



Sungho Choi

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Research Interests

My research lies at the intersection of **Physical AI**, **Embodied AI**, and **Visual Imitation Learning**. My primary goal is to develop robust, sample-efficient decision-making algorithms that enable robotic systems to acquire complex manipulation skills from diverse visual observations across morphological and dynamic domain shifts. My key research interests include:

- **Cross-Domain & Visual Imitation Learning:** Representation learning for domain-invariant feature extraction, discrete latent space projection, and non-adversarial reward formulation for visual policy learning.
- **Physical AI & Robot Manipulation:** Transferring simulation-learned behaviors to real-world robotic manipulators (Sim-to-Real) under visual variations and kinematic/dynamic mismatch.
- **Agentic Decision-Making & Foundation Models:** Diffusion policies, offline reinforcement learning, and integrating Vision-Language-Action (VLA) foundation models for generalized robotic agents.

Education

Ph.D. Student in Electrical Engineering

Mar. 2020 – Present

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea
Advisor: Prof. Youngchul Sung

M.S. in Electrical Engineering

Mar. 2018 – Feb. 2020

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea
Advisor: Prof. Youngchul Sung

B.S. in Electrical and Electronic Engineering

Mar. 2012 – Feb. 2018

Yonsei University, Seoul, Republic of Korea
Exchange Student, University of Toronto, ON, Canada

Fall 2016

Honors and Awards

World Cyber Games 2019, New Horizons, AI Soccer, Semi-Finalist

Jul. 2019

SISReL Team

Championship, The 1st AI SoccerWorldcup with Team AFC WISRL (\$10,000)

Aug. 2018

AFC-WISRL Team

Awarded the Highest Honors at Graduation

Feb. 2018

Yonsei University, Seoul, Republic of Korea

Publications

Journals

[J1] Adaptive multi-model fusion learning for sparse-reward reinforcement learning

Giseung Park, Whiyoung Jung, Seungyul Han, Sungho Choi and Youngchul Sung
Neurocomputing, vol. 633, Jun. 2025

Conferences

[C3] Domain Adaptive Imitation Learning with Visual Observation

Sungho Choi, Seungyul Han, Woojun Kim, Jongseong Chae, Whiyoung Jung, and Youngchul Sung
Advances in Neural Information Processing Systems 36 (2023): 44067-44104.

[C2] **Robust Imitation Learning against Variations in Environment Dynamics**

Jongseong Chae, Seungyul Han, Whiyoung Jung, Myungsik Cho, Sungho Choi, and Youngchul Sung
International Conference on Machine Learning. PMLR, 2022.

[C1] **Blockwise sequential model learning for partially observable reinforcement learning**

Giseung Park, Sungho Choi and Youngchul Sung
Proceedings of the AAAI Conference on Artificial Intelligence. Vol. 36. No. 7. 2022.

Under Review

[C5] **Domain-Invariant Per-Frame Feature Extraction for Cross-Domain Imitation Learning with Visual Observations**

Minung Kim, Kawon Lee, Jungmo Kim, Sungho Choi, and Seungyul Han
Submitted to *The Association for the Advancement of Artificial Intelligence (AAAI)*, 2027
<https://arxiv.org/abs/2502.02867>.

[C4] **Constrained Diffusion Policy Optimization for Offline Reinforcement Learning**

Gyeongmin Kim, Sungho Choi, Myungsik Cho, Jongseong Chae, Jeonghye Kim, and Youngchul Sung
Submitted to *Conference on Neural Information Processing Systems (NeurIPS)*, 2026.

In Preparation for Submission

[J2] **ProXIL: Cross-Domain Imitation Learning via Latent Space Projection to Discrete Representations**

Sungho Choi, Jongeui Park, Woohyeon Byeon, Seungyul Han, and Youngchul Sung
In preparation for submission to *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*.

Patents

Korean Patents

3. **Method and System for Blockwise Sequential Model Learning for Partially Observable Reinforcement Learning**

Youngchul Sung, Gieung Park, and Sungho Choi
Patent application date: 2023-02-17, Patent application number: 10-2023-0022223

2. **Domain Adaptive Imitation Learning Method and System with Visual Observation**

Youngchul Sung, Sungho Choi, Seungyul Han, Woojun Kim, Jongseong Chae, and Whiyoung Jung
Patent application date: 2023-02-17, Patent application number: 10-2023-0021570

1. **Robust Imitation Learning Method and System Against Variations in Environment Dynamics**

Jongseong Chae, Seungyul Han, Whiyoung Jung, Myungsik Cho, Sungho Choi, and Youngchul Sung
Patent application date: 2023-02-17, Patent application number: 10-2023-0021569

Project Experiences

Selected Research Projects

Cross-Domain Imitation Learning for Efficient Adaptation to Environmental Changes Based on Probabilistic Models

Funding Agent: National Research Foundation of Korea (NRF)
Role: **Principal Investigator (PI)** *Sep. 2024 – Aug. 2025*

Artificial Intelligence Research Hub Project

Funding Agent: Institute of Information & Communications Technology Planning & Evaluation (IITP)
Role: Participating Researcher *Jul. 2024 – Present*

Development of Artificial Intelligence Technology for Self-Improving Competency-Aware Learning Capabilities

Funding Agent: Institute of Information & Communications Technology Planning & Evaluation (IITP)
Role: Participating Researcher *Apr. 2022 – Present*

Information Theory Based Reinforcement Learning for Generalized Environments

Funding Agent: National Research Foundation of Korea (NRF)
Role: Participating Researcher *Mar. 2021 – Feb. 2025*

Teaching Experience

Teaching Assistant at KAIST

EE405 - Electronics Design Lab: Network of Smart Things

Fall 2019

Military Service

Sergeant, Republic of Korea Army (KATUSA)

Apr. 2013 – Jan. 2015

Korean Augmentation to the United States Army (KATUSA)

Camp Casey (Dongducheon), 2nd Infantry Division, Eighth U.S. Army