# Seungmin Oh

**Ph.D. Candidate in Artificial Intelligence**

Computational Intelligence Lab · Ajou University, South Korea

Advised by Prof. Jongbin Ryu · Expected graduation: Feb 2028

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Suwon, South Korea

**Efficient AI · Vision · LLM · VLM · VLA**

## Summary

Ph.D. candidate building **efficient AI** for deployment under tight compute budgets, from edge devices to robot control loops, across vision, language, and vision-language-action (VLA) models. **First place** in the Qualcomm-sponsored 2025 IEEE Low-Power Computer Vision Challenge (Track 1, CVPR 2025 Workshop), with the winning model deployed on Snapdragon through **Qualcomm AI Hub**.

## Education

**Ph.D. in Artificial Intelligence** *Feb 2022 – present*

*Ajou University, Suwon, South Korea · Advisor: Prof. Jongbin Ryu*

**B.S. in Software and Computer Engineering** *Feb 2016 – Feb 2022*

*Ajou University, Suwon, South Korea*

## Research Experience

**Computational Intelligence Lab, Ajou University** *Feb 2022 – present*

*Graduate Researcher*

### Vision-language-action models for robotic manipulation *2025 – present*

- Training methodology: world-state change prediction instead of raw actions, preserving VLM grounding (in prep.).
- Inference acceleration: fast action controller with lazy gating; full VLA invoked only on anticipated failure (in prep.).
- Failure detection: early visual observer for semi-closed-loop action-chunk execution [S.2].

### Efficient LLM compression *2024 – present*

- Structured pruning: overcomplete training for scaled recovery capacity [C.3].
- Structured pruning: curriculum-based layer-wise compression schedule [C.4].

### Efficient vision & test-time adaptation *2022 – present*

- On-device classification: 1st place, 2025 IEEE Low-Power Computer Vision Challenge Track 1 [A.1].
- Test-time adaptation: candidate verification and divergence shift [S.1].
- Re-parameterization: branch-level neural substitution [C.1].
- Representation learning: transformation-aware prompt conditioning via re-calibrated contrastive loss [C.2].
- Medical: CT-based triage for small-bowel obstruction [J.1]; CNN vs. ViT architectural behavior [J.2].

### Funded applied research projects (ETRI · NIA · 42dot) *2021 – 2024*

- Real-time detection transformer for autonomous driving (42dot); source-free domain adaptation for on-device face recognition (ETRI); lymphoma recognition and survival analysis from 3D CT (NIA); masked-face recognition with domain adaptation (ETRI).

**GGQ Company Inc., Seoul, South Korea** *2020*

*Research Intern*

- Game-scene understanding: player-name, skill, and HUD OCR in League of Legends; face recognition for attendance.

## Publications

S = under review C = conference A = preprint J = journal P = patent

**[S.2]** Donghyun Kim, **Seungmin Oh**, Dooyeon Na, Jongbin Ryu. Who Watches the VLA? Early Visual Observer for Semi-Closed-Loop Action-Chunked Execution. *Under review*.

**[S.1]** **Seungmin Oh**, Seunghun Kang, Jongbin Ryu. Efficient Test-Time Adaptation through Candidate Verification and Divergence Shifts. *Under review*.

**[C.4]** Donggeon Lee, Dooyeon Na, **Seungmin Oh**, Jongbin Ryu. Layer-wise Curriculum Learning for Efficient LLM Compression. *EMNLP 2026*.

**[C.3]** **Seungmin Oh**, Donggeon Lee, Jongbin Ryu. Train Overcomplete, Deploy Compact: Scaling Recovery Capacity for Structured LLM Pruning. *EMNLP 2026*.

**[C.2]** **Seungmin Oh**, Seunghun Kang, Jongbin Ryu. Re-calibrated Contrastive Loss for Transformation-Aware Prompt Conditioning in Vision-Language Models. *BMVC 2026*.

**[A.1]** Zihao Ye et al. (including **Seungmin Oh**, Jongbin Ryu). Evaluation of Winning Solutions of 2025 Low Power Computer Vision Challenge. *arXiv preprint*, 2026.

**[C.1]** **Seungmin Oh**, Jongbin Ryu. Neural Substitution for Branch-Level Network Re-parameterization. *ACCV 2024*, pp. 104–120, Springer.

**[J.2]** **Seungmin Oh**, Namkug Kim, Jongbin Ryu. Analyzing to Discover Origins of CNNs and ViT Architectures in Medical Images. *Scientific Reports*, 14:8755, 2024.

**[J.1]** **Seungmin Oh**, Jongbin Ryu, Hojung Shin, Jeongho Song, Sangyong Son, Hoon Hur, Sanguk Han. Deep Learning Using Computed Tomography to Identify High-Risk Patients for Acute Small Bowel Obstruction: Development and Validation of a Prediction Model. *International Journal of Surgery*, 109(12):4091–4100, 2023 (IF 15.3, JCR Top 1%).

**[P.1]** Hojung Shin, Jongbin Ryu, **Seungmin Oh**. Neural Network Classifier for Predicting High-Risk Small Bowel Obstruction Using Abdominal CT Images. *PCT application*, filed Sep 2024.

## Honors & Awards

**IEEE Low-Power Computer Vision Challenge Winner** *Apr 2025*
CVPR 2025 Workshops / IEEE / CVF / Qualcomm / Purdue University; ranked 1st among 45 teams
*Layer Imitation: Efficient Vision-Language Model on the Mobile NPU* [link]

**Google Solution Challenge – Global Top 100** *May 2023*
Google
*'Smiler,' an expression-training app for children with ASD* [link]

**Excellence Award** *Dec 2021*
ICT Mentoring Conference (ACK 2021), KOSIA
*Recommender System for Web Search Based on NLP to Improve User Search Environment* [link]

**Best Student Paper Award** *Jul 2021*
Korea Digital Contents Society
*Lightweight Video Search Using Video-to-Text Generation and Retrieval*

## Technical Skills

- **Training infrastructure:** built and operated a multi-node GPU cluster (about 20 nodes, 8× RTX 3090 each): containerized environment provisioning, per-node CUDA isolation, unattended long-running training pipelines.
- **Programming:** Python; C/C++ with SIMD- and cache-aware performance optimization; CUDA.
- **ML tooling:** PyTorch, Hugging Face, Weights & Biases, DVC, Docker, Kubernetes, Git / GitHub Actions; on-device deployment with Qualcomm AI Hub (Snapdragon).

## Research Funding

**Doctoral Research Grant** *Sep 2025 – Aug 2027*
National Research Foundation of Korea (NRF) · $36K
*Progressive Linear Activation for Depth-wise Reparameterization of Large-scale Models*

**Lesion-Class Re-labeling in Medical Image Training Data** *Oct 2022 – Dec 2023*
National Information Society Agency (NIA) · $20K

## Teaching & Leadership

**Lecturer**, tutorials for undergraduate AI research assistants, Ajou University (3 terms) *2023 – 2024*
**Teaching Assistant**, Capstone Design Project, Ajou University *2023*
**Founding Member**, Google Developer Student Club, Ajou University chapter *Sep 2022 – Dec 2023*