Jihoon Chung

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EDUCATION

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

Ph.D. Candidate in Department of Industrial and Systems Engineering, (2017-2023).

- *Advisor*: Dr. Zhenyu (James) Kong.
- *Dissertation*: Machine Learning for Process Monitoring and Control in Advanced Manufacturing Process.

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

HONORS AND AWARDS

- Finalist for IISE QCRE Division Best Track Paper Competition (2023).
- Winner for IISE QCRE 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).

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).

Journal Publications (Under Review/Revision)

1. **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." Under major revision at *Journal of Intelligent Manufacturing* (2022). DOI:10.48550/arXiv.2210.17274
2. 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." Under major revision at *IEEE Transactions on Pattern Analysis and Machine Intelligence* (2022). DOI:10.48550/arXiv.2204.12589

    - **Winner for IISE QCRE/ProcessMiner Data Challenge Competition**

    - **Winner for Informs DMDA Workshop Poster Competition**
3. N. Jordan, **J. Chung**, Z.J. Kong, and C. Williams. "Ensuring Additive Manufacturing Quality And Cyber-Physical Security Via Side Channel Measurements And Transmissions." Under review at *Journal of Manufacturing Systems* (2023).

Papers with Manuscript

1. **J. Chung**, and Z.J. Kong. "Grouping and Spatially Correlated Sparse Bayesian Learning with Application to Multi-Stage Assembly Systems." To be submitted to *IEEE Transactions on Automation Science and Engineering* (2023).

    - **Finalist for IISE QCRE Division Best Track Paper Competition**

Working Papers

1. **J. Chung**, C. Liu, and Z.J. Kong. "Machine Learning and Data Analytics for Additive Manufacturing in Cyber-Physical Security: A review paper."
2. **J. Chung**, R. Gnanasambandam, Y. Zhang, Z.J. Kong, and B. Shen. "Automatic Thresholding by Reconstruction Error in Unsupervised Anomaly Detection."

    - **Finalist for Informs QSR Data Challenge Competition**

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

- "Reinforcement Learning based Online Quality Assurance for Additive Manufacturing Process," *IISE Annual Conference*, Orlando, Florida, May 18-21, 2019.
- "Online Optimal Parameter Settings for Additive Manufacturing Processes by Reinforcement Learning with Knowledge Transfer," *Informs Annual Meeting*, Seattle, Washington, Oct. 20-23, 2019.

- "Additive Manufacturing Process Monitoring and Control Using Enhanced Reinforcement Learning," *IISE Annual Conference*, Virtual Meeting, Nov. 1-3, 2020.
- "Reinforcement Learning with Knowledge Transfer based Closed Loop Decision Making In Quality for Additive Manufacturing," *Informs Annual Meeting*, Virtual Meeting, Nov. 7-13, 2020.
- "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.
- "Anomaly Detection based on Generative Adversarial Network with Application to Additive Manufacturing Process," *Informs Annual Meeting*, Virtual Meeting, Oct. 24-27, 2021.
- "Grouping and Spatially Correlated Sparse Bayesian Learning with Application to Multi-Stage Assembly Systems," *IISE Annual Conference*, Seattle, Washington, May 21-24, 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," *Informs Annual Meeting*, Indianapolis, Indiana, Oct. 16-19, 2022.

TEACHING EXPERIENCE

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).

WORK EXPERIENCE

- Republic of Korea Army, (2011-2012).

SERVICE AND LEADERSHIP

- **Session Chair**: Data-driven Methods for Process Monitoring in Advanced Manufacturing, *Informs Annual Meeting*, 2022.
- **Journal Referee**: Journal of Intelligent Manufacturing, IEEE Transactions on Automation 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.