Qiu - University of Southern California
Yan Jin - University of Southern California

Knowledge Discovery for Early Failure Assessment of Complex Engineered Systems Using Natural Language Processing
Technical Paper Publication: IDETC2021-70694
Sequoia R. Andrade - HX5, LLC.
Hannah S. Walsh - NASA Ames Research Center

Logic Rules for Automated Synthesis of Function Models Using Evolutionary Algorithms
Technical Paper Publication: IDETC2021-70575
Amaninder Singh Gill - Florida Institute of Technology
Chiradeep Sen - Florida Institute of Technology

Automatic Composition of Encoding Scheme and Search Operators in System Architecture Optimization
Technical Paper Publication: IDETC2021-71399
Gabriel Apaza - Texas A&M University
Daniel Selva - Texas A&M University

AVT-01-02 Advances in Ground Vehicles Dynamics and Controls. Session, AVT-03-02 Advances in Methods for Ground Vehicle Systems Design
8/17/2021
1:00PM–1:50PM

Chair: ***Massimiliano Gobbi - Politecnico di Milano***
Chair: ***Lei Zuo - Virginia Tech***
Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Lin Xu - Wuhan University of Technology***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Vladimir Vantsevich - University of Alabama at Birmingham***
Chair: ***Corina Sandu - Virginia Tech***

Autonomous Bicycle Design and Control System
Technical Presentation: IDETC2021-74005
Akash Verma - IIITDM Jabalpur

Dynamical Analysis of the Utility Truck's Boom Equipment
Technical Presentation: IDETC2021-74850
Parth Patel - University of Alabama at Birmingham
Vladimir Vantsevich - University of Alabama at Birmingham
Gemunu Happawana - California State University
Chris Harned - Altec Inc.
David Boger - Altec Inc.

Test Bench for Characterization and Durability Tests of Motorbike Clutches
Technical Paper Publication: IDETC2021-70007
G. Previati - Politecnico di Milano
M. Gobbi - Politecnico di Milano

The MAIANDROS System for Random-Vibration-Based On-Board Railway Vehicle and Track Monitoring
Technical Paper Publication: IDETC2021-70166
Georgios Vlachospyros - University of Patras
Ilias A. Iliopoulos - University of Patras
Kiriakos Kritikakos - University of Patras
Nikolaos Kaliorakis - University of Patras
Spilios D. Fassois - University of Patras
John S. Sakellariou - University of Patras
Alexandros Deloukas - Attiko Metro S.A.
George Leoutsakos - Attiko Metro S.A.
Christos Giannakis - Attiko Metro S.A.
Elias Chronopoulos - Attiko Metro S.A.
Elias Tountas - Attiko Metro S.A.
Dimosthenis Kapiris - Attiko Metro S.A.

Multi-Objective Structural Optimization of Vehicle Wheels
Technical Paper Publication: IDETC2021-71062
P. Stabile - Politecnico di Milano
F. Ballo - Politecnico di Milano
M. Gobbi - Politecnico di Milano
G. Previati - Politecnico di Milano

DFMLC-02-01: Design for Service, Operations and Quality
8/17/2021
2:10PM–3:00PM

Chair: ***Steven Hoffenson - Stevens Institute of Technology***
Chair: ***Junfeng Ma - Mississippi State University***
Chair: ***Peter Sandborn - University of Maryland***

Environmental and Economic Assessment of a Portable E-Waste Recycling and Rare Earth Elements Recovery Process
Technical Paper Publication: IDETC2021-68555
Emmanuel Ohene Opare - University of Idaho
Amin Mirkouei - University of Idaho

Design for Product Circularity: Circular Economy Indicators With Tools Mapped Along the Engineering Design Process
Technical Paper Publication: IDETC2021-69629
Michael Saidani - University of Illinois at Urbana-Champaign
Harrison Kim - University of Illinois at Urbana-Champaign

Comparing Change Management Processes for Requirements and Manufacturing: An Interview Based Study
Technical Paper Publication: IDETC2021-69694
Meredith Sutton - Clemson University
Joshua D. Summers - University of Texas at Dallas

Application of Prognostics and Health Management (PHM) to Software System Fault and Remaining Useful Life (RUL) Prediction
Technical Paper Publication: IDETC2021-70508
Mohammad Rubyet Islam - University of Maryland
Peter Sandborn - University of Maryland

Exploring How Lean Product and Process Development Can Promote Industrial Sustainability
Technical Paper Publication: IDETC2021-70917
Daniel R. Cooper - University of Michigan
Katrina Appell - Katrina Appell Consulting

MSNDC-03-02 Contact and Interface Dynamics
8/17/2021
2:10PM–3:00PM

Chair: ***Jose Escalona - University of Seville***
Chair: ***Marco Morandini - Politecnico di Milano***
Chair: ***Wei Hu - University of Wisconsin-Madison***
Chair: ***Dan Negrut - University of Wisconsin-Madison***

A Simple Discrete Element Code for Particle Dampers
Technical Presentation: IDETC2021-73883
Fabio Biondani - Politecnico di Milano
Marco Morandini - Politecnico di Milano
Gian Luca Ghiringhelli - Politecnico di Milano
Mauro Terraneo - Vicoter
Potito Cordisco - Vicoter

A Variational Approach to Contact Interface Enforcement With Application to Nuclear Fuel Modeling
Technical Presentation: IDETC2021-74083
Antonio Recuero - Idaho National Laboratory
Alexander Lindsay - Idaho National Laboratory
Dewen Yushu - Idaho National Laboratory
Benjamin Spencer - Idaho National Laboratory

Nodal-Boundary Finite-Element Method for the Signorini Problem in Two Dimensions
Technical Presentation: IDETC2021-74481
David Urman - McGill University
Mathias Legrand - McGill University

High Precision Contact Model for Ball Bearings With Waviness
Technical Paper Publication: IDETC2021-67056
Camille Jeannot - Université *Bourgogne Franche-Comte, FEMTO-ST*
E. Sadoulet-Reboul - Université Bourgogne Franche-Comte, FEMTO-ST
S. Dufrenoy - ADR Company, ALCEN Group

CIE-03-03 CIE Special Session: Artificial Intelligence and Machine Learning in Design and Manufacturing
8/17/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Seung-Kyum Choi - Georgia Institute of Technology***
Chair: ***Zhenghui Sha - University of Arkansas***

Optimal Release Planning Using Machine Learning and Linear Integer Programming for Ideas in a Crowdsourcing Platform
Technical Paper Publication: IDETC2021-68177
Nour J. Absi-Halabi - American University of Beirut
Ali A. Yassine - American University of Beirut

Intelligent Design Prediction Aided by Non-Uniform Parametric Study and Machine Learning in Feature Based Product Development
Technical Paper Publication: IDETC2021-67923
Satchit Ramnath - Ohio State University
Jiachen Ma - Ohio State University
Jami J. Shah - Ohio State University
Duane Detwiler - Honda R&D Americas

Learning to Improve Performance During Non-Repetitive Tasks Performed by Robots
Technical Paper Publication: IDETC2021-67627
Yeo Jung Yoon - University of Southern California
Satyandra K. Gupta - University of Southern California

Multi-Sensor Data Fusion for Rotating Machinery Fault Diagnosis Using Residual Convolutional Neural Network
Technical Paper Publication: IDETC2021-67406
Tingli Xie - Georgia Institute of Technology
Xufeng Huang - University of Michigan-Dearborn
Seung-Kyum Choi - Georgia Institute of Technology

MSNDC-04-02 Nonlinear Dynamics of Structures
8/17/2021
2:10PM–3:00PM

Chair: ***Pierpaolo Belardinelli - Polytechnic University of Marche***
Chair: ***Richard Wiebe - University of Washington***
Chair: ***Sachin Goyal - University of California***

A Universal Nonlinear Analyzer for Rigid Multibody Systems Based on the Efficient Galerkin Averaging-Incremental Harmonic Balance Method
Technical Paper Publication: IDETC2021-68548
Ren Ju - Harbin Institute of Technology
Wei Fan - Sichuan University
Weidong Zhu - University of Maryland

Periodic Temperature Responses in a Thermal System Under a Periodic Heating
Technical Paper Publication: IDETC2021-68752
Bo Yu - University of Wisconsin Platteville
Albert C.J. Luo - Southern Illinois University, Edwardsville

Implementation Implications on the Performance of ANCF Simulations
Technical Presentation: IDETC2021-74815
Michael Taylor - University of Wisconsin-Madison
Radu Serban - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

An Efficiency Comparison of Different Ancf Implementations
Technical Presentation: IDETC2021-74816
Michael Taylor - University of Wisconsin-Madison
Radu Serban - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

DAC-11-02 Design of Engineering Materials and Structures
8/17/2021
2:10PM–3:00PM

Chair: ***Yuqing Zhou - Toyota Institute of North America***
Chair: ***Julian Norato - University of Connecticut***

Design of Four-Patch Multi-Stable Composite Laminates for Shape Morphing Applications
Technical Paper Publication: IDETC2021-67884
Jebin Biju - Clemson University
Georges Fadel - Clemson University
Suyi Li - Clemson University
Oliver Myers - Clemson University

A Framework for Interactive Structural Design Exploration
Technical Paper Publication: IDETC2021-71775
Sofia Valdez - University of Texas at Austin
Carolyn Seepersad - University of Texas at Austin
Sandilya Kambampati - Intact Solutions

Multi-Objective Robust Design Exploration of a Canine Ventricular Shunt for Managing Hydrocephalus
Technical Paper Publication: IDETC2021-67353
Gehendra Sharma - Mississippi State University
Anand Balu Nellippallil - Florida Institute of Technology
Ryan Yingling - Mississippi State University
Na Yeon Lee - Mississippi State University
Andy Shores - Mississippi State University
Raheleh Miralami - Mississippi State University
Tonya W. Stone - Mississippi State University
Raj K. Prabhu - NASA Glenn Research Center

Computational Investigation of Tissue and Blood Vessel Growth Trade-Offs in Hierarchical Lattices
Technical Paper Publication: IDETC2021-70739
Amit M.E. Arefin - Texas Tech University
Paul F. Egan - Texas Tech University

Geometry Enhanced Generative Adversarial Networks for Random Heterogeneous Material Representation
Technical Paper Publication: IDETC2021-71918
Hongrui Chen - Carnegie Mellon University
Xingchen Liu - International Computer Science Institute

CIE-31-01 SEIKM: Design Informatics
8/17/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Yuqian Lu - University of Auckland***
Chair: ***Kuo-Yi Lin - Tongji University***

Utilizing E to Explore the Mental States Involved in the Occurrence of Different Levels Design Fixation
Technical Paper Publication: IDETC2021-70913
Juan Cao - Sichuan University
Wu Zhao - Sichuan University
Xin Guo - Sichuan University
Tingting Wu - Chinese Academy of Sciences

Predicting Mechanical Properties of 3D Printed Lattice Structures
Technical Paper Publication: IDETC2021-70249
Shuai Ma - Chongqing University
Qian Tang - Chongqing University
Ying Liu - Cardiff University
Qixiang Feng - Chongqing University

Integrating Hedonic Quality for User Experience Modelling
Technical Paper Publication: IDETC2021-69781
Yanzhang Tong - Cardiff University
Yan Liang - Cardiff University
Ying Liu - Cardiff University
Yulia Hicks - Cardiff University
Irena Spasic - Cardiff University

Fuzzy Evaluation of Kansei Attributes Using Convolutional Neural Networks
Technical Paper Publication: IDETC2021-69567
Wei Jiang - Sichuan University
Kai Zhang - Sichuan University
Wu Zhao - Sichuan University
Xin Guo - Sichuan University

Genetic Algorithm-Based Clustering Method to Formulate Standard Specifications for Merchant Ship Preliminary Design
Technical Paper Publication: IDETC2021-69245
Chenwei Gui - University of Tokyo
Ranyi Zeng - University of Tokyo
Kenji Takahashi - Imabari Shipbuilding Co., Ltd.
Naoki Herai - Imabari Shipbuilding Co., Ltd.
Kazuhiro Aoyama - University of Tokyo

VIB-02-02 Nonlinear Systems, Phenomena and Energy Harvesting
8/17/2021
2:10PM–3:00PM

Chair: ***Serife Tol - University of Michigan***
Chair: ***Lei Zuo - Virginia Tech***
Chair: ***Wei-Che Tai - Michigan State University***
Chair: ***Peter Coffin - Sandia National Laboratories***
Chair: ***Biagio Carboni - Sapienza University of Rome***

Numerical Analysis and Parameter Optimization of a Portable Two-Body Attenuator Wave Energy Converter
Technical Paper Publication: IDETC2021-69977
Joseph Capper - Virginia Tech
Jia Mi - Virginia Tech
Qiaofeng Li - Virginia Tech
Lei Zuo - Virginia Tech

On the Mechanical Behaviour in Stiffness Compensated Piezoelectric Beams - an Experimental Investigation Towards Energy Harvesting
Technical Paper Publication: IDETC2021-68922
E. van de Wetering - Delft University of Technology
T.W.A. Blad - Delft University of Technology
R.A.J. van Ostayen - Delft University of Technology

On the Efficiency of Energy Harvesters Under Large-Amplitude Excitations
Technical Paper Publication: IDETC2021-66940
T.W.A. Blad - Delft University of Technology
N. Tolou - Delft University of Technology

Data-Driven Identification of Multiple Local Nonlinear Attachments
Technical Presentation: IDETC2021-74863
Aryan Singh - University of Nebraska-Lincoln
Keegan Moore - University of Nebraska-Lincoln

An Open-Source, Low-Cost Automatic Modal Hammer for Studying Nonlinear Dynamical Systems
Technical Presentation: IDETC2021-74860
Aryan Singh - University of Nebraska-Lincoln
Keegan Moore - University of Nebraska-Lincoln

DTM-04 Design Research: Empirical and Experimental Studies
8/17/2021
2:10PM–3:00PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Astrid Layton - Texas A&M University***
Chair: ***Jessica Menold - Penn State***

Can Gratitude Promote More Creative Engineering Design?
Technical Paper Publication: IDETC2021-70664
Natalie M. Sisson - University of Toronto
Emily A. Impett - University of Toronto
L.H. Shu - University of Toronto

Challenges and Strategies in Remote Design Collaboration During Pandemic: A Case Study in Engineering Education
Technical Paper Publication: IDETC2021-68485
Elise Belanger - Miami University
Caroline Bartels - Miami University
Jinjuan She - Miami University

Reflections on Designing in the Wild: How Theories of Design Information Manifest in Practice
Technical Paper Publication: IDETC2021-71581
Nicole B. Damen - University of Nebraska at Omaha
Christine A. Toh - University of Nebraska at Omaha

Sustainable Creativity: Overcoming the Challenge of Scale When Repurposing Wind-Turbine Blades
Technical Paper Publication: IDETC2021-70668
K. Arabian - University of Toronto
L.H. Shu - University of Toronto

Developing a Supply Chain Modeling Approach to Facilitate Ecology-Inspired Design for Sustainability and Resilience
Technical Paper Publication: IDETC2021-70782
Tyler Wilson - Texas A&M University
Abheek Chatterjee - Texas A&M University
Astrid Layton - Texas A&M University

MSNDC-09-01 Optimization, Sensitivity Analysis, and Uncertainty Quantification in Dynamic Systems
8/17/2021
3:20PM–4:40PM

Chair: ***Richard Wiebe - University of Washington***
Chair: ***Radu Serban - University of Wisconsin-Madison***
Chair: ***Daniel Dopico - University of La Coruña***

Non-Linear Random Vibrations Using Second-Order Adjoint and Projected Differentiation Methods
Technical Paper Publication: IDETC2021-69685
Dimitrios Papadimitriou - Oakland University
Zissimos P. Mourelatos - Oakland University
Zhen Hu - University of Michigan-Dearborn

Adjoint Sensitivity Analysis of Multibody Systems Modeled With Joint Coordinates Using an Augmented Lagrangian Formulation With Projections
Technical Presentation: IDETC2021-74682
Álvaro López Varela - Univerisdade da Coruña
Alberto Luaces Fernández - Universidade da Coruña
Daniel Dopico - Universidade da Coruña

Design of a Flexible Cannon Feed System Using Multibody Dynamic Simulation, Gaussian Process Emulation, and Direct Search Optimization
Technical Presentation: IDETC2021-74746
Ben Thornton - MSC Software
Jesse Behrens - Northrop Grumman
Eric Pesheck - MSC Software
Gavin Jones - SmartUQ

Optimisation With Discrete Adjoint Equations and Application to Worm-Like Motion
Technical Presentation: IDETC2021-75563
Jose Munoz - Universitat Politècnica de Catalunya
Ashutosh Bijalwan - Universitat Poltiècnica de Catalunya

Direct Sensitivity Analysis of Spatial Multibody Systems With Joint Friction Using Index-1 Formulation
Technical Paper Publication: IDETC2021-68777
Adwait Verulkar - Virginia Polytechnic Institute and State University
Corina Sandu - Virginia Polytechnic Institute and State University
Daniel Dopico - University of A Coruña
Adrian Sandu - Virginia Polytechnic Institute and State University

MESA-14-01 Fractional Derivatives and Their Applications: Applications
8/17/2021
3:20PM–4:40PM

Chair: ***YangQuan Chen - University of California, Merced***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***Yongguang Yu - Beijing Jiaotong University***
Chair: ***Changpin Li - Shanghai University***

Finite Time Control of a Fractional Order Hydro-Turbine Governing System With Load Rejection
Technical Paper Publication: IDETC2021-67359
Peng Chen - Northwest A&F University
Bin Wang - Northwest A&F University

Fractional Order Filter Discretization With Marine Predators Algorithm
Technical Paper Publication: IDETC2021-67611
Abdullah Ates - Inonu University
YangQuan Chen - UC Merced

Switched Fractional Order Model Reference Adaptive Control for an Automatic Voltage Regulator
Technical Paper Publication: IDETC2021-68302
Norelys Aguila-Camacho - Universidad Tecnológica Metropolitana
Jorge E. García-Bustos - Universidad Tecnológica Metropolitana
Eduardo I. Castillo-López - Universidad Tecnológica Metropolitana

Fractional Order Chaotic Model Based Enhanced Equilibrium Optimization Algorithm for Controller Design of 3 DOF Hover Flight System
Technical Paper Publication: IDETC2021-69307
Abdullah Ates - Inonu University
YangQuan Chen - University of California, Merced

A Fractional Order Control and Correction Strategy for EtherCAT Communication Clock Drift
Technical Paper Publication: IDETC2021-70814
Jihao Sun - Huazhong University of Science and Technology
Pengchong Chen - Huazhong University of Science and Technology
Ying Luo - Huazhong University of Science and Technology

Design and High Accuracy Numerical Implementation of Fractional Order PI Controller for PMSM Speed System
Technical Paper Publication: IDETC2021-71115
Baokun Wang - Huazhong University of Science and Technology
Shaohua Wang - Huazhong University of Science and Technology
Ying Luo - Huazhong University of Science and Technology

Fractional-Order Impedance Control Design for Robot Manipulator
Technical Paper Publication: IDETC2021-71936
Xiaolian Liu - Huazhong University of Science and Technology
Shaohua Wang - Huazhong University of Science and Technology
Ying Luo - Huazhong University of Science and Technology

Digital Twin-Based Fractional Order Controller Optimization for Industrial Robot
Technical Paper Publication: IDETC2021-72405
Pengchong Chen - Huazhong University of Science and Technology
Xuan Liu - Huazhong University of Science and Technology
Ying Luo - Huazhong University of Science and Technology

MR-03-01 Compliant Mechanisms (A. Midha Symposium)
8/17/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Simon Henein - École Polytechnique Fédérale de Lausanne***
Chair: ***Guimin Chen - Xi'an Jiaotong University***

Design of a New Piezoelectrically Actuated Compliant Micrograpper With High Area Usage Efficiency
Technical Paper Publication: IDETC2021-67371
Zekui Lyu - University of Macau
Qingsong Xu - University of Macau

Design of a Triple Crossed Flexure Pivot With Minimized Parasitic Shift
Technical Paper Publication: IDETC2021-67948
E. Thalmann - École Polytechnique Fédérale de Lausanne
S. Henein - École Polytechnique Fédérale de Lausanne

A Mirror-Symmetrical XY Compliant Parallel Manipulator With Improved Performances Without Increasing the Footprint
Technical Paper Publication: IDETC2021-69032
Jiaxiang Zhu - University College Cork
Guangbo Hao - University College Cork
Shiyao Li - University College Cork
Shuwen Yu - University College Cork
Xianwen Kong - Heriot-Watt University

A Flexure-Based Displacement Reducer Capable of Achieving Very Large Reduction Ratio
Technical Paper Publication: IDETC2021-69340
Houqi Wu - Xi'an Jiaotong University
Guimin Chen - Xi'an Jiaotong University

Design of a Monolithic Constant-Force Compliant Mechanism for Extended Range of Motion and Minimal Force Variation
Technical Paper Publication: IDETC2021-69726
Ching-Wei Lo - National Taiwan University
Yuan Chang - National Taiwan University
Mien-Li Wang - National Taiwan University
Cian-Ru Lin - National Taiwan University
Jyh-Jone Lee - National Taiwan University

A Family of Novel Compliant Linear-Motion Mechanisms Based on Compliant Rolling-Contact Element Pivot
Technical Paper Publication: IDETC2021-69887
Tonglong Huo - Beihang University
Jingjun Yu - Beihang University
Hongzhe Zhao - Beihang University
Xian Wei - Dagang Zhaodong Oil Company of PetroChina

A Novel Micro-Positioning Stage With Large-Stroke and Adjustable Stiffness
Technical Paper Publication: IDETC2021-70068
Zhijun Yang - Guangdong University of Technology
Bingyu Cai - Guangdong University of Technology
Ruiqi Li - Guangdong University of Technology
Hao Peng - Guangdong University of Technology
Youdun Bai - Guangdong University of Technology

MSNDC-04-03 Nonlinear Dynamics of Structures
8/17/2021
3:20PM–4:40PM

Chair: ***Richard Wiebe - University of Washington***
Chair: ***Sachin Goyal - University of California***

Optimal Performance Comparison of Nonlinear Energy Sinks and Linear Tuned Mass Dampers
Technical Paper Publication: IDETC2021-67824
Ivan Yegorov (Egorov) - North Dakota State University
Austin Uden - North Dakota State University
Daniil Yurchenko - Heriot-Watt University

Geometry Optimization for Resonator Nonlinearities and Modes Controlling
Technical Paper Publication: IDETC2021-68529
Amal Z. Hajjaj - Loughborough University
Nizar Jaber - King Fahd University of Petroleum and Minerals

Modal Analysis to Interpret Localization Phenomena in Two Nonlinear Tuned Mass Dampers
Technical Paper Publication: IDETC2021-69248
Yuji Harata - Aichi Institute of Technology
Takashi Ikeda - Hiroshima University

Nonlinear Dynamics Simulation of Bending Deflection for Composite Laminated Plate Under Varied Temperature Using Lyapunov Exponent Parameter
Technical Paper Publication: IDETC2021-70000
Louay S. Yousuf - San Diego State University

Parametric Resonance Produced in Two Coupled Oscillators
Student Poster Presentation: IDETC2021-74646
Wakaba Enami - University of Tsukuba
Hiroshi Yabuno - University of Tsukuba

Destabilized Mode in the Fluid Conveying Pipe Depending on the Bending Stiffness
Student Poster Presentation: IDETC2021-74587
E. Higuchi - University of Tsukuba
H. Yabuno - University of Tsukuba
K. Yabuno - Fukui University of Technology

DAC-12-01 Engineering for Global Development
8/17/2021
3:20PM–4:40PM

Chair: ***Natasha Wright - University of Minnesota***
Chair: ***Nordica MacCarty - Oregon State University***

The Development and Testing of Pour-Flush Toilet Sensors for Understanding User Interaction in Peri-Urban Households
Technical Paper Publication: IDETC2021-67697
Pablo Cotera Rivera - University of Toronto
Amy M. Bilton - University of Toronto

Assessing the Social Impacts of Improved Cookstoves in Peri-Urban and Rural Uganda Using Card Sorting
Technical Paper Publication: IDETC2021-70438
Erin Peiffer - Oregon State University
Nordica MacCarty - Oregon State University

Machine Learning Method for Forecasting Weather Needed For Crop Water Demand Estimations in Low-Resource Settings Using A Case Study in Morocco
Technical Paper Publication: IDETC2021-70571
Carolyn Sheline - Massachusetts Institute of Technology
Amos V. Winter - Massachusetts Institute of Technology

FMEA-Inspired Analysis for Social Impact of Engineered Products
Technical Paper Publication: IDETC2021-70595
Andrew Armstrong - Brigham Young University
Christopher A. Mattson - Brigham Young University
John L. Salmon - Brigham Young University
Eric Dahlin - Brigham Young University

Connecting Qualitative and Quantitative Analysis Through Bond Graph Modeling and System Dynamics
Technical Paper Publication: IDETC2021-70796
Hailie Suk - University at Buffalo
John Hall - University at Buffalo

A Computational Framework for Social Entrepreneurs to Determine Policies for Sustainable Development
Technical Paper Publication: IDETC2021-70827
Vispi Karkaria - College of Engineering
Ashok K. Das - SunMoksha Power Private Limited
Abhishek Yadav - University of Oklahoma
Ayushi Sharma - SunMoksha Power Pvt. Ltd.
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

Open Research Questions for Incorporating Multi-Stakeholder Interests in Engineering for Global Development
Technical Paper Publication: IDETC2021-71835
Phillip D. Stevenson - Brigham Young University
Amy E. Wood - Brigham Young Universiry
Chris A. Mattson - Brigham Young University
John L. Salmon - Brigham Young University

Feeling the Heat! Exploring the Relationship Between Students' Empathy, Attitudes Towards Sustainability, and Their Identification of Problem Requirements
Technical Paper Publication: IDETC2021-71993
Rohan Prabhu - Penn State University
Mohammed Alsager Alzayed - Kuwait University
Elizabeth Starkey - Pennsylvania State University

VIB-03-01 Jointed Structures, Contact and Friction
8/17/2021
3:20PM–4:40PM

Chair: ***Robert Kuether - Sandia National Laboratories***
Chair: ***Peter Coffin - Sandia National Laboratories***

Dynamic Wave Interactions in Axial Rods With Multiple Threaded Interfaces
Technical Presentation: IDETC2021-74720
Sandro Aldana - University of Nebraska-Lincoln
Keegan Moore - University of Nebraska-Lincoln

A Strategy for Fine Mesh Resolution in Contact Mechanics
Technical Paper Publication: IDETC2021-71360
Gaurav Chauda - Michigan State University
Daniel J. Segalman - Michigan State University

3D Linear Identification of Mechanical Joint Using FRF Decoupling and Inverse Structural Modification Methods
Technical Paper Publication: IDETC2021-70934
Hossein Soleimani - Middle East Technical University
Ender Cigeroglu - Middle East Technical University
H. Nevzat Özgüven - Middle East Technical University

Guidelines for Optimizing the Error in Area Ratio Damping Estimation Method
Technical Paper Publication: IDETC2021-70590
Balija Santoshkumar - Michigan State University
Firas A. Khasawneh - Michigan State University

Combined Coulomb and Viscous Damping Estimation Using Topological Signal Processing
Technical Paper Publication: IDETC2021-68456
Audun Myers - Michigan State University
Firas A. Khasawneh - Michigan State University

MR-08-02 Novel Mechanisms, Robots, and Applications
8/17/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Shikui Chen - Stony Brook University***
Chair: ***Ketao Zhang - Queen Mary University of London***

Multi-Material Topology Optimization of Ferromagnetic Soft Robots Using Reconciled Level Set Method
Technical Paper Publication: IDETC2021-67821
Jiawei Tian - State University of New York at Stony Brook
Xianfeng David Gu - State University of New York at Stony Brook
Shikui Chen - State University of New York at Stony Brook

Approximating Hinges With Multimaterial Compliant Joints
Technical Paper Publication: IDETC2021-67865
Independence Talken - University of Nebraska
Zijuan Liang - University of Notre Dame
Mark Plecnik - University of Notre Dame

Modeling and Design Exploration of Tensegrity Plate Mechanisms With Energy Dissipation Capabilities Enabled by Shape Memory Alloys
Technical Paper Publication: IDETC2021-70025
Pedro Silva - University of California, Irvine
Edwin A. Peraza Hernandez - University of California, Irvine

Orientation Control of Self-Righting Tensegrity Landers
Technical Paper Publication: IDETC2021-70989
Alan Zhang - University of California, Berkeley
Douglas Hutchings - Squishy Robotics
Mayank Gupta - University of California, Berkeley
Alice Agogino - University of California, Berkeley

The Kinematic and Static Analysis of the Dual Drive Fusiform Tensegrity Robot
Technical Paper Publication: IDETC2021-71292
Shibo Liu - Tianjin University
Jiangping Mei - Tianjin University
Panfeng Wang - Tianjin University
Fan Guo - Tianjin University

Design and Analysis of Three-Output Open Differential With 3-DOF
Technical Paper Publication: IDETC2021-68093
Rama Vadapalli - International Institute of Information Technology
Nagamanikandan Govindan - International Institute of Information Technology
Abhishek Sarkar - International Institute of Information Technology
K. Madhava Krishna - International Institute of Information Technology

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DTM-05 Design Theory: Studies on Iteration, Search, and Prototyping
8/17/2021
3:20PM–4:40PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Kosa Goucher-Lambert - University of California, Berkeley***
Chair: ***Alison Olechowski - University of Toronto***

Lessons Learned From Three Iterative Studies on Creativity Interventions
Technical Paper Publication: IDETC2021-68984
A. Sahar - University of Toronto
L.H. Shu - University of Toronto

Efficient Design Principles for Designing Innovative Aerial Robots
Technical Paper Publication: IDETC2021-69583
Chee How Tan - Singapore University of Technology and Design
Katja Hölttä-Otto - Aalto University
Shaohui Foong - Singapore University of Technology and Design

Effects of Structured Prototyping Support on Novice Designers' Prototyping Plans
Technical Paper Publication: IDETC2021-71057
Camilla Arndt Hansen - Technical University of Denmark
Tobias Eifler - Technical University of Denmark
Michael Deininger - Technical University of Denmark

Multi-Modal Search for Inspirational Examples in Design
Technical Paper Publication: IDETC2021-71825
Elisa Kwon - University of California, Berkeley
Forrest Huang - University of California, Berkeley
Kosa Goucher-Lambert - University of California, Berkeley

Manufacturing Fixation in Design: Exploring the Effects of Manufacturing Assumptions on Design Ideas
Technical Paper Publication: IDETC2021-70361
Jennifer Bracken Brennan - Pennsylvania State University
William B. Miney - Pennsylvania State University
Timothy W. Simpson - Pennsylvania State University
Kathryn W. Jablokow - Pennsylvania State University

MNS-02-01: Bio MEMS/NEMS
8/17/2021
3:20PM–4:40PM

Chair: ***Najib Kacem - University of Franche Comte***
Chair: ***Hanna Cho - The Ohio State University***
Chair: ***Brian Jensen - Brigham Young University***
Chair: ***Mohammad Shavezipur - Southern Illinois University, Edwardsville***

Subharmonic Resonance of Two Thirds Order of Electrostatically Actuated Bio-MEMS Circular Plates: Amplitude-Frequency Response
Technical Paper Publication: IDETC2021-66718
Dumitru I. Caruntu - University of Texas Rio Grande Valley
Julio Beatriz - University of Texas Rio Grande Valley
Marcos Alipi - University of Texas Rio Grande Valley

Detection of Electrolytes Based on Solid-State Ion-Selective Electrode
Technical Paper Publication: IDETC2021-67369
Li-Da Chen - National Chung Hsing University
Gou-Jen Wang - National Chung-Hsing University

Surface Functionalization of Silicon MEMS Biochemical Sensors for the Detection of Foodborne Pathogens
Technical Paper Publication: IDETC2021-69708
Md. Ebrahim Khalil Bhuiyan - Southern Illinois University
Dustin Smith - Southern Illinois University
Eric J. Voss - Southern Illinois University
Chin-Chuan Wei - Southern Illinois University
Mohammad Shavezipur - Southern Illinois University, Edwardsville

Analysis of Capillary Driven Flows Through Open Microchannels for Biosensing Application
Technical Paper Publication: IDETC2021-69838
Hadrikkumar Patel - Southern Illinois University
Terry Yan - Southern Illinois University
Mohammad Shavezipur - Southern Illinois University, Edwardsville

WEDNESDAY, AUGUST 18

MR-01-02 Mechanisms Synthesis & Analysis
8/18/2021
10:00AM–10:50AM

Chair: ***David Myszka - University of Dayton***
Chair: ***Leila Notash - Queens University***
Chair: ***Craig Lusk - University of South Florida***

An Application of Graph Theory for the Detection of Degenerate Structures in Planetary Gear Trains
Technical Paper Publication: IDETC2021-67479
Essam L. Esmail - University of Al-Qadisiyah
Anahed Juber - University of Al-Qadisiyah

A Pareto Front Mechanism Optimization for Controlling an Aircraft Using a Bio-Inspired Rotating Empennage
Technical Paper Publication: IDETC2021-69202
David H. Myszka - University of Dayton
James J. Joo - Air Force Research Laboratories
Andrew P. Murray - University of Dayton

Analysis and Synthesis of Conical Coil Springs
Technical Paper Publication: IDETC2021-69971
Harshkumar Patel - Texas A&M University-Kingsville
Hong Zhou - Texas A&M University-Kingsville

Type Synthesis of Long Symmetric Planar Shape-Morphing Mechanism Arrays
Technical Paper Publication: IDETC2021-71616
Craig Lusk - University of South Florida

MR-02-01 Theoretical & Computational Kinematics
8/18/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Kuan-Lun Hsu - National Taiwan University***
Chair: ***Xianwen Kong - Heriot-Watt University***

Classification of 3-DOF 3-UPU Translational Parallel Mechanisms Based on Constraint Singularity Loci Using GobnerCover
Technical Paper Publication: IDETC2021-70059
Xianwen Kong - Heriot-Watt University

Grooved Cam With a Translating Follower Having an Added Ternary-Roller Intermediate Link
Technical Paper Publication: IDETC2021-69734
Kuan-Lun Hsu - National Taiwan University
Tung-Hsin Pan - National Taiwan University
Long-Iong Wu - National Tsing Hua University

Spatial Mechanism-Environment Contact Geometric Models
Technical Paper Publication: IDETC2021-71380
Nina Robson - California State University
Aaron Lee - California State University

A Geometric Approach for Error Space Estimation of Planar Linkage
Technical Paper Publication: IDETC2021-66869
Jianzhong Ding - Beihang University
Chunjie Wang - Beihang University

MSNDC-05-01 Modeling, Simulation, and Validation of Vehicle Dynamics and Mobility
8/18/2021
10:00AM–10:50AM

Chair: ***Jose Escalona - University of Seville***
Chair: ***Hiroyuki Sugiyama - The University of Iowa***
Chair: ***Robert Seifried - Hamburg University of Technology***
Chair: ***Paramsothy Jayakumar - U.S. Army GVSC***

POD-Based Model Order Reduction for Tire-Soil Interaction Simulations
Technical Paper Publication: IDETC2021-69652
Christopher C. Sullivan - The University of Iowa
Hiroki Yamashita - The University of Iowa
Hiroyuki Sugiyama - The University of Iowa

Simulation of Robotic Mechanical Systems and Application in Robot-Terrain Interaction Using Project Chrono
Technical Presentation: IDETC2021-74708
Jason Zhou - University of Wisconsin-Madison
Wei Hu - University of Wisconsin-Madison
Radu Serban - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

Neural Network Surrogated Model for Hierarchical Multiscale Off-Road Mobility Simulation
Technical Presentation: IDETC2021-74734
Guanchu Chen - The University of Iowa
Hiroki Yamashita - The University of Iowa
Hiroyuki Sugiyama - The University of Iowa
Yeefeng Ruan - U.S. Army CCDC GVSC
Paramsothy Jayakumar - U.S. Army CCDC GVSC
Jaroslaw Knap - U.S. Army Research Laboratory
Kenneth W. Leiter - U.S. Army Research Laboratory
Xiaobo Yang - Oshkosh Corporation

Using an SPH-Based Continuum Representation of Granular Terrain to Simulate the Rover Mobility
Technical Paper Publication: IDETC2021-71289
Wei Hu - University of Wisconsin-Madison
Jason Zhou - University of Wisconsin-Madison
Radu Serban - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

Coupled Lateral and Longitudinal Control for Trajectory Tracking, Lateral Stability, and Rollover Prevention of High-Speed Automated Vehicles Using Minimum-Time Model Predictive Control
Technical Paper Publication: IDETC2021-68099
Shuping Chen - Beijing Institute of Technology
Huiyan Chen - Beijing Institute of Technology
Alex Pletta - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison

MSNDC-01-01 Computational Methods and Software Tools in Multibody Systems and Nonlinear Dynamics
8/18/2021
10:00AM–10:50AM

Chair: ***Alexander Humer - Johannes Kepler University***
Chair: ***Fran González - University of A Coruña***
Chair: ***Karin Nachbagauer - University of Applied Sciences Upper Austria***
Chair: ***Jose Escalona - University of Seville***

On MBS Constraints and Projections
Technical Paper Publication: IDETC2021-67886
Friedrich Pfeiffer - Technical University Muenchen

Machine-Learning Frameworks in Scientific Computing: Finite Element Analysis and Multibody Simulation
Technical Presentation: IDETC2021-74806
Simon Weitzhofer - Linz Center of Mechatronics
Alexander Humer - Johannes Kepler University

Linear Stability Analysis of a Waveboard Multibody Model With a Minimal Set of Equations
Technical Paper Publication: IDETC2021-67164
A.G. Agúndez - Universidad de Sevilla
D. García-Vallejo - Universidad de Sevilla
E. Freire - Universidad de Sevilla
A.M. Mikkola - Lappeenranta University of Technology

Automatic Differentiation in Automatic Generation of the Linearized Equations of Motion
Technical Paper Publication: IDETC2021-69118
Bruce Minaker - University of Windsor
Francisco González - University of A Coruña

Correlation of Reduced-Order Models of a Threaded Fastener in Multi-Axial Loading
Technical Paper Publication: IDETC2021-69587
Kevin Moreno - Northrop Grumman
Avaneesh Murugesan - University of California, Los Angeles
Michael Sheng - University of California, Los Angeles
Laith Alqawasmi - University of New Mexico
Tariq A. Khraishi - University of New Mexico
Neal B. Hubbard - Sandia National Laboratories

MR-06-02 Medical and Rehabilitation Robotics
8/18/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Amos Winter - Massachusetts Institute of Technology***
Chair: ***Sunil Agrawal - Columbia University***

Multi-Keel Passive Prosthetic Foot Design Optimization Using the Lower Leg Trajectory Error Framework
Technical Paper Publication: IDETC2021-67673
Victor Prost - Massachusetts Institute of Technology
Heidi V. Peterson - Massachusetts Institute of Technology
Amos G. Winter V - Massachusetts Institute of Technology

Myoelectric Control of Robotic Leg Prostheses and Exoskeletons: A Review
Technical Paper Publication: IDETC2021-69203
Ali Nasr - University of Waterloo
Brokoslaw Laschowski - University of Waterloo
John McPhee - University of Waterloo

Application of a Customized Optical Force Sensor to a Cable-Driven Leg Exoskeleton
Technical Paper Publication: IDETC2021-69353
Jiaxu Huang - Columbia University
Rand Hidayah - Columbia University
Sunil Agrawal - Columbia University
Jorge A. Diez - Miguel Hernández University
Nicolas García-Aracil - Miguel Hernández University

Development and Characterization of a Modular Soft Actuator Enabled Elbow Exoskeleton for Assistive Movements
Technical Paper Publication: IDETC2021-71549
Veysel Erel - University of Texas at Arlington Research Institute
Inderjeet Singh - University of Texas at Arlington Research Institute
Alexandra R. Lindsay - University of Texas at Arlington Research Institute
W.Y. Shi - University of Texas at Arlington Research Institute
Muthu B.J. Wijesundara - University of Texas at Arlington Research Institute

CIE-05-01CIE Graduate Student Poster Symposium
8/18/2021
10:00AM–12:30PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Anand Balu Nellippallil - Florida Institute of Technology***
Chair: ***Piyush Pandita - GE Research***

Uncertainty Quantification With Label-Free Regression
Student Poster Presentation: IDETC2021-74873
Huiru Li - Purdue University

Modular Design and Simulation Optimization of Indoor Assembled Heavy-Duty Installation Transportation Equipment
Student Poster Presentation: IDETC2021-74872
Haihan Wang - Sichuan University
Xin Guo - Sichuan University

Integrating Hedonic Quality for User Experience Modelling
Student Poster Presentation: IDETC2021-74797
Yanzhang Tong - Cardiff University

Ml-Based Modeling of Communication and Decision Making in Design Teams
Student Poster Presentation: IDETC2021-74775
Bhavika Jain - Purdue University and Plaksha University
Joseph Thomas Thachil - Purdue University and Plaksha University
Sachin Lokesh - Purdue University and Plaksha University

Energy Savings Using Part Decomposition for Assembly-Based Design in Additive Manufacturing
Student Poster Presentation: IDETC2021-74749
Angshuman Deka - University at Buffalo, SUNY

Predicting Mechanical Properties of 3d Printed Lattice Structures
Student Poster Presentation: IDETC2021-74744
Shuai Ma - Chongqing University

Exploring Machine Learning for Business Process Knowledge Extraction and Management
Student Poster Presentation: IDETC2021-74730
Junya Tang - Tongji University

Modeling Consumer Behavior in Energy Systems
Student Poster Presentation: IDETC2021-74718
Gina Dello Russo - Stevens Institute of Technology
Steven Hoffenson - Stevens Institute of Technology

A Data-Driven Approach of Detecting Human Fatigue for Adaptation in Human-Robot-Collaboration
Student Poster Presentation: IDETC2021-74690
Arsalan Lambay - Cardiff University

Developing a Digital Twin Framework for Improving Resilience in Military Supply Chain (MSC) of Defense Industries
Student Poster Presentation: IDETC2021-74650
Shehu Sani - University of Liverpool

Data-Driven Recommender System for Crowdsourcing Initiatives Design
Student Poster Presentation: IDETC2021-74626
Ziqing Li - Beijing Institute of Technology

A Digital Twin Based Robotic Grasp Planning for Deformable Objects
Student Poster Presentation: IDETC2021-74841
Omey Manyar - University of Southern California

A Conceptual Design Method for Heavy Equipment Using Resilient Principles
Student Poster Presentation: IDETC2021-74870
Yi Liu - Sichuan University
Xin Guo - Sichuan University

Optimization of Automotive Reverse Supply Chain Based on Ai Techniques
Student Poster Presentation: IDETC2021-74697
Hanbing Xia - University of Liverpool

Decision-Based Framework for Retrofitting SMEs Legacy Systems in the Context of Industry 4.0
Student Poster Presentation: IDETC2021-74733
Abdulrahman Alqoud - University of Liverpool

Platform for Framing the UK SME Digital Servitization Journey
Student Poster Presentation: IDETC2021-74725
Mohammed Khan - Liverpool University

A Mobile Manipulator System for Accurate and Efficient Spraying on Large Surfaces
Student Poster Presentation: IDETC2021-74869
Neel Dhanaraj - Center for Advanced Manufacturing

A Grasp-Planning Framework for Sheet Metal Multi-Type Grippers Using an Evolutionary Approach
Student Poster Presentation: IDETC2021-74864
James Ndodana - AAU

Exploiting Graph-Structured Data for Multi-Faceted Conceptual Modelling
Student Poster Presentation: IDETC2021-74837
Yuwei Wan - Cardiff University

Going Digital: Evaluating the Effect of the Rapid Transition to Virtual Learning Due to Covid-19 on Student Experiences in an Engineering Design Course
Student Poster Presentation: IDETC2021-74830
Sandeep Krishnakumar - The Pennsylvania State University
Torsten Maier - The Pennsylvania State University
Sarah Ritter - The Pennsylvania State University
Christopher Mccomb - The Pennsylvania State University
Jessica Menold - The Pennsylvania State University

Robust Design of Complex Socio-Technical Systems Using Complex Networks
Student Poster Presentation: IDETC2021-74811
Yinshuang Xiao - University of Arkansas

Surface Morphology Analysis Using Robust Autoencoder in Additive Manufacturing With Laser Engineered Net Shaping
Student Poster Presentation: IDETC2021-74805
Zhangyue Shi - Oklahoma State University
Soumya Mandal - Oklahoma State University
Sandip Harimkar - Oklahoma State University
Chenang Liu - Oklahoma State University

DAC-13-01 Geometric Modeling and Algorithms for Design and Manufacturing
8/18/2021
10:00AM–10:50AM

Chair: ***Morad Behandish - PARC***
Chair: ***Horea Ilies - University of Connecticut***

Fast Cutter Location Surface Computation Using Ray Tracing Cores
Technical Paper Publication: IDETC2021-68081
Daiki Ishii - Ibaraki University
Masatomo Inui - Ibaraki University
Nobuyuki Umezu - Ibaraki University

Automatic Parametric Modeling From Non-Feature Based Designs for Additive Manufacturing
Technical Paper Publication: IDETC2021-71900
Xinyi Xiao - Miami University
Byeong-Min Roh - The Pennsylvania State University

On a Class of Polar Log-Aesthetic Curves
Technical Paper Publication: IDETC2021-72184
Victor Parque - Waseda University

Design Concept Generation With Variational Deep Embedding Over Comprehensive Optimization
Technical Paper Publication: IDETC2021-69544
Kikuo Fujita - Osaka University
Kazuki Minowa - Osaka University
Yutaka Nomaguchi - Osaka University
Shintaro Yamasaki - Osaka University
Kentaro Yaji - Osaka University

SuperMeshing: A New Deep Learning Architecture for Increasing the Mesh Density of Metal Forming Stress Field With Attention Mechanism and Perceptual Features
Technical Paper Publication: IDETC2021-71158
Qingfeng Xu - Tsinghua University
Zhenguo Nie - Tsinghua University
Handing Xu - Tsinghua University
Haosu Zhou - Imperial College London
Xinjun Liu - Tsinghua University

DAC-16-01 Multidisciplinary Design Optimization, Multiobjective Optimization, and Sensitivity Analysis
8/18/2021
10:00AM–10:50AM

Chair: ***Mian Li - Shanghai Jiao Tong University***
Chair: ***Hongyi Xu - University of Connecticut***

Topology Optimization Taking Into Account Geometrical Constraint of No-Closed Hole for Additive Manufacturing Based on Fictitious Physical Model Concept
Technical Paper Publication: IDETC2021-66717
Takayuki Yamada - University of Tokyo
Yuki Noguchi - University of Tokyo

A Novel Method for Calculating the Parametric Hypervolume Indicator
Technical Paper Publication: IDETC2021-66751
Jonathan M. Weaver-Rosen - Texas A&M University
Richard J. Malak Jr. - Texas A&M University

Shared Autonomous Vehicle System Design for Battery Electric Vehicle (BEV) and Fuel Cell Electric Vehicle (FCEV)
Technical Paper Publication: IDETC2021-67734
Ungki Lee - Korea Advanced Institute of Science and Technology
Sunghyun Jeon - Korea Advanced Institute of Science and Technology
Ikjin Lee - Korea Advanced Institute of Science and Technology

Conformal Topology Optimization of Heat Conduction Problems on Manifolds Using an Extended Level Set Method (X-LSM)
Technical Paper Publication: IDETC2021-67819
Xiaoqiang Xu - State University of New York at Stony Brook
Shikui Chen - Stony Brook University
Xianfeng David Gu - State University of New York at Stony Brook
Michael Yu Wang - Hong Kong University of Science and Technology

Topology Optimization Design of Structures Based on Eigenfrequency Matching
Technical Paper Publication: IDETC2021-69498
Daniel Giraldo-Guzmán - Pennsylvania State University
Clifford Lissenden - Pennsylanvia State University
Parisa Shokouhi - Pennsylvania State University
Mary Frecker - Pennsylvania State University

VIB-04-01 Industrial Applications of Vibrations and Acoustics
8/18/2021
10:00AM–10:50AM

Chair: ***Ryan Monroe - Oakland University***
Chair: ***Weidong Zhu - University of Maryland, Baltimore County***
Chair: ***Venkat Ramakrishnan - FCA Group***
Chair: ***Peter Coffin - Sandia National Laboratories***

Model-Order-Reduction Approach for Structural Health Monitoring of Large Deployed Structures With Localized Operational Excitations
Technical Paper Publication: IDETC2021-70375
Mohamed Aziz Bhouri - Massachusetts Institute of Technology

Analytic Stability Analysis of Infinite Highly Interrupted Broaching
Technical Presentation: IDETC2021-67873
Zsolt Iklodi - Budapest University of Technology and Economics
Markel Sanz-Calle - Ideko
Zoltan Dombovari - Budapest University of Technology and Economics

Comparison of Weld Fatigue Methods and the Use of a Multi-Scale Method
Technical Presentation: IDETC2021-74358
James Freymiller - ATA Engineering
Adam Brink - Sandia National Laboratories
David Najera-Flores - ATA Engineering
Blake Reece - Sandia National Laboratories
Jason Schneider - Sandia National Laboratories
Michael Ross - Sandia National Laboratories

Health Monitoring Using Acoustic Emission Technique During Fused Filament Fabrication Printing Process
Technical Paper Publication: IDETC2021-70585
Ke Xu - Stevens Institute of Technology
Souran Manoochehri - Stevens Institute of Technology

Resonance and Contact Stiffness Based Nonuniform Web Tension Monitoring in Roll-to-Roll Processes
Technical Presentation: IDETC2021-67986
Dan Feng - Purdue University
Arvind Raman - Purdue University
Ryan Wagner - Purdue University

DTM-11 Design People: Collaboration and Behaviors
8/18/2021
10:00AM–10:50AM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Scarlett Miller - Penn State***
Chair: ***Noe Vargas Hernandez - University of Texas Rio Grande Valley***

Comparing Virtual and Face-to-Face Team Collaboration: Insights From an Agent-Based Simulation
Technical Paper Publication: IDETC2021-66043
Harshika Singh - Politecnico di Milano
Gaetano Cascini - Politecnico di Milano
Christopher McComb - Pennsylvania State University

"No, We're Not!" The Classification and Impact of Blocking Behavior in Design Team Meetings
Technical Paper Publication: IDETC2021-67978
John Mitchell - Pennsylvania State University
Daniel Henderson - Pennsylvania State University
Grace Halleran - Pennsylvania State University
Aditya Singh - Pennsylvania State University
Kathryn Jablokow - Pennsylvania State University
Neeraj Sonalkar - Stanford University
Jonathan Edelman - Hasso Plattner Institute

Some (Team) Assembly Required: An Analysis of Collaborative Computer-Aided Design Assembly
Technical Paper Publication: IDETC2021-68507
Kathy Cheng - University of Toronto
Alison Olechowski - University of Toronto

There Is No "I" in Team but There Is in Innovation: How Individual Attributes Impact Team Ideation and Selection Practices
Technical Paper Publication: IDETC2021-70915
Aoran Peng - Pennsylvania State University
Sam Hunter - Pennsylvania State University
Scarlett R. Miller - Pennsylvania State University

The Influence of Team Goal Alignment and Awareness on Human-Centered Design Team Decision-Making Strategy
Technical Paper Publication: IDETC2021-69793
Vivek Rao - University of California, Berkeley
Ananya Krishnan - University of California, Berkeley
Jieun Kwon - University of Minnesota, Twin Cities
Euiyoung Kim - Technical University of Delft
Alice Agogino - University of California, Berkeley
Kosa Goucher-Lambert - University of California, Berkeley

DEC-03-01 Innovative Practices in Design Education (Other Topics)
8/18/2021
11:10AM–12:30PM

Chair: ***Elizabeth Starkey - Pennsylvania State University***
Chair: ***Mohammad Fazelpour - University of Maryland***

An Investigation of the Influence of Disciplinary Distance in Interdisciplinary Education Through Faculty's Experience
Technical Paper Publication: IDETC2021-66739
Xiaoqi Feng - Aalto University
Katja Hölttä-Otto - Aalto University

Sustainability and Design Education: The Current Status of Product Design Higher Education in the UK
Technical Paper Publication: IDETC2021-68461
Emelia Delaney - Aston University
Wei Liu - King's College London

Assessment of Student Learning Through Reflection on Doing in Engineering Design
Technical Paper Publication: IDETC2021-70250
Yanwei Sun - Beijing Institute of Technology
Shan Peng - University of Oklahoma
Zachary Ball - Carnegie Mellon University
Zhenjun Ming - Beijing Institute of Technology
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

Modification of Robotics Curriculum for Project-Based First Year Engineering Design Course
Technical Paper Publication: IDETC2021-70711
Hannah Nolte - Penn State
Xiaomei Tan - Penn State
Alexander Weaver - Penn State
Elizabeth Starkey - Penn State

Analysis of the Knowledge Gain and Cognitive Load Experienced Due to the Computer-Aided Instruction of Additive Manufacturing Processes
Technical Paper Publication: IDETC2021-71667
Jayant Mathur - Pennsylvania State University
Scarlett R. Miller - Pennsylvania State University
Timothy W. Simpson - Pennsylvania State University
Nicholas A. Meisel - Pennsylvania State University

MESA-03-01 Robotics and Mobile Machines
8/18/2021
11:10AM–12:30PM

Chair: ***Massimo Callegari - Polytechnic University of Marche***
Chair: ***Matteo C. Palpacelli - Polytechnic University of Marche***
Chair: ***Chris Pretty - University of Canterbury***

Tracking and Synchronization Control for Dual-Drive System by Using Iterative Learning Control
Student Poster Presentation: IDETC2021-68071
Dongjun Oh - Sungkyunkwan University
Seungho Lee - SungKyunKwan University
Jachoon Koo - SungKyunKwan University

Autonomous Transport System With Taxi-Type Automated Guided Vehicles Based on Transport Density
Technical Paper Publication: IDETC2021-68097
Takuma Nakatani - Doshisha University
Daiki Morikawa - Doshisha University
Naoki Harada - Doshisha University
Toshiki Hirogaki - Doshisha University
Eiichi Aoyama - Doshisha University

Development of an End-Effector for Mitigation of Collisions
Technical Paper Publication: IDETC2021-68928
Domenico Tommasino - University of Padova
Matteo Bottin - University of Padova
Giulio Cipriani - University of Padova
Alberto Doria - University of Padova
Giulio Rosati - University of Padova

An Effective Approach to Model Parallel Robots With Flexible Links
Technical Paper Publication: IDETC2021-69983
Stefano Brillarelli - Polytechnic University of Marche
Matteo Claudio Palpacelli - Polytechnic University of Marche

Mechatronic Design of a Mobile Robot for Personal Assistance
Technical Paper Publication: IDETC2021-70389
Luigi Tagliavini - Politecnico di Torino
Andrea Botta - Politecnico di Torino
Luca Carbonari - Politecnico di Torino
Giuseppe Quaglia - Politecnico di Torino
Dario Gandini - Politecnico di Torino
Marcello Chiaberge - Politecnico di Torino

Design of a Human-Robot Collaborative System: Methodology and Case Study
Technical Paper Publication: IDETC2021-70684
Cecilia Scoccia - Polytechnic University of Marche
Marianna Ciccarelli - Polytechnic University of Marche
Giacomo Palmieri - Polytechnic University of Marche
Massimo Callegari - Polytechnic University of Marche

MR-04-02 Origami-Based Engineering Design
8/18/2021
11:10AM–12:30PM

Chair: ***Leila Notash - Queens University***
Chair: ***Shikui Chen - Stony Brook University***
Chair: ***Tomohiro Tachi - University of Tokyo***

Auxetic Structures Based on Rhombic Tiling
Technical Paper Publication: IDETC2021-67141
Kanata Warisaya - University of Tokyo
Hiroaki Hamanaka - Hyogo University of Teacher Education
Asao Tokolo - TOKOLO.COM
Tomohiro Tachi - University of Tokyo

The Kinematic Analysis and Bistable Characteristics of the Winding Origami Structure
Technical Paper Publication: IDETC2021-67410
Peng Liu - Tianjin University
Jiayao Ma - Tianjin University
Yan Chen - Tianjin University
Lin Yuan - Tianjin University
Haifeng Zhao - Chinese Academy of Sciences
Ke Wang - Chinese Academy of Sciences

Towards a Synthesis Method of Kresling Tower Used as a Compliant Building Block
Technical Paper Publication: IDETC2021-68904
John Berre - ICube
François Geiskopf - INSA - CNRS - University of Strasbourg
Lennart Rubbert - INSA - CNRS - University of Strasbourg
Pierre Renaud - INSA - CNRS - University of Strasbourg

Geometry and Kinematics of Cylindrical Waterbomb Tessellation
Technical Paper Publication: IDETC2021-69252
Rinki Imada - University of Tokyo
Tomohiro Tachi - University of Tokyo

Design of Stackable Origami Structures With Elastic Deployment Capabilities
Technical Paper Publication: IDETC2021-70028
Peiwen J. Ma - University of California, Irvine
Alessandro Verniani - University of California, Irvine
Edwin A. Peraza Hernandez - University of California, Irvine

Dynamics of Dual-Cell Series Miura-Ori Structures With Different Types of Inter-Cell Connections
Technical Paper Publication: IDETC2021-71939
Hai Zhou - Tongji University
Haiping Wu - Fudan University
Jian Xu - Tongji University
Hongbin Fang - Fudan University

A Study of the Multi-Stability in a Non-Rigid Stacked Miura-Origami Cellular Mechanism
Technical Paper Publication: IDETC2021-67670
Jiayue Tao - Clemson University
Suyi Li - Clemson University

DAC-07-01 Design for Additive Manufacturing
8/18/2021
11:10AM–12:30PM

Chair: ***Nicholas Meisel - Pennsylvania State University***
Chair: ***Yaoyao Fiona Zhao - McGill University***

A Multi-Scale Topology Optimization Approach for Optimal Macro-Layout and Local Grading of TPMS-Based Lattices
Technical Paper Publication: IDETC2021-67163
Niclas Strömberg - Örebro University

Topology Optimization With Locally Evaluable Complement Space Connectivity
Technical Paper Publication: IDETC2021-67499
Clinton B. Morris - Palo Alto Research Center
Amir M. Mirzendehdel - Palo Alto Research Center
Morad Behandish - Palo Alto Research Center

In-Situ Temperature Monitoring of ABS During Fused Filament Fabrication (FFF) Process With Varying Process Parameters
Technical Paper Publication: IDETC2021-69813
Youmna Mahmoud - Stevens Institute of Technology
Souran Manoochehri - Stevens Institute of Technology

Goal-Oriented Inverse Design (GoID) of Feedstock Filament for Fused Deposition Modeling
Technical Paper Publication: IDETC2021-70503
Angshuman Deka - University at Buffalo
Anand Balu Nellippallil - Florida Institute of Technology
John Hall - University at Buffalo

Topology Optimization for Additively Manufactured Self-Supporting Axisymmetric Structures
Technical Paper Publication: IDETC2021-70528
Hak Yong Lee - Johns Hopkins University
Julia D.W. Carroll - Johns Hopkins University
James K. Guest - Johns Hopkins University

3D Printed Food Design and Fabrication Approach for Manufacturability, Rheology, and Nutrition Trade-Offs
Technical Paper Publication: IDETC2021-70663
Rahmatul Mahmoud - Texas Tech University
Quang Nguyen - Texas Tech University
Gordon Christopher - Texas Tech University
Paul F. Egan - Texas Tech University

Mastering Manufacturing: Exploring the Influence of Engineering Designers' Prior Experience When Using Design for Additive Manufacturing
Technical Paper Publication: IDETC2021-71686
Rohan Prabhu - Pennsylvania State University
Timothy W. Simpson - Pennsylvania State University
Scarlett R. Miller - Pennsylvania State University
Nicholas A. Meisel - Pennsylvania State University

AVT-08-03 Advances in Intelligent Vehicles
8/18/2021
11:10AM–12:30PM

Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Beshah Ayalew - Clemson University-ICAR***
Chair: ***Guangqiang Wu - Tongji University Shanghai***

Real-Time Measurement Method of Rail Vehicle Wheel Flange Wear Using Inductive and Temperature Sensors
Technical Paper Publication: IDETC2021-66879
James Ndodana Njaji - Addis Ababa University
Celestin Nkundineza - Addis Ababa University

Remote Emergency Braking System for Autonomous Racing Electric Vehicles
Technical Paper Publication: IDETC2021-67426
Gennaro Sorrentino - Politecnico di Torino
Luca Danese - Politecnico di Torino
Salvatore Circosta - Politecnico di Torino
Stefano Feraco - Politecnico di Torino
Irfan Khan - Politecnico di Torino
Sara Luciani - Politecnico di Torino
Angelo Bonfitto - Politecnico di Torino
Nicola Amati - Politecnico di Torino

Racing Driver Modeling Based on Driving Behavior
Technical Paper Publication: IDETC2021-71113
Jinzhen Wang - Tsinghua University
Yiming Cheng - Tsinghua University
Liangyao Yu - Tsinghua University

Local Trajectory Planning for Autonomous Racing Vehicles Based on the Rapidly-Exploring Random Tree Algorithm
Technical Paper Publication: IDETC2021-67434
Eugenio Tramacere - Politecnico di Torino
Sara Luciani - Politecnico di Torino
Stefano Feraco - Politecnico di Torino
Salvatore Circosta - Politecnico di Torino
Irfan Khan - Politecnico di Torino
Angelo Bonfitto - Politecnico di Torino
Nicola Amati - Politecnico di Torino

Design of Light Weight-Low Cost Remotely Operated Underwater Vehicle
Technical Paper Publication: IDETC2021-70555
Salah Salah - Canadian International College
Kareem El Telbany - Canadian International College
Bavly Samy - Canadian International College
Ahmed Khalil - Canadian International College
Karim El-Ganzoury - Canadian International College
Wessam Hussien - October University for Modern Sciences and Arts
Mostafa Yacoub - Military Technical College

MR-08-03 Novel Mechanisms, Robots, and Applications
8/18/2021
11:10AM–12:30PM

Chair: ***Leila Notash - Queens University***
Chair: ***David Cappelleri - Purdue University***
Chair: ***Dennis Hong - University of California, Los Angeles***

Mechanical Design of a New Anthropomorphic Robot for Fastening in Wing-Box
Technical Paper Publication: IDETC2021-68098
Jiefeng Jiang - Hangzhou Normal University
Fengfeng (Jeff) Xi - Ryerson University
Jingjing You – Nanjing Forestry University
Qunxing Xue - Ryerson University

AgBug: Agricultural Robotic Platform for In-Row and Under Canopy Crop Monitoring and Assessment
Technical Paper Publication: IDETC2021-68143
Raja Manish - Purdue University
Ze An - Purdue University
Ayman Habib - Purdue University
Mitchell R. Tuinstra - Purdue University
David J. Cappelleri - Purdue University

Modular Foldable Airship Concept for Subterranean Exploration
Technical Paper Publication: IDETC2021-69954
Jorge Esteban Salas Gordóniz - École de Technologie Supérieure
Nicolas Reeves - University of Québec in Montréal
David St-Onge - École de Technologie Supérieure

Introduction and Preliminary Investigation of Buoyancy Assisted Robots That Are Cheap, Safe, and Will Never Fall Down
Technical Paper Publication: IDETC2021-70631
Matthew David Williams - University of California
Dennis Hong - University of California

Design and Kinematic Simulation of a Novel Leg Mechanism for Multi-Legged Robots
Technical Paper Publication: IDETC2021-70642
Simone Asci - Queen Mary University of London
Ketao Zhang - Queen Mary University of London

A Semi-Autonomous Quadruped Robot for Performing Disinfection in Cluttered Environments
Technical Paper Publication: IDETC2021-70850
Yiyu Chen - University of Southern California
Abhinav Pandey - University of Southern California
Zhiwei Deng - University of Southern California
Anthony Nguyen - University of Southern California
Ruiqi Wang - University of Southern California
Pornrawee Thonapalin - University of Southern California
Quan Nguyen - University of Southern California
Satyandra K. Gupta - University of Southern California

Precise and Effective Robotic Tool Change Strategy Using Visual Servoing With RGB-D Camera
Technical Paper Publication: IDETC2021-72123
Danming Wei - University of Louisville
Christopher M. Trombley - University of Louisville
Andriy Sherehiy - University of Louisville
Dan O. Popa - University of Louisville

DTM-12 Lightning Talks on New & Revisiting Directions
8/18/2021
11:10AM–12:30PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Tahira Reid - Purdue University***
Chair: ***Vimal Viswanathan - San Jose State University***

Embedding Equity and Elevating Community Voices in the Transition to Clean Mobility
Technical Presentation: IDETC2021-66956
Sita Syal - Stanford University
Margot Gerritsen - Stanford University

Why Couldn't We Do This More Often? Exploring the Feasibility of Virtual and Distributed Work in Product Design Engineering
Technical Presentation: IDETC2021-69163
Sharon Ferguson - University of Toronto
James Chen - University of Toronto
Safa Faidi - University of Toronto
Kimberly Lai - University of Toronto
Kevin Leonardo - University of Toronto
Alison Olechowski - University of Toronto

Linking Design Inquiries to Design Features in Engineering Design
Technical Presentation: IDETC2021-71969
Rafi Hanafiah - University of California
Daniele Grandi - Autodesk Research
Kosa Goucher-Lambert - University of California

Generative Design of Authentic 3D Shapes From 2D Sketches Using Target-Embedding Variational Autoencoder
Technical Presentation: IDETC2021-73981
Xingang Li - University of Arkansas
Charles Xie - Institute for Future Intelligence
Zhenghui Sha - University of Arkansas

Towards Fairness-Aware Design Decision-Making
Technical Presentation: IDETC2021-74760
Sumaiya Taru - University of Arkansas
Lu Zhang - University of Arkansas
Dinesh Gauri - University of Arkansas
Zhenghui Sha - University of Arkansas

MSNDC-05-02 Modeling, Simulation, and Validation of Vehicle Dynamics and Mobility
8/18/2021
1:00PM–1:50PM

Chair: ***Jose Escalona - University of Seville***
Chair: ***Hiroyuki Sugiyama - The University of Iowa***
Chair: ***Robert Seifried - Hamburg University of Technology***
Chair: ***Paramsothy Jayakumar - U.S. Army GVSC***

Study of the Kinematic and Dynamic Linearization of the Equations of Motion of Railway Vehicles
Technical Presentation: IDETC2021-68534
Javier F. Aceituno - University of Jaen
José L. Escalona - University of Seville

Cross-Sensitivity Characteristics of Instrumented Wheelset Associated With Longitudinal Force and Lateral Contact Position
Technical Paper Publication: IDETC2021-67522
Takatoshi Hondo - Railway Technical Research Institute
Takayuki Tanaka - Railway Technical Research Institute
Shoya Kuniyuki - Railway Technical Research Institute
Mitsugi Suzuki - Railway Technical Research Institute

Nonlinear Control of a Transient Inductrack System Using State Feedback
Technical Paper Publication: IDETC2021-69961
Ruiyang Wang - University of Southern California
Bingen Yang - University of Southern California

Prediction of Driver's Center of Gravity Position on a Stand-Up Type PMV Considering Intentions
Technical Paper Publication: IDETC2021-69357
Chihiro Nakagawa - Osaka Prefecture University
Kosuke Sato - Osaka Prefecture University
Atsuhiko Shintani - Osaka Prefecture University

Numerical Analysis of Parametric Excitation Generated in a Wheelset With Mass Unbalance
Student Poster Presentation: IDETC2021-74557
Junta Umemoto - University of Tsukuba
Hiroshi Yabuno - University of Tsukuba

MSNDC-01-02 Computational Methods and Software Tools in Multibody Systems and Nonlinear Dynamics
8/18/2021
1:00PM–1:50PM

Chair: ***Karin Nachbagauer - University of Applied Sciences Upper Austria***
Chair: ***Fran González - University of A Coruña***
Chair: ***Jose Escalona - University of Seville***
Chair: ***Alexander Humer - Johannes Kepler University***

On the Interpretation of the Adjoint Variables in Optimality Conditions of Time-Optimal Control Problems
Technical Presentation: IDETC2021-74132
Daniel Lichtenecker - Technical University of Munich
Philipp Eichmeir - University of Applied Sciences Upper Austria, Campus Wels
Karin Nachbagauer - University of Applied Sciences Upper Austria, Campus Wels

Nonsmooth Modal Analysis of a Two-Bar System via Boundary Element Method
Technical Presentation: IDETC2021-74729
Tianzheng Lu - McGill University
Mathias Legrand - McGill University

Flapping-Wing Aerial Vehicle Dynamics Optimization via Dmoc
Technical Presentation: IDETC2021-74564
Zdravko Terze - University of Zagreb
Viktor Pandža - University of Zagreb
Marko Kasalo - University of Zagreb
Dario Zlatar - University of Zagreb

Multi-Objective Cycle Optimization of a Three Degrees of Freedom Robotic System
Technical Presentation: IDETC2021-74607
Rodrigo Randulfe López - Universidade de Vigo
Marcos López Lago - Universidade de Vigo
Enrique Paz Domonte - Universidade de Vigo
Jacobo González Baldonedo - Universidade de Vigo
José Ángel López Campos - Universidade de Vigo
Abraham Segade Robleda - Universidade de Vigo
Enrique Casarejos Ruiz - Universidade de Vigo

Preliminary Study on Multibody Modeling and Simulation of an Underactuated Gripper With Differential Transmission
Technical Paper Publication: IDETC2021-72162
Gabriele Maria Achilli - University of Perugia
Silvia Logozzo - University of Perugia
Maria Cristina Valigi - University of Perugia
Monica Malvezzi - University of Siena

MESA-02-01 Bio-Inspired Robotics and Soft Robotics/Mechatronic and Embedded Systems for Agriculture 4.0/Bio-Mechatronics - Medical Devices & Technologies
8/18/2021
1:00PM–1:50PM

Chair: ***Abhijit Nagchaudhuri - University of Maryland Eastern Shore***
Chair: ***Chris Pretty - University of Canterbury***

Functional Analysis of the Trunk Flexion-Extension Through Gaussian Functions Fitting of the Movement Profile
Technical Paper Publication: IDETC2021-70338
Cinzia Amici - University of Brescia
Barbara Piovanelli - IRCCS Fondazione Don Carlo Gnocchi
Federica Ragni - University of Brescia
Raffaele Formicola - University of Brescia
Valter Cappellini - University of Brescia
Gabriele Candiani - Institute for Electromagnetic Sensing of the Environment, CNR
Alberto Borboni - University of Brescia
Stefano Negrini - University of Milan "La Statale"/IRCCS Istituto Ortopedico Galeazzi

Evoked Electromyographic Fatigue Indices During Intermittent Stimulation Towards Dynamic Wrist Contractions
Technical Paper Publication: IDETC2021-70962
Lachlan R. McKenzie - University of Canterbury
Benjamin C. Fortune - University of Canterbury
Logan T. Chatfield - University of Canterbury
Christopher G. Pretty - University of Canterbury

Corrugated Diaphragm Actuator for Soft Robotic and Exoskeleton Applications
Technical Paper Publication: IDETC2021-71544
Veysel Erel - University of Texas at Arlington Research Institute
Alexandra R. Lindsay - University of Texas at Arlington Research Institute
Inderjeet Singh - University of Texas at Arlington Research Institute
Muthu B.J. Wijesundara - University of Texas at Arlington Research Institute

Recent Field Implementation of Contemporary and Smart Farming Technologies at the University of Maryland Eastern Shore
Technical Paper Publication: IDETC2021-68464
Abhijit Nagchaudhuri - University of Maryland Eastern Shore
Christopher Hartman - University of Maryland Eastern Shore
Travis Ford - University of Maryland Eastern Shore
Jesuraj Pandya - University of Maryland Eastern Shore

DAC-06-01 Design and Optimization of Energy Systems
8/18/2021
1:00PM–1:50PM

Chair: ***Jie Zhang - University of Texas at Dallas***
Chair: ***Zhimin Xi - Rutgers University***

Evaluation of Commercial Building Clusters With Energy Storage to Reduce Reliance on Electrical Utility Grids
Technical Paper Publication: IDETC2021-67313
Gregory Kaminski - Stevens Institute of Technology
Philip Odonkor - Stevens Institute of Technology

Reliability Constrained Optimal Design of Distributed Generators in Power System Under Load and Wind Turbine Generation Uncertainty
Technical Paper Publication: IDETC2021-68199
Zhetao Chen - Rutgers University – New Brunswick
Zhimin Xi - Rutgers University – New Brunswick

Short-Term Vehicle Velocity Forecasting via Cycle Segmentation_x000B_Model Selection
Technical Paper Publication: IDETC2021-69058
Yuanzhi Liu - The University of Texas at Dallas
Jie Zhang - The University of Texas at Dallas

Co-Design Optimization of a Combined Heat and Power Hybrid Energy System
Technical Paper Publication: IDETC2021-71304
Dongze Li - University of Illinois at Urbana-Champaign
Jiaxin Wu - University of Illinois at Urbana-Champaign
Jie Zhang - University of Texas at Dallas
Pingfeng Wang - University of Illinois at Urbana-Champaign

Using Physics-Informed Generative Adversarial Networks to Perform Super-Resolution for Multiphase Fluid Simulations
Technical Paper Publication: IDETC2021-66719
Matthew Li - Pennsylvania State University
Christopher McComb - Pennsylvania State University

VIB-05-01 Dynamics of Soft Media, Robotics, Solids and Metamaterials
8/18/2021
1:00PM–1:50PM

Chair: ***Michael Leamy - Georgia Institute of Technology***
Chair: ***Hongbin Fang - Fudan University***
Chair: ***Serife Tol - University of Michigan***
Chair: ***Peter Coffin - Sandia National Lab***

A Modified Incremental Harmonic Balance Method for Periodic Forced Oscillations of a Dielectric Elastomer Membrane Undergoing In-Plane Deformation
Technical Paper Publication: IDETC2021-70823
Jian Zhang - Dalian University of Technology
Jian Zhao - Dalian University of Technology
Xuefeng Wang - Peking University
Hongyu Wang - Dalian University of Technology

Joint and Deformation Actuation for Motion Control of Articulated Flexible Robots: Small Deformation Problem
Technical Presentation: IDETC2021-67322
Zhengfeng Bai - Harbin Institute of Technology
Ahmed A. Shabana - University of Illinois at Chicago

Control of the Motion and Shape of Soft Robotic Systems
Technical Presentation: IDETC2021-66696
Ahmed Eldeeb - University of Illinois at Chicago
Ahmed A. Shabana - University of Illinois at Chicago

Negative Refractive Index in a Two-Dimensional Nonlinear Rotator Lattice
Technical Paper Publication: IDETC2021-71840
Lezheng Fang - Georgia Institute of Technology
Michael J. Leamy - Georgia Institute of Technology

Frequency Tunable Phononic Crystal Flat Lens for Subwavelength Imaging
Technical Paper Publication: IDETC2021-71319
Hrishikesh Danawe - University of Michigan
Serife Tol - University of Michigan

AVT-05-04 Advances in Vehicle Electrification and Powertrain Design
8/18/2021
1:00PM–1:50PM

Chair: ***Joel Anstrom - Penn State University***
Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Venkat Ramakrishnan - FCA Group***
Chair: ***Angelo Bonfitto - Politecnico Di Torino***

A Machine Learning Method for State of Charge Estimation in Lead-Acid Batteries for Heavy-Duty Vehicles
Technical Paper Publication: IDETC2021-68469
Sara Luciani - Politecnico di Torino
Stefano Feraco - Politecnico di Torino
Angelo Bonfitto - Politecnico di Torino
Andrea Tonoli - Politecnico di Torino
Nicola Amati - Politecnico di Torino
Maurizio Quaggiotto - CNH Industrial - IVECO

Seamless Shifting Control Based on Power Balance Method in Emergency Braking Condition
Technical Paper Publication: IDETC2021-71284
Zhenghong Lu - Tsinghua University
Jian Song - Tsinghua University
Liangyao Yu - Tsinghua University

Optimal Selection of Equivalence Factors for ECMS in Mild Hybrid Electric Vehicles
Technical Paper Publication: IDETC2021-71621
Shailesh Hegde - Politecnico di Torino
Angelo Bonfitto - Politecnico di Torino
Hadi Rahmeh - Politecnico di Torino
Nicola Amati - Politecnico di Torino
Andrea Tonoli - Politecnico di Torino

DTM-13 Design People: Understanding How Designers Think and Behave
8/18/2021
1:00PM–1:50PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Daniel McAdams - Texas A&M University***
Chair: ***kenton fillingim - Georgia Institute of Technology***

Understanding Professional Designers' Knowledge Organization Behavior: A Case Study in Product Teardowns
Technical Paper Publication: IDETC2021-68589
Ye Wang - Autodesk Research
Daniele Grandi - Autodesk Research
Dixun Cui - University of California, Berkeley
Vivek Rao - University of California, Berkeley
Kosa Goucher-Lambert - University of California, Berkeley

Quantifying the Predictive Abilities of Speculative Fiction: A Feasibility Study
Technical Paper Publication: IDETC2021-68723
Wanyu Xu - Texas A&M University
Maulik C. Kotecha - Texas A&M University
Diego Padilla - Texas A&M University
Juliette Jimenez - Texas A&M University
Daniel A. McAdams - Texas A&M University

How Designers Talk: Constructing and Analyzing a Design Thinking Data Corpus
Technical Paper Publication: IDETC2021-71200
Peter Lloyd - Delft University of Technology
Almila Akdag Salah - Delft University of Technology
Senthil Chandrasegaran - Delft University of Technology

Exploring the Effects of Individual Differences in Function Structure Modeling Behaviors
Technical Paper Publication: IDETC2021-71827
Apurva Patel - Clemson University
Joshua D. Summers - University of Texas at Dallas

Connecting Design Actions, Reasoning, and Outcomes in Concept-Selection
Technical Paper Publication: IDETC2021-71830
Yakira Mirabito - University of California, Berkeley
Kosa Goucher-Lambert - University of California, Berkeley

DFMLC-03-01: Design for Additive Manufacturing
8/18/2021
2:10PM–3:00PM

Chair: ***Yaoyao Fiona Zhao - McGill University***
Chair: ***Junfeng Ma - Mississippi State University***

Printability and Fidelity of Protein-Enriched 3D Printed Foods: A Case Study Using Cricket and Pea Protein Powder
Technical Paper Publication: IDETC2021-67783
Stefania Chirico Scheele - Texas Tech University
Mohammed Naimul Hoque - Texas Tech University
Gordon Christopher - Texas Tech University
Paul F. Egan - Texas Tech University

Exploration of Support Structure Design for Additive Manufacturing at a Major OEM: A Case Study
Technical Paper Publication: IDETC2021-69818
Lucas Morand - Clemson University
Joshua D. Summers - University of Texas at Dallas
Garrett J. Pataky - Clemson University

Design of Fused Deposition Modeling of Multiple Materials (FD3M)
Technical Paper Publication: IDETC2021-69501
David O. Kazmer - University Massachusetts Lowell
Robert G. Lahaie - University Massachusetts Lowell
Christopher J. Hansen - University Massachusetts Lowell

Orientation Optimization in Additive Manufacturing: Evaluation of Recent Trends
Technical Paper Publication: IDETC2021-71958
Jannatul Bushra - University of Arizona
Hannah D. Budinoff - University of Arizona

Development of a Design for Additive Manufacturing Worksheet for Medical Casts
Technical Paper Publication: IDETC2021-72103
Heena Noh - Incheon National University
Kijung Park - Incheon National University
Kiwon Park - Incheon National University
Gül E. Okudan Kremer - Iowa State University

MSNDC-06-01 Machine Learning in Dynamics
8/18/2021
2:10PM–3:00PM

Chair: ***Johannes Gerstmayr - Leopold-Franzens-Universität Innsbruck***
Chair: ***Frank Naets - KU Leuven***

Enabling Artificial Intelligence Studies in Off-Road Mobility Through Physics-Based Simulation of Multi-Agent Scenarios
Technical Paper Publication: IDETC2021-67070
Aaron Young - University of Wisconsin-Madison
Jay Taves - University of Wisconsin-Madison
Asher Elmquist - University of Wisconsin-Madison
Radu Serban - University of Wisconsin-Madison
Dan Negrut - University of Wisconsin-Madison
Simone Benatti - University of Parma
Alessandro Tasora - University of Parma

Reservoir Computing With the Lorenz System
Technical Presentation: IDETC2021-71324
Md. Raf E. Ul Shougat - North Carolina State University
XiaoFu Li - North Carolina State University
Tushar Mollik - North Carolina State University
Edmon Perkins - North Carolina State University

A Kalman Filter for State-Input Estimation With Rigid Multibody Models Based on the Deep Learning of Minimal Coordinates
Technical Presentation: IDETC2021-73488
Andrea Angeli - KU Leuven
Wim Desmet - KU Leuven
Frank Naets - KU Leuven

Constrained Deep Learning for System Identification and Predictive Control of Unknown Nonlinear Systems
Technical Presentation: IDETC2021-73985
Jan Drgona - Pacific Northwest National Laboratory
Aaron Tuor - Pacific Northwest National Laboratory
Elliott Skomski - Pacific Northwest National Laboratory
Soumya Vasisht - Pacific Northwest National Laboratory
Draguna Vrabie - Pacific Northwest National Laboratory

A Study of a Pendulum-Like Vibration Isolator With Quasi-Zero-Stiffness
Technical Paper Publication: IDETC2021-70184
Yishen Tian - Harbin Institute of Technology
Dengqing Cao - Harbin Institute of Technology
Yan Wang - University of New South Wales

MESA-11-01 Sensors and Actuators
8/18/2021
2:10PM–3:00PM

Chair: ***Tim Giffney - University of Canterbury***
Chair: ***Chris Pretty - University of Canterbury***

Stress and Resistance Relaxation for Carbon Nanoparticle Silicone Rubber Composite Large-Strain Sensors
Technical Paper Publication: IDETC2021-69206
Richie Ellingham - University of Canterbury
Tim Giffney - University of Canterbury

A Model for the Digital Method of Measuring LED Incident Photocurrent
Technical Paper Publication: IDETC2021-70651
Jake D. Campbell - University of Canterbury
Christopher G. Pretty - University of Canterbury
Jennifer Knopp - University of Canterbury
Phil J. Bones - University of Canterbury
Geoffrey Chase - University of Canterbury

A Tripolar Electromyography Device With Active Electrode-Skin Impedance Imbalance Compensation
Technical Paper Publication: IDETC2021-71924
Alex Towse - University of Canterbury
Ben Fortune - University of Canterbury
Chist Pretty - University of Canterbury
Michael Hayes - University of Canterbury

Optimization of Permanent Magnet Structure Parameters in Tubular Permanent Magnet Synchronous Linear Motor for HF Square-Wave Injection Sensorless Algorithm
Technical Paper Publication: IDETC2021-72047
Luhong Zhang - Tsinghua University
Bingran Li - Tsinghua University
Chunlei Zhang - Tsinghua University
Hui Zhang - Tsinghua University
Peiqing Ye - Tsinghua University

MSNDC-07-01 Time-Varying and Delay Systems
8/18/2021
2:10PM–3:00PM

Chair: ***James Chagdes - Miami University***
Chair: ***Zoltan Dombovari - Budapest University of Technology and Economics***
Chair: ***David Lehotzky - Budapest University of Technology and Economics***

An Alternative Formulation for Modeling Drillstring Self-Excited Oscillations Considering PDC Bits With Realistic Cutter Layout
Technical Paper Publication: IDETC2021-68257
Kaixiao Tian - University of Minnesota
Emmanuel Detournay - University of Minnesota
He Zhang - University of Minnesota

Robotic Machining Applications: Delayed Acceleration Feedback Control in Milling
Technical Presentation: IDETC2021-73909
Andras Bartfai - Budapest University of Technology and Economics
Asier Barrios - Ideko
Zoltan Dombovari - Budapest University of Technology and Economics

A Simple Approach for the Computation of Lyapunov-Floquet Transformations for the Mathieu Equation
Technical Paper Publication: IDETC2021-71028
Ashu Sharma - Auburn University

Mechanical Systems With Climate Change: Snapshot Attractors and Saddles in Time Varying Dynamics
Technical Presentation: IDETC2021-74536
György Károlyi - Budapest University of Technology and Economics
Dániel Jánosi - Eötvös University
Tamás Tél - Eötvös University

Augmented Fourier Approximation of the Strong Solution of the Stochastic Delay Mathieu Equation
Technical Presentation: IDETC2021-74782
Henrik Tamás Sykora - Budapest University of Technology and Economics
Zoltan Dombovari - Budapest University of Technology and Economics
Daniel Bachrathy - Budapest University of Technology and Economics

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CIE-04-01 CIE Special Session: Design, Simulation and Optimization for Additive Manufacturing
8/18/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Zhenghui Sha - University of Arkansas***

Two-Scale Topology Optimization With Parameterized Cellular Structures
Technical Paper Publication: IDETC2021-71980
Sina Rastegarzadeh - University of Illinois at Chicago
Jun Wang - University of Maryland
Jida Huang - University of Illinois at Chicago

Using Unsupervised Learning for Regulating Deposition Speed During Robotic Wire Arc Additive Manufacturing
Technical Paper Publication: IDETC2021-71865
Ashish Kulkarni - University of Southern California
Prahar M. Bhatt - University of Southern California
Alec Kanyuck - University of Southern California
Satyandra K. Gupta - University of Southern California

Classification of Dimensional Deviation in Additive Manufacturing LPBF Process for AlSi10Mg Alloy According to ISO 286 and ANSI B4.2
Technical Paper Publication: IDETC2021-71683
Sabrine Ben Amor - Université de Sousse
Floriane Zongo - École de technologie supérieure, Montreal
Borhen Louhichi - Université de Sousse
Vladimir Brailovski - École de technologie supérieure, Montreal
Antoine Tahan - École de technologie supérieure, Montreal

Design 3D Printed Coils for WPT
Technical Paper Publication: IDETC2021-71412
Jun Xu - Delft University of Technology
E. (Zjenja) Doubrovski - Delft University of Technology
Jo M. P. Geraedts - Delft University of Technology
Yu (Wolf) Song - Delft University of Technology

Enabling Multi-Robot Cooperative Additive Manufacturing: Centralized vs. Decentralized Approaches
Technical Paper Publication: IDETC2021-71343
Saivipulteja Elagandula - University of Arkansas
Laxmi Poudel - University of Arkansas
Wenchao Zhou - University of Arkansas
Zhenghui Sha - University of Arkansas

In-Situ Observation Selection for Quality Management in Metal Additive Manufacturing
Technical Paper Publication: IDETC2021-70035
Byeong-Min Roh – Pennsylvania State University
Soundar R.T. Kumara - Pennsylvania State University
Hui Yang - Pennsylvania State University
Timothy W. Simpson - Pennsylvania State University
Paul Witherell - National Institute of Standards and Technology
Yan Lu - National Institute of Standards and Technology

DAC-05-01 Decision Making in Engineering Design
8/18/2021
2:10PM–3:00PM

Chair: ***Jesse Austin-Breneman - University of Michigan***
Chair: ***Janet K. Allen - University of Oklahoma***

Evaluating Heuristics in Engineering Design: A Reinforcement Learning Approach
Technical Paper Publication: IDETC2021-70425
Karim Elsayed - Purdue University
Ilias Bilionis - Purdue University
Jitesh H. Panchal - Purdue University

Towards a Rational, Narrative-Based Design Framework for Navigating Radical Uncertainty in Engineering Design
Technical Paper Publication: IDETC2021-71156
Kenneth M. Bryden - Iowa State University
Scott Ferguson - North Carolina State University

Robust Design of Coupled Engineered Systems
Technical Paper Publication: IDETC2021-71187
Gehendra Sharma - Mississippi State University
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

A Graph Neural Network Approach for Product Relationship Prediction
Technical Paper Publication: IDETC2021-69462
Faez Ahmed - Massachusetts Institute of Technology
Yaxin Cui - Northwestern University
Yan Fu - Ford Motor Company
Wei Chen - Northwestern University

DAC-16-02 Multidisciplinary Design Optimization, Multiobjective Optimization, and Sensitivity Analysis
8/18/2021
2:10PM–3:00PM

Chair: ***Hongyi Xu - University of Connecticut***
Chair: ***Mian Li - Shanghai Jiao Tong University***

An Enhanced Squared Exponential Kernel With Manhattan Similarity Measure for High Dimensional Gaussian Process Models
Technical Paper Publication: IDETC2021-71445
Yanwen Xu - University of Illinois at Urbana-Champaign
Pingfeng Wang - University of Illinois at Urbana-Champaign

Multi-Material and Multi-Joint Topology Optimization for Lightweight and Cost-Effective Design
Technical Paper Publication: IDETC2021-67317
Luke Crispo - Queen's University
Stephen William Knox Roper - Queen's University
Rubens Bohrer - Queen's University
Rosalie Morin - Queen's University
Il Yong Kim - Queen's University

Leveraging Design Heuristics for Multi-Objective Metamaterial Design Optimization
Technical Paper Publication: IDETC2021-71226
Roshan Suresh Kumar - Texas A&M University
Srikar Srivatsa - Cornell University
Meredith Silberstein - Cornell University
Daniel Selva - Texas A&M University

Combinatorial Optimization of Pre-Formed Hose Assemblies
Technical Paper Publication: IDETC2021-71408
Erik Gustafsson - Linköping University
Mehdi Tarkian - Linköping University
Johan Persson - Linköping University

An Introduction to 3D SPI2 (Spatial Packaging of Interconnected Systems With Physics Interactions) Design Problems: A Review of Related Work, Existing Gaps, Challenges, and Opportunities
Technical Paper Publication: IDETC2021-72106
Satya R. T. Peddada - University of Illinois at Urbana-Champaign
Lawrence E. Zeidner - Raytheon Technologies Research Center
Kai A. James - University of Illinois at Urbana-Champaign
James T. Allison - University of Illinois at Urbana-Champaign

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CIE-32-01 SEIKM: Systems and Complex Systems Engineering and Design
8/18/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Chris Hoyle - Oregon State University***
Chair: ***Zhuo Yang - University of Massachusetts Amherst***

A Zero-Trust Methodology for Security of Complex Systems With Machine Learning Components
Technical Paper Publication: IDETC2021-70442
Britta Hale - Naval Postgraduate School
Douglas L. Van Bossuyt - Naval Postgraduate School
Nikolaos Papakonstantinou - VTT Technical Research Centre
Bryan O'Halloran - Naval Postgraduate School

A Taxonomy for Model-Based Systems Engineering
Technical Paper Publication: IDETC2021-69125
João Paulo Monteiro - IDMEC
Paulo J.S. Gil - IDMEC
Rui M. Rocha - Universidade de Lisboa

Learning From Insects to Increase Multi-Agent System Resilience: Functional Decomposition and Transfer to Support Biologically Inspired Design
Technical Paper Publication: IDETC2021-67788
Isabella V. Hernandez - Georgia Institute of Technology
Bryan C. Watson - Georgia Institute of Technology
Marc Weissburg - Georgia Institute of Technology
Bert Bras - Georgia Institute of Technology

System Design Priority Order Considering Uncertainty in Early Stages
Technical Paper Publication: IDETC2021-68216
Takumi Kuroyanagi - University of Tokyo
Shuho Yamada - University of Tokyo
Shigeki Hiramatsu - Mazda Motor Corporation
Hiroshi Unesaki - Mazda Motor Corporation
Shyuichi Kondo - Mazda Motor Corporation
Kazuhiro Aoyama - University of Tokyo

The Bus Factor in Conceptual System Design: Protecting a Design Process Against Major Regional and World Events
Technical Paper Publication: IDETC2021-70476
Douglas Van Bossuyt - Naval Postgraduate School
Ryan M. Arlitt - Technical University of Denmark

AVT-02-05 Advances in Modelling and Testing of Tires and Tire-Terrain Interaction/AVT-07-05 Advances in Off-Road, Agriculture, Military and Commercial Ground Vehicle Design and Testing
8/18/2021
2:10PM–3:00PM

Chair: ***Ole Balling - Aarhus University***
Chair: ***Peijun Xu - Ebco Inc.***
Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Hoda Mousavi - Virginia Tech***
Chair: ***Lin Li - Liebherr Mining Equipment***
Chair: ***Mostafa Yacoub - Military Technical College***

Digital Image Correlation in Studying Rolling Mechanics of Driving/Breaking Wheel
Technical Presentation: IDETC2021-67347
Milosz Rajchel - Georgia Institute of Technology
Michael Varenberg - Georgia Institute of Technology
Michael Leamy - Georgia Institute of Technology
Antonia Antoniou - Georgia Institute of Technology

Design and Path Planning of Autonomous Solar Lawn Mower
Technical Paper Publication: IDETC2021-69996
Souhail Hazem - Canadian International College
Mohamed Mostafa - Canadian International College
Ehab Mohamed - Canadian International College
Mohamed Hesham - Canadian International College
Abdelrahman Mohamed - Canadian International College
Eyad Lotfy - Canadian International College
Ayman Mahmoud - Canadian International College
Mostafa Yacoub - Military Technical College

Determining Hazard Severity via Probabilistic Risk Assessment in the Commercial Trucking Industry to Inform Design and Qualification
Technical Presentation: IDETC2021-74547
David Flores - Sandia National Laboratories

DTM-14 Design People: Influencing Factors on Designer Performance
8/18/2021
2:10PM–3:00PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Scarlett Miller - Penn State***
Chair: ***Julie Linsey - Georgia Institute of Technology***

Measuring Designers' Empathic Understanding of Users by a Quick Empathic Accuracy (QEA)
Technical Paper Publication: IDETC2021-69407
Jie Li - Aalto University
Antti Surma-aho - Aalto University
Katja Hölttä-Otto - Aalto University

A Framework for Centralizing Ethics in the Design Engineering of Spatial Computing Artifacts
Technical Paper Publication: IDETC2021-71203
Caseysimone Ballestas - Delft University of Technology
Senthil Chandrasegaran - Delft University of Technology
Euiyoung Kim - Delft University of Technology

Influence of Different Representation of Requirements on Idea Generation: An Experimental Study
Technical Paper Publication: IDETC2021-70805
Akash Patel - Clemson University
Joshua D. Summers - University of Texas at Dallas
Sourabh Karmakar - Clemson University

Predicting a Paradigm Shift: Exploring the Relationship Between Cognitive Style and the Paradigm-Relatedness of Design Solutions
Technical Paper Publication: IDETC2021-70909
Courtney Cole - The Pennsylvania State University
Jacqueline Marhefka - The Pennsylvania State University
Kathryn Jablokow - The Pennsylvania State University
Susan Mohammed - The Pennsylvania State University
Sarah Ritter - The Pennsylvania State University
Scarlett Miller - The Pennsylvania State University

A Review of Design-Related Literature Concerning Cognitive Processes, Prototyping Strategies, and Modeling Processes
Technical Paper Publication: IDETC2021-66994
Alexander R. Murphy - Georgia Institute of Technology
Bryan C. Watson - Georgia Institute of Technology
Megan E. Tomko - Georgia Institute of Technology
Ethan C. Hilton - Louisiana Tech University
Julie S. Linsey - Georgia Institute of Technology

DEC-03-02 Innovative Practices in Design Education (Other Topics)
8/18/2021
3:20PM–4:40PM

Chair: ***Mohammad Fazelpour - University of Maryland***
Chair: ***Andrew Olewnik - University at Buffalo***
Chair: ***Rohan Prabhu - The Pennsylvania State University***

Økoengineer – A Web-Based Game Platform for Guided Discovery-Based Sustainability Learning in Engineering Curricula
Technical Paper Publication: IDETC2021-69406
Haitham Abu-Ghaida - Aarhus University
Serena Leka - Aarhus University
Kamila Kunrath - Aarhus University
Rune Thostrup - Aarhus University
Devarajan Ramanujan - Aarhus University

Designing Design Problems: A Preliminary Field Study on Problem Creation
Technical Presentation: IDETC2021-74818
Andrew Olewnik - University at Buffalo
Scott Ferguson - North Carolina State University

Not Good Enough? Exploring Relationships Between Students' Empathy, Their Attitudes Towards Sustainability, and the Self-Perceived Sustainability of Their Solutions
Technical Paper Publication: IDETC2021-71960
Rohan Prabhu - Pennsylvania State University
Mohammed Alsager Alzayed - Kuwait University
Elizabeth Starkey - Pennsylvania State University

Design Experiences as Pathways for Embracing Failure
Technical Paper Publication: IDETC2021-71419
Madhurima Das - Massachusetts Institute of Technology
Maria C. Yang - Massachusetts Institute of Technology

Designing and 3D Printing Lab Equipment for Mechanical Vibrations Course and Laboratory: Work in Progress
Technical Paper Publication: IDETC2021-71427
Josh Lewis - Kennesaw State University
Benjamin Estrada - Kennesaw State University
Paul Pena - Kennesaw State University
Martin Garcia - Kennesaw State University
Ayse Tekes - Kennesaw State University

MESA-14-02 Fractional Derivatives and Their Applications: Design
8/18/2021
3:20PM–4:40PM

Chair: ***YangQuan Chen - University of California, Merced***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***Yongguang Yu - Beijing Jiaotong University***
Chair: ***Changpin Li - Shanghai University***

Parameter-Dependent Feedback Compensator Design for a Time-Fractional Reaction-Diffusion Equation
Technical Paper Publication: IDETC2021-67020
Jun-Wei Wang - University of Science and Technology Beijing
Hua-Cheng Zhou - Central South University

Fractional Active Disturbance Rejection Controller Based on Improved Differential Evolution Algorithm
Technical Paper Publication: IDETC2021-68264
Henghui Liang - Foshan University
Wei Yu - Foshan University
Rui Chen - Foshan University
Ying Luo - Huazhong University of Science and Technology

An Approach to Design Controllers for MIMO Fractional Order System Based on RFN Method
Technical Paper Publication: IDETC2021-69856
Tingxue Li - Northeastern University
Dingyu Xue - Northeastern University
Xinshu Cui - Northeastern University

Event-Triggered Boundary Control Strategy for a Time Fractional Wave Equation Subject to Boundary Disturbance
Technical Paper Publication: IDETC2021-70336
Zhan-Mei Yuan - Central South University
Hua-cheng Zhou - Central South University

A Fractional-Order Active Disturbance Rejection Controller Design for a PMSM Servo System
Technical Paper Publication: IDETC2021-71118
Bolin Li - Huazhong University of Science and Technology
Pengchong Chen - Huazhong University of Science and Technology
Ying Luo - Huazhong University of Science and Technology

MR-03-02 Compliant Mechanisms (A. Midha Symposium)
8/18/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Guangbo Hao - University College Cork***
Chair: ***Hongzhe Zhao - Beihang University***

Modelling the Axis Drift of Short Wire Flexures and Increasing Their Support Stiffness Using Polymers
Technical Paper Publication: IDETC2021-68255
Boris Daan - Delft University of Technology
Jelle Rommers - Delft University of Technology
Just L. Herder - Delft University of Technology

Design and Analysis of a Contact-Aided Variable Stiffness Flexure Hinge (CVSFH)
Technical Paper Publication: IDETC2021-68366
Shenyuan Dai - University of Science and Technology Beijing
Lifang Qiu - University of Science and Technology Beijing
Qichao Chen - University of Science and Technology Beijing
Yanlin Li - University of Science and Technology Beijing

Variable Stiffness Design and Analysis of Flexure Hinge Based on ID-LEJ
Technical Paper Publication: IDETC2021-68415
Yanlin Li - University of Science and Technology Beijing
Lifang Qiu - University of Science and Technology Beijing
Kang Zhou - University of Science and Technology Beijing
Chongxiang Li - University of Science and Technology Beijing

Effect of Matching Buckling Loads on Post-Buckling Behavior in Compliant Mechanisms
Technical Paper Publication: IDETC2021-68439
A. Numic - Delft University of Technology
T.W.A. Blad - Delft University of Technology
F. van Keulen - Delft University of Technology

Nonlinear Analysis of a Class of Inversion-Based Compliant Cross-Spring Pivots
Technical Paper Publication: IDETC2021-69028
Shiyao Li - University College Cork
Guangbo Hao - University College Cork
Yingyue Chen - University College Cork
Jiaxiang Zhu - University College Cork
Giovanni Berselli - University of Genova

Methods for Shape Fitting in Morphing Compliant Mechanisms
Technical Paper Publication: IDETC2021-70686
Alden Yellowhorse - Navajo Technical University
Jelle Rommers - Delft University of Technology
Ali Amoozandeh - Delft University of Technology
Just Herder - Delft University of Technology

The Mixed-Body Model: A Method for Predicting Large Deflections in Stepped Cantilever Beams
Technical Paper Publication: IDETC2021-71332
Brandon S. Sargent - Brigham Young University
Collin R. Ynchausti - Brigham Young University
Todd G. Nelson - University of Southern Indiana
Larry L. Howell - Brigham Young University

CIE-04-02 CIE Special Session: Design, Simulation and Optimization for Additive Manufacturing
8/18/2021
3:20PM–4:40PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Amir Mirzendehdel - PARC***

Assessment of the Run-Out of an Intervertebral Cervical Cage Fabricated by Additive Manufacturing Using Electron Beam Melting
Technical Paper Publication: IDETC2021-70241
Filippo Cucinotta - University of Messina
Rosalia Mineo – Mt. Ortho, srl.
Marcello Raffaele - University of Messina
Fabio Salmeri - University of Messina

Strut Diameter Uncertainty Prediction by Deep Neural Network for Additively Manufactured Lattice Structures
Technical Paper Publication: IDETC2021-69985
Recep M. Gorguluarslan - TOBB University of Economics and Technology
Gorkem Can Ates - TOBB University of Economics and Technology
O. Utku Gungor - TOBB University of Economics and Technology
Yusuf Yamaner - TOBB University of Economics and Technology

An Algorithm for Partitioning Objects Into a Cube Skeleton and Segmented Shell Covers for Parallelized Additive Manufacturing
Technical Paper Publication: IDETC2021-69326
Wilson Li - California State University Sacramento
Thomas Poozhikala - California State University Sacramento
Mahmoud Dinar - California State University Sacramento

Generation of Continuous Toolpaths for Additive Manufacturing Using Implicit Slicing
Technical Paper Publication: IDETC2021-69320
J.C. Steuben - U.S. Naval Research Laboratory
J.G. Michopoulos - U.S. Naval Research Laboratory
A.P. Iliopoulos - U.S. Naval Research Laboratory

Prediction of Melt Pool Geometry Using Deep Neural Networks
Technical Paper Publication: IDETC2021-69259
Fahad Ali Milaat - Catholic University of America
Zhuo Yang - National Institute of Standards and Technology
Hyunwoong Ko - National Institute of Standards and Technology
Albert T. Jones - National Institute of Standards and Technology

Topology Optimization of Self-Supported Enclosed Voids for Additive Manufacturing
Technical Paper Publication: IDETC2021-68785
Cunfu Wang - Xiamen University

MR-09-02 Mechanism-Based Metamaterials
8/18/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Jonathan Hopkins - University of California, Los Angeles***
Chair: ***Damiano Pasini - McGill University***

A Rigidity Perspective of Metamaterials
Technical Presentation: IDETC2021-74755
Adnan Sljoka - RIKEN Center for Advanced Intelligence Project
Andreas Mueller - Johannes Kepler University, Institute of Robotics

Hypar Origami: Mathematics, Computations, Applications, and Extensions
Technical Presentation: IDETC2021-74759
Ke Liu - California Institute of Technology
Tomohiro Tachi - University of Tokyo
Glaucio Paulino - Georgia Institute of Technology

Resilient and Reconfigurable Hierarchical Woven Materials
Technical Presentation: IDETC2021-74763
Widianto Moestopo - California Institute of Technology
Seola Lee - California Institute of Technology
Julia Greer - California Institute of Technology

A Designer's Map for Mechanical Metamaterials
Technical Presentation: IDETC2021-74774
Angkur Shaikeea - University of Cambridge
Huachen Cui - University of California, Los Angeles
Mark O' Masta - HRL Laboratories
Xiaoyu (Rayne) Zheng - University of California, Los Angeles
Vikram Deshpande - University of Cambridge

Study of the Kirigami Cut Design for Tunable Mechanical Stretchability
Technical Presentation: IDETC2021-74776
Yanqi Yin - Xi'an Jiaotong University
Yang Yu - Xi'an Jiaotong University
Bo Li - Xi'an Jiaotong University
Guimin Chen - Xi'an Jiaotong University

Decoupling Strength and Fracture Toughness With Multi-Material Double Gyroid Architected Lattices
Technical Presentation: IDETC2021-74778
Padmeya Prashant Indurkar - University of Cambridge
Angkur Jyoti Dipanka Shaikeea - University of Cambridge
Huachen Cui - University of California, Los Angeles
Zhenpeng Xu - University of California, Los Angeles
Xiaoyu (Rayne) Zheng - University of California, Los Angeles
Vikram Deshpande - University of Cambridge

An Origami Metamaterial With Reprogrammable Rigid Folding Kinematics
Technical Presentation: IDETC2021-74808
Phanisri Pratapa - Indian Institute of Technology Madras
Glaucio Paulino - Georgia Institute of Technology

Origami-Inspired Metamaterial Design Using Level-Set-Based Topology Optimization
Technical Presentation: IDETC2021-74822
Qian Ye - State University of New York at Stony Brook
Shikui Chen - Stonybrook

Combinatorial Functional Mechanical Metamaterials - Development of Multi-Plane Tunable Systems
Technical Presentation: IDETC2021-74859
Usman Waheed - Imperial College London

Stimuli-Responsive Hydrogel-Based Metamaterials With Tunable Bandgaps
Technical Presentation: IDETC2021-74866
Yuhang Hu - Georgia Institute of Technology
Herit Patel - Georgia Institute of Technology
Jiehao Chen - Georgia Institute of Technology
Alper Erturk - Georgia Institute of Technology

CIE-33-01 SEIKM: Smart Manufacturing Informatics
8/18/2021
3:20PM–4:40PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Ashis Banerjee - University of Washington***
Chair: ***Farhad Ameri - Texas State University***

Capability Language Processing (CLP): Classification and Ranking of Manufacturing Suppliers Based on Unstructured Capability Data
Technical Paper Publication: IDETC2021-71308
Kimia Zandbiglari - Texas State University
Farhad Ameri - Texas State University
Mohammad Javadi - University of Houston

Prediction of Production Performance in Smart Manufacturing Using Multivariate Adaptive Regression Spline
Technical Paper Publication: IDETC2021-69632
Ping Chong Chua - Nanyang Technological University
Seung Ki Moon - Nanyang Technological University
Yen Ting Ng - Agency for Science, Technology and Research
Huey Yuen Ng - Singapore Institute of Manufacturing Technology

A Novel Data Standards Platform Using the ISO Core Components Technical Specification
Technical Paper Publication: IDETC2021-68067
Nenad Ivezic - National Institute of Standards and Technology
Boonserm Kulvatunyou - National Institute of Standards and Technology
Elena Jelisic - National Institute of Standards and Technology
Hakju Oh - National Institute of Standards and Technology
Simon Frechette - National Institute of Standards and Technology
Vijay Srinivasan - National Institute of Standards and Technology

Exploration of the Digital Innovation Process in the Smart Product-Service System
Technical Paper Publication: IDETC2021-70848
Haneen A.F. Saymeh - Zhejiang University
Xiangying Zhang - Zhejiang University
Tao Peng - Zhejiang University
Renzhong Tang - Zhejiang University
Zuoxu Wang - Nanyang Technological University
Pai Zheng - The Hong Kong Polytechnic University

In-Process Data Fusion for Process Monitoring and Control of Metal Additive Manufacturing
Technical Paper Publication: IDETC2021-71813
Zhuo Yang - University of Massachusetts Amherst
Yan Lu - National Institute of Standards and Technology
Simin Li - University of Maryland
Jennifer Li - Blair High School
Yande Ndiaye - National Institute of Standards and Technology
Hui Yang - Pennsylvania State University
Sundar Krishnamurty - University of Massachusetts Amherst

AVT-04-06 Advances in Ground Vehicle Safety and Ergonomics / AVT-06-06 Advances in Light Vehicles Design. Session
8/18/2021
3:20PM–4:40PM

Chair: ***Costin Untaroiu - Virginia Tech***
Chair: ***Alberto Doria - University of Padova***
Chair: ***Liangyao Yu - Tsinghua University***
Chair: ***Luis Munoz - Universidad de los Andes***
Chair: ***Alan Mayton - CDC/NIOSH/PMRD***

Minimizing the Cost of Automotive Accidents by Optimizing the Design of Advanced Driver Assist Systems: An Empirical Study Based on a Full-Size Light-Duty Pickup Truck
Technical Paper Publication: IDETC2021-70641
Francis Fish - Georgia Institute of Technology
Bert Bras - Georgia Institute of Technology

Enhanced Lighting Lowers Risk of Slips-Trips-Falls for Mobile Equipment Operators at Surface Mines
Technical Presentation: IDETC2021-74415
Alan Mayton - CDC/NIOSH/PMRD

Thin Intumescent Coatings as a Fire Suppression System
Technical Presentation: IDETC2021-74799
Fred Snoy - Sandia National Laboratories
Karen Son - Sandia National Laboratories

Influence of the Cyclist's Characteristics on the Optimal Pacing Strategy for an Ascending Road
Technical Paper Publication: IDETC2021-71645
Manuel Angulo - Los Andes University
Alejandra Polanco - Pontificia Universidad Javeriana
Luis Muñoz - Los Andes University

Posture Optimization for Individual Time-Trial Cycling Races
Technical Presentation: IDETC2021-74874
Alejandra Polanco - Pontificia Universidad Javeriana
Luis Muñoz - Universidad de los Andes
Alberto Doria - University of Padua
Daniel Suarez - Pontificia Universidad Javeriana

DTM-15 Design Theory and Methodology Best Paper Session
8/18/2021
3:20PM–4:40PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Tahira Reid - Purdue University***
Chair: ***Vimal Viswanathan - San Jose State University***

Toward Computer Aided Visual Analogy Support (CAVAS): Augmenting Designers Through Deep Learning
Technical Paper Publication: IDETC2021-70961
Zijian Zhang - University of Southern California
Yan Jin - University of Southern California

Assessing Early Stage Design Sketches and Reflections on Prototyping
Technical Paper Publication: IDETC2021-66748
Madhurima Das - Massachusetts Institute of Technology
Maria C. Yang - Massachusetts Institute of Technology

If a Picture Is Worth 1000 Words, Is a Word Worth 1000 Features for Design Metric Estimation?
Technical Paper Publication: IDETC2021-70158
Kristen Edwards - Massachusetts Institute of Technology
Aoran Peng - The Pennsylvania State University
Scarlett R. Miller - Pennsylvania State University
Faez Ahmed - Massachusetts Institute of Technology

Co-Evolution of Communication and System Performance in Engineering Systems Design: A Stochastic Network-Behavior Dynamics Model
Technical Paper Publication: IDETC2021-71277
Ashish M. Chaudhari - Texas A&M University
Erica L. Gralla - George Washington University
Zoe Szajnfarber - George Washington University
Jitesh H. Panchal - Purdue University

Supporting Designer Learning and Performance in Design Space Exploration: A Goal-Setting Approach:
Technical Paper Publication: IDETC2021- 71257
Ashish M. Chaudhari - Texas A&M University
Roshan Suresh Kumar- Texas A&M University
Daniel Selva - Texas A&M University

MNS-02-02 Dynamics of M/NEMS
8/18/2021
3:20PM–4:40PM

Chair: ***Sherry Towfighian - Binghamton University***
Chair: ***Mohammad Shavezipur - Southern Illinois University, Edwardsville***
Chair: ***Hanna Cho - The Ohio State University***

The Effect of Membrane Load on the Usage of Berger's Model in Electrostatically Actuated Pre-Stressed Circular Curved Micro Plates
Technical Paper Publication: IDETC2021-69404
Lior Medina - University of Cambridge
Rami Eliasi - Tel Aviv University
Rivka Gilat - Ariel University
Slava Krylov - Tel Aviv University

Approximate Real-Time Force Spectroscopy Within Amplitude-Modulation Atomic Force Microscopy Topographical Imaging Using Few Harmonics and Fourier Methods
Technical Paper Publication: IDETC2021-67205
Berkin Uluutku - George Washington University
Santiago D. Solares - George Washington University

A Novel Dual-Mass Accelerometer Exploiting Mode Localization in Electrostatically Coupled Resonators
Technical Paper Publication: IDETC2021-67922
Ming Lyu - Dalian University of Technology
Jian Zhao - Dalian University of Technology
Najib Kacem - Université Bourgogne Franche-Comté
Pengbo Liu - Dalian University of Technology

Nonlinear Damping in Graphene Nanomechanical Systems
Technical Presentation: IDETC2021-68229
Ata Keşkekler - Delft University of Technology
Oriel Shoshani - Ben-Gurion University of the Negev
Peter G. Steeneken - Delft University of Technology
Farbod Alijani - Delft University of Technology

Efficient Response Amplification of Electrothermally Driven Resonators Using Magnets
Technical Paper Publication: IDETC2021-71177
Ghanimah Abuhaimed - King Abdullah University of Science and Technology
Nizar Jaber - King Abdullah University of Science and Technology
Nouha Alcheikh - King Abdullah University of Science and Technology
Mohammad I. Younis - King Abdullah University of Science and Technology

Tristable Properties in Electrostatically Actuated Initially Curved Coupled Micro Beams
Technical Paper Publication: IDETC2021-67179
Lior Medina - University of Cambridge
Ashwin A. Seshia - University of Cambridge

Elegant Mems Electrostatic Actuators and Triboelectric Transducers to Enable High Performance Sensors
Technical Presentation: IDETC2021-74804
Shahrzad (Sherry) Towfighian - Binghamton University

THURSDAY, AUGUST 19

MR-02-02 Theoretical & Computational Kinematics (A.T. Yang Symposium)
8/19/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Andreas Muller - Johannes Kepler University, Institute for Robotics***
Chair: ***Keisuke Arikawa - Kanagawa Institute of Technology***

Neural Network Based Transfer Learning for Robot Path Generation
Technical Paper Publication: IDETC2021-69006
Houcheng Tang - Queen's University
Leila Notash - Queen's University

An Analytic Condition for the Finite Degree-of-Freedom of Linkages and Its Computational Evaluation
Technical Paper Publication: IDETC2021-67468
Andreas Müller - Johannes Kepler University

Kinematic Modeling and Inverse Kinematics of Serial 6R Fragment of Molecule
Technical Paper Publication: IDETC2021-70853
Keisuke Arikawa - Kanagawa Institute of Technology

Forward Kinematics for Suspended Under-Actuated Cable-Driven Parallel Robots: A Neural Network Approach
Technical Paper Publication: IDETC2021-71064
Utkarsh A. Mishra - Indian Institute of Technology
Stéphane Caro - CNRS, Laboratoire des Sciences du Numerique de Nantes

DFMLC-04-01: Design for Manufacturing , Assembly and Product Service Systems
8/19/2021
10:00AM–10:50AM

Chair: ***Abigail Clarke-Sather - University of Minnesota Duluth***
Chair: ***Junfeng Ma - Mississippi State University***
Chair: ***Soonjo Kwon - Kumoh National Institute of Technology***

Estimation of Chatter Vibration Under End-Milling Process With a Wavelet Transform
Technical Paper Publication: IDETC2021-68193
Haruki Minetaka - Doshisha University
Nobutoshi Ozaki - Doshisha University
Toshiki Hirogaki - Doshisha University
Eiichi Aoyama - Doshisha University

Viscous Friction Effect During the Process of Tightening and Loosening of Bolted Joints
Technical Paper Publication: IDETC2021-68219
Qingyuan Lin - Shanghai Jiao Tong University
Yong Zhao - Shanghai Jiao Tong University
Qingchao Sun - Dalian University of Technology
Kunyong Chen - Shanghai Jiao Tong University

A User-Centered Medical Device Design Decision Making Approach Using Hybrid Rough Cooperative Game Model
Technical Paper Publication: IDETC2021-71293
Liting Jing - Zhejiang University of Technology
Junfeng Ma - Mississippi State University

Machine Learning to Predict Medical Devices Repair and Maintenance Needs
Technical Paper Publication: IDETC2021-71333
Hao-yu Liao - University of Florida
Karthik Boregowda - University of Florida
Willie Cade - ICR Management
Sara Behdad - University of Florida

Deep Learning and Machine Learning Techniques to Classify Electrical and Electronic Equipment
Technical Paper Publication: IDETC2021-71403
Shuaizhou Hu - University of Florida
Xinyao Zhang - University of Florida
Hao-yu Liao - University of Florida
Xiao Liang - University at Buffalo, SUNY
Minghui Zheng - University at Buffalo, SUNY
Sara Behdad - University of Florida

MR-05/MSNDC-08-01 Motion Planning, Dynamics, and Control of Robots
8/19/2021
10:00AM–10:50AM

Chair: ***Leila Notash - Queens University***
Chair: ***Chin-Hsing Kuo - University of Wollongong***
Chair: ***Andreas Muller - Johannes Kepler University, Institute for Robotics***
Chair: ***Damien Chablat - CNRS Nantes***

Trajectory Planning for a 3-SPS-U Tensegrity Mechanism
Technical Paper Publication: IDETC2021-69957
Swaminath Venkateswaran - G-SCOP Laboratory
Damien Chablat - CNRS/LS2N/Ecole Centrale de Nantes

A New Robot Path Planning Method Based on LSTM Neural Network and Rapidly-Exploring Random Tree Algorithm
Technical Paper Publication: IDETC2021-71234
Weifei Hu - Zhejiang University
Feng Tang - Zhejiang University
Zhenyu Liu - Zhejiang University
Jianrong Tan - Zhejiang University

Robot Motion Planner for Under-Constrained Trajectories With Part-Specific Geometric Variances
Technical Paper Publication: IDETC2021-71602
Ademola Oridate - University of Texas at Austin
Mitchell Pryor - University of Texas at Austin
Carolyn Conner Seepersad - University of Texas at Austin

Point-to-Point Path Planning Based on User Guidance and Screw Linear Interpolation
Technical Paper Publication: IDETC2021-71814
Riddhiman Laha - Technical Universität München
Anjali Rao - Vicarious AI
Luis F. C. Figueredo - Technical Universität München
Qing Chang - University of Virginia
Sami Haddadin - Technical Universität München
Nilanjan Chakraborty - Stony Brook University

Task Space Planning With Complementarity Constraint-Based Obstacle Avoidance
Technical Paper Publication: IDETC2021-72009
Anirban Sinha - Stony Brook University
Anik Sarker - Stony Brook University
Nilanjan Chakraborty - Stony Brook University

MSNDC-09-02 Optimization, Sensitivity Analysis, and Uncertainty Quantification in Dynamic Systems Joint with Dynamics of Smart Structures and Systems
8/19/2021
10:00AM–10:50AM

Chair: ***Richard Wiebe - University of Washington***
Chair: ***Radu Serban - University of Wisconsin - Madison***
Chair: ***Giuseppe Habib - Budapest University of Technology and Economics***
Chair: ***Stefano Lenci - Polytechnic University of Marche***
Chair: ***Andrea Arena - Sapienza University of Rome***
Chair: ***Dumitru Caruntu - University of Texas - Rio Grande Valley***
Chair: ***Daniel Dopico - University of La Coruña***

Multifidelity Uncertainty Quantification for Online Simulations of Automotive Propulsion Systems
Technical Paper Publication: IDETC2021-67585
Hang Yang - University of Michigan
Alex Gorodetsky - University of Michigan
Yuji Fujii - Ford Motor Company
Kon-Well Wang - University of Michigan

Evaluation of Inertial Measurement Units for Short Time Motion Tracking
Technical Paper Publication: IDETC2021-69604
Rene Neurauter - University of Innsbruck
Peter Hergel - University of Innsbruck
Johannes Gerstmayr - University of Innsbruck

Universal Upper Estimate for Prediction Errors Under Moderate Model Uncertainty
Technical Presentation: IDETC2021-67954
Bálint Kaszás - ETH Zürich
George Haller - ETH Zürich

Controlling the Hopf Bifurcation of Piezo-Electro-Mechanical Systems Loaded by Follower Forces
Technical Presentation: IDETC2021-74794
Arnaldo Casalotti - University of L'Aquila
Francesco D'annibale - University of L'Aquila

Dynamic Response to Transverse Loading of a Beam-Like Pipe via a Perturbation Approach
Technical Presentation: IDETC2021-75013
Arnaldo Casalotti - University of L'Aquila
Daniele Zulli - University of L'Aquila
Angelo Luongo - University of L'Aquila

MSNDC-10-01 Nonlinear and Computational Dynamics Aspects in Biomechanics
8/19/2021
10:00AM–10:50AM

Chair: ***James Chagdes - Miami University***
Chair: ***Erik Chumacero - University of Texas Rio Grande***
Chair: ***Matthew Leineweber - San Jose State University***

Simulation of a Pole Saw Assisted by a Gyroscopic Effect Device
Technical Paper Publication: IDETC2021-70112
Eduardo P. Okabe - State University of Campinas
Daniel L. Miletto - State University of Campinas
Milton S. Misuta - State University of Campinas
José Luiz P. Brittes - State University of Campinas

2d Computational Modeling of the All-Terrain Knee for Gait Analysis
Technical Presentation: IDETC2021-74633
Justin Li - San Jose State University
Ian Qualls - San Jose State University
Abhinaya Srikanth - San Jose State University
Matthew J Leineweber - San Jose State University

Investigating Whether Feedback Delay Induced Limit-Cycle Oscillations Must Diminish With Large Scale Motions or Not
Technical Presentation: IDETC2021-74735
Jacques-Ezechiel Nguessan - University of California, Merced
Sachin Goyal - University of California, Merced

Modelling of a Human Arm During a Simple Bicep Curl
Technical Presentation: IDETC2021-74836
Md. Modassir Firdaus - Indian Institute of Technology Gandhinagar
Muhammad Hassaan Ahmed - University of California, Merced
Pushan Patel - Indian Institute of Technology Gandhinagar
Matthew J. Leineweber - San José State University

CIE-10-01 AMS: Advanced Modeling and Simulation (AMS General)
8/19/2021
10:00AM–10:50AM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Seung-Kyum Choi - Georgia Institute of Technology***
Chair: ***James Yang - Texas Tech University***

Development of Line-to-Line Contact Formulation for Continuum Beams
Technical Paper Publication: IDETC2021-70450
Babak Bozorgmehri - LUT University
Marko K. Matikainen - LUT University
Aki Mikkola - LUT University

Isogeometric Shape Optimization for Design Dependent Loads
Technical Paper Publication: IDETC2021-70224
Arkaprabho Pal - Indian Institute of Technology Madras
Sourav Rakshit - Indian Institute of Technology Madras

Fast Two-Scale Analysis via Clustering
Technical Paper Publication: IDETC2021-68633
Chongxi Yuan - Purdue University
Xingchen Liu - International Computer Science Institute

Design Human-Robot Collaborative Lifting Task Using Optimization
Technical Paper Publication: IDETC2021-71818
Asif Arefeen - Oklahoma State University
Yujiang Xiang - Oklahoma State University

Optimized Torque Assistance During Walking With an Idealized Hip Exoskeleton
Technical Paper Publication: IDETC2021-71376
Neethan Ratnakumar - New Jersey Institute of Technology
Xianlian Zhou - New Jersey Institute of Technology

DAC-01-01 Control Co-Design
8/19/2021
10:00AM–10:50AM

Chair: ***James Allison - University of Illinois at Urbana-Champaign***
Chair: ***Daniel Herber - Colorado State University***

Open-Loop Control Co-Design of Floating Offshore Wind Turbines Using Linear Parameter-Varying Models
Technical Paper Publication: IDETC2021-67573
Athul K. Sundarrajan - Colorado State University
Yong Hoon Lee - University of Illinois at Urbana-Champaign
James T. Allison - University of Illinois at Urbana-Champaign
Daniel R. Herber - Colorado State University

A Methodology for Designing a Nonlinear Feedback Controller via Parametric Optimization: State-Parameterized Nonlinear Programming Control
Technical Paper Publication: IDETC2021-69295
Ying-Kuan Tsai - Texas A&M University
Richard J. Malak Jr. - Texas A&M University

Reliability-Based Co-Design of Lithium-Ion Batteries for Enhanced Fast Charging and Cycle Life Performances
Technical Paper Publication: IDETC2021-71402
Tonghui Cui - University of Illinois at Urbana-Champaign
Pingfeng Wang - University of Illinois at Urbana-Champaign

Systematic Enumeration and Identification of Unique Spatial Topologies of 3D Systems Using Spatial Graph Representations
Technical Paper Publication: IDETC2021-66900
Satya R.T. Peddada - University of Illinois at Urbana-Champaign
Nathan M. Dunfield - University of Illinois at Urbana-Champaign
Lawrence E. Zeidner - Raytheon Technologies Research Center
Kai A. James - University of Illinois at Urbana-Champaign
James T. Allison - University of Illinois at Urbana-Champaign

A Mixed-Method Analysis of Schedule and Cost Growth in Defense Acquisition Programs
Technical Paper Publication: IDETC2021-71517
Atharva Hans - Purdue University
Ashish M. Chaudhari - Texas A&M University
Ilias Bilionis - Purdue University
Jitesh H. Panchal - Purdue University

CIE-34-01 SEIKM: Enabling Digital Technologies for Smart Product-Service System Development
8/19/2021
10:00AM–10:50AM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Ying Liu - Cardiff University***
Chair: ***Li Xinyu - Nanyang Technological University***

Research on Multi-Dimensional Information Service Oriented to Innovative Process Planning
Technical Paper Publication: IDETC2021-71137
Jun Li - Sichuan University
Xin Guo - Sichuan University
Wu Zhao - Sichuan University

Predicting the Material Removal Rate in Chemical Mechanical Planarization Process: A Hypergraph Neural Network-Based Approach
Technical Paper Publication: IDETC2021-68250
Liqiao Xia - Hong Kong Polytechnic University
Pai Zheng - Hong Kong Polytechnic University
Chao Liu - Hong Kong Polytechnic University

Service Recommendation Based on Dynamic User Portrait: An Integrated Approach
Technical Paper Publication: IDETC2021-68080
Yuqi Tang - Beihang University
Shanshan Li - Beihang University
Wenyan Song - Beihang University
Caibo Zhou - Beihang University
Zixuan Niu - Beihang University

A Hypergraph-Based Knowledge Representation Model for Smart Product-Service System Development
Technical Paper Publication: IDETC2021-66732
Wang Zuoxu - Nanyang Technological University
Li Xinyu - Nanyang Technological University
Chen Chun-Hsien - Nanyang Technological University
Zheng Pai - Hong Kong Polytechnic University

DTM-21 Design People: Cognitive, Experimental Studies
8/19/2021
10:00AM–10:50AM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Arlindo Silva - Singapore University of Technology and Design***
Chair: ***Paul Grogan - Stevens Institute of Technology***

The Use of Analogies and the Design Brief Information: Impact on Creative Outcomes
Technical Paper Publication: IDETC2021-69938
Georgios Koronis - Singapore University of Technology and Design
Hernan Casakin - Ariel University
Arlindo Silva - Singapore University of Technology and Design
Jing Wen William Siew - Singapore University of Technology and Design

Exploration of the Dynamics of Neuro-Cognition During TRIZ
Technical Paper Publication: IDETC2021-70412
Julie Milovanovic - AAU-CRENAU
Mo Hu - Virginia Tech
Tripp Shealy - Virginia Tech
John Gero - University of North Carolina at Charlotte

Getting Beyond the Hairy House: Using Structure-Function-Mechanism to Advance Biologically Inspired Design Pedagogy
Technical Paper Publication: IDETC2021-71721
Michael E. Helms - Georgia Institute of Technology
Hoda Ehsan - Georgia Institute of Technology
Euisun Kim - Georgia Institute of Technology
Roxanne Moore - Georgia Institute of Technology
Meltem Alemdar - Georgia Institute of Technology
Christopher J. Cappelli - Georgia Institute of Technology
Jeff Rosen - Georgia Institute of Technology
Marc Weissburg - Georgia Institute of Technology

Investigating Mind-Mapping as a Tool for Problem Exploration in Early Design
Technical Paper Publication: IDETC2021-71750
Ting-Ju Chen - Texas A&M University
Shantanu Vyas - Texas A&M University
Vinayak R. Krishnamurthy - Texas A&M University

Does It Matter Where Design Teams Come From in Design Studies?
Technical Paper Publication: IDETC2021-70432
Julie Milovanovic - AAU-CRENAU
John Gero - University of North Carolina at Charlotte
Kurt Becker - Utah State University

MR-01-01 Mechanisms Synthesis & Analysis
8/19/2021
11:10AM–12:30PM

Chair: ***Philip Voglewede - Marquette University***
Chair: ***Leila Notash - Queens University***
Chair: ***Stephane Caro - Laboratoire des Sciences du Numerique de Nantes - Centrale Nantes***

Gravity Balancing Reliability and Sensitivity Analysis of Robotic Manipulators With Uncertainties
Technical Paper Publication: IDETC2021-66762
Po Ting Lin - National Taiwan University of Science and Technology
Chin-Hsing Kuo - University of Wollongong
Vu Linh Nguyen - National Chin-Yi University of Technology

Potential Energy as Design Criterion in Planar Multistable Mechanisms
Technical Paper Publication: IDETC2021-68550
Edward J. Dold - Marquette University
Philip A. Voglewede - Marquette University

On the Structural Constraint and Motion of 3-PRS Parallel Kinematic Machines
Technical Paper Publication: IDETC2021-70160
Hassen Nigatu - Korea Institute of Science and Technology
Yun Ho Choi - Korea Institute of Science and Technology
Doik Kim - Korea Institute of Science and Technology

Design and Kinematic Analysis of a Novel 2-DoF Closed-Loop Mechanism for the Actuation of Machining Robots
Technical Paper Publication: IDETC2021-70378
Angelica Ginnante - Nimbl'Bot
François Leborne - Nimbl'Bot
Caro Stéphane - Laboratoire des Sciences du Numerique de Nantes
Enrico Simetti - University of Genova
Giuseppe Casalino - University of Genova

A Comprehensive Numerical Study on the Number of Identifiable Kinematic Parameters of Parallel Mechanisms
Technical Paper Publication: IDETC2021-70723
Lingyu Kong - Intelligent Robot Research Center, Zhejiang Lab
Genliang Chen - State Key Laboratory of Mechanical System and Vibration
Guanyu Huang - Intelligent Robot Research Center, Zhejiang Lab
Sumian Song - Intelligent Robot Research Center, Zhejiang Lab
Anhuan Xie - Intelligent Robot Research Center, Zhejiang Lab
Dan Zhang - York University

Design of a Planar Cable-Driven Parallel Crane Without Parasitic Tilt
Technical Paper Publication: IDETC2021-71778
Lionel Etienne - Laboratoire des Sciences du Numerique de Nantes
Philippe Cardou - Université Laval
Marceau Métillon - Laboratoire des Sciences du Numerique de Nantes
Stephane Caro - Laboratoire des Sciences du Numerique de Nantes

The Redesign of a Recumbent Tricycle Using a Crank Rocker Mechanism to Increase Power Throughput in FES Cycling
Technical Paper Publication: IDETC2021-71314
Anthony L. Bazler - University of Dayton
David H. Myszka - University of Dayton
Andrew P. Murray - University of Dayton

DFMLC-05-01: Special Session: Design Tool Showcase & Design for Manufacturing and the Life Cycle in Response to COVID-19
8/19/2021
11:10AM–12:30PM

Chair: ***Daniel Cooper - University of Michigan***
Chair: ***Junfeng Ma - Mississippi State University***

A Fully Automated Design Pipeline for Mass Customisation of 3D Printed Respirator Masks for Post-COVID-19 Era
Technical Presentation: IDETC2021-68094
Shiya Li - Imperial College London
Mohanad Bahshwan - Imperial College London
Joseph Folkes - Imperial College London
Yongxuan Tan - Imperial College London
Samuel Willis - Imperial College London
Livia Kalossaka - Imperial College London
Usman Waheed - Imperial College London
Qinkai Yang - Imperial College London
Connor Myant - Imperial College London

An Automated CAD System for the Mass-Customisation of Parametric Models
Technical Presentation: IDETC2021-68109
Yongxuan Tan - Imperial College London
Shiya Li - Imperial College London
Mohanad Bahshwan - Imperial College London
Joseph Folkes - Imperial College London
Samuel Willis - Imperial College London
Connor Myant - Imperial College London

Circularity Indicators and Tools for Product Design: A Web-Based Visualization and Selection Tool
Technical Presentation: IDETC2021-69704
Michael Saidani - University of Illinois at Urbana-Champaign
Harrison Kim - University of Illinois at Urbana-Champaign
Bernard Yannou - Université Paris-Saclay, CentraleSupélec

Økoengineer: A Web-Based Game Platform for Guided Discovery-Based Sustainability Learning in Engineering Curricula
Technical Presentation: IDETC2021-70322
Haitham Abughaida - Aarhus University
Serena Leka - Aarhus University
Kamila Kunrath - Aarhus University
Rune Thostrup - Aarhus University
Devarajan Ramanujan - Aarhus University

Visualizing Model-Based Product Definitions in Augmented Reality
Technical Presentation: IDETC2021-71340
Teodor Vernica - National Institute of Standards and Technology
Robert Lipman - National Institute of Standards and Technology
William Bernstein - National Institute of Standards and Technology

Nestor: A Technical Language Processing (TLP) Tagging Tool
Technical Presentation: IDETC2021-71710
Thurston Sexton - National Institute of Standards and Technology
Michael P. Brundage - National Institute of Standards and Technology

Digital Co-Design Architecture and Tools for the Goal-Oriented Inverse Design of Evolving Products and Processes
Technical Presentation: IDETC2021-74829
Anand Balu Nellippallil - Florida Institute of Technology
Zhenjun Ming - Beijing Institute of Technology
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

MR-05/MSNDC-08-02 Motion Planning, Dynamics, and Control of Robots
8/19/2021
11:10AM–12:30PM

Chair: ***Leila Notash - Queens University***
Chair: ***Chin-Hsing Kuo - University of Wollongong***
Chair: ***Pinhas Ben-Tzvi - Virginia Tech***
Chair: ***Joo H. Kim - New York University***

Pre-Bending Motion Strategy Analysis of a 3-DOF UACT Robotic Finger
Technical Paper Publication: IDETC2021-67340
Shangling Qiao - Harbin Institute of Technology
Yichen Wang - Harbin University of Science and Technology
Hongwei Guo - Harbin Institute of Technology
Hong Xiao - Harbin Institute of Technology
Zongquan Deng - Harbin Institute of Technology

Cost of Controls for Multi-Rotor Drones
Technical Paper Publication: IDETC2021-67816
Samantha Hoang - University of Washington
I.Y. Shen - University of Washington

Tuning Motion of Musical Saw With a Humanoid Robot for Industrial Automation Based on a Sound Feed-Back Process
Technical Paper Publication: IDETC2021-68287
Hiroaki Hanai - Doshisha University
Atsuyuki Miura - Doshisha University
Toshiki Hirogaki - Doshisha University
Eiichi Aoyama - Doshisha University

Optimal Control of a 5-Link Biped Using Quadratic Polynomial Model of Two-Point Boundary Value Problem
Technical Paper Publication: IDETC2021-70733
Ernesto Hernandez-Hinojosa - University of Illinois at Chicago
Aykut Satici - Boise State University
Pranav Bhounsule - University of Illinois at Chicago

Safe Collaboration Between Human and Robot in a Context of Intermittent Haptique Interface
Technical Paper Publication: IDETC2021-71518
Stanley Mugisha - University of Genova
Matteo Zoppi - University of Genova
Rezia Molfino - University of Genova
Vamsi Guda - Laboratoire des Sciences du Numérique de Nantes
Christine Chevallereau - Laboratoire des Sciences du Numérique de Nantes
Damien Chablat - Laboratoire des Sciences du Numérique de Nantes

Feedback Control of the Locomotion of a Tailed Quadruped Robot
Technical Paper Publication: IDETC2021-71611
Yujiong Liu - Virginia Tech
Pinhas Ben-Tzvi - Virginia Tech

Reduced-Order Model With Foot Tipping Allowance for Legged Balancing
Technical Paper Publication: IDETC2021-71976
William Z. Peng - New York University
Hyunjong Song - New York University
Joo H. Kim - New York University

MESA-14-03 Fractional Derivatives and Their Applications 3
8/19/2021
11:10AM–12:30PM

Chair: ***YangQuan Chen - University of California, Merced***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***Yongguang Yu - Beijing Jiaotong University***
Chair: ***Changpin Li - Shanghai University***

Modulating Functions Based Fast and Robust Estimation for a Class of Fractional Order Vibration Systems
Technical Paper Publication: IDETC2021-67447
Zhi-Bo Wang - Universite d'Orléans
Da-Yan Liu - Universite d'Orléans
Driss Boutat - Universite d'Orléans
Yang Tian - Shenyang Ligong University
Hao-Ran Liu - Yanshan University

Infinite Energy Problem of Fractional Circuit Elements: Overview and Perspectives
Technical Paper Publication: IDETC2021-67602
Yiheng Wei - Southeast University
YangQuan Chen - University of California
Yuquan Chen - Hohai University
Hui Zhang - China University of Mining and Technology

Mean Square Consensus of Discrete-Time Fractional-Order Multi-Agent Systems With Measurement Noises
Technical Presentation: IDETC2021-68660
Xiaolin Yuan - Beijing Jiaotong University
Yongguang Yu - Beijing Jiaotong University
Guojian Ren - Beijing Jiaotong University

Fear Effect of a Switching Diffusion Modified Leslie-Gower Multi-Predator-Multi-Prey System
Technical Presentation: IDETC2021-69885
Zhenzhen Lu - Beijing Jiaotong University
Yongguang Yu - Beijing Jiaotong University
Lipo Mo - Beijing Technology and Business University
Guojian Ren - Beijing Jiaotong University
Conghui Xu - Beijing Jiaotong University

Thermal Modeling Using Two-Port Network Impedance Fractional-Order Approximations
Technical Paper Publication: IDETC2021-69968
Jean-François Duhé - University of Bordeaux, CNRS, IMS-UMR 5218
Stephane Victor - University of Bordeaux, CNRS, IMS-UMR 5218
Pierre Melchior - University of Bordeaux, CNRS, IMS-UMR 5218
Youssef Abdelmoumen - IHU Liryc, Electrophysiology and Heart Modeling Institute
François Roubertie - IHU Liryc, Electrophysiology and Heart Modeling Institute

A New Triangle: Fractional Calculus, Renormalization Group, and Machine Learning
Technical Paper Publication: IDETC2021-70505
Haoyu Niu - University of California
YangQuan Chen - University of California, Merced
Lihong Guo - Jilin University
Bruce J. West - University of North Texas

Normal Form of Bifurcation for Caputo-Hadamard Fractional Differential System With a Parameter
Technical Paper Publication: IDETC2021-70870
Chuntao Yin - Shanghai University

A Graphical Stability Analysis Method for Cascade Conjugate Order Systems
Technical Paper Publication: IDETC2021-71143
Gulten Cetintas - University of Mus Alparslan
Serdar Ethem Hamamci - İnonu University

DAC-02-01 Artificial Intelligence and Machine Learning for Challenging Real-World Problems in Design Automation
8/19/2021
11:10AM–12:30PM

Chair: ***Dipanjan Ghosh - Hitachi America***
Chair: ***Payam Ghassemi - University at Buffalo***
Chair: ***Ritesh Khire - 84.51***

CreativeGAN: Editing Generative Adversarial Networks for Creative Design Synthesis
Technical Paper Publication: IDETC2021-68103
Amin Heyrani Nobari - Massachusetts Institute of Technology
Muhammad Fathy Rashad - Universiti Teknologi Petronas
Faez Ahmed - Massachusetts Institute of Technology

A Study on the Acoustic Signal Based Frameworks for the Real-Time Identification of Geometrically Defective Wire Arc Bead
Technical Paper Publication: IDETC2021-69573
Nowrin Akter Surovi - Singapore University of Technology and Design
Audelia Gumarus Dharmawan - Singapore University of Technology and Design
Gim Song Soh - Singapore University of Technology and Design

Stochastically-Trained Physics-Informed Neural Networks: Application to Thermal Analysis in Metal Laser Powder Bed Fusion
Technical Paper Publication: IDETC2021-70557
Justin Pierce - The Pennsylvania State University
Glen Williams - The Pennsylvania State University
Timothy W. Simpson - The Pennsylvania State University
Nicholas A. Meisel - The Pennsylvania State University
Christopher McComb - The Pennsylvania State University

Can Machine Learning Tools Support the Identification of Sustainable Design Leads From Product Reviews? Opportunities and Challenges
Technical Paper Publication: IDETC2021-70613
Michael Saidani - University of Illinois at Urbana-Champaign
Harrison Kim - University of Illinois at Urbana-Champaign
Bernard Yannou - Université Paris-Saclay

Classifying Component Function in Product Assemblies With Graph Neural Networks
Technical Paper Publication: IDETC2021-70840
Vincenzo Ferrero - Oregon State University
Bryony DuPont - Oregon State University
Kaveh Hassani - Autodesk
Daniele Grandi - Autodesk

Potential Energy Surfaces for Conceptual Design and Analysis of Mechanical Systems
Technical Paper Publication: IDETC2021-70921
Charles A. Manion - University of Maryland
Mark Fuge - University of Maryland

VIB-06-01 MEMS, NEMS and Control of Vibration, Shock and Noise
8/19/2021
11:10AM–12:30PM

Chair: ***Haifeng Zhang - University of North Texas***
Chair: ***Najib Kacem - University of Franche Comte***
Chair: ***Peter Coffin - Sandia National Lab***

Exploring the Influence of Temperature and Humidity on a Resonant Mass Co2 Sensor for Buildings
Technical Presentation: IDETC2021-74847
Abhi Boyina - Purdue University
Eugenio Frias Miranda - Purdue University
Zachary Siefker - Purdue University
John Hodul - Purdue University
Bryan Boudouris - Purdue University
George Chiu - Purdue University
James Braun - Purdue University
Jeffrey F. Rhoads - Purdue University

Energy Isolation Study by Utilizing Quasi-Zero Stiffness Introduced by Buckling in Elastic Strut Elements
Technical Presentation: IDETC2021-74712
Chengen Wang - University of Nebraska-Lincoln
Anna Allen - University of Nebraska-Lincoln
Ethan Krings - University of Nebraska-Lincoln
Eric Markvicka - University of Nebraska-Lincoln
Keegan Moore - University of Nebraska-Lincoln

Vibration Suppression of a Linear Oscillator Force-Excited by Random Excitation via an Inerter Pendulum Vibration Absorber
Technical Paper Publication: IDETC2021-71674
Joel A. Cosner - Michigan State University
Wei-Che Tai - Michigan State University

Reduction of Whole Body Vibration in a Wide Frequency Range Using Inflation Pressure Control of Air Bladder Cushion
Technical Paper Publication: IDETC2021-71374
Pavan Nuthi - UTA Research Institute
Yixin Gu - UTA Research Institute
Aida Nasirian - UTA Research Institute
Alexandra Lindsay - UTA Research Institute
Himanshu Purandare - UTA Research Institute
Nischita Haldipurkar - UTA Research Institute
Kashish Shah - UTA Research Institute
Muthu B.J. Wijesundara - UTA Research Institute

A Topological Insulator Based Electroacoustic Transistor
Technical Presentation: IDETC2021-68745
Sai Aditya Raman Kuchibhatla - Georgia Institute of Technology
Amir Darabi - Georgia Institute of Technology
Michael Leamy - Georgia Institute of Technology

MNS-04 Dynamics of M/NEMS and Functional Materials
8/19/2021
11:10AM–12:30PM

Chair: ***Najib Kacem - University of Franche Comte***
Chair: ***Mohammad Shavezipur - Southern Illinois University, Edwardsville***
Chair: ***Yong Shi - Stevens Institute of Technology***
Chair: ***Sherry Towfighian - Binghamton University***

Droplet Testing by a High Precision Micro-Force Sensor
Technical Paper Publication: IDETC2021-71272
Dongjie Wang - Xi'an Jiaotong University
Ziming Ren - Xi'an Jiaotong University
Shudong Wang - Xi'an Jiaotong University
Weixuan Jing - Xi'an Jiaotong University
Zhuangde Jiang - Xi'an Jiaotong University
Xueyong Wei - Xi'an Jiaotong University

Multiple Harmonic Lissajous Scanning Patterns for Endomicroscopy With Parametrically-Resonant Micro-Mirrors
Technical Paper Publication: IDETC2021-71280
Nicholas Chan - University of Michigan
Miki Lee - University of Michigan
Haijun Li - University of Michigan
Thomas D. Wang - University of Michigan
Kenn R. Oldham - University of Michigan

Viscoelastic Soft Matter Deformation, Damage and Loss of Functionality in Static and Dynamic Atomic Force Microscopy Measurements
Technical Presentation: IDETC2021-74316
Santiago D. Solares - George Washington University

Flexural-Torsional Free Vibration Analysis of a Piezoactive Double-Beam Afm Probe
Technical Presentation: IDETC2021-74823
Anahita Zargarani - University of Alabama
Nima Mahmoodi - University of Alabama

Rotating Toroidal Shell for Angular Rate Sensors Applications
Technical Presentation: IDETC2021-74839
Slava Krylov - Tel Aviv University
Sergey Sorokin - Aalborg University
Radoslav Darula - Aalborg University

Electrostatic of Thermal Tuning of Mode Frequencies to Achieve Internal Resonance in a Micro-Mechanical Resonator
Technical Presentation: IDETC2021-74857
Jun Yu - The Ohio State University
Hanna Cho - The Ohio State University

Integer Ratio Self-Synchronization in Pairs of Limit Cycle Oscillators
Technical Paper Publication: IDETC2021-71254
Aditya Bhaskar - Cornell University
B. Shayak - Cornell University
Alan Zehnder - Cornell University
Richard Rand - Cornell University

DFMLC-06-01: Design of Thermal and Energy Systems
8/19/2021
1:00PM–1:50PM

Chair: ***Amin Mirkouei - University of Idaho***
Chair: ***Qing Wang - Durham University***
Chair: ***Junfeng Ma - Mississippi State University***

Techno-Economic and Environmental Assessment of Dairy Products: A Case Study in Southeast Idaho, USA
Technical Paper Publication: IDETC2021-69285
Brekke Van Slyke - University of Idaho
Amin Mirkouei - University of Idaho
Michael McKellar - University of Idaho

Using Machine Learning for the Classification of the Remaining Useful Cycles in Lithium-Ion Batteries
Technical Paper Publication: IDETC2021-69647
Harry Coutts - Durham University
Qing Wang - Durham University

Electric Vehicle Battery Simulation: How Electrode Porosity and Thickness Impact Cost and Performance
Technical Paper Publication: IDETC2021-71511
Yixin Zhao - University of Florida
Sara Behdad - University of Florida

Home Energy Management Systems (HEMS): Coupled Flexible Load Management in Homes
Technical Paper Publication: IDETC2021-71680
Yilin Jiang - University of Oklahoma
Li Song - University of Oklahoma
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

MR-05/MSNDC-08-03 Motion Planning, Dynamics, and Control of Robots
8/19/2021
1:00PM–1:50PM

Chair: ***Leila Notash - Queens University***
Chair: ***Chin-Hsing Kuo - University of Wollongong***
Chair: ***Johannes Gerstmayr - Leopold-Franzens-Universität Innsbruck***
Chair: ***Damien Chablat - CNRS Nantes***
Chair: ***Joo H. Kim - New York University***

An Improved Dynamic Model of the Mecanum Wheel for Multibody Simulations
Technical Paper Publication: IDETC2021-70281
Peter Manzl - University of Innsbruck
Johannes Gerstmayr - University of Innsbruck

Learning of a Basketball Free Throw With a Flexible Link Robot
Technical Paper Publication: IDETC2021-71660
Jannik Timke - Hamburg University of Technology
Merlin Morlock - Hamburg University of Technology
Daniel A. Duecker - Hamburg University of Technology
Robert Seifried - Hamburg University of Technology

Model-Based Design and Optimization of Passive Shoulder Exoskeletons
Technical Paper Publication: IDETC2021-69437
Ali Nasr - University of Waterloo
Spencer Ferguson - University of Waterloo
John McPhee - University of Waterloo

Towards Transparent Motion Planning of Wearable Rehabilitation Exoskeletons via Model-Based Estimation
Technical Paper Publication: IDETC2021-70011
Jiamin Wang - Virginia Polytechnic Institute and State University
David Blankenship - Virginia Polytechnic Institute and State University
Oumar Barry - Virginia Polytechnic Institute and State University

In Search of the Jerk Element
Technical Paper Publication: IDETC2021-70486
Zachary P. Belyaev - Marquette University
Samuel Downes - Marquette University
Philip A. Voglewede - Marquette University

MESA-12-01 Mechatronics and Embedded Systems Education
8/19/2021
1:00PM–1:50PM

Chair: ***Binsen Qian - University of California at Davis***
Chair: ***Chris Pretty - University of Canterbury***

Digital Twin Based Interactive Mechatronics Lab Development for Remote Lab Offering and Evaluation
Technical Paper Publication: IDETC2021-66747
Jairo Viola - University of California, Merced
Furkan Guc - University of California, Merced
YangQuan Chen - Univ of California, Merced
Mauricio Calderon - Universita degli Studi di Brescia

Teaching Mechatronic System Modeling: A Fifteen-Year Journey
Technical Paper Publication: IDETC2021-67326
Shuvra Das - University of Detroit Mercy

A Block-Based Arduino Programming Platform for Developing Computational Thinking Skills for K-12 Students
Technical Paper Publication: IDETC2021-68148
Binsen Qian - University of California
Harry H. Cheng - University of California

MR-03-03 Compliant Mechanisms (A. Midha Symposium)
8/19/2021
1:00PM–1:50PM

Chair: ***Leila Notash - Queens University***
Chair: ***Lifang Qiu - University of Science and Technology Beijing***
Chair: ***Just Herder - Delft University of Technology***

Conceptual Design of a Compliant Hip Orthosis for Trendelenburg Gait
Technical Paper Publication: IDETC2021-68104
P. Vugts - Delft University of Technology
J. Rommers - Delft University of Technology
Bram T. Sterke - Erasmus Medical Center
J.L. Herder - Delft University of Technology

Design and Analysis of Flexible Continuum Robot Based on Origami and Mortise-Tenon Structure (FCRBOM)
Technical Paper Publication: IDETC2021-68169
Yue Yu - University of Science and Technology Beijing
Lifang Qiu - University of Science and Technology Beijing
Decheng Wang - China Academy of Machinery Science and Technology Group Co., Ltd.
Jing Zou - University of Science and Technology Beijing

A Compliant Micromechanism for Biaxially Stretching Biological Cells
Technical Paper Publication: IDETC2021-68421
Neeraj Singh Fartyal - Indian Institute of Technology, Goa
Himanshu Marwah - Indian Institute of Technology, Goa
Sreenath Balakrishnan - Indian Institute of Technology, Goa

Design and Actuation of a Skeleton for a Robotic Fish
Technical Paper Publication: IDETC2021-69688
Dina Joy K. Abulon - University of California
Jiaji Li - University of California
J. Michael McCarthy - University of California

A Reconfigurable Variable-Stiffness Parallel Beam for Compliant Robotic Mechanisms Towards Safe Human Interaction
Technical Paper Publication: IDETC2021-70226
Jiaming Fu - Purdue University
Dongming Gan - Purdue University

CIE-10-02 AMS: Advanced Modeling and Simulation (AMS General)
8/19/2021
1:00PM–1:50PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Ravi Burla - Autodesk***
Chair: ***Piyush Pandita - GE Research***

A Single-Card GPU Implementation of Peridynamics
Technical Paper Publication: IDETC2021-68032
John D. Bartlett - University of Washington
Duane Storti - University of Washington

Coupled Electromagnetic and Thermoelastic Response of Conductive Materials Under Mechanical Loading and High Current Pulse Conditions
Technical Paper Publication: IDETC2021-71130
J.G. Michopoulos - U.S. Naval Research Laboratory
A.P. Iliopoulos - U.S. Naval Research Laboratory
J.C. Steuben - U.S. Naval Research Laboratory
N.A. Apetre - U.S. Naval Research Laboratory
S. Douglass - U.S. Naval Research Laboratory
A.G. Lynn - U.S. Naval Research Laboratory
R.L. Cairns III - Alion Science and Technology

Scalable3-Bo: Big Data Meets Hpc — A Scalable Asynchronous Parallel High-Dimensional Bayesian Optimization Framework on Supercomputers
Technical Paper Publication: IDETC2021-70828
Anh Tran - Sandia National Laboratories

The Importance of the Mode II Term on the Analysis of Angled Cracks in Unidirectional Carbon Fiber Composites
Technical Paper Publication: IDETC2021-67236
Jacob Biddlecom - Clemson University
Garrett J. Pataky - Clemson University

The Importance of the Mode II Term on the Analysis of Angled Cracks in Unidirectional Carbon Fiber Composites
Technical Paper Publication: IDETC2021-71724
Nessrine Elloumi- University of Sfax
Aicha Ben Makhlouf- University of Sousse
Borhen Louhichi- University of Sousse
Dominique Deneux- University Polytechnique Hauts-de-France

DAC-09-01 Design for Resilience and Failure Recovery
8/19/2021
1:00PM–1:50PM

Chair: ***Chao Hu - Iowa State University***
Chair: ***Zequn Wang - Michigan Technological University***

Utilizing 3D Printing Pens for Maintenance and Repair of Additively Manufactured Components
Technical Paper Publication: IDETC2021-66780
Kyle Koren - Florida Institute of Technology
Toluwalase Olajoyegbe - University of Georgia
Beshoy Morkos - University of Georgia
Hector Gutierrez - Florida Institute of Technology

Point-Cloud Neural Network Using Transfer Learning-Based Multi-Fidelity Method for Thermal Field Prediction in Additive Manufacturing
Technical Paper Publication: IDETC2021-67963
Xufeng Huang - University of Michigan-Dearborn
Zhen Hu - University of Michigan-Dearborn
Tingli Xie - Georgia Institute of Technology
Zhuo Wang - University of Michigan-Dearborn
Lei Chen - University of Michigan-Dearborn
Qi Zhou - Huazhong University of Science & Technology

Understanding Resilience Optimization Architectures With an Optimization Problem Repository
Technical Paper Publication: IDETC2021-70985
Daniel Hulse - NASA Ames Research Center
Hongyang Zhang - Oregon State University
Christopher Hoyle - Oregon State University

Value of Information for Continuous Monitoring Systems in Recurrent Maintenance Decision Scenarios
Technical Paper Publication: IDETC2021-71021
Xinyang Liu - University of Illinois at Urbana-Champaign
Pingfeng Wang - University of Illinois at Urbana-Champaign

Physics-Informed Machine Learning for Degradation Diagnostics of Lithium-Ion Batteries
Technical Paper Publication: IDETC2021-71407
Adam Thelen - Iowa State University
Yu Hui Lui - Iowa State University
Sheng Shen - Iowa State University
Simon Laflamme - Iowa State University
Shan Hu - Iowa State University
Chao Hu - Iowa State University

CIE-40-01 VES: Virtual Environments and Design Visualization (VES General)
8/19/2021
1:00PM–1:50PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Marina Carulli - Politecnico di Milano***
Chair: ***Vinayak Krishnamurthy - Texas A&M University***

Creating Virtual Reality Teaching Modules for Low-Cost Headsets
Technical Paper Publication: IDETC2021-72084
Takudzwa Mujuru - Lafayette College
Christian Lopez Bencosme - Lafayette College

A Method to Develop Virtual Reality Platforms for the Medical Rehabilitation of Severe Memory Loss After Brain Stroke
Technical Paper Publication: IDETC2021-70319
Daniel Lanzoni - University of Bergamo
Andrea Vitali - University of Bergamo
Daniele Regazzoni - University of Bergamo
Caterina Rizzi - University of Bergamo

Influence of Realistic Virtual Environments and Humanlike Avatars on Patients With Social Phobia
Technical Paper Publication: IDETC2021-70265
Milena Stefanova - Politecnico di Milano
Margherita Pillan - Politecnico di Milano
Alberto Gallace - University of Milano-Bicocca

Virtual Reality (VR) for the Support of the Analysis and Operation of a Solar Thermal Tower Power Plant
Technical Paper Publication: IDETC2021-70202
Kamran Mahboob - University of Engineering and Technology Lahore
Atif Mahboob - Technische Universitaet Ilmenau
Stephan Husung - Technische Universitaet Ilmenau

DTM-23 Design Theory: Understanding Representation and Behavior
8/19/2021
1:00PM–1:50PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Christopher McComb - Penn State***
Chair: ***Ying Liu - Cardiff University***

When Decomposition Increases Complexity: How Decomposing Introduces New Information Into the Problem Space
Technical Paper Publication: IDETC2021-71917
Suparna Mukherjee - The George Washington University
Anthony Hennig - The George Washington University
Taylan G. Topcu - The George Washington University
Zoe Szajnfarber - The George Washington University

Design Embedding: Representation Learning of Design Thinking to Cluster Design Behaviors
Technical Paper Publication: IDETC2021-72406
Molla Hafizur Rahman - University of Arkansas
Charles Xie - Institute for Future Intelligence
Zhenghui Sha - University of Arkansas

Aligning Human and Computational Evaluations of Functional Design Similarity
Technical Paper Publication: IDETC2021-71905
Ananya Nandy - University of California
Kosa Goucher-Lambert - University of California

Addressing Challenges to Problem Complexity: Effectiveness of AI Assistance During the Design Process
Technical Paper Publication: IDETC2021-70467
Binyang Song - Penn State
Nicolas F. Soria Zurita - Penn State
Hannah Nolte - Penn State
Harshika Singh - Politechnico di Milano
Jonathan Cagan - Carnegie Mellon University
Christopher McComb - Penn State

Complexity Should Not Be in the Eye of the Beholder: How Representative Complexity Measures Respond to the Commonly-Held Beliefs of the Literature
Technical Paper Publication: IDETC2021-69598
Anthony Hennig - George Washington University
Taylan G. Topcu - George Washington University
Zoe Szajnfarber - George Washington University

MNS-05 Micro/Nano Robotics, Sensors and Actuators, Functional Materials
8/19/2021
1:00PM–1:50PM

Chair: ***Gloria Wiens - University of Florida***
Chair: ***Muhammad Khan - Naval Surface Warfare Center, IHEODTD***
Chair: ***Yong Shi - Stevens Institute of Technology***

Mode-Dependent Selective Detection of Humidity and Helium Using Electromagnetically Actuated Clamped Guided MEMS Resonators
Technical Paper Publication: IDETC2021-71131
Usman Yaqoob - King Abdullah University of Science and Technology
Nizar Jaber - King Fahd University of Petroleum & Minerals
Nouha Alcheikh - King Abdullah University of Science and Technology
Mohammad Younis - King Abdullah University of Science and Technology

Simulation of Corona Electrostatic Separator for End-of-Life Management in Printed Circuit Boards
Technical Paper Publication: IDETC2021-71447
Trunal Patil - STIIMA-CNR
Lara Rebaioli - STIIMA-CNR
Irene Fassi - STIIMA-CNR

Teleoperation Interface for sAFAM, a Solid Articulated Four Axes Microrobot
Technical Paper Publication: IDETC2021-71552
Moath Alqatamin - University of Louisville
Brooke Ritz - University of Louisville
Andriy Sherehiy - University of Louisville
Douglas Jackson - University of Louisville
Roushi Zhong - University of Louisville
Sri Chowdhury - University of Louisville
Danming Wei - University of Louisville
Dan O. Popa - University of Louisville

Mathematical and Computational Modeling of Resistance Spot Welding Solidification Process
Technical Paper Publication: IDETC2021-68155
Ruiji Sun - Purdue University
Matthew Higgins - Purdue University
Haiyan H. Zhang - Purdue University

A MEMS Tunable Capacitor With Dual Deformation Modes and High Tunability and Linearity
Technical Paper Publication: IDETC2021-69831
Mahdi Shahi - Southern Illinois University
Mohammad Shavezipur - Southern Illinois University

DFMLC-07-01/DTM-06-01: Design for Sustainable Product Use, User Behavior
8/19/2021
2:10PM–3:00PM

Chair: ***L.H. Shu - University of Toronto***
Chair: ***Junfeng Ma - Mississippi State University***
Chair: ***Sara Behdad - University of Florida***

Exploring a Temperature-Decreasing Shower Concept to Conserve Water and Energy
Technical Paper Publication: IDETC2021-70671
N. Saniei - Ontario Tech University
E. Shibata - University of Toronto
S. Lui - Ontario Tech University
J. Magcalas - Ontario Tech University
B. McPhee - Ontario Tech University
S. Tariq - Ontario Tech University
L.H. Shu - University of Toronto

Understanding How Consumers Transition to and Experience Reusable Fast-Moving Consumer Goods: A Qualitative Exploration of Behaviour Change, Considering Motivation, Ability and Prompts Throughout the User Journey
Technical Presentation: IDETC2021-73911
Catriona Tassell - Dyson School of Design Engineering, Imperial College London
Marco Aurisichhio - Dyson School of Design Engineering, Imperial College London

Validating Perceived Sustainable Design Features Using a Novel_x000B_Collage Approach
Technical Paper Publication: IDETC2021-66708
Nasreddine El-Dehaibi - Stanford University
Ting Liao - Stanford University
Erin F. Macdonald - Stanford University

Can Online Customer Reviews Help Design More Sustainable Products? A Preliminary Study on Amazon Climate Pledge Friendly Products
Technical Paper Publication: IDETC2021-69705
Michael Saidani - University of Illinois at Urbana-Champaign
Harrison Kim - University of Illinois at Urbana-Champaign
Bernard Yannou - Université Paris-Saclay, CentraleSupélec
Nawres Ayadhi - Université Paris-Saclay, CentraleSupélec

Reducing Waste Outflow to Motivate Water Conservation
Technical Paper Publication: IDETC2021-70670
S. Halabieh - University of Toronto
L.H. Shu - University of Toronto

MR-05/MSNDC-08-04 Motion Planning, Dynamics, and Control of Robots
8/19/2021
2:10PM–3:00PM

Chair: ***Leila Notash - Queens University***
Chair: ***Chin-Hsing Kuo - University of Wollongong***
Chair: ***Johannes Gerstmayr - Leopold-Franzens-Universität Innsbruck***
Chair: ***Andreas Muller - Johannes Kepler University, Institute for Robotics***
Chair: ***David Cappelleri - Purdue University***

A Novel Approach With Bayesian Networks to Multi-Robot Task Allocation in Dynamic Environments
Technical Paper Publication: IDETC2021-66902
Ching-Wei Chuang - University of California, Davis
Harry H. Cheng - University of California, Davis

Comparison of Neural Network-Based Pose Estimation Approaches for Mobile Manipulation
Technical Paper Publication: IDETC2021-69800
Arindam B. Chowdhury - Purdue University
Juncheng Li - Purdue University
David J. Cappelleri - Purdue University

Multi-UAV Cooperative Transportation Using Dynamic Control Allocation and a Reinforcement Learning Compensator
Technical Paper Publication: IDETC2021-71797
Shuai Li - Stevens Institute of Technology
Damiano Zanotto - Stevens Institute of Technology

Symbolic Nonlinear Model Predictive Control of a Planar End-Effector-Based Post-Stroke Rehabilitation Robot
Technical Presentation: IDETC2021-74664
Arash Hashemi - University of Waterloo
Anson Maitland - University of Waterloo
John McPhee - University of Waterloo

MESA-15-01 Small Unmanned Vehicle Technologies and Applications
8/19/2021
2:10PM–3:00PM

Chair: ***Youmin Zhang - Concordia University***
Chair: ***Chris Pretty - University of Canterbury***
Chair: ***YangQuan Chen - University of California, Merced***
Chair: ***Wencen Wu - San Jose State University***

Application of Smart, Swarm and Small UAV's for Methane Emission Reduction
Technical Paper Publication: IDETC2021-66794
Di An - University of California, Merced
YangQuan Chen - University of California, Merced

LSTM-Enabled Level Curve Tracking in Scalar Fields Using Multiple Mobile Robots
Technical Paper Publication: IDETC2021-68554
Kunj J. Parikh - San Jose State University
Wencen Wu - San Jose State University

Model Predictive Control of Fixed Wing Aircraft Using a Disturbance Observer Approach
Technical Paper Publication: IDETC2021-70022
Vinayak Deshpande - Concordia University
Youmin Zhang - Concordia University

Self-Optimizing Loop Sifting and Majorization for 3D Reconstruction
Technical Paper Publication: IDETC2021-71393
Guoxiang Zhang - University of California, Merced
YangQuan Chen - University of California, Merced

MR-03-04 Compliant Mechanisms (A. Midha Symposium)
8/19/2021
2:10PM–3:00PM

Chair: ***Leila Notash - Queens University***
Chair: ***Mary Frecker - Pennsylvania State University***
Chair: ***Hong Zhou - Texas A&M University-Kingsville***

Local Redesign for Additive Manufacturability of Compliant Mechanisms Using Topology Optimization
Technical Paper Publication: IDETC2021-67642
Stijn Koppen - Delft University of Technology
Emma Hoes - Delft University of Technology
Matthijs Langelaar - Delft University of Technology
Mary I. Frecker - Penn State University

Programmable Stiffness and Applications of 3D Printed TPU Grid Lattices
Technical Paper Publication: IDETC2021-69826
Yifan Yuan - University of Pennsylvania
Cynthia Sung - University of Pennsylvania

Constant Force Compliant Mechanisms Without Preloading
Technical Paper Publication: IDETC2021-69958
Premkumar Pujali - Texas A&M University-Kingsville
Hong Zhou - Texas A&M University-Kingsville

Mechanical Characterization of Metal Additively Manufactured Contact Aided Cellular Compliant Mechanisms
Technical Paper Publication: IDETC2021-71756
Jivtesh B. Khurana - Pennsylvania State University
Mary Frecker - Pennsylvania State University

CIE-20-01 CAPPD: Computer-Aided Product and Process Development (CAPPD General)
8/19/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Tsz Ho Kwok - Concordia University***
Chair: ***Ehsan T. Esfahani - State University of New York at Buffalo***

Calibration of Parallel Kinematic Machine Based on Stewart Platform: A Literature Review
Technical Paper Publication: IDETC2021-71619
Sourabh Karmakar - Clemson University
Apuvra Patel - Clemson University
Cameron J. Turner - Clemson University

Computationally Assisted Retrieval and Reuse of 3D Solid Models and Assembly Work Instructions
Technical Paper Publication: IDETC2021-70480
Rahul Sharan Renu - Francis Marion University
Gregory Mocko - Clemson University

Ml-Based Modeling of Communication and Decision Making in Design Teams
Technical Presentation: IDETC2021-74779
Bhavika Jain - Purdue University and Plaksha University
Joseph Thomas Thachil - Purdue University and Plaksha University
Sachin Lokesh - Purdue University and Plaksha University

Testing and Validation of a Custom CAD Tool to Support Design for Manufacturing: An Experimental Study
Technical Paper Publication: IDETC2021-69820
Apurva Patel - Clemson University
Joshua D. Summers - University of Texas at Dallas
Akash Patel - Clemson University
James L. Mathieson - Lockheed Martin Space
Michael P. Sbarra - Lockheed Martin Space
Joshua Ortiz - Clemson University

Fast, Accurate, and Automated 3D Reconstruction Using a Depth Camera Mounted on an Industrial Robot
Technical Paper Publication: IDETC2021-71725
Rishi Malhan - University of Southern California
Rex Jomy Joseph - University of Southern California
Prahar M. Bhatt - University of Southern California
Brual Shah - University of Southern California
Satyandra K. Gupta - University of Southern California

Evolutionary Grasp Planning for Sheet Metal Parts With Multi-Type Grippers
Technical Paper Publication: IDETC2021-71632
Jicmat Ali Tribaldos - Florida Institute of Technology
Chiradeep Sen - Florida Institute of Technology

DAC-14-01 User-Focused Design Tools and Methodologies
8/19/2021
2:10PM–3:00PM

Chair: ***Matthew Parkinson - Pennsylvania State University***
Chair: ***Nico Soria - Pennsylvania State University***

Optimal Allocation of Design Margins in Additive Remanufacturing
Technical Paper Publication: IDETC2021-69378
Khalil Al Handawi - McGill University
Massimo Panarotto - Chalmers University of Technology
Petter Andersson - GKN Aerospace Engine Systems
Ola Isaksson - Chalmers University of Technology
Michael Kokkolaras - McGill University

Integrating User Preference Into Improved Home Appliance Scheduling
Technical Paper Publication: IDETC2021-70244
Jacob Starks - University of Oklahoma
Li Song - University of Oklahoma
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

*Identifying Computer-Aided Design Action Types From Professional UserÂ Analytics Data_x000B__x000B_*
Technical Paper Publication: IDETC2021-72102
Alison Olechowski - University of Toronto
Kevin Leonardo - University of Toronto

Integrating Sales, Design and Production: A Configuration System for Automation in Mass Customization
Technical Paper Publication: IDETC2021-68426
Camilla Wehlin - Linköping University
Olle Vidner - Linköping University
Leon Poot - Linköping University
Mehdi Tarkian - Linköping University

Lessons Learned About Product Redesign for Evolvability Using Reflective Entries
Technical Paper Publication: IDETC2021-71913
Lindsey Jacobson - North Carolina State University
Scott Ferguson - North Carolina State University

CIE-41-01 VES: Technologies for VR, AR, and MR (Methods, Processes, and Applications)
8/19/2021
2:10PM–3:00PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Andrea Vitali - Universitã di Bergamo***

Visualizing Model-Based Product Definitions in Augmented Reality
Technical Paper Publication: IDETC2021-71329
Teodor Vernica - National Institute of Standards and Technology
Robert Lipman - National Institute of Standards and Technology
William Z. Bernstein - National Institute of Standards and Technology

An Application of Machine Learning to Predict Stiffness Discrimination Thresholds Using Haptics
Technical Paper Publication: IDETC2021-69337
Ernur Karadoğan - Central Michigan University

Digital Engineering With Blockchain/Cybersecurity and Digital Twin
Technical Presentation: IDETC2021-69294
Sreekumar Pillai - consulting services

A New Paradigm for the Enjoyment and Exploitation of Cultural Heritage Based on Spatial Augmented Reality: The Case of the Ducal Palace of Urbino
Technical Paper Publication: IDETC2021-68896
Alma Leopardi - Università Politecnica delle Marche
Silvia Ceccacci - Università Politecnica delle Marche
Maura Mengoni - Università Politecnica delle Marche

Automated and Adaptive Geometry Preparation for AR/VR-Applications
Technical Paper Publication: IDETC2021-66731
Maximilian Peter Dammann - Technische Universität Dresden
Wolfgang Steger - Technische Universität Dresden
Ralph Stelzer - Technische Universität Dresden

VIB-07-01 Vibrations and Stability of Mechanical and Continuous Systems
8/19/2021
2:10PM–3:00PM

Chair: ***Dumitru Caruntu - University of Texas - Rio Grande Valley***
Chair: ***Christopher G. Cooley - Oakland University***
Chair: ***Weidong Zhu - University of Maryland, Baltimore County***
Chair: ***Peter Coffin - Sandia National Laboratories***

Finite Element/Contact Mechanics Analysis of Spur Gear Pairs With Tooth Root Cracks
Technical Paper Publication: IDETC2021-71896
Yaosen Wang - Oakland University
Adrian A. Hood - Army Research Laboratory
Christopher G. Cooley - Oakland University

Modal Analysis of Curved Beams With In-Plane and Out-of-Plane Motion
Technical Presentation: IDETC2021-74835
Fatemeh Afzali - Michigan State University
Amr Saleh - Michigan State University
Brian Feeny - Michigan State University

Subharmonic Resonance of One Fourth Order of Electrostatically Actuated MEMS Circular Plates: Amplitude-Frequency Response
Technical Paper Publication: IDETC2021-70415
Dumitru I. Caruntu - University of Texas Rio Grande Valley
Julio Beatriz - University of Texas Rio Grande Valley
Miguel Martinez - University of Texas Rio Grande Valley

Vibration Characteristics of 3D Printed Viscoelastic Graded Polymeric Plates
Technical Paper Publication: IDETC2021-68460
Justin Carter - Miami University
Kumar Vikram Singh - Miami University
Fazeel Khan - Miami University

Vibration Analysis of Beams Using Alternative Admissible Functions With Penalties
Technical Paper Publication: IDETC2021-68459
Srividyadhare Kateel - University of Ottawa
Natalie Baddour - University of Ottawa

DTM-24 Design Practice: Extracting Meaning from Practice
8/19/2021
2:10PM–3:00PM

Chair: ***Joshua Summers - University of Texas at Dallas***
Chair: ***Jesse Austin-Breneman - University of Michigan***
Chair: ***Bradley Camburn - Oregon State University***

Designing Robust Systems Using Bioinspired Product Architecture
Technical Paper Publication: IDETC2021-68956
Devesh Bhasin - Texas A&M University
David Staack - Texas A&M University
Daniel A. McAdams - Texas A&M University

Transformation Design Principles as Enablers for Designing Reconfigurable Robots
Technical Paper Publication: IDETC2021-69373
M. Kalimuthu - Singapore University of Technology and Design
A.A. Hayat - Singapore University of Technology and Design
M.R. Elara - Singapore University of Technology and Design
K.L. Wood - University of Colorado Denver

Understanding Household Energy Challenges in Himalayan Communities Using Participatory Design Approaches
Technical Paper Publication: IDETC2021-67972
Lisa Tang - Massachusetts Institute of Technology
Arnav Patel - Massachusetts Institute of Technology
Daniel J. Sweeney - Massachusetts Institute of Technology
Nilanjana Banerjee - University of Petroleum and Energy Studies
Amit K. Thakur - University of Petroleum and Energy Studies
Pranava Chaudhari - University of Petroleum and Energy Studies
Rahul Kumar - University of Petroleum and Energy Studies
Jyeshtharaj Joshi - Institute of Chemical Technology

Extending Usage Context-Based Design to Coupled Usage Contexts: A Vehicle Design Case Study
Technical Paper Publication: IDETC2021-67890
Mojtaba Arezoomand - University of Michigan
Jesse Austin-Breneman - University of Michigan

When the Going Gets Tough: Exploring Changes in the Startup Landscape Due to the Challenges of 2020
Technical Paper Publication: IDETC2021-71798
Tobias Mahan - Penn State University
Pratima Saravanan - Penn State University
Sandeep Krishnakumar - Penn State University
Hannah Nolte - Penn State University
Christopher McComb - Penn State University
Jessica Menold - Penn State University

DFMLC-08-01/DAC-20-01: Modeling and Optimization for Sustainable Design and Manufacturing
8/19/2021
3:20PM–4:40PM

Chair: ***Bryony Dupont - Oregon State University***
Chair: ***William Bernstein - National Institute of Standards and Technology***
Chair: ***Junfeng Ma - Mississippi State University***

Selection Method of Molding Condition for Self-Adhesive Products Using Only Bamboo Fibers Extracted With a Machining Center Based on Bayesian Optimization
Technical Paper Publication: IDETC2021-68167
Daigo Tauchi - Doshisha University
Toshiki Hirogaki - Doshisha University
Eiichi Aoyama - Doshisha University
Keiji Ogawa - Ryukoku University
Hiromichi Nobe - Mifuji-Kikai, Inc.

A Reusable Unit Process Life Cycle Inventory Model for Infeed Centerless Grinding
Technical Paper Publication: IDETC2021-69609
Marija Glisic - Aarhus University
Badrinath Veluri - Grundfos
Devarajan Ramanujan - Aarhus University

An Approach for Identifying and Customizing the Effective Ecodesign Tools for Environmentally Sustainable Product Development
Technical Paper Publication: IDETC2021-69759
Prashant Kumar Singh - Indian Institute of Technology Ropar
Prabir Sarkar - Indian Institute of Technology Ropar

An Eco-Industrial Park-Based Method for Net Zero Community Creation
Technical Paper Publication: IDETC2021-71440
Garrett Hairston - Texas A&M University
Astrid Layton - Texas A&M University

Product Development Using Perceived Correlations Between the United Nations Sustainable Development Goals and Social Impact Categories
Technical Paper Publication: IDETC2021-72065
Gabrielle E. Johnson - Brigham Young University
Marin J. Fisher - Brigham Young University
John L. Salmon - Brigham Young University
Christopher A. Mattson - Brigham Young University

Reliability-Informed Economic and Energy Evaluation for Design for Remanufacturing: A Case Study on a Hydraulic Manifold
Technical Paper Publication: IDETC2021-67996
Venkat P. Nemani - Iowa State University
Jinqiang Liu - Iowa State University
Navaid Ahmed - John Deere Reman, Deere & Company
Adam Cartwright - John Deere Reman, Deere & Company
Gül E. Kremer - Iowa State University
Chao Hu - Iowa State University

Impact of Asset Management in a Green Supply Chain
Technical Paper Publication: IDETC2021-70826
Sara Hajihashemi - University of Oklahoma
Reza Alizadeh - University of Oklahoma
Janet K. Allen - University of Oklahoma
Farrokh Mistree - University of Oklahoma

A Probabilistic Approach for Estimating the Environmental Impact of Novel Product Concepts
Technical Paper Publication: IDETC2021-70990
Vincenzo Ferrero - Oregon State University
Chris Hoyle - Oregon State University
Bryony DuPont - Oregon State University

MSNDC-11-01 Dynamics of Smart Structures and Systems
8/19/2021
3:20PM–4:40PM

Chair: ***Richard Wiebe - University of Washington***
Chair: ***Giuseppe Habib - Budapest University of Technology and Economics***
Chair: ***Stefano Lenci - Polytechnic University of Marche***
Chair: ***Andrea Arena - Sapienza University of Rome***
Chair: ***Dumitru Caruntu - University of Texas - Rio Grande Valley***

Flexural-Axial 1:2 Internal Resonances in the Nonlinear Oscillations of a Planar Beam
Technical Presentation: IDETC2021-66830
Stefano Lenci - Polytechnic University of Marche
Francesco Clementi - Polytechnic University of Marche
Lukasz Kloda - Lublin University of Technology
Jerzy Warminski - Lublin University of Technology
Giuseppe Rega - Sapienza University of Rome

Case Study of a Heavy Chain With an Electromagnetic Device: A Discussion on Vibration Control, Energy Harvesting and Hysteresis
Technical Presentation: IDETC2021-67271
Breno Mendes - University of São Paulo
Eduardo Ribeiro - University of São Paulo
Carlos Mazzilli - University of São Paulo

Sommerfeld Effects and Bifurcations of Limit Cycles and Limit Flows in Rotor Dynamics
Technical Paper Publication: IDETC2021-69684
Walter V. Wedig - KIT Karlsruher Institut für Technologie

Nonlinear Spectral Properties of Elastic Waves Propagating Along a Pantographic Metamaterial With Local Inertia Amplifiers
Technical Paper Publication: IDETC2021-72924
Valeria Settimi - Polytechnic University of Marche
Marco Lepidi - University of Genoa
Andrea Bacigalupo - University of Genoa

Augmented Perpetual Manifolds: Mechanical System With Particle-Transversal Wave and Like 'Dancing' Motions
Technical Presentation: IDETC2021-74624
Fotios Georgiades - Center for Nonlinear Systems, Chennai Institute of Technology

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MR-04-03 Origami-Based Engineering Design
8/19/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Jiayao Ma - Tianjin University***
Chair: ***Joseph Gattas - University of Queensland***

Serial Chain of Rigid Origami That Extends, Bends and Turns
Technical Paper Publication: IDETC2021-67013
Haruto Kamijo - University of Tokyo
Tomohiro Tachi - University of Tokyo

Sequentially Working Origami Multi-Physics Simulator (SWOMPS): A Versatile Implementation
Technical Paper Publication: IDETC2021-68042
Yi Zhu - University of Michigan
Evgueni T. Filipov - University of Michigan

Inhomogeneous Folding Modes in Infinite Lattices of Rigid Triangulated Miura-Ori
Technical Paper Publication: IDETC2021-68532
Anandaroop Lahiri - Indian Institute of Technology Madras
Phanisri P. Pratapa - Indian Institute of Technology Madras

Mathematical Elucidation of the Traditional Japanese Fan Focusing on Its Structure
Technical Paper Publication: IDETC2021-68773
Keiko Yamazaki - Meiji University
Fujiko Abe - Meiji University
Ichiro Hagiwara - Meiji University

Finite Element Analysis and Thick-Panel Clash Behaviour of Steel Fold-Lines
Technical Paper Publication: IDETC2021-69513
Quan Shi - University of Queensland
Joseph M. Gattas - University of Queensland

Method for Generating Mechanical Linkages of Polygons That Fold Into a Similar Shape
Technical Paper Publication: IDETC2021-70089
Yohei Yamamoto - University of Tsukuba
Jun Mitani - University of Tsukuba

Structures With Multiple Rigid Configurations Due to Prestress and Unilateral Contacts
Technical Paper Publication: IDETC2021-70397
Charles Dorn - California Institute of Technology
Yang Li - Wuhan University
Sergio Pellegrino - California Institute of Technology

CIE-21-01 CAPPD: Digital Human Modelling and Human-In-the Loop for Product Design, Training, and Manufacturing
8/19/2021
3:20PM–4:40PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Caterina Rizzi - University of Bergamo***
Chair: ***Ehsan T. Esfahani - State University of New York at Buffalo***

Evaluating Assistive Information in Augmented Reality Based Manual Assembly With Occluded Components
Technical Presentation: IDETC2021-73936
Chih-Hsing Chu - National Tsing Hua University
Ching-Hung Ko - National Tsing Hua University
Dawi Karomati Baroroh - National Tsing Hua University

The Human Error and Functional Failure Reasoning Framework: How Does It Scale?
Technical Paper Publication: IDETC2021-71839
Lukman Irshad - Oregon State University
H. Onan Demirel - Oregon State University
Irem Y. Tumer - Oregon State University

Real-Time Fatigue Detection for Human Aware Adaptation in Human-Robot Collaboration
Technical Paper Publication: IDETC2021-70975
Rakesh Suresh Kumar - University at Buffalo
Sri Sadhan Jujjavarapu - University at Buffalo
Lung Hao Lee - University at Buffalo
Ehsan T. Esfahani - University at Buffalo

Neurocognitive Effects of Incentivizing Students to Improve Performance Through Repeat Attempts in Design Settings
Technical Paper Publication: IDETC2021-72058
Devanshi Shah - University of Georgia
Elisabeth Kames - Florida Polytechnic University
Beshoy Morkos - University of Georgia

Identify Finger Rotation Angles With Aruco Markers and Action Cameras
Technical Paper Publication: IDETC2021-71208
Tianyun Yuan - Delft University of Technology
Yu (Wolf) Song - Delft University of Technology
Gerald A. Kraan - Reinier de Graaf Hospital
Richard H.M. Goossens - Delft University of Technology

MR-09-01 Mechanism-Based Metamaterials
8/19/2021
3:20PM–4:40PM

Chair: ***Leila Notash - Queens University***
Chair: ***Jonathan Hopkins - University of California, Los Angeles***
Chair: ***Damiano Pasini - McGill University***

Statically Balanced Architected Materials That Achieve Switchable States of Stiffness
Technical Presentation: IDETC2021-74305
P.R. Kuppens - Delft University
M.A. Bessa - Delft University
J.L. Herder - Delft University
J.B. Hopkins - University of California, Los Angeles

Microtwist Homogenization of Kagome and Pyrochlore Lattices on Mechanical Polarization
Technical Presentation: IDETC2021-74608
Hui Chen - University of Missouri-Columbia
Guoliang Huang - University of Missouri

Non-Cuttable Material Created Through Local Resonance and Strain Rate Effects
Technical Presentation: IDETC2021-74724
Stefan Szyniszewski - Durham University

Tensegrity Metamaterials: Toward Failure-resistant Engineering Systems Through Delocalized Deformation
Technical Presentation: IDETC2021-74737
Jens Bauer - University of California, Irvine
Julie Kraus - Georgia Institute of Technology
Cameron Crook - University of California, Irvine
Julian J. Rimoli - Georgia Institute of Technology
Lorenzo Valdevit - University of California, Irvine

Light Stiff Lattice Architectures: Improved Stability Through Topological Changes
Technical Presentation: IDETC2021-74784
Mazdak Tootkaboni - University of Massachusetts
Alireza Asadpoure - University of Massachusetts
Lorenzo Valdevit - University of California, Irvine

Fabrication of Compliant Structural Elements With Additive Manufacturing and Subtractive Post-Processing
Technical Presentation IDETC2021-74812
Andrew Gross - University of South Carolina

Tunable Stability of Elastomeric Beams With Strain-Programmable Stiffness
Technical Presentation: IDETC2021-74827
Nathan Hertlein - University of Cincinnati
Seung-Yeol Jeon - Johns Hopkins University
Beijun Shun - Johns Hopkins University
Andrew Gillman - U.S. Air Force Research Laboratory
Sung Hoon Kang - Johns Hopkins University
Philip Buskohl - U.S. Air Force Research Laboratory

Design of Modular Compliant Mechanical Logic Gates
Technical Presentation: IDETC2021-74842
Jordan Power - University College Cork
Guangbo Hao - University College Cork

Design of Mesh-Based Actuator Metamaterials Inspired by Pennate Muscle Architectures
Student Poster Presentation: IDETC2021-74871
Girish Krishnan - University of Illinois at Urbana-Champaign

DAC-04-01 Data-Driven Design
8/19/2021
3:20PM–4:40PM

Chair: ***Faez Ahmed - Massachusetts Institute of Technology***
Chair: ***Ali Mehmani - Prescriptive Data***

Automatically Discovering Mechanical Functions From Physical Behaviors via Clustering
Technical Paper Publication: IDETC2021-69328
Kevin Chiu - University of Maryland
David Anderson - Engora, Inc.
Mark Fuge - University of Maryland

Understanding the Energy Behavior of Building Occupants Through the Chronology of Their Energy Interactions
Technical Paper Publication: IDETC2021-69953
Danielle Preziuso - Stevens Institute of Technology
Gregory Kaminski - Stevens Institute of Technology
Philip Odonkor - Stevens Institute of Technology

Data-Driven Customer Segmentation Based on Online Review Analysis and Customer Network Construction
Technical Paper Publication: IDETC2021-70036
Seyoung Park - University of Illinois at Urbana-Champaign
Harrison M. Kim - University of Illinois at Urbana-Champaign

Using Deep Learning to Simulate Multi-Disciplinary Design Teams
Technical Paper Publication: IDETC2021-70596
Gary M. Stump - The Pennsylvania State University
Michael Yukish - The Pennsylvania State University
Jonathan Cagan - Carnegie Mellon University
Christopher McComb - The Pennsylvania State University

Investigate the Influence of Online Ratings and Reviews in Purchase Behavior Using Customer Choice Sets
Technical Paper Publication: IDETC2021-70806
Kangcheng Lin - University of Illinois
Harrison Kim - University of Illinois

Data-Driven Design via Scalable Gaussian Processes for Multi-Response Big Data With Qualitative Factors
Technical Paper Publication: IDETC2021-71570
Liwei Wang - Northwestern University
Suraj Yerramilli - Northwestern University
Akshay Iyer - Northwestern University
Danial Apley - Northwestern University
Ping Zhu - Shanghai Jiao Tong University
Wei Chen - Northwestern University

BIKED: A Dataset and Machine Learning Benchmarks for Data-Driven Bicycle Design
Technical Paper Publication: IDETC2021-71681
Lyle Regenwetter - Massachussetts Institute of Technology
Brent Curry - BikeCAD.ca
Faez Ahmed - Massachusetts Institute of Technology

A Topic Modeling Approach to Study Design Requirements
Technical Paper Publication: IDETC2021-72151
Cheng Chen - University of Georgia
Jesse Mullis - University of Georgia
Beshoy Morkos - University of Georgia

CIE-41-02 VES: Technologies for VR, AR, and MR (Methods, Processes, and Applications)
8/19/2021
3:20PM–4:40PM

Chair: ***Paul Witherell - National Institute of Standards and Technology***
Chair: ***Christian Lopez - Lafayette College***

Multisensory VR for Delivering Training Content to Machinery Operators
Technical Paper Publication: IDETC2021-69974
Monica Bordegoni - Politecnico di Milano
Marina Carulli - Politecnico di Milano
Elena Spadoni - Politecnico di Milano

Gestural Interfaces to Support the Sketching Activities of Designers
Technical Paper Publication: IDETC2021-71233
Pierstefano Bellani - Politecnico di Milano
Marina Carulli - Politecnico di Milano
Giandomenico Caruso - Politecnico di Milano

Virtual Reality Exergames: Promoting Physical Health Among Industry Workers
Technical Paper Publication: IDETC2021-67608
Thomas Stranick - Lafayette College
Christian Lopez - Lafayette College

Virtual Reality Exergames: Promoting Physical Health Among Industry Workers
Student Competition: IDETC2021-67605
Thomas Stranick - Lafayette College
Christian Lopez - Lafayette College

VIB-08-01 Vibration and Stability of Mechanical Systems and Machine Learning Applications to Vibrations and Dynamics
8/19/2021
3:20PM–4:40PM

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

Investigation of Vibration Mitigation in High-Aspect-Ratio Wings Using Multi-Directional Clearance Nonlinearities
Technical Presentation: IDETC2021-74868
Judith Brown - University of Nebraska-Lincoln
Keegan Moore - University of Nebraska-Lincoln

Insect Wing Buckling Influences Stress and Stability During Collisions
Technical Paper Publication: IDETC2021-70551
Mark A. Jankauski - Montana State University
Ryan Schwab - Montana State University
Cailin Casey - Montana State University
Andrew Mountcastle - Bates College

Neural Network Ensemble With Embedded Hamiltonian Constraints for Modeling Nonlinear Structural Dynamics
Technical Presentation: IDETC2021-74322
David A. Najera-Flores - ATA Engineering
Michael Todd - University of California, San Diego

Towards Generalization of Intelligent Fault Detection for Roller Element Bearings via Distinct Dataset Transfer Learning
Technical Paper Publication: IDETC2021-67773
Justin Larocque-Villiers - University of Ottawa
Patrick Dumond - University of Ottawa

Data Augmentation for Roller Bearing Health Indicator Estimation Using Multi-Channel Frequency Data Representations
Technical Paper Publication: IDETC2021-66701
Jacob Hendriks - University of Ottawa
Patrick Dumond - University of Ottawa

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Design Engineering Division (DED) fosters understanding and research covering the art, science, and application of design engineering to the product realization process including conception, evolution, and manufacturing of products.

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