In-Bum Chung

Research interests: **Design Optimization, Design for Resilience**, **Complex Systems**, **Network Analysis**, Machine Learning, Stochastic Optimization, Metaheuristic Optimization, Surrogate Modeling, Adaptive Sampling

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Education

University of Illinois Urbana-Champaign — **Illinois, United States**
Ph.D. in Industrial Engineering — *In Progress (ABD)*
Dissertation: **Design and recovery optimization of complex network systems for resilience enhancement**
Selected Courses: Data-driven Design Methods, Engineering Design Optimization, Control Co-design, Optimization Under Uncertainty, Integer Programming, Reliability Engineering

Hanyang University — **Seoul, Republic of Korea**
M.S. in Mechanical Engineering — *February 2018*
Thesis: **Dimensionality reduction using statistical analysis and model based methods: a comparison between elementary effect method and random forest regressor**
Selected Courses: Multidisciplinary Design Optimization, Machine Learning Theory, Regression Analysis, Application of Genetic Algorithm, Application of Fuzzy Logic and Neural Networks

Hanyang University — **Seoul, Republic of Korea**
B.S. in Mechanical Engineering (Cum Laude) — *February 2016*

Work Experience

PIDOTECH Inc. — **Seoul, Republic of Korea**
Research Engineer (Full-time) — *February 2018-June 2021*
Research Engineer (Part-time) — *July 2021-June 2022*

- R&D of optimization algorithms, metamodeling methods, and dimensionality reduction techniques
- Investigation and implementation of deep-learning models and methods for engineering design applications

Teaching Experience

Certificate in Foundations of Teaching (UIUC CITL) – involves teaching development workshops, observation and reflection of teaching, and exploring literature on teaching

Teaching Assistantship (**Recognized on the "**List of Teachers Ranked as Excellent by Their Students**")*

SE 101: Engineering Graphics & Design* (Undergraduate Core)	Spring 2025
SE 410: Components Design (Undergraduate/Graduate Elective)	Fall 2024
SE 450: Decision Analysis I (Graduate Elective)	Fall 2023

Research Projects

- **Data-Driven Design Decision Support for Remanufacturing of High-Value Components in Industrial and Agricultural Equipment** (11/2023 – 09/2025)
  - Project funded by REMADE Institute: collaborating with industrial partner (John Deere) to create models for evaluating economic and environmental impact of manufacturing and remanufacturing equipment, conducting failure mode analysis, cost analysis, and establish framework for design for reman (DfRem); expand concept to system-level with multiple parts; estimate system behavior through data-driven modeling

- **Multi-timescale Nuclear-Renewable Hybrid Energy Systems Operations to Improve Electricity System Resilience, Reliability, and Economic Efficiency** (09/2022 – 12/2023)
  - Project funded by DOE: establishing an open-source repository to share the dataset and codes for resilient power networks through deep generative approach for disruption management; establishing a lab setup for hardware-in-the-loop (HIL) test for integrated energy system (IES) control

Journal Publications *(*co-first authorship)*

[J1] **In-Bum Chung**, Yi Luo, Pingfeng Wang, "Data-driven Co-design of Power Distribution Networks for Resilience Enhancement through Graph Neural Network aided Performance Estimation," Reliability Engineering & System Safety (*under second round of review*).

[J2] Mohammad Mundiwala, **In-Bum Chung** … Pingfeng Wang, Chao Hu, "A System-Level Cost Modeling Framework for Design for Remanufacturing: A Case Study of an Agricultural Machine Transmission," Journal of Mechanical Design (*Accepted*).

[J3] **In-Bum Chung**, Pingfeng Wang, "Design of Transmission Networks for Enhanced Resilience under Stochastic Disruption Scenarios using Graph Generative Models," Journal of Mechanical Design, 148(2): 021706, 2026.

[J4] **In-Bum Chung**, Pingfeng Wang, "Dataset on Complex Power Systems: Design for Resilient Transmission Networks using a Generative Model," Journal of Mechanical Design, 147(4): 041709, 2025.

[J5] Xinyang Liu*, **In-Bum Chung***, Mohammad Behtash*, Matthew Davied, Todd Thompson … Pingfeng Wang, Chao Hu, "A Design for Remanufacturing Framework Incorporating Identification, Evaluation, and Validation: A Case Study of Hydraulic Manifold," Journal of Mechanical Design, 147(8): 084502, 2025.

[J6] Jiaxin Wu, **In-Bum Chung**, Zheng Liu, Pingfeng Wang, "Co-Design Optimization of Combined Heat and Power-based Microgrids," *Journal of Renewable and Sustainable Energy*, 15(5): 056301, 2023.

[J7] **In-Bum Chung**, Dohyun Park, Dong-Hoon Choi, "Surrogate-based Global Optimization Using an Adaptive Switching Infill Sampling Criterion for Expensive Black-Box Functions," *Structural and Multidisciplinary Optimization*, 57, 1443-1459, 2018.

[J8] Yong-Hun Kang, **In-Bum Chung**, Dong-Hoon Choi, "Simulation-based Turbofan Shape Optimization for Reducing Power Consumption and Noise of a Bladeless Circular Ceiling Air Conditioner," *International Journal of Precision Engineering and Manufacturing*, 18, 1155-1163, 2017.

Conference Proceedings

[C1] **In-Bum Chung**, Lei Wu, Pingfeng Wang. "Recovery Optimization of a Power Distribution Network Considering a Coupling with Transportation Network for Dispatching Resources." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 89220, p. V03AT03A045. American Society of Mechanical Engineers, 2025.

[C2] Mohammad Mundiwala, **In-Bum Chung**, Matthew Davied, Michael Lee, Corey Smith… Chao Hu. "A System-Level Cost Modeling Framework for Design for Remanufacturing: a Case Study of an Agricultural Machine Transmission." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 89237, p. V03BT03A038. American Society of Mechanical Engineers, 2025.

[C3] Parth Bansal, **In-Bum Chung**, Mohammad Mundiwala, Chao Hu, Pingfeng Wang. "Fault Detection and

Pressure-Time Curve Prediction for Fluid-Structure Interactions with Physics-Based Modeling and Machine Learning." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 89220, p. V03AT03A044. American Society of Mechanical Engineers, 2025.

[C4] **In-Bum Chung**, Yi Luo, Pingfeng Wang, "Disruption Management of Interdependent Power Networks Using a Data-Driven Co-Design Approach for Enhanced System Resilience." In ASME *International Mechanical Engineering Congress and Exposition*, vol. 88599, p. V001T02A015. American Society of Mechanical Engineers, 2024.

[C5] Xinyang Liu, **In-Bum Chung**, Mohammad Behtash, Matthew Davied, Todd Thompson… Chao Hu. "A Design for Remanufacturing Framework Incorporating Identification, Evaluation, and Validation: A Case Study of Hydraulic Manifold." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 88377, p. V03BT03A049. American Society of Mechanical Engineers, 2024.

[C6] **In-Bum Chung**, Pingfeng Wang, "Generative Design for Power System Networks Using WGAN and Graph Performance Measures for Guided Generation," In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 88360, p. V03AT03A040. American Society of Mechanical Engineers, 2024.

[C7] Zheng Liu, Jiaxin Wu, Wuchen Fu, Pouya Kabirzadeh, **In-Bum Chung**… Yumeng Li. "Control Co-Design of Battery Packs with Immersion Cooling." In *ASME International Mechanical Engineering Congress and Exposition*, vol. 87592, p. V002T02A016. American Society of Mechanical Engineers, 2023.

[C8] **In-Bum Chung**, Pingfeng Wang, "Multi-Fidelity Modeling for Dynamic Power Control and Optimization of Nuclear-Renewable Hybrid Energy Systems." In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, vol. 87301, p. V03AT03A036. American Society of Mechanical Engineers, 2023.

[C9] **In-Bum Chung**, Jiaxin Wu, and Pingfeng Wang. "Control Co-Design of Combined Heat and Power Hybrid Energy Systems." In *IISE Annual Conference and Expo*. IISE, 2023.

[C10] Dohyun Park, **In-Bum Chung**, Dong-Hoon Choi. "Surrogate based Global Optimization Using Adaptive Switching Infill Sampling Criterion." In *World Congress of Structural and Multidisciplinary Optimisation*, pp. 692-699. Cham: Springer International Publishing, 2017.

Awards & Fellowships

ISE Jerry S. Dobrovolny Graduate Student Fellowship	AY 2025-2026
Mavis Future Faculty Fellow	AY 2025-2026
Ben Hamilton Graduate Research Award	2024
Hansen Fellowship	2022

Skills

Programming: **Python** (Numpy, Scipy, Scikit-Learn), MATLAB, C
Modeling: **Network/Graph-based modeling** (NetworkX), power system modeling (MATPOWER, pandapower), **machine learning-based surrogate modeling**, design of experiments
Optimization: **Data-driven optimization, metaheuristic optimization**, mixed-integer programming
CAD Software: CATIA, Autodesk Fusion 360