Proceedings of ASME 2024
International Design Engineering
Technical Conferences and
Computers and Information in
Engineering Conference

(IDETC-CIE2024)

Volume 2B

44th Computers and Information in Engineering Conference (CIE)

August 25-28, 2024 Washington, DC

Conference SponsorsDesign Engineering Division

Computers and Information in Engineering Division

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

© 2024, The American Society of Mechanical Engineers, 150 Clove Road, Little Falls, NJ 07424, USA (www.asme.org)

All rights reserved. "ASME" and the above ASME symbols are registered trademarks of the American Society of Mechanical Engineers. No part of this document may be copied, modified, distributed, published, displayed, or otherwise reproduced in any form or by any means, electronic, digital, or mechanical, now known or hereafter invented, without the express written permission of ASME. No works derived from this document or any content therein may be created without the express written permission of ASME. Using this document or any content therein to train, create, or improve any artificial intelligence and/or machine learning platform, system, application, model, or algorithm is strictly prohibited.

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

For authorization to photocopy material for internal or personal use under those circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, tel:978-750-8400, www.copyright.com.

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions

ISBN: 978-0-7918-8835-3

TABLE OF CONTENTS

Mohammad Abu-Mualla, Jida Huang	I
Enhancing Isogeometric Analysis With NURBS-Based Synthesis	15
Towards a Multi-User Experience Data-Driven Design Framework for Sustainable Smart Take-Away Food Packaging	24
ANN Crowds: An Investigation of Individual Voices in the Crowd	34
Implementation of Network Optimization and Resiliency Analysis Towards Mission Assurance Daniel J. Scott, David C. Jensen	47
Navigating the Tradespace: Empowering Decision-Making With Data Manipulation	56
Implementing the Risk Management Framework for Additive Manufacturing Security: A Model-Based Approach	68
Exploring Latent System Design Description and Requirement Similarities Using Transformer Based Contextual Embeddings	79
Knowledge Extraction in Additive Manufacturing: a Formal Concept Analysis Approach	90
Challenges in the Development and Integration of the Ground Vehicle Simulation Modeling Ontology	113
A Graph Database Schema for Metal Additive Informatics	126
Leveraging Latent Textual Topology for Standard Identification in Engineering Design	140
Well-Formed Quality of System Requirements for Verifying to ISO 29148-2018: A Natural Language Processing (NLP) Based Framework and Quantitative Metric	149
Application of Munich Agile Concept for MBSE for a Holistic Approach To Collect Vehicle Data Based on Board Diagnostic System	159
Functional Analysis of Cyber-Physical Systems for Confidentiality Quantum Resilience	168
Exploring a Graph Theoretic Approach for the Quantitative Comparison of Digital Twin Designs	183

T 1 T 1 T T 1 TT 1 TT 1 T	193
Lukman Irshad, Hannah Walsh	
ulti-Scale Model Predictive Control for Laser Powder Bed Fusion Additive Manufacturing	206
egrating Machine Learning Into the Design of Green Building Systems Emily Payne, Astrid Layton	217
fects of Intentional Group Framing on Tradespace Exploration	226
edictive Modeling for Public Policy Design: The Impact of Artificial Lights at Night (ALAN) on rd Strikes	236
Joey Paul E. Haynes, Mayank J. Bhalerao, Wesley T. Honeycutt, Janet K. Allen, Farrokh Mistree	
fer and Efficient Factory by Predicting Worker Trajectories Using Spatio-Temporal Graph tention Networks	249
Satya Saravan Kumar Kasarapu, Gokula Vasantha, Jonathan Corney, Jack Hanson, John Quigley, Hanane El-Raoui, Nathan Thompson, Andrew Sherlock	24)
Order-Free End-to-End Multi-AGV Scheduling Method Based on Safe Deep Q-Network and ynchronous Coordination	261
Jingbo Qu, Mian Li, Tianyu Wang	
easuring the U. S. Biomanufacturing Economy	271
Basic Formal Ontology-Based Ontological Modeling for Plan and Occurrence, a omanufacturing Process Verification Use Case	281
Dusan Sormaz, Saruda Seeharit, Boonserm Kulvatunyou, Milos Drobnjakovic	
wards Novel Standard-Based Approach to Flexible Supply Chain Integration	291
proving Knowledge Capture, Access, and Reuse by a Model-Based and Data-Driven anagement Using the Example of Aviation's Retrofit	299
Fabian N. Laukotka, Dieter Krause	2
ntology-Based Context-Aware Data Analytics in Additive Manufacturing	309
quirements Mining From Engineering Standards - Development and Evaluation of a Standards quirements Mining Framework	318
Janosch Luttmer, Dominik Ehring, Kathrin Vinke, Mohamed Alazzazy, Arun Nagarajah	
hancing VR Shopping With Dynamic Space Re-Arrangements: Towards Contextualized	
Formation Displays and Improved Locomotion	327

The Beginning of IDIVE: Interactive Design in Immersive Virtual Environments	344
Extended Position-Based Dynamics Virtual Reality Simulator for Thoracoscopic Surgery Training Pietro Piazzolla, Marco Rossoni, Marco Domenico Buttiglione, Elena Lucania, Giorgio Colombo, Francesco Guerrera, Marco Gribaudo	351
Parametric: Empowering In-Situ Parametric Modeling in Augment Reality for Personal Fabrication Runlin Duan, Xiyun Hu, Min Liu, Jingyu Shi, Karthik Ramani	360
Evaluation of Educational Modes in Virtual Reality: A Pilot Study	373
Comparative Analysis of Real-Time and Simulated Monitoring Techniques for MIG Welding	382
An Augmented Reality Platform for Real-Time Ergonomic Assessment and Biomechanical Simulation	392
Prototype2Code: End-to-End Front-End Code Generation From UI Design Prototypes	400
Data Driven Metareasoning for Defending a Perimeter Against Cooperative Intrusion	411
A Structural Re-Parameterization Network for Bearing Fault Diagnosis Under Variable Working Conditions	421
On the Prediction of Tremor Dynamics Motion Using Neural Network	427
Data-Defined Machine Intelligence for Mechanical Properties Identification	433
Predicting Human Context-Aware Action Modifications for AI Assistance in Visually Demanding Tasks	441
A Multi-Fidelity Approach to Testing and Evaluation of AI-Enabled Systems	448
Can an LLM Learn an Unseen Engineering Language? An Empirical Study of Prompt Engineering on ChatGPT and Function Modeling	461
Exploring Deep Learning Models for Pathological Tremors Prediction Using EMG and Kinematic Measurements	473
A Vision-Based Health Inspection of Power Line Conductors for the Mobile Damping Robot	481

A Learning Framework for Enabling Robots to Autonomously Dispense Granular Material On-	
Demand	490
Jeon Ho Kang, Rishabh Shukla, Moksh Mehta, Satyandra K. Gupta	

Author Index