Seunghwan Um

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Research Statement

Hi there! I'm a PhD student at Robotics Innovatory, Sungkyunkwan University, South Korea, under the supervision of Prof. Hyouk Ryeol Choi. My research focuses on designing a versatile robotic gripper for logistics.
These days, I'm interested in developing a robotic system that can interact with the external environment for grasping or manipulation, so I'm considering various methods such as gripper design and imitation learning.

Education

- **Sungkyunkwan University (SKKU)** — *Mar. 2022 - Present*
  Ph.D in Mechanical Engineering — Suwon, Republic of Korea
- **Hanyang University (ERICA)** — *Mar. 2018 - Feb. 2022*
  B.S in Mechanical Engineering — Ansan, Republic of Korea

Publications

J=Journal, C=Conference, S=In Submission, P=Patent, T=Thesis

[J.2] **Development of Adaptive Gripper Enhancing Power Grasp Range and Linearity**.
Issac Rhee, Chun Soo Kim, Heeyeon Jeong, Seunghwan Um, and Hyouk Ryeol Choi* et al.
IEEE Access, 2024.

[J.1] **ReC-Gripper: A Reconfigurable Combined Suction and Fingered Gripper for Various Logistics Picking and Stowing Tasks**.
Seunghwan Um, Heeyeon Jeong, Chun Soo Kim, Issac Rhee, and Hyouk Ryeol Choi*.
IEEE Robotics and Automation Letters (RA-L), Presented in ICRA 2024.

[C.1] **Overcoming Heavy Clutter: Utilizing the Hybrid Grasping Network and Gripper**.
Seunghwan Um, Yeong Gwang Son, Tat Hieu Bui, Ho Sang Jung, and Hyouk Ryeol Choi*.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024
Workshop: Benchmarking via Competitions in Robotic Grasping and Manipulation Icon_Collection/gold_medal.png ***[Best Extended Abstract]***

[S.2] **Title: T.B.D**.
Seunghwan Um, Yeong Gwang Son, and Hyouk Ryeol Choi*.
The manuscript was invited to be published in *IEEE Robotics and Automation Practice (RA-P).*

[S.1] **Title: T.B.A.**
Seunghwan Um, Yeong Gwang Son, Juyong Hong, Chun Soo Kim, et al. and Hyouk Ryeol Choi*.
Manuscript submitted for publication in *IEEE/ASME Transactions on Mechatronics (TMECH).*

Patents

[P.3] **Hybrid Gripper Capable of Bin Picking and Shelf Picking**.
Seunghwan Um, Heeyeon Jeong, Chun Soo Kim, Issac Rhee, and Yoon Haeng Lee.
Korean Intellectual Property Office, Patent No. 10-2023-0076248. Publication Date: 2024.12.23.

[P.2] **Adaptive Gripper Capable of Parallel Motion**.
Issac Rhee, Chun Soo Kim, Seunghwan Um, Heeyeon Jeong, and Yoon Haeng Lee.
Korean Intellectual Property Office, Patent No. 10-2023-0077512. Registration Date: 2023.12.06.

[P.1] **Suction Gripper Capable of Translational and Rotational Movements**.
Chun Soo Kim, Issac Rhee, Seunghwan Um, Heeyeon Jeong, and Yoon Haeng Lee.
Korean Intellectual Property Office, Patent No. 10-2023-0093340. Registration Date: 2023.10.18.

Experience

- **AIDIN ROBOTICS - Cobot Solution Team** — *May 2022 - Present*
  Researcher — Anyang-si, Gyeonggi-do, Republic of Korea
  ◦ Designed grippers for shelf-picking solutions, contributing to efficient logistics automation.
- **Korea Institute of Industrial Technology (KITECH)** — *October 2021 - December 2021*
  Research Student — Ansan-si, Gyeonggi-do, Republic of Korea
  ◦ Designed and developed control systems for a 2-DoF manipulator, enhancing its performance and accuracy.
- **Wall Climbing Car (WCC) [Undergraduate Project]** — *December 2020 - October 2021*
  Team Leader — Ansan-si, Gyeonggi-do, Republic of Korea
  ◦ Designed a wall-climbing car's propeller frame and control system.

Projects

- **Development of Smart Vision System and All-in-One Universal Gripper for Multi-Various Random Piece Picking** *May 2022 - Present*
  Participating organizations: AIDIN ROBOTICS, SKKU, KITECH, CJ Logistics Republic of Korea
  - **Research Objective**: Developing robotic picking system including a gripper and vision system for piece picking in a logistics environment.
  - Designing an integrated gripper capable of various grasping strategy for a shelf environment among logistics environments
  - Researching grasping strategy that can pick objects while avoiding external constraints in a shelf environment

Honors and Awards

- **Samsung Humantech Paper Award** *Feb. 2025*
  Samsung Electronics Co., Ltd. [Samsung Humantech]
- **9th Robotic Grasping of Manipulation Competition - Picking in Clutter** *May. 2024*
  IEEE, IEEE RAS [RGMC 2024]
- **KSME Student Creative Design Competition** *Oct. 2021*
  The Korean Society of Mechanical Engineers (KSME) [YouTube]
- **Creative and Intelligent Robot Contest** *Sep. 2021*
  Daejeon Metropolitan City, Chungnam National University [YouTube]

Grant

- **BK21 Research Encouragement Scholarship** *Fall. 2024*
- **Brain Hanyang, Academic Excellence Scholarship** *Spring. 2018*