Bo Shen

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EDUCATION

Ph.D. Candidate in Industrial and Systems Engineering 2017 – 2022 (Expected)
Virginia Polytechnic Institute and State University

– *Dissertation:* Advanced Machine Learning for Quality Assurance of Smart Additive Manufacturing, advised by Dr. Zhenyu (James) Kong

Bachelor of Science in Statistics 2013 – 2017
University of Science and Technology of China

RESEARCH INTERESTS

- **Methodology:** *High dimensional streaming data analysis; Optimization for machine learning; Bayesian optimization; Federated learning; Physics-informed machine learning; Reinforcement learning.*
- **Application:** *Smart manufacturing; Additive manufacturing; Cybersecurity; Industrial Internet of Things (IIoT).*

HONORS AND AWARDS

- Runner-up, INFORMS QSR Industry Data Challenge (2020)
- Finalist, INFORMS QSR Best Refereed Paper Competition (2020)
- 2nd place, INFORMS & HFES Student Poster Competition, ISE, Virginia Tech (2019, 2020)
- Fellowship, Grado Department of Industrial & Systems Engineering, Virginia Tech (2017)

PUBLICATIONS

Journal Publications (Published/Accepted)

1. **Shen, B.**, Wang, R., Law, A. C. C., Kamath, R., Choo, H., & Kong, Z. J. (2021). Super Resolution for Multi-Sources Image Stream Data using Smooth and Sparse Tensor Completion and its Applications in Data Acquisition of Additive Manufacturing. *Technometrics*, 1-16. DOI: 10.1080/00401706.2021.1905074

   – Finalist for INFORMS QSR Best Refereed Paper Competition

2. **Shen, B.**, Xie, W., & Kong, Z. J. (2020). Clustered Discriminant Regression for High Dimensional Data Feature Extraction and Its Applications in Healthcare and Additive Manufacturing. *IEEE Transactions on Automation Science and Engineering.* DOI: 10.1109/TASE.2020.3029028

Journal Publications (Under Review/Revision)

3. **Shen, B.**, Kamath, R., Choo, H., & Kong, Z. J. (2021). Robust Tensor Decomposition based Background/Foreground Separation in Noisy Videos and Its Applications in Additive Manufacturing. *IEEE Transactions on Automation Science and Engineering.* Under revision. DOI: 10.36227/techrxiv.14561775.v2

4. **Shen, B.**, Kong, Z. J. (2021). A Novel Active Anomaly Discovery Method and Its Applications in Additive Manufacturing. *IISE Transactions.* Under review. DOI: 10.36227/techrxiv.16674412.v1

5. **Shen, B.**, Gnanasambandam, R., Wang, R., & Kong, Z. J. (2021). Multi-Task Gaussian Process Upper Confidence Bound for Hyperparameter Tuning. *IISE Transactions.* Under the second round of review. DOI: 10.36227/techrxiv.16674400.v1

Working Journal Papers (Draft Accomplished)

6. Maftouni, M., **Shen, B.**, Law, A. C. C., & Kong, Z. J. (2021). A Mask-guided Attention Deep Learning Model for COVID-19 Diagnosis based on an Integrated CT Scan Images Database. To be submitted to *IISE Transactions on Healthcare Systems Engineering.*
   - Runner-up for INFORMS QSR Industry Data Challenge
7. **Shen, B.**, Xie, W., & Kong, Z. J. (2021). Robust Tensor Principal Component Analysis: Formulation, Algorithm, and Applications. To be submitted to *IEEE Transactions on Pattern Analysis and Machine Intelligence.*
8. Chung, J., **Shen, B.**, Law, A. C. C., & Kong, Z. J. (2021). Reinforcement Learning based Process Knowledge Transfer for Quality Assurance of Additive Manufacturing. To be submitted to *IEEE Transactions on Automation Science and Engineering.*
9. Chung, J., **Shen, B.**, & Kong, Z. J. (2021). Sparse Bayesian Learning with Prior Knowledge and Temporally Correlated Solution Vectors with Application to Fault Diagnosis in Multi station Assembly Systems. To be submitted to *Journal of Manufacturing Systems.*
10. Wang, R., Garcia, D., **Shen, B.**, Ma, X., Kamath, R., Choo, H., Fezzaa, K., & Kong, Z. J. (2021). In-process Multi-physical Melt Pool Characteristics Sensing and Data Correlation in Laser Powder Bed Fusion. To be submitted to *Additive Manufacturing.*

Conference Papers (Published)

1. Maftouni, M., Law, A. C. C., **Shen, B.**, Zhou, Y., Yazdi, N., & Kong, Z. J. (2021). A Robust Ensemble-Deep Learning Model for COVID-19 Diagnosis based on an Integrated CT Scan Images Database. *Proceedings of the 2021 IISE Annual Conference.* DOI: proquest/2560887697

TEACHING EXPERIENCE

Teaching Experience at Virginia Tech

ISE 2214 Manufacturing Processes Lab (2017 Fall, 2019 Spring & Fall): *Lab Instructor*

ISE 2014 Engineering Economy (2018 Fall): *Graduate Teaching Assistant*

ISE 4404 Statistical Quality Control (2018 Spring): *Graduate Teaching Assistant*

MENTORING EXPERIENCE

Ph.D. Mentor at Virginia Tech: Raghav Gnanasambandam

- Bayesian Optimization using Deep Gaussian Process for metal Additive Manufacturing Process Optimization

INVITED TALK

1. **Multi-Task Gaussian Process Upper Confidence Bound for Hyperparameter Tuning**
   - INFORMS Annual Meeting, Anaheim, CA, 2021
   - IISE Annual Conference 2020 (Virtual)

2. **Robust Tensor Decomposition based Background/Foreground Separation in Noisy Videos and Its Applications in Additive Manufacturing**
   - INFORMS Annual Meeting, Anaheim, CA, 2021
3. **Super Resolution for Multi-Sources Image Stream Data using Smooth and Sparse Tensor Completion and its Applications in Data Acquisition of Additive Manufacturing**
   - INFORMS Annual Conference 2020 (Virtual)
   - IISE Annual Conference 2020 (Virtual)
4. **Robust Tensor Principal Component Analysis: Formulation, Algorithm, and Applications**
   - INFORMS Annual Conference 2020 (Virtual)
   - INFORMS Annual Conference, Seattle, WA, 2019
5. **Clustered Discriminant Regression for High-Dimensional Data Feature Extraction and Its Applications in Healthcare and Additive Manufacturing**
   - IISE Annual Conference, Orlando, FL, 2019

SERVICE AND LEADERSHIP

Session Chair: Data Mining and Machine Learning in Smart Manufacturing, INFORMS Annual Conference 2021

Journal Referee: IISE Transactions, IEEE Transactions on Automation Science and Engineering

VP Finance: The INFORMS Student Chapter at Virginia Tech (2021 – 2022)

Professional Society Memberships: Institute of Industrial and Systems Engineers (IISE), Institute for Operation Research and the Management Sciences (INFORMS), Institute of Electrical and Electronics Engineers (IEEE)