Sungjae Park

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Education

Seoul National University: Mar. 2017 – Aug. 2023

Department of Mechanical Engineering (Double Major in Mathematics), **Total GPA : 4.23/4.3**
Graduated **1st place** in Mechanical Engineering Department, **2nd place** in Engineering Department among fall graduates.

Research Interests

My research goal is to develop robot with human-like abilities, including **physical capabilities** for manipulation tasks, and **cognitive capabilities** for intuitive understanding of the real world. Specifically, I am interested in :

- Complex, long horizon manipulation tasks (e.g. cooking)
- Physical reasoning with interaction (e.g. inferring object properties with interaction)
- Physical reasoning for interaction (e.g. intuitive physics)

Research Experience

Cognitive Learning for Vision and Robotics Lab, Research Intern Jul. 2022 – Present
Advisor : Joseph J. Lim

Done is Better than Perfect : Learning Complex Manipulation with Error Recovery (In-progress)
• Developing a robot learning algorithm that can iteratively recover from failure states and retry, as humans naturally do when performing complex manipulation tasks.
• Modeled iterative recovery and retry process as hierarchical reinforcement learning, where the high level policy determines whether to use task policy or call recovery.

Accelerating Reinforcement Learning with Critical States from Prior Data (In-progress)
• Developing an efficient reinforcement learning algorithm based on task-oriented critical states.
• Critical states refer to states where number of near-optimal actions is significantly smaller than others, such as when the ball is about to reach the floor in Breakout.

SNU Robotics Lab, Undergraduate Thesis Research Intern Mar. 2022 – Dec. 2022
Advisor : Frank C. Park, Joseph J. Lim

Efficient Cross-Embodiment Learning with Object-Centric Planner
• Developed cross-embodiment learning algorithm with object-centric motion planning.
• With an object-centric planner learned from offline demonstration data of another robot, the target robot can efficiently learn the same task.
• Awarded Outstanding BS Thesis Presentation Award

Dynamic Robotics Systems Lab, Research Intern Jul. 2021 – Aug. 2021, Jan. 2022 – June. 2022
Advisor : Jaeheung Park

Vision Guided Peg Insertion
• Developed vision-based peg-in-hole algorithm for dual robot arm with hole detection using hand-eye camera and YOLO.

Motion Planning under Constraint with Learned Reachable Manifold
• Developed motion planning algorithm under constraint with block neural autoregressive flow (BNAF) for Panda Franka robot arm. Density estimation model was used to determine the discontinuity of the manifold.

Scholarships

Presidential Science Scholarship Mar. 2021 – Feb. 2023
Gangwon Future Highflier Scholarship Jan. 2018 – Present
Full-funded scholarship for academic excellence Mar. 2018 – Feb. 2019, Mar.2021

Awards and Honors

Outstanding BS Thesis Presentation Award Dec. 2022
2nd place, International Design Contest Robocon 2018 Aug. 2018
Silver Prize in Math/Computation Field, Samsung Humantech Paper Award Feb. 2015

Skills

Language : C++, Python, Java
Libraries/Frameworks : Pytorch, ROS, YOLO, SMACH
Modeling : SolidWorks

Teaching Experience

Teaching Assistant | Introduction to Robotics Mar. 2022 – Jun. 2022
Undergraduate Tutoring | Linear Algebra 1 Mar. 2021 – Jun.2021
Undergraduate Tutoring | Physics 1,2 Mar. 2018 – Dec. 2018, Mar. 2021 – Dec.2021

English Proficiency

GRE : Verbal Reasoning 160/170, Quantitative Reasoning 170/170, Analytical Writing 4.0/6.0
TOEFL : 112/120 (Reading 29/30, Listening 30/30, Speaking 26/30, Writing 27/30)