Dongjae Lee

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Research Interests

Aerial Manipulation, Robot-Environment Interaction, Robust Control, Model Predictive Control, Multi-agent Control

Education

Seoul National University — *Seoul, South Korea*

Ph.D. candidate in Aerospace Engineering — *Sep 2020 – present*

- Advisor: Prof. H. Jin Kim
- Research focus: aerial manipulation for robot-environment interaction

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

Seoul National University — *Seoul, South Korea*

B.S. in Mechanical and Aerospace Engineering — *Mar 2014 – Feb 2018*

Experiences

Visiting PhD student — *Stockholm, Sweden*

KTH Royal Institute of Technology — *Apr 2024 – present*

- Advisor: Prof. Dimos Dimarogonas
- Research focus: collaborative manipulation, distributed control

Online Education Mentor — *Seoul, South Korea*

Engineering Mathematics — *Dec 2017 – Jun 2018*

HOLIX (former: Educast)

Honors

Awards

2024	BK Future Innovation Talent Award (Silver Prize)	*Seoul National University, South Korea*
2022	BK Aerospace Excellence Research Award	*Seoul National University, South Korea*
2021	**2021 ICRA Best Paper Award** on Unmanned Aerial Vehicles	*IEEE*
2020	2020 ICCAS Outstanding Paper Award	*ICROS, South Korea*

Fellowship

2024	BK Fellowship for Outstanding Graduate Student Overseas Training	*National Research Foundation (NRF), South Korea*
2022–2023	Ph.D. Research Fellowship	*National Research Foundation (NRF), South Korea*
2021–2022	BK Research Fellowship	*Seoul National University, South Korea*
2016	National Scholarship	*Korea Student Aid Foundation, South Korea*

Projects

Tiltrotor design and collaborative transportation — *South Korea*

Ministry of Education (MoE) — *Jun 2022 – May 2023*

- platform design, control & experiments, **led the team of graduate students**

Landscape inspection and motion planning for automating industrial excavator — *South Korea*

Hyundai Construction Equipment (HCE) — *Feb 2020 – Dec 2022*

- optimization-based motion planning & outdoor experiment

Precise aerial manipulation with autonomous drones — *South Korea*

Ministry of Trade, Industry and Energy (MoTIE) — *Feb 2020 – May 2020*

- outdoor experiment of cooperative aerial transportation

Development of specialized multirotor for transportation — *South Korea*

Ministry of Trade, Industry and Energy (MoTIE) — *Jan 2019 – Dec 2019*

- pick-and-place mechanism design & outdoor experiment

Skills

Programming C/C++, Matlab, Simulink, ROS, Python
Language Korean (native), English (proficient)
Tools Git, CAD(Solidworks, Onshape), Optimization Toolbox/Solver(Acados, CasADi, CPLEX)

Publications

* indicates equal contributions

Journal Articles

[J1] Autonomous Heavy Object Pushing Using a Coaxial Tiltrotor
S. Hwang*, **D. Lee***, C. Kim, H. J. Kim
IEEE Transactions on Automation Science and Engineering **(T-ASE)** *accepted*.

[J2] Autonomous Excavator for Precise Earthcutting and Onboard Landscape Inspection
I. Jang*, J. Kim*, **D. Lee***, C. Kim*, C. Oh, Y. Kim, S. Woo, H. Sung, H. J. Kim
IEEE Robotics & Automation Magazine **(RAM)** *accepted*.

[J3] Image-Based Time-Varying Contact Force Control of Aerial Manipulator using Robust Impedance Filter
J. Byun, J. Kim, D. Eom, **D. Lee**, C. Kim, H. J. Kim
IEEE Robotics and Automation Letters **(RA-L)** 9.5 (2024) pp. 4854–4861. IEEE, 2024.

[J4] Design, Modeling and Control of a Top-loading Fully-Actuated Cargo Transportation Multirotor
W. Park, X. Wu, **D. Lee**, S. J. Lee
IEEE Robotics and Automation Letters **(RA-L)** 8.9 (2023) pp. 5807–5814. IEEE, 2023.

[J5] A Hybrid Controller Enhancing Transient Performance for an Aerial Manipulator Extracting a Wedged Object
J. Byun, I. Jang, **D. Lee**, H. J. Kim
IEEE Transactions on Automation Science and Engineering **(T-ASE)** (2023). IEEE, 2023.

[J6] RISE-based trajectory tracking control of an aerial manipulator under uncertainty
D. Lee, J. Byun, H. J. Kim
IEEE Control Systems Letters **(LCSS)** 6 (2022) pp. 3379–3384. IEEE, 2022.

[J7] Aerial manipulator pushing a movable structure using a DOB-based robust controller
[2021 ICRA Best Paper Award on Unmannaed Aerial Vehicles]
D. Lee, H. Seo, I. Jang, S. J. Lee, H. J. Kim
IEEE Robotics and Automation Letters **(RA-L)** 6.2 (2021) pp. 723–730. IEEE, 2021.

[J8] Fully actuated autonomous flight of thruster-tilting multirotor
S. J. Lee, **D. Lee**, J. Kim, D. Kim, I. Jang, H. J. Kim
IEEE/ASME Transactions on Mechatronics **(T-MECH)** 26.2 (2021) pp. 765–776. IEEE, 2021.

Conference Proceedings

[C1] Saturated RISE control for considering rotor thrust saturation of fully actuated multirotor
D. Lee, H. J. Kim
2024 International Conference on Unmanned Aircraft Systems **(ICUAS)** *accepted*, 2024.

[C2] Autonomous aerial perching and unperching using omnidirectional tiltrotor and switching controller
D. Lee, S. Hwang, J. Byun, S. J. Lee, H. J. Kim
2024 International Conference on Robotics and Automation **(ICRA)** *accepted*, 2024.

[C3] Safety-Critical Control under Multiple State and Input Constraints and Application to Fixed-Wing UAV
D. D. Oh*, **D. Lee***, H. J. Kim
2023 IEEE Conference on Decision and Control **(CDC)**, 2023.

[C4] Minimally actuated tiltrotor for perching and normal force exertion
D. Lee, S. Hwang, C. Kim, S. J. Lee, H. J. Kim
2023 IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2023.

[C5] Globally Defined Dynamic Modelling and Geometric Tracking Controller Design for Aerial Manipulator
B. Kim, **D. Lee**, J. Byun, H. J. Kim
2023 IEEE International Conference on Robotics and Automation **(ICRA)**, 2023.

[C6] Stability and robustness analysis of plug-pulling using an aerial manipulator
J. Byun, **D. Lee**, H. Seo, I. Jang, J. Choi, H. J. Kim
2021 IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2021.

[C7] Real-time motion planning of a hydraulic excavator using trajectory optimization and model predictive control
D. Lee*, I. Jang*, J. Byun, H. Seo, H. J. Kim
2021 IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2021.

[C8] Robust and Recursively Feasible Real-Time Trajectory Planning in Unknown Environments
I. Jang, **D. Lee**, S. Lee, H. J. Kim
2021 IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2021.

[C9] Aerial manipulation using model predictive control for opening a hinged door
D. Lee, H. Seo, D. Kim, H. J. Kim
2020 IEEE International Conference on Robotics and Automation **(ICRA)**, 2020.

[C10] Trajectory planning with safety guaranty for a multirotor based on the forward and backward reachability analysis
H. Seo, C. Y. Son, **D. Lee**, H. J. Kim
2020 IEEE International Conference on Robotics and Automation **(ICRA)**, 2020.

[C11] Cargo transportation strategy using T 3-Multirotor UAV
S. J. Lee, **D. Lee**, H. J. Kim
2019 International Conference on Robotics and Automation **(ICRA)**, 2019.

Manuscripts under review / in preparation

[M1] Aerial physical interaction with robust stability guarantee against sudden collision and contact-loss
D. Lee, J. Byun, H. J. Kim
submitted to IEEE Transactions on Robotics (T-RO).

[M2] Robust Omnidirectional Aerial Manipulation with Enlarged Workspace
D. Lee*, B. Kim*, H. J. Kim
submitted to IEEE Transactions on Robotics (T-RO).

Academic Services

- Journal reviewer for IEEE RAL *2021–2024*
- Journal reviewer for IEEE/ASME TMECH *2021, 2023*
- Journal reviewer for IEEE TASE *2021, 2023–2024*
- Journal reviewer for IEEE TAC *2024*
- Journal reviewer for IEEE LCSS *2022*
- Journal reviewer for IEEE ACCESS *2020*
- Journal reviewer for Springer IJCAS *2019, 2021-2024*
- Conference reviewer for IEEE ICRA *2020–2023*
- Conference reviewer for IEEE IROS *2023*

Reference

Prof. H. Jin Kim, Seoul National University, hjinkim@snu.ac.kr