Dongjae Lee (이동재)

Visiting Postdoctoral Researcher at Robotics Institute, Carnegie Mellon University
1723, Murray Ave, Pittsburgh, PA 15217, USA
dongjae713@gmail.com | dongjaelee95.github.io | Google Scholar

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 — *Seoul, South Korea*
Ph.D. in Aerospace Engineering — *Sep 2020 – Feb 2025*
- Advisor: Prof. H. Jin Kim
- Dissertation: nonprehensile aerial manipulation with robust stability guarantee
- Cumulative GPA: 4.05/4.30

Seoul National University — *Seoul, South Korea*
M.S. in Mechanical and Aerospace Engineering — *Sep 2018 – Aug 2020*
- 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 National University — *Seoul, South Korea*
B.S. in Mechanical and Aerospace Engineering — *Mar 2014 – Feb 2018*
- Cumulative GPA: 3.82/4.30

Experience

Collaborating Visitor — *Pittsburgh, United States*
Robotics Institute, Carnegie Mellon University — *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, South Korea*
Seoul National University — *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 — *Stockholm, Sweden*
KTH Royal Institute of Technology — *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	**2021 ICRA Best Paper Award** on Unmanned Aerial Vehicles	*IEEE*
2020	2020 ICCAS Outstanding Paper Award	*ICROS*

Fellowships

2025–2026	**NRF Postdoctoral Fellowship** for Overseas Training	*National Research Foundation of Korea* (*NRF*)
2024	BK Fellowship for Graduate Student Overseas Training	*National Research Foundation of Korea* (*NRF*)
2022–2023	NRF Ph.D. Research Fellowship	*National Research Foundation of Korea* (*NRF*)
2021–2022	BK Research Fellowship	*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**, D. V. Dimarogonas, H. J. Kim , *Switching control of underactuated multi-channel systems with input constraints for cooperative manipulation* , *IEEE Transactions on Control Systems Technology* **(TCST)** *accepted*.

[J2] Y. Lim, S. Jung, D. Kim, **D. Lee**, H. J. Kim , *Safe Multimodal Replanning via Projection-based Trajectory Clustering in Crowded Environments* , *IEEE Robotics and Automation Letters* **(RA-L)** *accepted*.

[J3] **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*.

[J4] 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.

[J5] 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.

[J6] 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.

[J7] 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.

[J8] 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.

[J9] 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.

[J10] **D. Lee**, J. Byun, H. J. Kim , *RISE-based trajectory tracking control of an aerial manipulator under uncertainty* , *IEEE Control Systems Letters* **(LCSS)**, 2022.

[J11] **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 Unmannaed Aerial Vehicles**.

[J12] 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. 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*, *accepted to 2026 IEEE International Conference on Robotics and Automation* **(ICRA)**, 2026.

[C2] 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*, *accepted to 2026 IEEE International Conference on Robotics and Automation* **(ICRA)**, 2026.

[C3] 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.

[C4] **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.

[C5] **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.

[C6] 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.

[C7] **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.

[C8] 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.

[C9] 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.

[C10] **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.

[C11] 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.

[C12] **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.

[C13] 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.

[C14] 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] **D. Lee***, Y. Wang*, X. Guo*, Y. Zhan, Y. Jiang, M. Cao, J. Xie, C. Mao, S. Scherer, J. Geng, G. Shi , *AM-Bench: A Modular Simulation Suite and Benchmark for Aerial Manipulation Policy Learning* , *under review* (*conference 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 — *Siheung, South Korea*

Seoul National University — *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 — *Seoul, South Korea*

HOLIX (formerly Educast) — *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