

Dongjae Lee (이동재)

Visiting Postdoctoral Researcher at Robotics Institute, Carnegie Mellon University

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Research Interests

My research focuses on control algorithms for real-world robotic systems, integrating hardware design, classical and learning-based control, optimization, and system-level implementation. The goal is to develop reliable and explainable robotic systems while pursuing more efficient and practical applications. Current interests include *aerial/whole-body manipulation, multi-agent collaboration, and embodiment-aware robot learning algorithms*.

Education

Seoul National University

Ph.D. in Aerospace Engineering

- Advisor: Prof. H. Jin Kim
- Dissertation: nonprehensile aerial manipulation with robust stability guarantee
- Cumulative GPA: 4.05/4.30

Seoul, South Korea

Sep 2020 – Feb 2025

Seoul National University

M.S. in Mechanical and Aerospace Engineering

- Advisor: Prof. H. Jin Kim
- Thesis: opening a hinged door with an aerial manipulator using model predictive control
- Cumulative GPA: 4.19/4.30

Seoul, South Korea

Sep 2018 – Aug 2020

Seoul National University

B.S. in Mechanical and Aerospace Engineering

- Cumulative GPA: 3.82/4.30

Seoul, South Korea

Mar 2014 – Feb 2018

Experience

Collaborating Visitor

Robotics Institute, Carnegie Mellon University

- Hosts: Prof. Guanya Shi and Prof. Sebastian Scherer
- Research on learning-based high-level policy for whole-body manipulation and cooperative manipulation
- Financial support by **NRF Postdoctoral Fellowship for Overseas Training**

Pittsburgh, United States

Sep 2025 – Present

Postdoctoral Researcher

Seoul National University

- Advisor: Prof. H. Jin Kim
- Organized a hands-on course on micro drone systems for approx. 40 students
- Advised and mentored Ph.D. students in aerial robotics research projects

Seoul, South Korea

Mar 2025 – Aug 2025

Visiting PhD Student

KTH Royal Institute of Technology

- Advisor: Prof. Dimos V. Dimarogonas
- Research on switching control of underactuated multi-channel system for cooperative manipulation
- Financial support by **BK Fellowship for Outstanding Graduate Students Overseas Training**

Stockholm, Sweden

Apr 2024 – Oct 2024

Honors and Awards

AWARDS

2025	Outstanding Doctoral Dissertation Award
2024	BK Future Innovation Talent Award (Silver Prize)
2021	2021 ICRA Best Paper Award on Unmanned Aerial Vehicles
2020	2020 ICCAS Outstanding Paper Award

Seoul National University

Seoul National University

IEEE

ICROS

FELLOWSHIPS

2025–2026	NRF Postdoctoral Fellowship for Overseas Training
2024	BK Fellowship for Graduate Student Overseas Training
2022–2023	NRF Ph.D. Research Fellowship
2021–2022	BK Research Fellowship

National Research Foundation of Korea (NRF)

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National Research Foundation of Korea (NRF)

Seoul National University

Funded Projects

Multi-agent nonprehensile aerial manipulation

Pittsburgh, United States

Ministry of Education (MoE)

Sep 2025 – Present

- Leading the project as a recipient of the **NRF Postdoctoral Fellowship for Overseas Training**
- Integrated high-level policy and low-level control for cooperative aerial manipulation

Hands-on course on micro drone systems

Seoul, South Korea

Seoul National University (SNU)

Mar 2025 – Aug 2025

- Organized a course as part of a regional talent development program, and **led a team of graduate students**
- Lecture on PID control and dynamics for drones, followed by a hands-on session using micro drones

Tiltrotor design and collaborative aerial transportation

Seoul, South Korea

Ministry of Education (MoE)

Jun 2022 – May 2023

- Led the project as a recipient of the **NRF Ph.D. Research Fellowship**
- Two first-author papers in top-tier robotics conferences and one registered Korean patent

Landscape inspection and motion planning for industrial excavator

Seoul, South Korea

Hyundai Construction Equipment (HCE)

Feb 2020 – Dec 2022

- Co-led the motion planning part of the project
- Two first-author papers in top-tier venues: one conference and one journal paper

Development of specialized multirotor for transportation

Seoul, South Korea

Ministry of Trade, Industry and Energy (MoTIE)

Jan 2019 – Dec 2019

- Designed and prototyped an aerial pick-and-place mechanism
- Participated in field tests for validating the multirotor's transportation capability

Publications and Patents

* indicates equal contributions

THESIS

- [T1] **D. Lee**, *Nonprehensile Aerial Manipulation with Robust Stability Guarantee*, Ph.D. Dissertation, 2025.
- [T2] **D. Lee**, *Opening a Hinged Door with an Aerial Manipulator using Model Predictive Control*, Master's Thesis, 2020.

JOURNAL ARTICLES

- [J1] **D. Lee**^{*}, B. Kim^{*}, H. J. Kim, *Autonomous aerial manipulation at arbitrary pose in SE(3) with robust control and whole-body planning*, *The International Journal of Robotics Research (IJRR)* accepted.
- [J2] S. Hwang^{*}, **D. Lee**^{*}, C. Kim, H. J. Kim, *Autonomous heavy object pushing using a coaxial tiltrotor*, *IEEE Transactions on Automation Science and Engineering (T-ASE)*, 2025.
- [J3] I. Jang^{*}, J. Kim^{*}, **D. Lee**^{*}, C. Kim^{*}, C. Oh, Y. Kim, S. Woo, H. Sung, H. J. Kim, *Towards Fully Integrated Autonomous Excavation: Autonomous Excavator for Precise Earth Cutting and Onboard Landscape Inspection*, *IEEE Robotics & Automation Magazine (RAM)*, 2025.
- [J4] G. Park, H. Park, W. Park, **D. Lee**, M. Kim, S. J. Lee, *The pallettrone cart: human-robot interaction-based aerial cargo transportation*, *IEEE Robotics and Automation Letters (RA-L)*, 2024.
- [J5] J. Byun, J. Kim, D. Eom, **D. Lee**, C. Kim, H. J. Kim, *Image-based time-varying contact force control of aerial manipulator using robust impedance filter*, *IEEE Robotics and Automation Letters (RA-L)*, 2024.
- [J6] W. Park, X. Wu, **D. Lee**, S. J. Lee, *Design, modeling and control of a top-loading fully-actuated cargo transportation multirotor*, *IEEE Robotics and Automation Letters (RA-L)*, 2023.
- [J7] J. Byun, I. Jang, **D. Lee**, H. J. Kim, *A hybrid controller enhancing transient performance for an aerial manipulator extracting a wedged object*, *IEEE Transactions on Automation Science and Engineering (T-ASE)*, 2023.
- [J8] **D. Lee**, J. Byun, H. J. Kim, *RISE-based trajectory tracking control of an aerial manipulator under uncertainty*, *IEEE Control Systems Letters (LCSS)*, 2022.
- [J9] **D. Lee**, H. Seo, I. Jang, S. J. Lee, H. J. Kim, *Aerial manipulator pushing a movable structure using a DOB-based robust controller*, *IEEE Robotics and Automation Letters (RA-L)*, 2021, **2021 ICRA Best Paper Award on Unmanned Aerial Vehicles**.
- [J10] S. J. Lee, **D. Lee**, J. Kim, D. Kim, I. Jang, H. J. Kim, *Fully actuated autonomous flight of thruster-tilting multirotor*, *IEEE/ASME Transactions on Mechatronics (T-MECH)*, 2021.

CONFERENCE PROCEEDINGS

- [C1] J. Byun, Y. Kim, **D. Lee**, H. J. Kim, *Safety-critical control for aerial physical interaction in uncertain environment*, 2025 *IEEE International Conference on Robotics and Automation (ICRA)*, 2025.

- [C2] **D. Lee**, H. J. Kim , *Saturated RISE control for considering rotor thrust saturation of fully actuated multirotor*, 2024 International Conference on Unmanned Aircraft Systems (ICUAS), 2024.
- [C3] **D. Lee**, S. Hwang, J. Byun, S. J. Lee, H. J. Kim , *Autonomous aerial perching and unperching using omnidirectional tiltrotor and switching controller*, 2024 IEEE International Conference on Robotics and Automation (ICRA), 2024.
- [C4] D. D. Oh*, **D. Lee***, H. J. Kim , *Safety-critical control under multiple state and input constraints and application to fixed-wing UAV*, 2023 IEEE Conference on Decision and Control (CDC), 2023.
- [C5] **D. Lee**, S. Hwang, C. Kim, S. J. Lee, H. J. Kim , *Minimally actuated tiltrotor for perching and normal force exertion*, 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.
- [C6] B. Kim, **D. Lee**, J. Byun, H. J. Kim , *Globally defined dynamic modelling and geometric tracking controller design for aerial manipulator*, 2023 IEEE International Conference on Robotics and Automation (ICRA), 2023.
- [C7] J. Byun, **D. Lee**, H. Seo, I. Jang, J. Choi, H. J. Kim , *Stability and robustness analysis of plug-pulling using an aerial manipulator*, 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
- [C8] **D. Lee***, I. Jang*, J. Byun, H. Seo, H. J. Kim , *Real-time motion planning of a hydraulic excavator using trajectory optimization and model predictive control*, 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
- [C9] I. Jang, **D. Lee**, S. Lee, H. J. Kim , *Robust and recursively feasible real-time trajectory planning in unknown environments*, 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
- [C10] **D. Lee**, H. Seo, D. Kim, H. J. Kim , *Aerial manipulation using model predictive control for opening a hinged door*, 2020 IEEE International Conference on Robotics and Automation (ICRA), 2020.
- [C11] H. Seo, C. Y. Son, **D. Lee**, H. J. Kim , *Trajectory planning with safety guaranty for a multirotor based on the forward and backward reachability analysis*, 2020 IEEE International Conference on Robotics and Automation (ICRA), 2020.
- [C12] S. J. Lee, **D. Lee**, H. J. Kim , *Cargo transportation strategy using T 3-Multirotor UAV*, 2019 IEEE International Conference on Robotics and Automation (ICRA), 2019.

MANUSCRIPTS UNDER REVIEW

- [M1] J. Lee*, **D. Lee***, Y. Kim H. Lee, H. J. Kim , *Geometric Backstepping Control of Omnidirectional Tiltrotors Incorporating Servo-Rotor Dynamics for Robustness against Sudden Disturbances* , under review (conference submission).
- [M2] H. Gupta, X. Gao, H. Ha, C. Pan, M. Cao, **D. Lee**, S. Scherer, S. Song, G. Shi , *UMI-on-Air: Embodiment-Aware Guidance for Embodiment-Agnostic Visuomotor Policies* , under review (conference submission).
- [M3] **D. Lee**, D. V. Dimarogonas, H. J. Kim , *Switching control of underactuated multi-channel systems with input constraints for cooperative manipulation* , under review (journal submission).

PATENTS

- [P1] H. J. Kim, **D. Lee** , *5 자유도 비행체 및 제어방법 (5 Degrees-of-Freedom Aerial Vehicle and Control Method)*, Korean Patent, Patent No. 10-2854901, PCT Application No. PCT/KR2024/095089., 2025.

Teaching

Hands-on course on micro drone systems

Seoul National University

Siheung, South Korea

Mar 2025 – Aug 2025

- Organized and led a course, instructing approximately 40 undergraduate students from other universities
- Encouraged active student participation through a drone racing-style competition

Engineering mathematics

HOLIX (formerly Educust)

Seoul, South Korea

Nov 2017 – Jun 2018

- Delivered an online lecture series on engineering mathematics for undergraduate students
- Attracted more than 1,500 enrolled learners

Reference

- Prof. H. Jin Kim, Seoul National University, hjinkim@snu.ac.kr
- Prof. Guanya Shi, Carnegie Mellon University, guanyas@andrew.cmu.edu
- Prof. Dimos V. Dimarogonas, KTH Royal Institute of Technology, dimos@kth.se
- Prof. Sebastian Scherer, Carnegie Mellon University, basti@andrew.cmu.edu
- Prof. Seung Jae Lee, Seoul National University of Science and Technology, seungjae_lee@seoultech.ac.kr