

Seungjae (Jay) Lee

ROBOT LEARNING · REINFORCEMENT LEARNING

College Park, MD, USA

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Education

University of Maryland, College Park

PH.D. STUDENT IN COMPUTER SCIENCE

- Advised by Prof. Furong Huang and Prof. Jia-Bin Huang

MD, USA

Aug. 2024 - Present

Seoul National University

M.S. IN AEROSPACE ENGINEERING

- Advised by Prof. H. Jin Kim

Seoul, Korea

Mar. 2021 - Feb. 2024

Seoul National University

B.S. IN MECHANICAL AND AEROSPACE ENGINEERING

- GPA: 3.99 (Major: 4.09)/4.30 (11th out of 144 graduating students)
- Graduated Summa Cum Laude (1st in Department of Aerospace Engineering)
- Military service (2 years)

Seoul, Korea

Mar. 2015 - Feb. 2021

Selected Research

μ_0 : A Scalable 3D Interaction-Trace World Model

CoRL 2026

CO-FIRST AUTHOR

[Project]

- Trace world model that predicts 3D interaction traces instead of pixels or low-level actions, enabling cross-embodiment transfer from video-only pretraining.
- **Best Paper Award (2nd Place)**, IROS 2026 RoBoWoMo Workshop.

TraceGen: World Modeling in 3D Trace-Space Enables Learning from Cross-Embodiment Videos

CVPR 2026

CO-FIRST AUTHOR

[Project]

- Predicts future motion in a compact 3D trace space rather than pixels, learning a transferable motion prior from 123K human and robot videos (1.8M observation-trace-language triplets).
- 80% success with only five target-robot videos and 50–600× faster inference than video world models; 67.5% success from five handheld-phone human videos.

Fly-by-Code: Embodied Coding Agents for Aerial Manipulation with Active Visual and Physical Feedback

Preprint 2026

CO-ADVISOR (EQUAL ADVISING)

[Project]

- Coding agent writes diagnostic programs after each execution, gathering evidence through new viewpoints and targeted physical probes to refine aerial manipulation programs.
- 75.0% task success vs. 31.7% for the code-as-policy baseline across six simulated tasks.

Dex-One2Many: Learning Dexterous Manipulation from a Single Human Demonstration

Preprint 2026

CO-ADVISOR (EQUAL ADVISING)

[Project]

- Abstracts a single human video into sequential scene graphs that guide RL, generalizing to object poses and grasps never shown in the video.
- 94.6–96.8% mean success on unseen configurations across five tasks and four arm-hand embodiments.

VQ-BiT: Behavior Generation with Latent Actions

ICML 2024 (Spotlight)

FIRST AUTHOR

[Project]

- Vector-quantized behavior transformer for multimodal action prediction, conditional generation, and partial observation handling; integrated into Hugging Face LeRobot.
- **Outstanding Paper Award**, ICML 2024 MFM-EAI Workshop.

Publications

Underline denotes co-first authors or equal advising

INTERNATIONAL CONFERENCE

1. **Seungjae Lee**, Yoonkyo Jung, Jusuk Lee, Jonghun Shin, Amir Hossein Shahidzadeh, Yao-Chih Lee, H. Jin Kim, Jia-Bin Huang, and Furong Huang, “ μ_0 : A Scalable 3D Interaction-Trace World Model,” in *Conf. Robot Learn.*

(CoRL), 2026. **Best Paper Award (2nd Place), IROS 2026 RoBoWoMo Workshop.**

2. Jeremy A. Collins, **Seungjae Lee**, Rachanon Wachakorn, Krishnan Srinivasan, Animesh Garg, Vitor Campagnolo Guizilini, and Paarth Shah, “TAPESTRY: A Single Backbone for Video Generation and Robot Control,” in *Conf. Robot Learn. (CoRL)*, 2026.
3. Jusuk Lee, **Seungjae Lee**, Jonghun Shin, Hoseong Jung, Sungha Kim, Daesol Cho, H. Jin Kim, Jia-Bin Huang, and Furong Huang, “DynaFLIP: Rethinking Robotics Perception via Tri-Modal-Dynamics Guided Representation,” in *Proc. Neural Information Processing Systems (NeurIPS)*, 2026.
4. Zikui Cai, Kaushal Janga, Tan Dat Dao, **Seungjae Lee**, Shivin Dass, Mingyo Seo, Kaiyu Yue, Mintong Kang, Nandhu Pillai, Monte Hoover, Aadi Palnitkar, Ruchit Rawal, Ruijie Zheng, Bo Li, Yuke Zhu, Roberto Martín-Martín, Tom Goldstein, and Furong Huang, “Beyond Episodic Evaluation: Memory Architectural Bottlenecks in Sequential Embodied Question Answering,” in *Proc. IEEE/RSJ Int. Conf. Intell. Robot. Syst. (IROS)*, 2026.
5. **Seungjae Lee**, Yoonkyo Jung, Inkook Chun, Yao-Chih Lee, Zikui Cai, Hongjia Huang, Aayush Talreja, Tan Dat Dao, Yongyuan Liang, Jia-Bin Huang, and Furong Huang, “TraceGen: World Modeling in 3D Trace-Space Enables Learning from Cross-Embodiment Videos,” in *Proc. IEEE/CVF Conf. Comput. Vis. Pattern Recognit. (CVPR)*, 2026.
6. Yuanchen Ju, Yongyuan Liang, Yen-Jen Wang, Nandiraju Gireesh, Yuanliang Ju, **Seungjae Lee**, Qiao Gu, Elvis Hsieh, Furong Huang, and Koushil Sreenath, “MomaGraph: State-Aware Unified Scene Graphs with Vision-Language Model for Embodied Task Planning,” in *Int. Conf. Learn. Represent. (ICLR)*, 2026. **Oral.**
7. Inkook Chun, **Seungjae Lee**, Michael Samuel Albergo, Saining Xie, and Eric Vanden-Eijnden, “Dynamic Test-Time Compute Scaling in Control Policy: Difficulty-Aware Stochastic Interpolant Policy,” in *Proc. Neural Information Processing Systems (NeurIPS)*, 2025.
8. **Seungjae Lee**, Daniel Ekpo, Haowen Liu, Furong Huang, Abhinav Shrivastava, and Jia-Bin Huang, “Imagine, Verify, Execute: Memory-guided Agentic Exploration with Vision-Language Models,” in *Conf. Robot Learn. (CoRL)*, 2025.
9. Haritheja Etukuru, Norihito Naka, Zijin Hu, **Seungjae Lee**, Julian Mehu, Aaron Edsinger, Chris Paxton, Soumith Chintala, Lerrel Pinto, and Nur Muhammad Mahi Shafiullah, “Robot Utility Models: General Policies for Zero-Shot Deployment in New Environments,” in *Proc. IEEE Int. Conf. Robot. Automat. (ICRA)*, 2025. **Oral, CoRL 2024 Workshop on Language and Robot Learning.**
10. **Seungjae Lee**, Yibin Wang, Haritheja Etukuru, H. Jin Kim, Nur Muhammad Mahi Shafiullah, and Lerrel Pinto, “VQ-BeT: Behavior Generation with Latent Actions,” in *Proc. Int. Conf. Mach. Learn. (ICML)*, 2024. **Spotlight (Top 3.5%); Outstanding Paper Award, ICML 2024 MFM-EAI Workshop.**
11. **Seungjae Lee**, Daesol Cho, Jonghae Park, and H. Jin Kim, “CQM: Curriculum Reinforcement Learning with a Quantized World Model,” in *Proc. Neural Information Processing Systems (NeurIPS)*, 2023.
12. Daesol Cho, **Seungjae Lee**, and H. Jin Kim, “Diversify & Conquer: Outcome-directed Curriculum RL via Out-of-Distribution Disagreement,” in *Proc. Neural Information Processing Systems (NeurIPS)*, 2023.
13. Dongseok Shim, **Seungjae Lee**, and H. Jin Kim, “SNeRL: Semantic-aware Neural Radiance Fields for Reinforcement Learning,” in *Proc. Int. Conf. Mach. Learn. (ICML)*, 2023.
14. Daesol Cho, **Seungjae Lee**, and H. Jin Kim, “Outcome-directed Reinforcement Learning by Uncertainty & Temporal Distance-Aware Curriculum Goal Generation,” in *Int. Conf. Learn. Represent. (ICLR)*, 2023. **Spotlight (Top 5.65%).**
15. **Seungjae Lee**, Jigang Kim, Inkyu Jang, and H. Jin Kim, “DHRL: A Graph-Based Approach for Long-Horizon and Sparse Hierarchical Reinforcement Learning,” in *Proc. Neural Information Processing Systems (NeurIPS)*, 2022. **Oral (Top 1.76%).**
16. Inkyu Jang, Dongjae Lee, **Seungjae Lee**, and H. Jin Kim, “Robust and Recursively Feasible Real-Time Trajectory Planning in Unknown Environments,” in *Proc. IEEE/RSJ Int. Conf. Intell. Robot. Syst. (IROS)*, 2021.

INTERNATIONAL JOURNAL

1. **Seungjae Lee**, Jongho Shin, Hyeong-Geun Kim, Daesol Cho, and H. Jin Kim, “Deep End-to-End Imitation Learning for Missile Guidance with Infrared Images,” *Int. J. Control, Automat. Syst. (IJCAS)*, 2023.

PREPRINTS & WORKSHOP PAPERS

1. Jaewoo Lee, Jeongyeon Seo, Sihyun Cho, Gyeongrak Choe, Yutong Wang, Bavin Saravanan, Jia-Bin Huang, Furong Huang, Sebastian Scherer, Guanya Shi, H. Jin Kim, **Seungjae Lee**, and Dongjae Lee, “Fly-by-Code: Embodied Coding Agents for Aerial Manipulation with Active Visual and Physical Feedback,” 2026. *Preprint*.
2. Jusuk Lee, Sungha Kim, Yeonsoo Park, Jonguk Cheon, Yoonkyo Jung, Yongjun You, H. Jin Kim, Jia-Bin Huang, Furong Huang, Youngseok Jang, and **Seungjae Lee**, “Dex-One2Many: Learning Dexterous Manipulation from a Single Human Demonstration,” 2026. *Preprint*.
3. Amir-Hossein Shahidzadeh, **Seungjae Lee**, Eadom Dessalene, Shanthosh Raaj Mohanram Mageswari, Soroush Etemad, Furong Huang, Cornelia Fermüller, and Yiannis Aloimonos, “What to Attend, What to Keep: Skill-Conditioned Visuotactile Representation with Progress-Guided Event Memory,” 2026. *Preprint*. **Best Paper Finalist, IROS 2026 Touch2Action Workshop**.
4. Zhi Wang, Botao He, Kelin Yu, **Seungjae Lee**, Ruohan Gao, Furong Huang, and Yiannis Aloimonos, “HumanEgo: Zero-Shot Robot Learning from Minutes of Human Egocentric Videos,” 2026. Under review. **Best Paper Award (Winner), IROS 2026 WORLDS Workshop**.
5. Jeffrey Yang Fan Chiang, **Seungjae Lee**, Jia-Bin Huang, Furong Huang, and Yizheng Chen, “Why Are Web AI Agents More Vulnerable Than Standalone LLMs? A Security Analysis,” in *ICLR Workshop on Building Trust in Language Models and Applications*, 2025.

Work Experience (Including Internship)

Research Intern, Generalist Embodied Agent Research (GEAR) Team

NVIDIA

- Working with Dr. Jim Fan, Dr. Danfei Xu, and Dr. Ruijie Zheng.

[Santa Clara, CA, USA](#)

May. 2026 - Aug. 2026

Research Intern, Large Behavior Model (LBM) Team

TOYOTA RESEARCH INSTITUTE

[Cambridge, MA, USA](#)

May. 2025 - Aug. 2025

Intern, Deep Learning Algorithm Team, Device Solutions (DS)

SAMSUNG ELECTRONICS

[Gyeonggi-do, Korea](#)

Jul. 2020 - Aug. 2020

Projects

LeRobot Project [🔗 ★ 28.2k]

HUGGING FACE

- Implemented the VQ-BeT policy as part of the LeRobot project

May. 2024 - Jul. 2024

Vector-Quantized Behavior Transformer for Multi-Modal Demonstrations [🔗 ★ 221]

CO-WORK WITH GENERALIZABLE ROBOTICS AND AI LAB (PROF. LERREL PINTO), NEW YORK UNIVERSITY

[Remote](#)

Jul. 2023 - Jun. 2024

Training Excavator Virtual Driver based on Inverse RL

CO-WORK WITH HD HYUNDAI HEAVY INDUSTRIES CO., LTD.

Apr. 2023 - Apr. 2024

End-to-End Machine Learning Based Guidance Research

CO-WORK WITH THE AGENCY FOR DEFENSE DEVELOPMENT (NATIONAL RESEARCH INSTITUTE OF KOREA)

May. 2021 - Apr. 2023

Teaching Experience

[CMSC320] Introduction to Data Science

TEACHING ASSISTANT

[University of Maryland](#)

Spring, 2026

[CMSC722] AI Planning

TEACHING ASSISTANT

[University of Maryland](#)

Fall, 2024

Teen Startup Team (AI Music & Gallery Team)

AI TECHNICAL COACH

Applied Computing Foundation

Jun. 2023 - Jan. 2024

2023 Hyundai Motor Company AI Boosting Camp

TEACHING ASSISTANT

Seoul National University

Aug. 2023

[M2795.002600] Principles of Flight Vehicle Control

TEACHING ASSISTANT

Seoul National University

Spring, 2021

Dream Consultant

MENTOR & CAMP LEADER

Non-Profit Organization, Seoul

Jul. 2016 - Sep. 2020

[034.005] Basic Physics 1, [034.006] Basic Physics 2

TUTOR

Seoul National University

2016, 2019

Honors & Awards

AWARDS

- 2026 **Best Paper Award (Winner), HumanEgo**, IROS 2026 WORLDS Workshop
- 2026 **Best Paper Award (2nd Place), μ_0** , IROS 2026 RoBoWoMo Workshop
- 2026 **Best Paper Finalist, What to Attend, What to Keep**, IROS 2026 Touch2Action Workshop
- 2024 **Outstanding Paper Award (Winner), VQ-BeT**, ICML 2024 MFM-EAI Workshop
- Jun. 2023 **Global Excellence Scholarship 2023**, Hyundai Motor Chung Mong-Koo Foundation
- May. 2023 **Top Prize, Best Poster Competition**, SNU AI Institute Spring Retreat
- Dec. 2022 **Global Excellence Scholarship 2022**, Hyundai Motor Chung Mong-Koo Foundation
- Dec. 2022 **Scholar Award**, NeurIPS 2022
- Feb. 2022 **Brain Korea 21 (BK21) Aerospace Excellence Research Award**, Seoul National University
- Feb. 2021 **Summa Cum Laude (1st in Department of Aerospace Engineering)**, Seoul National University

SCHOLARSHIPS

- 2024– **Daishin Songchon Scholarship Foundation**, USD 100,000/year
- 2021–2023 **Hyundai Motor Chung Mong-Koo Foundation**, Tuition + KRW 3,600K/year
- 2020–2021 **OK Bae & Jung Scholarship Foundation**, KRW 6,000K/year

INVITED TALKS

- Aug. 2023 **LG Tech Talk**, LG AI Research

Academic Services

- 2026 **Organizer**, Scaling H2R: Scaling Laws and Diversity in Human-to-Robot, CoRL'26 Workshop
- 2024 **Program committee**, RSS'24 SemRob Workshop
- 2022– **Reviewer**, ICML'22'24'25, IROS'23, NeurIPS'23'25'26, ICLR'24'25'26, ICRA'24'25, AAAI'25, CoRL'25'26, RSS'25, CVPR'26