

Minseon Gwak

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RESEARCH INTERESTS

Artificial Intelligence powered by *signal processing* and *control theory*.

- Computation and memory efficiency of sequence models
- Effectiveness of sequence models in capturing long-range context
- Language and DNA sequence

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] **M. Gwak**, S. Moon, J. Ko, and P. 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] **M. Gwak**, K. S. Kim, and P. Park, "Explainable ai framework with multi-source data-driven anomaly detection for injection molding machines," in *2024 14th Asian Control Conference (ASCC)*, IEEE, Jul. 2024, pp. 1–5.
- [3] **M. Gwak***, J. P. Yun*, J. Y. Lee, S.-S. Han, P. Park, and C. Lee, "Attention-guided jaw bone lesion diagnosis in panoramic radiography using minimal labeling effort," *Scientific Reports*, vol. 14, no. 1, p. 4981, Feb. 2024.
- [4] Y. Jwa*, **M. Gwak***, J. Kwak*, C. W. Ahn, and P. 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] **M. Gwak***, M. S. Kim*, J. P. Yun, and P. Park, "Robust and explainable fault diagnosis with power-perturbation-based decision boundary analysis of deep learning models," *IEEE Transactions on Industrial Informatics*, vol. 19, no. 5, pp. 6982–6992, May 2023.
- [6] **M. Gwak**, S. Ryu, Y. Park, H.-W. Na, and P. 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] T. Park, **M. Gwak**, and P. 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] T. Park, M. Kim, **M. Gwak**, T. Cho, and P. 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 Short-Term Scholar, Institute for Software Research. Fully funded by the Korean government (~40K USD in total).	Pittsburgh, USA
06/2018 - 08/2018	SK Telecom Internship.	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 of die casting machines

Explainable AI for Fault Diagnosis using Vibration Data

The Korea Institute of Industrial Technology

Visualization and model ensemble based on decision boundaries for fault diagnosis models

Label Noise Correction on Sensor Data for Anomaly Detection

Samsung Electronics

Identification and cleaning of mislabeled data

High-Resolution Vision-Based Surface Mounter Technology

K&P Company, Korea

Misalignment-adjusting system using high-resolution image processing

Distributed Dynamic State Estimation using Kalman Filters

The Korea Electric Power Corporation

Mathematical modeling of distributed power systems

TALKS

12/2024	Invited Talk	Polaris3D
	<i>Deep State Space Models with System Theory</i>	
07/2024	Invited Talk	Kyungpook National University
	<i>From State Space Models to Deep State Space Models</i>	

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++

REFEREES

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Assistant Professor, Department of Electrical Engineering, *Pohang University of Science and Technology*

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Visiting Faculty Researcher, *Google*

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Assistant Professor, Department of Oral and Maxillofacial Radiology, *Yonsei University College of Dentistry*

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

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