CURRICULUM VITAE

Chenhui Shao
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A. PERSONAL

A.1. Education

Ph.D.	2016	Mechanical Engineering, University of Michigan
		Advisors: Dr. S. Jack Hu and Dr. Jionghua (Judy) Jin
M.A.	2013	Statistics, University of Michigan
M.S.E.	2013	Industrial and Operations Engineering, University of Michigan
B.E.	2009	Automation, University of Science and Technology of China

A.2. Employment

○ **Associate Professor**, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, August 2022–present

○ **Director**, ZJUI Education Programs – Mechanical Engineering, University of Illinois at Urbana-Champaign, August 2022–present

○ **Affiliate Faculty Member**, Institute for Inclusion, Diversity, Equity & Access, University of Illinois at Urbana-Champaign, October 2021–present

○ **Assistant Professor**, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, August 2016–August 2022

○ **Adjunct Assistant Professor**, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, April 2016–August 2016

○ **Postdoctoral Research Fellow**, Department of Mechanical Engineering, University of Michigan, April 2016–August 2016

B. HONORS AND AWARDS

○ Dean's Award for Excellence in Research, The Grainger College of Engineering, University of Illinois at Urbana-Champaign, 2022.

○ Editor's Choice Article, 2022. Yuhang Yang, Zhiqiao Dong, Yuquan Meng, and **Chenhui Shao**, "Data-driven intelligent 3D surface measurement in smart manufacturing: Review and outlook," *Machines*, Vol. 9, No. 1, pp. 13.

○ ASME Best Reviewers Award, 2021. The award recognizes outstanding and distinguished service to the *Journal of Manufacturing Science and Engineering*.

○ ASME Chao and Trigger Young Manufacturing Engineer Award, 2021. The award recognizes a young manufacturing researcher under 40 with potential for significant fundamental contributions to the

science and technology of manufacturing processes. One award is given every year.

○ <u>IISE Manufacturing and Design (M&D) Division Outstanding Young Investigator Award</u>, 2021. This award recognizes outstanding early-career Manufacturing and Design (M&D) Division members for their technical contribution to manufacturing and design. One award is given every year.

○ <u>Selected Attendee for the DELTA Junior Faculty Institute</u>, 2021. The ASEE (American Society for Engineering Education) DELTA (Developing Engineering Leaders of Tomorrow in the Academy) Junior Faculty Institute is a program for early-stage faculty members who show promise of significant impact over the course of their career. 30 participants are selected nationwide.

○ <u>Highlighted Project in the Manufacturing USA Report</u>, 2021. For project "Quantitative Non-Destructive Evaluation of Fatigue Damage Based on Multi-Sensor Fusion."

○ <u>Feature Article</u>, 2021. Yuhang Yang, Zhiqiao Dong, Yuquan Meng, and **Chenhui Shao**, "Data-driven intelligent 3D surface measurement in smart manufacturing: Review and outlook," *Machines*, Vol. 9, No. 1, pp. 13.

○ <u>National Science Foundation CAREER Award</u>, 2020.

○ <u>SME Barbara M. Fossum Outstanding Young Manufacturing Engineer Award</u>, 2019. The SME Outstanding Young Manufacturing Engineer Award recognizes manufacturing engineers, age 35 or younger, who have made exceptional contributions and accomplishments in the manufacturing industry.

○ <u>RAMP (Reusable Abstractions of Manufacturing Processes) Competition, 2nd Prize</u>, 2019. Organized by National Institute of Standards and Technology (NIST), the RAMP competition focuses on the modeling of manufacturing processes for system-level sustainability assessment.

○ <u>UIUC List of Teachers Ranked as Excellent by Their Students</u>, Spring 2018, Fall 2018, Fall 2019, Spring 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022.

○ <u>SME 30 Under 30 Honoree</u>, 2018. The SME 30 Under 30 program honors individuals who exemplify extraordinary promise in manufacturing and the STEM (science, technology, engineering or mathematics) skills that underpin the discipline.

○ <u>Best Paper Award</u>, 2017. **Chenhui Shao**, Jionghua (Judy) Jin, and S. Jack Hu, "Dynamic sampling design for characterizing spatiotemporal processes in manufacturing," *2017 ASME International Manufacturing Science and Engineering Conference*, Los Angeles, California, June 4–8, 2017.

○ <u>Scholar-in-Residence</u>, National Center for Supercomputing Applications (NCSA), 2017.

○ <u>Best Applications Paper Award</u>, IISE Transactions, 2017. Saumuy Suriano, Hui Wang, **Chenhui Shao**, S. Jack Hu, and Praveen Sekhar, (2015), "Progressive measurement and monitoring for multi-resolution data in surface manufacturing considering spatial and cross correlations," *IIE Transactions*, Vol. 47, No. 10, pp. 1033–1052.

○ <u>Feature Article</u>, IIE Transactions, 2015.

○ <u>The Honor Society of Phi Kappa Phi</u>, 2013–present.

○ <u>Rackham Travel Grant</u>, University of Michigan, 2013–2015.

○ <u>National Science Foundation Travel Grant</u>, 2013.

○ <u>Departmental Fellowship</u>, Department of Mechanical Engineering, University of Michigan, 2009–2010.

C.   RESEARCH

C.1.   Research Interest

- Smart manufacturing
- Machine learning
- Statistics
- Big data analytics in manufacturing
- Materials joining
- Manufacturing systems control and automation

C.2.   Grants and Contracts

Since August 2016, a total of over $8 million in research grants has been received by me and my collaborators at Illinois. Over $3 million is allocated to support my research program.

1. *Center for Advanced Research in Drying*, "Image-Based Physics-Constrained Machine Learning for Process Optimization and Design in Paper Drying Systems." January 2022–December 2022. Role: PI. Total: $22,500.

2. *National Science Foundation*, "IUCRC Phase II: U of Illinois at Urbana-Champaign: Center for Advanced Research in Drying (CARD)." August 2021–July 2026. Role: co-PI. Total: $500,000.

3. *National Science Foundation*, "Collaborative Research: A Digital Manufacturing Platform to Democratize Biological Tissue Access Using Smart Two-Photon Polymerization." May 2021–April 2024. Role: PI. Total: $250,000.

4. *USDA-NIFA*, "AI Institute for Next Generation Food Systems." 2020–2025. Role: co-PI. Total for Illinois site: $800,000.

5. *ZJU-UIUC Joint Research Center*, "Adaptive, Resilient Cyber-Physical Manufacturing Networks." 2020–2025. Role: co-PI. Total: $1,500,000.

6. *Department of Energy*, "Novel Energy-Efficient Drying Technologies for Food, Pulp and Paper, and other Energy Intensive Manufacturing Industries." July 2020–June 2023. Role: co-PI. Total: $4,519,028.

7. *National Science Foundation*, "CAREER: Dynamic Process-Attribute-Data-Performance Modeling to Enable Smart Ultrasonic Metal Welding." February 2020–January 2025. Role: PI. Total: $500,000.

8. *Center for Advanced Research in Drying*, "Smart Drying Enabled by Multi-Source Data Fusion and Machine Learning." January 2020–December 2021. Role: PI. Total: $100,000.

9. *The REMADE Institute*, "Quantitative Non-Destructive Evaluation of Fatigue Damage Based on Multi-Sensor Fusion." July 2019–February 2021. Role: PI. Total: $200,027.

10. *Department of Energy*, "A Multi-Scale Computational Platform for Predictive Modeling of Corrosion in Al-Steel Joints." September 2018–December 2021. Role: PI at Illinois. Total: $1,978,431.

11. *Department of Energy*, "Roll-to-Roll Manufactured Hybrid Metal-Polymer Heat Exchangers with Anti-Fouling and Self-Monitoring for Waste Heat Recovery." March 2018–February 2020. Role: co-PI. Total: $1,250,000.

12. *NSF Network for Computational Nanotechnology - Hierarchical nanoMFG Node*, "Uncertainty Quantification in Computational Tools for Nanomanufacturing." 2017–2022. Role: PI. Received support in forms of Graduate Research Assistants.

13. *CRRC Industrial Institute CO., LTD.*, "Research on Key Technology of Rail Transit-Based Wireless Sensor Intelligence Data." July 2017–June 2019. Role: PI. Total: $298,931.

14. *National Center for Supercomputing Applications (NCSA)*, "Big Data Enabled Multi-Level Decision-Making for Smart Manufacturing." July 2017–June 2018. Role: PI. Total: $25,000.

15. *CRRC Industrial Institute CO., LTD.*, "Wheel-Track Wear Indicators, Calculation and Testing Methods for Heavy-Haul Freight Cars." January 2017–June 2018. Role: PI. Total: $132,873.

D. PUBLICATION

Publications are listed in reverse chronological order. <u>Underlined</u> names indicate students.

D.1. Journal Papers

1. <u>Manan Mehta</u>, <u>Siyuan Chen</u>, Haichuan Tang, and **Chenhui Shao**, (2023), "A federated learning approach to mixed fault diagnosis in rotating machinery," *Journal of Manufacturing Systems*, accepted. (An earlier version of this paper will be presented at the *51st Annual North American Manufacturing Research Conference*, New Brunswick, New Jersey, June 12–16, 2023).

2. <u>Manan Mehta</u> and **Chenhui Shao**, (2023), "A greedy agglomerative framework for clustered federated learning," *IEEE Transactions on Industrial Informatics*, in press, DOI: 10.1109/TII.2023.3252599.

3. Parth Bansal, Zhuoyuan Zheng, <u>Yuquan Meng</u>, Weiling Wen, Mihaela Banu, Jingjing Li, Blair E. Carlson, **Chenhui Shao**, Pingfeng Wang, and Yumeng Li, (2023), "Corrosion of Al-Fe self-pierce riveting joints with multiphysics-based modeling and experiments," *Journal of Manufacturing Processes*, Vol. 95, pp. 434–445.

4. <u>Yulun Wu</u>, <u>Yuquan Meng</u>, and **Chenhui Shao**, (2022), "End-to-end online quality prediction for ultrasonic metal welding using sensor fusion and deep learning," *Journal of Manufacturing Processes*, Vol. 83, pp. 685–694.

5. Parth Bansal, Zhuoyuan Zheng, **Chenhui Shao**, Jingjing Li, Mihaela Banu, Blair E. Carlson, and Yumeng Li, (2022), "Physics-informed machine learning assisted uncertainty quantification for the corrosion of dissimilar material joints," *Reliability Engineering & System Safety*, Vol. 227, pp. 108711.

6. <u>Manan Mehta</u> and **Chenhui Shao**, (2022), "Federated learning-based semantic segmentation for pixel-wise defect detection in additive manufacturing," *Journal of Manufacturing Systems*, Vol. 64, pp. 197–210. Source code available at https://github.com/mananm2/FLAM.

7. <u>Yuquan Meng</u> and **Chenhui Shao**, (2022), "Physics-informed ensemble learning for online joint strength prediction in ultrasonic metal welding," *Mechanical Systems and Signal Processing*, Vol. 181, pp. 109473.

8. Bibek Poudel, Pil-Ho Lee, Guangchao Song, Hoa Nguyen, Patrick Kwon, Kayoung Kim, Kyongho Jung, **Chenhui Shao**, and Haseung Chung, (2022), "Innovative magnetic-field assisted finishing (MAF) using nano-scale solid lubricant: A case study on mold steel," *International Journal of Precision Engineering and Manufacturing-Green Technology*, Vol. 9, pp. 1411–1426.

9. Davis J. McGregor, Miles V. Bimrose, **Chenhui Shao**, Sameh Tawfick, William P. King, (2022),

"Using machine learning to predict part geometry and qualify parts across multiple additive machines, materials, and part designs," *Additive Manufacturing*, Vol. 55, pp. 102848.

10. <u>Yuhang Yang</u>, Varun A. Kelkar, Hemangg S. Rajputa, Adriana C. Salazar Coariti, Kimani C. Toussaint Jr., **Chenhui Shao**, (2022), "Machine-learning-enabled geometric compliance improvement in two-photon lithography without hardware modifications," *Journal of Manufacturing Processes*, Vol. 76, pp. 841–849.

11. <u>Yuhang Yang</u>, Davis J. McGregor, Sameh Tawfick, William P. King, and **Chenhui Shao**, (2022), "Hierarchical data models improve the accuracy of feature level predictions for additively manufactured parts," *Additive Manufacturing*, Vol. 51, pp. 102621.

12. <u>Siyuan Chen</u> and **Chenhui Shao**, (2021), "Efficient online tracking-by-detection with Kalman filter," *IEEE Access*, Vol. 9, pp. 147570–147578. Source code available at https://github.com/siyuanc2/kiout.

13. <u>Manan Mehta</u> and **Chenhui Shao**, (2021), "Adaptive sampling design for multi-task learning of Gaussian processes in manufacturing," *Journal of Manufacturing Systems*, Vol. 61, pp. 326–337.

14. <u>Yuhang Yang</u> and **Chenhui Shao**, (2021), "Hybrid multi-task learning-based response surface modeling in manufacturing," *Journal of Manufacturing Systems*, Vol. 59, pp. 607–616.

15. Davis J. McGregor, Samuel Rylowicz, Aaron Brenzel, Daniel Baker, Charles Wood, David Pick, Hallee Deutchman, **Chenhui Shao**, Sameh Tawfick, and William P. King, (2021), "Analyzing part accuracy and sources of variability for additively manufactured lattice parts made on multiple printers," *Additive Manufacturing*, Vol. 40, pp. 101924.

16. <u>Qasim Nazir</u> and **Chenhui Shao**, (2021), "Online tool condition monitoring for ultrasonic metal welding via sensor fusion and machine learning," *Journal of Manufacturing Processes*, Vol. 62, pp. 806–816.

17. <u>Yuhang Yang</u>, <u>Zhiqiao Dong</u>, <u>Yuquan Meng</u>, and **Chenhui Shao**, (2021), "Data-driven intelligent 3D surface measurement in smart manufacturing: Review and outlook," Feature Article, *Machines*, Vol. 9, No. 1, pp. 13.

18. <u>Haotian Chen</u>, <u>Yuhang Yang</u>, and **Chenhui Shao**, (2021), "Multi-task learning for data-efficient spatiotemporal modeling of tool surface progression in ultrasonic welding," *Journal of Manufacturing Systems*, Vol. 58, Part A, pp. 306–315.

19. <u>Siyuan Chen</u>, <u>Yuquan Meng</u>, Haichuan Tang, Yin Tian, Niao He, and **Chenhui Shao**, (2020), "Robust deep learning-based diagnosis of mixed faults in rotating machinery," *IEEE/ASME Transactions on Mechatronics*, Vol. 25, No. 5, pp. 2167–2176. Source code available at https://github.com/siyuanc2/machine-fault-diag.

20. <u>Yuquan Meng</u>, Manjunath C Rajagopal, Gowtham Kuntumalla, Ricardo Toro, Hanyang Zhao, Ho Chan Chang, Sreenath Sundar, Srinivasa Salapaka, Nenad Miljkovic, Placid Ferreira, Sanjiv Sinha, and **Chenhui Shao**, (2020), "Multi-objective optimization of peel and shear strengths in ultrasonic metal welding using machine learning-based response surface methodology," *Mathematical Biosciences and Engineering*, Vol. 17, No. 6, pp. 7411–7427.

21. Boge Wen, <u>Siyuan Chen</u>, and **Chenhui Shao**, (2020), "Temporal action proposal for online driver action monitoring using Dilated Convolutional Temporal Prediction Network," *Computers in Industry*, Vol. 121, pp. 103255. Source code available at https://github.com/madokaka/DCTPN.

22. <u>Kai Xu</u>, <u>Zheng Feng</u>, Hao Wu, Dongri Xu, Fu Li, and **Chenhui Shao**, (2020), "Optimal profile design

for rail grinding based on wheel–rail contact, stability, and wear development in high-speed electric multiple units," *Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit*, Vol. 234, No. 6, pp. 666–677.

23. Sreenath Sundar, Manjunath C Rajagopal, Hanyang Zhao, Gowtham Kuntumalla, Yuquan Meng, Ho Chan Chang, **Chenhui Shao**, Placid Ferreira, Nenad Miljkovic, Sanjiv Sinha, and Srinivasa Salapaka, (2020), "Fouling modeling and prediction approach for heat exchangers using deep learning," *International Journal of Heat and Mass Transfer*, Vol. 159, pp. 120112.

24. Ho Chan Chang, Manjunath C Rajagopal, Muhammad Jahidul Hoque, Junho Oh, Longnan Li, Jiaqi Li, Hanyang Zhao, Gowtham Kuntumalla, Sreenath Sundar, Yuquan Meng, **Chenhui Shao**, Placid Ferreira, Srinivasa Salapaka, Sanjiv Sinha, and Nenad Miljkovic, (2020), "Composite structured surfaces for durable dropwise condensation," *International Journal of Heat and Mass Transfer*, Vol. 156, pp. 119890.

25. Hanyang Zhao, Chirag Anand Deshpande, Longnan Li, Xiao Yan, Muhammad Jahidul Hoque, Gowtham Kuntamalla, Manjunath C Rajagopal, Ho Chan Chang, Yuquan Meng, Sreenath Sundar, Placid Ferreira, **Chenhui Shao**, Srinivasa Salapaka, Sanjiv Sinha, and Nenad Miljkovic, (2020), "Extreme anti-scaling performance of slippery omniphobic covalently attached liquids," *ACS Applied Materials & Interfaces*, Vol. 12, No. 10, pp. 12054–12067.

26. Yuhang Yang, Yifang Zhang, Y. Dora Cai, Qiyue Lu, Seid Koric, and **Chenhui Shao**, (2019), "Hierarchical measurement strategy for spatiotemporal processes in manufacturing," *Journal of Manufacturing Systems*, Vol. 53, pp. 159–168.

27. Kai Xu, Zheng Feng, Hao Wu, Fu Li, and **Chenhui Shao**, (2019), "Investigating the influence of rail grinding on ride comfort of high-speed EMUs using multi-body dynamics modeling," *Vehicle System Dynamics*, Vol. 57, No. 11, pp. 1621–1642.

28. Manjunath C. Rajagopal, Ho Chan Chang, Timothy Man, Gowtham Kuntumalla, Yuquan Meng, Sreenath Sundar, Hanyang Zhao, Srinivasa Salapaka, **Chenhui Shao**, Placid Ferreira, Nenad Miljkovic, and Sanjiv Sinha, (2019), "Materials-to-device design of hybrid metal-polymer heat exchanger tubes for low temperature waste heat recovery," *International Journal of Heat and Mass Transfer*, Vol. 143, pp. 118497.

29. Yaser Zerehsaz, **Chenhui Shao**, and Jionghua (Judy) Jin, (2019), "Tool wear monitoring in ultrasonic welding using high-order decomposition," *Journal of Intelligent Manufacturing*, Vol. 30, No. 2, pp. 657–669.

30. **Chenhui Shao**, Hui Wang, Saumuy Suriano, and S. Jack Hu, (2019), "Engineering fusion spatial modeling to enable areal measurement system analysis for optical surface metrology," *Measurement*, Vol. 136, pp. 163–172.

31. **Chenhui Shao**, Shuang Li, Haitao Li, and Jie Sheng, (2019), "Control for time-varying delay systems by integrating semi-discretization and hysteresis-based switching," *Asian Journal of Control*, Vol. 21, No. 5, pp. 1–12.

32. Yuquan Meng, Yuhang Yang, Haseung Chung, Pil-Ho Lee, and **Chenhui Shao**, (2018), "Enhancing sustainability and energy efficiency in smart factories: a review," *Sustainability*, Vol. 10, No. 12, pp. 4779.

33. Lihang Nong, **Chenhui Shao**, Tae Hyung Kim, and S. Jack Hu, (2018), "Improving process robustness in ultrasonic metal welding of lithium-ion batteries," *Journal of Manufacturing Systems*, Vol. 48, Part B, pp. 45–54. (An earlier version of this paper was presented at the *46th Annual North American*

Manufacturing Research Conference, College Station, Texas, June 18–22, 2018.)

34. Pil-Ho Lee, Jung Sub Kim, Sang Won Lee, **Chenhui Shao**, and Haseung Chung, (2018), "Experimental investigation on a hybrid manufacturing process of micro-scale mold for biomimetic intestinal villi's scaffold," *Journal of Mechanical Science and Technology*, Vol. 32, No. 9, pp. 4283–4289.

35. <u>Yuhang Yang</u> and **Chenhui Shao**, (2018), "Spatial interpolation for periodic surfaces in manufacturing using a Bessel additive variogram model," *ASME Journal of Manufacturing Science and Engineering*, Vol. 140, No. 6, pp. 061001.

36. Tahasin Shireen, **Chenhui Shao**, Hui Wang, Jingjing Li, Xi Zhang, and Mingyang Li, (2018), "Iterative multi-task learning for time-series modeling of solar panel PV outputs," *Applied Energy*, Vol. 212, pp. 654–662.

37. **Chenhui Shao**, Jionghua (Judy) Jin, and S. Jack Hu, (2017), "Dynamic sampling design for characterizing spatiotemporal processes in manufacturing," *ASME Journal of Manufacturing Science and Engineering*, Vol. 139, No. 10, pp. 101002. (An earlier version of this paper was presented at the *2017 ASME International Manufacturing Science and Engineering Conference*, Los Angeles, California, June 4–8, 2017).

38. Haris Ali Khan, Jingjing Li, and **Chenhui Shao**, (2017), "Analyses of friction stir riveting processes: A review," *ASME Journal of Manufacturing Science and Engineering*, Vol. 139, No. 9, pp. 090801. (An earlier version of this paper was presented at the *2017 ASME International Manufacturing Science and Engineering Conference*, Los Angeles, California, June 4–8, 2017).

39. **Chenhui Shao**, Jie Ren, Hui Wang, Jionghua (Judy) Jin, and S. Jack Hu, (2017), "Improving machined surface shape prediction by integrating multi-task learning with cutting force variation modeling," *ASME Journal of Manufacturing Science and Engineering*, Vol. 139, No. 1, pp. 011014.

40. Zi Chen, **Chenhui Shao**, Wei Wang, Zhuang Zuo, Xiang Mou, S. Jack Hu, Joseph A. DiGiuseppe, Yili Zu, L. Jeffrey Medeiros, and Shimin Hu, (2017), "Cytogenetic landscape and impact in blast phase of chronic myeloid leukemia in the era of tyrosine kinase inhibitor therapy," *Leukemia*, Vol. 31, pp. 585–592.

41. Weihong Guo, **Chenhui Shao**, Tae Hyung Kim, Jionghua (Judy) Jin, S. Jack Hu, Hui Wang, and J. Patrick Spicer, (2016), "Integrating univariate control charts and Mahalanobis distance for process monitoring with near zero type II error," *Journal of Manufacturing Systems*, Vol. 38, pp. 141–150.

42. **Chenhui Shao**, Tae Hyung Kim, Jionghua (Judy) Jin, S. Jack Hu, J. Patrick Spicer, and Jeffrey A. Abell, (2015), "Tool wear monitoring for ultrasonic metal welding of lithium-ion batteries," *ASME Journal of Manufacturing Science and Engineering*, Vol. 138, No. 5, pp. 051005. (An earlier version of this paper was presented at the *2015 ASME International Manufacturing Science and Engineering Conference*, Charlotte, North Carolina, June 8–12, 2015).

43. Saumuy Suriano, Hui Wang, **Chenhui Shao**, S. Jack Hu, and Praveen Sekhar, (2015), "Progressive measurement and monitoring for multi-resolution data in surface manufacturing considering spatial and cross correlations," *IIE Transactions*, Vol. 47, No. 10, pp. 1033–1052.

44. **Chenhui Shao** and Jie Sheng, (2014), "The framework for linear periodic time-delay systems based on semi-discretization: stability analysis and control," *Asian Journal of Control*, Vol. 16, No. 5, pp. 1350–1360.

45. S. Shawn Lee, **Chenhui Shao**, Tae Hyung Kim, S. Jack Hu, Elijah Kannatey-Asibu, Wayne W. Cai, J. Patrick Spicer, and Jeffrey A. Abell, (2014), "Characterization of ultrasonic metal welding by cor-

relating online sensor signals with weld attributes," *ASME Journal of Manufacturing Science and Engineering*, Vol. 136, No. 5, pp. 051019. (An earlier version of this paper was presented at the *2014 ASME International Manufacturing Science and Engineering Conference*, Detroit, Michigan, June 9–13, 2014).

46. **Chenhui Shao**, Kamran Paynabar, Tae Hyung Kim, Jionghua (Judy) Jin, S. Jack Hu, J. Patrick Spicer, Hui Wang, and Jeffrey A. Abell, (2013), "Feature selection for manufacturing process monitoring using cross-validation," *Journal of Manufacturing Systems*, Vol. 32, No. 4, pp. 550–555. (An earlier version of this paper was presented at the *41st Annual North American Manufacturing Research Conference*, Madison, Wisconsin, June 10–14, 2013).

D.2. Book Chapters

1. **Chenhui Shao**, Tae Hyung Kim, Jionghua (Judy) Jin, S. Jack Hu, J. Patrick Spicer, and Jeffrey A. Abell, (2017), "Tool wear monitoring for ultrasonic metal welding of lithium-ion batteries," In W. W. Cai, B. Kang, and S. J. Hu (Eds.), Ultrasonic Welding of Lithium-Ion Batteries. New York, NY: AMSE Press.

2. S. Shawn Lee, **Chenhui Shao**, Tae Hyung Kim, S. Jack Hu, Elijah Kannatey-Asibu, Wayne W. Cai, J. Patrick Spicer, and Jeffrey A. Abell, (2017), "Process monitoring using online sensor signals." In W. W. Cai, B. Kang, and S. J. Hu (Eds.), Ultrasonic Welding of Lithium-Ion Batteries. New York, NY: AMSE Press.

D.3. Refereed Conference Papers

Papers revised for journal publications are excluded.

1. Zhiqiao Dong, Qianmeng Chen, Kuan-Chieh Lu, and **Chenhui Shao**, "A fast and cost-effective imaging system for fine-scale tool condition monitoring in ultrasonic metal welding," *Proceedings of the 2023 ASME International Manufacturing Science and Engineering Conference*, accepted.

2. Kuan-Chieh Lu, Yuquan Meng, Zhiqiao Dong, and **Chenhui Shao**, "Online cost-effective classification of mixed tool and material conditions in ultrasonic metal welding: towards integrated monitoring and control," *Proceedings of the 2023 ASME International Manufacturing Science and Engineering Conference*, accepted.

3. Zhuoyuan Zheng, Parth Bansal, Pingfeng Wang, **Chenhui Shao**, and Yumeng Li, "Corrosion modeling and prognosis of the Al-Fe self-pierce riveting joints," *Proceedings of the 2020 ASME International Mechanical Engineering Congress and Exposition*, pp. V014T14A017.

4. Gowtham Kuntumalla, Yuquan Meng, Manjunath Rajagopal, Ricardo Toro, Hanyang Zhao, Ho Chan Chang, Sreenath Sundar, Srinivasa Salapaka, Nenad Miljkovic, **Chenhui Shao**, Placid Ferreira, Sanjiv Sinha, "Joining techniques for novel metal polymer hybrid heat exchangers," *Proceedings of the 2019 ASME International Mechanical Engineering Congress and Exposition*, pp. V02BT02A018.

5. Yuquan Meng, Dingyu Peng, Qasim Nazir, Gowtham Kuntumalla, Manjunath C. Rajagopal, Ho Chan Chang, Hanyang Zhao, Sreenath Sundar, Placid M. Ferreira, Sanjiv Sinha, Nenad Miljkovic, Srinivasa M. Salapaka, and **Chenhui Shao**, "Ultrasonic welding of soft polymer and metal: a preliminary study," *Proceedings of the 2019 ASME International Manufacturing Science and Engineering Conference*, pp. V002T03A083.

6. Yuhang Yang, Siyuan Chen, Letao Wang, Jingying He, Shang-Ming Wang, Luwen Sun, and **Chen-**

hui Shao, "Influence of coating spray on surface measurement using 3D optimal scanning systems," *Proceedings of the 2019 ASME International Manufacturing Science and Engineering Conference*, pp. V001T02A009.

7. <u>Yuhang Yang</u>, Y. Dora Cai, Qiyue Lu, Yifang Zhang, Seid Koric, and **Chenhui Shao**, "High-performance computing based big data analytics for smart manufacturing," *Proceedings of the 2018 ASME International Manufacturing Science and Engineering Conference*, pp. V00-3T02A013.

8. Pil-Ho Lee, <u>Yuhang Yang</u>, **Chenhui Shao**, Haseung Chung, Patrick Steven McCormick, Patrick Kwon, and Hoa Nguyen, "Experimental and statistical study on magnetic-field assisted finishing of mold steel using nano-scale solid lubricant and abrasive particles," *Proceedings of the 2018 ASME International Manufacturing Science and Engineering Conference*, pp. V003T02A012.

9. **Chenhui Shao**, Weihong Guo, Tae Hyung Kim, Jionghua (Judy) Jin, S. Jack Hu, J. Patrick Spicer, and Jeffrey A. Abell, "Characterization and monitoring of tool wear in ultrasonic metal welding," *9th International Workshop on Microfactories*, Honolulu, Hawaiʻi, October 5–8, 2014, pp. 161–169.

10. Jie Sheng, **Chenhui Shao**, Zhengtao Ding, and Haibo Ji, "Consensus control of a class of nonlinear systems with communication time delay," *2014 American Control Conference*, Portland, Oregon, June 4–6, 2014, pp. 819–824, IEEE.

11. **Chenhui Shao** and Jie Sheng, "Stability analysis and control of linear periodic time-delay systems with state-space models based on semi-discretization," *2012 UKACC International Conference on Control*, Cardiff, UK, September 3–5, 2012, pp. 784–788, IEEE.

12. Jie Sheng, Keyong Han, and **Chenhui Shao**, "Finite time controller design for single inverted pendulum system," *2012 Chinese Control Conference*, Hefei, China, July 25–27, 2012, pp. 1468–1472, IEEE.

13. Jie Sheng, **Chenhui Shao**, Lei Wang, Zonghai Chen, and Chao Jiang, "Stability analysis and control of linear neutral systems based on method of semi-discretization," *2010 Chinese Control and Decision Conference*, Xuzhou, China, May 26–28, 2010, pp. 723–728, IEEE.

14. Jie Sheng, Haitao Li, **Chenhui Shao**, Keyong Han, and Zonghai Chen, "Control design of linear systems with variable time-delay based on hysteresis-based switching algorithms and semi-discretization," *2010 Chinese Control Conference*, Beijing, China, July 29–31, 2010, pp. 363–368, IEEE.

D.4. Other Publications

1. <u>Sixian Jia</u>, <u>Yuhang Yang</u>, Varun A. Kelkar, Hemangg S. Rajput, Adriana C. Salazar Coariti, Kimani C. Toussaint Jr, and **Chenhui Shao**, "Modeling and visualization of geometric errors for hemisphere structures produced by two-photon lithography," *nanoHUB Software Tools*, doi:10.21981/AJXT-8688, available at https://nanohub.org/tools/tplvaranlz.

2. **Chenhui Shao**, "University of Michigan students have hand in Volt battery reliability," *Momentum*, SAE International, pp. 10–11, March 2015.

E. TEACHING

E.1. Course Development

○ *ME 453 Data Science in Manufacturing Quality Control* (previously offered under name *ME 498 Manufacturing Data and Quality Systems*), UIUC, Fall 2018, Fall 2019, Fall 2020, Fall 2022. The objective of this course is to teach students fundamentals of quality management in the big data era and state-of-the-art data science (e.g., machine learning, statistics) tools to solve factory floor quality problems. A series of lectures are available online at nanoHUB.org (https://nanohub.org/resources/29263). These online lectures have served over 5,600 users.

E.2. Courses Offered

○ *ME 340 Dynamics of Mechanical Systems*, Fall 2016, Spring 2017, Spring 2018, Spring 2020, Spring 2021, Fall 2021, Spring 2022, Spring 2023, UIUC
○ *Senior Capstone Design*, Spring 2018, Fall 2019, Spring 2021, Fall 2022, UIUC
○ Guest lectures in *ME 498 Additive Manufacturing and Product Realization*, Fall 2017 and *ECE 298 Solar Car*, Fall 2019, UIUC
○ *IOE 466 Statistical Quality Control*, Fall 2015, University of Michigan

E.3. Ph.D. Committees Chaired

1. Yuhang Yang, "Machine-learning-based measurement, modeling, and control of spatial variability in advanced manufacturing," 2021.
   Current Position: Research Scientist at Meta.

2. Yuquan Meng, "Physics-informed machine learning for smart decision-making in ultrasonic metal welding," 2023.

Ph.D. Students Currently Under My Supervision

1. Siyuan Chen, "Deep learning for manufacturing process control with applications to rotating machinery and industrial drying," expected December 2023. Interned at 3M in summer 2022. Will join 3M as a Data Scientist after graduation.

2. Manan Mehta, "Data-efficient machine learning for decision-making in smart manufacturing," expected December 2023. Will intern at Seagate Technology in summer 2023.

3. Kuan-Chieh Lu, "Integrated learning, monitoring, and control for ultrasonic metal welding," expected May 2024. Will intern at Intel in summer 2023.

4. Zhiqiao Dong, "Compressed surface measurement in manufacturing," expected May 2024.

5. Shichen Li, "Smart drying enabled by multi-source data fusion and machine learning," expected May 2024. Interned at Meta in summer 2022.

6. Sixian Jia, "Data-driven modeling and mitigation of process variability in two-photon lithography," expected May 2025.

7. Li-Wei Shih, "Vision-based human action recognition on the factory floor," expected May 2026.

8. Alice Mei, "Harnessing 3D point clouds in manufacturing: measurement uncertainty, dimensional accuracy, and process control," expected May 2026.

9. Ahmadreza Eslaminia, "Cyber-physical systems for industrial internet of things (IIoT): cyber infrastructure and cloud analytics," co-advised with Professor Klara Nahrstedt in the Department of Computer Science, expected May 2026.

E.4.   MS Theses Advised

1. Yuhang Yang, "Spatial modeling for periodic surfaces in manufacturing," 2017.
   Current position: Research Scientist at Meta.

2. Qasim Nazir, "Online tool condition monitoring for ultrasonic metal welding via sensor fusion and machine learning," 2020.
   Current position: Application Support Engineer at MathWorks.

3. Min-Hsiu Hsu, "Machine learning-based non-destructive evaluation of fatigue damage in metals," 2021.
   Current position: Software Engineer at Apple. Previous position: Data Scientist at Micron.

4. Wulun Wu, "An end-to-end online quality prediction system for ultrasonic metal welding based on deep learning," 2021.
   Current position: Ph.D. student in ISE Department at UIUC.

5. Zhizhong Wei, "Imbalanced classification for process control of ultrasonic metal welding," expected 2023.

E.5.   MS Independent Studies

○ Venkata Sai Sujan Bommidala, Haotian Chen, Dayae Frail, Ruifan Li, Zhe Liu, Xudong Shao, Letao Wang, Yihan Wang, Jiaxin Wu, Yao Xue, Weiye Zhang, Di Zhu

E.6.   Undergraduate Research Advising

○ NSF Research Experiences for Undergraduates (REU): Abdullah Raafat Alfaraj, Abdulrahman Alshareef, Osama Hisham Azhar, Seenara Khan

○ NCSA SPIN (Students Pushing Innovation) Program: Abdullah Raafat Alfaraj

○ Undergraduate Independent Studies (ME 297/497): John-Luc Pec, Dingyu Peng, Qinan Zhou

○ Undergraduate Research Assistants: Riya Agrawal, Qianmeng Chen, Sude Ela Demir, Yutian Gao, Jingying He, Jihwan Jeong, David Lee, Justin Miner, Jaehyeon Park, Corynne Roberts, Luwen Sun, Jiashuo Tong, Shang-Ming Wang, Christopher Wong, Ziran Zhou, Kangyu Zhu

F.   PRESENTATIONS

1. "Doing more with less: cost-effective machine learning for manufacturing quality control," *IISE Webinar*, Manufacturing and Design (M&D) Division and Quality Control & Reliability Engineering (QCRE) Division, February 2023.

2. "Feature-level geometric accuracy prediction for additive production," *INFORMS Annual Meeting*, Indianapolis, Indiana, October 2022.

3. "Big data uses for drying processes," *1st USDA/CARD Drying Workshop*, virtual, June 2022.

4. "Smart ultrasonic metal welding enabled by physics-informed machine learning," *Advances in Welding & Additive Manufacturing Research Conference*, virtual, June 2022.

5. "Image-based physics-constrained machine learning for process optimization and design in paper drying systems," co-presented with Lin Cheng, AGCO Corporation, virtual, April 2022.

6. "Cost-effective machine learning for smart manufacturing," Smart Manufacturing Seminar Series, The Hong Kong University of Science and Technology (Guangzhou), virtual, March 2022.

7. "Cost-effective machine learning for smart manufacturing," Smart Manufacturing Seminar Series, University of Michigan, Ann Arbor, Michigan, March 2022.

8. "Cost-effective machine learning for smart manufacturing," Society of Women Engineers (SWE), University of Illinois at Urbana-Champaign, Urbana, Illinois, January 2022.

9. "Smart drying enabled by multi-source data fusion and machine learning," AGCO Corporation, virtual, July 2021.

10. "Machine learning-based non-destructive evaluation of fatigue damage in metals," co-presented with Jingjing Li, REMADE Institute Webinar, virtual, March 2021.

11. "Failure detection for crankshaft grinding," invited seminar at Caterpillar Large Engine Center, Lafayette, Indiana, virtual, January 2021.

12. "Smart ultrasonic metal welding," DREMES Joint Research Center for Flexible Manufacturing Workshop, virtual, January 2021.

13. "Smart ultrasonic metal welding," Department of Materials Science and Engineering, The Ohio State University, virtual, November 2020.

14. "Sampling design for intelligent 3D sensing in manufacturing," 2020 IISE Annual Conference & Expo, virtual, November 2020.

15. "Smart drying enabled by multi-source data fusion and machine learning," Mondelēz International, Inc. (global, cross categories audience), virtual, September 2020.

16. "Quantitative non-destruction evaluation of fatigue damage based on multi-sensor fusion," REMADE Institute Technology Summit, virtual, May 2020.

17. "Non-destructive evaluation of fatigue damage based on sensor fusion and machine learning," co-presented with Kathryn Matlack and Jingjing Li, World Remanufacturing Day Webinar, REMADE Institute, virtual, April 2020.

18. "Digital manufacturing: vision and recent advances," Caterpillar Technical Center, Chillicothe, Illinois, virtual, January 2020.

19. "Bridging manufacturing education to factory-floor problem-solving," Caterpillar Technical Center, Chillicothe, Illinois, July 2019.

20. "Manufacturing of an innovative hybrid heat exchanger," *RAMP (Reusable Abstractions of Manufacturing Processes) Competition*, Erie, Pennsylvania, June 2019.

21. "Ultrasonic welding of soft polymer and metal: a preliminary study," *ASME International Manufacturing Science and Engineering Conference*, Erie, Pennsylvania, June 2019.

22. "Influence of coating spray on surface measurement using 3D optimal scanning systems," *ASME International Manufacturing Science and Engineering Conference*, Erie, Pennsylvania, June 2019.

23. "Process capability analysis for two photon lithography using 3D geometric data," *1st NSF nanoMFG Node Workshop on Data-Science Enabled Advances in Nanomanufacturing (DSEAN)*, Urbana, Illinois, February 2019.

24. "HPC-enabled real-time learning and decision-making for smart manufacturing," *NCSA Industry Conference*, Urbana, Illinois, October 2018.

25. "Improving process robustness in ultrasonic metal welding of lithium-ion batteries," *46th Annual North American Manufacturing Research Conference*, College Station, Texas, June 2018.

26. "High-performance computing based big data analytics for smart manufacturing," *ASME International Manufacturing Science and Engineering Conference*, College Station, Texas, June 2018.

27. "Big data enabled multi-level decision-making for smart manufacturing," *NCSA Industry Conference*, Urbana, Illinois, October 2017.

28. "Big data enabled smart manufacturing," *Joint UIUC/Sandia Data Science Workshop*, Urbana, Illinois, September 2017.

29. "Cost-effective measurement and modeling for spatiotemporal processes," School of Mechanical Engineering, Zhejiang University, Hangzhou, China, July 2017.

30. "Dynamic sampling design for characterizing spatiotemporal processes in manufacturing," *ASME International Manufacturing Science and Engineering Conference*, Los Angeles, California, June 2017.

31. "Sampling, modeling, and control for spatiotemporal processes in manufacturing," ARI Research Seminar Series, Illinois Applied Research Institute, University of Illinois at Urbana-Champaign, Champaign, Illinois, April 2017.

32. "Sampling, modeling, and control for spatiotemporal processes in manufacturing," University of Science and Technology of China, Hefei, China, December 2016.

33. "Data-based spatial and temporal modeling for surface variation monitoring in manufacturing," Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, March 2016.

34. "Data-based spatial and temporal modeling for surface variation monitoring in manufacturing," Department of Mechanical and Aerospace Engineering, The State University of New York at Buffalo, Buffalo, New York, February 2016.

35. "Data-based spatial and temporal modeling for surface variation monitoring in manufacturing," Department of Industrial, Manufacturing, and Systems Engineering, Texas Tech University, Lubbock, Texas, February 2016.

36. "Data-based spatial and temporal modeling for surface variation monitoring in manufacturing," Department of Mechanical and Industrial Engineering, University of Iowa, Iowa City, Iowa, February 2016.

37. "Data-based spatial and temporal modeling for surface variation monitoring in manufacturing," Department of Industrial and Manufacturing Systems Engineering, Iowa State University, Ames, Iowa, February 2016.

38. "Spatial and temporal modeling for surface variation monitoring," *From Industrial Statistics to Data Science*, Ann Arbor, Michigan, October 2015.

39. "Tool wear monitoring for ultrasonic metal welding of lithium-ion batteries," *ASME International*

Manufacturing Science and Engineering Conference, Charlotte, North Carolina, June 2015.

40. "Tool wear characterization and monitoring for ultrasonic metal welding of lithium-ion batteries," *Richard & Eleanor Towner Prize for Outstanding Ph.D. Research Poster Presentation, Engineering Graduate Symposium*, College of Engineering, University of Michigan, Ann Arbor, Michigan, November 2014.

41. "An adaptive measurement strategy for characterizing time variant surfaces using image data," *INFORMS Annual Meeting*, San Francisco, California, November 2014.

42. "A transfer learning approach to surface variation modeling and cost-effective monitoring," *INFORMS Annual Meeting*, San Francisco, California, November 2014.

43. "Characterization and monitoring of tool wear in ultrasonic metal welding," *9th International Workshop on Microfactories*, Honolulu, Hawai'i, October 2014.

44. "Monitoring of joining quality and tool conditions for ultrasonic metal welding of lithium-ion batteries," Department of Mechanical Engineering, University of Hawai'i, Honolulu, Hawai'i, October 2014.

45. "Consensus control of a class of nonlinear systems with communication time delay," *American Control Conference*, Portland, Oregon, June 2014.

46. "Feature selection for manufacturing process monitoring using cross-validation," *41st Annual North American Manufacturing Research Conference*, Madison, Wisconsin, June 2013.

G.   MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

○ American Society of Mechanical Engineers (ASME)

○ Society of Manufacturing Engineers (SME)

○ Institute of Industrial and Systems Engineers (IISE)

○ Institute for Operations Research and the Management Sciences (INFORMS)

H.   SERVICE

H.1.   Editorial Functions

○ Review Editor, *Frontiers in Manufacturing Technology*, 2022–present.

○ Associate Editor, *IEEE International Conference on Automation Science and Engineering (CASE)*, 2021, 2022.

○ Associate Editor, *Journal of Manufacturing Processes*, 2020–present.

○ Member of the Reviewer Board, *Journal of Manufacturing and Materials Processing*, 2020–present.

○ Guest Editor, *Mathematical Biosciences and Engineering*, *Special Issue on Mathematical Problems in Advanced Manufacturing*, 2020.

○ Member, NAMRI/SME Scientific Committee, 2018–present.

○ Scientific Committee Member, *7th CIRP Conference on Assembly Technologies and Systems*, Tianjin, China, May 10–12, 2018.

H.2. Conference/Workshop Organization

○ Symposium Organizer, *ASME International Manufacturing Science and Engineering Conference*, New Brunswick, New Jersey, June 12–16, 2023.

○ Program Committee Member, *1st REMADE Circular Economy Technology Conference*, Washington, D.C., March 20–21, 2023.

○ Symposium Organizer, *ASME International Manufacturing Science and Engineering Conference*, West Lafayette, Indiana, June 27–July 1, 2022.

○ Session Chair, *Advances in Welding & Additive Manufacturing Research Conference*, virtual, June 13–16, 2022.

○ Symposium Organizer, *ASME International Manufacturing Science and Engineering Conference*, virtual, 2020.

○ Track Chair, *2019 International Conference on Production Research*, Chicago, Illinois, August 10–14, 2019.

○ Symposium Organizer, *ASME International Manufacturing Science and Engineering Conference*, Erie, Pennsylvania, June 10–14, 2019.

○ Co-Chair of the Organizing Committee, *1st NSF nanoMFG Node Workshop on Data-Science Enabled Advances in Nanomanufacturing (DSEAN)*, Urbana, Illinois, February 26–27, 2019.

○ Symposium Organizer, *ASME International Manufacturing Science and Engineering Conference*, College Station, Texas, June 18–22, 2018.

○ Session Chair, *13th IEEE Conference on Automation Science and Engineering (CASE)*, Xi'an, China, August 20–23, 2017.

○ Session Chair, *ASME International Manufacturing Science and Engineering Conference*, Los Angeles, California, June 4–8, 2017, 2017.

○ Session Chair, *ASME International Manufacturing Science and Engineering Conference*, Blacksburg, Virginia, June 27–July 1, 2016.

○ Session Chair, *ASME International Manufacturing Science and Engineering Conference*, Charlotte, North Carolina, June 8–12, 2015.

○ Session Chair, *9th International Workshop on Microfactories*, Honolulu, Hawai'i, October 5–8, 2014.

H.3. Reviewer/Referee

○ Served on multiple National Science Foundation proposal review panels

○ Served on a proposal review panel of the REMADE Institute

○ Reviewed articles for Journal of Manufacturing Systems, Journal of Manufacturing Processes, AMSE Journal of Manufacturing Science and Engineering, CIRP Journal of Manufacturing Science and Technology, IEEE/ASME Transactions on Mechatronics, Mechanical Systems and Signal Processing, IEEE Transactions on Automation Science and Engineering, IISE Transactions, Journal of Materials Processing Technology, Technometrics, International Journal of Production Research, Manufacturing Letters, Journal of Manufacturing and Materials Processing, Journal of Cleaner Production, Journal of Intelligent Manufacturing, Computers & Industrial Engineering, Computers in Industry, International Journal of Precision Engineering and Manufacturing-Green Technology, Applied Sciences, Sustain-

ability, Symmetry, Processes, Energies, Materials, Information, Engineering Science and Technology: an International Journal, Science and Technology of Welding and Joining, Mathematical Biosciences and Engineering, Advances in Mechanical Engineering, Materialia, Procedia CIRP, Transactions of the NAMRI/SME, Proceedings of the ASME MSEC, Proceedings of the IISE Annual Conference, Proceedings of the IEEE CASE, Proceedings of the REMADE Circular Economy Tech Summit and Conference, Proceedings of the Chinese Control and Decision Conference, Proceedings of the Chinese Control Conference

H.4. Campus Contributions

College and University

- ZJUI Operations Committee, 2022–present

- Departmental representative in the proposing team for VinUniversity collaboration, 2022–present

- Advisory Board Member, UIUC-CRRC Research Center, 2018–present

Department

- Chair, Data Science Committee, 2022–present
  The Data Science Committee is charged with developing an action plan that will organically integrate data science education into the curricula of mechanical engineering and engineering mechanics. The Committee also promotes and facilitates data-science-related research collaborations within MechSE.

- International Programs Lead, Graduate Programs Committee, 2022–present

- Proposing team for Illinois manufacturing certificate, 2022–present

- Alumni and Corporate Relations Committee, 2017–2022

- Seminar Committee, 2017–2022

- Social Committee, 2016–2019

- Graduate Admissions Committee, 2016–present

- Engineering Open House Committee, 2016–2017