

# 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	<b>Pohang University of Science and Technology (POSTECH)</b> Ph.D. student in Electrical Engineering, advised by PooGyeon Park	Pohang, Korea
02/2019 - 02/2021	<b>Pohang University of Science and Technology (POSTECH)</b> M.S. in Electrical Engineering, advised by PooGyeon Park	Pohang, Korea
03/2015 - 02/2019	<b>Pohang University of Science and Technology (POSTECH)</b> 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	<b>Carnegie Mellon University</b> Visiting scholar in the Institute for Software Research. Fully funded by the Korean government (~40K USD in total).	Pittsburgh, USA
06/2018 - 08/2018	<b>SK Telecom</b> Internship. Answer retriever for smart speakers.	Seoul, Korea
07/2017 - 11/2017	<b>University of New South Wales</b> Exchange student, School of Electrical Engineering and Telecommunications.	Sydney, Australia

## PROJECTS

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### 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

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12/2024 Invited talk

Polaris3D

07/2024 Invited talk

Kyungpook National University

## TEACHING

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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

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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

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Language Korean, English

Programming PyTorch, JAX/Flax, Bash/Shell, MATLAB, C/C++

## REFERENCES

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### PooGyeon Park

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### Jaeho Lee

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Assistant Professor

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### Jangwoon Park

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Associate Professor

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