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 *Deep State Space Models with System Theory*	Polaris3D
07/2024	Invited Talk *From State Space Models to Deep State Space Models*	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++

REFEREES

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Adjunct Professor, Institute for Convergence Research and Education in Advanced Technology, *Yonsei University*
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Chena Lee, D.D.S., Ph.D. chenalee@yuhs.ac
Assistant Professor, Department of Oral and Maxillofacial Radiology, *Yonsei University College of Dentistry*
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