

# Byung-Kwan Lee

Ph.D., School of Electrical Engineering at KAIST

Research Scientist at  NVIDIA

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 LinkedIn ·  Github ·  Google Scholar ·  Huggingface

## Research Interest

Building **efficient, high-performing Vision-Language Models (VLMs)**, with focus on:

- Distillation / RL
- Agent
- Pruning
- Compression
- Data / Training / Inference Efficiency

## Work Experience

### NVIDIA • Research Scientist

Oct. 2025 - Current

**LEAD** **AXPO: Agent eXplorative Policy Optimization** [COMPLETED] Agentic RL training that recovers tool usage through tool-call resampling, improving multimodal reasoning performance against larger baselines.

**Under Review** **U.S. Patent Application 2026** **ArXiv Release** **Internal Release**

**LEAD** **Masking Teacher and Reinforcing Student** [COMPLETED] Mask-progressive RL distillation that gradually un.masks teacher weights and uses offline RL with accuracy & distillation rewards.

**CVPR 2026 Accept** **U.S. Non-Provisional Patent Filed 2026** **ArXiv Release** **Internal Release**

**LEAD** **GenRecal** [COMPLETED] Cross-architecture VLM distillation via a Recalibrator that aligns heterogeneous token representations regardless of vocabulary, token splits, or index ordering.

**Under Review** **U.S. Patent Upgraded to Non-Provisional 2025** **Internal Tech Transfer**

**LEAD** **Unified RL & Imitation Learning for VLMs** [COMPLETED] Combines RL with adversarial imitation, using an LLM-based discriminator and multi-teacher guidance to build lightweight yet powerful VLMs.

**NeurIPS 2025 Accept** **U.S. Patent Upgraded to Non-Provisional 2025** **ArXiv Release** **Internal Release**

### NVIDIA • Research Intern

Oct. 2024 - Oct. 2025

**LEAD** **VLSI: Verbalized Layers-to-Interactions** [COMPLETED] Layer-wise distillation using intermediate verbalizers, enabling small VLMs (2B/7B) to align with large VLMs' reasoning progression and outperform GPT-4V.

**CVPR 2025 Accept** **U.S. Non-Provisional Patent Filed 2025** **ArXiv Release** **Internal Release** **Internal Tech Transfer**

**LEAD** **GenRecal** [INITIATED] Initial design of the Recalibrator framework for cross-tokenizer VLM distillation; first proof-of-concept and internal demo.

**U.S. Provisional Patent Filed 2025** **ArXiv Release** **Internal Release**

**LEAD** **Unified RL & Imitation Learning for VLMs** [INITIATED] First formulation of the RL + adversarial imitation training pipeline; initial experiments and team setup.

**U.S. Provisional Patent Filed 2025**

## Education

### KAIST

Mar. 2020 - Aug. 2025

Ph.D., School of Electrical Engineering

◦ GPA: 3.77/4.3

◦ Dissertation: *Building High-performing, Efficient-size Vision Language Models: Merge, Modify, and Distill* [Link]

### KAIST

Mar. 2018 - Feb. 2020

M.S., The Cho Chun Sik Graduate School of Green Transportation

◦ GPA: 3.72/4.3

◦ Thesis: *Training Encoder-Attention through Fully-Connected CRFs for Efficient End-to-End Lane Detection Model* [Link]

### Hanyang University

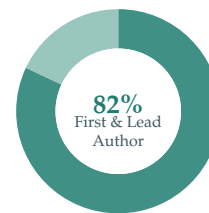
Mar. 2014 - Feb. 2018

B.S., Mathematics and Electronic Engineering

◦ GPA: 3.86/4.5

## Publications

Overall	16 Accepts · 4 Pending · 2 Tech Reports
Computer Vision	5 CVPR · 2 ICCV · 1 ECCV · 1 ICIP
Machine Learning	3 NeurIPS · 1 ICLR
NLP	1 ACL · 1 EMNLP
Journal	1 Pattern Recognition



■ 82% (18/22) First & Lead Author  
■ 18% (4/22) Co-Author

- “Agent eXplorative Policy Optimization for Multimodal Agentic Reasoning”**  
Minki Kang, Shizhe Diao, Ryo Hachiuma, Sung Ju Hwang, Pavlo Molchanov, Yu-Chiang Frank Wang, Byung-Kwan Lee  
Under Review [Paper (Coming Soon)] [Project]  
U.S. Patent Application, NVIDIA Research, 2026
- “Hide to See: Reasoning-prefix Masking for Visual-anchored Thinking in VLM Distillation”**  
Seonghoon Yu, Dongjun Nam, Byung-Kwan Lee<sup>†</sup>, Jeany Son<sup>†</sup>  
Under Review [Paper][Code]
- “Why and When Visual Token Pruning Fails? A Study on Relevant Visual Information Shift in MLLMs Decoding”**  
Jiwan Kim, Kibum Kim, Wonjoong Kim, Byung-Kwan Lee, Chanyoung Park  
Under Review [Paper][Project]
- “GenRecal: Generation after Recalibration from Large to Small Vision Language Models”**  
Byung-Kwan Lee, Ryo Hachiuma, Yong Man Ro, Yu-Chiang Frank Wang, and Yueh-Hua Wu  
Under Review, [Paper][Project]  
U.S. Patent Application Filed (Non-Provisional), NVIDIA Research, 2025
- “Masking Teacher and Reinforcing Student for Distilling Vision-Language Models”**  
Byung-Kwan Lee, Yu-Chiang Frank Wang, Ryo Hachiuma  
Computer Vision and Pattern Recognition (CVPR), 2026 [Paper]  
U.S. Patent Application Filed (Non-Provisional), NVIDIA Research, 2026
- “Recursive Think-Answer Process for LLMs and VLMs”**  
Byung-Kwan Lee<sup>\*</sup>, Youngchae Chee<sup>\*</sup>, Yong Man Ro  
Computer Vision and Pattern Recognition (CVPR) Findings, 2026 [Paper][Project]
- “RefineBench: Evaluating Refinement Capability in Language Models”**  
Young-Jun Lee<sup>\*</sup>, Seungone Kim<sup>\*</sup>, Byung-Kwan Lee, Minkyong Moon, Yechan Hwang, Jong Myoung Kim, Graham Neubig, Sean Welleck, Ho-Jin Choi  
International Conference on Learning Representations (ICLR), 2026 [Paper][Project]  
Best Runner-Up Award, Workshop for Multi-Turn Interactions in Large Language Models, NeurIPS 2025 (Oral, Top 1%) [Link]
- “Unified Reinforcement and Imitation Learning for Vision-Language Models”**  
Byung-Kwan Lee, Ryo Hachiuma, Yong Man Ro, Yu-Chiang Frank Wang, Yueh-Hua Wu  
Neural Information Processing Systems (NeurIPS), 2025 [Paper][Project]  
U.S. Patent Application Filed (Non-Provisional), NVIDIA Research, 2025
- “MultiVerse: A Multi-Turn Conversation Benchmark for Evaluating Large Vision and Language Models”**  
Young-Jun Lee, Byung-Kwan Lee, Jianshu Zhang, Yechan Hwang, Byungsoo Ko, Han-Gyu Kim, Dongyu Yao, Xuankun Rong, Eojin Joo, Seung-Ho Han, Bowon Ko, Ho-Jin Choi  
IEEE/CVF International Conference on Computer Vision (ICCV), 2025 [Paper][Project]

- Workshop for Knowledge-Intensive Multimodal Reasoning, ICCV 2025 [[Link](#)]
10. **“VLsI: Verbalized Layers-to-Interactions from Large to Small Vision Language Models”**  
Byung-Kwan Lee, Ryo Hachiuma, Yu-Chiang Frank Wang, Yong Man Ro, Yueh-Hua Wu  
Computer Vision and Pattern Recognition (CVPR), 2025 [[Paper](#)][[Project](#)]  
U.S. Patent Application Filed (Non-Provisional), NVIDIA Research, 2025
  11. **“Phantom of Latent for Large Language and Vision Models”**  
Byung-Kwan Lee, Sangyun Chung, Chae Won Kim, Beomchan Park, Yong Man Ro  
Technical Report [[Paper](#)][[Code](#)][[Huggingface Model](#)]
  12. **“TroL: Traversal of Layers for Large Language and Vision Models”**  
Byung-Kwan Lee, Sangyun Chung, Chae Won Kim, Beomchan Park, Yong Man Ro  
Empirical Methods in Natural Language Processing (EMNLP), 2024 [[Paper](#)][[Code](#)][[Huggingface Model](#)]
  13. **“Meteor: Mamba-based Traversal of Rationale for Large Language and Vision Models”**  
Byung-Kwan Lee, Chae Won Kim, Beomchan Park, Yong Man Ro  
Neural Information Processing Systems (NeurIPS), 2024 [[Paper](#)][[Code](#)][[Huggingface Model](#)]  
31st Samsung HumanTech Paper Awards in section of Computer Science & Engineering
  14. **“MoAI: Mixture of All Intelligence for Large Language and Vision Models”**  
Byung-Kwan Lee, Beomchan Park, Chae Won Kim, Yong Man Ro  
European Conference on Computer Vision (ECCV), 2024, [[Paper](#)][[Code](#)][[Huggingface Model](#)]
  15. **“CoLLaVO: Crayon Large Language and Vision mOdel”**  
Byung-Kwan Lee, Beomchan Park, Chae Won Kim, Yong Man Ro  
Findings of the Association for Computational Linguistics (ACL), 2024, [[Paper](#)][[Code](#)][[Huggingface Model](#)]  
2024 KCC XAI Workshop, Best Paper Awards
  16. **“Causal Unsupervised Semantic Segmentation”**  
Junho Kim\*, Byung-Kwan Lee\*, and Yong Man Ro  
Journal of Pattern Recognition [[Paper](#)][[Code](#)]
  17. **“Mitigating Adversarial Vulnerability through Causal Parameter Estimation by Adversarial Double Machine Learning”**  
Byung-Kwan Lee\*, Junho Kim\*, and Yong Man Ro  
IEEE/CVF International Conference on Computer Vision (ICCV), 2023 [[Paper](#)][[Code](#)]
  18. **“Mitigating Dataset Bias in Image Captioning through CLIP Confounder-free Captioning Network”**  
YeonJu Kim, Junho Kim, Byung-Kwan Lee, Sebin Shin, and Yong Man Ro  
IEEE International Conference on Image Processing (ICIP), 2023 [[Paper](#)][[Code](#)]
  19. **“Demystifying Causal Features on Adversarial Examples and Causal Inoculation for Robust Network by Adversarial Instrumental Variable Regression”**  
Junho Kim\*, Byung-Kwan Lee\*, and Yong Man Ro  
Computer Vision and Pattern Recognition (CVPR), 2023 [[Paper](#)][[Code](#)]
  20. **“Masking Adversarial Damage: Finding Adversarial Saliency for Robust and Sparse Network”**  
Byung-Kwan Lee\*, Junho Kim\*, and Yong Man Ro  
Computer Vision and Pattern Recognition (CVPR), 2022 [[Paper](#)][[Code](#)]
  21. **“Distilling Robust and Non-Robust Features in Adversarial Examples by Information Bottleneck”**  
Junho Kim\*, Byung-Kwan Lee\*, and Yong Man Ro  
Neural Information Processing Systems (NeurIPS), 2021 [[Paper](#)][[Code](#)]
  22. **“Towards Adversarial Robustness of Bayesian Neural Network through Hierarchical Variational Inference”**  
Byung-Kwan Lee\*, Youngjun Yu, and Yong Man Ro  
Technical Report [[Paper](#)][[Code](#)]

## Reviewer Experience

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IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	Journal
IEEE Transactions on Neural Networks and Learning Systems (TNNLS)	Journal
IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)	Journal
Computer Vision and Pattern Recognition (CVPR)	Conference
International Conference on Computer Vision (ICCV)	Conference
European Conference on Computer Vision (ECCV)	Conference
International Conference on Learning Representations (ICLR)	Conference
Neural Information Processing Systems (NeurIPS)	Conference
International Conference on Machine Learning (ICML)	Conference
AAAI Conference on Artificial Intelligence (AAAI)	Conference
Association for Computational Linguistic (ACL)	Conference
Empirical Methods in Natural Language Processing (EMNLP)	Conference

## Invited Talks and Awards

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Silver Reviewer Award, International Conference on Machine Learning (ICML)	2026
Best Runner-Up Award (Oral, Top 1%), Multi-Turn Interactions in LLMs Workshop @ NeurIPS	2025
Invited Talk in Kongju University	2025
Invited Talk in Hanyang University ERICA	2025
Invited Talk in Kookmin University	2025
Invited Talk in Dongseo University	2025
31st Samsung HumanTech Paper Awards in section of Computer Science & Engineering	2025
KCC XAI Workshop, Best Paper Awards	2024
Invited Talk in Korea Institute of Science and Technology Information (KISTI)	2024
Invited Talk in NAVER HyperCLOVA X	2024
Invited Talk in Kakao Brain	2024
1st Award for Research Presentation in Center for Applied Research in Artificial Intelligence (CARAI)	2023
GIRE Research Mentor, Seoul International School – “MUSe”, Journal of Student Research [ <a href="#">Publication</a> ]	2023
KAIST SW IT Academy, AI Project Director of 1st Award Topic	2023
Invitation to Presenter in Korean Conference on Computer Vision (KCCV)	2023
KAIST SW IT Academy, Lecturer of Data Structure & Algorithm, Deep Learning, Computer Vision	2023
Invitation to Presenter in Korean Conference on Computer Vision (KCCV)	2022
2nd Award for Research Presentation in Center for Applied Research in Artificial Intelligence (CARAI)	2022
KAIST Fellowship	Mar. 2020 - Feb. 2024
National Government Fellowship	Mar. 2018 - Feb. 2020
1st President’s Award for International Autonomous Vehicle Competition, Team Leader [ <a href="#">YouTube</a> ][ <a href="#">Talk</a> ]	2018