RAHUL RAI

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PROFESSIONAL PREPARATION

National Institute of Technology, Ranchi, (NIFFT), India	Manufacturing Engg.	B.Tech	2000
University of Missouri-Rolla, Rolla, MO	Manufacturing Engg.	M.S.	2002
The University of Texas at Austin, Austin, TX	Mechanical Engg.	Ph.D.	2006

ACADEMIC APPOINTMENTS

8/20–	Professor & Dean's Distinguished Professor, Department of Automotive Engineering, Clemson University, International Center for Automotive Research (CU-ICAR) Greenville, SC
9/16–8/20	Associate Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo, Buffalo, NY
8/12–8/16	Assistant Professor, Department of Mechanical and Aerospace Engineering, University at Buffalo, Buffalo, NY

RESEARCH CENTER AND TEACHING APPOINTMENTS

8/18-8/19	Visiting Professor, Palo Alto Research Center (PARC), Palo Alto, CA (Sabbatical)
5/11-6/12	Staff Research Scientist, United Technologies Research Center (UTRC), Berkeley, CA
10/10-5/11	Visiting Research Scientist, Palo Alto Research Center (PARC), Palo Alto, CA
5/08–8/11	Assistant Professor, Mechanical Engineering, California State University, Fresno, CA
8/07–5/08	Lecturer, Mechanical Engineering, California State University, Fresno, CA
8/06–8/07	Postdoctoral Fellow, NSF Center for e-Design, Virginia Tech, VA

RESEARCH INTERESTS

- *Domain Focus:* Manufacturing, Engineering Design, Cyber-Physical Systems (CPS), Human-Technology Symbiosis, Extended Reality (XR/AR/VR), and Connected and Autonomous Vehicles (CAVs).
- *Methodologies:* Machine Learning (Probabilistic Graphical Models, Deep Learning, and Reinforcement Learning), AI (Graph Grammar, Search, and Applied Ontology), Optimization, Geometric Reasoning, Mesh Processing, Group Morphology, Design of Experiments (DoE) and Metamodeling, and Uncertainty Quantification.

- *Specific Application Areas:* Hybrid Physics Integrated Machine Learning for Cyber-Physical Systems (CPS), Diagnostics and Prognostics of CPS, Machine Perception and Big-Data for Digital Manufacturing, Machine Learning in Industry 4.0, AI/ML for Human-Technology Symbiosis Applications in Manufacturing and Assembly, Automated Process Planning for Additive and Subtractive Manufacturing Processes, Human Computer Interaction in Design, Machine Learning based Material Informatics, Augmented Reality based Assembly and Maintenance, Connected and Autonomous Vehicles (CAVs) Perception, Design for Additive Manufacturing, Conceptual Design Exploration, Generative Design, and Industrial Ontology Foundry (IOF).

GRADUATE AND POSTDOCTORAL ADVISORS

- Matthew I Campbell (Ph.D., The University of Texas at Austin)
- Venkat Allada (MS, Missouri S&T)
- Janis Terpenny (Postdoctoral, Virginia Tech).

AWARDS AND HONORS

- Prognostics and Health Management Society (PHM) Conference Best Paper Award, 2019
- ASME IDETC/CIE Division, Young Engineer Award, 2017
- HP Design Innovation Award, 2009
- Pelco Faculty Fellowship, Fresno State, 2009
- Grilione Faculty Fellowship, Fresno State, 2008
- Best Undergraduate Honors Thesis, National Institute of Technology, Ranchi, 2000, (NIFFT, (*Resulted in Three Journal Publications*).

PROFESSIONAL MEMBERSHIPS

- American Society of Mechanical Engineers (ASME)
- Member of American Society for Engineering Education (ASEE)
- Member of Association for Computing Machinery (ACM)
- Member of American Association of Artificial Intelligence (AAAI)
- Member of Institute of Electrical and Electronics Engineers (IEEE)
- Member of SAE International (SAE)
- Member of Society of Manufacturing Engineers (SME)

RESEARCH

FUNDED PROJECTS

Total Number of Funded Projects: 28 Total $ Value: $55,241,284 My Share: $8,044,981
Total number of funded projects as PI: 20, Total number of funded projects as co-PI *: 8

P28 South Carolina Department of Agriculture: Autonomous Integrated Tractor and Spraying System Start Date: August 2021, (Role PI, *$120,000*, Percentage Share (100%)).

P27 * South Carolina Research Authority: Enabling Factory to Factory (F2F) Networking for Future Manufacturing across South Carolina Start Date: August 2021, (Role Co-PI, *$1,500,000*, Percentage Share (30%), CU PI: Laine Mears (40%) , Co-PI Marrisa Porter (30%)).

P26 * South Carolina Research Authority: Modernizing South Carolina Manufacturing Assets to Enable Industry 4.0. Start Date: August 2021, (Role Co-PI, *$1,800,000*, Percentage Share (20%), CU PI: Srikanth Pilla (40%), Co-PI Gang Li (20%), Co-PI Mark Johnson Percentage Share (20%)).

P25 Naval Surface Warfare Center (NSWC - NEEC): COVIA: Computer Vision based Intelligent Assistant for Mistake Proofing of Complex Maintenance Tasks on Navy Ships. Start Date: May 2021, 2 Year Extension of Project 19 (Role PI, *$300,000*, Percentage Share (80%), CU Co-PI: Venkat Krovi, Percentage Share (20%)).

P24 Clean Energy Smart Manufacturing Innovation Institute (CESMII): Hybrid modeling for energy efficient CNC grinding. Start Date: December 2020 (Role PI, *$977,457*, Multi PI collaborative proposal from Clemson University (UB), West Virginia University, and ITAMCO, Clemson University share *$367,629*, Percentage Share (37.61%), Single PI from Clemson University).

P23 * ARL: Virtual Prototyping of Autonomy-Enabled Ground Systems (VIPR-GS). Start Date: June 2020 (*$18,000,000*). Role Co-PI, Percentage Share of Clemson University (CU) Budget (3.8%), CU PI: Zoran Filipi, 35 Clemson University Faculty are part of this grant).

P22 * ARL: An Integrated Multi-Material Digital Life Cycle Approach for Additive Manufacturing of Ground Vehicle Structures and Components. Start Date: October 2020 (*$11,086,533*, Role Co-PI, Percentage Share of Clemson University (CU) Budget (13%), CU PI: Srikanth Pilla, Percentage Share (35.5%), CU Co-PI: Gang Li, Percentage Share (25.5%), CU Co-PI Fadi Abdeljawad, Percentage Share (13%), CU Co-PI Shunyu Li, Percentage Share (13%)).

P21 * DARPA: SemaFor Program: Multi-media Analytics Leading to Intent and Semantic Evidence (MALISE). Start Date: June 2020 (*$12,003,432*, Multi PI, Multi Institution collaborative proposal from SRI, University at Buffalo, Carnegie Mellon University, and University at Maryland, University at Buffalo (UB) Share *$1,295,988*, Role Co-PI, Percentage Share of UB budget (25%), UB PI: Dave Doermann, Percentage Share (50%), UB Co-PI: Junsong Yuan, Percentage Share (25%)).

P20 Office of Naval Research (ONR): Science of Artificial Intelligence: Smart Configuration Optimizer Through Transformative analYtics (SCOTTY). Start Date: March 2020 (Role PI, *$3,041,387*, Collaborative proposal from Clemson University and Palo Alto Research Center (PARC), Clemson University share *$955,998*, Percentage Share of Clemson University Budget as PI (50%), Co-PI: Benjamin Lawler, Percentage Share (25%), Co-PI: Pierluigi Pisu, Percentage Share (20%) and Co-PI: Zoran Filippi, Percentage Share (5%))))).

P19 Naval Surface Warfare Center (NSWC - NEEC): COVIA: Computer Vision based Intelligent Assistant for Mistake Proofing of Complex Maintenance Tasks on Navy Ships. Start Date: May 2019 (Role PI, *$450,000*, Percentage Share (100%)).

P18 DARPA: Physics LEArning (PLEA): A Hybrid Physics Guided Machine Learning Approach for Predictive Modeling of Complex Systems. Start Date: September 2018 (*$986,741*, Role PI, Percentage Share (50%), Co-PI: Souma Chowdhury, Percentage Share (30%), Co-PI: Dave Doermann, Percentage Share (20%)).

P17 UB Center for Material Informatics COE Grant: A Deep Learning-Based Material Informatics System for Metallic Powder-Based Additive Manufacturing. Start Date: July 2017 (Role PI: *$40,000*, Percentage Share (100%)).

P16 * DMDII: Coordinated Holistic Alignment of Manufacturing Processes. Start Date: January 2017 (*$1,348,821*, Role Co-PI, Percentage Share (33%), PI: Barry Smith, Percentage Share (33%), Co-PI: Kemper Lewis, Percentage Share (33%)).

P15 * Digital Manufacturing and Design Specialization (Online Coursera Course). Start Date: September 2016 (*$1,081,926*, Role Co-PI Percentage Share (25%), PI: Kemper Lewis Percentage Share (25%), Co-PI: Sara Behdad, Percentage Share (25%), Co-PI: Chi Zhou, Percentage Share (25%)).

P14 Network of Excellence in Materials and Advanced Manufacturing: MAM Network: 3D Printing Based Fabrication of Conformal Sensors. Start Date: May 2015 (Role PI, *$25,000*, Percentage Share (100%)).

P13 * Network of Excellence in Materials and Advanced Manufacturing: MAM Network: Supplemental Support for Digital and Additive Manufacturing. Start Date: May 2015 (PI: Gary Halada (Stony Brook), *$75,000*, Role co-PI, Percentage Share (26.6%, $20,000)).

P12 NSF CMMI System Science–1534849: Uncertainty Propagation Methods for Networked Complex Systems. Start Date: April 2015 (Role PI, *$5,000*, NSF REU Supplement, Percentage Share (100%)).

P11 NSF CMMI System Science–1301235: Uncertainty Propagation Methods for Networked Complex Systems. Start Date: August 2013 (Role PI, *$410,643*, Percentage Share (25%), Co-PI Puneet Singla - Percentage Share (25%), Co-PI Tarunraj Singh - Percentage Share (25%), and Co-PI Abani Patra - Percentage Share (25%)).

P10 NYSERDA–PON 2722: Feasibility Studies: Data-Driven Energy Minimization Strategies for Buffalo Sewer Authority. Start Date: February 2014 (Role PI, *$25,000*, Percentage Share (100%)).

P9 NYSP2I–63206: Intelligent Decision Enabled Application (IDEA) for Energy Efficient Additive Manufacturing. Start Date: January 2013 (Role PI, *$30,000*, Percentage Share (100%)).

P8 NYSP2I–63615: Data Driven Optimization of Buffalo Wastewater Treatment Plans (WWTPs). Start Date: February 2013 (Role PI, *$30,000*, Percentage Share (100%)).

P7 NSF CMMI EDI–1215650: Knowledge Representation and Design for Managing Product Obsolescence. Funded by Engineering Design and Innovation. Start Date: November 2011 (Role PI, *$44,329*, Percentage Share (100%)).

P6 NSF CMMI EDI–0928837: Collaborative Research: Knowledge Representation and Design for Managing Product Obsolescence. Funded by Engineering Design and Innovation/NSF/EDI. Start Date: August 2009 (Role PI, *$315,015*, Percentage Share (33.3%), Co-PI: Janis Terpenny, Virginia Tech, Percentage Share (33.3%), Co-PI: Peter Sandborn, University at Maryland, Percentage Share (33.3%),).

P5 DARPA (i-FAB, BAA-11-20): Reasoning about Manufacturability and Design Changes via Graph-Grammar Based Search. Funded by DARPA. Start Date: May 2011 (Role PI, *$400,000*, Percentage Share (100%), Subcontracted through Xerox PARC, Multi team proposal totaling $2.3 Million Dollars with 4 PIs from various research centers and universities).

P4 DARPA (META-II, BAA-10-59): Formal Co-verification of Correctness of Large Scale Cyber-Physical Systems during Design. Funded by DARPA. Start Date: October 2010 (Role PI, *$750,000*, Percentage Share (100%), Subcontracted through Xerox PARC, Multi team proposal totaling $3.5 Million Dollars with 4 PIs from various research centers and universities).

P3 Niagara Bottling LLC: Computational Design Optimization of Water Bottle Packaging Systems. Funded by Niagara Bottling LLC. Start Date: September 2010 (Role PI, *$5,000*, Percentage Share (100%), Fresno State).

P2 Hewlett Packard (HP): Distributed Computational Design Environment (DiCoDE). Funded by HP. Start Date: May 2009 (Role PI, $280,000, Percentage Share (100%), Fresno State).

P1 PELCO by Schneider Electric: Lean Manufacturing of Assembly Lines. Funded by PELCO. Start Date: June 2008 (Role PI, *$15,000*, Percentage Share (100%), Fresno State).

PATENTS

PT1 *P. Jaiswal**, and R. Rai (2018), *Method for automated 3D print quality assessment and redesign (Full Patent 17/267,430).*

PUBLICATIONS

Google Scholar Webpage: http://goo.gl/OGCsQZ
Number of google scholar citations: 1578, h-index: 22, i10-index: 43 (as of 28th October, 2021)

Number of peer-reviewed journal articles published or to appear in journals: 59
Number of peer-reviewed journal articles that have gone through at least one round of review and have been accepted contingent on a revision that needs to be approved (under revision): 2
Number of peer-reviewed journal articles submitted (in review): 3
Number of peer-reviewed conference articles published: 73
Graduate Student Author *, *Postdoc Author*†, *Undergraduate Student Author* ‡

Peer reviewed journal publications

J64 *D. Patel**, *D. Bielecki**, R. Rai, and G. Dargush (2021), *Improving connectivity and accelerating multiscale topology optimization using deep neural network techniques, (Submitted, in review).*

J63 *R. Yang**, *S. Singh**, M. Tavakkoli, N. Amiri, A. Karami, and R. Rai (2021), *Deep learning architecture for computer vision-based structural defect detection,* in Engineering Applications of Artificial Intelligence, *(Submitted, in review).*

J62 *R. Yang**, *S. Singh**, M. Tavakkoli, N. Amiri, A. Karami, and R. Rai (2021), *CNN-LSTM based deep learning approach for mode shape prediction from continuous video streams,* in Structural Control and Health Monitoring, *(Submitted, in review).*

..... ↑ Journal papers above this line are currently under the first round of review and have not received any reviewer feedback ↑ .....

J61 S. Singh, A. Mohanty, R. Rai, B. Mahanty, and M.K. Tiwari (2021), *An optimization based framework for operational-level resource composition in inclusive manufacturing system,* in ASME Journal of Computing and Information Science, *(Under revision).*

J60 J. Wang, W. Chen, M. Fuge, and R. Rai (2021), *A conditional generative model for implicit surface-based inverse design of cellular structures,* in Structural and Multidisciplinary Optimization, *(Under revision).*

..... ↑ Journal papers above this line are articles that have gone through at least one round of review and have been accepted contingent on a revision that needs to be approved ↑ .....

J59 R. Rai, M.K. Tiwari, D Ivanov and A. Dolgui (2021), *Machine learning in manufacturing and industry 4.0 applications,* in International Journal of Production Research, DOI: https://doi.org/10.1080/00207543.2021.1956675

J58 *D. Bielecki**, *D. Patel**, R. Rai, and G. Dargush (2021), *Multi-stage deep neural network accelerated topology optimization,* in Structural and Multidisciplinary Optimization, pp 1-15, DOI: https://doi.org/10.1007/s00158-021-03028-5

J57 A. Sharma, *Z. Zhang**, and R. Rai (2021), *Interpretive model of manufacturing: A theoretical framework and research agenda for machine learning in manufacturing,* in International Journal of Production Research, DOI: https://doi.org/10.1080/00207543.2021.1930234

J56 D. Jivani, R. Rai, and O. Wodo (2021), *Skeletal-based microstructure representation and convolution reconstruction,* in Computational Material Science, 193, DOI: https://doi.org/10.1016/j.commatsci.2021.110409

J55 $C. Young^*$, and R. Rai (2021), *Automated procedure reconfiguration framework for augmented reality-guided maintenance applications,* in ASME Journal of Computing and Information Science, pp. 1-23 DOI: https://doi.org/10.1115/1.4051054

J54 $S. Singh^*$, $R. Khawale^*$, $H. Zhang^*$, $H. Chen^*$, and R. Rai (2021), *Personal protective equipments (PPEs) for COVID-19: A product lifecycle management (PLM) perspective,* in International Journal of Production Research, pp. 1-22, DOI: https://doi.org/10.1080/00207543.2021.1915511

J53 $Z. Zhang^*$, S. Chowdury, D. Doermann and R. Rai (2021), *MIDPhyNet: Memorized infusion of decomposed physics in neural networks to model dynamic systems,* in Neurocomputing, 428, pp. 116-129. DOI: https://doi.org/10.1016/j.neucom.2020.11.042

J52 I. Matei, C. Zheng, S. Chowdury, R. Rai, and J. D. Kleer (2021), *Controlling draft interactions between quadcopter unmanned aerial vehicles with Physics-aware modeling*, in Journal of Intelligent and Robotic Systems, 101 (1), pp. 1-21 DOI: https://doi.org/10.1007/s10846-020-01295-w

J51 $C. Sahu^*$, $C. Young^*$, and R. Rai (2020), *Artificial intelligence and machine learning in augmented reality-assisted manufacturing applications: A Review,* in International Journal of Production Research, DOI: https://doi.org/10.1080/00207543.2020.1859636

J50 $J. Wang^*$, and R. Rai (2020), *Generative design of conformal cubic periodic cellular structures using a surrogate model-based optimization scheme,* in International Journal of Production Research, DOI: https://doi.org/10.1080/00207543.2020.1859637

J49 $J. Wang^*$, J. Callahan, O. Ogunbodede, and R. Rai (2020), , *Hierarchical combinatorial design and optimization of non-periodic metamaterial structures*, in Additive Manufacturing, DOI: https://doi.org/10.1016/j.addma.2020.101710

J48 $A. Behjat^*$, C. Zeng, R. Rai, I. Matei, D. Doermann, and S. Chowdhury (2020), *A physics aware learning architecture with input transfer networks for predictive modeling,* in Applied Soft Computing, 96, 106665 DOI: https://doi.org/10.1016/j.asoc.2020.106665

J47 R. Rai,, and $C. Sahu^*$ (2020), *Driven by data or derived through physics? A review of hybrid physics guided machine learning techniques with cyber physical system (CPS) focus,* in IEEE Access, 8, 71050-71073, DOI: 10.1109/ACCESS.2020.2987324

J46 Y. Liu, R. Rai, A. Purwar, B. He, and M. Mani (2020), *Machine learning applications in manufacturing,* in ASME Journal of Computing and Information Science, 20(2), pp. 020301, DOI: https://doi.org/10.1115/1.4046427

J45 $R.\ Yang^*$, Z. Ahmed, U. Schulthess, M. Kamal, and R. Rai (2019), *Deep learning based computer vision approach for smallholder farming agricultural field boundaries detection,* in Remote Sensing Applications: Society and Environment, 20, DOI: https://doi.org/10.1016/j.rsase.2020.100413

J44 $M.M.\ Ali^*$, $R.\ Yang^*$, $B.\ Zhang^*$, F. Furini, R. Rai, J.N. Otte, and B. Smith (2019), *Enriching the functionally graded materials (FGM) ontology for digital manufacturing,* in International Journal of Production Research, DOI: https://doi-org.libproxy.clemson.edu/10.1080/00207543.2020.1787534

J43 $A.\ Mukherjee^*$, R. Rai, P. Singla, T. Singh, and A. Patra (2019), *Overlapping clustering based technique for Uncertainty Quantification in high dimensional dynamical systems,* in SIAM Journal of Uncertainty Quantification, 8(3), DOI: https://doi-org.libproxy.clemson.edu/10.1137/18M1200567

J42 $R.\ Yang^*$, $S.\ Singh^*$, M. Tavakkoli, N. Amiri, A. Karami, Y. Yang, and R. Rai (2019), *CNN-LSTM deep learning architecture for computer vision based modal frequency detection,* in Mechanical Systems and Signal Processing, 144, 106885, DOI: https://doi.org/10.1016/j.ymssp.2020.106885

J41 S.E. Ghiasian, $P.\ Jaiswal^*$, R. Rai, and K. Lewis (2019), *A preference-based approach to assess a component's design readiness for additive manufacturing,* in ASME Journal of Mechanical Design, DOI: 10.1115/1.4045604

J40 $M.M.\ Ali^*$, M. D. Doumbouya, H. Karray, T. Louge, and R. Rai (2019), *Ontology based approach to extract product's design features from online customers' reviews,* in Computers and Industrial Engineering, DOI: https://doi.org/10.1016/j.compind.2019.103175

J39 $A.\ Mukherjee^*$, R. Rai, P. Singla, T. Singh, and A. Patra (2019), *Effect of DEM uncertainty on geophysical mass flow via identification of strongly coupled subsystem,* in International Journal of Uncertainty Quantification, DOI: 10.1615/Int.J.UncertaintyQuantification.2019029044

J38 $J.\ Wang^*$, J. Armstrong, and R. Rai (2019), *Investigation of compressive deformation behaviors of cubic periodic cellular structural cubes through 3D printed parts and FE simulations,* in Rapid Prototyping Journal, DOI: https://doi.org/10.1108/RPJ-03-2019-0069

J37 $B.\ Zhang^*$, J. Grant, L. Bruckman, O. Wodo, and R. Rai (2019), *Degradation mechanism detection in photovoltaic backsheets by fully convolutional neural network,* in Scientific Reports, 9(1), pp. 1-13, DOI: 10.1038/s41598-019-52550-6

J36 $R.\ Yang^*$, and R. Rai (2019), *Machine auscultation: enabling machine diagnostics using convolutional neural networks and large-scale machine audio data,* in Advances in Manufacturing, 7(2), pp. 174-187, DOI: 10.1007/s40436-019-00254-5

J35 J. N. Otte, D. Kiritsis, $M.M.\ Ali^*$, $R.\ Yang^*$, $B.\ Zhang^*$, R. Rudnicki, R. Rai, and B. Smith (2019), *An ontological approach to representing the product life cycle,* in Applied Ontology,

14(2), pp. 179-197, DOI: 10.3233/AO-190210

J34 *A.P. Khadilkar**, *J. Wang**, and R. Rai (2019), *Deep learning based stress prediction for Bottom-up SLA 3D printing process,* in The International Journal of Advanced Manufacturing Technology (IJAMT), 1-15, DOI: 10.1007/s00170-019-03363-4

J33 *M.M. Ali**, R. Rai, J.N. Otte and B. Smith (2019), *A product life cycle ontology for additive manufacturing,* in Computers and Industrial Engineering, 105, 191-203. DOI: 10.1016/j.compind.2018.12.007

J32 *P. Jaiswal**, and R. Rai (2019), *A geometric reasoning approach for additive manufacturing print quality assessment and automated model correction,* in Journal of Computer Aided Design, 109, pp. 1-11, DOI: 10.1016/j.cad.2018.12.001

J31 *B. Zhang**, *P. Jaiswal**, R. Rai, P. Guerrier, and G. Baggs (2019), *Convolutional neural network based inspection of metallic additive manufacturing parts,* in Rapid Prototyping Journal, 25(3), pp. 530-540, DOI: 10.1108/RPJ-04-2018-0096

J30 N. Paliwal, *P. Jaiswal**, V.M. Tutino, H. Shallwani, J.M. Davies, A. Siddiqui, R. Rai, and H. Meng (2018), *Outcome prediction of intracranial aneurysm treatment by flow diverters using machine learning,* in Neurosurgical Focus (Predictive Analytics in Medicine), 45 (5), DOI: 10.3171/2018.8.FOCUS18332

J29 *B. Zhang**, *P. Jaiswal**, R. Rai, and S. Nelaturi (2018), *Additive manufacturing of functionally graded material objects: A review,* in ASME Journal of Computing and Information Science, 18(4), pp. 041002, DOI: 10.1115/1.4039683

J28 *J. Huang**, and R. Rai (2018), *Gesture-based mid-air sketching platform for conceptual 3D modeling,* in ASME Journal of Computing and Information Science, 18(4), pp. 041014 DOI: 10.1115/1.4040982

J27 *Z. Zhang**, P. Jaiswal, and R. Rai (2018), *FeatureNet: Machining feature recognition based on 3D convolution neural network,* in Journal of Computer Aided Design (JCAD), 101, pp. 12-22. DOI: 10.1016/j.cad.2018.03.006

J26 *J. Wang**, S. Das, R. Rai, and C. Zhou (2018), *Data-driven simulation for fast prediction of pull-up process in bottom-up stereo-lithography,* in Journal of Computer Aided Design (JCAD), 99, pp. 29-42. DOI: 10.1016/j.cad.2018.02.002

J25 *B. Zhang**, J. Huang, R. Rai, and H. Manjunatha (2018), *A sequential sampling algorithm for multi-stage static coverage problems,* in ASME Journal of Computing and Information Science, 18(2), pp. 021016. DOI: 10.1115/1.4039901

J24 *J. Huang**, *P. Jaiswal**, and R. Rai (2018), *Gesture-based system for next generation natural and intuitive interfaces,* in Artificial Intelligence for Engineering Design, Analysis and Manufacturing (AIEDAM), pp. 1-5. DOI: 10.1017/S0890060418000045

J23 *J. Sovizi**, R. Rai, and V. Krovi (2018), *Wrench uncertainty quantification and reconfiguration analysis in loosely interconnected cooperative systems,* in ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering, 4(2), pp. 022102.

DOI: 10.1115/1.4037122

J22 *P. Jaiswal**, *J. Patel**, and R. Rai (2018), *Build orientation optimization for additive manufacturing of functionally graded material objects,* in The International Journal of Advanced Manufacturing Technology (IJAMT), pp. 1-13. DOI: 10.1007/s00170-018-1586-9

J21 *A. Mukherjee**, R. Rai, P. Singla, T. Singh, and A. Patra (2017), *Comparison of linearization and graph clustering methods for uncertainty quantification of large dynamical systems,* in International Journal of Uncertainty Quantification,7 (1), pp. 23-56. DOI: 10.1615/Int.J.UncertaintyQuantification.2016017192

Peer reviewed journal publications: Before Tenure

J20 *B. Zhang**, *Y. Liu**, V. Krovi, and R. Rai (2017), *Invariant probabilistic sensitivity analysis for building energy models,* in Journal of Building Performance Simulation, 10(4), pp.392-405. DOI: 10.1080/19401493.2016.1265590

J19 *S.S. Babu**, and R. Rai (2017), *Sketching in three dimensions: A beautification scheme,* in Artificial Intelligence for Engineering Design, Analysis and Manufacturing (AIEDAM), 31(3) pp.376-392 DOI: 10.1017/S0890060416000512

J18 *A. Verma†*, and R. Rai (2017, *Sustainability induced dual-level optimization of additive manufacturing process,* in International Journal of Advanced Manufacturing Technology, 88 (5-8) pp. 1-15. DOI: 10.1007/s00170-016-8905-9

J17 *B. Zhang**, and R. Rai (2017), *Probabilistic factor graph based approach for automatic material assignments to 3D models,* in ASME Journal of Mechanical Design, 139 (1), pp. 014501. DOI: 10.1115/1.4034838

J16 *B. Zhang**, N. Adurthi, R. Rai, and P. Singla (2016), *A novel sampling algorithm for static coverage problem in presence of probabilistic resource intensity allocation maps,* in ASME Journal of Mechanical Design, 138 (3), pp. 031403. DOI: 10.1115/1.4032395

J15 *P. Jaiswal**, *J. Huang**, and R. Rai (2016), *Assembly based conceptual 3D modeling with unlabeled components using probabilistic factor graphs,* in Journal of Computer Aided Design (JCAD), 74, pp. 45-54. DOI: 10.1016/j.cad.2015.10.002

J14 R. Rai, and *A. Deshpande** (2016), *Fragmentary shape recognition: a BCI study,* in Journal of Computer Aided Design (JCAD) 71, pp. 51-64. DOI: 10.1016/j.cad.2015.10.001

J13 C. Williams, R. Rai, J. Panchal, S. Ferguson, B. Dupont, and J. Allison (2015), *New perspectives on design automation,* in ASME Journal of Mechanical Design, 137 (5), pp.050301. DOI: 10.1115/1.4030256

J12 *S.S. Babu**, and R. Rai (2014), *Human factors study on the usage of BCI headset for 3D CAD modeling,* in Journal of Computer Aided Design (JCAD), 54, pp. 51-55. DOI: 10.1016/j.cad.2014.01.006

J11 M. Campbell, R. Rai, and T. Kurtoglu (2012), *A stochastic tree search algorithm for generative grammars,* ASME Journal of Computing and Information Science in Engineering, 12 (3), pp.031006. DOI: 10.1115/1.4007153

J10 X. Chang, R. Rai, and J. Terpenny (2010), *Development and utilization of ontologies in design for manufacturing,* ASME Journal of Mechanical Design, 132 (2), pp.021009. DOI: 10.1115/1.4000697

J9 R. Rai, and M. Campbell (2008), *Q2S2: A new methodology for merging quantitative and qualitative information in experimental design,* ASME Journal of Mechanical Design, 130 (3), pp.031103. DOI: 10.1115/1.2829884

J8 R. Rai, and J. Terpenny (2008), *Principles for managing technological product obsolescence,* IEEE Transactions on Components and Packaging Technologies, 31(4), pp. 880-889. DOI: 10.1109/TCAPT.2008.2005115

J7 R. Rai, and V. Allada (2006), *Agent-based optimization for product family design,* Annals of Operations Research, 143, pp. 147-156. DOI: 10.1007/s10479-006-7378-x

J6 R. Rai, and V. Allada (2003), *Agent-based factor X model to study diffusion of eco-innovations,* International Journal of Agile Manufacturing, 6(1), pp. 17-29.

J5 R. Rai, and V. Allada (2003), *Modular product family design: agent-based Pareto-optimization and quality loss function-based post-optimal analysis,* International Journal of Production Research, 41(17), pp. 4075-4098. DOI: 10.1080/0020754031000149248

J4 R. Rai, V. Rai, M.K. Tiwari, and V. Allada (2002), *Disassembly sequence generation: A petri-net based heuristic approach,* International Journal of Production Research, 40(13), pp. 3183-3198. DOI: 10.1080/00207540210146116

J3 U.M.B.S Sarma, S. Kant, R. Rai, and M.K. Tiwari (2002), *Modeling the machine loading problem of FMSs and its solution using a tabu-search based heuristic,* International Journal of Computer Integrated Manufacturing, 15(4), pp. 285-295. DOI: 10.1080/09511920110086926

J2 M.K. Tiwari, N. Sinha, S. Kumar, R. Rai, S. Mukhopadhyay (2002), *A Petri Net based approach to determine the disassembly strategy of a product,* International Journal of Production Research, 40(5), pp. 1113-1129. DOI: 10.1080/00207540110097176

J1 R. Rai, S. Kameswaran, and M. K. Tiwari (2002), *Machine-tool selection and operation allocation in FMS: Solving a fuzzy goal programming model using genetic algorithm,* International Journal of Production Research, 40(3), pp. 641-665. DOI: 10.1080/00207540110081515

Peer reviewed conference publications

‡ indicates conference publication in machine learning focused conferences with acceptance rate less than 35%.

C73 J. Ortiz, J. Summers, J. Coykendall, T. Roberts and R. Rai, (2021), *A topological formalism for quantitative analysis of design spaces,* ICED21 23rd International Conference on Engineering Design, Gothenberg, Sweden.

C72 P. Ghassemi, A. Behjat, C. Zheng, A. Lulekar, R. Rai, and S. Chowdhury (2020), *Physics-aware surrogate-based optimization with transfer mapping neural networks: for bio-inspired flow tailoring,* AIAA Aviation 2020, Reno, NV, USA.

C71 C. Somarakis, I. Matei, J. De Kleer, R. Rai, and S. Chowdhury (2020), *Joint identification and control in hybrid linear systems,* 2020 IFAC World Congress, Berlin, Germany.

C70 I. Matei, J. De Kleer, R. Minhas, and R. Rai (2020), *Deep learning for control: a non-reinforcement learning view,* 2020 American Control Conference, Denver, CO, USA.

C69 R. Rai (2019), *Hybrid machine learning models,* MLCON 2019: Machine Learning for Intelligence Applications (MLCON), Washington D.C., USA.

C68 ‡ $S. Singh^*$, A. Behjat, S. Chowdhury, A. and R. Rai (2019), *PI-LSTM:Physics-Infused long short-term memory network,* 18th IEEE Conference on Machine Learning and Applications (ICMLA), Boca Raton, FL, USA.

C67 I. Matei, J. De Kleer, A. Feldman, M. Zhenirovskyy, and R. Rai (2019), *Classification based diagnosis: integrating partial knowledge of the physical system,* Proceedings of the Annual Conference of the PHM Society, Scottdale, AZ, USA.

C66 I. Matei, J. De Kleer, M. Zhenirovskyy, and R. Rai (2019), *Real time model-based diagnosis enabled by hybrid modeling,* 2019 International workshop on the principles of diagnosis (DX), Klagenfurt, Austria.

C65 T. Rajendra, $P. Jaiswal^*$, N. Paliwal, M. Waqas, M. Mokin, A. Siddiqui, R. Rai, and H. Meng (2019), *Automated localization and segmentation of major cerebral vasculature with aneurysms from 3D DSA using deep-learning ,* 2019 SPIE Medical Imaging, Houston, TX, USA.

C64 R. Rai (2019), *Driven by data or derived through physics: Hybrid physics guided machine learning approach,* 9th IFAC Conference MIM 2019 on Manufacturing Modeling, Management, and Control, Berlin, Germany.

C63 R. Rai (2019), *Physics LEarning (PLEA): A hybrid physics guided machine learning approach for predictive modeling of complex systems*, AIAA aviation conference, Dallas, TX, USA.

C62 S.E. Ghiasian, $P. Jaiswal^*$, R. Rai, and K. Lewis (2019), *A design modification system for additive manufacturing: Towards feasible geometry development,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Anaheim, CA, USA.

C61 T. Rajendra, $P. Jaiswal^*$, N. Paliwal, A. Siddiqui, R. Rai, and H. Meng (2019), *Deep-Learning based region-of-interest selection in 3D cerebrovascular images,* 2019 Summer Biomechanics, Bioengineering, and Biotransport Conference, Seven Springs, PA, USA.

C60 T. Rajendra, N. Paliwal, $P.\ Jaiswal^*$, A. Siddiqui, R. Rai, and H. Meng (2019), *Automated segmentation of cerebral arteries from patient-specific 3D cerebrovascular images using deep-learning and group morphology,* 2019 Summer Biomechanics, Bioengineering, and Biotransport Conference, Seven Springs, PA, USA.

C59 J. Callahan, O. Ogunbodede, M. Dhameliya, $J.\ Wang^*$, and R. Rai (2018), *Hierarchical combinatorial design and optimization of quasi-periodic metamaterial structures,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Quebec City, Canada.

C58 S.E. Ghiasian, $P.\ Jaiswal^*$, R. Rai and K. Lewis (2018), *From conventional to additive manufacturing: Determining component fabrication feasibility,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Quebec City, Canada.

C57 $D.\ Bielecki^*$, $P.\ Jaiswal^*$, and R. Rai (2017), *Binary image recognition utilizing computer generated templates,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Cleveland, OH, USA.

Peer reviewed conference publications: Before Tenure

C56 F. Furini, R. Rai, B. Smith, G. Colombo, and V. Krovi (2016), *Development of a manufacturing ontology for functionally graded materials,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C55 $P.\ Jaiswal^*$, R. Rai, and S. Nelaturi (2016), *Representation hysteresis in interoperability computational workflows of 3D models,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C54 $K.B.\ Koyalamudi^*$, $R.\ Yang^*$, and R. Rai (2016), *Additive manufacturing of conductive polymer nano-composites under the influence of external magnetic field,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C53 $J.\ Wang^*$, S. Das, C. Zhou, and R. Rai (2016), *Data-driven simulation for fast prediction of pull-up process in bottom-up stereo-lithography,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C52 $J.\ Wang^*$, and R. Rai (2016), *Classification of bio-inspired periodic cubic cellular material based on compressive deformation behaviors of 3D printed parts and FE simulations,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C51 $H.\ Manjunath^*$, J. Huang, $B.\ Zhang^*$, and R. Rai (2016), *A sequential sampling algorithm for multi-stage static coverage problems,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C50 $B.\ Zhang^*$, $P.\ Jaiswal^*$, R. Rai, and S. Nelaturi (2016), *Additive manufacturing of functionally graded objects: A review,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C49 $P.\ Shekhar^*$, and R. Rai (2016), *Anomaly detection in complex spatiotemporal networks through location aware geospatial big data sets,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C48 $A.\ Mukherjee^*$, R. Rai, P. Singla, T. Singh, and A. Patra (2016), *An adaptive gaussian mixture model approach based framework for solving fokker-planc kolmogrov equation related to high dimensional dynamical systems,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Charlotte, NC, USA.

C47 $J.\ Wang^*$, and R. Rai (2015), *Additive manufacturing of conformal piezo-electric sensors,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX, USA.

C46 $G.\ Siwach^*$, and R. Rai (2015), *A SLA based conformal piezo-resistive self-sensing sensor fabrication process,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX, USA.

C45 $A.\ Sharma^*$, and R. Rai (2015), *A novel 3D printing assisted manufacturing process for mounting electronic circuit on conformal surfaces,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX, USA.

C44 $A.\ Mukherjee^*$, R. Rai, P. Singla, T. Singh, and A. Patra (2015), *Non negative matrix factorization based uncertainty quantification method for complex networked systems,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C43 $Y.\ He^*$, $A.\ Mukherjee^*$, and R. Rai (2015), *Analysis of hybrid dynamical systems with uncertainty in initial conditions,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C42 $A.\ Sharma^*$, and R. Rai (2015), *Transfer printing of stretchable electronics on conformal surfaces,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C41 $G.\ Siwach^*$, and R. Rai (2015), *3D conformal piezo-resistive sensor printing,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C40 $N.\ Feng^*$, $P.\ Jaiswal^*$, and R. Rai (2015), *Sketch Beautification in Air,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C39 $A.V.\ Thakur^*$, and R. Rai (2015), *User study of hand gestures for gesture based 3D CAD modeling,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Boston, MA, USA.

C38 $A.\ Mukherjee^*$, R. Rai, P. Singla, T. Singh, and A. Patra (2015), *Laplacian graph based approach for uncertainty quantification of large scale dynamical systems,* American Control Conference (ACC), Chicago, IL.

C37 $S.\ Gupta^*$, and R. Rai (2014), *A graph grammar based approach to 3D print and assemble*

furniture, Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX, USA.

C36 $S.\ Pareek^{*}$, $V.\ Sharma^{*}$, and R. Rai (2014), *Design for additive manufacturing of kinematic pairs,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX, USA.

C35 $J.\ Huang^{*}$, and R. Rai (2014), *Hand gesture based intuitive interface for CAD,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C34 $A.\ Verma^{\dagger}$, and R. Rai (2014), *Computational geometric solutions for efficient additive manufacturing process planning,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C33 $A.\ Deshpande^{*}$, E.T. Esfahani, and R. Rai (2014), *Geons and non-accidental relations in 2D shape abstraction: A BCI study study,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C32 $A.\ Mukherjee^{*}$, Y. Zhang, and R. Rai (2014), *Probabilistic design miming,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C31 $B.\ Zhang^{*}$, and R. Rai (2014), *Materials follow form and function: Probabilistic factor graph approach for automatic material assignments to 3D models,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C30 $S.S.\ Babu^{*}$, $P.\ Jaiswal^{*}$, E.T. Esfahani, and R. Rai (2014), *Sketching in air: A single stroke classification framework,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C29 $R.\ Gopi^{*}$, S. Das, and R. Rai (2014), *A novel design optimization method for obtaining desired deformation behavior in additively manufactured multi-material parts,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C28 $J.\ Sovizi^{*}$, R. Rai, and V. Krovi (2014), *3D face recognition under isometric expression deformation,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Buffalo, NY, USA.

C27 $A.\ Verma^{\dagger}$, and R. Rai (2013), *Energy efficient modeling and optimization of additive manufacturing processes,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX.

C26 $R.\ Bhat^{*}$, $A.\ Deshpande^{*}$, R. Rai, and E.T. Esfahani (2013), *BCI-Touch based system, a multimodal CAD interface for object manipulation,* Proceedings of ASME IMECE, Sandiego, CA, USA.

C25 $A.\ Verma^{\dagger}$, and R. Rai (2013), *Modeling multi operator-multi-UAV (MOMU) operator attention allocation problem,* Proceedings of ASME IMECE, Sandiego, CA, USA.

C24 $A.\ Godre^{*}$, A. Nikolaev and R. Rai (2013), *An energy consumption rewards system to incen-*

tivize environmentally conscious social behavior, Proceedings of ASME IMECE, Sandiego, CA, USA.

C23 $P.\ Jaiswal^{*}$, A. Bajad, V.G. Nanjudaswamy, $A.Verma^{\dagger}$, and R. Rai (2013), *Creative exploration of scaled product family 3D models using gesture based conceptual computer aided design(C-CAD) tool,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Portland, OR, USA.

C22 $S.S.\ Babu^{*}$, A. Verma, and R. Rai (2013), *Creating by imaging: use of natural and intuitive BCI in 3D CAD modeling,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Portland, OR, USA.

C21 $V.G.\ Nanjudaswamy^{*}$, A. Kulkarni, Z. Chen, $P.\ Jaiswal^{*}$, $S.S.\ Babu^{*}$, $A.Verma^{\dagger}$, and R. Rai (2013), *Creative exploration of scaled product family 3D models using gesture based conceptual computer aided design(C-CAD) tool,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Portland, OR, USA.

C20 $B.\ Brown^{*}$, T. Singh, and R. Rai (2013), *Pareto front identification via objective vector jacobian matrix singularity,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Portland, OR, USA.

C19 M. Majji, and R. Rai (2013), *Autonomous task assignment of multiple operators for human robot interaction,* American Control Conference (ACC), Washington, D.C.

C18 $B.\ Brown^{*}$, T. Singh, and R. Rai (2013), *Jacobian matrix singularity based pareto front identification for unconstrained multi-objective problems,* American Control Conference (ACC), Washington, D.C.

C17 S. B. Bopardikar, S.S. Nair, and R. Rai (2013), *Sequential randomized matrix factorization* American Control Conference (ACC), Washington, D.C.

C16 R. Rai (2012), *Identifying key product attributes and their importance levels from online customer reviews,* Proceedings of ASME International Design Engineering Technical Conference ASME/DETC/CIE, Chicago, IL, USA.

C15 R. Rai, $P.\ Killaru^{*}$, $R.\ Vallepalli^{*}$, and M.I. Campbell (2011), *A novel search algorithm for interactive automated conceptual design generator (ACDG),* ASME International Design Engineering Technical Conference ASME/DETC/DAC, Washington D.C., USA.

C14 $C.\ Schafaer^{\ddagger}$, $R.\ Parks^{\ddagger}$, and R. Rai (2011), *Design for emerging bottom of the pyramid markets: A product service system (PSS) based approach,* ASME International Design Engineering Technical Conference ASME/DETC/DAC, Washington D.C., USA.

C13 R. Rai, $U.\ Tekunoff^{\ddagger}$, $C.\ Schafaer^{\ddagger}$, P. Sandborn and J. Terpenny (2010), *Mitigating e-Waste: A product service system (PSS) based design approach to create obsolescence resistant products,* ASME International Design Engineering Technical Conference ASME/DETC/DAC, Montreal, Canada.

C12 M.I. Campbell, R. Rai, and T. Kurtoglu (2009), *A stochastic graph grammar algorithm for interactive search,* ASME International Design Engineering Technical Conference

ASME/DETC/DAC, San Diego, CA, USA.

C11 R. Rai, and J. Terpenny (2007), *Principles for managing product obsolescence,* 16th International Conference of Engineering Design (ICED), August 28-31, Paris, France.

C10 R. Rai, A. Sahin, and J. Terpenny (2007), *Undergraduate learning experiences through research in emerging areas of engineering design: Product platform planning and design for managing product obsolescence,* ASEE Conference, Hawaii, USA.

C9 R. Rai, and M.I. Campbell (2007), *Q2S2: Merging qualitative information in sequential DOE,* ASME International Design Engineering Technical Conference ASME/DETC/CIE, Las Vegas, NV, USA.

C8 R. Rai, and M.I. Campbell (2006), *Qualitative and quantitative sequential sampling,* ASME International Design Engineering Technical Conference ASME/DETC/CIE, Philadelphia, PA, USA.

C7 R. Rai, and M.I. Campbell (2004), *Extracting product performance by embedding sensors in SFF prototypes,* Proceeding of the Solid Freeform Fabrication Symposium, Austin, TX. Pp. 366-376.

C6 R. Rai, and M.I. Campbell (2003), *Computational design synthesis: A generalization of methods in engineering design,* In Proceedings of AAAI symposium, March 21-24, Stanford, CA, USA.

C5 R. Rai, and V. Allada (2002), *Adaptive-agent based simulation model to study diffusion of eco-innovation strategies,* ASME International Design Engineering Technical Conference ASME/DETC/CIE, Montreal, Canada.

C4 V. Allada, and R. Rai (2002), *Module based multiple product design,* Proceedings of IIE Annual Conference, Orlando, FL, USA.

C3 R. Rai, J. Liang, and V. Allada (2001), *Sustainable product development: An artifact system (AS) based Framework,* Proceedings of International Conference on Engineering Design (ICED-01), Glasgow, Scotland.

C2 R. Rai, S. Kameswaran, and M.K. Tiwari (1999), *Solving an FMS design problem using Genetic algorithm,* Proceeding of International conference on operation management for global economy (POMS), New Delhi, India.

C1 S. Kameswaran, R. Rai, and M.K. Tiwari (1999), *Solving the markovian decision problem using genetic algorithm,* Proceeding of International conference on operation management for global economy (POMS), New Delhi, India.

INVITED TALKS

- Geometric Reasoning and Hybrid Machine Learning: Applications in Manufacturing and Design, National Institute of Industrial Engineering (NITIE), Mumbai, India, January 2020.
- Driven by data or derived through physics: Hybrid physics guided machine learning approach, MIM 2019 conference invited talk, Berlin, Germany, August 2019.

- Driven by data or derived through physics: Hybrid physics guided machine learning approach, LG Research, Toronto, Canada, August 2019.
- Driven by data or derived through physics: Hybrid physics guided machine learning approach, AI Summer School, Autodesk, Toronto, Canada, August 2019.
- Driven by data or derived through physics: Hybrid physics guided machine learning approach, Naval Surface Warfare Center, Port-Hueneme, December 2018.
- Driven by data or derived through physics: Hybrid physics guided machine learning approach, Air Force Research Lab (AFRL), November 2018.
- Driven by data or derived through physics: Hybrid physics guided machine learning approach, AIAA symposium, Dallas, Texas, June 2019.
- Geometric Reasoning and Hybrid Machine Learning: Applications in Manufacturing and Design, California State University, Fresno, Fresno, California, June 2018.
- Geometric Reasoning and Hybrid Machine Learning: Applications in Manufacturing and Design, Palo Alto Research Center (PARC), Palo Alto, California, February 2018
- Invited as one of the six speakers at Mu Alpha Theta, the National High School and Two-Year College Mathematics Honor Society Convention, 2017.
- Invited as one of six emerging engineering design researcher in the USA to speak at special general session DAC Lightening Talks (ASME IDETC 2014 Conference).
- Invited as one of ten speakers to outline future of additive manufacturing education in the USA at NSF Additive Manufacturing Education Workshop, 2014.

PROJECT, THESIS, DISSERTATION, AND POSTGRADUATE SCHOLAR ADVISOR

Total number of postdoctoral scholars sponsored: 4.
Total number of graduate students supervised: 17 Ph.D and 32 MS Students.
Total number Ph.D students graduated: 8.
Total number of MS students graduated: 30.
Total number of undergraduate students supervised: 12.
Member of Project/Thesis/Dissertation Committee (Not main advisor): More than 40.

Postdoctoral scholars supervised:

- Anoop Verma *(August 2012 - January 2014)*
  Current Position: Senior Data and Applied Scientist – Microsoft
- Yunbo Zhang *(August 2013 - May 2014)*
  Current Position: Assistant Professor in Department of Mechanical Engineering at Rochester Institute of Technology (RIT)
- Ruoyu Yang *(October 2020 - Current)*
- Mohan Surya Raja Elapolu *(June 2021 - Current)*

Chair of Ph.D Dissertation Committee:

- **Doctoral–Graduated (8)**
  - Jinmiao Huang (Graduated: August 2015): Dissertation Title: "*Intuitive interface for conceptual 3D modeling.*"
    Current Position: Research Staff, LG Research
  - Arpan Mukherjee (Graduated: January 2018): Dissertation Title: "*Uncertainty propagation methods for high-dimensional complex systems.*"
    Current Position: Post Doctoral Researcher, MDI, University at Buffalo (With Dr. Krishna Rajan).
  - Binbin Zhang (Graduated: August 2018): Dissertation Title: "*Intelligent material informatics applications in design and manufacturing.*"
    Current Position: KLA-Tencor, Research Staff.
  - Prakhar Jaiswal (Graduated: January 2019) Dissertation Title: "*Novel geometric reasoning and machine learning frameworks for design and additive manufacturing.*"
    Current Position: Google Inc, Lens Group, Research Staff.
  - Jun Wang (Graduated: January 2019) Dissertation Title: "*Integrated framework for design exploration and analysis of periodic, non-periodic, and quasi-periodic cellular structures based components.*"
    Current Position: Post Doctoral Researcher, University at Maryland (with Dr. Mark Fuge).
  - Munira Mohammed Ali (Graduated: August 2019) Dissertation Title: "*Ontology-based reasoning for design and manufacturing knowledge management.*"
    Current Position: Faculty at Unversiti Malaysia Pahang, Kuantan.
  - Ruoyu Yang (Graduated: Summer 2020): Dissertation Title: "*Continuous video stream pixel sensor: Deep Learning architectures for structural health monitoring.*"
    Current Position: Post-doctoral Research with me in GRAIL Lab at CU-ICAR.
  - Zhibo Zhang (Graduated: Spring 2021): Dissertation Title: "*Physics-infused hybrid machine learning models and their applications.*"
    Current Position: KLA-Tencor, Research Staff.

- **Doctoral–Current (11)**
  - Dustin Bielecki (Expected Graduation: Summer 2022): Tentative Dissertation Title: "*KnotNetwoks: Knot inspired lattices: A computational design approach.*"
  - Darshil R. Patel (Expected Graduation: Summer 2022): Tentative Dissertation Title: "*Topology optimization based mutli-scale design approach for interpenetrating composites*"
    Note: Research Intern at PARC (Xerox), June 2018 – May 2019
  - Ryan Nyugen (Expected Graduation: Summer 2022): Tentative Dissertation Title: "*Generative adversarial networks (GANs) based regression*"
    Note: Research Intern at Naval Surface Warfare Center, June 2020 – August 2020

- Aliakbar Earnpurwala (Expected Graduation: Fall 2022): Tentative Dissertation Title: "*TBD.*"
- Shubhendu Kumar Singh (Expected Graduation: Summer 2023): Tentative Dissertation Title: "*TBD*"
- Raj Pradip Khawale (Expected Graduation: Summer 2023): Tentative Dissertation Title: "*TBD*"
- Chandan Sahu (Expected Graduation: Summer 2023): Tentative Dissertation Title: "*TBD*"
- Shengli Xu (Expected Graduation: Summer 2024): Tentative Dissertation Title: "*TBD.*"
- Vinayak Khade (Expected Graduation: Summer 2025): Tentative Dissertation Title: "*TBD.*"
- Shailendran Poyyamozhi (Expected Graduation: Summer 2025): Tentative Dissertation Title: "*TBD.*"
- Haider Alsalih (Expected Graduation: Summer 2025): Tentative Dissertation Title: "*TBD.*"

Chair of MS Thesis Committee:

- **Thesis–Graduated (16)**
  - Jun Wang (Graduated: Summer 2014, Thesis)
    Current Position: Pursued Ph.D. with me
    Thesis Title: Data-driven simulation for fast prediction of pull-up process in bottom-up stereo-lithography
  - Aditya Thakur (Graduated: Summer 2014, Thesis)
    Current Position: Engineering Manager - Systems Engineering and Advanced Technology, JCB India Limited
    Thesis Title: User Study of Hand gestures and fatigue for CAD interfaces
  - Sree Shanker Babu (Graduated: Summer 2014, Thesis)
    Current Position: Pursued Ph.D at UIUC
    Thesis Title: Sketching in 3D: A Beautifcation Scheme
  - Ting-Ju Chen (Graduated: Spring 2015, Thesis)
    Current Position: Pursuing Ph.D at Texas A&M
    Thesis Title: Sequential Sampling in Krigging Metamodels
  - Apoorv Sharma (Graduated: Summer 2015, Thesis)
    Current Position: Sr. Manufacturing Engineer at TESLA Inc.
    Thesis Title: Transfer Printing of Stretchable Electronic Circuits on Conformal Surfaces

- Gaurav Siwach (Graduated: Spring 2016, Thesis)
  Current Position: Mechanical Design II Engineer, ASML, San Diego, CA.
  Thesis Title: Additive Manufacturing of Conformal Sensors
- Ryoyu Yang (Graduated: Summer 2016, Thesis)
  Current Position: Pursued Ph.D. with me
  Thesis Title: Additive Manufacturing of Conductive Polymer Nano-composites under the Influence of External Magnetic Field
- Jayan Kumar Patel (Graduated: Summer 2017, Thesis)
  Current Position: Functional Consultant, Highradius Corporation, Houston, TX.
  Thesis Title: Build Orientation Optimization for Additive Manufacturing of Functionally Graded Materials (FGM)
- Zhibo Zhang (Graduated: Summer 2017, Thesis)
  Current Position: Pursued Ph.D. with me
  Thesis Title: FeatureNet: Machining Feature Recognition based on 3D Convolutional Neural Network
- Aditya Pramod Khadilkar (Graduated: Summer 2018, Thesis)
  Current Position: System Engineer - AI Verification, Zoox, Foster City, CA
  Thesis Title: Deep Learning Based Stress Prediction for Bottom-Up SLA 3D Printing Process
- Raj Pradip Khawale (Graduated: Summer 2019, Thesis)
  Current Position: Pursuing Ph.D. with me
  Thesis Title: Finite Element Analysis on Periodic Structures
- Shubhendu Kumar Singh (Graduated: Summer 2019, Thesis)
  Current Position: Pursuing Ph.D. with me
  Thesis Title: Hybrid Machine Learning Approach for Predictive Modeling of Complex Systems
- Chandan Kumar Sahu (Spring 2020, Thesis)
  Current Position: Pursuing Ph.D. with me
  Thesis Title: Boon of Hybrid Approaches Over The Bane of Model Based and Machine Learning Approaches in Modeling Cyber-Physical Systems.
- Crystal Young (Summer 2020, Thesis)
  Current Position: Research Engineer, Naval Surface Warfare Center (NSWC)- Indian Head.
  Thesis Title: Automated procedure reconfiguration framework for augmented reality-guided maintenance applications.
- Halong Zhang (Summer 2020, Thesis)
  Thesis Title: TCN Architecture for Computer Vision-Based Modal Frequency Detection
  Current Position: Product Marketing Trainee, Xpeng Motors, Guangdong, China.

- Dhruv Patel (Summer 2021, Thesis)
  Thesis Title: A blockchain based secure machine leanring model integration for collaborative manufacturing
  Current Position: Data Process Engineer, Radiometer, California, USA.

- **Thesis–Current (1)**
  - Haiyong Chen (Expected Graduation: Fall 2021, Thesis)

Chair of MS Project Committee:

- **Project–Graduated (15)**
  - Anil Kumar (Graduated: Fall 2008, Fresno State, Project)
    Current Position: Manufacturing Engineer at Pelco by Schneider Electric
  - Hima Jyothsna (Graduated: Fall 2008, Fresno State, Project)
    Current Position: Unknown
  - Harbir Singh (Graduated: Spring 2009, Fresno State, Project)
    Current Position: Senior Manufacturing Engineer at Pacific Laser Systems
  - Ravi Kiran Vallepali (Graduated: Spring 2010, Fresno State, Project)
    Current Position: Senior Implementation Consultant at Edifecs
  - Rohan Patil (Graduated: Spring 2011, Fresno State, Project)
    Current Position: Software Developer at Barracuda Networks
  - Ranjit Gopi (Graduated: Summer 2013, UB, Project)
    Current Position: Mechanical Design Engineer at Swanson Industries, Inc.
  - Nianteng Feng (Graduated: Summer 2014, UB, Project)
    Current Position: Accessory Equipment Design Engineer at GE Power & Water
  - Sulabh Gupta (Graduated: Summer 2014, UB, Project)
    Current Position: Mechanical Design Engineer at Schneider Packaging
  - Akshay Deshpande (Graduated: Summer 2014, UB, Project)
    Current Position: Product Design Engineer, Wastequip
  - Venkata Sai Eshwar (Graduated: Summer 2014, UB, Project)
    Current Position: Sales Operations Specialist, Dassault Systems (Solidworks)
  - Azhar Vellore (Graduated Summer 2014, UB, Project)
    Current Position: Pursuing Ph.D at UC Merced.
  - Zhongshan Shi (Graduated: Summer 2014, UB, Project)
    Current Position: Mechanical Engineer at IMA LIFE
  - Kiran Babu Koyalamudi (Graduated: Fall 2015, UB, Project)
    Current Position: Unknown
  - Junqing Deng (Graduated: Summer 2015, UB, Project)
    Current Position: Design Engineer, Greater Detroit Area

- Anna Szweda (Graduated: Fall 2017, UB, Project)
  Current Position: Energy Engineer, M/E Engineering, P.C.

Undergraduate Student Research Project Advisor:

- Carson Schaffer (BS, Summer 2009)
- Richard Parks (BS, Summer 2010)
- Richard Veihdeffer III (BS, Summer 2013)
- Josh Ulrich (BS, Summer 2013)
- Brian Klossner (BS, Summer 2015)
- Haidi Wang (BS, Summer 2015)
- Lester Li (BS, Fall 2017)
- Yuri Ghrimyan (BS, Fall 2017)
- Ansh Shukla (BS, Summer 2017)
- Andrew Alegria (BS, Summer 2018)
- Maxwell Kolarich (BS, Summer 2020)
- Liam O Brian (BS, Summer 2020)

Member of Project/Thesis/Dissertation Committee (Selected among more than 35):

- Ph.D.
- Xiaobo Zhou (Ph.D., Fall 2014)
- Javad Sovizi (Ph.D., Summer 2016)
- Ardeshir Raihanian (Ph.D., Summer 2018)
- Hamid Khakpour Nejadkha (Ph.D., Spring 2019)
- Mriganka Roy (Ph.D., Summer 2020)
- Amir Behjat (Ph.D., Fall 2020)
- MS
- Yuvraj Ratan Naikavade (MS, Summer 2013)
- Dipen Dave (MS Summer 2013)
- Sudhanshu Rathod (MS, Summer 2013)
- Aditya Reddy Ashammagari (MS, Summer 2013)
- Vaibhav Sharma (MS, Fall 2014)
- Rohit Bhat (MS, Summer 2014)
- Arshad Vaqas (MS, Summer 2015)
- Philip Odonkor (MS, Summer 2015)
- Shrey Pareek (MS, Summer 2015)

- Malav Kapadia (MS, Summer 2015)
- Mustafa Celebi (MS, Summer 2015)
- Sahil Kamdar (MS, Summer 2015)
- Yang Yu (MS, Summer 2016)
- Benjamin Renuato (MS, Summer 2016)
- Felipe Meneguzzo Pasquali (MS, Summer 2016)
- Sanchit Kumar Gupta (MS, Summer 2017)
- Chenrui Guo (MS, Summer 2017)
- Steve Paul (MS, Summer 2017)
- Kaige Zhu (MS, Summer 2017)

TEACHING

Coursera

$Number\ of\ Students\ \ in\ online\ course\ on\ Coursera\ Platform\ (\#)$

- Intelligent Machining *(# 21,104 till 10th May, 2021)*
- Advanced Manufacturing Process Analysis *(# 17,266, till 10th May, 2021)*

At Clemson University

$Number\ of\ Students\ \ in\ Class\ (\#)$

- AuE 8930 Deep Learning: Applications in Engineering *(Graduate, Spring 2021–(# 21))*

At University at Buffalo

$Number\ of\ Students\ \ in\ Class\ (\#)$

- MAE 600 Deep Learning: Applications in MAE *(Graduate, Fall 2019–(# 15))*
- MAE 600 Solid Modeling, Group Morphology, and Planning: Manufacturing Applications *(Graduate, Spring 2016–(# 6))*
- MAE 550 Optimization in Engineering Design *(Graduate, Fall 2014–(# 51), Fall 2015–(# 44) , Fall 2016–(# 32), Fall 2017–(# 36))*
- MAE 600 Machine Learning in Computational Shape Synthesis *(Graduate, Fall 2013–(# 8))*
- MAE 451 Design Process and Methods *(Undergraduate, Fall 2015–(# 252), Fall 2016–(# 202), Fall 2017–(# 162), Fall 2019–(# 196))*
- MAE 376 Applied Mathematics for MAE *(Undergraduate, Fall 2013–(# 69))*
- MAE 477/577 Computer Aided Design and Manufacturing Applications *(Undergraduate/Graduate, Spring 2013–(# 51), Spring 2014–(# 67))*

At California State University, Fresno (Fresno State)

- Advanced Engineering Mathematics *(Graduate, Fall 2007–(# 34))*
- Material Science Lab *(Undergraduate, Fall 2007–(# 15), Fall 2009–(# 17))*
- Engineering Product Design *(Undergraduate, Fall 2007–(# 38), Fall 2008–(# 42), Fall 2009–(# 41), Fall 2010–(# 42))*
- Design of Machine Elements *(Undergraduate, Fall 2007–(# 36), Fall 2008–(# 40))*
- Theory of Machines and Mechanisms *(Undergraduate, Spring 2008–(# 36), Spring 2009–(# 38), Spring 2010–(# 35))*
- Machine Design *(Undergraduate, Spring 2008 –(# 17), Spring 2009–(# 15), Spring 2010–(# 18))*
- Engineering Graphics *(Undergraduate, Spring 2009 –(# 28), Fall 2009 –(# 28), Spring 2010 –(# 28), Fall 2012–(# 28))*

SERVICE

UNIVERSITY LEVEL

- Executive Committee (EC) Member of Digital Manufacturing and Design Innovation Institute (DMDII) (University at Buffalo, Tier 1 Member, August 2016 - May 2018).
- Technical Advisory Committee (TAC) Member of Digital Manufacturing and Design Innovation Institute (DMDII) (University at Buffalo, Tier 1 Member, August 2016 - May 2018).
- Organization Committee Member: New Horizons in Digital and Additive Manufacturing Conference, University at Buffalo (March 16-17, 2015).
- Network of Excellence in Materials and Advanced Manufacturing Committee Member: Focus Area - Digital and Additive Manufacturing, University at Buffalo (August 2014-August 2020).

SCHOOL LEVEL

- School of Engineering and Applied Science - Shared Instrumentation Laboratories Committee, University at Buffalo (May 2014-August 2020).
- Digital Additive Manufacturing Center (University at Buffalo), Founding Faculty Member (August 2014 - May 2015).

DEPARTMENTAL LEVEL

- Tenure and Promotion Committee Representative for the Mechanical and Aerospace Engineering Department (University at Buffalo, 2017-2020).

- Strategic Planning Committee (SPC), Design Area Representative, Mechanical and Aerospace Engineering Department, University at Buffalo, (Fall 2014-Summer 2018).
- Served as the Chair of the Mechanical and Aerospace Engineering Design Faculty Search Committee, University at Buffalo, (Spring 2017).
- Served on the Mechanical and Aerospace Engineering Design Faculty Search Committees, University at Buffalo (Spring 2013, Spring 2014, Spring 2015, Spring 2016, Spring 2018, Spring 2020).
- Mechanical and Aerospace Engineering ABET Undergraduate Lab Committee, University at Buffalo (Fall 2012-Spring 2013).

PROFESSIONAL SERVICE, REVIEW, AND RELATED ACTIVITIES

Journal Associate Editor:

- International Journal of Production Research (April 2019- current)
- ASME Journal of Computing and Information Science in Engineering (March 2017- current)

Special Issue Guest Editor:

- International Journal of Production Research (May 2020): Machine Learning in Manufacturing and Industry 4.0 Applications
- ASME Journal of Computing and Information Science in Engineering (June 2019): Machine Learning Applications in Manufacturing

Journal Reviewer (Number of Journal Paper Reviewed - More than 100):

- ASME Journal of Mechanical Design
- Journal of Computer Aided Design (CAD)
- Research in Engineering Design
- Artificial Intelligence in Engineering Design (AIEADM)
- ASME Journal of Computing and Information Science in Engineering
- IIE Transactions
- International Journal of Production Research
- Mechanical Systems and Signal Processing
- International Journal of Advanced Manufacturing Technology

Conference Organization Committee:

- Local Chair for ASME-IDETC 2014 Conference: Responsible for co-ordination of multiple activities such conference venue space coordination, Advanced manufacturing and design impact forum organization, University at Buffalo welcome reception organization, and Niagara Falls conference reception organization.

- Chair, Computer-Aided Product and Process Development (CAPPD) Technical Committee, ASME-IDETC-CIE 2016 Conference: Responsible for co-ordinating reviews of multiple CIE CAPPD sessions. Additionally, as a chair I am responsible for coordination with other technical committees of CIE.
- Co-Chair, Computer-Aided Product and Process Development (CAPPD) Technical Committee, ASME-IDETC-CIE 2015 Conference: Responsible for co-ordinating reviews of multiple CIE CAPPD sessions.
- Secretary, Computer-Aided Product and Process Development (CAPPD) Technical Committee, ASME-IDETC-CIE 2014 Conference: Responsible for co-ordinating CIE poster session and student awards.

Conference Reviewer (2007-present: Number of Conference Paper Reviewed - Over 100):

- ASME-International Design Engineering Technical Conference-Design Automation Conference (DAC),
- ASME-International Design Engineering Technical Conference-Design Theory and Methodology Conference (DTM)
- ASME-International Design Engineering Technical Conference-Design for Manufacturing and Life Cycle Conference (DFMLC)
- ASME-International Design Engineering Technical Conference- Computers and Information in Engineering Conference (CIE)
- International Conference on Engineering Design (ICED)
- Solid Freeform Fabrication Symposium
- ASME IMECE

Conference Session Organizer and Chair Duties (2007-present):

- ASME-International Design Engineering Technical Conference-Design Automation Conference (DAC),
- ASME-International Design Engineering Technical Conference-Design Theory and Methodology Conference (DTM)
- ASME-International Design Engineering Technical Conference-Design for Manufacturing and Life Cycle Conference (DFMLC)
- ASME-International Design Engineering Technical Conference- Computers and Information in Engineering Conference (CIE)
- International Conference on Engineering Design (ICED)
- Solid Freeform Fabrication Symposium
- ASME IMECE

Reviews For Funding Agencies:

- NSF CMMI 2010 (1 Panel)
- NSF CMMI 2012 (1 Panel)
- NSF CMMI 2013 (2 Panels)
- NSF CMMI 2014 (2 Panels)
- NSF CMMI 2015 (1 Panel)
- DMDII 2015 (2 Panels)
- NSF CMMI 2017 (1 Panel)
- ERC, Europe 2017 (1 Panel)
- NSF CMMI 2018 (2 Panels)
- NSERC, Canada 2018 (1 Panel)
- NSF CMMI 2019 (1 Panel)
- NSF CISE 2020 (1 Panel)