

Curriculum Vitae

Hao Yan

Assistant Professor

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Education

- Ph.D.** Industrial Engineering, Georgia Institute of Technology, 2017, Minor: Machine Learning
Ph.D. advisors: Dr. Jianjun Shi and Dr. Kamran Paynabar
- M.S.** Statistics, Georgia Institute of Technology, 2015
- M.S.** Computational Science and Engineering, 2016
- B.S.** Economics, Peking University, 2011
- B.S.** Physics, Peking University, 2011

Honors and Awards

1. Best Student Paper Award Finalist in Quality, Statistics, and Reliability Section of INFORMS, for the paper “AKMM: Adaptive Sensing for Online Anomaly Detection,” 2016.
2. Best Paper Award Winner in the Quality, Statistics, and Reliability Refereed Track of INFORMS for the paper “Real-time Monitoring and Diagnosis of High-Dimensional Data Streams via Spatio-Temporal Smooth Sparse Decomposition,” Oct 2015.
3. Best Student Paper Award Winner in the Industrial and Systems Engineering Research Conference (ISERC) in the Quality Control and Reliability Engineering (QCRE) division, for the paper “Monitoring and Diagnostics of Streaming Images Via Recursive Smooth-Sparse Decomposition,” May 2015.
4. Best Student Paper Award Winner in the Data Mining Section of INFORMS, for the paper “Image Defect Detection via Smooth Sparse Decomposition,” Nov. 2014.
5. John Morris Fellowship, Georgia Institute of Technology, 2012.
6. Meritorious Winner in Mathematical Contest in Modeling, 2010.
7. Second Prize in the 23rd Chinese Physics Olympiad (CPhO), 2006.
8. Third Prize in the 21st Chinese Mathematical Olympiad (CMO), 2006.

Publications

Refereed Journals and Transactions (Papers published or accepted):

1. **Yan, H.**, Paynabar, K., Shi, J., 2017, “Online High-dimensional Monitoring and Diagnostics via Recursive Spatio-Temporal Smooth Sparse Decomposition”, *Technometrics*, accepted. (This paper received Best Paper Award in the QSR Refereed Track of INFORMS 2015 and Best Student Paper Award in the Industrial and Systems Engineering Research Conference 2015).
2. Zhang, C., **Yan, H.**, Shi, J., 2017, “Multiple Sensor-Based Monitoring and Anomaly Detection”, *Journal of Quality Technology*, accepted
3. Yue, X., Wang, K., **Yan, H.**, Zhang, C., Liang, R., Shi, J., 2017, “Generalized Wavelet

Shrinkage of in-line Raman Spectroscopy for Quality Monitoring of Continuous Nano-manufacturing for Carbon Nanotube Buckypaper”, *IEEE Transactions on Automation Science and Engineering*, accepted.

4. Yue, X., **Yan, H.**, Liang, R., Shi, J., 2017, “A Wavelet-based Penalized Mixed-effects Model for Multichannel Profile Detection of In-line Raman Spectroscopy”, *IEEE Transactions on Automation Science and Engineering*, Accepted.
5. **Yan, H.**, Paynabar, K., Shi, J., 2016, “Anomaly Detection in Images with Smooth Background Via Smooth-Sparse Decomposition”, *Technometrics*, in press. (This paper received Best Student Paper Award in Data Mining Section of INFORMS 2014)
6. **Yan, H.**, Liu, K., Zhang, X., Shi, J., 2016, “Multiple Sensor Data Fusion in Degradation Modeling Under Different Operational Conditions”, *IEEE Transactions on Reliability*, Vol. 65(3), pp1416-1426
7. Mesnil, O., **Yan, H.**, Ruzzene, M., Paynabar, K., Shi, J., 2016, “Fast wavenumber measurement for accurate and automatic location and quantification of defect in composite”, *Structural Health Monitoring*, Vol. 15(2), pp223-234.
8. **Yan, H.**, Paynabar, K., Shi, J., 2015, “Image-based Process Monitoring using Low-rank Tensor Decomposition”, *IEEE Transactions on Automation Science and Engineering*, Vol. 12(1), pp216-227.

Refereed Journals and Transactions (Papers under review):

9. Zhang, C., **Yan, H.**, Shi, J., “Multivariate Profile Monitoring based on Sparse Multichannel Functional Principle Component Analysis”, *IIE Transactions*, submitted
10. **Yan, H.**, Pacella, M., Paynabar, K., “Structured Point Cloud Data Modeling via Regularized Tensor Decomposition and Regression”, *Technometrics*, submitted

Working Papers (Papers completed and to be submitted soon)

11. **Yan, H.**, Paynabar, K., Shi, J., “AKM2D: An Adaptive Framework for Online Sensing And Anomaly Detection”, *to be submitted to IIE Transactions*. (This paper is one of the four finalists of Best Student Paper Award in Quality, Statistics, and Reliability Section of INFORMS).
12. Zhang, C., **Yan, H.**, Shi, J., “Dynamic Multivariate Functional Data Modeling via Sparse Subspace Learning”, *to be submitted to Technometrics*

Conference Publications:

13. Mesnil, O., **Yan, H.**, Ruzzene, M., Paynabar, K., Shi, J., 2014, “Frequency Domain Instantaneous Wavenumber Estimation for Damage Quantification in Layered Plate Structures”, *EWSHM - 7th European Workshop on Structural Health Monitoring*, Jul 2014, Nantes, France.
14. Mesnil, O., **Yan, H.**, Ruzzene, M., Paynabar, K., Shi, J., 2015, “Guided Wavefield Reconstruction from Sparse Measurements Using Compressed Sensing”, *International Workshop on Structural Health Monitoring*, Sep 2015, Stanford, United States.

Research Interest

My research interests focus on developing efficient and scalable methodologies and algorithms for analysis of large-scale high-dimensional data with complex heterogeneous data structure to extract information or useful features for the purpose of data fusion for assessment of system performance, early detection of system anomalies, intelligent sampling and sensing for data collection and decision making to achieve optimal system performance. My research lies at the intersection of statistics, large-scale optimization, computational science and industrial engineering and can be categorized into the following areas:

1. **Real time modeling and analysis with large scale high dimensional data:** Develop scalable and computational efficient algorithms for real time modeling and analysis of high dimensional data with complex structure (tensor structure, complex spatio-temporal structure, *etc.*)
2. **Data fusion for modeling of complex systems:** Develop data analysis and data fusion techniques to combine information from multiple sensors for process modeling, anomaly detection and quality improvement for complex systems.
3. **Smart adaptive sampling strategy and data reconstruction:** Develop smart and adaptive sampling for different systems to reduce the data collection time. Develop quality measurement and data reconstruction techniques using compressive sensing.

Teaching Experience

- **Lecture, IEE 598 Design and Analysis of Engineer Experiments**
- **Guest Lecturer**, developed and lectured a 10-lecture module on high-dimensional data analytics and parallel processing (including lectures, homework, lab and exams) for a Ph.D. level course: ISYE 7204 “Informatics in Production and Service System,” Fall 2016, Georgia Institute of Technology.
- **Guest Lecturer**, developed and lectured an 8-lecture module on High-dimensional Statistics (including lectures, homework, lab and exams) for a Ph.D. level course: ISYE 7204 “Informatics in Production and Service System,” Fall 2014, Georgia Institute of Technology
- **Teaching Assistant**, ISyE 6405 “Statistical Methods for Manufacturing Design/Improvement,” Fall 2012, Fall 2014, Georgia Institute of Technology
- **Teaching Assistant**, ISyE 3039 “Methods of Quality Improvement,” Spring 2015, Fall 2013, and Spring 2013, Georgia Institute of Technology
- **Teaching Assistant**, ISYE 6414 “Regression Analysis,” Summer 2012, Georgia Institute of Technology

Invited Presentations

1. INFORMS Conference, “Unsupervised High-dimensional Profile Monitoring and Anomaly Detection via Variational Autoencoder”, Nov. 2017, Houston, TN.
2. INFORMS Conference, “Online Adaptive Sampling and Estimation for Clustered Anomaly Detection”, Nov. 2016, Nashville, TN.
3. INFORMS Conference, “Structured Point Cloud Data Modeling Via Regularized Tensor Decomposition and Regression”, Nov. 2016, Nashville, TN.
4. INFORMS Conference, “Real-time Monitoring and Diagnosis of High-Dimensional Data Streams via Spatio-Temporal Smooth Sparse Decomposition” Nov. 2015, Philadelphia, PA

5. QPRC, “Monitoring and Diagnosis of High-Dimensional Data Streams via Recursive Smooth-Sparse Decomposition”, June. 2015, Raleigh, NC
6. ISERC, “Monitor and diagnostics of streaming images via recursive smooth-sparse decomposition”, May. 2015, Nashville, TN
7. INFORMS Conference, “Image Defect Detection via Smooth-Sparse Decomposition”, Nov. 2014, San Francisco, CA
8. INFORMS Conference, “Multiple sensor data fusion in degradation modeling under different operation conditions”, Nov. 2014, San Francisco, CA.
9. INFORMS Conference, “Image-based process monitoring and defect detection via smooth-sparse decomposition”, Nov. 2014, San Francisco, CA.
10. INFORMS Conference, “Image-based process monitoring using low rank tensor decomposition”, Oct. 2013, Minneapolis, MN.

Professional Services

- Chair and organizer of a session on “Machine Learning for Manufacturing Informatics”, INFORMS Annual Meeting, Houston, 2017
- Chair and organizer of a session on “High-Dimensional Functional Data Analysis”, INFORMS Annual Meeting, Houston, 2017
- Chair and organizer of a session on “High-Dimensional Functional Data Analysis”, INFORMS Annual Meeting, Nashville, 2016
- Invited reviewer of *Technometrics*, *IEEE Transactions on Industrial Electronics*, *IIE Transaction*, *Computers & Industrial Engineering*, *Journal of Manufacturing Systems*, *Computers & Industrial Engineering*
- Review committee for Data Mining Best Student Paper Competition of INFORMS 2015

Professional Membership

- Members of *INFORMS*, *IIE*, and *ASA*