Curriculum Vitae

Prahalada Rao

Associate Professor
Grado Department of Industrial and Systems Engineering
Virginia Polytechnic Institute and State University (Virginia Tech)
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Lab Website: https://lamps.ise.vt.edu
Google Scholar: Prahalada Rao - Google Scholar

Summary of Accomplishments Updated: 03/18/2024

Research Accomplishments	
Funding Record	
Federal Funding	• $3,567,691 (Total my share); • $2,200,800 (my share after tenure, 09/2020 to present) • $1,366,891 (my share before tenure, 08/2014 to 08/2020) National Science Foundation (NSF), Department of Energy (DoE), National Institute of Standards and Technology (NIST), and Department of Defense (DoD).
Industry	$58,000 (Nebraska), $5,000 (Virginia Tech)
Internal	$10,000 (Nebraska), $35,000 (Virginia Tech)
Publications	74 peer-reviewed journal papers published, including 2 best paper awards. 4 papers currently under review. 27 peer-reviewed conference proceedings published. Citations: 3502, h-index: 35, i10-index: 64
Students Graduated	6 Ph.D. students graduated; 5 ongoing Ph.D. students 4 MS students graduated
Notable Awards and Recognition	Society of Manufacturing Engineers (SME) - Yoram Koren Outstanding Young Manufacturing Engineer Award (2017) SME Outstanding Reviewer Award (2018) NSF Career Award (2018) University of Nebraska-Lincoln - College of Engineering Research and Creative Activity Award (2019).

Teaching and Pedagogy	
Courses Taught	ISE 5204 – Manufacturing Systems Engineering ISE 3204 – Manufacturing Processes ISE 3214 – Facilities and Logistics MECH 321 – Statistics and Data Analytics (required undergraduate course) MECH 422 – Industrial Quality Control MECH 472/872 – Additive Manufacturing (AM) MECH 499/899 – Metallurgy and Processing Science of Additive Manufacturing. MECH 492/892 – Data-driven Engineering
Instructor rating	At Virginia Tech 5.2 on 6; at University of Nebraska 4.3 on 5.
Teaching Grants	$268, 000
Undergraduates Advised	7 REU supported with 2 continuing for Ph.D.

Table of Contents

Section 1 Education and Employment History

Section 1.1 Education History

Doctor of Philosophy
Industrial Engineering and Management
Oklahoma State University
Stillwater, Oklahoma, United States
December 2008 – August 2013.

Master of Science
Industrial Engineering and Management
Oklahoma State University
Stillwater, Oklahoma, United States
August 2003 – August 2006.

Bachelor of Engineering
Production Engineering (First Class)
Victoria Jubilee Technical Institute (VJTI)
Bombay University, India.
August 1999 – May 2003.

Section 1.2 Employment History

Virginia Polytechnic Institute and State University (Virginia Tech).
Grado Department of Industrial and Systems Engineering
Associate Professor (with Tenure), August 2022 – Present

University of Nebraska-Lincoln (UNL).
Mechanical and Materials Engineering
Associate Professor (with Tenure), August 2020 – August 2022
Assistant Professor (Tenure-track), August 2016 – August 2020.

Binghamton University (State University of New York).
Systems Science and Industrial Engineering
Assistant Professor (Tenure-track), August 2014 – August 2016.

Virginia Polytechnic Institute and State University (Virginia Tech).
Grado Department of Industrial and Systems Engineering
Post-Doctoral Research Associate
August 2013 – August 2014.

Section 2 Research Funding

Section 2.1 Externally Funded Research Grants

External research grant funding received to date

(08/17/2014 - present)

- $3,567,691 (My Share)
- $7,351,286 (Total of all grants participated as PI or Co-PI)

External grant funding received <u>after</u> tenure and promotion to associate professor

(08/31/2020 - present)

- $2,200,800 (My share)
- $5,509,153 (Total of all grants participated as PI or Co-PI)

External grant funding received <u>before</u> tenure and promotion to associate professor

(08/17/2014 - 08/30/2020)

- $1,366,891 (My Share)
- $1,842,133 (Total of all grants participated as PI and Co-PI)

Summary of grant funding obtained *after* tenure and promotion to associate professor 08/31/2020

Project Title	Sponsor	Role (PI or Co-PI)	Dates	Total Amount	Percentage Attributed to me	Location obtained, and other remarks
Preventing, Detecting, and Correcting flaws in laser powder bed fusion by combining thermal simulations with in-situ meltpool sensor data	National Institute of Standards and Technology	PI	05/01/2023 04/30/2025	$956,146	100%	Obtained at Virginia Tech
FAIM: Future Additive Interdisciplinary Manufacturing	Office of Naval Research	Co-PI	01/01/2024 12/31/2024	$3,498,062	15%	Obtained at Virginia Tech, PI Chris Williams
Modeling and Process Planning Tool for Hybrid Metal Additive/Subtractive Manufacturing to Control Residual Stress and Reduce Distortion	NAVAIR via PINE, Inc.	PI	01/09/2024 01/01/2025	$74,998	100%	Obtained at Virginia Tech
PFI TT: PFI-TT: Ultrafast Thermal Simulation of Metal Additive Manufacturing	National Science Foundation	PI	06/15/2021 06/14/2023	$250,000	100%	Obtained at UNL, transferred to Virginia Tech
STTR: Intelligent Additive Manufacturing - Metals. Phase 1	Office of Naval Research	PI	06/08/2020 12/08/2020	$9,996	100%	Obtained at UNL
Understanding the thermal physics and metallurgy of big area additive manufacturing.	Department of Energy	PI	09/01/2020 08/31/2023	$670,000	50%	Obtained at UNL, grant was left behind at UNL, as this is EPSCoR region restricted.
AI Institute: Planning: AI-enabled Secure and Responsive Smart Manufacturing	National Science Foundation	PI	09/01/2020 08/31/2021	$49,951	100%	Obtained at UNL
External Funding	$2,200,800 (My share after tenure and promotion to associate professor) $5,509,153 (Total of all grants participated as PI and Co-PI after tenure and promotion to full professor)					

Summary of grant funding obtained *before* tenure and promotion to associate professor

Project Title	Sponsor	Role (PI or Co-PI)	Dates	Total Amount	Percentage Attributed to me	Location obtained, and other remarks
RII Track-4: Understanding the Fundamental Thermal Physics in Metal Additive Manufacturing and its Influence on Part Microstructure and Distortion.	National Science Foundation	PI	02/01/2020 to 01/31/2022	$148,629	100%	Obtained at UNL
MRI: Acquisition of an X-Ray Computed Tomography System at the University of Nebraska-Lincoln for Advancing Multidisciplinary Research and Education in the Great Plains Region.	National Science Foundation	Co-PI	09/01/2018 to 08/31/2020	$562,803	20%	Obtained at UNL. I was the main writer, and initiator for this award. A senior professor was added as PI to strengthened the team.
A Novel DLP 3D Printer Optimized for Ceramics and Metals	Tethon3D, Omaha, Nebraska Nebraska Department of Economic Development	Co-PI	08/01/2018 to 01/31/2020	$50,000	50%	Obtained at UNL. PI Bai Cui, UNL.
CAREER: Smart Additive Manufacturing - Fundamental Research in Sensing, Data Science, and Modeling Toward Zero Part Defects	National Science Foundation	PI	04/01/2018 to 09/30/2023	$508,000	100%	Obtained at UNL.
Supplement: NSF INTERN: CAREER: Smart Additive Manufacturing -	National Science Foundation	PI	10/01/2019 to 04/01/2020	$35,895	100%	Obtained at UNL.

Project Title	Sponsor	Role (PI or Co-PI)	Dates	Total Amount	Percentage Attributed to me	Location obtained, and other remarks
Fundamental Research in Sensing, Data Science, and Modeling toward Zero part defects.						
Supplement: NSF INTERN: CAREER: Smart Additive Manufacturing - Fundamental Research in Sensing, Data Science, and Modeling toward Zero part defects.	National Science Foundation	PI	09/01/2019 to 03/01/2020	$35,836	100%	Obtained at UNL.
Big Data Analytics Supplement to NSF CAREER	National Science Foundation	PI	04/01/2020 to 03/31/2021	$70,000	100%	Obtained at UNL.
CPS: Medium: Cyber-Enabled Online Quality Assurance for Scalable Additive Bio-Manufacturing	National Science Foundation	PI	09/01/2017 to 08/31/2021	$208,000	100%	Obtained at UNL.
Biosensor Data Fusion for Real-Time Monitoring of Global Neurophysiological Function	National Science Foundation	PI	04/27/2016 to 08/31/2019	$222,970	100%	Obtained at Binghamton University.
External Funding	$1,366,891 (My Share, before tenure and promotion to associate professor) $1,842,133 (Total, before tenure and promotion to associate professor)					

Section 2.2 Internally Funded Research Grants.

Summary Table of Internal Funded Projects.

Project Title	*Sponsor*	*Role*	*Dates*	*Total Amount*	*Percentage Attributable to me*
Commonwealth Center for Advanced Manufacturing Innovation Grant	Virginia Tech (Dean's Office)	PI	08/01/2023 to 07/17/2024	~$35,000 (Tuition and Stipend for one GRA)	100%
Magnetic Abrasive Finishing (MAF) of Metal 3D Printed Parts	Layman Seed fund, University of Nebraska-Lincoln	PI	05/01/2017 to 04/30/2019	$10,000	100%

Section 2.3 (Non-Research) Funding Record

Project Title	*Sponsor*	*Role*	*Dates*	*Total Amount*	*Percentage Attributable to me*
Advanced Manufacturing Summer Institute (Continuing Grant, Funding Renewed)	Department of Energy	*PI*	01/01/2019 to 12/31/2019	$137,573	*50%*
Advanced Manufacturing Summer Institute	Department of Energy	*PI*	03/01/2018 - 08/31/2018	$118,000	*50%*
Funding for Teaching Activities				$127, 786 (my share) Co-PI: Dr. Jeff Shield $255, 573 (total)	

Section 3 Scholarship

Link to Google Scholar
H-index 36; i10-index 67

The following subscripts indicate students under my supervision.
1: Undergraduate student 2: Master's student 3: Ph.D. student 4: Postdoctoral researcher

Section 3.1 Peer reviewed journal publications

Total: 74

1. Kaustubh Deshmukh[3], Alex Riensche[3], Ben Bevans[3], Ryan J. Lane, Kyle Snyder, Harold (Scott) Halliday, Christopher B. Williams, Reza Mirzaeifar, Prahalada Rao

   Effect of processing parameters and thermal history on microstructure evolution and mechanical properties in laser powder bed fusion of SS316L
   Materials and Design, In-Process, July 2024.
   doi: 10.1016/j.matdes.2024.113136

   Collaboration with Commonwealth Center for Advanced Manufacturing (CCAM).

2. N.Liu, X. Li, M. Rajanna, E. Reutzel, B. Sawyer, **P. Rao**, J. Lua, N. Phan and Y.Yu

   Deep Neural Operator Enabled Digital Twin Modeling for Additive Manufacturing

   Advances in Computational Science and Engineering, In-Press, July 2024

   Collaboration with GEM Inc., Penn State ARL, Lehigh University
   doi: 10.3934/acse.2024010

3. N. Piercy[3], A. Vishnu, J. Kulkarni, S. Simhabatla, K. Cole, **P. Rao**

   Rapid Thermal Modeling of Wire Arc Additive Manufacturing Process using a Mesh-free Spectral Graph Theory Approach

   International Journal of Advanced Manufacturing Technology, July 2024
   doi: 10.1007/s00170-024-13994-x

   Collaboration with Indian Institute of Technology (Hyderabad) and University of Nebraska-Lincoln.

4. A.R. Riensche[3], B.D. Bevans[3], G. King[2], A. Krishnan, K.D. Cole, **P. Rao**

   Predicting meltpool depth and primary dendritic arm spacing in laser powder bed fusion additive manufacturing using physics-based machine learning.

   Materials & Design, 237, p.112540., January 1, 2024.
   doi: 10.1016/j.matdes.2023.112540

   Collaboration with Edison Welding Institute

5. J. Seo, **P. Rao**, B. Raeymaekers

   Generating synthetic as-built additive manufacturing surface topography using progressive growing generative adversarial networks.

   Friction (special issue on computational tribology), September 2023.
   doi: 10.1007/s40544-023-0826-7

6. B. Bevans[3], C. Barrett, T. Spears, A. Gaikwad[3], A. Riensche[3], Z. Smoqi[3], H. Halliday, **P. Rao**

   Heterogeneous Sensing and Shape Agnostic Flaw Detection in Laser Powder Bed Fusion Additive Manufacturing

   Virtual and Physical Prototyping, Volume 18, Issue 1, April 2023.
   doi: /10.1080/17452759.2023.2196266
   Collaboration with Open Additive and Navajo Technical University.

7. S. Gerdes[3], A. Gaikwad[3], S. Ramesh, I.V. Rivero, A. Tamayol, **P. Rao**,

   Monitoring and Control of Biological Additive Manufacturing Using Machine Learning,

   Journal of Intelligent Manufacturing, March 2023.
   doi: 10.1007/s10845-023-02092-6

   Collaboration with Rivero group RIT, and Tamayol group UConn Health Center.

8. B. D. Bevans[3], A. Ramalho, Z. Smoqi[3], A. Gaikwad[3], T. G. Santos, **P. Rao**, J. P. Oliveira

   Monitoring and Flaw Detection during Wire-based Directed Energy Deposition using In-situ Acoustic Sensing and Wavelet Graph Signal Analysis,

   Materials and Design, Volume 225, January 2023, 111480
   doi:10.1016/j.matdes.2022.111480

   Collaboration with J.P. Oliveira Group, NOVA University, Lisbon, Portugal.

9. A. Riensche[3], P. Carriere, Z. Smoqi[3], A. Menendez, P. Frigola, S. Kutsaev, A. Araujo, N.G. Matavalam, **P. Rao**

   Application of Hybrid Laser Powder Bed Fusion Additive Manufacturing to Microwave Radio Frequency Quarter Wave Cavity Resonators,

   Journal of Advanced Manufacturing Technology, 124, pp.619–632, January 2023.
   doi:10.1007/s00170-022-10547-y

   Collaboration with RadiaBeam Technologies, Santa Monica, CA.

10. A. Riensche[3], B. Bevans[3], Z. Smoqi[3], R. Yavari[3], A. Krishnan, J. Gilligan, N. Piercy[3], K. Cole, **P. Rao,**

    Feedforward Control of Thermal History in Laser Powder Bed Fusion: Toward Physics-based Optimization of Processing Parameters

    Materials and Design, Volume 224, December 2022, 111351.
    doi:10.1016/j.matdes.2022.111351

    Collaboration with Edison Welding Institute, Columbus, Ohio.

11. Z. Smoqi[3], L. D. Sotelo, A. Gaikwad[3], J.A. Turner, **P. Rao**,

    Nondestructive Ultrasound Evaluation of Additively Manufactured Wear Coatings
    NDE&T International, Vol. 133, January 2023, 102754.
    doi:10.1016/j.ndteint.2022.102754

12. S. Ramesh, C. Mahajan, S. Gerdes[3], A. Gaikwad[3], **P. Rao**, D.R. Cormier, I.V. Rivero,

    Numerical and Experimental Investigation of Aerosol Jet Printing

    Additive Manufacturing, Volume 59, Part A, November 2022, 103090.
    doi:10.1016/j.addma.2022.103090

    Collaboration with Iris Rivero Group, Rochester Institute of Technology (RIT).

13. A. Riensche[3], J. Severson[2], R. Yavari[3], N. Piercy[3], K. Cole, **P. Rao**

    Thermal Modeling of Directed Energy Deposition Additive Manufacturing using Graph Theory

    Rapid Prototyping Journal (In-Press), July 2022.
    doi: 10.1108/RPJ-07-2021-0184

14. H. Kobir[2], B. Bevans[3], R. Yavari[3], L. Castro[3], A. Riensche[3], K. Cole, **P. Rao**

    Thermomechanical Modeling in Additive Manufacturing using Graph Theory – Prediction of Recoater Crash

    Progress in Additive Manufacturing, July 2022.
    Special Issue on Design and Modelling in Additive Manufacturing
    doi:10.1007/s40964-022-00331-5

15. A. Gaikwad[3], R. J. Williams, H. de Winton, B. D. Bevans[3], Z. Smoqi[3], **P. Rao**, P. A. Hooper

    Multi-Phenomena Data Fusion for Enhanced Process Monitoring in Laser Powder Bed Fusion

    Materials and Design, Volume 221, September 2022, 110919.
    Special Issue: In-line metrology, design optimization and material development in AM.
    doi: 10.1016/j.matdes.2022.110919
    Collaboration with Imperial College, London

16. A. Gaikwad[3], T. Chang, B. Giera, N. Watkins, S. Mukherjee, A. Pascall, D. Stobbe, **P. Rao**

    In-process Monitoring of Droplet-on-Demand Liquid Metal Jetting Additive Manufacturing using Machine Learning,

    Journal of Intelligent Manufacturing, Vol. 33, pp. 2093-2117, June 2022.
    doi: 10.1007/s10845-022-01977-2
    Collaboration with Lawrence Livermore National Laboratory.

17. Z. Smoqi[3], A. Gaikwad[3], B. Bevans[3], M.H. Kobir[2], J. Craig, A-A. Haj, A. Peralta, **P. Rao**

    Invited Article: *Prediction of Porosity in Laser Powder Bed Fusion using Physics-informed Meltpool Signatures and Machine Learning*

    Journal of Materials Processing Technology, Volume 304, June 2022, pp. 117550. Special Issue Additive Manufacturing – Process Qualification doi: 10.1016/j.jmatprotec.2022.117550
    Collaboration with Stratonics, Inc., and Honeywell, Inc.

18. Z. Smoqi[3], B. D. Bevans[3], A. Gaikwad[3], J. Craig, A. A-A Haj, B. Roeder, B. Macy, J. E. Shield, **P. Rao**

    Closed-loop Control of Meltpool Temperature in Directed Energy Deposition Additive Manufacturing Using a Co-axial Two-wavelength Pyrometer,

    Materials and Design, Volume 215, March 2022, 110508s
    doi: 10.1016/j.matdes.2022.110508
    Collaboration with Stratonics, Inc.

19. A. Ramalho, T.G. Santos, B.D. Bevans[3], Z. Smoqi[3], **P. Rao**, J.P. Oliveira,

    Effect of contaminations on the acoustic emissions during wire and arc additive manufacturing of 316L stainless steel,

    Additive Manufacturing, Volume 51, 2022
    doi: 1016/j.addma.2021.102585.
    Collaboration with NOVA University, Lisbon, Portugal.

20. S. Ramesh, O. Harrysson, **P. Rao**, A. Tamayol, D. R. Cormier, Y. Zhang, I. V. Rivero
    Extrusion bioprinting: Recent progress, challenges, and future opportunities

    Bioprinting, Volume 21, 2021
    doi: 1016/j.bprint.2020.e00116.
    Collaboration with North Carolina State, Rochester Institute of Technology, and Connecticut.

21. S. Gerdes[3], S. Ramesh, Azadeh Mostafavi, A. Tamayol, I. V. Rivero, **P. Rao**

    Extrusion-based 3D (Bio)Printed Tissue Engineering Scaffolds: Process–Structure–Quality Relationships

    ACS Biomaterials, Science and Engineering, 2021, 7, 10, 4694–4717
    doi: 10.1021/acsbiomaterials.1c00598
    Collaboration with, Rochester Institute of Technology and University of Connecticut.

22. K. D. Cole, A. Riensche[3], **P. Rao,**

    Discrete Green's functions and spectral graph theory for computationally efficient thermal modeling

    International Journal of Heat and Mass Transfer, Volume 183, Part B, February 2022, 122112.
    doi: /10.1016/j.ijheatmasstransfer.2021.122112

23. R. Yavari[3], A. Riensche[3], E. Tekerek, L. Jacquemetton, H. Halliday, M. Vandever, A. Tenequer, V. Perumal, A. Kontsos, Z. Smoqi[3], K. Cole, **P. Rao**,

    Digitally twinned additive manufacturing: Detecting flaws in laser powder bed fusion by combining thermal simulations with in-situ meltpool sensor data

    Materials & Design, Volume 211, 2021, 110167.
    Special Issue: In-line metrology, design optimization and material development in additive manufacturing, pp :109229
    doi: 10.1016/j.matdes.2021.110167.
    Collaboration with Sigma Additive, Drexel University, & Navajo Technical University
    Article highlighted in the press: https://3dprintingindustry.com/news/realtime-in-situ-meltpool-analysis-and-digital-twin-method-used-to-prevent-metal-3d-printing-flaws-197802/

24. R. Yavari[3], Z. Smoqi[3], A. Riensche[3], B. Bevans[3], H. Kobir[2], H. Mendoza, H. Song, K. Cole, **P. Rao**

Part-Scale Thermal Simulation of Laser Powder Bed Fusion Using Graph Theory: Effect of Thermal History on Porosity, Microstructure Evolution, and Recoater Crash.

Materials & Design, Volume 204, 2021, 109685
Special Issue: In-line metrology, design optimization and material development in additive manufacturing, pp :109229
doi: 10.1016/j.matdes.2021.109685.
Collaboration with Edison Welding Institute

25. R. Yavari[3], R. Williams, A. Riensche[3], P. A. Hooper, K. D. Cole, L. Jacquemetton, H. Halliday, **P. Rao**

Thermal Modeling in Metal Additive Manufacturing using Graph Theory – Application to Laser Powder Bed Fusion of a Large Volume Impeller.

Additive Manufacturing, Volume 41, 2021,
doi:10.1016/j.addma.2021.101956

Collaboration with Imperial College London, Sigma Labs, Inc, and Navajo Technical University.

26. R. Salary[3], J. Lombardi, D. Weerawarne, **P. Rao**, and M. Poliks

A Computational Fluid Dynamics (CFD) Investigation of Pneumatic Atomization, Aerosol Transport and Deposition in Aerosol Jet Printing (AJP) Process.

Journal of Micro- and Nanomanufacturing, Volume 9, Issue 1: 010903 (16 pages)
doi: 10.1115/1.4049958
Collaboration with Binghamton University and Marshall University

27. R. Chen, **P. Rao**, Y. Liu, E. Reutzel, H. Yang.
Recurrence Network Analysis of Design-quality Interactions in Additive Manufacturing
Additive Manufacturing, January 2021
doi: 10.1016/j.addma.2021.101861
Collaboration with Penn State and NIST.

28. Z. Smoqi[3], J. Toddy, H. Halliday, J. E. Shield, and **P. Rao**.

Process-Structure Relationship in the Directed Energy Deposition of Cobalt-Chromium Alloy Coatings.

Materials and Design, Volume 197, January 2021.
Special Issue: In-line metrology, design optimization and material development in additive manufacturing, pp :109229.
doi: 10.1016/j.matdes.2020.109229
Collaboration with Navajo Technological University

29. H. Yang, **P. Rao**, T. Simpson, Y. Lu, P. Witherell, A. R. Nassar, E. Reutzel, and S. Kumara

Six-sigma Quality Management of Additive Manufacturing.

Proceedings of the IEEE Volume: 109, Issue: 4, April 2021
doi: 10.1109/JPROC.2020.3034519
Collaboration with NIST and Penn State

30. J. Liu, J. Zheng, **P. Rao**, and Z. Kong.
Machine learning–driven in situ process monitoring with vibration frequency spectra for chemical mechanical planarization.
International Journal Advanced Manufacturing Technology, 111, 1873–1888 (2020).
doi:/10.1007/s00170-020-06165-1
Collaboration with Auburn University and Virginia Tech.

31. A. C. Gaikwad[3], B. Giera, G.M. Guss, J-B Forien, M. J. Matthews, and **P. Rao**.
Heterogeneous Sensing and Scientific Machine Learning for Quality Assurance in Laser Powder Bed Fusion – A Single-track Study.
Additive Manufacturing, December 2020, Volume 36, pp. 101659
doi:/10.1016/j.addma.2020.101659
Collaboration with Lawrence Livermore National Laboratory

32. R. Yavari[3], R.J. Williams, K. Cole, P. Hooper, and **P. Rao**.
Thermal Modeling in Metal Additive Manufacturing using Graph Theory: Experimental Validation with In-situ Infrared Thermography Data from Laser Powder Bed Fusion.
ASME Transactions, Journal of Manufacturing Science and Engineering,
142(12): 121005, 2020.
doi: 10.1115/1.4047619.
Collaboration with Imperial College, London

33. J. Williams[3], **P. Rao**, A. Samal, M. Johnson.
Paired Trial Classification: A Novel Deep Learning Technique for MVPA.
Frontiers of Neuroscience, Volume 14, Issue 47, April 2020.
doi: 10.3389/fnins.2020.00417
Collaboration with Center for Brain, Biology, and Behavior – UNL.

34. R. Salary, J.P. Lombardi, D. L. Weerawane, M.S. Tootooni[3], **P. Rao**, M. Poliks.
A Sparse Representation-based Classification (SRC) Approach for Near Real-time Functional Monitoring of Aerosol Jet-Printed Electronic Devices.
ASME Transactions, Journal of Manufacturing Science and Engineering
142(8): 081007, 2020.
doi:/10.1115/1.4047045
Collaboration with Binghamton University and Marshall University.

35. K. Cole, R. Yavari[3], and **P. Rao**.
Computational heat transfer with spectral graph theory: Quantitative verification, International Journal of Thermal Sciences. Volume 153, July 2020.
doi: 10.1016/j.ijthermalsci.2020.106383

36. S. Gerdes[3], A. Mostafavi, S. Ramesh, A. Memic, I. Rivero, **P. Rao**, and A. Tamayol.
Process-Structure-Quality Relationships of 3D Printed PCL-Hydroxyapatite Scaffolds,
Tissue Engineering (Part A).
Volume: 26 Issue 5-6: March 17, 2020
doi: 10.1089/ten.TEA.2019.0237
Collaboration with Rochester Institute of Technology and UConn Medical School.

37. A.C. Gaikwad[3], R. Yavari[3], M. Montazeri[3], K. Cole, L. Bian, and **P. Rao**.
Toward the Digital Twin in Metal Additive Manufacturing – Integrating Thermal Simulations, Sensing, and Analytics to Detect Process Faults.
IISE Transactions, Volume 52, Issue 11, pp. 1204-1217
doi: 10.1080/24725854.2019.1701753
Article highlighted in the Oct. 2020 Issue of the Industrial Engineer Magazine.
Collaboration with Mississippi State.

38. A.C. Gaikwad[3], F. Imani, H. Yang, E. Reutzel, and, **P. Rao**.
Prediction of Thin Wall Build Quality in Laser Powder Bed Fusion using Deep Learning of In-Situ Images, ASTM Journal of Smart and Sustainable Manufacturing Systems
3 (1), pp. 98-121, 2019.
doi:10.1520/SSMS20190027
Collaboration with Penn State Applied Research Laboratory.

39. M. Montazeri[3], A. Nassar. C. Stutzman, **P. Rao**.
Heterogeneous Sensor-based Condition Monitoring in Directed Energy Deposition,
Additive Manufacturing, Volume 30, December 2019, 100916.
doi.org/10.1016/j.addma.2019.100916
Collaboration with Penn State Applied Research Laboratory by Dr. Nassar.

40. M. Amini, S.I. Chang, and **P. Rao**.
A Cybermanufacturing and Artificial Intelligence Framework for Laser Powder Bed Fusion (LPBF) Additive Manufacturing Process.
Manufacturing Letters, 21, pp. 41-44, 2019.
doi:10.1016/j.mfglet.2019.08.007
Collaboration with Kansas State University

41. M. Roy, R. Yavari[3], C. Zhou, O. Wodo, and **P. Rao**.
Prediction and Experimental Validation of Part Thermal History in Fused Filament Fabrication Additive Manufacturing Process.
ASME Transactions, Journal of Manufacturing Science and Engineering
141(12), pp. 121001-10, 2019.
doi: 10.1115/1.4045056
Collaboration with University at Buffalo (SUNY)

42. M. Montazeri[3], A. Nassar, A. Dunbar, and **P. Rao**.
In-Process Monitoring of Porosity in Additive Manufacturing Using Optical Emission Spectroscopy Signals.
IISE Transactions (Manufacturing and Design), Volume 52(5), 2019.
doi: 10.1080/24725854.2019.1659525
Collaboration with State Applied Research Laboratory.

43. R. Yavari[3], K. Cole, and **P. Rao**.
Thermal Modeling in Metal Additive Manufacturing using Graph Theory.
ASME Transactions, Journal of Manufacturing Science and Engineering
2019, Vol. 141, pp. 0710071-20.
doi: 10.1115/1.4043648

44. J. Lombardi, R. Salary[3], D. Weerawarne, **P. Rao**, M. Poliks.
Image-Based Closed-Loop Control of Aerosol Jet Printing Using Classical Control Methods
ASME Transactions, Journal of Manufacturing Science and Engineering
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Section 3.2 Peer reviewed journal publications under review or pending revisions.

1. Anis Assad[3], Benjamin D. Bevans[3], Willem Potter[1], **Prahalada Rao**, Denis Cormier, Fernando Deschamps, Jakob Hamilton, Iris V. Rivero, *Monitoring and Detection of Incipient Process Instabilities in Laser Wire Directed Energy Deposition using Physics-based Machine Learning of Meltpool Images*
   Materials and Design, Under Review, May 2024.

2. Alex Riensche[3], Benjamin Bevans[3], Antonio Carrington[3], Kaustubh Deshmukh[3], Kamden Shephard[1], John Sions, Kyle Snyder, Yuri Plotnikov, Kevin Cole, **Prahalada Rao**
   Autonomous Optimization of Processing Parameters in Laser Powder Bed Fusion Additive Manufacturing through Model Predictive Control of Thermal History
   Additive Manufacturing, Under Review, April 2024

3. Benjamin Bevans[3], Alex Riensche[3], Antonio Carrington[3], Kaustubh Deshmukh[3], Mihir Darji[3], John Sions, Kyle Snyder, Derek Hass, **Prahalada Rao** *Online Monitoring of Part Quality in Laser Powder Bed Fusion Additive Manufacturing Process using Acoustic Emission Sensors,* Additive Manufacturing, Under Review, May 2024

4. Benjamin D. Bevans[3], Antonio Carrington[3], Alex Riensche[3], Adriane Tenequer, Christopher Barrett, Harold (Scott) Halliday, Raghavan Srinivasan, Kevin D. Cole, Prahalada Rao *Digital Twins for Rapid In-situ Qualification of Part Quality in Laser Powder Bed Fusion Additive Manufacturing,* Additive Manufacturing, Under Review, June 2024

Section 3.3 Peer reviewed conference proceedings with presentations
Presenter

1. Benjamin Bevans[3], Anis Assad[4], Jakob Hamilton, **Prahalada Rao**, and Iris Rivero
   In-Process Monitoring of Process Stability in Laser Wire Directed Energy Deposition Using Physics-Based Machine Learning
   Paper#: MSEC2024-123863
   Proceedings of the ASME 2023 19th International Manufacturing Science and Engineering Conference MSEC2024 June 17-21, 2024, University of Tennessee, TN, USA.

2. Kaustubh Deshmukh[3], Alexander Riensche[3], Ryan J. Lane, Kyle Snyder, Christopher B. Williams, Reza Mirzaeifar, and **Prahalada Rao**
   Brief Paper: Deciphering the Effect of Part Thermal History on Microstructure and Mechanical Properties in Laser Powder Bed Fusion of SS316L
   Paper#: MSEC2024-123865
   Proceedings of the ASME 2023 19th International Manufacturing Science and Engineering Conference MSEC2024 June 17-21, 2024, University of Tennessee, TN, USA.

3. Alexander Riensche[3], Benjamin Bevans[3], Grant King[2], Ajay Krishnan, Kevin Cole, and **Prahalada Rao**
   Predicting Microstructure Evolution in Laser Powder Bed Fusion Additive Manufacturing Using Physics-Based Machine Learning
   Paper#: MSEC2024-125230
   Proceedings of the ASME 2023 19th International Manufacturing Science and Engineering Conference MSEC2024 June 17-21, 2024, University of Tennessee, TN, USA.

4. Alexander Riensche[3], Benjamin Bevans[3], John Sions, Kyle Snyder, Yuri Plotnikov, Derek Hass, and **Prahalada Rao**
   Toward Rapid Process Qualification of Laser Powder Bed Fusion: Model Predictive Control of Part Thermal History
   Paper#: MSEC2024-125241
   Proceedings of the ASME 2023 19th International Manufacturing Science and Engineering Conference MSEC2024 June 17-21, 2024, University of Tennessee, TN, USA.

5. Benjamin Bevans[3], Alexander Riensche[3], John Sions, Kyle Snyder, Yuri Plotnikov, Derek Hass, and **Prahalada Rao**
   Brief Paper: Process Monitoring and Fault Detection in Laser Powder Bed Fusion Using In-Situ Acoustic Emissions
   Paper#: MSEC2024-125256
   Proceedings of the ASME 2023 19th International Manufacturing Science and Engineering Conference MSEC2024 June 17-21, 2024, University of Tennessee, TN, USA.
   Accompanying poster was deemed **Best Poster 2nd Place**.

6. Alex Riensche[3], Ben Bevans[3], Ziyad Smoqi[3], Reza Yavari[3], Ajay Krishnan, Josie Gilligan, Nicholas Piercy, Kevin Cole, and **Prahalada Rao**
Physics-based feedforward control of thermal history in laser powder bed fusion additive manufacturing
Paper#: MSEC2023-103829
Proceedings of the ASME 2023 18th International Manufacturing Science and Engineering Conference MSEC2023 June 12-16, 2023, Rutgers University, NJ, USA.
doi: 10.1115/MSEC2023-103829
Student (A. Riensche) placed second in Doctoral Colloquium

7. Ben Bevans[3], Andre Ramalho, Ziyad Smoqi[3], Aniruddha Gaikwad[3], Telmo Santos, **Prahalada Rao**
Flaw detection in wire arc additive manufacturing using in-situ acoustic sensing and graph signal analysis
Paper#: MSEC2023-101622
Proceedings of the ASME 2023 18th International Manufacturing Science and Engineering Conference MSEC2023 June 12-16, 2023, Rutgers University, NJ, USA.
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8. Yavari, Reza[3], Richard Williams, Cole, Kevin D., Paul Hooper and **Rao, Prahalad**.
Thermal modeling in metal additive manufacturing using graph theory: experimental validation with in-situ infrared thermography data from laser powder bed fusion.
Paper#: MSEC2020-8433
Proceedings of the ASME 2020 15th International Manufacturing Science and Engineering Conference MSEC2020 June 22-26, 2020, Cincinnati, OH, USA. V001T01A028; 10 pages.
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9. Yavari, Reza[3], Cole, Kevin D., and **Rao, Prahalad.**
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Proceedings of the ASME 2019 14th International Manufacturing Science and Engineering Conference. Volume 1: Additive Manufacturing; Manufacturing Equipment and Systems; Bio and Sustainable Manufacturing. Erie, Pennsylvania, USA. June 10–14, 2019. V001T01A030.
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Predicting Part-Level Thermal History in Metal Additive Manufacturing Using Graph Theory: Experimental Validation With Directed Energy Deposition of Titanium Alloy Parts.
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11. Gaikwad, Aniruddha[3], Imani, Farhad, **Rao, Prahalad**, Yang, Hui, and Reutzel, Edward.

    Design Rules and In-Situ Quality Monitoring of Thin-Wall Features Made Using Laser Powder Bed Fusion. Paper #: MSEC2019-3035

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12. Roy, Mriganka, Yavari, Reza[3], Zhou, Chi, Wodo, Olga, and **Rao, Prahalad.**

    Modeling and Experimental Validation of Part-Level Thermal Profile in Fused Filament Fabrication. Paper # MSEC2019-2897

    Proceedings of the ASME 2019 14th International Manufacturing Science and Engineering Conference. Volume 1: Additive Manufacturing; Manufacturing Equipment and Systems; Bio and Sustainable Manufacturing. *Erie, Pennsylvania, USA. June 10–14, 2019. V001T01A031.* doi: 10.1115/MSEC2019-2897

13. Salary, Roozbeh Ross, Lombardi, Jack P., Weerawarne, Darshana L., **Rao, Prahalad K.**, and Poliks, Mark D.
    A State-of-the-Art Review on Aerosol Jet Printing (AJP) Additive Manufacturing Process. Paper # MSEC2019-3008.
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    Design Rules for Additive Manufacturing – Understanding the Fundamental Thermal Phenomena to Reduce Scrap

    Proceedia Manufacturing, Volume 33, 2019, Pages 375-382.
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    In-situ Image-Based Monitoring and Closed-Loop Control of Aerosol Jet Printing. Paper # MSEC2018-6487

    46th Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME/2018 Manufacturing Science and Engineering Conference (MSEC) of the ASME, June 18th-June 22nd, Texas A&M University, College Station, TX, 2018, pp. V001T01A039; 10 pages. doi:10.1115/MSEC2018-6487

16. F. Imani, B. Yao, R. Chen, **P. Rao**, H. Yang.

    Fractal pattern recognition of image profiles for manufacturing process monitoring and control. Paper # MSEC2018-6523,

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    Smart manufacturing: a state-of-the-art review in context of conventional and modern manufacturing process modeling, monitoring and control. Paper # MSEC2018-6658,

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    In-Process Monitoring of Material Cross-Contamination in Laser Powder Bed Fusion Paper # MSEC2018-6470,

    46th Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME/2018 Manufacturing Science and Engineering Conference (MSEC) of the ASME, June 18th-June 22nd, Texas A&M University, College Station, TX, 2018, pp. V001T01A037; 10 pages. doi:10.1115/MSEC2018-6470

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    Layerwise In-process Quality Monitoring in Laser Powder Bed Fusion.

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20. M.S. Tootooni[3*], A. Dsouza[2], R. Donovan[1], **P. Rao**, Z. Kong, P. Borgesen.

    Assessing The Geometric Integrity Of Additive Manufactured Parts From Point Cloud Data Using Spectral Graph Theoretic Sparse Representation-Based Classification Paper # MSEC2017-2794,

    45th Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME/2017 Manufacturing Science and Engineering Conference (MSEC) of the ASME, June 4th-June 8th, University of Southern California, Los Angeles, CA, 2017, pp. V002T01A042; 13 pages. doi:10.1115/MSEC2017-2794

21. R. Salary, J. Lombardi, **P. Rao**, M. Poliks.

Additive Manufacturing (AM) of Flexible Electronic Devices: Online Monitoring Of 3d Line Topology In Aerosol Jet Printing Process Using Shape-From-Shading (SfS) Image Analysis, Paper # MSEC2017-2947,

45th Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME/2017 Manufacturing Science and Engineering Conference (MSEC) of the ASME, June 4th-June 8th, University of Southern California, Los Angeles, CA, 2017. pp. V002T01A046; 11 pages. doi:10.1115/MSEC2017-2947

22. M. S. Tootooni[3*], M. Fan, R. Sivasubramony[2], C.-A. Chou, V. Miskovic, and **P. Rao**.

Graph Theoretic Compressive Sensing Approach for Classification of Global Neurophysiological States from Electroencephalography (EEG) Signals,

in Lecture Notes in Computer Science, Vol 9919, 2016, pp. 42-51. doi: 10.1007/978-3-319-47103-7_25. *Brain Informatics and Health: International Conference, BIH 2016,* Omaha, NE, USA, October 13-16, 2016 Proceedings. Online ISBN: 978-3-319-47103-7.
doi: 10.1007/978-3-319-47103-7_5

23. M. Fan, M.Tootooni[3*], R. Sivasubramony[2], V. Miskovic, **P. Rao**, C-A. Chou.

Acute Stress Detection Using Recurrence Quantification Analysis of Electroencephalogram (EEG) Signals.

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24. R. Salary, J. Lombardi, M. Tootooni[3], R. Donovan[1], **P. Rao**, M. Poliks.

In-situ Sensor-based Monitoring and Computational Fluid Dynamics Modeling of Aerosol Jet Printing Process. Paper # MSEC2016-8535,

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25. **P. Rao,** Z. Kong, C. Duty, R. Smith.

Three Dimensional Point Cloud-based Dimensional Integrity Assessment for Additive Manufactured Parts using Spectral Graph Theory. Paper # MSEC2016-8516,

44th Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME/2016 Manufacturing Science and Engineering Conference (MSEC) of the ASME, June 27th-July 1st, Blacksburg, VA, 2016. pp. V002T04A048; 14 pages.
doi:10.1115/MSEC2016-8516

26. **P. Rao**, Z. Kong, S. Bukkapatnam, O. Beyca, K. Case, R. Komanduri.

Quantification of Ultraprecision Surface Morphology using an Algebraic Graph Theoretic Approach. Paper # NAMRC 43-65 *Hoken Symposium*,
43rd Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME, *Proceedia Manufacturing*, June 8th – June 12th, Charlotte, NC, 2015. Volume 1, 2015, Pages 12-26.
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27. **P. Rao**, J. Liu, D. Roberson, Z. Kong.
Sensor-based Online Fault Detection in Additive Manufacturing, Paper # MSEC 2015-9389

43rd Proceedings of the North American Manufacturing Research Institution (NAMRI) of SME, June 8th – June 12th, Charlotte, NC, 2015. pp. V002T04A010; 13 pages.
doi:10.1115/MSEC2015-9389.

Section 3.4 Patents and Disclosures

1. *Simulating Heat Flux in Additive Manufacturing.*
   Link
   Assignees: R. Yavari, K. Cole, P. Rao,
   Application Number US20220058315A1, Date: 02/24/2022

2. *Thermal Modeling of Additive Manufacturing using Graph Theory.*
   Link
   Assignees: J. Severson, R. Yavari, P. Rao, K. Cole
   Application Number: US20220114307A1, Date: 04/14/2022

3. *Thermal modeling of additive manufacturing using progressive horizontal subsections*, Assignees: R. Yavari, K. Cole, P. Rao, Date: 07/01/2020,
   Link
   Application Number: US20220284154A1

4. *Systems and methods for combining thermal simulations with sensor data to detect flaws and malicious cyber intrusions in additive manufacturing*, Patent Filed: 9/20/2021 Assignees: R. Yavari, P. Rao, K. Cole, A. Riensche,
   Link
   International Patent Application Number: WO2023038844A1

5. *Thermal modeling of additive manufacturing*, Provisional Patent Filed, 9/21/2021, Assignees: K. Cole, A. Riensche, P. Rao
   Link
   International Patent Application Number: WO2023076636A1

6. Feedforward Control of Laser Powder Bed Fusion Additive Manufacturing
   Assignees: Reza Yavari, Prahalada Rao, Alex Riensche, Kevin Cole, Benjamin Bevans, Filing Date: 07/29/2023
   Link
   International Patent Application Number: WO2024026100A2.

7. *Additive manufacturing defect detection*
   Assignees: Prahalada Rao, Ziyad Smoqi, Benjamin Bevans, Aniruddha Gaikwad.
   Filing Date: 08/31/2023.
   Patent Pending: US20240070838A1
   Link

Section 3.5 Invited talks or keynote speeches.

1. Invited Talk: *Smart Additive Manufacturing Part Quality Assurance*, Missouri University of Science and Technology 04/25/2024. Host: Dr. Frank Liou
2. Invited Talk: *Smart Additive Manufacturing Part Quality Assurance,* University of Nevada-Reno, 04/19/2024. Host: Dr. Pradeep Menezes
3. Invited Talk: *Smart Additive Manufacturing Part Quality Assurance,* University of Washington, 03/26/2024. Host: Dr. Shuai Huang
4. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*, Rutgers University, 01/24/2024. Host: Dr. Rajiv Malhotra
5. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*. Virginia Commonwealth University. 08/29/2023. Host. Dr Ravi Hadimani.
6. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*. Idaho National Labs. 07/17/2023. Hosts. Dr. Donna Guillen, Dr. Amir Ali
7. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*, University of Oklahoma, 10/27/2023, Host: Dr. Kash Barker
8. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*, Oklahoma State University, 10/26/2023, Host: Dr. Srikanthan Ramesh
9. Invited Keynote Address: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*. International Conference on Material Processing using Lasers and Surface Engineering, Indian Institute of Technology, Madras, 12/14/2023.
10. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*. CCAM Technology Days, VCU 05/24/2023
11. Invited Talk: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics*. University of Arkansas. 04/07/2023. Host: Dr. Shengfan Zhang.
12. Keynote Address: *The Good, The Bad, and The Ugly: Smart AM Part Qualification with Modeling, Sensing & Analytics.* America Makes TRX, 03/08/2023, El Paso, Texas.
13. Invited Talk: *Smart Additive Manufacturing*: *Integrating thermal modeling and machine learning for flaw-free metal AM.* Aerospace Corp., 08/25/2022, Host: Dr. Jacob I. Rome
14. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Smart Additive Manufacturing*. GE Aviation, Cincinnati, OH, 06/30/2022, Host: Dr. Scott Gold.
15. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Smart Additive Manufacturing*. Virginia Tech, VA. 04/15/2021, Host: Dr. Z. Kong.
16. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Additive Manufacturing.* Northeastern University, MA. 03/13/2021, Host: Dr. S. Kamarthi.
17. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Additive Manufacturing*. University of Cincinnati, OH. 02/12/2021, Host: Dr. M. Jog.

18. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Additive Manufacturing*. University of Nebraska-Omaha. 01/21/2021, Host: Dr. A. Kaminskiy.
19. Invited Talk: M4AM: *Modeling, Monitoring, Materials, and Machine Learning for Flaw-free Additive Manufacturing*. Florida International Univ.. 01/12/2021. Host: Dr. A. Agarwal
20. Invited Talk: *The Digital Twin in Additive Manufacturing*: *Thermal Modeling, Sensing, and Analytics for Zero Part Defects in Additive Manufacturing*.
International Virtual Conference on Innovations in Advanced Materials Processing, Vellore Institute of Technology, India, 06/24/2020
21. *The Digital Twin in Additive Manufacturing*: *Thermal Modeling, Sensing, and Analytics for Zero Part Defects in Additive Manufacturing*,
Industrial and Systems Engineering, Texas A&M, February 7th, 2020. Sponsor: Dr. Satish Bukkapatnam
22. *Smart Additive Manufacturing: Modeling, Sensing, and Analytics for Zero Part Defects.*
Oak Ridge National Laboratory. December 10th, 2019. Sponsor: Dr. Scott Smith.
23. *Smart Additive Manufacturing The Digital Twin of Additive Manufacturing*, Iowa State University, Department of Industrial and Manufacturing Systems Engineering, 12/05/2019. Host: Dr. Matt Frank.
24. *Ultrafast Thermal Simulation in Additive Manufacturing*,
General Electric Global Research Center, Edge and Controls Conference (Invited Talk). Niskayuna, NY, September 11th, 2019. Sponsor: Dr. Subhrajit Roychowdhury
25. *The Digital Twin in Additive Manufacturing*: *Thermal Modeling, Sensing, and Analytics for Zero Part Defects in Additive Manufacturing*,
Mechanical and Nuclear Engineering, Rensselaer Polytechnic Institute.
September 13th, 2019. Sponsor: Dr. Johnson Samuel.
26. *Ushering the Digital Twin in Metal Additive Manufacturing*,
International Young Scientist Forum on Smart Manufacturing and Artificial Intelligence, Northwestern Polytechnic University, Taicang, China, July 12th, 2019. Sponsor: Dr. Min Xia.
27. *Smart Additive Manufacturing Integrating In-Process Sensing, Big Data Analytics, and Thermal Modeling for Zero Part Defects*
Rutgers University, New Brunswick, NJ, 02/022/2019. Host: Dr. E. Elsayed.
28. *Correct-as-you-Build in AM – Fixing Part Defects Inside the Machine*,
Optomec Inc., December 4th, 2018. Sponsor: Mr. Tom Cobb and Mrs. Karen Manley.
29. *Integrating In-Process Sensing, Big Data Analytics, and Modeling for Zero Part Defects in Smart Additive Manufacturing*,
University of Michigan, September 14th, 2018, Sponsor: Dr. Judy Jin.
30. *Additive Manufacturing (AM/3D Printing) – Fiction, Fantasy, or Fact.*
September 6th, 2018. Total Manufacturing Company. Sponsor: UNL Industry Relations
31. *Additive Manufacturing (AM/3D Printing) – Fiction, Fantasy, or Fact.* August, 16th 2018. Dell Technologies, Roundrock Austin Texas, Sponsor: Dr. Mario Cornejo
32. *Invited Webinar: Smart Additive Manufacturing*. October 9th, 2018. Sponsor: Dr. Linkan Bian on behalf of Institute of Industrial Engineers, Manufacturing and Design Division.

33. *Big Data Analytics in Additive Manufacturing*, Kansas State University. March 28th, 2018. Sponsor: Dr. Dong Lin
34. *The Unusual Effectiveness of Spectral Graph Theory for Quality Assurance in Additive Manufacturing*. Foundations of Accuracy Control for Additive Manufacturing Workshop , University of Southern California. February 8th, 2018. Sponsor: Dr. Qiang Huang.
35. *Graph Theoretic Signal Processing - Application to Additive Manufacturing and Neurophysiology***,** Virginia Tech. February 27th, 2018. Sponsor: Dr. James Kong
36. *Big Data Analytics in Additive Manufacturing*, Iowa State University. February 21st, 2018. Sponsor: Dr. Iris Rivero.
37. *Invited Talk: Qualify-as-you-build A Paradigm for Sustainability in Additive Manufacturing (AM) through Big Data Analytics***.** Emerging Researcher Showcase, 2017 International Forum on Sustainable Manufacturing, Institute of Sustainable Manufacturing, University of Kentucky. December 7th-8th, 2017. Sponsor: Travel, lodging, and conference registration was funded through a NSF Travel Grant. Invited by: Dr. Fazleena Badurdeen and Dr. I.S Jawahir.
38. *Big Data Analytics in Additive Manufacturing*, National Institute of Standards and Technology. November 14th, 2017. Sponsor: Dr. Brandon Lane
39. *Graph Theoretic Sensor Fusion Application to Additive Manufacturing and Neurophysiology.* October 12th, 2017. Pennsylvania State University, Sponsor: Dr. Hui Yang
40. *Towards Certify-as-you-build in Aerosol Jet Printing (AJP): Process Modeling, Online Monitoring, and Quality Assurance*. April 21st, 2016, North Dakota State University, Sponsor: Dr. Om Prakash Yadav
41. Invited Webinar: In-process Quality Assurance in Additive Manufacturing. April 4th, 2017. Sponsor: Dr. Z. Kong on behalf of Institute of Industrial Engineers, Quality Control and Reliability Engineering Division.
42. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, University of Kentucky (Spring 2016), Sponsor: Dr. I.S. Jawahir.
43. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, University at Buffalo (Fall 2015, Spring 2016), Sponsor: Dr. Chi Zhou, Dr. Ann Bizantz.
44. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, Texas Tech University (Spring 2016), Sponsor: Dr. Han-Chou Zhang
45. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, Kansas State University (Spring 2016), Sponsor: Dr. Bradley Kramer
46. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, University of Iowa (Spring 2016), Sponsor: Dr. Yong Chen
47. *Graph Theoretic Sensor Fusion and its Application to Additive Manufacturing and Neurophysiology*, University of South Florida (Spring 2016), Sponsor: Dr. Tapas K. Das
48. *Invited Webinar: Additive Manufacturing: Capabilities, Research Challenges and Process Monitoring*. Presented with Dr. Alaa Elwany. Feb. 25th, 2016. Sponsor: Institute of Industrial Engineers, Quality Control and Reliability Engineering Division.

Section 3.6 Conference presentations without papers (Since 2017)

1. B. Bevans, A. Assad, Aiden Martin, Jean-Baptiste Forein, Nick Calta, Philip DePond, Brian Giera, P. Rao , *Detecting Failures in Laser Powder Bed Fusion Additive Manufacturing of Complex Lattice Structures*, International Conference on Additive Manufacturing, 10/302023, Washington, DC.
2. A. Riensche, G. King[2], A. Krishnan, K.D. Cole, P. Rao *Layer-Wise Prediction of Microstructural Evolution in Laser Powder Bed Fusion using Physics-Based Machine Learning*, International Conference on Additive Manufacturing, 10/302023, Washington, DC.
3. J.D. Hamilton, A. Assad, B. Bevans, A. Cardinali, P. Rao, D. Cormier, I.V. Rivero, *Uncovering Fundamental Process Deficiencies in Wire-laser Directed Energy Deposition using In-situ High Speed Imaging*, Solid Freeform Fabrication SFF 2023, 08/15/2023, Austin, TX.
4. B. Bevans, A. Martin, J-B Forein, N. Calta, P. DePond, B. Giera, P. Rao *Qualification of Single Tracks in Laser Powder Bed Fusion using Thermionic and Photodiode Sensing*, Solid Freeform Fabrication SFF 2023, 08/16/2023, Austin, TX.
5. A. Assad, B. Bevans, J. Hamilton, I. Rivero, D. Cormier, P. Rao, *Monitoring of Process Stability in Laser Wire Directed Energy Deposition*, Solid Freeform Fabrication SFF 2023, 08/15/2023, Austin, TX.
6. B. Bevans, A. Assad, Aiden Martin, Jean-Baptiste Forein, Nick Calta, Philip DePond, Brian Giera, P. Rao , *Detecting Failures in Laser Powder Bed Fusion Additive Manufacturing of Complex Lattice Structures*, Solid Freeform Fabrication SFF 2023, 08/16/2023, Austin, TX.
7. A. Riensche, G. King[2], A. Krishnan, K.D. Cole, P. Rao *Layer-Wise Prediction of Microstructural Evolution in Laser Powder Bed Fusion using Physics-Based Machine Learning*, Solid Freeform Fabrication SFF 2023, 08/14/2023, Austin, TX.
8. A. Riensche, P. Rao, *Physics-based Process Optimization and Monitoring in Laser Powder Bed Fusion,* Doctoral Symposium, ASME MSEC, 06/15/2023, Rutgers University, New Brunswick, NJ. ***2nd Place Doctoral Symposium Award***
9. B. Bevans, P. Rao *In-Situ Part Qualification in Metal Additive Manufacturing*, Doctoral Symposium, ASME MSEC, 06/15/2023, Rutgers University, New Brunswick, NJ.
10. A. Riensche, B. Bevans, Z. Smoqi, R. Yavari, N. Piercy, J. Gilligan, A. Krishnan, K. Cole, P. Rao, *Feed-Forward Control of Part Properties using Graph Theory in Laser Powder Bed Fusion*, Solid Freeform Fabrication SFF 2022, 07/26/2022, Austin, TX.
11. G. King, B. Bevans, A. Riensche, A. Gaikwad, Z. Smoqi, A. Krishnan, P. Rao, *Prediction of microstructure in LPBF using part-level thermal simulations, in-process sensor data, and machine learning*, SFF 2022, 07/26/2022, Austin, TX.
12. Z. Smoqi, A. Gaikwad, B. Bevans, H. Kobir, P. Rao, O*nline Prediction of Porosity in LPBF using Physics-informed Meltpool Signatures and Machine Learning*, SFF 2022 07/26/2022. Austin, TX.

13. A. Rienche, P. Carriere, Z. Smoqi, A. Menendez, P. Frigola, N.G. Matavalam, P. Rao, *Hybrid Laser Powder Bed Fusion of Aluminum Alloy (AlSi10Mg) Radio Frequency Resonators*, SFF 2022, 07/26/2022, Austin, TX.

14. A. Gaikwad, R. Williams, B. Bevans, P. Hooper, P. Rao, *Multi-phenomena Data Fusion for Enhanced Process Monitoring in LPBF*, SFF 2022, 07/27/2022, Austin , TX.

15. R. Yavari, A. Riensche, E. Tekerek, L. Jacquemetton, H. Halliday, M. Vandever, A. Tenequer, V. Perumal, A. Kontsos, Z. Smoqi, K. Cole, P. Rao, *Digitally Twinned Additive Manufacturing Real-time Detection of Flaws in Laser Powder Bed Fusion by Combining Thermal Simulations with In Situ Meltpool Sensor Data.*, SFF 2022, 07/27/2022, Austin, TX.

16. N. Piercy, K. Cole, P. Rao, *Thermal Modeling of Wire+Arc Additive Manufacturing Using Spectral Graph Theory*, SFF 2022, 07/27/2022, Austin, TX.

17. B. Bevans, C. Barrett, T. Spears, A. Gaikwad, A. Riensche, P. Rao, *Multi-scale Shape Agnostic Flaw Detection in Laser Powder Bed Fusion using Heterogeneous Sensor Data*, SFF 2022, 07/25/2022, Austin, TX.

18. B. Bevans, A. Ramalho, A. Gaikwad, Z. Smoqi, J.P. Oliveira, P. Rao, *Monitoring and Flaw Detection in Wire-based Directed Energy Deposition using In-situ Acoustic Sensing, ,* SFF 2022, 07/27/2022, Austin, TX.

19. Z. Smoqi, A. Gaikwad, B. Bevans, H. Kobir, P. Rao, O*nline Prediction of Porosity in LPBF using Physics-informed Meltpool Signatures and Machine Learning*, NIST AMBench Conference, 08/15/2022, Austin, TX.

20. R. Yavari, A. Riensche, E. Tekerek, L. Jacquemetton, H. Halliday, M. Vandever, A. Tenequer, V. Perumal, A. Kontsos, Z. Smoqi, K.Cole, P. Rao, *Digitally Twinned Additive Manufacturing Real-time Detection of Flaws in Laser Powder Bed Fusion by Combining Thermal Simulations with In Situ Meltpool Sensor Data.*, NIST AMBench Conference, 08/15/2022, Washington, DC.

21. A. Riensche, B. Bevans, Z. Smoqi, R. Yavari, N. Piercy, J. Gilligan, A. Krishnan, K. Cole, P. Rao, *Feed-Forward Control of Part Properties using Graph Theory in Laser Powder Bed Fusion*, NIST AMBench Conference, 08/15/2022, Washington, DC.

22. R. Yavari, P. Rao, *Correlating the Effect of Part Geometry and Support Structure on Thermal History in LPBF,* SFF 2021, 07/21/2021, Austin, TX.

23. R. Yavari, R. Williams, P. Hooper, P. Rao, *Thermal Modeling in AM Using Graph Theory Validation with In-situ Thermography Measurements for a Large Impeller Part made Using Laser Powder Bed Fusion*, SFF 2021, Austin, TX.

24. J. Severson, R. Yavari, P. Rao *Thermal modeling of additive manufacturing using graph theory: Validation with directed energy deposition*, SFF 2021, 07/21/2021, Austin, TX.

25. J. Severson, R. Yavari, A. Gaikwad, K. Cole, P. Rao, *Thermal Modeling in Metal Additive Manufacturing Using Graph Theory: Experimental Validation with Directed Energy Deposition*, Finite Elements in Fluids Conference, 04/03/2019, Chicago, IL.
26. R. Yavari, K. Cole, P. Rao, Thermal Modeling in Metal Additive Manufacturing Using Graph Theory, Finite Elements in Fluids Conference, 04/03/2019, Chicago, IL.
27. R. Yavari, A. Gaikwad, P. Hooper, K. Cole, P. Rao *Modeling and Validation of the Part Distortion in Laser Powder Bed Fusion Using Graph Theory*, Finite Elements in Fluids Conference, 04/03/2019, Chicago, IL.
28. R. Yavari, K. Cole, A. Gaikwad, M. Montazeri, P. Rao, L. Bian, *Ushering the Digital Twin in Metal Additive Manufacturing*, Finite Elements in Fluids Conference, 04/02/2019, Chicago, IL.
29. R. Yavari, K. Cole, A. Gaikwad, M. Montazeri, P. Rao, L. Bian, *Ushering the Digital Twin in Metal Additive Manufacturing*, Applied Human Factors and Engineering Conference, 07/24/2019, Washington, DC.
30. A.C. Gaikwad, B. Giera, P. Rao, *Heterogeneous Sensing-based In-process Quality Monitoring of Single-tracks Built using Laser Powder Bed Fusion Additive Manufacturing Process*, SFF 2019, 08/13/2019, Austin, TX.
31. R. Yavari. A.C. Gaikwad, M. Montazeri, K. Cole, L. Bian, P. Rao, *The Digital Twin in Metal Additive Manufacturing – A Paradigm Integrating Modeling, Sensing and Machine Learning for Defect Prediction*, SFF 2019, 08/13/2019, Austin, TX.
32. R. Yavari, K. Cole, P. Rao, *Part-Level Thermal Modeling in Additive Manufacturing using Graph Theory*, SFF 2019, 08/12/2019, Austin, TX.
33. R. Yavari, K. Cole, P. Rao *Experimental Validation of the Thermal Distribution Predicted by the Graph Theory Approach Application to Laser Powder Bed Fusion*, SFF 2019, 08/12/2019, Austin, TX.
34. S. Gerdes, A. Mostafavi, S. Ramesh, A. Tamayol, I. Rivero, P. Rao, *Material-structure-property Optimization and In-process Monitoring of 3D Printed Bone Tissue*, SFF 2019, 08/14/2019, Austin, TX.
35. M. Montazeri, A. Nassar, C. Stutzman, P. Rao, *Using Heterogeneous In-process Sensor Data To Detect Lack-of-fusion Defects In Directed Energy Deposition of Titanium Alloy (Ti-6Al-4V) Parts*, SFF 2019, 08/14/2019, Austin, TX.
36. Z. Smoqi, J. Severson, J. Toddy, H. Halliday, T. Cobbs, P. Rao, *Process-structure-property Relationships in the Coating of Stellite on Inconel 718 by Directed Energy Deposition Process*, SFF 2019, 08/14/2019

37. M. Montazeri, P. Rao, In-Process Condition Monitoring in Laser Powder Bed Fusion (LPBF), SFF 2017, 08/07/2022

38. E. Curtis, A. Gaikwad, F. Imani, M. Montazeri, P. Rao, H. Yang , E. Reutzel, A. Nassar *Linking Process Parameters to Part Defects through In Process Sensor Signatures in Laser Powder Bed Fusion (LPBF)*, SFF 2017, 08/07/2017, Austin, TX.

39. P. Rao, *Detection of Porosity in Laser Powder Bed Fusion Using Spectral Graph Theoretic Machine Learning of In-process Optical Emission Spectroscopy Signals*, SFF 2018, 08/013/2018. Austin, TX.

40. P. Rao, *In-process Detection of Material Cross-contamination in Laser Powder Bed Fusion*, SFF 2018, 08/14/2018, Austin, TX.

41. P. Rao, *Real-time Detection of Build Failures in Thin-wall Structures* , SFF 2018, 08/14/2018, Austin, TX.

Section 3.7 Books and book chapters

1. P. Rao.
   Chapter 6: Process Monitoring and Control, in *Laser-based Additive Manufacturing of Metal Parts - Modeling, Optimization, and Control of Mechanical Properties*, Eds. Linkan Bian, Nima Shamsaei, and John Usher, CRC Press, Taylor and Francis Group, ISBN: 978-1-4987-3998-6 Publication Date: August 16, 2017.

2. B. Khoda, T. Benny[2], P. Rao, M. Sealy, C. Zhou.
   Chapter 8: Applications of Laser-based Additive Manufacturing, in *Laser-based Additive Manufacturing of Metal Parts - Modeling, Optimization, and Control of Mechanical Properties*, Eds. Linkan Bian, Nima Shamsaei, and John Usher, CRC Press, Taylor and Francis Group, ISBN: 978-1-4987-3998-6 Publication Date: August 16, 2017. Number of Pages: 46.

3. P. Rao, R. Komanduri, and S. Bukkapatnam
   Sensor-based Modeling and Monitoring of Chemical Mechanical Polishing, VDM Verlag, ISBN 978-3-639-03564-3. December 3, 2008.

Section 3.8 Other Publications

1. Short Article- Newsletter for the Manufacturing and Design Division of the IISE, Additive Manufacturing – Research Opportunities for Industrial Engineers, Fall 2018. URL.
2. *The final step toward quality in additive manufacturing* – Industrial and Systems Engineer Magazine, April 2019, Volume 51, Number 4. URL

Section 3.9 National and International Research Awards and Recognition

1. Best Paper Award, with K. Bastani and Z. Kong, IISE Transactions, 2018 for paper entitled, *An Online Sparse Estimation-based Classification (OSEC) Approach for Real-time Monitoring in Advanced Manufacturing Process from Heterogeneous Sensor Data*. IIE Transactions, Quality and Reliability Engineering, 48(7), pp. 579-598, 2016.

2. Best Paper Award (Honorable Mention), 2017, with K. Case, Z. Kong, S. Bukkapatnam, O. Beyca for paper entitled *A Graph-Theoretic Approach for Quantification Of Surface Morphology and Its Application To Chemical Mechanical Planarization (CMP) Process*. IIE Transactions, Quality and Reliability Engineering, 47(10), pp. 1-24, 2015.

3. Society of Manufacturing Engineers, Yoram Koren Outstanding Young Manufacturing Engineer Award, 2017

4. Society of Manufacturing Engineers, Outstanding Reviewer Award, 2018.

5. Finalist, IISE Manufacturing and Design Division's Young Investigator Award, 2016

Section 3.10 Regional and Local Research Awards and Recognition

1. UNL Faculty Research and Creative Activity Award, 2019
2. Nominated by Oklahoma State University for the Institute of Industrial and Systems Engineers (IISE) Pritsker Dissertation Award, 2014
3. Department Nominee, University-wide Dissertation Award, Oklahoma State University, 2014
4. Finalist, IIE, John L. Imhoff graduate fellowship, 2010
5. Outstanding Research Assistant, Alpha Pi Mu, Oklahoma State University chapter, 2009
6. Finalist, IIE Graduate thesis (Master's) award, 2007

Section 3.11 Invited Expert Panels

1. Invited Panelist, NSF ERVA, Knoxville, TN, March 30th-31st, 2023.
2. Invited Panelist, Progress, Impact, and Future of In-Situ Monitoring in AM panel discussion at ASTM International Conference on Additive Manufacturing, November 24th, ICAM.
3. Invited Panelist and Presenter, National Science Foundation, Workshop on Smart Manufacturing Systems, Cyber Physical Systems Conference, Organizers: Drs. K. Barton and M.Sibin. Washington DC, Nov. 16th, 2018.

Section 4 Teaching, Pedagogy, and Student Advising

Section 4.1 Courses Taught

Virginia Tech

1. ISE 5204 – Manufacturing Systems Engineering
   Fall 2023, SPOT Rating 5.31; Department Average 5.17

2. ISE 3204 – Manufacturing Processes
   Fall 2023, SPOT Rating 5.25; Department Average 5.17

3. ISE 3214 – Facilities and Logistics
   Fall 2023 (2 sections), SPOT Rating 3.15; Department Average 4.96

At University of Nebraska-Lincoln (2016-2022)
(Ratings were consistently above 4 out of 5)

1. MECH 321 – Statistics and Data Analytics (required undergraduate course)
   (Fall 17, 18, 20, 21)
2. MECH 422 – Industrial Quality Control
   (Spring 18, 20)
3. MECH 472/872 – Additive Manufacturing (AM)
   (Spring 16, 18, 20, 22)
4. MECH 499/899 – Metallurgy and Processing Science of Additive Manufacturing.
   (Summer, 20, 21)
5. MECH 492/892 – Data-driven Engineering
   (Spring 21)

Binghamton University
(Ratings were consistently above 4 out of 5)

1. SSIE 5501 – Statistics and Probability
   (Fall 2014, 2015)
2. SSIE 5533 – Industrial Quality Control
   (Spring 2015, 2016)

Section 4.2 PhD Students supervised to completion

1. **Benjamin D. Bevans**
   Co-supervisor: None
   Dissertation Title: Born Qualified Additive Manufacturing: In-Situ Part Quality Assurance in Metal Additive Manufacturing
   Percentage Funding provided by me: 100%
   Defense Date: June 14th, 2024
   Current Employment: Research Assistant Professor, University of Oklahoma

2. **Aniruddha C. Gaikwad**
   Co-supervisor: None
   Dissertation Title: *Smart Additive Manufacturing: Sensing, Monitoring, and Machine Learning for Quality Assurance in Metal Additive Manufacturing.*
   Percentage funding provided by me: 100%
   Defense Date: July 18th, 2022.
   Current Employment: Xerox, Charlotte, NC

3. **Samuel E. Gerdes**
   Co-supervisor: None
   Dissertation Title*: Defect Detection and Process Control in Biological Additive Manufacturing*
   Percentage funding provided by me: 100%
   Defense Date: July 21st, 2022

4. **Ziyad Smoqi**
   Co-supervisor: None.
   Dissertation Title: *M^3AM: Materials, Monitoring, and Machine Learning for Flaw-free Additive Manufacturing*
   Percentage funding provided by me: 50%.
   Rest of the funding by MME department TA-ship.
   Defense Date: May 25th, 2022.
   Current Employment: GE Aviation, Cincinnati, OH

5. **M. Reza Yavari**
   Co-supervisor: None.
   Dissertation Title: *Thermal Modeling in Metal Additive Manufacturing using Graph Theory*
   Percentage Funding provided by me: 100%
   Defense Date: 21st June 2021.
   Current Employment: Vulcan Forms, Boston, MA

6. **Mohammad Montazeri**
   Co-supervisor: None.
   Dissertation Title: *Smart Additive Manufacturing: In-Process Sensing and Data Analytics for Online Defect Detection in Metal Additive Manufacturing Processes.*
   Percentage Funding provided by me: 100%
   Defense Date: 30th Aug. 2019.
   Current Employment: Novartis, Cambridge, MA

7. **Mohammad Samie Tootooni**
   Degree completed at Binghamton University.
   Co-supervisor: None.
   Dissertation Title: *Sensor Based Monitoring of Multidimensional Complex Systems Using Spectral Graph Theory.*
   Percentage Funding provided by me: 100%
   Defense Date: June 21st, 2016 (Binghamton University).
   Current Employment: Tenure-track Assistant Professor at Loyola University, Chicago

8. **Roozbeh Salary**
   Degree Completed at Binghamton University
   Primary Supervisor: Dr. Mark Poliks
   I was the co-supervisor for Roozbeh, but had to relinquish my role after moving to UNL. However, we published 3 papers between 2016-2019.
   Percentage Funding provided by me: 0%
   Graduation Date: June, 2018 (Binghamton University).
   Current Employment: Associate Professor in Engineering Division at Marshall University, West Virginia.

Section 4.3 PhD students currently in progress.

9. **Alexander Riensche**
   Percentage Funding provided by me: 100%
   Expected Graduation Date: August 2024 (Defense set for 2nd week of July, 2024)

10. **Antonio Carrington, Jr.**
    Percentage Funding provided by me: 100%
    Expected Graduation Date: August 2026

11. **Mihir Darji**
    Percentage Funding provided by me: 100%
    Expected Graduation Date: August 2026

12. **Kaustubh Deshmukh** (co-advised with Dr. Chris Williams)
    Percentage Funding provided by me: 100%
    Expected Graduation Date: August 2025

Section 4.4 Visiting Scholars and Post-docs

1. **Anis Assad Neto**
   Catholic University, Brazil, August 2022- May 2023

2. **Alper Demiray**,
   Tubitak Scholarship, Turkey, September 2022 – March 2023

3. **Andre Ramalho**
   NOVA University, Lisbon, Portugal, January 2024 – Present.

Section 4.5 MS Students (Thesis Option)

1. **Grant King** (University of Nebraska-Lincoln)
   Thesis: *Prediction of Meltpool Depth In Laser Powder Bed Fusion Using In-Process Sensor Signatures, Thermal Simulations, And Machine Learning.*
   Graduation Date: November 28th, 2022
   Current Employment: GE Aviation, Cincinnati, OH.
2. **Mohammed H. Kobir** (University of Nebraska-Lincoln)
   Thesis Title: Thermomechanical Modeling in Metal Additive Manufacturing using Graph Theory
   Graduation Date: M.S. Thesis Defended, July, 2021
3. **Aniruddha Gaikwad** (University of Nebraska-Lincoln)
   Thesis Title: *Design Rules for Additive Manufacturing.*
   Admitted to Materials Science Ph.D. program, January 2019.
   Percentage funding provided by me: 100%
   Graduation Date: M.S. Thesis Defended January, 23rd, 2019.
4. **Jordan Severson** (University of Nebraska-Lincoln)
   Thesis Title: *Thermal Modeling in Directed Energy Deposition using Graph Theory*
   Percentage funding provided by me: 100%.
   Thesis Defense Date: May 2020.
   Graduation Data: April 2020
   Currently with Boeing, St. Louis.
5. **Ashley D'Souza** (Binghamton University)
   Thesis Title: *Experimental Evolutionary Optimization of Geometric Integrity in Fused Filament Fabrication Additive Manufacturing Process (Binghamton University)*
   Percentage Funding provided by me: 100%
   Graduation Date: May 3rd, 2016
   Current Employment: Manufacturing Engineer at AMETEK Haydon Kirk Motion Solutions, Waterbury, Connecticut, CT.

Section 4.6 Undergraduate Students

1. Sidney Stern, Industrial and Systems Engineering, Virginia Tech, Spring 2023.
2. Kamden Shephard, Industrial and Systems Engineering, Virginia Tech, Spring 2023.
3. Lukas Brokamp, Industrial and Systems Engineering, Virginia Tech, Spring 2023.
4. Hunter Goddard, Industrial and Systems Engineering, Virginia Tech, Spring 2023.
5. Aaron Norlinger, Mechanical and Materials Engineering, NSF REU supplemental funding ($8000), Summer 2021.
6. Ben Bevans, Mechanical Engineering, University of Nebraska, Funded through UNL UCARE. Spring 2017 – 2019. John Woollam Scholar 2019. Honorable Mention, NSF Graduate Research Fellowship Program, 2019.
7. Grant King, Mechanical Engineering, University of Nebraska, University of Nebraska, Funded through UNL UCARE and NSF REU supplemental funding ($8,000). Spring 2017 – Present. John Wollam Scholar 2019.
8. Sam Gerdes, Biosystems Engineering, University of Nebraska, University of Nebraska, Funded through UNL UCARE and NSF REU supplemental funding ($8,000). Spring 2017 – August 2019. Honorable Mention, NSF Graduate Research Fellowship Program, 2017.
9. Joseph Broadway, Mechanical Engineering, University of Nebraska, Funded through UNL UCARE. Spring 2018 – Spring 2019.
10. August McLenehan, Mechanical Engineering, University of Nebraska, Funded through UNL UCARE. Summer 2018.
11. Emily Curtis, Mechanical Engineering, University of Nebraska. Fall 2016.
12. Ryan Donovan, Mechanical Engineering, Binghamton, Funded through NSF REU supplemental funding ($5,000). Credit Hours: N/A. 2015-2016.

Section 5 Service

Section 5.1 Journal Editorships or Associate Editorships

1. Special Issue Editor, Journal of Manufacturing and Materials Processing (ISSN 2504-4494), Smart and Advanced Manufacturing, 2024
2. Guest Advisor: Special issue in Quality Assurance in Metal Additive Manufacturing: Modeling, Monitoring, Metallurgy, Machine Learning, and Process Control, 2024 LINK
3. Scientific Advisory Board, Additive Manufacturing, Modeling Systems and 3D Prototyping, 10th Applied Human Factors and Ergonomics Conf., July 24th – 28th, 2019 Washington DC.
4. Associate Editor, Transactions of the Institution of Industrial and Systems Engineers, Journal of Quality and Reliability, August 2018 – August 2022
5. Associate Editor, Transaction of the Institution of Industrial and Systems Engineers, Journal of Design and Manufacturing, January 2019 – Present
6. Associate Editor, International Journal of Rapid Manufacturing, August 2014-Present
7. Associate Editor, International Journal of Rapid Manufacturing, Special Issue, Cyber Manufacturing -Emerging Frontiers in Sensing, Modelling and Control.
8. Member of the Editorial Review Board, Journal of Manufacturing Systems, Society of Manufacturing Engineers. Summer 2017 – Summer 2019.

Section 5.2 Journals for which papers were reviewed

1. Materials and Design
2. Additive Manufacturing, and Additive Manufacturing Letters
3. Journals of Materials Processing Technology
4. Transactions of the American Society of Mechanical Engineers, Journal of Manufacturing Science and Engineering
5. Transactions of the Institute of Industrial and System Engineers, Journal of Quality and Reliability; and Journal of Manufacturing and Design
6. Transactions of the Institute of Electrical and Electronics Engineers (numerous journals), including Transactions of Automation Science and Engineering; Semiconductor Manufacturing; Sensors.
7. Society of Manufacturing Engineers (SME), Journal of Manufacturing Systems; and Journal of Manufacturing Processes.
8. Materials Science and Engineering (A)

Section 5.3 Leadership Positions in International and National Organizations

1. Symposium Organizer, Smart Additive Manufacturing − ASME, Manufacturing Science and Engineering Conference, Since 2021.
2. Symposium Organizer, Quality Assurance in Additive Manufacturing − Sensing, Analytics, and Control, ASME, Manufacturing Science and Engineering Conference, 2014-2020.
3. Symposium Organizer, Cyber physical Systems, Advances in Cyber Physical Systems − Stochastic Modeling, and Sensor Networks in Advanced Manufacturing, ASME Manufacturing Science and Engineering Conference, 2014-2020
4. Session Organizer, Big Data Analytics in Additive Manufacturing, Solid Freeform Fabrication Symposium, 2018, 2019, 2020, 2021, 2022, 2024.
5. Referee, Best Paper Competition, Institute of Industrial and Systems Engineers Annual Conference, 2015, 2016, 2020.

6. Organizer, Best Paper Competition, Quality, Statistics, and Reliability (QSR) Division, Institute for Operations Research and Management Science World Meeting, Houston, Texas, 2017.
7. Invited Panelist, Future Academician Session, Quality, Statistics, and Reliability (QSR) Division, Institute for Operations Research and Management Science World Meeting, Houston, Texas, 2017.
8. Referee, Best Paper Competition, Quality, Statistics, and Reliability (QSR) Division, Institute for Operations Research and Management Science World Meeting, Nashville, TN, 2016.
9. Panelist and Referee, Best Student Paper Competition, Quality, Statistics, and Reliability (QSR) Division, Institute for Operations Research and Management Science World Meeting, Philadelphia, PA, 2015.
10. Track Organizer, Quality and Reliability Engineering, Institute of Industrial and Systems Engineers, 2015, Nashville, TN.

Section 5.4 Leadership Positions in Regional and Local Organizations.

1. Invited Guest Speaker and Science Fair Judge, Greater Nebraska Science and Engineering Fair (GNSEF), Nebraska City High School, Saturday, March 25, 2017. Sponsor: Dr. Pam Rademacher (GNSEF Director).

Section 5.5 Memberships in Professional Organizations

1. American Society of Mechanical Engineers (ASME, Since 2014)
2. Institute of Industrial and Systems Engineers (IISE, Since 2003)
3. Institute for Operations Research and Management Science (INFORMS, Since 2005)
4. Materials Research Society, Since 2017.

Section 5.6 Research review panels

1. National Science Foundation, Major Research Instrumentation Program, March 2024. Program Office: Alexander Leonessa
2. Louisiana Board of Regents Support Fund Departmental Enhancement Engineering B Review, February 2024 (Served as panel chair).
3. National Science Foundation, Advanced Manufacturing (CAREER) September 2023, Program Officer: Linkan Bian
4. National Science Foundation, Office of Integrative Activities, June 2023, Program Officer: Phinas Ben-Tzvi
5. National Science Foundation, Small Business Innovation Research, September 2023, Program Officer: Vincent Lee
6. National Science Foundation, Partnerships for Innovation, October 2023, Program Officer: Debora Rodrigues
7. Singapore Agency for Science, Technology, and Research (A*STAR), Technical Review Panel Workshop for Singapore's MTC Programmatic Proposal '4D Additive Manufacturing (AM) of Smart Structures, October 3, 2023, Program Officer: Sir John O'Reilly.
8. National Science Foundation, Advanced Manufacturing, 09/13/2022, Program Officer: Kershed Cooper
9. National Science Foundation, PFI: Sensing and Metrology, 09/15/2022, Program Officer: Samir Iqbal

10. NASA Postdoctoral Program (NPP), Nano Compositing of La3-xTe4 through Reactive Decomposition of NiTe, 04/20/2022
11. Singapore Agency for Science, Technology, and Research (A*STAR), 04/06/2022
12. National Science Foundation, Leap-HI: Manufacturing, 02/15/2022, 02/16/2022, Program Officer: Bruce Kramer
13. Louisiana Board of Regents 2021-22 Departmental Enhancement Engineering B Panel, 01/25/2022
14. National Science Foundation, Advanced Manufacturing, 01/27/2022, Program Officer: Y. Kevin Chou.
15. National Science Foundation, MoMS ERI Proposal Review A, 10/18/2021 – 10/19/2021, Program Officer: Lucy Zhang.
16. National Science Foundation, PFI: Biomedical Engineering, 09/20/2021, Program Officer: Jesus Soriano-Molla
17. National Science Foundation, SBIR: Phase I: Advanced Manufacturing I, 02/16/2021, Program Officer: Elizabeth Mirkowski
18. NASA Flight Opportunities Bioprinting and Polymer Manufacturing Panel, 08/25/2020
19. National Science Foundation, Advanced Manufacturing, 05/08/2020, Program Officer: Kershed Cooper.
20. National Science Foundation, Cyber-Physical Systems, 06/12/2018 – 06/13/2018, Program Officer: David Corman
21. Panelist for Proposal Review, National Science Foundation, Service Manufacturing and Operations Research (SMOR), July 2016.
22. Ad-hoc Panelist for European Research Foundation, Summer 2020, 2021.
23. Ad-hoc Reviewer, Department of Energy, Summer 2020.
24. Young Reviewers' Panel, ASME MSEC, 2015, Charlotte, NC.

Section 5.7 Leadership positions on internal committees.

Position Type	Area	Department	University	Year
Tenure track	Advanced manufacturing	Industrial and Systems Engineering	Virginia Tech	Fall 2023
Non-tenure Track	Advanced manufacturing	Industrial and Systems Engineering	Virginia Tech	Spring 2023
Tenure-track	Additive Manufacturing	Mechanical and Materials Engineering	UNL	Fall 2022
Tenure-track	Robotics and Automation, and Systems Integration	Electrical and Computer Engineering	UNL	Fall 2020
Tenure-track	Mechanical and Manufacturing	Mechanical and Materials Engineering	UNL	Fall 2020
Tenure-track	Biomedical Engineering	Mechanical and Materials Engineering	UNL	Fall 2019

Section 5.8 Other Service Accomplishments

1. Faculty Adviser for VEXRobotics Student Group (2017-2021)
2. Faculty Adviser WarGamers Club (2017-2021)

Section 6 Other Accomplishments

Section 6.1 Professional Development

- Listed in Academic Keys Who's Who in Engineering Academia, 2015
- Invited to attend the Junior Faculty Colloquium: IISE, Nashville, TN, 2015
- Invited to attend the Future Academician Colloquium: INFORMS, Phoenix, AZ, 2012
- ASQ Certified Quality Process Analyst (CQPA), 2005
- APICS Certified in Supply Chain Management (CSM) - Module I, 2004

List of References

1. **Dr. Satish T.S. Bukkapatnam**
   Rockwell International Chair Professor
   Industrial and Systems Engineering
   Texas A&M University, College Station, TX 77843
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2. **Dr. Zhenyu (James) Kong**
   Professor
   Grado Department of Industrial and Systems Engineering
   Virginia Polytechnic Institute and State University
   Blacksburg, VA 24061
   zkong@vt.edu;
   office: 540-231-9762; cell: 405-334-8574

3. **Dr. Iris Rivero**
   Professor and Head
   Department of Industrial and Systems Engineering
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   iris.rivero@ufl.edu
   cell: 806-543-6245

4. **Dr. Soundar Kumara**
   Allen E. Pearce and Allen M. Pearce Professor of Industrial Engineering
   Industrial and Manufacturing Engineering
   Pennsylvania State University
   State College, PA 16803
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   office: 814-863-2359

5. **Dr. Shivakumar (Shiva) Raman**
   Professor and Department Head
   Director of ISE; David Ross Boyd Professor; Morris Pittman Professor; Samual Roberts Noble Foundation Presidential Professor
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