

Minseon Gwak

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RESEARCH INTERESTS

Artificial intelligence powered by *signal processing* and *control theory*

- Sequence modeling
- Deep state space models
- Language, DNA sequence, Time series

EDUCATION

02/2021 - Present	Pohang University of Science and Technology (POSTECH) Ph.D. student in Electrical Engineering, advised by PooGyeon Park	Pohang, Korea
02/2019 - 02/2021	Pohang University of Science and Technology (POSTECH) M.S. in Electrical Engineering, advised by PooGyeon Park	Pohang, Korea
03/2015 - 02/2019	Pohang University of Science and Technology (POSTECH) B.S. in Electrical Engineering	Pohang, Korea

PUBLICATIONS

- [1] **Minseon Gwak**, Seongrok Moon, Joohwan Ko, and PooGyeon Park. “Layer-Adaptive State Pruning for Deep State Space Models”. In: *The Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS)*. Dec. 2024.
- [2] **Minseon Gwak**, Kyung Soo Kim, and PooGyeon Park. “Explainable AI Framework with Multi-Source Data-Driven Anomaly Detection for Injection Molding Machines”. In: *2024 14th Asian Control Conference (ASCC)*. IEEE. July 2024, pp. 1–5.
- [3] **Minseon Gwak***, Jong Pil Yun*, Ji Yun Lee, Sang-Sun Han, PooGyeon Park, and Chena Lee. “Attention-guided jaw bone lesion diagnosis in panoramic radiography using minimal labeling effort”. In: *Scientific Reports* 14.1 (Feb. 2024), p. 4981.
- [4] Younkyung Jwa*, **Minseon Gwak***, Jiin Kwak*, Chang Wook Ahn, and PooGyeon Park. “Scalable Robust Multi-Agent Reinforcement Learning for Model Uncertainty”. In: *2023 62nd IEEE Conference on Decision and Control (CDC)*. IEEE. Dec. 2023, pp. 3402–3407.
- [5] **Minseon Gwak***, Min Su Kim*, Jong Pil Yun, and PooGyeon Park. “Robust and explainable fault diagnosis with power-perturbation-based decision boundary analysis of deep learning models”. In: *IEEE Transactions on Industrial Informatics* 19.5 (May 2023), pp. 6982–6992.
- [6] **Minseon Gwak**, Seunghyun Ryu, Yongbeom Park, Hyeon-Woo Na, and PooGyeon Park. “Frequency-Domain Data Augmentation of Vibration Data for Fault Diagnosis using Deep Neural Networks”. In: *2022 22nd International Conference on Control, Automation and Systems (ICCAS)*. IEEE. Oct. 2022, pp. 1588–1591.
- [7] Taesu Park, **Minseon Gwak**, and PooGyeon Park. “A filtered-x scheduled step-size active noise cancellation algorithm considering implementation”. In: *2021 21st International Conference on Control, Automation and Systems (ICCAS)*. IEEE. Oct. 2021, pp. 1016–1020.
- [8] Taesu Park, Minsu Kim, **Minseon Gwak**, Taesung Cho, and PooGyeon Park. “Active noise control algorithm robust to noisy inputs and measurement impulsive noises”. In: *2020 20th International Conference on Control, Automation and Systems (ICCAS)*. IEEE. Oct. 2020, pp. 622–626.

EXPERIENCE

08/2022 - 02/2023	Carnegie Mellon University Visiting scholar in the Institute for Software Research. Fully funded by the Korean government (~40K USD in total).	Pittsburgh, USA
06/2018 - 08/2018	SK Telecom Internship. Answer retriever for smart speakers.	Seoul, Korea
07/2017 - 11/2017	University of New South Wales Exchange student, School of Electrical Engineering and Telecommunications.	Sydney, Australia

PROJECTS

PHM Platform using Explainable AI

The Ministry of SMEs and Startups, Korea

Explainable fault detection and diagnosis for die casting process.

Explainable AI for Fault Diagnosis using Vibration Data

The Korea Institute of Industrial Technology

Decision boundary visualization for deep fault diagnosis models to improve its explainability.

Label Noise Correction on Sensor Data for Anomaly Detection

Samsung Electronics

Identification of mislabeled data.

High-Resolution Vision-Based Surface Mounter Technology System

K&P Company, Korea

Manufacturing-misalignment-adjusting system using high-resolution image processing and geometric algorithm.

Distributed Dynamic State Estimation using Kalman Filters

The Korea Electric Power Corporation

Mathematical modeling of a distributed power system for distributed Kalman filtering.

TALKS

12/2024 Invited talk

Polaris3D

07/2024 Invited talk

Kyungpook National University

TEACHING

Fall, 2024 Teaching Assistant, EECE 695: Deep State-Space Model

POSTECH

Spring, 2023 Teaching Assistant, EECE 663: Estimation Theory

POSTECH

Fall, 2021 Teaching Assistant, EECE 320: Introduction to Automatic Control

POSTECH

Spring, 2019 Teaching Assistant, EECE 331: Electric Circuits

POSTECH

HONORS AND AWARDS

01/2025 Best Graduate Research Award, Department of Electrical Engineering, POSTECH

12/2024 Financial Aid Award, NeurIPS

11/2024 POSTECHIAN Innovation Fellowship, POSTECH (~4,400 USD)

10/2024 Bronze Prize, The Second Koh Young AI Competition, Koh Young

01/2024 Best Graduate Research Award, Department of Electrical Engineering, POSTECH

09/2020 Excellent Paper Award, The Korean Institute of Electrical Engineers

02/2020 Scholarship, Korea Electric Power Corporation

02/2019 Best Undergraduate Project Award, Department of Electrical Engineering, POSTECH

SKILLS

Language Korean, English

Programming PyTorch, JAX, Git, Bash, Matlab, C/C++

REFERENCES

PooGyeon Park, Ph.D.

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Assistant Professor

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Chena Lee, D.D.S., Ph.D.

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Visiting Professor

Division of Oral and Maxillofacial Radiology, Faculty of Dentistry, University of British Columbia

Assistant Professor

Department of Oral and Maxillofacial Radiology, Yonsei University College of Dentistry

Jangwoon Park, Ph.D.

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Associate Professor

Department of Engineering, Texas A&M University-Corpus Christi

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