

Special Issue: Highlights From ASME Computers and Information in Engineering (CIE) 2017

This is the first special issue based on selected papers presented at the 37th ASME Computers and Information in Engineering (CIE) conference held in Cleveland, OH, Aug. 6–9, 2017. The CIE conference is held annually in conjunction with the International Design Engineering Technical Conferences (IDETC). The ASME CIE conference is the flagship conference of the ASME's CIE division. This special issue contains 11 papers selected from 95 papers presented at the conference on diverse topics related to the *Journal of Computing and Information Science in Engineering* (JCISE). The topics range from computational methods to human–computer interactions.

The papers in this special issue include winners of best-paper awards and other highly rated papers at the conference. The papers were nominated by the four technical committees of the CIE division: (a) Advanced Modeling and Simulation (AMS), (b) Computer Aided Product and Process Development (CAPPD), (c) Virtual Environments and Systems (VES), and (d) Systems Engineering, Information and Knowledge Management (SEIKM).

The AMS Technical committee focuses on advances in modeling and simulation in engineering with emphasis on topics such as novel numerical techniques, inverse problems, computational multiphysics modeling, and uncertainty quantification. Two papers representing the AMS technical committee are included in this special issue. In their paper, *On the Multiphysics Modeling of Surface Aging Under Cathodic Protection*, Michopoulos and co-authors leverage data-driven methods and first principle thermodynamic theory to establish an analytical and computational framework for aging predictions of cathodic surfaces. In *Multiscale Topology Optimization for Additively Manufactured Objects*, Steuben and co-authors present a multiscale method for generating functional components using additive manufacturing. The authors integrate the mesoscale structuring capabilities of implicit slicers with topology optimization at the macroscale.

The CAPPD technical committee emphasizes fundamental research and computational tool development to support product and process realization. It encompasses all aspects of product and process development: design, analysis, optimization, process planning, inspection, and manufacturing. The research topics include well-established areas such as geometric modeling, feature-based design, tolerance analysis, and product-service systems design, and emerging topics such as emotional engineering, human modeling for engineering design, multimodal interfaces. This special issue includes three papers representing CAPPD ranging from tolerance analysis to human-centric design. Ameta and co-authors, in their paper titled *Tolerance-Maps to Model Composite Positional Tolerancing for Patterns of Features*, present an approach for composite position tolerances, applied to patterns of features. They develop T-maps for a pattern of

features at two levels: assembly level and part level. The authors show that the model conforms to the nuances of GD&T standards. Chu and Wang present a parametric modeling method for deriving free-form geometry from scanned facial data. Their paper is titled *Mass Customized Design of Cosmetics Masks Using Three-Dimensional Parametric Human Face Models Constructed From Anthropometric Data*. The method enables human-centric customization of products. Along the theme of human-centric design, Kaipa and co-authors present a framework for human-robot collaboration in their paper *Design of Hybrid Cells to Facilitate Safe and Efficient Human–Robot Collaboration During Assembly Operations*. The authors illustrate their approach using a mock-up of simplified jet-engine assembly.

The VES technical committee is focused on research issues involved in developing hardware and software for virtual environments, i.e., computer-generated immersive 3D worlds that facilitate the design of virtual products. The VES community addresses a number of emerging areas, including tangible user interfaces, multimodal user interfaces, multisensoral techniques, haptics, and alternative and combinatorial reality. In this special issue, these topics are represented by three papers. In the paper *Automated Coordinate Measuring Machine Inspection Planning Knowledge Capture and Formalization*, Anagnostakis and co-authors present an automated tool for capturing the motions of CMM inspection planners, and logging their actions in the form of an inspection plan. The tool has applications for understanding planners' strategies, and for developing training methods for novice users. Lesniak and Tucker presented a method for dynamically recreating real-world environments into virtual environments to support design collaboration among multiple remote users. Their paper is titled *Dynamic Rendering of Remote Indoor Environments Using Real-Time Point Cloud Data*. The paper by Ariansyah and co-authors, *Analysis of Autonomous Indexes on Driver's Workload to Assess the Effect of Visual ADAS on User Experience and Driving Performance in Different Driving Conditions*, focuses on supporting human drivers of vehicles to enhance road safety. The authors present a driving simulator system that utilizes measurements from physiological sensors, such as heart rate sensors and respiration rate, to measure the subjective effort and workload during a driving task.

Finally, the SEIKM technical committee promotes research on design informatics, ontology engineering, information discovery, agent-based systems, knowledge and function representation, system engineering, model-based design, and knowledge capture, reuse and management. In addition to these established areas, the emphasis is on emerging topics including smart manufacturing informatics, data fusion, and factory of the future. Three papers in this special issue highlight the research carried out by the SEIKM community. The paper *Optimality Conditions for Constrained*

Least-Squares Fitting of Circles, Cylinders, and Spheres to Establish Datums, by Shakarji and Srinivasan, addresses theoretical aspects of establishing data by fitting mathematical objects to point clouds. The optimality conditions presented in the paper enable verification of feasibility of candidate solutions and help in algorithm development. Sabbagh and co-authors present a *Thesaurus-Guided Text Analytics Technique for Capability-Based Classification of Manufacturing Suppliers*, which enables consumers of manufacturing services to leverage the services provided by diverse supply pool. It uses Naïve Bayes approach for classification of free-form text on suppliers' capabilities, and generates concept vectors of the capabilities. Bailey and co-authors adopt a model-based approach to facilitate integrated vehicle simulations. In their paper titled *A Framework for Automated Model Interface Coordination Using SysML*, the authors present a SysML-based modeling approach to describe different domain models in a formal way and to automate the process of creating and managing interfaces among the models. The approach enables model reuse across vehicle platforms.

Our goal with this special issue is to bring the latest developments and high-quality research outcomes to the JCISE audience in the shortest possible timeframe. The authors of the nominated papers were invited to revise and submit their papers based on the feedback received at the conference. The submitted papers underwent the review process for JCISE.

We thank all the authors for contributing papers in a timely manner. We would like to thank the members of the committee responsible for nominations and facilitating the review process. The committee members represented different technical committees of the ASME CIE division. They include Ashis Banerjee (SEIKM), David C. Jensen (SEIKM), Seung Ki Moon (AMS), Robert Wendrich (VES), and Chi Zhou (CAPPD). Finally, special thanks to the Editor, Dr. Satyandra K. Gupta for his vision and support throughout the entire process.

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