Curriculum Vitae

Dr. Kaibo Liu

Department of Industrial and Systems Engineering
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Education

Ph.D. 2013, Industrial Engineering (Minor: Machine Learning), Georgia Institute of Technology

M.S. 2011, Statistics, Georgia Institute of Technology

B.S. 2009, Industrial Engineering and Engineering Management, Hong Kong University of Science and Technology, Hong Kong

Employment

Grainger STAR Professor, Industrial and Systems Engineering, University of Wisconsin-Madison, July 2024~present

Professor, Industrial and Systems Engineering, University of Wisconsin-Madison, Sep 2023~June 2024

Associate Professor, Industrial and Systems Engineering, University of Wisconsin-Madison, Sep 2019~Aug 2023

Associate Director, UW-Madison IoT Systems Research Center, April 2019~present

Assistant Professor, Industrial and Systems Engineering, University of Wisconsin-Madison, Nov 2013~Aug 2019

Research Interest

System Informatics and Industrial Big Data Analytics; Data Fusion for Process Modeling, Monitoring, Diagnosis, Prognostics, and Decision Making; Data Science, Machine Leaning, Statistical Learning, and Reinforcement Learning; Spatiotemporal field modeling and prediction; Bioinformatics.

Honors and Awards

Society, National and International Awards

1 *Hromi Medal Award*, American Society for Quality (ASQ), 2024

2 *Award for Technical Innovation in Industrial Engineering*, Institute of Industrial and

Systems Engineers (IISE), 2021

3 *Innovations in Education Award*, Institute of Industrial and Systems Engineers (IISE), 2020

4 *Dr. Hamed K. Eldin Outstanding Early Career IE in Academia Award*, Institute of Industrial and Systems Engineers (IISE), 2019

5 *Outstanding Young Manufacturing Engineer Award*, Society of Manufacturing Engineers (SME), 2019

6 *Feigenbaum Medal Award*, American Society for Quality (ASQ), 2019

7 *Pritsker Doctoral Dissertation Award (2nd place)*, Institute of Industrial and Systems Engineers (IISE), 2014

8 *Richard A. Freund International Scholarship*, American Society for Quality (ASQ), 2013

9 *Gilbreth Memorial Fellowship*, Institute of Industrial and Systems Engineers (IISE), 2012

University Awards

1 *Georgia Tech Alumni Association's 40 Under 40*, 2023

2 *Ragnar E. Onstad Service to Society Award*, UW-Madison, 2025

Awards Related to Publications

1 *Best Paper Finalist award in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC)*, for the paper "Interactive Resource Planning and Change Detection via Multi-agent Reinforcement Learning," 2025

2 *Best Paper Finalist award in the DAIS Section of Industrial and Systems Engineering Research Conference (ISERC)*, for the paper "Instance Selection via Voronoi Neighbors for Binary Classification Tasks," 2023

3 *Feature Article "A Bayesian Deep Learning Framework for Interval Estimation of Remaining Useful Life in Complex Systems by Incorporating General Degradation Characteristics" in ISE Magazine*, 2020

4 *Best Application Paper Award in IISE Transactions*, for the paper "Modeling of a three-dimensional dynamic thermal field under grid-based sensor networks in grain storage," 2020

5 *Best Paper Award (second runner-up) in IEEE Transactions on Automation Science and Engineering*, for the paper "Causation-based Monitoring and Diagnosis for Multivariate Categorical Processes with Ordinal Information," 2020

6 *Best New Application Paper Award (first runner-up) in IEEE Transactions on Automation*

Science and Engineering, for the paper "Structural Degradation Modeling Framework for Sparse Datasets with an application on Alzheimer's Disease," 2020

7 *Best Paper Award in Quality, Statistics, and Reliability Section of INFORMS*, for the paper "Collusion Detection and Ground Truth Inference in Crowdsourcing for Labeling Tasks," 2019

8 *Feature Article "A Generic Framework for Multisensor Degradation Modeling based on Supervised Classification and Failure Surface" in ISE Magazine*, 2019

9 *Feature Article "Modeling of a three-dimensional dynamic thermal field under grid-based sensor networks in grain storage" in ISE Magazine*, 2019

10 *Feature Article "Causation-based Process Monitoring and Diagnosis for Multivariate Categorical Processes" in ISE Magazine*, 2017

11 *Best Paper Finalist Award (theoretical track) in the Data Mining Section of INFORMS*, for the paper "Statistical Degradation Modeling and Prognostics of Multiple Sensor Signals via Data Fusion: A Composite Health Index Approach," 2017

12 *Feature Article "Present and future of analytics education" in INFORMS Magazine*, 2016

13 *Feature Article "Industrial data analytics courses: need, content and expectations – insights from 2015 ISERC panel discussion" in ISE Magazine*, 2016

14 *Best Student Paper Award in the Industrial and Systems Engineering Research Conference (ISERC)*, for the paper "Adaptive Sensor Allocation Strategy for Process Monitoring and Diagnosis in a Bayesian Network," 2013

15 *Best Student Paper Award in Data Mining Section of INFORMS*, for the paper "Health Index Development Based on Sensory Data Fusion for Degradation Modeling and Prognostic Analysis," 2012

16 *Best Student Paper Award Finalist in Quality, Statistics, and Reliability Section of INFORMS*, for the paper "Physician Performance Assessment Using a Composite Quality Index," 2012

Publications (underlined are my students)

Refereed Journals

1. **Liu, K.** and Shi, J. (2013), "Objective-Oriented Optimal Sensor Allocation Strategy for Process Monitoring and Diagnosis by Multivariate Analysis in a Bayesian Network", *IISE Transactions*, 45, 630-643.

2. Jin, R. and **Liu, K.** (2013), "Multistage Multimode Process Monitoring Based on a Piecewise Linear Regression Tree Considering Modeling Uncertainty", *IISE Transactions*, 45, 617-629.

3. **Liu, K.**, Gebraeel, N., and Shi, J. (2013), "A Data-Level Fusion Model for Developing Composite Health Indices for Degradation Modeling and Prognostic Analysis", *IEEE Transactions on Automation Science and Engineering*, 10, 652-664. (This paper received Best Student Paper Award in Data Mining Section of INFORMS, 2012)

4. **Liu, K.**, Jain, S., and Shi, J. (2013), "Physician Performance Assessment Using a Composite Quality Index", *Statistics in Medicine*, 32, 15, 2661-2680. (This paper received Best Student Paper Award Finalist in Quality, Statistics, and Reliability Section of INFORMS, 2012)

5. **Liu, K.**, Zhang, X., and Shi, J. (2014), "Adaptive Sensor Allocation Strategy for Process Monitoring and Diagnosis in a Bayesian Network", *IEEE Transactions on Automation Science and Engineering*, 11, 2, 452-462. (This paper received Best Student Paper Award in the Industrial and Systems Engineering Research Conference (ISERC), 2013; This paper was selected for presentation in the T-ASE invited session in the 2015 INFORMS conference)

6. **Liu, K.**, Mei, Y., and Shi, J. (2015), "An adaptive sampling strategy for online high-dimensional process monitoring", *Technometrics*, 57, 3, 305-319. (This paper was selected for presentation in the Technometrics-sponsored session in the 2015 JSM conference.)

7. **Liu, K.** and Shi, J. (2015), "A Systematic Approach for Business Data Analytics with a Real Case Study", *International Journal of Business Analytics (IJBAN)*, 2, 4, 23-44.

8. **Liu, K.** and Shi, J. (2015), "Internet of Things (IoT)-enabled System Informatics for Service Decision Making: Achievements, Trends, Challenges, and Opportunities", *IEEE Intelligent Systems*, 30, 6, 18-21.

9. Zhou, C., **Liu, K.**, Zhang, X., Zhang, W., and Shi, J. (2016), "An automatic process monitoring method using recurrence plot in progressive stamping processes", *IEEE Transactions on Automation Science and Engineering*, 13, 2, 1102-1111.

10. Song, C., **Liu, K.**, Zhang, X., Chen, L., and Xian, X. (2016), "An Obstructive Sleep Apnea Detection Approach Using a Discriminative Hidden Markov Model from ECG Signals", *IEEE Transactions on Biomedical Engineering*, 63, 7, 1532-1542 (This paper was selected as the Best Student Paper Finalist in the Industrial and Systems Engineering Research Conference (ISERC), 2015).

11. **Liu, K.** and Huang, S. (2016), "Integration of Data Fusion Methodology and Degradation Modeling Process to Improve Prognostics", *IEEE Transactions on Automation Science and Engineering*, 13, 1, 344-354. (This paper was selected for presentation in the T-ASE invited session in the 2016 INFORMS conference)

12. Yan, H., **Liu, K.,** Zhang, X., and Shi, J. (2016), "Multiple Sensor Data Fusion for Degradation Modeling and Prognostics under Multiple Operational Conditions", *IEEE Transactions on Reliability*, 65, 3, 1416-1426.

13. Hao, L., **Liu, K.**, Gebraeel, N., and Shi, J. (2017), "Controlling the Residual Life Distribution of Parallel Multi-component Systems Through Workload Adjustment", *IEEE Transactions on Automation Science and Engineering*, 14, 2, 1042-1052.

14. **Liu, K.**, Chehade, A., and Song, C. (2017), "Optimize the Signal Quality of the Composite Health Index via Data Fusion for Degradation Modeling and Prognostic Analysis", *IEEE Transactions on Automation Science and Engineering*, 14, 3, 1504-1514. (This paper received the Best Student Poster award in Quality, Statistics, and Reliability Section of INFORMS, 2015; This paper was selected for presentation in the T-ASE invited session in the 2018 INFORMS conference)

15. Li, J., **Liu, K.**, and Xian, X. (2017), "Causation-based Process Monitoring and Diagnosis for Multivariate Categorical Processes", *IISE Transactions*, 49, 3, 332-343. (Feature article in ISE Magazine; This paper was selected for presentation in the IISE Transactions sponsored session in the 2018 INFORMS conference).

16. Chehade, A., Bonk, S., and **Liu, K.** (2017), "Sensory-based Failure Threshold Estimation for Remaining Useful Life Prediction", *IEEE Transactions on Reliability*, 66, 3, 939-949.

17. Xian, X., Wang, A., and **Liu, K.** (2018), "A Nonparametric Adaptive Sampling Strategy for Online Monitoring of Big Data Streams", *Technometrics*, 60, 1, 14-25. (This paper received the Best Student Poster award in Quality, Statistics, and Reliability Section of INFORMS, 2016; This paper was selected for presentation in the Technometrics invited session in the 2018 INFORMS conference)

18. Song, C., **Liu, K.**, Zhang, X. (2018), "Integration of Data-level Fusion Model and Kernel Methods for Degradation Modeling and Prognostic Analysis", *IEEE Transactions on Reliability*, 67, 2, 640-650.

19. Chehade, A., Song, C., **Liu, K.**, Saxena, A., and Zhang, X. (2018), "A Data-level Fusion Approach for Degradation Modeling and Prognostic Analysis under Multiple Failure Modes", *Journal of Quality Technology*, 50, 2, 150-165. (This paper received the Best Student Paper Finalist award (2nd place) in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2016).

20. Lin, Y., **Liu, K.**, Byon, E., Qian, X., and Huang, S. (2018), "A Collaborative Learning Framework for Estimating Many Individualized Regression Models in a Heterogeneous Population", *IEEE Transactions on Reliability*, 67, 1, 328-341.

21. Xian, X., Archibald, R., Mayer, B., **Liu, K.**, and Li, J. (2019), "An Effective Online Data Monitoring and Saving Strategy for Large-Scale Climate Simulations", *Quality Technology & Quantitative Management*, 16, 3, 330-346.

22. Wang, A., Xian, X., Tsung, F., and **Liu, K.** (2018), "A Spatial Adaptive Sampling Procedure for Online Monitoring of Big Data Streams", *Journal of Quality Technology*, 50, 4, 329-343. (This paper was selected for presentation in the JQT invited session in the 2019

INFORMS conference)

23. Song, C., and **Liu, K.** (2018), "Statistical Degradation Modeling and Prognostics of Multiple Sensor Signals via Data Fusion: A Composite Health Index Approach", *IISE Transactions*, 50, 10, 853-867. (This paper received the Best Paper Finalist award (theoretical track) in the Data Mining Section of INFORMS, 2017).

24. Chehade, A., and **Liu, K.** (2019), "Structural Degradation Modeling Framework for Sparse Datasets with an application on Alzheimer's Disease", *IEEE Transactions on Automation Science and Engineering*, 16, 1, 192-205. (This paper receives the Best New Application Paper Award (first runner-up) in IEEE Transactions on Automation Science and Engineering, 2020).

25. Wang, D., **Liu, K.**, and Zhang, X. (2019), "Modeling of a three-dimensional dynamic thermal field under grid-based sensor networks in grain storage", *IISE Transactions*, 51, 5, 531-546. (Feature article in ISE Magazine; This paper receives the Best Application Paper in IISE Transactions, 2020)

26. Xian, X., Li, J., and **Liu, K.** (2019), "Causation-based Monitoring and Diagnosis for Multivariate Categorical Processes with Ordinal Information", *IEEE Transactions on Automation Science and Engineering*, 16, 2, 886-897 (This paper receives the Best Paper Award (second runner-up) in IEEE Transactions on Automation Science and Engineering, 2020).

27. Song, C., **Liu, K.**, and Zhang, X. (2019), "A Generic Framework for Multisensor Degradation Modeling based on Supervised Classification and Failure Surface", *IISE Transactions*, 51, 11, 1288-1302. (Feature article in ISE Magazine).

28. Feng, T., Qian, X., **Liu, K.**, and Huang, S. (2019), "Dynamic Inspection of Latent Variables in State-Space Systems", *IEEE Transactions on Automation Science and Engineering*, 16, 3, 1232-1243.

29. Kim, M., Song, C., and **Liu, K.** (2019), "A Generic Health Index Approach for Multisensor Degradation Modeling and Sensor Selection", *IEEE Transactions on Automation Science and Engineering*, 16, 3, 1426-1437. (This paper was selected for presentation in the T-ASE invited session in the 2019 INFORMS conference).

30. Wang, D., **Liu, K.**, and Zhang, X. (2020), "Spatiotemporal Thermal Field Modeling Using Partial Differential Equations with Time-Varying Parameters", *IEEE Transactions on Automation Science and Engineering*, 17, 2, 646 - 657.

31. Xian, X., Zhang, C., Bonk, S., and **Liu, K.** (2021), "Online Monitoring of Big Data Streams: A Rank-based Sampling Algorithm by Data Augmentation", *Journal of Quality Technology*, 53, 2, 135-153. (This paper was selected for presentation in the JQT invited session in the 2021 INFORMS conference).

32. Wang, D., **Liu, K.**, Zhang, X. and Wang, H. (2020), "Spatiotemporal Multitask Learning

for 3-D Dynamic Field Modeling", *IEEE Transactions on Automation Science and Engineering*, 17, 2, 708-721. (This paper received the Best Student Paper Finalist award in the DAIS Section of Industrial and Systems Engineering Research Conference (ISERC), 2019).

33. Xian, X., Ye, H., Wang, X., and **Liu, K.** (2021), "Spatiotemporal modeling and real-time prediction of origin-destination traffic demand", *Technometrics*, 63, 77-89. (This paper was selected and featured in Advances In Engineering).

34. Ye, H., Wang, X., and **Liu, K.** (2021), "Adaptive Preventive Maintenance for Flow Shop Scheduling with Resumable Processing", *IEEE Transactions on Automation Science and Engineering*, 18, 106 - 113.

35. Kim, M., and **Liu, K.** (2021), "A Bayesian Deep Learning Framework for Interval Estimation of Remaining Useful Life in Complex Systems by Incorporating General Degradation Characteristics", *IISE Transactions*, 53, 326-340. (This paper received the Best Student Poster honorable mention award in Quality, Statistics, and Reliability Section of INFORMS, 2020; Feature article in ISE Magazine; This paper was selected for presentation in the IISE Transactions invited session in the 2021 INFORMS conference)

36. Kim, M., Ou, E., Loh, P., Allen, T., Agasie, R., and **Liu, K.** (2020), "RNN-Based Online Anomaly Detection in Nuclear Reactors for Highly Imbalanced Datasets with Uncertainty", *Nuclear Engineering and Design*, 364, 110699 (This paper received the Best Student Paper Finalist award (second place) in the Energy Systems section of Industrial and Systems Engineering Research Conference (ISERC), 2021).

37. Wang, D., **Liu, K.**, and Zhang, X. (2022), "A Spatiotemporal Prediction Approach for A 3D Thermal Field from Sensor Networks", *Journal of Quality Technology*, 54, 215-235. (This paper received Best Student Paper Award in Data Mining Section of INFORMS, 2019).

38. Wang, D., **Liu, K.**, and Zhang, X. (2022), "A Generic Indirect Deep Learning Approach for Multisensor Degradation Modeling", *IEEE Transactions on Automation Science and Engineering*, 19, 3, 1924 - 1940.

39. Kim, M., Song, C., and **Liu, K.** (2022), "Individualized Degradation Modeling and Prognostics in a Heterogeneous Group via Incorporating Intrinsic Covariate Information", *IEEE Transactions on Automation Science and Engineering*, 19, 1503 - 1516.

40. Ma, Z., Wang, S., Kim, M., **Liu, K.**, Chen, C., and Pan, W. (2021), "Transfer Learning of Memory Kernels in Coarse-grained Modeling", *Soft Matter*, 17, 5864-5877. (This paper was selected to be highlighted on the outside front cover of Soft Matter).

41. Song, C., **Liu, K.**, and Zhang, X. (2021), "Collusion Detection and Ground Truth Inference in Crowdsourcing for Labeling Tasks", *Journal of Machine Learning Research*, 22(190), 1−45. (This paper received the Best Paper award in the Quality, Statistics, and

Reliability Section of INFORMS, 2019).

42. Kim, M., Cheng, J. C., and **Liu, K.** (2021), "An Adaptive Sensor Selection Framework for Multisensor Prognostics", *Journal of Quality Technology*, 53, 566-585.

43. Ye, H., and **Liu, K.** (2022), "A generic online nonparametric monitoring and sampling strategy for high-dimensional heterogeneous processes", *IEEE Transactions on Automation Science and Engineering*, 19, 3, 2079 - 2094. (This paper received the Best Student Paper Finalist award in the DAIS section of Industrial and Systems Engineering Research Conference (ISERC), 2021).

44. Wang, D., Li, F., and **Liu, K.** (2023), "Modeling and Monitoring of a Multivariate Spatio-Temporal Network System", *IISE Transactions*, 55, 4, 331-347.

45. Song, C., Zheng, Z., and **Liu, K.** (2022), "Building Local Models for Flexible Degradation Modeling and Prognostics", *IEEE Transactions on Automation Science and Engineering*, 19, 3483 - 3495.

46. Ye, H., Xian, X., Cheng, J. C., Hable, B., Shannon, R. W., Elyaderani, M. K. and **Liu, K.** (2023), "Online Nonparametric Monitoring of Heterogeneous Data Streams with Partial Observations based on Thompson Sampling", *IISE Transactions*, 55, 4, 392-404. (This paper received the Best Student Paper Finalist award in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2020; This paper was selected for presentation in the IISE Transaction invited session in the 2022 INFORMS conference).

47. Ou, E., Kim, M., Loh, P., Allen, T., Agasie, R., and **Liu, K.** (2022), "Automatic Recognition System for Document Digitization in Nuclear Power Plants", *Nuclear Engineering and Design*, 398, 111975.

48. Wang, D., Li, F., **Liu, K.**, and Zhang, X. (2024), "Real-time Cyber-Physical Security Solution Leveraging an Integrated Learning-Based Approach", *ACM Transactions on Sensor Networks*, 20, 2, 1-22.

49. Ye, H., Zheng, Z., Cheng, J. C., Hable, B., and **Liu, K.** (2024), "Online monitoring of high-dimensional asynchronous and heterogeneous data streams for shifts in location and scale", *International Journal of Production Research*, 62, 3, 720-736.

50. Zheng, Z., Zhao, W., Hable, B., Gong, Y., Wang, J., Shannon, R. W., and **Liu, K.** (2024), "Transfer Learning-based Independent Component Analysis", *IEEE Transactions on Automation Science and Engineering*, 21, 1, 783-798.

51. Kim, M., Allen, T., and **Liu, K.** (2023), "Covariate Dependent Sparse Functional Data Analysis", *INFORMS Journal on Data Science*, 2, 1, 81-98.

52. Wang, D., and **Liu, K.** (2024), "An Integrated Deep Learning-Based Data Fusion and Degradation Modeling Method for Improving Prognostics", *IEEE Transactions on Automation Science and Engineering*, 21, 2, 1713-1726.

53. Fu, Y., **Liu, K.**, and Zhu, W. (2024), "Instance Selection via Voronoi Neighbors for Binary Classification Tasks", *IEEE Transactions on Knowledge and Data Engineering*, 36, 3921-3933. (This paper received the Best Paper Finalist award in the DAIS Section of Industrial and Systems Engineering Research Conference (ISERC), 2023)

54. Zheng, Z., Ye, H., and **Liu, K.** (2025), "Online Nonparametric Monitoring for Asynchronous Processes with Serial Correlation", *IISE Transactions*, 57, 172-185.

55. Sun, J., Zhou, S., Veeramani, R., and **Liu, K.** (2025), "Prediction of Condition Monitoring Signals Using Scalable Pairwise Gaussian Processes and Bayesian Model Averaging", *IEEE Transactions on Automation Science and Engineering*, 22, 2746-2757.

56. Li, H., Ye, H., Cheng, J. C., and **Liu, K.** (2025), "Online Monitoring of Heterogeneous Partially Observable Data Streams based on Q-learning", *IEEE Transactions on Automation Science and Engineering*, 22, 4802 - 4817. (This paper received the Best Student Paper Finalist award in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2023)

57. Zheng, Z., Zhang, J., Xiao, L., Williams, W. R., Cheng, J. C., and **Liu**, **K.** (2025), "Online Nonparametric Process Monitoring for IoT Systems Using Edge Computing", *IISE Transactions*, 7, 803-817.

58. Huh, Y., Kim, M., Olivas, K., Allen, T., and **Liu, K.** (2024), "Degradation Modeling using Bayesian Hierarchical Piecewise Linear Models: A case study to predict void swelling in irradiated materials", *Journal of Quality Technology*, 56, 498-513.

59. Huh, Y., Kim, M., **Liu**, **K.**, and Zhou, S. (2024), "An Integrated Uncertainty Quantification Model for Longitudinal and Time-to-event Data", *IEEE Transactions on Automation Science and Engineering*, 22, 5863 - 5876.

60. Zhang, J., Zheng, Z., Li, J., and **Liu, K.** (2025), "Self-Starting Monitoring and Dynamic Sampling of High-Dimensional Data Streams", *IEEE Transactions on Automation Science and Engineering*, 22, 7897 - 7911.

61. Li, H. and Chen, Y., **Liu, K.** (2025), "Cost-Effective Dynamic Sampling in High Dimensional Online Monitoring with advantage actor-critic", *International Journal of Production Research*, accepted.

62. Yang, J.[£], Zheng, Z.[£], Jiao, Y., Yu, K., Bhatara, S., Yang, X., Natarajan, S., Zhang, J., Easton, J., Yan, K., Peng, J., **Liu, K.**, and Yu, J. (2025), "Spotiphy: generative modeling in single-cell spatial whole transcriptomics", *Nature Methods*, 22, 724–736. ([£]These authors contributed equally to this work.) (This paper was selected to be April cover of *Nature Methods*; This work was featured in "Know your Madisonian" series published by the Wisconsin State Journal.)

63. Fu, Y., Huh, Y., and **Liu, K.** (2025), "Degradation Modeling and Prognostic Analysis Under Unknown Failure Modes", *IEEE Transactions on Automation Science and*

Engineering, 22, 11012 - 11025.

64. Li, H., Zheng, Z., and **Liu, K.** (2025), "Online Monitoring of High-dimensional Data Streams with Deep Q-network", *IEEE Transactions on Automation Science and Engineering*, 22, 12606-12620.

65. Serrao, B., Huh, Y., Ciuperca, E., Sahin, E., **Liu, K.**, and Duarte, J. (2025), "A Quantitative Analysis of ATF Surface Characteristics on Critical Heat Flux using Machine Learning", *Nuclear Engineering and Design*, 435, 113924.

66. Huh, Y., Fu, Y., and **Liu, K.** (2025), "A Bayesian spike-and-slab sensor selection approach for high-dimensional prognostics", *IEEE Transactions on Automation Science and Engineering*, 22, 13814-13827.

Submitted Papers

67. Xu, H., Xian, X., Zhang, C., and **Liu**, **K.**, "Change Detection for Partially-Observable Linear Dynamic Systems with Adaptive Sampling via Upper Confidence Region", submitted to *IEEE Transactions on Cybernetics*, under review.

68. Fu, Y., Huh, Y., and **Liu, K.**, "Dynamic Sensor Selection for Remote Prognostics", *IISE Transactions*, under revision.

69. Zheng, Z., and **Liu, K.**, "A Neural Network-based Adaptive Sampling in Monitoring High-dimensional Processes", *Technometrics*, under review.

Peer-reviewed Conference Proceedings

1. Lin, Y., **Liu, K.**, Byon, E., Qian, X., and Huang, S. (2015), "Domain-Knowledge Driven Cognitive Degradation Modeling of Alzheimer's Disease", *The SIAM International Conference on Data Mining*, 721-729.

Other publications

2. **Liu, K.** (2016), "Industrial data analytics courses: need, content and expectations – insights from 2015 ISERC panel discussion", *Industrial Engineer*, 48, 4, 43-46. (Feature article in ISE Magazine).

3. **Liu, K.**, Klabjan, D., Shmoys, D., and Sokol, J. (2016), "Present and future of analytics education", *ORMS Today*, 43, 5, 32-35. (Feature article in INFORMS Magazine).

Research Grants Funded

Dr. Liu has been a PI or Co-PI on ~$11.1 million in total external funding. He is the principal investigator (PI) of 9 federal grants. For the external grants, Dr. Liu's personal share amount is ~$4 million.

External Grants

1. NIH, “Enabling immunotherapy for high-risk Group 3 medulloblastoma via systems immunology”, $3,235,050, Co-Investigator (my portion: $320,000), subcontract from St. Jude Children’s Research Hospital (with Jiyang Yu (PI)), 09/2024-08/2028.

2. DOE, “Cybersecurity in advanced reactor fleet by cyber-informed design, real-time anomaly detection, dynamic monitoring, and cost-effective mitigation strategies”, $1,000,000, PI (my portion: $400,000), with Laura Albert (Co-PI), Todd Allen (Co-PI), Fan Zhang (Co-PI), Bri Rolston (Co-PI), and Robert England (Co-PI), 10/2023-09/2026.

3. DOE, “Building Cyber-resilient Architecture for Advanced Reactors via Integrated Operations and Network Digital Twin”, $1,000,000, Co-PI (my portion: $160,000), with Fan Zhang (PI), David Huggins (Co-PI), Samuel Litchfield (Co-PI), Alex Brazalovich (Co-PI), Jason Davis (Co-PI), and Mike Rowland (Co-PI), 10/2023-09/2026.

4. ONR, “Explainable AI for prognostics with uncertainty quantification and domain knowledge enhancement”, $712,551, PI (my portion: $372,224), with Shiyu Zhou (Co-PI), 5/2023-4/2027.

5. NIH, “Intracellular and Intercellular Network Rewiring and Hidden Driver Inference from Single-Cell Data”, $679,708, Co-Investigator (my portion: $80,000), subcontract from St. Jude Children’s Research Hospital (with Jiyang Yu (PI)), 09/2022-08/2024.

6. US ARMY CORPS OF ENGINEERS, “Enable Predictive Maintenance for Smart and Connected Systems - Harnessing the Power of Artificial Intelligence”, $419,423, Sole PI, 09/2020-09/2023.

7. DOE, “Engineering-Informed, Data-Driven Degradation Modeling, Prognostics and Control for Radiation-induced Void Swelling in Reactor Steels”, $400,000, PI (my portion: $236,242), with Todd Allen (Co-PI), 10/2020-09/2023.

8. AFOSR, “Mesoscale Modeling of Soft Matter: A Bottom-up Approach”, $599,983, Co-PI (my portion: $228,534), with Wenxiao Pan (PI), 07/2020-06/2024.

9. 3M, “Online anomaly detection and fault localization for heterogeneous data streams” and “Transfer learning enabled quality improvement for production systems”, $270,730, Sole PI, 10/2019-11/2021.

10. DOE, “Big data analytics solutions to improve nuclear power plant efficiency: Online monitoring, visualization, prognosis, and maintenance decision making”, $797,820, PI (my portion: $433,942), with Po-Ling Loh (Co-PI), Todd Allen (Co-PI) and Chris Comfort (Co-PI), 10/01/2018-09/30/2021.

11. AFOSR, “Dynamic Data-Driven Modeling, Sampling and Monitoring of Big Spatial-Temporal Data Streams for Real-Time Solar Flare Detection”, $120,001, PI (my portion: $67,001), with Shuai Huang (Co-PI), 02/2018-02/2019.

12. ONR, “Internet of Things-enabled Condition-based Monitoring, Diagnosis, and

Prognostics for Navy Equipment", $274,551, Sole PI, 04/2017-03/2021.

13. NSF-CNS, "CRISP Type 2/Collaborative Research: Harnessing Interdependency for Resilience: Creating an "Energy Sponge" with Cloud Electric Vehicle Sharing," $874,801, Co-PI (my portion: $273,526), with Xin Wang (PI) and Emilia Tjernstroem (Co-PI), 09/2016-08/2022.

14. NSF-CMMI with a REU supplement, "Collaborative Research: Data-Driven Smart Monitoring of Alzheimer's Disease via Data Fusion, Personalized Prognostics, and Selective Sensing," $155,729, PI, 09/2014-08/2017.

15. NSF-CMMI with a REU supplement, "Collaborative Research: Online Monitoring of High-Dimensional Streaming Data Using Adaptive Order Shrinkage," $155,729, PI, 08/2014-07/2018.

16. Toyota Material Handling North America University Research Program, "Data-Driven Failure Predictive Analytics for Internet of Things (IoT) enabled Service Systems", $410,001, Co-PI (my portion: $113,090), with Raj Veeramani (PI) and Shiyu Zhou (Co-PI), 11/2016-10/2017.

Intramural Grants

1. UW-Madison Campus Fall Competition, "Internet of Things (IoT)-enabled data analytics for service decision making", $38,823, PI, 07/2016-06/2017.

Technical Presentations

1. "Anomaly detection based on big data streams and crowdsourcing tasks", Amazon online webinar, April 2025.

2. "Research Roadmaps and Recent Advances in Data Science for Prognostics", KAIST online webinar, Nov. 2024.

3. INFORMS Conference, invited panelist for "QSR Student Introduction and Interaction Panel", Oct. 2024, Seattle, WA, USA.

4. "Research Roadmaps and Recent Advances in Data Science for Prognostics", INFORMS QSR Webinar, Feb 2024, USA

5. "Industrial Data Science for Quality Improvement in Complex Systems", Rensselaer Polytechnic Institute, January 2024, USA

6. "Research Roadmaps and Recent Advances in Data Science for Prognostics", U.S. Army ERDC, October 2023, USA

7. "Explainable AI for Prognostics", Applied Research Lab at Pennsylvania State University, May 2023, USA.

8. INFORMS Conference, invited panelist for “Starting tenure-track career”, 2022, Indianapolis, IN, USA.
9. “Industrial Data Science for Nuclear Applications”, UW-Madison INES Seminar, Nov. 2022, USA.
10. “Online monitoring of big data streams --- roadmap and recent advances”, IISE QCRE and DAIS Joint Webinar, Nov. 2022, USA.
11. “Enable Predictive Maintenance for Smart and Connected Systems - Harnessing the Power of Artificial Intelligence”, U.S. Army ERDC, Nov. 2022, USA
12. “AI-based predictive maintenance and quality improvement”, UW-Madison IoT Systems Research Center event, May 2022, USA.
13. “Online monitoring of big data streams --- roadmap and recent advances”, Texas A&M, April 2022, USA.
14. “Industrial Data Science for Quality Improvement in Complex Systems”, Ford Motor, April 2022, USA.
15. “Online monitoring of big data streams --- roadmap and recent advances”, Arizona State University, Feb. 2022, USA.
16. “Data Science for Complex Degradation Systems”, U.S. Army ERDC, June 2021, USA.
17. “Online monitoring of heterogeneous big data streams”, UW-Madison IoT Systems Research Center webinar, March 2021, USA.
18. “Anomaly Detection and Fault Diagnosis”, UW-Madison IoT Systems Research Center webinar, Feb. 2020, USA.
19. IEEE International Conference on Automation Science and Engineering, “Data Science for Degradation Systems”, Aug. 2019, Vancouver, BC, Canada.
20. IEEE International Conference on Automation Science and Engineering, “Spatiotemporal modeling and real-time prediction of origin-destination traffic demand”, Aug. 2019, Vancouver, BC, Canada.
21. “Industrial Big Data Analytics for Quality Improvement in Complex Systems”, 3M company, August 2019, USA.
22. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Shanghai Jiaotong University, July 2019, China.
23. “Multisensor Degradation Modeling and Prognostics”, the 9th International Symposium on Quality Science and Reliability Technology, July 2019, China.
24. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”,

University of Southern California, Mar. 2019, USA.

25. “Industrial Big Data Analytics for Quality Improvement in Complex Systems”, Machine-ground interaction consortium (MAGIC), Dec. 2018, USA.
26. “Data Science to Large Data Sets of Multivariable Data --- Help Identify the Key Variables”, Johnson Controls International (JCI) Campus Visit, Nov. 2018, USA.
27. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, University of Iowa, Oct. 2018, USA.
28. “Big Data Analytics for Real-time Complex System Monitoring”, IoT center industry event, Oct. 2018, USA.
29. “Dynamic Data-Driven Adaptive Sampling and Monitoring of Big Spatial-Temporal Data Streams”, AFOSR PI Meeting, Sep. 2018, USA.
30. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Wisconsin Institute for Discovery, Sep. 2018, USA.
31. “Industrial Analytics Research at UW-Madison IoT Systems Research Center”, Kohler Company, Sep. 2018, USA.
32. “Big data for prognostics”, Chinese academy of science, July 2018, China.
33. “Data-level fusion for multisensor degradation modeling and prognostics”, Peking University, June 2018, China.
34. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Argonne National Laboratory, June 2018, USA.
35. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Virginia Tech, April. 2018, USA.
36. “Tutorial for Industrial Data Analytics Using R”, IoT System Research Center, UW-Madison, Dec. 2017, USA.
37. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Purdue University, Oct. 2017, USA.
38. “Data fusion for degradation modeling and prognostics”, Chinese Academy of Science, Aug. 2017, China.
39. IEEE International Conference on Automation Science and Engineering, “A Nonparametric Adaptive Sampling Strategy for On-line Monitoring of Big Data Streams”, Aug. 2017, Xi’an, China.
40. InfoSymbiotics/DDDAS Conference, “Dynamic Data-Driven Adaptive Sampling and Monitoring of Big Spatial-Temporal Data Streams for Real-Time Solar Flare Detection”,

Aug. 2017, Cambridge, Massachusetts.

41. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Idaho National Lab, Jul. 2017, USA.
42. “Industrial Analytics Revolution-From Data to Action”, Kohler Company, Jul. 2017, USA.
43. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Beijing Jiaotong University, Jun. 2017, USA.
44. “Data Fusion for Degradation Modeling and Prognostics”, Peking university, Jun. 2017, China.
45. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Rutgers university, Jan. 2017, USA.
46. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, University of Washington, Dec. 2016, USA.
47. INFORMS Conference, “Integration of Data Fusion Methodology and Degradation Modeling Process to Improve Prognostics”, Nov. 2016, Nashville, TN. (This talk was presented at the T-ASE invited session).
48. “Big Data Analytics for Real-time Complex System Monitoring and Prognostics”, Arizona State University, Oct. 2016, USA.
49. IEEE International Conference on Automation Science and Engineering, “Integration of Data Fusion Methodology and Degradation Modeling Process to Improve Prognostics”, Aug. 2016, Fort Worth, TX.
50. InfoSymbiotics/DDDAS Conference, “Dynamic Data-Driven Adaptive Sampling and Monitoring of Big Spatial-Temporal Data Streams for Real-Time Solar Flare Detection”, Aug. 2016, Hartford, Connecticut.
51. “Data Analytics for Service Decision Making”, Peking University, Dec. 2015, China.
52. “Big Data Analytics for System Monitoring and Prognostics”, Xi’an Jiaotong University, Dec. 2015, China.
53. “Data Analytics for Service Decision Making”, Tsinghua University, Dec. 2015, China.
54. “Data Analytics for Service Decision Making”, Chinese Academy of Science, Jan. 2016, China.
55. INFORMS Conference, “Adaptive Sensor Allocation Strategy for Process Monitoring and Diagnosis in a Bayesian Network”, Nov. 2015, Philadelphia, PA. (This talk was presented at the T-ASE invited session).

56. INFORMS Conference, Invited panelist for "Panel Discussion on Big Data Science", Nov. 2015, Philadelphia, PA.

57. Joint Statistical Meeting, "An adaptive sampling strategy for online high-dimensional process monitoring", August 2015, Seattle, WA. (This talk was presented at the *Technometrics* invited session).

58. Spring Research Conference, "Recent advances in sensor system design and measurement strategy", May 2015, Cincinnati, OH.

59. "System informatics and data analytics enabled by IoT", Hitachi Big Data Lab, Hitachi Data Systems Corporation, April 2015, San Jose, CA.

60. "Data fusion for process monitoring, prognostics and management", Prognostics Center of Excellence (PCoE), Ames Research Center, NASA, April 2015, San Jose, CA.

61. INFORMS Conference, "A Systematic Approach for Business Data Analytics with a Real Case Study", Nov. 2014, San Francisco.

62. INFORMS Conference, "Integration of Data Fusion Methodology and Degradation Modeling Process to Improve Prognostics", Nov. 2014, San Francisco.

63. "System informatics and data analytics", Peking University, May 2014, China.

64. "Quality improvement via system informatics and data analytics", Chinese Academy of Science, May 2014, China.

65. "System informatics and data analytics", Tsinghua University, May 2014, China.

66. INFORMS Conference, "Adaptive sampling strategy for online high-dimensional process monitoring with swarming intelligence", Oct. 2013, Minneapolis.

67. INFORMS Conference, "Dynamic Control of Residual Life Distribution through Production Rate Adjustment in Serial-Parallel Multistage Manufacturing Processes", Oct. 2013, Minneapolis.

68. IEEE International Conference on Automation Science and Engineering, Workshop of System Informatics and Analytics, "An adaptive sampling strategy for online high-dimensional process monitoring", Aug. 2013, Madison.

69. The Industrial and Systems Engineering Research Conference, "Adaptive Sensor Allocation Strategy for Process Monitoring and Diagnosis in a Bayesian Network", May. 2013, Puerto Rico.

70. INFORMS Conference, "Health Index Development Based on Sensory Data Fusion for Degradation Modeling and Prognostic Analysis", Oct. 2012, Phoenix.

71. INFORMS Conference, "Capability-Enhanced Adaptive Sensor Allocation Strategy for Process Monitoring and Diagnosis in a Bayesian Network", Oct. 2012, Phoenix.

72. NSF Engineering Research and Innovation Conference, "Health index Development for Degradation Modeling and Prognostic Analysis", Jul. 2012, Boston.

73. INFORMS Conference, "Healthcare Physician Performance Assessment and Evaluation Indices Study", Nov. 2011, Charlotte.

74. INFORMS Conference, "Objectives-Oriented Optimal Sensor Allocation Strategy for Process Monitoring and Diagnosis by Multivariate Analysis in a Bayesian Network", Nov. 2011, Charlotte.

Teaching Experience

Instructor, Undergraduate course, "Methods of Quality Improvement," ISYE 3039, GT, Summer 2012.

Guest Lecturer, Ph.D. course, "Informatics in Production and Service System," ISYE 7204, GT.

Instructor, Graduate course (*newly developed*), "Data Mining and Analytics" ISyE 691, UW-Madison, Spring 2014.

This newly developed graduate-level course will help students understand the advanced data mining and analytics tools, such as Ordinary/Penalized Linear Regression, dimension reduction, model assessment and selection, clustering, classification, ensemble methods, and undirected/directed graphical models. Also, it teaches several popular data analytics software, like R, MATLAB, and Tableau for better visualization of the data structures and decision making. After taking this course, students are expected to establish a strong foundation for both applying data mining techniques to complex real-world problems and for addressing core research topics in data mining and analytics through developing a real data analytics project.

Instructor, Undergraduate/Graduate course, "Inspection, Quality Control and Reliability," ISyE 512, UW-Madison, Fall 2014, Fall 2015, Fall 2016.

Instructor, Undergraduate course (*newly developed*), "Fundamentals of industrial data analytics," ISyE 691, UW-Madison, Spring 2015; ISyE 601, UW-Madison, Spring 2016; ISyE 412, UW-Madison, Spring 2017, Spring 2018, Spring 2019, Spring 2020, Spring 2021.

This newly developed undergraduate-level course will provide students with understanding of the fundamentals of using data mining and analytics techniques to transform from data-rich into decision-smart. It focuses on training students with the ability to formulate and solve real-world industrial problems with appropriate modeling strategies and scientific principles. This course includes three components: (1) learning fundamental industrial data mining and analytics theory;

(2) implementation of industrial data analytics techniques with lab demonstration; and (3) project experience for solving a real-life industrial data analytics problem.

Instructor, Online industry course (*newly developed*), "Fundamentals of industrial data analytics," ISyE 412, UW-Madison, Spring 2018, Spring 2019, Spring 2021, Spring 2022, Spring 2024.

I have also developed a new online industry class based on the course materials of ISyE 412 through collaboration with the department of Engineering Development Program at UW-Madison. The course was first offered in Spring 2018, and attracted in total 31 students, ranging in age from the late 20s to the mid-50s and living in 16 different states and three other countries (Canada, Nigeria and United Arab Emirates). All students of this course are working engineers, such as from 3M, Harley-Davidson, Intel, Siemens, Boeing and John Deere, just name a few. Through this class, those working engineers can now catch up on important data analytics skills, which may not have been offered as part of their original training.

Instructor, Undergraduate course/Graduate course, "Information Sensing and Analysis for Manufacturing Processes," ISyE 612, UW-Madison, Spring 2016, Spring 2018, Spring 2020, Spring 2024.

Sem. and Year	*Course No.*	*No. Enrolled*	*Instructor Rating "This instructor compared to all instructors you have had is Top 20%"*
Spr. 2014	ISyE 691	19	4.22 / 5
Fall 2014	ISyE 512	49	3.68 / 5
Spr. 2015	ISyE 691*	36	4.34 / 5
Fall 2015	ISyE 512	49	3.96 / 5
Spr. 2016	ISyE 601*	14	4.88 / 5
Spr. 2016	ISyE 612	10	4.57 / 5
Fall 2016	ISyE 512	51	4.12 / 5
Spr. 2017	ISyE 412	28	4.35 / 5
Spr. 2018	ISyE 612	21	3.85 / 5
Spr. 2018	ISyE 412	55	3.79 / 5
Spr. 2019	ISyE 412	57	3.78 / 5
Spr. 2020	ISyE 612	11	3.63 / 5

Spr. 2020	ISyE 412	48	4.43 / 5
Spr. 2024	ISyE 612	13	4.88 / 5

*ISyE 412 was formerly listed as ISyE 691 and ISyE 601 in spring 2015 and spring 2016 before it becomes a new course.

Interpro online classes for working engineers:

Sem. and Year	*Course No.*	*No. Enrolled*	*Overall Course Satisfaction*
Spr. 2018	ISyE 412	31	3.5 / 5
Spr. 2019	ISyE 412	20	4.11 / 5
Spr. 2021	ISyE 412	28	4.12 / 5
Spr. 2022	ISyE 412	26	4.13 / 5
Spr. 2024	ISyE 412	23	3.75 / 4*

*The overall course satisfaction total was adjusted from 5 to 4.

Students Advised

Graduated Ph.D. Students (8)

1. *Abdallah Chehade* (graduated in summer 2017)

   - Thesis: "Data-Driven Approaches for Condition Monitoring and Predictive Analytics"
   - First employment: Assistant professor, Department of Industrial and Manufacturing Systems Engineering, University of Michigan-Dearborn

   Academic achievements:

   - Best Student Paper Finalist award (2nd place) in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2016
   - Best Student Poster award in the Quality, Statistics, and Reliability Section of INFORMS, 2015
   - Student Research Grant Funds Competition, UW-Madison, 2015
   - Richard S. and Harriet K. Fein Scholarship, UW-Madison, 2016

2. *Xiaochen Xian* (graduated in summer 2019)

   - Thesis: "Big Data Modeling and Monitoring in Complex Systems"
   - First employment: Assistant professor, Department of Industrial and Systems Engineering, University of Florida

   Academic achievements:

   - Best Student Poster award in the Quality, Statistics, and Reliability Section of INFORMS, 2016

- Industrial Graduate Support Endowment Scholarship, UW-Madison, 2017

3. *Changyue Song* (graduated in summer 2020)

   - Thesis: "Internet of Things-Enabled Degradation Modeling, Inference, and Prognosis"
   - First employment: Assistant professor, School of Systems and Enterprises, Steven Institute of Technology

   Academic achievements:

   - Best Student Paper Finalist award in the Industrial and Systems Engineering Research Conference (ISERC), 2015
   - Best Paper Finalist Award (theoretical track) in the Data Mining Section of INFORMS, 2017
   - Industrial Graduate Support Endowment Scholarship, UW-Madison, 2018
   - Campus-Wide Best TA Award, 2018
   - Mary G. and Joseph Natrella Scholarship, ASA, 2019
   - Wisconsin Distinguished Graduate Fellowship, UW-Madison, 2019
   - Best Paper award in the Quality, Statistics, and Reliability Section of INFORMS, 2019

4. *Honghan Ye* (graduated in summer 2021)

   - Thesis: "Intelligent Maintenance and Monitoring Strategy for Smart Manufacturing Systems"
   - First employment: Data Scientist, 3M

   Academic achievements:

   - Best Student Paper Finalist award in the QCRE section of Industrial and Systems Engineering Research Conference (ISERC), 2020
   - Best Student Paper Finalist award in the DAIS section of Industrial and Systems Engineering Research Conference (ISERC), 2021
   - Student Research Grants Competition Award, UW-Madison, 2021
   - NSF sponsorship, Quality and Productivity Research Conference (QPRC), 2021

5. *Minhee Kim* (graduated in summer 2022)

   - Thesis: "System Informatics and Data Analytics for Smart and Connected Systems – Going Beyond Accuracy"
   - First employment: Assistant professor, Department of Industrial and Systems Engineering, University of Florida

   Academic achievements:

   - Industrial Graduate Support Endowment Scholarship, UW-Madison, 2019
   - Best Student Poster honorable mention award in Quality, Statistics, and Reliability Section of INFORMS, 2020
   - Best Student Paper Finalist award (second place) in the Energy Systems section of Industrial and Systems Engineering Research Conference (ISERC), 2021

- Gilbreth Memorial Fellowship, IISE, 2021
- Student Research Grants Competition Award, UW-Madison, 2021
- Mary G. and Joseph Natrella Scholarship, ASA, 2021

6. *Wenjun Zhu* (graduated in summer 2022, co-advised with Prof. Jingshan Li)

   - Thesis: "Modeling and Analysis of Patient Transitions in Healthcare Delivery Systems"
   - First employment: Research Scientist, GNS Healthcare

   Academic achievements:

   - Rea C and David H Gustafson Scholarship, UW-Madison, 2020

7. *Ziqian Zheng* (graduated in summer 2024)

   - Thesis: "Advanced Process Modeling and Monitoring of Complex Data in Intelligent and Connected Systems"
   - First employment: General Software Engineer, WeRide Corp.

   Academic achievements:

   - Rea C & David H Gustafson Scholarship, 2023
   - Winner of the QSR Best Student Poster Competition at INFORMS, 2023

8. *Haoqian Li* (graduated in fall 2024)

   - Thesis: "Reinforcement Learning for Online Process Monitoring with Dynamic Partial Observations"
   - First employment: Applied Scientist, Amazon

   Academic achievements:

   - Best Student Paper Finalist award in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2023

Current Ph.D. Students

- *Ye Kwon Huh* (started in fall 2020)
- *Ying Fu* (started in fall 2022)

  Academic achievements:

  - Best Paper Finalist award in the DAIS Section of Industrial and Systems Engineering Research Conference (ISERC), 2023

- *Jiahui Zhang* (started in fall 2022)
- *Xin Xia* (started in spring 2025)

  Academic achievements:

- Best Paper Finalist award in the QCRE Section of Industrial and Systems Engineering Research Conference (ISERC), 2025

Master Students

- Guangda Shi (2015 spring independent study)
- Qi Chen (2015 fall independent study)
- Quan Chen (2015 fall independent study)
- Swaminathan Ramesh-Sashi (2016 spring independent study)
- Sommer Ahmad (2016 spring independent study)
- Suraj Subhash Thatte (2016 summer independent study)
- Ting Lei (2016 fall independent study)
- Nam Young Kim (2017 spring independent study)
- Scott Bonk (2016-2017, research assistant): joined Belvedere Trading LLC
- Wenjun Zhu (2018 spring independent study): continued her Ph.D. study in ISyE department at UW-Madison in 2018 fall
- Congfei Zhang (2018 fall independent study): joined Kwai Inc.
- Chao-sheng Wu (2022 spring research volunteer)
- Lingyun Xiao (2022-2023, research assistant)

Undergraduate Students

- Bingjie Liu (2014 summer independent study): joined the IOE Ph.D. program at University of Michigan
- Jiamin Chen (funded by NSF REU, 2015): joined the master program in Operations Research at Columbia University
- Alyssa Krueger (funded by NSF REU, 2015)
- Claire Stamborski (funded by NSF REU, 2016)
- Scott Bonk (funded by NSF REU, 2016): continued his graduate study in ISyE department at UW-Madison in 2016-2017
- Yingxin Jia (undergraduate research assistant, 2019)
- Laura Zhou (volunteer study, 2024)
- Douglas Weittenhiller III (independent research study, 2025)
- Gavin Mlnarik (independent research study, 2025)

Visiting Scholars and Students

- Di Wang, Peking University, 9/2018-11/2019
- Dr. Xi Zhang, Peking University, 7/2018 - 11/2018
- Dr. Xi Wang, Beijing Jiaotong University, 12/2017 - 12/2018
- Yue Liu, Zhejiang University, 9/2017-9/2018
- Andy Wang, Hong Kong University of Science and Technology, 12/2015-5/2016
- Dr. Baiyong Men, China University of Petroleum (Beijing), 12/2014 - 12/2015

External Professional Services

Editorial Services:

- Associate Editor, IEEE Conference on Automation Science and Engineering, 12/2016-12/2019

- Editor, IEEE Conference on Automation Science and Engineering, 1/2020-12/2022
- Editorial review board, Journal of Quality Technology, 7/2017-12/2018
- Guest Editor, IEEE Transactions on Automation Science and Engineering on "Automation Analytics beyond Industry 4.0: From Hybrid Strategy to Zero-Defect Manufacturing", 2020
- Associate Editor, IEEE Transactions on Automation Science and Engineering, 7/2017-12/2023
- Department Editor, IISE Transactions on Data Science, Quality and Reliability, 10/2021-11/2024
- Senior Editor, IEEE Transactions on Automation Science and Engineering, 12/2023-12/2029
- Focus Issue Editor, IISE Transactions on Data Science, Quality and Reliability, 11/2024-11/2027

Professional Society Services:

- Council Member, INFORMS Section on Data Mining, 2015-2017
- Council Member, INFORMS Section on Quality, Statistics, and Reliability, 2017-2019
- Founder and Administrator, **I**ndustrial **E**ngineering E**RA** (**IERA**), http://iera.name/, a web platform and home base for Industrial Engineers all over the world, 03/2015-10/2023
- Scientific Committee to First European & American Conference on Business Analytics, Supply Chain and Logistics (EUSA-BASCL 2016)
- Website and Newsletter Editor, INFORMS Section on Data Mining, 2013-2015
- SME faculty advisor, 9/2017-9/2020
- Chair-Elect, INFORMS Quality, Statistics, and Reliability Section, 2020
- Chair, INFORMS Quality, Statistics, and Reliability Section, 2021
- Organizing committee member, 2nd INFORMS Workshop on Quality, Statistics & Reliability, Indianapolis, IN, 2022
- Program committee member, 1st INFORMS Conference on Quality, Statistics, and Reliability (ICQSR), Raleigh, NC, 2023
- Committees Choice Sessions Co-Chairs, INFORMS 2025

Award Committees

- Best Paper Award Competition in Data Mining Section of INFORMS conference
- Best Student Paper Award Competition in Data Mining Section of INFORMS conference
- Best Student Paper Award Competition in Quality, Statistics, and Reliability Section of INFORMS conference
- Best Paper Award Competition in Quality, Statistics, and Reliability Section of INFORMS conference
- Best Student Poster Competition in Quality, Statistics, and Reliability Section of INFORMS conference
- Best Student Paper Award Competition in QCRE Section of the ISERC
- Best Paper Award Competition in QCRE Section of the ISERC
- Best paper and best application paper award committee of IISE Transactions on DSQR
- Best paper and best application paper award committee (chair) of IISE Transactions on DSQR
- Best Paper Award Competition (Chair) of INFORMS Conference on Quality, Statistics, and Reliability (ICQSR)

Proposal Review Panels

- NSF CMMI panel review (3 times)
- NSF CISE panel review (1 time)
- NSF Materials Research panel review (1 time)
- Hong Kong Research Grants Council (RGC) review (5 times)
- DOE NEUP review (5 times)
- DOE Distinguished Early Career Program review (1 time)

Referees

- Technometrics
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Reliability
- IEEE Transactions on Information Theory
- IEEE Transactions on Signal Processing
- IISE Transactions
- Journal of Quality Technology
- Journal of the American Statistical Association
- International Journal for Quality in Health Care
- ASME Journal of Manufacturing Science and Engineering
- Journal of Manufacturing Systems
- IEEE Robotics and Automation Letters
- IEEE Internet of things
- Control Engineering Practice
- Quality and Reliability Engineering International
- Journal of Global Optimization
- Annals of Operation Research
- International Journal of Production Research
- Journal of Medical Systems
- Journal of Aerospace Computing, Information, and Communication
- Robotics and Computer Integrated Manufacturing
- Journal of Mechanical Engineering Science
- Journal of Engineering Manufacture
- International Journal of Distributed Sensor Networks
- Robotics and Computer-Integrated Manufacturing
- Book Chapter, Healthcare Data Analytics (Wiley Series in Operations Research and Management Science)
- The Industrial and Systems Engineering Research Conference (ISERC)

Professional Membership

- Members of *INFORMS* (senior member), *IISE* (senior member), *ASQ* (senior member), *SME*, *IEEE* (senior member), and *ASME*

Conference Organizing Activities

- Organizer and Co-chair, sessions on “Explainable AI for prognostics,” INFORMS

Conference, Seattle, WA, 2024

- Organizer and Co-chair, sessions on "Integration of Machine Learning and Statistical Approaches for Quality Improvement," INFORMS Conference, Phoenix, AZ, 2023
- Organizer and Co-chair, sessions on "Advanced Online Process Monitoring of Complex Data in Smart and Connected Systems," INFORMS Conference, Phoenix, AZ, 2023
- Organizer and Co-chair, sessions on "Best Paper Competition," INFORMS QSR Conference, Raleigh, NC, 2023
- Organizer and Co-chair, sessions on "Efficient Algorithms in Big Data Monitoring," INFORMS conference, Indianapolis, IN, 2022
- Co-chair and organizing committee member, 1st INFORMS Workshop on Quality, Statistics & Reliability, Anaheim, CA, 2021
- Organizer and Co-chair, sessions on "Modeling and Analytics for Heterogeneity in System Informatics," INFORMS conference, Anaheim, CA, 2021
- Organizer and Co-chair, sessions on "Big Data Analytics in System Monitoring and Anomaly Detection," INFORMS conference, Anaheim, CA, 2021
- Cluster Chair, Quality, Statistics and Reliability, INFORMS conference, National Harbor, MD, 2020
- Organizer and Co-chair, panel discussion sessions on "Industrial Data Science," INFORMS conference, Seattle, WA, 2019
- Organizer and Co-chair, panel discussion sessions on "Industry Job Hunting," INFORMS conference, Seattle, WA, 2019
- Organizer and Co-chair, sessions on "Data Analytics for Engineering and Service System Improvement," INFORMS conference, Seattle, WA, 2019
- Organizer and Co-chair, sessions on "Statistical Modeling and Inference in Smart and Connected Systems," INFORMS conference, Seattle, WA, 2019
- Co-Chair, sessions on "Advances in Data Analytics, Modeling and Control for Intelligent Engineering Systems," IEEE CASE, Vancouver, BC, Canada, 2019
- Organizer and Co-Chair, workshop on "Data Science for Engineering Automation," IEEE CASE, Vancouver, BC, Canada, 2019
- Organizer and Co-Chair, sessions on "Modeling, Monitoring, and Prediction in Complex Systems," INFORMS Conference, Phoenix, AZ, 2018
- Organizer and Co-Chair, sessions on "Big Data Modeling and Monitoring," INFORMS Conference, Phoenix, AZ, 2018
- Organizer and Co-Chair, sessions on "Data analytics for system improvement I," INFORMS Conference, Houston, TX, 2017
- Organizer and Co-Chair, sessions on "Data analytics for system improvement II,"

INFORMS Conference, Houston, TX, 2017

- Organizer and Co-Chair, sessions on "Data analytics for system improvement III," INFORMS Conference, Houston, TX, 2017
- Organizer and Chair, sessions on "Data analytics for system improvement I," INFORMS Conference, Nashville, TN, 2016
- Organizer and Co-Chair, sessions on "Data analytics for system improvement II," INFORMS Conference, Nashville, TN, 2016
- Organizer and Co-Chair, sessions on "Data analytics for system improvement III," INFORMS Conference, Nashville, TN, 2016
- Organizer and Chair, Panel Discussion Sessions on "IoT-enabled Data Analytics: Opportunities, Challenges and Applications," INFORMS Conference, Nashville, TN, 2016
- Organizer and Chair, sessions on "Data Analytics for Enterprise System Improvement," Spring Research Conference, Chicago, IL, 2016
- Organizer and Chair, Panel Discussion Sessions on "Industrial Data Analytics Education: Present and Future," ISERC Conference, Anaheim, CA, 2016
- Organizer and Chair, Panel Discussion Sessions on "IoT-enabled data analytics: needs, opportunities and challenges," ISERC Conference, Anaheim, CA, 2016
- Organizer and Co-Chair, sessions on "Data Analytics for Quality Control and Improvement II," INFORMS Conference, Philadelphia, PA, 2015
- Organizer and Chair, sessions on "Data Analytics for Manufacturing and Healthcare Enterprise System," INFORMS Conference, Philadelphia, PA, 2015
- Organizer and Chair, Panel Discussion Sessions on "IoT-enabled Data Analytics: Opportunities, Challenges and Applications," INFORMS Conference, Philadelphia, PA, 2015
- Organizer and Chair, Panel Discussion Sessions on "Industrial Analytics Courses: the Needs, Contents and Expectations," ISERC, Nashville, TN, 2015
- Organizer and Chair, Panel Discussion Sessions on "Present and Future of Analytics Programs," ISERC, Nashville, TN, 2015
- Organizer and Chair, sessions on "Data Analytics for Manufacturing System Design," INFORMS Conference, San Francisco, CA, 2014
- Organizer and Chair, sessions on "Data Fusion for Process Monitoring and Diagnosis," INFORMS Conference, San Francisco, CA, 2014
- Organizer and Chair, sessions on "Data Fusion for Prognostics," INFORMS Conference, San Francisco, CA, 2014
- Organizer and Co-Chair, sessions on "Smart Monitoring of Complex Systems," INFORMS Conference, San Francisco, CA, 2014

- Organizer and Chair, sessions on "Data Fusion for Process Control," INFORMS Conference, Minneapolis, MN, 2013

Other Outside Activities

- Faculty Mentor, Summer internship program, Research for Intelligence & Security Challenges (RISC), 2023, 2024
- Faculty Mentor, Research for Intelligence & Security Challenges (RISC), 2024-2025
- Faculty Fellow, Department of Defense (DOD) Research Participation Program, 9/2023-9/2024

Service within the University

Departmental Services

- Departmental Colloquium Organizer, 2014-2018
- Academic Affairs Cluster Committee, 2013-2017, 2023
- Qualifier Exam Committee, Manufacturing and Production Systems, 2015-present
- Manufacturing and Production Systems Area Group, 2013-present
- Manufacturing and Production Systems Area Group convener, 2021, 2023
- Faculty Affair Cluster Committee, 2013-2016, 2018, 2019, 2021
- Department scholarship committee, 2017
- Hiring committee, Faculty position, 2018, 2021, 2022, 2023
- Graduate Admissions and Recruiting Committee (GARC), 2019, 2021, 2024
- Graduate Admissions and Recruiting Committee Chair (GARC), 2022, 2023
- Hiring committee, Faculty Associate/Teaching Professor, 2019
- Oversight and Review Committees, 2019, 2021, 2022, 2023, 2024
- AI Task force committee, 2023, 2024
- Faculty award and recognition committee Chair, 2024

College Services

- Wendt Space Recommendation Committee, 2017
- Hiring committee, COE hiring in Machine Learning and AI, 2018
- Review committee, Byron Bird Award - Excellence in Research Publication, 2020
- Co-lead, CoE Task Force for Defense and Cyber Security Research, 2022
- Academic Staff/University Staff Distinguished Achievement Award Committee, 2023, 2024, 2025

Campus-wide Services

- Faculty senate (or alternative), 2014, 2015, 2018 fall
- RISE AI Thought Leaders committee, 2024, 2025

Ph.D. Dissertation Committees

- Xiufeng Shao, Ph.D. 2017, "Ranking and Selection procedures for feasibility determination", Committee Member.
- Qing Li, Ph.D. 2017, "Citywide Real-time Grid-based Traffic Emissions Estimation and Air Quality Inference Using Big Data", Committee Member.

- Abdallah Chehade, Ph.D. 2017, “Data-Driven Approaches for Condition Monitoring and Predictive Analytics”, Committee Chair.
- Yuhang Liu, Ph.D. 2017, “Data Analytics Models and Methods for Fault Identification and Prognosis in Mechanical Structures and Manufacturing Processes”, Committee Member.
- Xilu Wang, Ph.D. 2017, “Statistical Shape Modeling for Custom Design and Analysis”, Committee Member.
- Raed Kontar, Ph.D. 2018, “Data-driven Modeling and Prognosis of Condition Monitoring Signals in Engineering Systems”, Committee Member.
- Mohammad Nabhan, Ph.D. 2019, “Dynamic Robust Sparse Modelling and Sampling of High-dimensional Data Streams for Online Process Monitoring”, Committee Member.
- Xiaochen Xian, Ph.D. 2019, “Big Data Modeling and Monitoring in Complex Systems”, Committee Chair.
- Chao Wang, Ph.D., 2019, “Data-driven Modeling, Monitoring and Control for Smart and Connected Systems”, Committee Member.
- Changyue Song, Ph.D. 2020, “Internet of Things-Enabled Degradation Modeling, Inference, and Prognosis”, Committee Chair.
- Salman Jahani, Ph.D. 2021, “Monitoring, Prognosis and Decision-Making for Internet of Things Enabled Systems”, Committee Member.
- Yuguang Wu, Ph.D. 2021, “Large-scale Electric Vehicle Sharing Fleet Management”, Committee Member.
- Honghan Ye, Ph.D. 2021, “Intelligent Maintenance and Monitoring Strategy for Smart Manufacturing Systems”, Committee Chair.
- Minhee Kim, Ph.D. 2022, “System Informatics and Data Analytics for Smart and Connected Systems – Going Beyond Accuracy”, Committee Chair.
- Jaesung Lee, Ph.D. 2022, “Data-Driven Variation Modeling and Management with Application of Advanced Manufacturing Processes and Systems”, Committee Member.
- Wenjun Zhu, Ph.D. 2022, “Modeling and Analysis of Patient Transitions in Healthcare Delivery Systems”, Committee Co-Chair.
- Akash Deep, Ph.D. 2022, “Data-driven Modeling, Prognosis, and Control of Discrete Events in Smart and Connected Systems”, Committee Member.
- Abhijeet Bhardwaj, Ph.D. 2023, “Unsupervised Analytics Models using Natural Language and Sensory Data for Industrial Equipment Degradation Modeling and Decision-Making”, Committee Member.
- Zhan Ma, Ph.D. 2024, “Data-driven Model Order Reduction”, Committee Member.
- Congfang Huang, Ph.D. 2024, “Data-driven and Physics-based Modeling and Optimization for Smart Systems”, Committee Member.

- Ziqian Zheng, Ph.D. 2024, “Advanced Process Modeling and Monitoring of Complex Data in Intelligent and Connected Systems”, Committee Chair.
- Haoqian Li, Ph.D. 2024, “Reinforcement Learning for Online Process Monitoring with Dynamic Partial Observations”, Committee Chair.