

# Zhangyue Shi

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## EDUCATION

### Oklahoma State University

Aug. 2019 – May. 2023 (Expected)

Ph. D., Major in Industrial Engineering & Management, Minor in Statistics. GPA: 4.0/4.0

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. GPA: 3.7/4.0

Xi'an, Shaanxi, China

## SKILLS

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

**Hardware:** Raspberry Pi

**Modeling:** Autodesk Inventor, Autodesk 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
  - Incorporate 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, which could further reduce risk of unauthorized access on files
- **Design quality assurance:**
  - Extract surface morphology feature based on **neural network (autoencoder)** via **TensorFlow** and conventional statistics
  - 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; utilize **adaptive boosting** classifier for supervised monitoring and **OCSVM** to construct **EWMA chart** in **R** for unsupervised monitoring based on extracted feature
  - 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 via **PyTorch**

## SELECTED HONORS AND AWARDS

- Robberson Research and Creative Activity Grant, Graduate College, Oklahoma State University, 2022.
- 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.**, Mandal, S., Harimkar, S., & Liu, C. (2022). *Hybrid Data-Driven Feature Extraction-Enabled Surface Morphology Analysis in Additive Manufacturing with Laser Engineered Net Shaping*. **The International Journal of Advanced Manufacturing Technology**.
- **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 OSU* | Reviewer, *Journal of Intelligent Manufacturing, Healthcare Analytics* | Member, *IISE, INFORMS*