

Zhangyue Shi

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EDUCATION

Oklahoma State University

Aug. 2019 – Aug. 2023 (Expected)

Ph. D., Major in Industrial Engineering & Management, Minor in Statistics.

Stillwater, OK, USA

- *Dissertation Topic: Advanced Data Analytics-based Quality Assurance for Smart Manufacturing*

Xi'an Jiaotong University

Aug. 2015 – Jun. 2019

Bachelor of Engineering in Mechanical Engineering.

Xi'an, Shaanxi, China

SKILLS

Programming: Python (PyTorch, TensorFlow), R, MATLAB **Language:** Mandarin (native), English (fluent), German (basic)

Microcontroller: Raspberry Pi

Modeling: Autodesk Inventor, CAD, Solidworks

Quantitative Methodologies: Statistical Process Control, Supervised Learning, Self-supervised Learning, Data Augmentation, Model Compression, Markov Decision Processes, Time Series Analysis, Bayesian Modeling, Hypothesis Test

EXPERIENCES

Oklahoma State University *Research Assistant*

Aug. 2019 – Present

- **Data quality assurance:** A blockchain-enabled approach for cyber-physical security protection in manufacturing
 - Apply blockchain for important file (G-code)/data (stream data) storage using **Python**. Via mismatch of hash value in blocks, malicious modification on files could be detected timely and accurately
 - Apply **asymmetry encryption method** to encrypt files and design a **camouflage method** to camouflage ciphertext to reduce risk of unauthorized access on files
- **Design quality assurance:** Hybrid data-driven feature extraction-enabled surface modeling for process design
 - Extract low-dim feature from printing surface based on **neural network (autoencoder)** in **TensorFlow** and domain knowledge
 - Correlate extracted features with machine parameters using **random forest** classifier in **scikit-learn**
- **Process quality assurance:** Develop machine learning-based methods to enhance the *in-situ* monitoring performance
 - Set up experimental platform; collect *in-situ* printing vibration signal via accelerometer and **Raspberry Pi**
 - Apply **LSTM-autoencoder** to extract feature from vibration signal; apply **adaptive boosting** classifier for supervised monitoring; utilize **OCSVM** to construct **EWMA chart** in **R** for unsupervised monitoring
 - Propose a **data augmentation** method based on **Generative Adversarial Network (GAN)** which can generate more high-quality anomaly data for classifier training in order to enhance the anomaly detection performance
 - Incorporate **knowledge distillation** framework in decentralized system to improve efficiency of neural network while preserving data privacy using **PyTorch**

SELECTED HONORS AND AWARDS

- Outstanding Graduate Student, School of Industrial Engineering and Management, Oklahoma State University, 2022.
- NSF Student Support Award, North American Manufacturing Research Conference (NAMRC) 49, 2021.
- Data Challenge Competition Finalist, Quality, Statistics and Reliability (QSR) Section, INFORMS Annual Meeting, 2019.
- Second Prize, National Collegiate Mechanical Product Digital Design Contest, Ministry of Education, China, 2018.
- First Prize, National College Students Mathematical Modeling Competition Undergraduate Group Shaanxi Division, China, 2017.

PUBLICATIONS

- Shi, Z., Mamun, A. A., Kan, C., Tian, W., & Liu, C. (2022). *An LSTM-autoencoder based online side channel monitoring approach for cyber-physical attack detection in additive manufacturing*. **Journal of Intelligent Manufacturing**.
- Shi, Z., Kan, C., Tian, W., & Liu, C. (2021). *A Blockchain-based G-code protection approach for cyber-physical security in additive manufacturing*. **Journal of Computing and Information Science in Engineering**.
- Li, Y., Shi, Z., Liu, C., Tian, W., Kong, Z., & Williams, C. B. (2021). *Augmented Time Regularized Generative Adversarial Network (ATR-GAN) for Data Augmentation in Online Process Anomaly Detection*. **IEEE Transactions on Automation Science and Engineering**.
- Shi, Z., Mandal, S., Harimkar, S., & Liu, C. (2021). *Surface Morphology Analysis Using Convolutional Autoencoder in Additive Manufacturing with Laser Engineered Net Shaping*. **Procedia Manufacturing**.
- Shi, Z., Liu, C., Kan, C., Tian, W., & Chen, Y. (2021). *A Blockchain-Enabled Approach for Online Stream Sensor Data Protection in Cyber-Physical Manufacturing Systems*. **IDETC-CIE 2021**.

COMMUNITY ENGAGEMENTS

President, *INFORMS Student Chapter at Ok State University* | Reviewer, *NAMRC 50, Healthcare Analytics* | Member, *IISE, INFORMS*