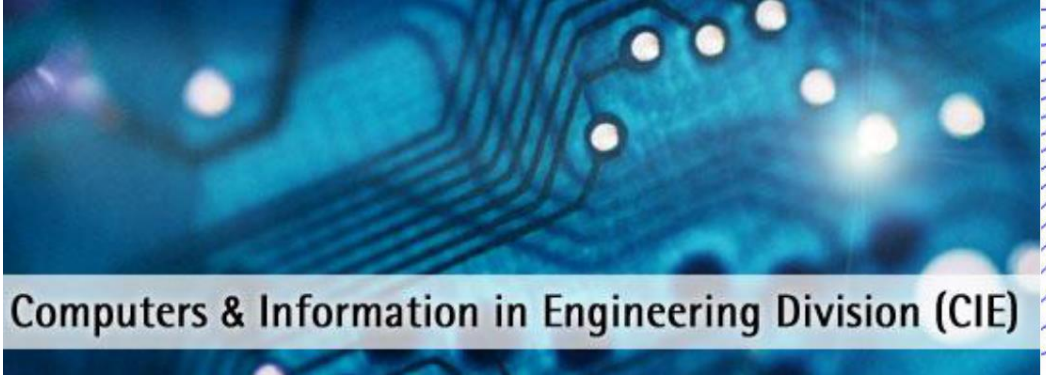


https://community.asme.org/computersinformationengineering/default.aspx

Winter 2023 - Summer 2024 Newsletter

MESSAGE FROM THE CHAIR

CATERINA RIZZI

Greetings to all and welcome to the 2023-2024 edition of the Computers and Information in Engineering (CIE) Division newsletter. On behalf of the CIE executive committee and the technical committees, I send our best wishes to the entire CIE community.

After the return to an in-person conference in 2022, we successfully held the 43rd Annual Computers and Information in Engineering Conference on August 20th – August 23rd at the Boston Park Plaza, Boston MA. The conference aims at sharing knowledge, experience and progress in the areas of Computers and Information in Engineering and provides a forum for researchers, practitioners, educators, and students from industry, academia, and government to share their latest findings and challenges and foster a sustainable research and education community.

The 43rd annual CIE conference included 117 accepted papers and technical presentations with an increase of about 20% compared to the previous year and better results were only reached before 2016. The papers have been submitted through various technical sessions and organized around the four Technical Committees of the CIE Division, precisely: Advanced Modeling and Simulation, Computer Aided Product and Process Design, Systems Engineering and Information Knowledge Management and Virtual Environments and Systems. These papers and presentations were supported at the conference by an exciting keynote talk and a diverse set of technical panels. Moreover, for the first time a new topic on "AI/ML approaches in Engineering" was organized as well as a new CIE Technical Committee has been put in place.

Dr. Mike Molnar from NIST was invited to serve as the keynote speaker. He is the founding director of the Advanced Manufacturing National Program Office, the interagency team responsible for the Manufacturing USA program and also leads the NIST Office of Advanced Manufacturing. He delivered the keynote "Advancing U.S. Manufacturing-Opportunities for Innovation, Collaboration and Competitiveness." In his talk, Dr. Mike Molnar presented the Manufacturing USA program, discussed the developments and opportunities in U.S. manufacturing ecosystems and the new U.S. strategy on critical and emerging technologies including new program initiatives, opportunities for innovation, collaboration, and competitiveness.

A Division-sponsored Industrial panel entitled "Knowledge Transfer (KT) in Education, Academia and Industry: Forward Thinking to Preserve Engineering Leadership" addressed the challenges and approaches to KT with a live question and answer session to engage the audience with the five panelists from academia and industry. Other four TC sponsored panels were organized: "Digital Twin for Smart Manufacturing", "2VESAccess–Accessibility, Inclusion and Wellbeing in Virtual Environment", "Challenges and Opportunities in Computing Research to Enable Next-Generation Engineering Applications", and "JCISE Spotlight Talks on Extended Reality in Design and Manufacturing". Further details on these events can be found on the 2023 IDETC webpage (https://event.asme.org/ IDETC-CIE-2023).

During the CIE Award Luncheon outstanding contributors to the CIE community were recognized, headlined by Azad M. Madni from University of Southern California, receiving the CIE Lifetime Achievement Award. Best papers for each of the TCs were recognized as well as the overall conference Best Paper Award, which went to Neelotpal Dutta, Tianyu Zhang, Guoxin Fang, Ismail E. Yigit, and Charlie C.L. Wang for their paper entitled "Vector Field Based Volume Peeling for Multi-Axis Machining."

The CIE Division continued our student engagement activities through the signature Graduate Student Poster Session and the second live installment of the ASME CIE Hackathon. Thanks to NIST sponsorship, the CIE Division awarded stipends to 10 students this year, a

tradition we look forward to continuing into 2023. The second in-person ASME CIE Hackathon was supported by a hybrid presence, allowing for participation from around the world. Two companies, Autodesk and Sandia, support and provide problems to be solved by highly motivated undergraduate and graduate students for cash prizes. Full results can be found in the ASME CIE Hackathon section that follows later in the newsletter. We look forward to continuing the event at this year's conference, with registration available soon at the conference webpage.

I would like to thank the four TC chairs for their exceptional contributions: Piyush Pandita, Anand Nellippallil, Zhuo Yang, and Vinayak Krishnamurthy and John Steuben for his contribution to promote a new TC on AI and ML in Engineering . I would like to express my sincere appreciation to all of the division's volunteers, including symposium organizers and paper reviewers, for making the 2023 CIE Conference. A special thanks to the ASME staff members Andrew Koleba, Barbara Zlatnik, and Stacey Cooper for their hard work and continuous support in organizing the conference.

Effective July 1st, 2023, the new Executive Committee members include: Chair: Caterina Rizzi (University of Bergamo), Vice Chair: Robert E. Wendrich (Rawshaping Technology RBSO), Technical Program Chair: Krishnanand Kaipa (Old Dominion University), Secretary: John Steuben (US Naval Research Laboratory), Member-at-large: Xiaozhi (Christina) Wang (American Bureau of Shipping). Gaurav Ameta (Siemens), Marc Halpern (Gartner Inc.) continue to be our Industry Executive. Paul Witherell (NIST), the past chair, this year serves as the chair of the Honors and Awards Committee.

The conference is a great opportunity to meet all together and establish new collaborations and strengthen existing ones, and this is also thanks to all CIE volunteers for their active engagement and support, which are essential to promote and organize the conference.

The organization of the 2024 CIE Conference has started. Please see the call for papers and participation towards the end of the newsletter. The CIE division welcomes members of all experience levels as volunteers to continuously strengthen our community.

Visit the conference webpage (https://event.asme.org/IDETC-CIE) for further details and updates and feel free to contact the members of the Executive Committee and Technical Committees listed in this newsletter.

See you in Washington!
Caterina Rizzi
CIE Division Chair
2023-2024

CIE 2023 Conference Report

Notes from Past Chair and Award Chair

Paul Witherell

Congratulations to all of the organizers of the ASME CIE 2023 conference! It's great to see our conference continue to grow after the pandemic as our community grows stronger. This year was the first time in a long time we offered a new technical track, on AI and ML, and it was great to see the response! Special thanks to the ASME staff, Andy Koleba and Barbara Zlatnik, for all their support and to Stacey Cooper for helping us all get our publications through.

This year myself and Caterina Rizzi have had the pleasure of serving as the Conference Chairs for the overall ASME IDETC CIE conferences. This has been a wonderful opportunity and we hope you are all able to enjoy the camaraderie of the greater DED and CIE communities during the many events planned.

As the CIE awards chair for 2023-2024, I would like to inform you that CIE is seeking nominations for the following division-level awards:

- *Young Engineer Award*: to recognize a promising young investigator who is making outstanding contributions to the progress in the application of computers in engineering.
- *Lifetime Achievement Award*: to recognize a person who has had a significant impact on the use of computers in engineering practice and/or education.
- *Leadership Award*: to recognize outstanding performance in one or more areas of concern to both the computer industry and the various engineering fields.
- *Excellence in Research*: CIE recognizes a person for outstanding research contributions in any field associated with the use of computers in engineering.
- *Distinguished Service Award*: to recognize a person for dedicated service in support of the CIE Division's mission.
- *Best Ph.D. Thesis/Dissertation Award*: to recognize promising young investigators who authored the best Ph.D. thesis of the year in CIE.

Details about these awards are available at: https://www.asme.org/about-asme/honors-awards/unit-awards#cie. While this year's deadlines have passed, we are always looking for deserving candidates.

We look forward to seeing you at CIE 2024 in Washington, D.C.!

Paul Witherell
CIE Award Chair
2022-2023

Division Honors and Awards

Our division's honors and awards were conferred during the annual CIE conference, which took place in Boston MA.

2023 CIE Lifetime Achievement Award

The 2021 ASME CIE Lifetime Achievement Award was awarded to Prof. Azad Madni at the University of Southern California. This award recognizes Prof. Madni's outstanding career, his many achievements and accomplished students, and his leadership in the fields of mechanical, aerospace, astronautical, and systems engineering.

2023 CIE Excellence in Research Award

The 2023 ASME CIE Excellence in Research Award was awarded to Prof. Kincho Law at Stanford University, in recognition of his outstanding ability and potential for making significant contributions to the discipline of computers and information in engineering.

2023 CIE Young Engineer Award

This year's ASME CIE Young Engineer Awards is presented to Dr. Anand Balu Nellippallil at the Florida Institute of Technology, in recognition of his outstanding ability and potential for making significant contributions to the discipline of computers and information in engineering.

2023 CIE Distinguished Service Award

This year's recipient of the Distinguished Service Award is Dr. Paul Witherell of the National Institute of Standards and Technology. The Distinguished Service Award recognizes his commitment and dedicated service in support of the CIE Division's mission.

2023 CIE TC Leadership awards

This year the ASME CIE division recognizes the leadership of our four technical committees with four leadership awards. For the AMS TC, Dr. Piyush Pandita of General Electric Aerospace. For the CAPPD TC, Dr. Anand Balu Nellippallil of the Florida Institute of Technology. For the SEIKM TC, Dr. Douglas L. Van Bossuyt of the U.S. Naval Postgraduate School. For the VES TC, Dr. Vinayak Krishnamurthy of Texas A&M.

AMS:
Dr. Pandita

CAPPD:
Dr. Nellippallil

SEIKM:
Dr. Van Bossuyt

VES
Dr. Krishnamurthy

2023 CIE Best PhD Dissertation Awards

This year two Best Dissertations awards have been granted, acknowledging the author's valuable contributions to study of computers and information in engineering.

The first is awarded to Dr. Prahar Bhatt from the University of Southern California for his dissertation titled "*Process Planning for Robotic Additive Manufacturing.*"

The second is one to Dr. Shahroz Khan Lu from the University of Strathclyde for his dissertation titled "IDEAS@MI: Intelligent Data-driven systEms for digitAl deSign in Maritime Industry."

2023 CIE Best Paper Award

This year's CIE Conference Best Paper Award was presented to Neelotpal Dutta, Tianyu Zhang, Guoxin Fang, Ismail E. Yigit, and Charlie C.L. Wang, for their paper titled "Vector Field Based Volume Peeling for Multi-Axis Machining."

Short Abstract of the 2023 CIE Best Paper

This paper presents an easy-to-control volume peeling method for multi-axis machining based on the computation taken on vector fields. The current scalar field-based methods are not flexible and the vector field-based methods do not guarantee the satisfaction of the constraints in the final results. We first conduct an optimization formulation to compute an initial vector field that is well aligned with those anchor vectors specified by users according to different manufacturing requirements. The vector field is further optimized to be an irrotational field so that it can be completely realized

by a scalar field's gradients. Iso-surfaces of the scalar field will be employed as the layers of working surfaces for multi-axis volume peeling in the rough machining. Algorithms are also developed to remove and process singularities of the fields. Our method has been tested on a variety of models and verified by physical experimental machining.

TECHNICAL COMMITTEE REPORT

ADVANCED MODELING AND SIMULATION (AMS)

The Advanced Modeling and Simulation (AMS) Symposium track provides a venue for researchers to present the original research topics of modeling and simulation, including theoretical advances in modeling and simulation in engineering, advances in finite element methodology, novel numerical techniques, advances in numerical analysis and efficient implementation, and industrial applications of modeling and simulation.

At the 2023 ASME CIE/IDETC conference in Boston, MA, we observed that the total number of papers submitted increased more than two-fold compared to previous years that had been affected by the COVID-19 pandemic. The AMS TC now sees a comparable number of submissions to the pre-COVID level. As a result, the number of sessions and symposiums was also increased to allow for more in-person attendance. A total of 40 papers were accepted among the six symposiums of AMS. Of these, 19 papers were among the 6 symposiums organized directly by *AMS*, and 21 papers were accepted under the CIE symposiums jointly organized by *AMS/SEIKM/CAPPD*. The presented topics ranged from state-of-the-art machine learning to many engineering applications for advanced modeling and simulation. Topics of specific interest included advanced manufacturing and physics-informed machine learning.

The 2023 AMS symposium topics presented at Boston, MA include the following:

AMS General (CIE-01): This symposium covered a wide range of topics on modeling and simulation that were not included in the special sessions below.

Inverse Problems in Science & Engineering (CIE-02): The algorithmic methods for the solution of inverse problems could be grouped into two basic approaches: pure inverse methods and optimization-based methods. That is, in some methods, sophisticated regularization formulations are used. In other methods, different optimization algorithms are used as tools to solve de facto inverse problems. In this symposium, papers on Inverse Problems and their applications from leading international and interdisciplinary research communities were presented.

Computational Multiphysics Applications (CIE-03): Computational modeling and simu-lation of multi-physics systems in engine-ering require the development of sophisti-cated forward models, integration methods, numerical algorithms, and computational techniques. This symposium featured presen-tations on applying optimization methods to identify parameterized models in manufac-turing and reduced-order models in multi-physics computational fluid dynamics applications.

Uncertainty Quantification in Simulation and Model Verification & Validation (CIE-04): Uncertainties are inherent in computational models because of abstraction and numerical treatments. This symposium was conducted in one session. Probabilistic machine learning for high-dimensional problems is of specific interest. Dimensionality reduction methods for solving PDE and high-dimensional Gaussian process regression and Bayesian optimization are presented in this symposium, along with design optimization applications and materials with fast microstructure reconstruction applications.

Simulation in Advanced Manufacturing(CIE-05): This symposium covered state-of-the-art research and development on human modeling and simulation in engineering, with applications of digital human modeling and simulation occurring in industry, military, and clinical practice.

Material Characterization Methods and Applications (CIE-06): Material character-ization is a crucial modeling process as its ability to capture material constitutive behavior physics has a significant impact on the correctness of computational simulation. This symposium covers a wide range of material characterization issues, including the development of high-resolution methods and their applications and advancing material characterization for high-performance simulations in one session.

Digital Twin: Advanced Human Modeling and Simulation in Engineering (CIE-21) (AMS/ CAPPD): Simulation plays an important role in understanding the detailed processes of additive manufacturing. This symposium was jointly organized by AMS and CAPPD and was conducted in one session. Papers on various aspects of human modeling and simulation using machine learning, for patient-specific, optimal control and prediction were presented.

Physics-Informed Machine Learning for Design and Advanced Manufacturing (CIE-23 AMS/ SEIKM) and

Artificial Intelligence and Machine Learning in Design and Manufacturing (CIE-24 SEIKM/AMS): This joint symposium features a state-of-the-art physics-based, physics-informed, physics-constrained scientific machine learning with additive manufacturing and other applications.

The joint 2023 AMS/SEIKM/CAPPD panel entitled "*Digital twin for smart manu-facturing*" features five well-known experts in the area of design, additive manu-facturing, robotics, machine learning, and integrated computational model engineering, with lively discussions around research gaps, challenges, and opportunities for digital twins in the age of Industry 4.0.

AMS contributed several graduate student posters that were presented in the CIE student poster session jointly organized by the various CIE technical committees. This year at Boston, MA, CIE poster session drew 8 poster submissions from 5 different institutes with many interactive conversations between presenters and audience.

AMS, alongside SEIKM, organized the annual, 7-day long, 4th ASME hackathon event entitled "Digital Mechanical Engineering with Artificial Intelligence". This hackathon event features material design with problems proposed by Autodesk - "What material to choose? Automating material selection for product design" and Sandia National Laboratories - "Generative exascale materials design". Teams from Nanyang Technological University, Purdue University, and Northwestern University won first ($1400), second ($700), and third prizes ($350), respectively for the Autodesk problem. Teams from University of Connecticut, University of Texas - Austin, and University of Maryland - College Park won the first ($1400), second ($700), and third prizes ($350) for the Sandia problem. The 2023 hackathon event was organized by Anh Tran (chair/AMS), Hyunwoong Ko (co-chair/SEIKM), Zhenghui Sha (SEIKM), Dehao Liu (AMS), Daniele Grandi (Autodesk), Ye Wang (Autodesk), Allin Groom (Autodesk), Zhuo Yang (SEIKM), Yan Lu (SEIKM).

AMS TC members (Dehao Liu, Sandipp Krishnan Ravi, John Michopoulos) collaborated with with others (Francisco Chinesta - ENSAM Institute of Technology - France, Elias Cueto - University of Zaragoza - Spain, Jian-Xun Wang - University of Notre Dame - USA) to organize a special issue on Scientific Machine Learning for Manufacturing Processes and Material Systems. Topics of interest include:

- Physics-informed ML for process/materials design and optimization,
- Physics-informed ML for diagnostics, prognostics, and process control,
- Uncertainty quantification in scientific machine learning,
- Leveraging high-throughput framework for modeling and optimization,
- Efficient modeling through adaptive and active learning algorithms,
- Explainable AI and causal inference augmented predictive modeling,
- Exploring state-of-the-art ML algorithms in modeling and optimization,
- Understanding of systems through knowledge representation and reasoning,
- Leveraging data-fusion and multi-fidelity techniques in modeling.

AMS Technical Committee Best Paper Award The 2023 AMS Best Paper was awarded to: IDETC2023-114851, "*Cross-Domain Health Conditions Identification Based on Joint Distribution Modeling of Fused Prototypes*" by Tingli Xie, Xufeng Hang, and Seung-Kyum Choi.

2023 AMS TC Leadership

Chair:

- Anh Tran, Sandia National Laboratories, anhtran@sandia.gov

Vice-chairs:

- Piyush Pandita, General Electric Research, piyush.pandita@ge.com
- James Yang, Texas Tech University, james.yang@ttu.edu
- Ashish Chaudhari, MIT, amchaudhari@mit.edu

Secretaries:

- Dehao Liu, Binghamton University, dehaoliu@binghamton.edu
- Mike Xiang, Oklahoma State University, yujiang.xiang@okstate.edu

Member-at-large:

- Sandippkrishnan Ravi, General Electric Research, sandippkrishnan.ravi@ge.com

TECHNICAL COMMITTEE REPORT

COMPUTER-AIDED PRODUCT AND PROCESS DEVELOPMENT (CAPPD)

As part of the 2023 CIE conference, CAPPD organized seven symposia: 1) CAPPD general, 2) Human-in-the loop product design and automation, 3) Digital Human Modelling for Design and, 4) Product and Process Design Automation for Industry 4.0, 5) Data-Driven Product Design and Fabrication, 6) Digital Twin: Advanced Human Modeling and Simulation in Engineering organized jointly with AMS and SEIKM, 7) Design,

Simulation and Optimization for Additive Manufacturing, organized jointly with AMS and SEIKM.

In total, 46 draft papers were submitted to CAPPD and 43 were accepted, corresponding to an acceptance rate of 93%. As in the past, the CAPPD technical committee continued to organize the CIE Graduate Student Poster Session. Thanks to the outstanding efforts of the CAPPD secretary, Jun Wang and Satchit Ramnath, this year's poster session drew 19 poster submissions from 15 different institutes in the United States, 10 of them were selected with CIE travel award and 15 presented at the conference.

CIE CAPPD BEST PAPER AWARD

The 2023 CAPPD Best Paper Award was awarded to: IDETC/CIE 117063, "Generative Design of Statistically Self-Similar Mechanical Structures" by Noah Hill, Matt Ebert, Mena Maurice, and Vinayak Krishnamurthy, in the symposium of CAPPD General.

Panel Topic: Digital Twin for Smart Manufacturing

Jointly organized with AMS and SEIKM, CAPPD invited panelists: Dr. Conrad Tucker

From Carnegie Mellon University, Dr. John G. Michopoulos from the U.S. Naval Research Laboratory, Dr. Wei Chen, from Northwestern University, Dr. Satyandra K. Gupta

From University of Southern California, and Dr. Yan Lu from NIST have a comprehensive discussion on the following topics:

- What are Digital Twins (DT)?
- Emerging methods for model building, calibration & validation, adaptive learning & updating for DT
- Applications
- Gaps and Challenges
- Future Insights on DT for Smart Manufacturing

2023-2024 CAPPD TC LEADERSHIP

Chair: Jida Huang, University of Illinois at Chicago (jida@uic.edu)

Vice Chair: Jun Wang, Santa Clara University (jwang22@scu.edu)

Secretary: Satchit Ramnath, Clemson University, sramnat@clemson.edu

Members-at-large: Lin Guo, South Dakota School of Mines & Tech., lin.guo@sdsmt.edu and Guoxin Fang, Chinese University of Hong Kong, guoxinfang@mae.cuhk.edu.hk

Past Chair: Anand Balu Nellippallil, Florida Institute of Technology (anellippallil@fit.edu)

TECHNICAL COMMITTEE REPORT

VIRTUAL ENVIRONMENTS & SYSTEMS (VES)

The Virtual Environment & Systems (VES) Symposium track hosted a total number of 11 technical papers organized in 2 sessions. VES Symposium provides a forum to researchers to share their experiences and knowledge on a variety of topics such as: Design Tools and VR- Systems; Portable and wearable VR Systems, Multisensory Interactive Technologies; Simulation and Interaction; Enhanced Visualization and Motion-Based Design Systems; Methods and Tools for Developing Virtual Environments in Design Engineering, Multiple Realities (i.e. VR-AR-MR-XR) and Blended Spaces; Immersive Learning and Education with VR and AR based systems; Gamification through Virtual Environments; Methods, Processes and Strategies for Technology, User Experience and User Interfaces, Natural User Interface for VR and AR, Artificial Intelligence and Machine Learning Approaches for Virtual Environments. These topics have been organized into 3 main themes as follows:

- Data Management: Big Data and Deep Learning in Virtual Environments for Design Engineering;
- Tracking and Sensing (Strategies, Hardware, and Software): Emerging Technologies and New Challenges;
- Interactive and Multisensory User Interfaces.

The VES community has expressions of interest and focus on the use of virtual reality technologies applicable to a plethora of domains. The design and operation of engineered and/or cyber-physical systems present unique challenges and opportunities for integrating human intelligence, cognition, multi-sensory aspects, and decision-making with computer intelligence. Issues related to enabling humans to visualize, simulate and make decisions in the context of large amounts of data, choice-architecture on information and as one of many agents or stakeholders in D&E processes. Over the years the VES Community reached and demonstrated high scientific quality in their sessions, contributions and outreach/crossover to other domains and disciplines. The VES community is always looking for researchers and domain-experts (including cross-domains, multi-disciplinary) to expand and strengthen their platform and research endeavors. Please feel free to contact us (see below) if you are interested to join, participate or get involved.

TECHNICAL COMMITTEE REPORT

SYSTEMS ENGINEERING, INFORMATION AND KNOWLEDGE MANAGEMENT (SEIKM)

The goal of the Systems Engineering, Information, and Knowledge Management (SEIKM) Technical Committee (TC) is two-fold; (i) to serve the SEIKM community in the broad computer and information engineering field through activities promoting the dissemination of new knowledge and new technology, and (ii) to advance research related to design, engineering, and operation of systems where complexity, connectivity, uncertainty, knowledge discovery, and management present unique challenges. As the interest in IoT, big data, machine learning and AI, cyber-physical systems, digital twin, and sociotechnical systems has grown, there is room for significant collaborative research impact from our community. To help both the research community as well as industry, several efforts have been made by the SEIKM TC in the last year, including the CIE 2021 virtual conference, ASME-CIE Hackathon event.

For the CIE 2023 conference, six sessions were organized/co-organized by the SEIKM TC. The number of accepted papers was 19 with an acceptance rate of 95%.

With support from ASME, the AMS and SEIKM TC's assisted in the organization of the hackathon event as part of pre-conference activity for CIE 2023. This event offered two data science problems open to student participants. One problem is about *AI-enabled CAD Modeling,* and was sponsored by Autodesk inc. The second problem, *Enriching CAD objects with microstructure datasets*, is provided by Sandia National Laboratory.

ASME 2023 STUDENT HACKATHON

The Computer & Information in Engineering (CIE) Division of the American Society of Mechanical Engineers (ASME) held past hackathon events at the IDETC/CIE 2020, 2021, 2022 Conferences. These hackathon events provide students and engineering practitioners with a unique opportunity to learn how data science and machine learning techniques can be leveraged to solve real-world engineering problems.

Given the previous resounding successes, the CIE Division held the ASME-CIE Hackathon again at the IDETC/CIE 2023 Conference in a hybrid fashion, with both virtual and on-site participation, as a pre-conference event from Aug. 13-20, 2023. This event offered participants the choice of two technical problems. The first, from Autodesk Inc, was entitled "What Material to Choose? Automating Material Selection for Product Design." This problem was organized by Daniele Grandi (Autodesk), Ye Wang (Autodesk), Allin Groom (Autodesk), and Zhenghui Sha. The second problem, From Sandia National Laboratory, covered the topic of enriching simple CAD models with microstructure at the mesoscale level, using datasets generated from Sandia's SPPARKS code. This problem was organized by Anh Tran (Sandia National Labs), and Dehao Liu (Binghamton University).

ASME-CIE 2023 HACKATHON WINNERS

Problem 1: What Material to Choose?

First Place: Team Lequun - Lequn Chen of Nanyang Technological University.

Second Place: Team Boilermakers – Karim El Sayed, and Vikranth Gadi of Purdue University.

Third Place: Team Pioneers – Jie Chen and Zhuoxin Sun of Northwestern University.

Honorable Mention: Team Voldermort – Zachary Gou and Felix Richter of the University of Central Florida and Boston University (respectively).

Problem 2: Microstructure-enriched CAD

First Place: Team Nothing_Deterministic – Leidong Xu and Zihan Wang of the University of Connecticut.

Second Place: Team TBD – Ronni Stone and Phillip Gavino of the University of Texas at Austin.

Third Place: Microstructure Dream Team – Nathaniel Hoffman and Cashen Diniz of the University of Maryland at College Park.

ASME CIE HACKATHON ORGANIZERS

The ASME Hackathon was made possible by:

Sponsors:

Autodesk Inc.

ASME TEC

ASME CIE Division

ASME Staff Support:
Barbara Zlatnik and Andrew Koleba.

CIE Division ExComm Committee Reps: Caterina Rizzi, Robert Wendrich.

Team Organizers:
Dani Grandi, Ye Wang, Allin Groom, Zhenghui Sha Anh Tran, Dehao Liu, Theron Rodgers, John Mitchell.

ASME CIE Hackathon Committee Members:

- Dr. Anh Tran (Sandia National Laboratories) (chair), anhtran@sandia.gov
- Prof. Zhenghui Sha (University of Texas – Austin), zsha@austin.utxas.edu
- Prof. Hyunwoong Ko (Arizona State University), hyunwoong.ko@asu.edu
- Dr. Zhuo Yang (Georgetown University, NIST), zy253@georgetown.edu
- Prof. Dehao Liu (Binghamton University), dehaoliu@binghamton.edu
- Dr. Yan Lu (National Institute of Standards and Technologies), yan.lu@nist.gov

POSTER SESSION AND AWARDS

The ASME-CIE Graduate Research Poster session is an opportunity for graduate students in the preliminary phase of their research programs (MS or within 2 years of starting a PhD) to present their current work to the CIE research community. This session provides the students a chance to obtain external feedback on their preliminary research that may not yet be ready for presentation at the conference in archival form.

This year the CIE Division selected and supported 23 students from 16 Universities to participate in the CIE Graduate Student Poster Session. The 2023 CIE poster session awardees are listed below.

1. Ronnie Frank Pires Stone, "Toward Swarm Manufacturing: Developing A Multi-Robot Cooperative Framework for Complex Manufacturing Tasks."
2. Zahra Zanjani Foumani, "Mitigating the Effects of Source-Dependent Bias And Noise on Multi-Source Bayesian Optimization."
3. Forouzan Naderi, "Physics-Informed Deep Learning for Chemical Source Localization And Characterization."
4. Jiacheng (Marc) Cai, "When Creativity Goes Rogue: Uncovering the Potential Dangers Of VR for Engineering Design."
5. Ian Walter, "Modeling The Dynamics of Customer Demand to Determine the Optimal Time to Release Product Updates: A Cognitive Approach."
6. Matthew Bowen, "Additive Manufacturing Methodology for Agricultural Machinery Spare Part Production."
7. Lauren Bertelsen, "Laser Cutters for Rapid Pneunet Generation."
8. Teodor Vernica, "Lcad: A Framework for Coupling Computer-Aided Design and Life Cycle Analysis Visualizations."
9. Hossein Basereh Taramsari, "An Integrated Holistic Approach Toward Sustainable Product Design Using Life Cycle Assessment."
10. Cole Jetton, "Surrogate Assisted User-Feedback Architectures for Optimizing Multilevel Coupled Design Problems"

ASME CIE POSTER SESSION ORGANIZERS

The ASME CIE Poster Session was made possible by:

Award Presenter:

Dr. Mike Molnar, NIST.

Organizers:

Jun Wang, University of Maryland

Satchit Ramnath, The Ohio State University

AWARD NOMINATIONS

NOMINATE YOUR COLLEAGUES FOR CIE DIVISION AWARDS

- Best Paper Award
- Best Ph.D. Thesis/Dissertation Award
- Distinguished Service Award
- Excellence In Research Award
- Leadership Award
- Lifetime Achievement Award
- Young Engineer Award

For details visit: https://www.asme.org/about-asme/get-involved/honors-awards/unit-awards

UPDATES FROM ASME JOURNAL OF COMPUTING AND INFORMATION SCIENCE IN ENGINEERING (JCISE)

YAN WANG, EDITOR, JCISE

OVERVIEW

The Journal of Computing and Information Science in Engineering (JCISE) publishes articles related to scientific computing methods (e.g., modeling, simulation, representation, algorithm) and computational tools (e.g., high-performance computing, virtual and augmented reality) that aim to improve engineering products and systems for their complete lifecycle (e.g., design, manufacturing, operation, maintenance, disposal, and recycling). The target audience and application areas for JCISE are

mainly in mechanical and other related engineering disciplines. JCISE emphasizes new modeling and computational methodologies.

The twelve thrust areas are computer-aided design and manufacturing, computational geometry & geometry processing, cyber-physical-social systems, data analytics & machine learning, engineering optimization, human-computer interface & human modeling, intelligent manufacturing, machine intelligence & robotics system, modeling and simulation & scientific computing, precision engineering & reverse engineering, sustainability & product lifecycle management, and systems engineering & engineering informatics.

ASSOCIATE EDITORS

Computer-Aided Design and Manufacturing

- Jonathan Roy Corney, Ph.D. (University of Edinburgh, UK)
- Kaushalkumar A. Desai, Ph.D. (Indian Institute of Technology Jodhpur, India)
- B. Gurumoorthy, Ph.D. (Indian Institute of Science, India)
- Alison Olechowski, Ph.D. (University of Toronto, Canada)
- P.V.M. Rao, Ph.D. (Indian Institute of Technology Delhi, India)

Computational Geometry & Geometry Processing

- Stephen Baek, Ph.D. (University of Virginia, USA)
- Ajay Joneja, Ph.D. (Hong Kong University of Science and Technology, Hong Kong)
- Vinayak R. Krishnamurthy, Ph.D. (Texas A&M University, USA)

Cyber-Physical-Social Systems

- Chih-Hsing Chu, Ph.D. (National Tsing Hua University, Taiwan)
- Yan Lu, Ph.D. (National Institute of Standards and Technology, USA)

Data Analytics & Machine Learning

- Linkan Bian, Ph.D. (Mississippi State University, USA)
- Jianxi Luo, Ph.D. (Singapore University of Technology and Design, Singapore)
- Hui Yang, Ph.D. (Pennsylvania State University, USA)
- Xiaowei Yue, Ph.D. (Tsinghua University, China)

Engineering Optimization

- Seung-Kyum Choi, Ph.D. (Georgia Institute of Technology, USA)
- Amir H. Gandomi, Ph.D. (University of Technology Sydney, Australia)
- Samy Missoum, Ph.D. (The University of Arizona, USA)
- Kazuhiro Saitou, Ph.D. (University of Michigan, USA)
- Yu Song, Ph.D. (Delft University of Technology, The Netherlands)

Human-Computer Interface & Human Modeling

- Francesco Ferrise, Ph.D. (Politecnico di Milano, Italy)
- Caterina Rizzi, Ph.D. (University of Bergamo, Italy)
- Shanna Smith, Ph.D. (National Taiwan University, Taiwan)

Intelligent Manufacturing

- Gaurav Ameta, Ph.D. (Siemens Corporate Technology, USA)
- Tsz-Ho Kwok, Ph.D. (Concordia University, Canada)
- Yayue Pan, Ph.D. (University of Illinois at Chicago, USA)
- Zhinan Zhang, Ph.D. (Shanghai Jiao Tong University, China)

Machine Intelligence & Robotics System

- Ehsan T. Esfahani, Ph.D. (State University of New York at Buffalo, USA)
- Krishnanand Kaipa, Ph.D. (Old Dominion University, USA)
- Atul Thakur, Ph.D. (Indian Institute of Technology Patna, India)

Modeling, Simulation & Scientific Computing

- Johann Guilleminot, Ph.D. (Duke University, USA)
- Guang Lin, Ph.D. (Purdue University, USA)
- John G. Michopoulos, Ph.D. (Naval Research Laboratory, USA)

Precision Engineering & Reverse Engineering

- Nabil Anwer, Ph.D. (Ecole Normale Superieure Paris-Sarclay, France)
- Jun Wang, Ph.D. (Nanjing University of Aeronautics and Astronautics, China)

Sustainability & Product Lifecycle Mgmt.

- William Bernstein, Ph.D. (Air Force Research Laboratory, USA)
- Bin He, Ph.D. (Shanghai University, China)

Systems Engineering & Informatics

- Yusheng Liu, Ph.D. (Zhejiang University, China)
- Yongsheng Ma, Ph.D. (Southern University of Science and Technology, China)
- Duhwan Mun, Ph.D. (Korea University, Korea)
- Douglas Van Bossuyt, Ph.D. (Naval Postgraduate School, USA)

JOURNAL STATISTICS

Annual paper submissions: 617 (Year 2023)

Annual paper publications: 88 (Year 2022)

Impact Factor: 3.1

We are now publishing 12 issues per year.

RECENT SPECIAL ISSUES

FEBRUARY 2023 Issue: *Machine Intelligence for Engineering Under Uncertainties*

(Guest Editors: Amir Gandomi, Marc Mignolet, Christian Soize, Yan Wang)

JUNE 2023 Issue: *Highlights of CIE 2022*

(Guest Editors: Mahesh Mani, Paul Witherell, Caterina Rizzi)

DECEMBER 2023 Issue: *Challenges and Opportunities in Computing Research to Enable Next-Generation Engineering Applications* (Position Papers)

(Guest Editors: SK Gupta, Janet K Allen, Ehsan Esfahani, B. Gurumoorthy, Bin He, Ying Liu, John Michopoulos, Jitesh Panchal, Anurag Purwar, Kristina Wärmefjord)

JANUARY 2024 Issue: *Machine Learning and Representation Issues in CAD/CAM*

(Guest Editors: Anurag Purwar, Kaushalkumar Desai, Stephen Canfield, Rahul Rai, Zhenguo Nie)

MARCH 2024 Issue: *Extended Reality in Design and Manufacturing*

(Guest Editors: Chih-Hsing Chu, Vinayak Krishnamurthy, William Bernstein, Yunbo Zhang, Junfeng Ma)

MAY 2024 Issue: *CIE 2023 Highlight* (Guest Editors: Caterina Rizzi, Robert Wendrich, Krishnanand Kaipa, Paul Witherell, John Steuben)

JULY 2024 Issue: *Cybersecurity in Manufacturing*

(Guest Editors: Dan Li, Fan Zhang, Gaurav Ameta, Mark Yampolskiy, Satish Bukkapatnam, Wenmeng Tian)

Over the next year, JCISE is planning the following special issues/sections:

Special Issue on Scientific Machine Learning for Manufacturing Processes and Material Systems

(Guest Editors: Anindya Bhaduri, Francisco Chinesta, Elias Cueto, Dehao Liu, John Michopoulos, Sandipp Krishnan Ravi, Jian-Xun Wang)

Special Issue on Large Language Models in Design and Manufacturing

(Guest Editors: Yaoyao Fiona Zhao, Evangelos Niforatos, Tonya Custis, Yan Lu, Jianxi Luo)

Special Issue on Human-Robot Collaboration in Industry 5.0

(Guest Editors: Chih-Hsing Chu, Yunbo Zhang, Francesco Ferrise, Pai Zheng, Qing (Cindy) Chang)

Special Issue on Networks and Graphs for Engineering Systems and Design

(Guest Editors: Zhenghui Sha, Astrid Layton, Babak Heydari, Megan Konar, Douglas Van Bossuyt)

RECENT SPOTLIGHT TALKS

February 28, 2023 Spotlight Talk by Professor Charbel Farhat (Stanford University) on article:

Marie-Jo Azzi, Chady Ghnatios, Philip Avery, and Charbel Farhat, "Acceleration of a Physics-Based Machine Learning Approach for Modeling and Quantifying Model-Form Uncertainties and Performing Model Updating," ASME *J. Comput. Inf. Sci. Eng*. Feb 2023, 23(1): 011009. doi: https://doi.org/10.1115/1.4055546

May 19, 2023 Spotlight Talk by Professor Mian Li (Shanghai Jiao Tong University) on article:

Xueke Zheng, Ying Wang, Le Wang, Runze Cai, Mian Li, and Yu Qiu, "Data-Driven Sensor Selection for Signal Estimation of Vertical Wheel Forces in Vehicles," ASME *J. Comput. Inf. Sci. Eng.* June 2023, 23(3): 031010. doi: https://doi.org/10.1115/1.4055514

July 14, 2023 Spotlight Talk by Professor Jianxi Luo (Singapore University of Technology & Design) on article:

Qihao Zhu and Jianxi Luo, "Generative Transformers for Design Concept Generation," ASME *J. Comput. Inf. Sci. Eng.* Aug 2023, 23(4): 041003. doi: https://doi.org/10.1115/1.4056220

July 21, 2023 Spotlight Talk by Dr. John G. Michopoulos (U.S. Naval Research Laboratory) on article:

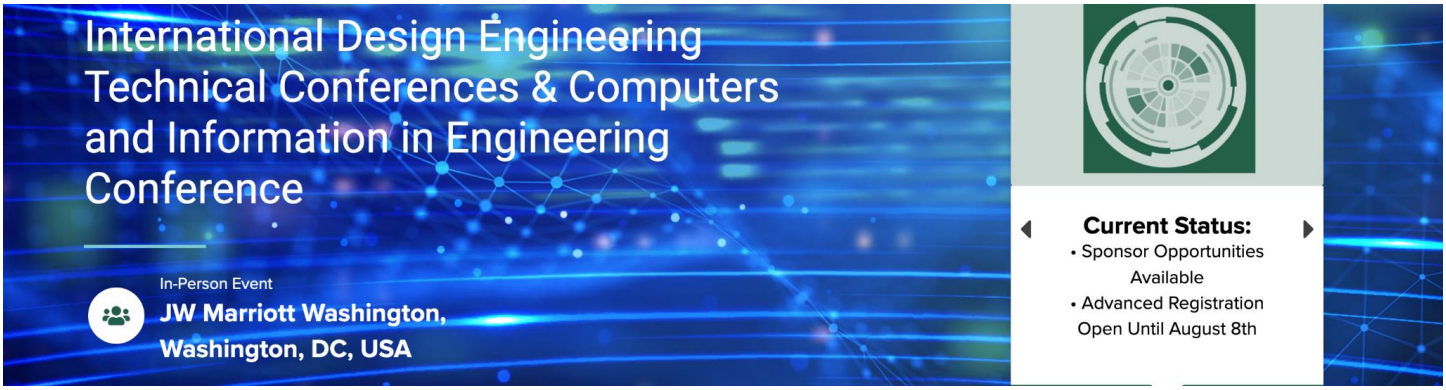
John G. Michopoulos, Nicole A. Apetre, Athanasios P. Iliopoulos, and John C. Steuben, "Effects of Elastoplasticity, Damage, and Environmental Exposure on the Behavior of Adhesive Step-Lap Joints," ASME *J. Comput. Inf. Sci. Eng.* June 2023, 23(3): 030904. doi: https://doi.org/10.1115/1.4056361

2023 REVIEWERS OF THE YEAR

Nicole A. Apetre — U.S. Naval Research Laboratory, USA

Shaurya Shriyam — Indian Institute of Technology Delhi, India

Wenhao Yang — Rochester Institute of Technology, USA



44TH ASME COMPUTERS AND INFORMATION ENGINEERING CONFERENCE (CIE)

CALL FOR PAPERS

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

The CIE Division is excited to put out all call for papers for the 42nd CIE Conference, to be held on August 25-28, 2024, Washington DC, USA. All five CIE tracks are soliciting papers in all aspects of computer applications on experimental, numerical, or analytical studies, with emphasis on the highlighted topic areas.

TRACK SYMPOSIUMS

- Advanced Modeling and Simulation (AMS)
- Computer-Aided Product and Process Development (CAPPD)
- Virtual Environments and Systems (VES)
- Systems Engineering Information Knowledge Management (SEIKM)
- Artificial Intelligence and Machine Learning (AI/ML)

TRACK SYMPOSIUM TOPICS

- Advanced Modeling and Simulation (AMS General)
- Inverse Problems in Science and Engineering
- AMS: Computational Multiphysics Applications
- AMS: Uncertainty Quantification in Simulation and Model Verification & Validation
- AMS: Simulation in Advanced Manufacturing
- AMS: Material Characterization Methods and Applications
- Digital Twin: Advanced Human Modeling and Simulation in Engineering
- AMS/SEIKM Joint Topic: Physics-Informed Machine Learning for Design and Advanced Manufacturing
- AMS/SEIKM: Artificial Intelligence and Machine Learning in Design and Manufacturing
- AMS/CAPPD/SEIKM: Design, Simulation and Optimization for Additive Manufacturing
- Computer-Aided Product and Process Development (CAPPD General)
- Human-In-the Loop Product Design and Automation
- Digital Human Modelling for Design and Manufacturing
- Product and Process Design Automation for Industry 4.0
- Data-Driven Product Design and Fabrication
- Graduate Student Poster Symposium
- Systems Engineering Information Knowledge Management (SEIKM General)
- Design Informatics
- Systems Engineering and Complex Systems
- Smart Manufacturing Informatics
- Advanced Manufacturing for Bioeconomy and Circular Economy
- Digital Twin Modeling and Analytics for Advanced Manufacturing
- Physics-Informed Machine Learning for Advanced Design and Manufacturing
- Artificial Intelligence and Machine Learning in Design and Manufacturing
- Design, Simulation, and Optimization for Additive Manufacturing
- Smart Manufacturing Informatics
- Knowledge Capture, Reuse, and Management
- USER EXPERIENCE (UX) DESIGN FOR VIRTUAL ENVIRONMENTS
- VIRTUAL SYSTEMS FOR ENGINEERING, HEALTHCARE, AND EDUCATION
- AR/VR FOR MANUFACTURING SYSTEMS
- VR/AR HARDWARE AND ACCESSIBILITY
- INDUSTRIAL METAVERSE FOR SUPPLY CHAIN AND LOGISTICS
- JCISE SPOTLIGHT TALKS ON XXXXXX
- VES SHOW-AND-TELL
- CIE-VES Panel
- AI/ML General Session
- AI/ML Best Practices & Data Management
- AI/ML Engineering-Informed Approaches

Selected papers will be published in ASME *Journal of Computing and Information Science in Engineering* (JCISE). Five Best Papers will be awarded, including CIE Conference Best Paper and AMS, CAPPD, SEIKM and VES Best Paper.

CONFERENCE ORGANIZERS:

Conference Chair:
Dr. Robert Wendrich
Rawshaping Technology RBSO, Nieuwkoop, the Netherlands, robert@rawshaping.com

Program Chair:
Dr. Krishnanand Kaipa
Old Dominion University, Norfolk,VA, USA
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RELEVANT JOURNALS, CONFERENCES & JOURNALS SPECIAL ISSUES

JOURNAL OF COMPUTING AND INFORMATION SCIENCE IN ENGINEERING

The Journal of Computing and Information Science in Engineering publishes archival research results and advanced technical applications. The scope includes: Solid and Geometric Modeling; Computational geometry; Reverse Engineering; Virtual Environments and Haptics; Tolerance Modeling and Computational Metrology; Rapid Prototyping; Internet-Aided Design, Manufacturing and Commerce; Information Models and Ontologies for Engineering Applications; PDM/Enterprise Information Management; AI/Knowledge Intensive CAD/CAM; Engineering Simulation and Visualization, including FEA and Meshing; Creative IT; and Computational Algorithms/Software Development for mechanical product development.

http://computingengineering.asmedigitalcollection.asme.org/journal.aspx

ASME DIGITAL COLLECTION
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Founded in 1880 as the American Society of Mechanical Engineers, ASME is the premier professional membership organization for more than 127,000 mechanical engineers and associated members worldwide. ASME also conducts one of the world's largest technical publishing operations in the world, offering thousands of titles including some of the profession's most prestigious journals, conference proceedings, and ASME Press books.

The ASME Digital Collection, previously known as The ASME Digital Library, is ASME's repository of current and archival literature featuring:

- ASME's Transaction Journals from 1960 to present.
- ASME's Conference Proceedings from 2002 to present.
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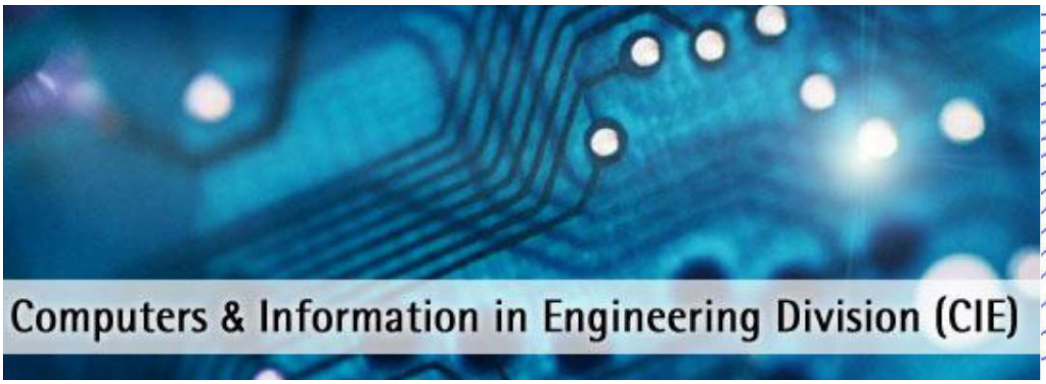
The International Mechanical Engineering Congress and Exposition (IMECE) is ASME's largest research and development conference focused primarily on mechanical engineering, but encompasses perspectives from many engineering disciplines. As per the latest revision to our ASME Anywhere policy, the 2022 conferences will be held in person. Exact dates and venue locations will be posted shortly. At IMECE one can experience stimulating innovation from basic discovery to translational application of new approaches and foster collaborations that engage stakeholders and partners not only from academia, but also from national laboratories, industry and government funding bodies. During last years, initiatives have been shared between CIE and IMECE communities.

For further information see:
https://event.asme.org/IMECE



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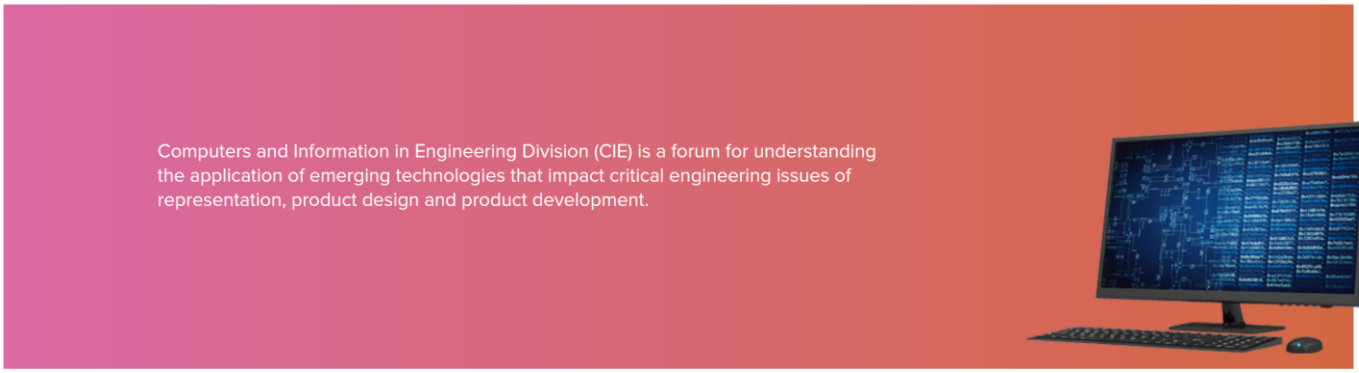
Computers & Information In Engineering



https://www.asme.org/get-involved/groups-sections-and-technical-divisions/technical-divisions/technical-divisions-community-pages/computers-information-in-engineering

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