William (Bill) Z. Bernstein, Ph.D.

CONTACT INFORMATION

National Institute of Standards and Technology
Systems Integration Division
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RESEARCH INTERESTS

Smart Manufacturing, Digital Enterprise, Sustainable Manufacturing, Visual Analytics, Industrial Augmented Reality, Product Lifecycle Management, Information Modeling

CURRENT APPOINTMENT

Mechanical Engineer, National Institute of Standards and Technology **2015 to present**
Systems Integration Division, Gaithersburg, Maryland

- Project Leader - Product Lifecycle Data Exploration and Visualization (PLDEV), Model-Based Enterprise (MBE) Program, Engineering Laboratory
- Chair - NIST Extended Reality (XR) Community of Interest (COI).
  The NIST XR COI organizes all NIST-wide activities related to AR, VR, and XR research
- Co-Chair - AME Subpanel - Digital Information Visualization (DIV) Working Group.
- ***Summary:*** Dr. Bernstein is a Mechanical Engineer in the Systems Integration Division at the National Institute of Standards and Technology (NIST). He manages a project on Product Lifecycle Data Exploration and Visualization as part of the Model-Based Enterprise Program. Currently, Dr. Bernstein developed the Digital Information Visualization and Exploration (DIVE) Lab, a new visualization laboratory at NIST to support research into smart manufacturing systems with particular emphasis on deriving actionable knowledge from manufacturing data. He contributes to standards focused on the integration of manufacturing and design knowledge to connect the "digital thread" between these two areas.

EDUCATION

Purdue University, West Lafayette, Indiana

Ph.D., School of Mechanical Engineering, December 2015

- Thesis Topic: *Human-centered environmentally conscious product redesign methods*
- Advisers: Professor Karthik Ramani and Professor Fu Zhao
- Area of Study: Engineering Design

University of Cincinnati, Cincinnati, Ohio

B.S., Biomedical Engineering, June 2009

- Area of concentration: Biomechanics
- Minor in Materials Science Engineering

HONORS AND AWARDS

American Society of Mechanical Engineers

- **Young Engineer Award**, Computer and Information in Engineering (CIE) Division, 2019.
- **DFMLC Scholar Award**, Design for Manufacturing and the Life Cycle (DFMLC) Committee, 2014.
- **DFMLC Best Paper Award**, Design for Manufacturing and the Life Cycle (DFMLC) Committee, 2013.
  - ShapeSift: Suggesting sustainable options in design reuse from part repositories [DOI]

US Department of Commerce

- **Bronze Medal Award**, 2020.

National Institute of Standards and Technology

- NIST Foundations of Leadership Program (FLP), 2018.

National Science Foundation
- Travel Grant for MSEC 2012/NAMRC 40, 2012
- Graduate Research Fellowship Honorable Mention, 2011

Purdue University
- **Magoon Excellence in Teaching Award**, College of Engineering, 2015.
- **Travel Grant**, College of Engineering, 2014
- **Best Graduate Poster**, Ecological Sciences and Engineering (ESE) Symposium, 2011
  - Discovering Material Recovery Scenarios for Industrial Machinery [URL]

Society of Manufacturing Engineers
- **Outstanding Reviewer Status**, *Journal of Manufacturing Systems*, 2018.

Professional Experience

Design Engineer, Consultant, Continuous Solutions LLC **2014 to 2016**
Portland, Oregon
- Machine design for permanent magnet synchronous machines

Graduate Research Assistant, Purdue University **2009 to 2015**
School of Mechanical Engineering, C Design Lab
West Lafayette, Indiana
- Supervisor: Prof. Karthik Ramani
- Human-centered environmentally conscious product redesign methods

Research Intern, Tata Consultancy Services **2013 to 2014**
TCS Innovation Labs - Cincinnati
Milford, Ohio
- Supervisors: Dr. Jeffrey Tew, Dr. Devadatta Kulkarni, and Dr. Guatam Sardar
- Information visualization tool development for supply chain decision making

Research Assistant, Tampere University of Technology **2011**
Department of Production Engineering
Tampere, Finland
- Supervisors: Dr. Mikko Koho and Prof. Seppo Torvinen
- Benchmarking competitive sustainable manufacturing industrial practices in Finland

Technical Research Consultant, Sandvik Mining and Construction Oy **2011**
Tampere, Finland
- Assessment of material recovery scenarios for heavy earth-moving equipment

R&D Design Engineer, Ethicon Endo-Surgery Inc. **2008**
Cincinnati, Ohio
- Supervisor: Dr. Rob Beetel
- Design and testing for harmonic scalpel technology

Research Assistant, University of Cincinnati, School of Medicine **2006 to 2007**
Cincinnati, Ohio
- Supervisors: Dr. Peter J. Stambrook and Dr. El Mustapha Bahassi
- Protein interaction in the context of DNA damage repair

Refereed Journal Publications

20. Kwon, S., Monnier, L. V., Barbau, R., **Bernstein, W. Z.**, 2020. Enriching Standards-Based Digital Thread by Fusing As-Designed and As-Inspected Data Using Knowledge Graphs. *Advanced Engineering Informatics*. [DOI]

19. Shankar Raman, A., Haapala, K.R., Raoufi, K., Linke, B.S., **Bernstein, W.Z.**, Morris, K.C., 2020. Defining Near-Term to Long-Term Research Opportunities to Advance Metrics, Models, and Methods for Smart and Sustainable Manufacturing. *Smart and Sustainable Manufacturing Systems*. [DOI]

18. Brodsky, A., Nachawati, M.O., Krishnamoorthy, M., **Bernstein, W.Z.**, Menasce, D.A., 2019. Factory optima: a web-based system for composition and analysis of manufacturing service networks based on a reusable model repository. *International Journal of Computer Integrated Manufacturing*. [DOI][PDF]

17. Ramanujan, D., **Bernstein, W.Z.**, Totorikaguena, M.A., Ilvig, C.F., Orskov, K.B., 2018. Generating Contextual Design for Environment Principles in Sustainable Manufacturing Using Visual Analytics. *Journal of Manufacturing Science and Engineering*. [DOI][PDF]

16. Mani, M., Morris, K.C., Lyons, K.W., **Bernstein, W.Z.**, 2018. Reusable Models of Manufacturing Process for Discrete, Batch, and Continuous Production. *Journal of the Washington Academy of Sciences*. [URL]

15. Brundage, M.P., **Bernstein, W.Z.**, Hoffenson, S., Chang, Q., Nishi, H., Kilks, T., Morris, K.C., 2018. Analyzing environmental sustainability methods for use earlier in the product lifecycle. *Journal of Cleaner Production*. [DOI][PDF]

14. **Bernstein, W.Z.**, Bala Subramaniyan, A., Brodksy, A., Garretson, I.C., Haapala, K.R., Libes, D., Pan, R., Prabhu, V., Sarkar, A., Shankar Raman, A., Wu, Z., 2018. Research directions of an open unit manufacturing process repository: a collaborative vision. *Manufacturing Letters*. [DOI][PDF]

13. **Bernstein, W.Z.**, Hedberg Jr., T., Helu, M., Barnard Feeney, A., Contextualizing manufacturing data for lifecycle decision making, 2018. *International Journal of Product Lifecycle Management*. [URL]

12. Ramanujan, D., **Bernstein, W.Z.**, Chandrasegaran, S.K., Ramani, K., 2017. Visual analytics tools for sustainable lifecycle design: current status, challenges, and future opportunities. *Journal of Mechanical Design*, Special Issue on Data-Driven Design. [DOI] [PDF]

11. Feng, S.C., **Bernstein, W.Z.**, Hedberg Jr., T., Barnard Feeney, A., 2017. Toward knowledge management for smart manufacturing. *Journal of Computing and Information Science in Engineering*, 17(3), p. 031016. [DOI] [PDF]

10. Bairaktarova, D., **Bernstein, W.Z.**, Reid, T. and Ramani, K., 2016. Beyond surface knowledge: an exploration of how empathic design techniques enhances engineers understanding of users' needs. *International Journal of Engineering Education*, 32(1), p.111-122. [PDF]

9. Ramanujan, D., **Bernstein, W.Z.**, Benjamin, W., Ramani, K., Elmqvist, N., Kulkarni, D. and Tew, J., 2015. A Framework for Visualization-Driven Eco-Conscious Design Exploration. *Journal of Computing and Information Science in Engineering*, 15(4), p.041010. [DOI] [PDF]

8. **Bernstein, W.Z.**, Ramanujan, D., Kulkarni, D.M., Tew, J., Elmqvist, N., Zhao, F. and Ramani, K., 2015. Mutually coordinated visualization of product and supply chain metadata for sustainable design. *Journal of Mechanical Design*, 137(12), p.121101. [DOI] [PDF]

7. Ramanujan, D., **Bernstein, W.Z.**, Choi, J.K., Koho, M., Zhao, F. and Ramani, K., 2014. Prioritizing Design for Environment Strategies using a stochastic analytic hierarchy process. *Journal of Mechanical Design*, 136(7), p.071002. [DOI] [PDF]

6. **Bernstein, W.Z.**, Ramanujan, D., Zhao, F., Ramani, K. and Cox, M.F., 2012. Teaching design for environment through critique within a project-based product design course. *International Journal of Engineering Education*, 28(4), p.799. [PDF]

5. Ramani, K., Ramanujan, D., **Bernstein, W.Z.**, Zhao, F., Sutherland, J., Handwerker, C., Choi, J.K., Kim, H. and Thurston, D., 2010. Integrated sustainable life cycle design: a review. *Journal of Mechanical Design*, 132(9), p.091004. [DOI] [PDF]

4. Devanathan, S., Ramanujan, D., **Bernstein, W.Z.**, Zhao, F. and Ramani, K., 2010. Integration of sustainability into early design through the function impact matrix. *Journal of Mechanical Design*, 132(8), p.081004. [DOI] [PDF]

3. Zhao, F., **Bernstein, W.Z.**, Naik, G. and Cheng, G.J., 2010. Environmental assessment of laser assisted manufacturing: case studies on laser shock peening and laser assisted turning. *Journal of Cleaner Production*, 18(13), pp.1311-1319. [DOI] [PDF]

2. Andrysik, Z., **Bernstein, W.Z.**, Deng, L., Myer, D.L., Li, Y.Q., Tischfield, J.A., Stambrook, P.J. and Bahassi, E.M., 2010. The novel mouse Polo-like kinase 5 responds to DNA damage and localizes in the nucleolus. *Nucleic acids research*, 38(9), pp.2931-2943. [DOI] [PDF]

1. Bahassi, E.M., Ovesen, J.L., Riesenberg, A.L., **Bernstein, W.Z.**, Hasty, P.E. and Stambrook, P.J., 2008. The checkpoint kinases Chk1 and Chk2 regulate the functional associations between hBRCA2 and Rad51 in response to DNA damage. *Oncogene*, 27(28), pp.3977-3985. [DOI] [PDF]

Conference Publications

31. Hanke, A., Vernica, T., **Bernstein, W.Z.**, Linking performance data and geospatial information of manufacturing assets through standard representations. *Proceedings of the ASME 2020 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [PDF]

30. **Bernstein, W.Z.**, Tensa, M., Praniewicz, M., Kwon, S., Ramanujan, D., 2020. An automated workflow for integrating sustainability assessment into parametric part design through standard reference models. *Proceedings of the 27th CIRP Conference on Life Cycle Engineering (LCE)*. [PDF][DOI]

29. Komoto, H., **Bernstein, W.Z.**, Kwon, S., Kimura, F., 2020. Standardizing environmental performance evaluation of manufacturing systems through ISO 20140. *Proceedings of the 27th CIRP Conference on Life Cycle Engineering (LCE)*. [DOI]

28. Vernica, T.I., Hanke, A.M., **Bernstein, W.Z.**, 2020. Leveraging standard geospatial representations for industrial augmented reality. *Proceedings of the 11th Model-Based Enterprise Summit (MBE 2020)*. [PDF]

27. Shankar Raman, A., Harper, D., Haapala, K.R., Linke, B.S., **Bernstein, W.Z.**, Morris, K.C., 2019. Challenges in Representing Manufacturing Processes for Systematic Sustainability Assessments: Workshop on June 21, 2018. *Proceedings of the 2019 ASME International Manufacturing Science and Engineering Conference*. [DOI]

26. Sprock, T., Sharp, M., **Bernstein, W.Z.**, Brundage, M.P., Helu, M., Hedberg, T., 2019. Integrated Operations Managament for Distributed Manufacturing. *Proceedings of the 9th IFAC cofnerence on Manufacturing Modelling, Management and Control (MIM 2019)*. [DOI][PDF]

25. Monnier, L.V., **Bernstein, W.Z.**, Foufou, S., 2019. A proposed mapping method for aligning machine execution data to numerical control code. *Proceedings of the IEEE Internaional Conference on Automation Science and Engineering (CASE 2019)*. [DOI][PDF]

24. Kulkarni A., **Bernstein, W.Z.**, Lechevalier, D., Balasubramanian, D., Denno, P., Karsai, G., 2019. Towards Operational Use of Unit Manufacturing Process Models. *Proceedings of the 20th IEEE International Conference on Industrial Technology*. [DOI][PDF]

23. **Bernstein, W.Z.**, Tamayo, C.D., Lechevalier, D., Brundage, M.P., 2019. Incorporating unit manufacturing process models into life cycle assessment workflows. *Proceedings of the 26th CIRP Conference on Life Cycle Engineering*. [DOI][PDF]

22. **Bernstein, W.Z.**, Krima, S., Monnier, L.V., Shahid, M., 2019. Securing, Authenticating, and Visualizing Data-Links for Manufacturing Enterprises. *Proceedings of the 10th Model-Based Enterprise Summit (MBE 2019)*. [PDF]

21. Ramanujan, D., **Bernstein, W.Z.**, 2018. VESPER: visual exploration of similarity and performance metrics for computer-aided design repositories. *Proceedings of the 2018 ASME International Manufacturing Science and Engineering Conference*. [DOI][PDF]

20. **Bernstein, W.Z.**, Lechevalier, D., Libes, D., 2018. UMP builder: capturing and exchanging manufacturing models for sustainability. *Proceedings of the 2018 ASME International Manufacturing Science and Engineering Conference*. [DOI][PDF]

19. Brodsky, A., Krishnamoorthy, M., Nachawati, M.O., **Bernstein, W.Z.**, Menascé, D.A., 2017. Manufacturing and contract service networks: composition, optimization, and tradeoff analysis based on a reusable repository of performance models. *Proceedings of the 2017 IEEE International Conference on Big Data*. [DOI][PDF]

18. Ameri, F., **Bernstein, W.Z.**, 2017. A thesaurus-guided framework for visualization of unstructured manufacturing capability data. *Proceedings of the 2017 International APMS Conference*. [DOI]

17. Ramanujan, D., **Bernstein, W.Z.**, 2017. Design patterns for visualization-based tools in sustainable product design. *Proceedings of the ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [PDF][DOI]

16. Li, K., **Bernstein, W.Z.**, 2017. Developing a capability-based similarity metric for manufacturing processes. *Proceedings of the ASME 2017 International Manufacturing Science and Engineering Conference*. **Best paper finalist.** [DOI] [PDF]

15. Brundage, M.P., **Bernstein, W.Z.**, Morris, K.C., Horst, J.A., 2017. Using graph-based visualizations to explore key performance indicator relationships for manufacturing production systems. *Procedia CIRP*, 61, pp. 451-456. [DOI] [PDF]

14. Brodsky, A., Krishnamoorthy, M., **Bernstein, W.Z.**, Nachawati, M.O., 2016. A system and architecture for reusable abstractions of manufacturing processes. In *Proceedings of the 2016 IEEE International Conference on Big Data*. [DOI] [PDF]

13. **Bernstein, W.Z.**, Mani, M., Lyons, K.W., Morris, K.C. and Johansson, B., 2016. An open web-based repository for capturing manufacturing process information. In *Proceedings of the ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

12. Ramanujan, D., **Bernstein, W.Z.**, Kulkarni, D., Tew, J. and Ramani, K., 2016. ShapeSIFT: evaluating InfoVis tools for eco-conscious design. In *Proceedings of the ASME 2016 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

11. Rebouillat, L., Barletta, I.G., Johansson, B., Mani, M., **Bernstein, W.Z.**, Morris, K.C. and Lyons, K.W., 2016. Understanding sustainability data through unit manufacturing process representations: a case study on stone production. In *Proceedings of the 49th CIRP Conference on Manufacturing Systems*. Procedia CIRP. [DOI] [PDF]

10. **Bernstein, W.Z.**, Ramanujan, D., Elmqvist, N., Zhao, F. and Ramani, K., 2014. ViSER: Visualizing Supply Chains for Eco-Conscious Redesign. In *Proceedings of the ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

9. Ramanujan, D., **Bernstein, W.Z.**, Cardella, M. and Ramani, K., 2014. Contextualizing Environmental Sustainability in Design Engineering Curricula. In *Proceedings of the ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

8. **Bernstein, W.Z.**, Ramanujan, D., Zhao, F. and Ramani, K., 2013. Profiling energy consumption of smartphone users for environmentally efficient business decisions. In *Proceedings of the ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

7. Ramanujan, D., Benjamin, W., **Bernstein, W.Z.**, Elmqvist, N. and Ramani, K., 2013. ShapeSIFT: Suggesting Sustainable Options in Design Reuse From Part Repositories. In *Proceedings of the ASME 2013 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*. [DOI] [PDF]

6. **Bernstein, W.Z.**, Ramani, A., Ruan, X., Ramanujan, D. and Ramani, K., 2012. Designing-In Sustainability by Linking Engineering Curricula With K-12 Science Projects. In *Proceedings of the ASME 2012 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pp. 305-312. [DOI] [PDF]

5. **Bernstein, W.Z.**, Ramanujan, D., Koho, M., Zhao, F. and Ramani, K., 2012. Discovering Material Recovery Scenarios for Industrial Machinery: A Case-Based Approach. In *Proceedings of the ASME 2012 International Manufacturing Science and Engineering Conference*, pp. 1097-1104. [DOI] [PDF]

4. Ramanujan, D., **Bernstein, W.Z.**, Zhao, F. and Ramani, K., 2011. Addressing uncertainties within product redesign for sustainability: a function based framework. In *Proceedings of the ASME 2011 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pp. 1057-1064. [DOI] [PDF]

3. **Bernstein, W.Z.**, Ramanujan, D., Cox, M.F., Zhao, F., Sutherland, J.W. and Ramani, K., 2011. Implementing design critique for teaching sustainable concept generation. In *Proceedings of the 18th International Conference on Engineering Design (ICED 11), Impacting Society through Engineering Design*, Vol. 8: Design Education, Lyngby/Copenhagen, Denmark, 15.-19.08. 2011. [PDF]

2. **Bernstein, W.Z.**, Ramanujan, D., Devanathan, S., Zhao, F., Sutherland, J. and Ramani, K., 2010. Function impact matrix for sustainable concept generation: a designer's perspective. In *Proceedings of the ASME 2010 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, pp. 377-383. [DOI] [PDF]

1. **Bernstein, W.Z.**, Ramanujan, D., Devanathan, S., Zhao, F., Ramani, K. and Sutherland, J., 2010. Development of a framework for sustainable conceptual design. In 17th CIRP International Conference on Life Cycle Engineering. Hefei, China: CIRP. [PDF]

ISSUED PATENTS

1. Ramanujan, D., **Bernstein, W.Z.**, Ramani, K., Kulkarni, D.M. and Tew, J., 2019. System and method for multi-dimensional data representation of objects. U.S. Patent No. 10275501. [Google Patents][PDF]

Patent Applications

1. **Bernstein, W.Z.**, Ramanujan, D., Ramani, K., Kulkarni, D.M. and Tew, J., 2016. System and method for multi-level data representation of object lifecycle. U.S. Patent Application 14/818,816. [Google Patents]

Other Publications

9. **Bernstein, W.Z.**, "Mixing and Matching Standards to Ease AR Integration within Factories," *Augmented Reality for Enterprise Alliance (AREA) Blog*. [URL]

8. **Bernstein, W.Z.**, "Mixing and Matching Standards to Ease AR Integration within Factories," *Augmented Reality for Enterprise Alliance (AREA) Blog*. [URL]

7. **Bernstein, W.Z.**, Morris, K.C., Competition Seeks to Improve Manufacturing Practices and Standards Development. *Manufacturing Engineering*. [URL]

6. Faust, R., Isaacs, K., **Bernstein, W.Z.**, Sharp, M., Scheidegger, C, 2019. Anteater: Interactive Visualization for Program Understanding. *Arxiv Preprint*. [PDF]

5. Lechavlier, D., **Bernstein, W.Z.**, 2019. The Unit Manufacturing Process (UMP) Builder: User's Guide. *NIST Interagency/Internal Report (NISTIR) 8258*. [DOI][PDF]

4. **Bernstein, W.Z.**, Lechevalier, D., 2019. A Reference Schema for the Unit Manufacturing Process Information Model. *Journal of Research (NIST JRES)*. [DOI][PDF]

3. Ivezic, N., Kulvatunyou, B., Cho, H., Lu, Y., Davis, J., Wuest, T., Ameri, F., **Bernstein, W.Z.**, 2017. NIST/OAGi Workshop: Drilling down on Smart Manufacturing - Enabling Composable Apps. *Advanced Manufacturing Series (NIST AMS)*. [DOI][PDF]

2. **Bernstein, W.Z.** *Human-centered environmentally conscious product redesign methods*. PhD thesis, Purdue University, West Lafayette, IN, 2015. [URL]

1. Ramanujan, D., **Bernstein, W.Z.**, Koho, M. and Torvinen, S., Pavlic, T.P. Competitive and sustainable production systems and networks. Technical Report. Technological University of Tampere, Department of Production Engineering, Tampere, Finland, 2012. [PDF]

Invited Talks

24. "An automated workflow for integrating sustainability assessment into parametric part designthrough standard reference models." Virtual presentation at CIRP LCE.

23. "The potential for standardizing AR-ready geospatial definitions for production systems," Tea Seminar to Systems Integration Division at NIST, Gaithersburg, MD, January 8, 2020.

22. ergo-x

21. âĂIJDirections for Sustainable Manufacturing Standards: Towards more accurate and reproducible manufacturing process models for life cycle inventory model generation.' October 23, 2019. Virtual Lecture to Graduate Class in Aarhus University.

20. "Securing, Authenticating, and Visualizing Data-Links for Manufacturing Enterprise." MBE Summit 2019. National Institute of Standards and Technology, Gaithersburg, MD. April 2, 2019.

19. "Incorporating Unit Manufacturing Process Models into Life Cycle assessment Workflows." CIRP LCE 2019. West Lafayette, IN. May 8, 2019.

18. “VESPER: Visual Exploration of Similarity and Performance Metrics for Computer-Aided Design Repositories.” ASME MSEC 2018. June 19, 2018.

17. “Integrating Data Visualization Software with Manufacturing Facility Databases: Reference Implementation and Lessons Learned. MBE Summit 2018. National Institute of Standards and Technology, Gaithersburg, MD. April 2, 2018.

16. “The Unit Manufacturing Process (UMP) Repository: Progress and Next Steps.” Technical Seminar. National Institute of Standards and Technology, Gaithersburg, MD. March 29, 2018.

15. “Manufacturing and Contract Service Networks: Composition, Optimization and Trade-off Analysis based on a Reusable Repository of Performance Models.” IEEE BigData 2nd Symposium on Data Analytics for Advanced Manufacturing, Boston, MA. December 13, 2017.

14. “Design Patterns for Visualization-Based Tools in Sustainable Product Design.” ASME IDETC/CIE 2017, Cleveland, OH. August 8, 2017.

13. “Data-Driven Manufacturing: Challenges, Opportunities, and Vision.” Technical Seminar. GE Digital, San Ramon, CA. January, 24, 2017.

12. “An Open Web-Based Repository for Capturing Manufacturing Process Information.” ASME IDETC/CIE 2016, Charlotte, NC. August 13, 2016.

11. “Update on SETAC 2016 Roadmapping: Life Cycle Tools, Uncertainty & Visualization.” W6: Advancing Sustainable Design: Road-mapping and Community Building, ASME IDETC/CIE 2016, Charlotte, NC. August 12, 2016.

10. “Crowdsourcing Manufacturing Knowledge: Capture and Elicitation Approaches.” NIST & OAGi Workshop: Drilling down on Smart Manufacturing - Enabling Composable Apps. National Institute for Standards and Technology, Gaithersburg, MD. April 18, 2016.

9. “Smart Visualization for Smart Manufacturing.” Model-Based Enterprise Summit 2016. National Institute for Standards and Technology, Gaithersburg, MD. April 12, 2016.

8. “Data Representation Methods for Lifecycle Decision Making. Technical Seminar.” National Institute of Standards and Technology, Gaithersburg, MD. March 24, 2015.

7. “ViSER: Visualizing supply chains for eco-conscious redesign.” ASME IDETC/CIE 2014, Buffalo, NY. August, 18, 2014.

6. “Profiling energy consumption of smartphone users for environmentally efficient business decisions.” ASME IDETC/CIE 2013, Portland, OR. August 6, 2013.

5. “ShapeSIFT: Suggesting sustainable options in design reuse from part repositories.” ASME IDETC/CIE 2013, Portland, OR. August 5, 2013.

4. “Designing-In Sustainability by Linking Engineering Curricula With K-12 Science Projects.” ASME IDETC/CIE 2012, Chicago, IL. August 13, 2012.

3. “Discovering material recovery scenarios for industrial machinery: A case-based approach.” ASME MSEC 2012, South Bend, IN. June 6, 2012.

2. “Implementing design critique for teaching sustainable concept generation.” ICED ’11. Copenhagen, Denmark. August 17, 2011.

1. “Function impact matrix for sustainable concept generation: A designer’s perspective.” ASME IDETC/CIE 2010, Montreal, Quebec. August 17, 2010.

PROFESSIONAL SERVICE

Journal Guest Editor

- *Journal of Manufacturing Science and Engineering - Special Issue on Sustainable Life Cycle Engineering*, 2019.

Journal Paper Referee (in alphabetical order)

- *International Journal of Automation Technology*
- *Journal of Cleaner Production*
- *Journal of Computing and Information Science in Engineering*
- *Journal of Manufacturing Science and Engineering*
- *Journal of Manufacturing Systems*
- *Journal of Mechanical Design*
- *Journal of Sustainability*
- *Robotics and Computer-Integrated Manufacturing*
- *Transactions on Visualization and Computer Graphics*

Conference Paper Referee (in alphabetical order)

- *IEEE Big Data Conferences*
- *ASME MSEC Conferences*
- *ASME IDETC/CIE Conferences*
- *CIRP Life Cycle Engineering Conferences*
- *IEEE VIS Conferences*

Conference Service

- ASME DFMLC2020 Conference Chair
- ASME DFMLC2019 Conference Chair
- ASME DFMLC2018 Program Chair
- Symposium & Session Chairs
  - MSEC2018: Advances in Information Visualization and Visual Analytics for Product Lifecyle Decision-Making tem IDETC2017: DFMLC-1: Integrated Product and Process Development
  - IDETC2017: DFMLC-14: Student Poster Competition on Data-Driven X for the Life Cycle. Designed and led event.
  - MSEC2017: 1-4 Environmental Sustainability of Additive Manufacturing Processes
  - MSEC2017: 5-4-1 Sustainable Manufacturing: Design and Planning
  - IEEE Big Data 2016: I&G-short2: Massive Processing & Experience.
  - IDETC2016: DFMLC 1-1: Integrated Product and Process Development.
  - IDETC2014: DFMLC 12-1: Sustainability of Industrial Systems (Special Session)
- Workshop Organizer
  - RAMP 2019 Competition. 2019 ASME MSEC, Erie, PA, June 10-14, 2018.
  - RAMP 2018 Competition. 2018 ASME MSEC, College Station, TX, June 18-22, 2018.
  - "Workshop on Formalizing Manufacturing Processes for Structured Sustainability Assessments," 2017 ASME MSEC, Los Angeles, CA, June 4 – 8, 2017.
  - RAMP 2017 Competition. 2017 ASME MSEC, Los Angeles, CA, June 4 – 8, 2017.
  - "Advancing sustainable design: road-mapping and community building," 2016 ASME IDETC/CIE, Charlotte, NC, August 21–24, 2016.
  - "Crowdsourcing of manufacturing knowledge," NIST/OAGi Smart Manufacturing Workshop, Gaithersburg, MD, April 18–19, 2016.

Standards Service

- Work Item Lead
  - Appendix to ISO 20140 TR - Usage Guide
  - Revision of ASTM E3012
  - Revision of ASTM E2987
- Official Host
  - 29th ISO TC 184 SC5 WG10 meeting in February 2020.
  - 27th ISO TC 184 SC5 WG10 meeting in February 2019.
  - 23rd ISO TC 184 SC5 WG10 meeting in September 2017.

- Comment Coordinator
  - ISO 20140-5: Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment - Part 5: Environmental performance evaluation data. ISO/TC 184/SC 5, 2017.
  - ISO 20140-2: Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment - Part 2: Environmental performance evaluation process. ISO/TC 184/SC 5, 2016.

MENTORING & ADVISING

Teodor Vernica Post-master's researcher in Computer Science, Aarhus University.
Project title: *Investigating Interoperability Challenges for Industrial Augmented Reality*.
2019 - Present.

Aaron Hanke
Bachelor's thesis in Engineering Design and CAD, TU-Dresden.
Project title: *Linking Performance Data and Geospatial Information of Manufacturing Assets through Standard Representations*.
2019 - 2020.

Soonjo Kwon, PhD
Postdoctoral scientist in Engineering Design, KAIST.
Project title: *Model-Based Design for Inspection*.
2018 - Present.

Laetitia Monnier
PhD student in Computer Science, University of Burgandy.
Project title: *Data Mapping Toolkits for the Digital Thread*.
2018 - Present.

Rebecca Faust
PhD candidate in Computer Science, Arizona University.
Project title: *Visualization-Driven Understanding of Data Workflows*.
2017 - Present.

Melissa Tensa
Undergraduate student in Mechanical Engineering, Oregon State University.
Project title: *Integrating Environmental Life Cycle Assessment into Parametric Design Optimization*.
Summer of 2019.

Cesar D. Tamayo
Undergraduate student in Computer Engineering, Arizona State University.
Project title: *Incorporating Unit Manufacturing Process Models into Life Cycle Assessment Workflows*.
Summer of 2018.

Bohan Shan
Undergraduate student in Computer Engineering, University of Maryland College Park.
Project title: *Mining the publication universe for manufacturing process models.*
2017 - 2019.

Nathaniel Gibbons
Undergraduate student in Physics and Mathematics, Lebanon Valley College.
Project title: *Towards a workflow for optimizing machining instructions using reusable performance models*.
Summer of 2017.

Chris Ricigliano
High school student, Wilbert Tucker Woodson High School
Project title: *Using visualization software to analyze manufacturing data*.
Summers of 2016 & 2017.

Kevin Li
Undergraduate student in Mechanical Engineering, University of Maryland College Park.
Project title: *Defining a similarity measure for manufacturing processes*.
Summer of 2016.

TEACHING EXPERIENCE

Purdue University, West Lafayette, IN

Teaching Assistant **2013, 2014**

- ME 553: Product and Process Design
- Main instructor: Karthik Ramani

Lead Lecturer **2013**

- MSE 697: Design for Global Sustainability
  - Graduate-level course in applied life cycle assessment
  - Program PI: Carol H. Handwerker

Teaching Assistant **2012**

- ME 597: Sustainable Design and Manufacturing
  - Graduate-level course on sustainable engineering
  - Main instructor: Fu Zhao

University of Cincinnati, Cincinnati, OH

Learning Assistance Center Tutor **2008 to 2009**

- Undergraduate mathematics and engineering disciplines

PROFESSIONAL MEMBERSHIPS

American Society for Mechanical Engineers (ASME)	**2009 to present**
ASTM International	**2015 to present**
Institute of Electrical and Electronics Engineers (IEEE)	**2018 to present**
ISO TC184 SC5	**2016 to present**