Jihoon Chung

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PROFESSIONAL EXPERIENCE

Pusan National University, Busan, Korea.

Assistant Professor at the Department of Industrial Engineering (March 2024-).

Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia, U.S.A.

Postdoctoral Researcher in Smart Manufacturing Analytics Research & Technology Lab, (May 2023-Feb. 2024).
- *Advisor*: Dr. Zhenyu (James) Kong.

EDUCATION

Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, Virginia, U.S.A.

Ph.D., Department of Industrial and Systems Engineering, (2017-2023 (May)).
- *Advisor*: Dr. Zhenyu (James) Kong.
- *Dissertation*: Process Monitoring and Control of Advanced Manufacturing based on Physics-Assisted Machine Learning.

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea.

M.S., Department of Industrial and Systems Engineering, (2015-2017).

Hanyang University, Seoul, Republic of Korea.

B.S., Department of Industrial Engineering, (2008-2015), Graduated Cum Laude.

RESEARCH INTERESTS

- **Methodology:** *Machine learning; Bayesian statistics; Reinforcement learning; Generative adversarial network; Physics-informed machine learning; Bayesian optimization.*
- **Application:** *Smart manufacturing; Additive manufacturing; Semiconductor manufacturing; Cybersecurity; Healthcare.*

HONORS AND AWARDS

- Finalist for IISE QCRE Division Best Track Paper Competition (2023).
- Finalist for ICQSR Data Challenge (2023).
- Winner for IISE QCRE Division Data Challenge (2023).
- Winner for IISE QCRE Division Best Student Paper Award (2022).
- Winner for IISE Manufacturing & Design Division Best Student Paper Award (2022).
- Winner for IISE QCRE/ProcessMiner Data Challenge Competition (2022).
- Winner for Informs DMDA Workshop Poster Competition (2022).
- Finalist for Informs QSR Data Challenge Competition (2022).
- Winner for Informs Student Chapter (Magna Cum Laude Award) (2022).
- ISE Graduate Student Travel Awards (VT) (2018-2021) & (2022).
- Grado Department of Industrial and Systems Engineering Fellowship (VT) (2017-2018).
- National Scholarship, Republic of Korea (2015-2016).
- Academic Scholarship in Hanyang University (2013-2014).

JOURNAL PUBLICATIONS

Journal Publications (Published/Accepted)

1. **J. Chung**, and H. Kim. "Crime risk maps: a multivariate spatial analysis of crime data," *Geographical analysis* 51.4 (2019): 475-499. DOI:10.1111/gean.12182

2. **J. Chung**, B. Shen, A.C.C Law and Z.J. Kong. "Reinforcement Learning-based Defect Mitigation for Quality Assurance of Additive Manufacturing." *Journal of Manufacturing Systems* 65 (2022): 822-835. DOI:10.1016/j.jmsy.2022.11.008
    - **Winner for IISE QCRE Division Best Student Paper Award**

3. **J. Chung**, B. Shen, and Z.J. Kong. "A Novel Sparse Bayesian Learning and Its Application to Fault Diagnosis for Multi-station Assembly Systems." Accepted at *IISE Transactions* (2023). DOI:10.1080/24725854.2023.2199813

4. A.C.C Law, R. Wang, **J. Chung**, D. Garcia, E. Kucukdger, B.N Johnson, and Z.J. Kong. "Process Parameter Optimization for Reproducible Fabrication of 3D-printed Tissue Scaffold Porosity and Mechanical Properties." Accepted at *Journal of Intelligent Manufacturing* (2023). DOI:10.1007/s10845-023-02141-0

5. **J. Chung**, B. Shen, and Z.J. Kong. "Anomaly Detection in Additive Manufacturing Processes using Supervised Classification with Imbalanced Sensor Data based on Generative Adversarial Network." Accepted at *Journal of Intelligent Manufacturing* (2023). DOI:10.1007/s10845-023-02163-8

6. R. Gnanasambandam, B. Shen, **J. Chung**, X. Yue, and Z.J. Kong. "Self-scalable Tanh (Stan): Accelerated Convergence and Better Generalization of Physics-Informed Neural Networks." Accepted at *IEEE Transactions on Pattern Analysis and Machine Intelligence* (2023). DOI:10.1109/TPAMI.2023.3307688
    - **Winner for IISE QCRE/ProcessMiner Data Challenge Competition**
    - **Winner for Informs DMDA Workshop Poster Competition**

7. N. Jordan, **J. Chung**, Z.J. Kong, and C. Williams. "Ensuring Additive Manufacturing Quality And Cyber-Physical Security Via Side Channel Measurements And Transmissions." Accepted at *Journal of Manufacturing Systems* (2024).

Journal Publications (Under Review/Revision)

1. **J. Chung**, and Z.J. Kong. "A Sparse Bayesian Learning for Diagnosis of Nonstationary and Spatially Correlated Faults with Application to Multi-Stage Assembly Systems." Under minor revision at *IEEE Transactions on Automation Science and Engineering* (2023). DOI: 10.48550/arXiv.2310.16058
    - **Finalist for IISE QCRE Division Best Track Paper Competition**

2. C. Li, **J. Chung**, B. Cai, H. Wang, X. Zhou, and B. Shen. "On Model Compression for Neural Networks: Framework, Algorithm, and Convergence Guarantee." Under major revision at *Journal of Machine Learning Research* (2023).

3. **J. Chung**, J. Li, H. Xu, A. Saimon, P. Hong, and Z.J. Kong. "Predicting the Stereoselectivity of Chemical Transformations by the Composite Machine Learning Method." Under minor revision at *Scientific Reports* (2023).

4. **J. Chung**, J. Zhang, Y. Liu, A. Saimon, B.N Johnson, and Z.J. Kong. "Imbalanced Spectral Data Analysis using Data Augmentation based on the Generative Adversarial Network."Under minor revision at *Scientific Reports* (2023).

PROJECTS

- National Science Foundation, (2022-2023), "MIP: GlycoMIP - Automating the Synthesis of Rationally Designed Glycomaterials."
- Department of Energy/Clean Energy Smart Manufacturing Innovation Institute (CESMII) (sub-awarded via Honeywell Inc.), (2021-2022), "Smart Thermal Processing."
- Department of Energy/Clean Energy Smart Manufacturing Innovation Institute (CESMII), (2020-2021), "Energy-Efficient Material Processing through Automated Process Monitoring and Controls."

- Office of Naval Research, (2018-2020), "Ensuring Additive Manufacturing Quality and Cyber Physical Security via Side Channel Data Fusion and the Cyber Physical Hash."
- National Research Foundation of Korea, (2015-2016), "Mobile Device User Density Estimation Integrating Different Types of Positioning Data."
- Korea Association of University, (2014-2015), "Recommendation Systems Focused on Schedule Management."

INVITED TALKS

- "Process Monitoring and Control of Advanced Manufacturing based on Physics-Assisted Machine Learning," *Hanyang University*, Seoul, Korea, Aug. 31, 2023.
- "Process Monitoring and Control of Advanced Manufacturing based on Physics-Assisted Machine Learning," *Ulsan National Institute of Science & Technology*, Ulsan, Korea, Aug. 22, 2023.
- "Imbalanced Data Analysis from Advanced Manufacturing Process using Data Augmentation based on Generative Adversarial Network," *Informs Annual Meeting*, Phoenix, Arizona, Oct. 15-18, 2023.
- "Automatic Thresholding by Reconstruction Error in Unsupervised Anomaly Detection," *IISE Annual Conference*, New Orleans, Louisiana, May 20-23, 2023.
- "Grouping and Spatially Correlated Sparse Bayesian Learning with Application to Multi-Stage Assembly Systems," *Informs Annual Meeting*, Indianapolis, Indiana, Oct. 16-19, 2022.
- "Imbalanced Data Classification via Generative Adversarial Network with Application to Anomaly Detection in Additive Manufacturing Process," *Informs Annual Meeting*, Indianapolis, Indiana, Oct. 16-19, 2022.
- "Grouping and Spatially Correlated Sparse Bayesian Learning with Application to Multi-Stage Assembly Systems," *IISE Annual Conference*, Seattle, Washington, May 21-24, 2022.
- "Anomaly Detection based on Generative Adversarial Network with Application to Additive Manufacturing Process," *Informs Annual Meeting*, Virtual Meeting, Oct. 24-27, 2021.
- "Sparse Bayesian Learning with Temporally Correlated Source Vectors with Application to Fault Diagnosis in Multistation Assembly Systems," *Informs Annual Meeting*, Virtual Meeting, Oct. 24-27, 2021.
- "Reinforcement Learning with Knowledge Transfer based Closed Loop Decision Making In Quality for Additive Manufacturing," *Informs Annual Meeting*, Virtual Meeting, Nov. 7-13, 2020.
- "Additive Manufacturing Process Monitoring and Control Using Enhanced Reinforcement Learning," *IISE Annual Conference*, Virtual Meeting, Nov. 1-3, 2020.
- "Online Optimal Parameter Settings for Additive Manufacturing Processes by Reinforcement Learning with Knowledge Transfer," *Informs Annual Meeting*, Seattle, Washington, Oct. 20-23, 2019.
- "Reinforcement Learning based Online Quality Assurance for Additive Manufacturing Process," *IISE Annual Conference*, Orlando, Florida, May 18-21, 2019.

TEACHING EXPERIENCE

Instructor in Pusan National University.

- IE 3500452: Linear Models in Data Science, Spring 2024.
- DE 7600045: Statistical Models and Analysis, Spring 2024.

Teaching Assistant in Virginia Tech.

- ISE 4214: Lean Manufacturing, Spring 2018, 2019.
- ISE 2014: Engineering Economy, Fall 2018.
- ISE 3434: Deterministic Operations Research, Fall 2017.

Teaching Assistant in KAIST.

- IE 101: Introduction to Operations Research, Fall 2015, Spring 2016.

MENTORING EXPERIENCE

Undergraduate Research in Virginia Tech (ISE 4994).

- Real Time Process Monitoring for 3D Printing Process via Generative Adversarial Network (Fall 2018).

SERVICE AND LEADERSHIP

- **Session Chair**
  - "Data Driven Approaches for Cyber Physical Systems," *Informs Annual Meeting*, 2023.
  - "Advanced Machine Learning II," *IISE Annual Conference*, 2023.
  - "Data-driven Methods for Process Monitoring in Advanced Manufacturing," *Informs Annual Meeting*, 2022.
- **Journal Referee**
  - IEEE Transactions on Automation Science and Engineering.
  - IEEE Transactions on Neural Networks and Learning Systems.
  - IISE Transactions.
  - Journal of Manufacturing Systems.
  - Journal of Intelligent Manufacturing.
  - Journal of Manufacturing Science and Engineering.
- **Professional Society Memberships**
  - Institute of Industrial and Systems Engineering (IISE).
  - Institute for Operation Research and the Management Sciences (INFORMS).
  - Institute of Electrical and Electronics Engineers (IEEE).
- **VP Events**: The INFORMS Student Chapter at Virginia Tech (2021-2022).
- **Incoming Exchange Program Leader**, AIESEC, Hanyang University (2009-2010).

SOFTWARE SKILLS

- Computer Programming: Python, Matlab, R, Java, C++ , WinBUGS.

REMARK

- Dual Citizenship: U.S.A. and Republic of Korea.