

Jinyeong Park (박진영)

AI Researcher | Computer Science



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► Educations

Master of Science in Computer Science & Engineering

Incheon National University, Republic of Korea

March 2024 – August 2026

GPA: 4.44 / 4.5

Dean's Award, Graduate School (one of the top 11)

Bachelor of Engineering in Computer Science & Engineering

Incheon National University, Republic of Korea

March 2020 - February 2024

GPA: 4.28 / 4.5

Graduation Standing: 4 / 71

► Research Areas & Topics

Areas: Reinforcement Learning, Computer Vision, Multimodal Learning

Topics: Intrinsically-Motivated Exploration, Open-Vocabulary Object Detection (OVOD), Computer-Aided Design (CAD) Generation, Quantization

► Publications

Interntional Papers

[1-st author] **Jinyeong Park**, et al. "Mol-AIR: Molecular Reinforcement Learning with Adaptive Intrinsic Rewards for Goal-Directed Molecular Generation." *Journal of Chemical Information and Modeling* 65.5 (2025): 2283-2296.

SCIE, Impact Factor: 6.4 (Q1, 2025), Cited 30+ times

DOI: [10.1021/acs.jcim.4c01669](https://doi.org/10.1021/acs.jcim.4c01669)

[2-nd author] Minseong Kim, **Jinyeong Park**, et al. "GuideCAD: A Lightweight Multimodal Framework for 3D CAD Model Generation via Prefix Embedding," in *IEEE Access*, vol. 13, pp. 153406-153419, 2025.

SCIE, Impact Factor: 4.2 (Q2, 2025)

DOI: [10.1109/ACCESS.2025.3604810](https://doi.org/10.1109/ACCESS.2025.3604810)

Domestic Papers (Korea)

[2-nd author] Sungyoon Jung, **Jinyeong Park**, et al. "ViPCAD: A Vision and Prompt-based Multimodal Model for CAD Command Sequence Generation." in Proceedings of the Korea Computer Congress (KCC), 2025, pp. 88-90.

[2-nd author] Seungseok Han, **Jinyeong Park**, et al. "Coordinated Exploration in Distributed Traffic Signal Control through Adjacent Intersection Novelty Sharing." in Proceedings of the Korea Computer Congress (KCC), 2026, pp. 2285-2287.

► Under Reviews

[1-st author] **Jinyeong Park**, et al. "QATMA: Quantization-Aware Training with Multimodal Alignment for Open-Vocabulary Object Detection." arXiv preprint arXiv:2603.05964 (2026).

[2-nd author] Hanseul Choi, **Jinyeong Park**, et al. "CAMEL-CLIP: Channel-aware Multimodal Electroencephalography-text Alignment for Generalizable Brain Foundation Models." arXiv preprint arXiv:2603.13272 (2026).

► Research Experiences

Research Assistant

Incheon National University, Department of Computer Science & Engineering

Lab: [GAILAB](#)

Advisor: Jibum Kim

March 2022 – Present

Molecular Reinforcement Learning for Drug Discovery

RL, Drug Design | 2023 – 2024 | [Paper](#) | Supported by NRF

- **Proposed Mol-AIR**, an intrinsically-motivated exploration framework for goal-directed molecular generation, addressing the exploration-exploitation trade-off in vast chemical spaces
- **Designed adaptive intrinsic rewards** by combining a history-based reward using locality-sensitive hashing (LSH) over Morgan fingerprints to track visited molecular structures with a Random Network Distillation (RND)-based learning reward on latent policy states, enabling adaptive exploration across training phases
- **Developed a dual-critic architecture** with separate episodic and non-episodic advantage estimation (GAE) to decouple credit assignment across extrinsic and two intrinsic reward signals, stabilizing PPO-based policy optimization
- **Achieved state-of-the-art performance** across 6 molecular property benchmarks (e.g., pLogP, QED, drug-likeness similarity), outperforming existing intrinsic reward baselines on every task, including reaching the theoretical optimum of QED where prior methods failed
- **Demonstrated translational utility** through a proof-of-concept multi-objective task, jointly optimizing binding activity against the dopamine D2 receptor (DRD2), drug-likeness, and synthetic accessibility to discover inhibitor candidates, with top candidates validated via molecular docking simulation

Efficient Multimodal Learning for 3D CAD Model Generation

Multimodal, CAD, PEFT | 2024 – 2025 | [Paper](#) | Supported by NRF

- **Participated in developing GuideCAD**, a parameter-efficient framework for text-image-conditioned 3D CAD generation, which achieved comparable quality to fine-tuning with 4× fewer trainable parameters and roughly 2× lower total training time
- **Evaluated the feasibility of LLM-generated text prompt templates**, informing the design of the dataset's text prompt generation pipeline
- **Reviewed and edited the manuscript**, contributing to the framing and clarity of the paper prior to submission

Low-Bit Quantization-Aware Training for Open-Vocabulary Object Detection

Multimodal, Object Detection, Model Compression | 2025 – Present | [Paper](#) | In collaboration with Prof. Hyeonbo Baek at University of Seoul

- **Proposed QATMA**, the first multimodal-aware, architecture-agnostic QAT framework for open-vocabulary object detection, identifying that extremely low-bit quantization distorts both cross-modal (region-text) and intra-modal (region-region) alignment—a failure mode unaddressed by prior closed-vocabulary quantization methods
- **Designed Curriculum QAT (CQAT)**, which partitions the detector into functional modules (backbone, neck-head) and progressively expands the quantization scope across training stages, suppressing error accumulation to enable stable low-bit optimization
- **Devised Text-anchored Pairwise Similarity Distillation (TPSD)**, constructing unified pairwise similarity matrices anchored on text embeddings to jointly transfer region-text and region-region alignment from a full-precision teacher model
- **Consistently outperformed QAT baselines** on LVIS (+2.5–4.3 AP) and COCO (+4.1–7.6 AP) zero-shot benchmarks across YOLO-World-M/L/X, with especially large rare-category improvements (up to +6.9 APr, a 93.2% relative gain), and validated generalization to the DETR-based OmDet-Turbo detector (+4.8 AP)

Multimodal EEG-Text Foundation Model for Generalizable Brain Decoding

Multimodal, BCI | 2025 – 2026 | [Paper](#)

- **Contributed to the conceptualization** of CAMEL-CLIP, a contrastive EEG-text foundation model designed to be robust to channel heterogeneity across EEG datasets, which achieved state-of-the-art linear-probing performance, outperforming the strongest unimodal foundation model by 9.1% in balanced accuracy and improving EEG-text alignment by up to 23.6%
- **Proposed the idea behind synthetic report ensemble prompt generation**, a technique that averages embeddings from multiple synthesized clinical report variants per label, nearly doubling text-prototype cosine similarity (0.257 → 0.482) and improving downstream classification accuracy by up to 8.5% over single-prompt baselines
- **Provided feedback** on methodology and experimental design, and **reviewed and edited the manuscript**, contributing to the framing and clarity of the paper prior to submission

Multimodal 3D CAD Generation for Traditional Korean Wooden Architecture

Multimodal, CAD | 2026 – Present | In collaboration with ETRI

- Analyzing traditional Korean wooden architecture component data (STEP/B-rep) and benchmarking existing multimodal CAD generation models — including image/point-cloud-based reverse engineering and text-to-CAD — that produce editable, parametric CadQuery code, to assess generalization on this out-of-distribution domain
- Surveying model architectures, training strategies, and data augmentation techniques, and working toward constructing a paired CAD dataset for this domain to support model development under limited-data, out-of-distribution conditions

► Selected Projects

- **Urban Flood Depth Prediction** | Time-series, Real-world | 2025 – Present | Supported by Ministry of the Interior and Safety, Korea
Time-series forecasting for urban flood depth prediction on NYC FloodNet dataset
- **Deep Learning-based Water Leakage Detection** | Anomaly Detection, Time-series, Real-world | 2025 – Present | In collaboration with SONDAR Company
Developing an anomaly detection framework for water leakage detection in advanced metering infrastructure systems
- **Traffic Signal Control** | RL | 2025 | [Paper](#)
Multi-agent RL for coordinated traffic signal control with novel adjacent intersection intrinsic reward mechanisms

- **Data-driven Transit Design** | *ML, Real-world* | 2024 | *Supported by AI & Big Data Center, Incheon National University*
Transportation data analysis and data-driven optimization for locations of bus stops and transfer centers in Incheon
- **Multiple Knapsack Problem** | *RL* | 2024 | [Github](#)
Comparative study of reinforcement learning algorithms for the combinatorial optimization problem