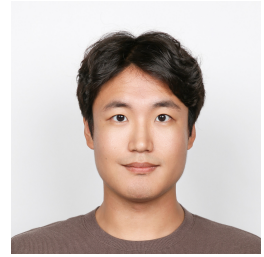


Joonhee Kim, Postdoctoral Researcher

Physical Battery Digital Twins & AI-Driven Battery Management

✉ junheemike@postech.ac.kr

☎ +82 10-8312-8458



Education

- 2021. 03. – 2026. 02. **Ph.D., POSTECH**, Convergence IT Engineering.
Thesis title: *Physical Digital Twin Framework for Advanced Battery Management.*
- 2016. 03. – 2021. 02. **B.S., POSTECH**, Mechanical Engineering.
- 2018. 08. – 2019. 01. **Exchange Student, Grenoble INP**, Energy and Smart Systems.

Employment History

- 2026. 03. – 2027. 03. **Postdoctoral Researcher.** POSTECH Future IT Innovation Institute.
- 2018. 03. – 2018. 08. **Intern.** Eightpercent Co., Ltd.

Research Publications

Journal Articles

- 1 **J. Kim**, H. Moon, K. Yoon, H. Chun, M. Lee, J. Ko, and S. Han, "A physics-driven generative model to accelerate artificial intelligence development for lithium-ion battery diagnostics," *Applied Energy*, vol. 391, p. 125 873, 2025.
- 2 D. Lim, C. Park, **J. Kim**, J. Hong, and S. Han, "PIT-NBV: Poisson-informed transformer for 6-DOF next best view planning in 3D object reconstruction with narrow field of view," *IEEE Transactions on Cognitive and Developmental Systems*, 2025.
- 3 H. Pyeon, J. Lee, S. Park, K. Yoon, K. Park, K. Kim, **J. Kim**, H. Chun, G. Ahn, and S. Han, "Ultrafast computation of lithium-ion battery dynamics using its closed-form solutions," *Journal of Energy Storage*, vol. 135, p. 117 773, 2025.
- 4 **J. Kim**, H. Chun, H. Kim, M. Lee, and S. Han, "Strategically switching metaheuristics for effective parameter estimation of electrochemical lithium-ion battery models," *Journal of Energy Storage*, vol. 64, p. 107 094, 2023.

Conference Proceedings

- 1 **J. Kim** and S. Han, "Dimension-invariant strategically switching metaheuristics for scalable battery parameter estimation," in *2026 IFAC World Congress*, 2026, (accepted).
- 2 **J. Kim**, S. Park, D. Kim, E. Choi, and S. Han, "Motion-specific battery health assessment for quadrotors using high-fidelity battery models," in *2026 IEEE International Conference on Robotics and Automation (ICRA)*, IEEE, 2026, (accepted).
- 3 J. Choi, **J. Kim**, J. Lee, S. Kim, S. Lee, and S. Han, "Information-theoretic approach to optimal experimental design of current profiles for accurate battery parameter estimation," in *Electrochemical Society Meeting Abstracts 248*, The Electrochemical Society, Inc., 2025, pp. 3446–3446.
- 4 D. KIM, **J. Kim**, K. Yoon, S. Kim, S. Lee, and S. Han, "Interpretable and lightweight SOH estimation for Li-ion battery from EIS via bandwise CNN-attention," in *Electrochemical Society Meeting Abstracts 248*, The Electrochemical Society, Inc., 2025, pp. 3436–3436.

- 5 H. Moon, **J. Kim**, and S. Han, "Maximizing the performance of data-driven capacity estimation for lithium-ion battery," in *IFAC-PapersOnLine*, vol. 58, Elsevier, 2024, pp. 31–37.
- 6 K. Yoon, **J. Kim**, H. Pyeon, K. Kim, and S. Han, "Physics-informed neural network for heat transfer problem with cylindrical heat sources in battery pack geometry," in *2024 24th International Conference on Control, Automation and Systems (ICCAS)*, IEEE, 2024, pp. 702–705.

Patents

- KR ■ Myeongjae Lee, **Joonhee Kim**, Soohee Han, Jungsu Kim, Jinho Kim, Hangeol Kim, Hyosik Moon, Hwiyoung Jeon, "METHOD AND APPARATUS FOR TRAINING SHORT CIRCUIT DETECTION MODEL," Korean Registered Patent No. 10-2877564-0000, registered Oct. 23, 2025.
- Jungsu Kim, **Joonhee Kim**, Jinho Kim, Myeongjae Lee, Hwiyoung Jeon, Soohee Han, "METHOD AND DEVICE WITH BATTERY MODEL OPTIMIZATION," Korean Patent Application Publication No. 10-2024-0036437, published Mar. 20, 2024.
- US ■ Myeongjae Lee, **Joonhee Kim**, Soohee Han, Jungsu Kim, Jinho Kim, Hangeol Kim, Hyosik Moon, Hwiyoung Jeon, "METHOD AND APPARATUS FOR TRAINING SHORT CIRCUIT DETECTION MODEL," US Patent Application Publication US 2025/0124346 A1, published Apr. 17, 2025.
- Jungsu Kim, **Joonhee Kim**, Jinho Kim, Myeongjae Lee, Hwiyoung Jeon, Soohee Han, "METHOD AND DEVICE WITH BATTERY MODEL OPTIMIZATION," US Patent Application Publication US 2024/0111921 A1, published Apr. 4, 2024.



Projects

- 2026 – ■ **National Research Foundation of Korea**, Physics-Isomorphic AI-based Early Diagnosis of Heterogeneous Degradation and Thermal Runaway in Lithium-Ion Battery Packs.
- 2025 – 2026 ■ **Hyundai Mobis**, Development of Big-Data-Driven Predictive Models for Degradation Factors in Battery Systems.
- **Samsung Electronics**, Optimization of Fast-Charging Current Protocols using Advanced Battery Degradation Models.
- 2023 – ■ **Ministry of Trade, Industry and Energy**, Development of Sensor and Robotic Technologies for Supporting Search-and-Rescue and Firefighting Operations.
- 2023 – 2024 ■ **Samsung Electronics**, Optimization of Fast-Charging Current Profiles for Reducing Lithium-Ion Battery Degradation Using Reinforcement Learning.
- 2022 – 2023 ■ **Samsung Electronics**, Development of AI-Based Battery Short-Circuit Detection Algorithms Using Virtual Battery Models.
- 2021 – 2024 ■ **National Research Foundation of Korea**, Development of Electrochemical Analysis Tools for Lithium-Ion Batteries Considering Morphological Features.
- 2021 – 2022 ■ **Samsung Advanced Institute of Technology**, Development of Physics-Based Electrochemical Models for Internal Short Circuits in Batteries.

Awards & Honors

- 2025 ■ **Honorable Mention**, "Introducing My Research" 3-Minute Science Talk Competition, POSTECH
- 2021 ■ **Excellence Award** (CEO Award, POSTECH Holdings), POSTECH Startup Competition

Teaching Experience

- 2020  **Course Mentor**, “Fluid Mechanics,” Department of Mechanical Engineering, POSTECH.
  **Course Mentor**, “System Control,” Department of Mechanical Engineering, POSTECH.

Professional Activities

- 2025  **Journal Reviewer**, Journal of Electrical Engineering & Technology (2 reviews).