

# 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

Pittsburgh, United States

Sep 2025 – Present

- 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**

### Postdoctoral Researcher

Seoul National University

Seoul, South Korea

Mar 2025 – Aug 2025

- 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

### Visiting PhD Student

KTH Royal Institute of Technology

Stockholm, Sweden

Apr 2024 – Oct 2024

- 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**

## Honors and Awards

### AWARDS

2025	Outstanding Doctoral Dissertation Award	Seoul National University
2024	BK Future Innovation Talent Award (Silver Prize)	Seoul National University
2021	<b>2021 ICRA Best Paper Award</b> on Unmanned Aerial Vehicles	IEEE
2020	2020 ICCAS Outstanding Paper Award	ICROS

Seoul National University

Seoul National University

IEEE

ICROS

### FELLOWSHIPS

2025–2026	<b>NRF Postdoctoral Fellowship</b> 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

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## 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

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\* 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](#)<sup>\*</sup>, B. Kim<sup>\*</sup>, 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<sup>\*</sup>, [D. Lee](#)<sup>\*</sup>, 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<sup>\*</sup>, J. Kim<sup>\*</sup>, [D. Lee](#)<sup>\*</sup>, C. Kim<sup>\*</sup>, 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 palletrone 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

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### 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 Educast)

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

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- 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