

Jayden Dongwoo Lee

POSTDOCTORAL RESEARCHER, AITA INNOCORE · KAIST

Department of Aerospace Engineering, KAIST, Daejeon, Republic of Korea

☎ +82-10-3153-3527 | ✉ cin6474@kaist.ac.kr | 🌐 www.lee-jd.com | in dongwoo-lee-889864246 | 🆔 0000-0002-6204-0644

"Toward reliable and resilient autonomy for aerospace systems — bridging model-based control, data-driven methods, and defense-grade navigation."

Summary

A data-driven GNC (Guidance, Navigation, and Control) researcher whose work spans the full life cycle of unmanned aerospace systems, from *fault-tolerant control of eVTOL/multirotor platforms* to *quantum-magnetometer-based navigation for GNSS-denied and defense applications*. Ph.D. dissertation awarded the **KAIST College of Engineering Best Dissertation Award** (Feb. 2026) — the highest recognition given to doctoral research across the entire KAIST College of Engineering. Currently a postdoctoral researcher in the AITA InnoCORE program at KAIST, where AI-empowered aerospace research is led by Prof. Hyochoong Bang. The research portfolio integrates (i) rigorous model-based control (Lyapunov, SMC, MPC, MRAC), (ii) modern data-driven methods (Gaussian Process, Koopman operator, SINDy, deep/reinforcement learning), and (iii) hardware-in-the-loop and flight-test validation — a combination that directly answers the demand for *advanced mechanical engineering research and education in aerospace and defense*.

Highlights

- **Highest academic distinction.** Awarded the **KAIST College of Engineering Best Dissertation Award (2026)** — the highest doctoral research recognition across all engineering departments at KAIST — for the Ph.D. thesis *"Data-Driven Fault Diagnosis and Fault-Tolerant Control for Redundancy of eVTOL Systems."*
- **Recognized research with national-impact applications.**
 - Invited oral presentation at *ION 2026 Pacific PNT* on Federated EKF integrating Terrain-Referenced and Quantum-Magnetometer-Aided Navigation for **GNSS-denied / jamming-resilient** operation.
 - Best Paper Award at **Korea Institute of Military Science and Technology (KIMST, 2025)** for MPC/NDO-based terrain-following guidance of tilt-rotor UAVs.
 - Research outcomes directly applicable to Korean aerospace and defense R&D roadmaps — including loitering-munition guidance, missile time-delay control, and UWB/INS-integrated UAV localization.
- **AI ↔ classical control hybrid expertise — full coverage of modern aerospace GNC research.**
 - *AI / data-driven:* Koopman operator, SINDy, Gaussian Process regression, reinforcement learning (DDQN, SAC/TD3), fuzzy gain scheduling.
 - *Model-based:* Nonlinear disturbance observer (NDO), Sliding mode control (SMC), Model predictive control (MPC), Model reference adaptive control (MRAC), Feedback linearization, Lyapunov-based FTC.
 - *Estimation & navigation:* Extended / Federated Kalman Filter, Factor graph optimization, Tolles-Lawson compensation, Terrain-aided navigation, Quantum-magnetometer-aided navigation.
- **Field-deployable hardware & system integration capability.** Custom flight control computer (FCC) PCB design (OrCAD), PX4 / ArduPilot full stack, HILS / PILS verification, sensor integration with VectorNav VN-200, ZED-F9P RTK-GPS, OPM (Optically Pumped Magnetometer), Red Pitaya DSP, and LattePanda embedded computing — with demonstrated technology transfer to industry partners.

Field of Interest

RESEARCH INTERESTS COVER — BUT ARE NOT CONFINED TO — THE FOLLOWING:

- **AI-based flight control & guidance** — reinforcement learning, deep learning, and Koopman/SINDy-based control for autonomous aerospace systems
- **GPS-denied navigation for aerospace applications** — quantum-magnetometer-aided MagNav, terrain-aided navigation, and federated EKF for jamming-resilient operation
- **Fault-tolerant flight control for eVTOL & UAM** — actuator/sensor fault detection, accommodation, and airworthiness-oriented redundancy management
- **Defense unmanned systems** — missile guidance, loitering-munition guidance, terrain-following flight, swarm UAV operation
- **Integrated GNC platforms** — HILS/PILS, custom FCC design, full-scale flight test instrumentation for technology transfer to industry/defense

Education

Korea Advanced Institute of Science and Technology (KAIST)

Daejeon, Republic of Korea

PH.D. IN AEROSPACE ENGINEERING

Sep. 2021 – Aug. 2025

- Dissertation: *"Data-Driven Fault Diagnosis and Fault-Tolerant Control for Redundancy of eVTOL Systems"*
- **Awarded KAIST College of Engineering Best Dissertation Award (CoE PhD Best Dissertation Award, Feb. 2026)**
- Advisor: Prof. Hyochoong Bang, Flight Dynamics, Guidance and Control Laboratory
- GPA: 3.88 / 4.3

Korea Advanced Institute of Science and Technology (KAIST)

Daejeon, Republic of Korea

M.S. IN AEROSPACE ENGINEERING

Sep. 2019 – Aug. 2021

- Thesis: “Model Reference Adaptive Control Design for Quadrotor UAV Transporting Unknown Payloads”
- Advisor: Prof. Hyochoong Bang
- GPA: 3.91 / 4.3

Ulsan National Institute of Science and Technology (UNIST)

Ulsan, Republic of Korea

B.S. IN MECHANICAL AND AEROSPACE ENGINEERING (CUM LAUDE)

Mar. 2015 – Aug. 2019

- Thesis: “Design of Hybrid Propulsion Multirotor System”
- Advisor: Prof. Hungsun Son
- GPA: 3.62 / 4.3, graduated Cum Laude

Professional Experience

AITA InnoCORE Program, Department of Aerospace Engineering, KAIST

Daejeon, Republic of Korea

POSTDOCTORAL RESEARCHER

Sep. 2025 – Present

- Advised by Prof. Hyochoong Bang. AITA InnoCORE is an inter-university flagship program for AI-empowered aerospace technology education and research.
- Lead researcher on AI-based fault-tolerant control (FTC) and quantum-magnetometer-aided navigation (MagNav) for eVTOL and unmanned aerial systems.
- Mentor graduate and undergraduate students on disturbance-observer design, data-driven system identification, and drone-based aeromagnetic survey experiments.
- Coordinate flight-test campaigns integrating VN-200 INS, ZED-F9P dual-antenna RTK-GPS, and magnetometer payloads for GNSS-denied navigation research.

AI Research Center, Hanyoung Nux Co., Ltd.

Republic of Korea

AI RESEARCH ENGINEER (CONCURRENT WITH GRADUATE STUDIES)

Apr. 2021 – Feb. 2024

- Designed industrial temperature-controller algorithms combining classical PID tuning with data-driven (machine-learning) adaptation.
- Delivered productized control modules for Hanyoung Nux's instrument line.
- Gained multi-year, real-industrial experience in closed-loop control deployment — a complement to purely academic training.

Research Output Summary

Detailed lists of all journal papers, conference papers, patents, and funded research projects are provided in the accompanying document “Research Accomplishments (Jayden Dongwoo Lee).” This section summarizes the headline numbers.

PEER-REVIEWED JOURNAL PAPERS (SCIE)

- **8** first-author SCIE journal papers published (+ **2** under review)
- **11** co-author SCIE journal papers published (+ **6** under review)
- Published in *Aerospace Science and Technology*, *Control Engineering Practice*, *Acta Astronautica*, *Journal of Intelligent & Robotic Systems*, *International Journal of Control, Automation and Systems (IJCAS)*, *International Journal of Aeronautical and Space Sciences (IJASS)*, *IEEE Sensors Journal*, *Advanced Science*, *Composites Part B: Engineering*, and others.

INTERNATIONAL CONFERENCE PAPERS

- **23** international conference papers (AIAA SciTech, EUCASS, IAC, ICCAS, ICUAS, APISAT, ICAS, EuroGNC, RiTA, ICEFA, and others).
- **1 Best Paper Award** at a major international conference: *23rd ICCAS* (Yeosu, 2023).

DOMESTIC JOURNAL PAPERS & PATENTS

- **6** KCI-indexed domestic journal papers (KSAS, ICROS) (+ **1** under review).
- **5** filed patents on UAV flight control, Koopman-operator-based fault diagnosis, and redundant FCC architectures.

FUNDED RESEARCH PROJECTS

- Participated as *key researcher* / *core researcher* in **11** funded research projects.
- Funding agencies: **Agency for Defense Development (ADD)**, **National Research Foundation of Korea (NRF)**, **Defense Technology Security Research Center**, **Ministry of SMEs and Startups**, **Korea Coast Guard**, AITA InnoCORE program, Hyundai-NGV, Telepix, Airbility.
- See accompanying *Research Accomplishments* document for per-project roles and durations.

Teaching & Mentoring

Department of Aerospace Engineering, KAIST

Daejeon, Republic of Korea

TEACHING ASSISTANT — AWARDED **KAIST EXCELLENT TA AWARD (2024)**

2021 – 2025

- *AE30000 Flight Dynamics Project* — undergraduate; aircraft design and flight test, fundamentals of aerodynamics.
- *AE350 Aerospace Control Engineering* — undergraduate; UAV control and PID controller design.
- *AE552 Advanced Linear Stability and Control* — graduate; nonlinear control, guidance laws, AI-based GNC.
- *AE40005 Spacecraft Systems* — undergraduate; satellite systems and attitude control.
- Recognized with the **KAIST Excellent Teaching Assistant Award (Sep. 2024)** for outstanding student mentorship and pedagogical contribution.

KAIST Department of Aerospace Engineering / Hanwha Aerospace

Daejeon, Republic of Korea

GRADUATE MENTOR — HANWHA-KAIST SPACE PEBBLE PROGRAM (1ST–4TH COHORT)

2022 – 2025

- Served as graduate mentor for the *Hanwha-KAIST Space Pebble* program — a highly competitive K-12 space-science talent-development program organized by KAIST Department of Aerospace Engineering and sponsored by Hanwha Aerospace.
- Mentored middle-school students through hands-on aerospace mission projects, guiding them from open-ended ideation through engineering analysis to final presentation.
- Continuous involvement across all four cohorts (2022–2025) demonstrates sustained commitment to public engagement and science outreach beyond the conventional university classroom.

Center for Research Officers for National Defense, Republic of Korea

Republic of Korea

RESEARCH MENTOR — MILITECH CHALLENGE (2ND–5TH EDITION)

2021 – 2024

- Served as a research mentor in the *MiliTech Challenge*, a national defense R&D mentoring program for cadets of the Korean Science & Technology Reserve Officer corps — future officers responsible for defense R&D at the Agency for Defense Development.
- Guided cadet teams on aerospace and defense research topics including reinforcement-learning-based UAV dogfighting, deep-learning target recognition for surveillance and reconnaissance, and aerodynamic design of small loitering munitions.
- **Mentee achievements:** mentored team won the **Grand Prize (Minister of National Defense Award) at the 3rd MiliTech Challenge (2024)**, and a separate mentored team received the **Encouragement Prize at the 2024 Korea Air Force Academy Future Aerospace Conference** (sponsored by Hanwha Aerospace).

Honors & Awards

DISSERTATION & TOP ACADEMIC HONORS

2026 **Best Dissertation Award (CoE PhD Best Dissertation Award), KAIST College of Engineering**

Daejeon, Republic of Korea

2024 **Grand Paper Award**, Institute of Control, Robotics and Systems (ICROS)

Republic of Korea

ENTREPRENEURSHIP & INNOVATION AWARDS

2024 **1st Prize (Grand Prize)**, 2024 Defense-Technology-Based Startup Competition, Defense Acquisition Program Administration (DAPA)

Republic of Korea

2024 **Excellence Prize (4th place, Minister's Award of Science and ICT)**, 2024 Challenge! K-Startup Grand Finale, Ministry of SMEs and Startups

Republic of Korea

BEST PAPER AWARDS

2025 **Best Paper Award**, Korea Institute of Military Science and Technology (KIMST)

Republic of Korea

2025 **Best Paper Award**, Society for Aerospace System Engineering (SASE)

Republic of Korea

2024 **Best Paper Award**, Institute of Control, Robotics and Systems (ICROS)

Republic of Korea

2024 **Best Paper Award**, Society for Aerospace System Engineering (SASE)

Republic of Korea

2024 **Best Paper Award**, Society for Aerospace System Engineering (SASE)

Republic of Korea

2024 **Best Paper Award**, Korean Society for Aeronautical and Space Sciences (KSAS)

Republic of Korea

2023 **Best Paper Award**, 23rd International Conference on Control, Automation and Systems (ICCAS)

Yeosu, Republic of Korea

2020 **Best Paper Award**, Society for Aerospace System Engineering (SASE)

Republic of Korea

SCHOLARSHIPS & ACADEMIC DISTINCTIONS

2025 **Paan Foundation Academic Scholarship**, Paan Foundation

Republic of Korea

2025 **Cho Jung-hoon Scholarship**, KAIST

Daejeon, Republic of Korea

2025 **Moral Character Scholarship**, KAIST

Daejeon, Republic of Korea

2024 **Excellent Teaching Assistant Award**, KAIST

Daejeon, Republic of Korea

2019 **Cum Laude (Graduated with Honors)**, Ulsan National Institute of Science and Technology (UNIST)

Ulsan, Republic of Korea

Technical Skills

PROGRAMMING & SIMULATION

- **Languages:** C / C++, Python, MATLAB, Simulink
- **ML / control frameworks:** PyTorch, TensorFlow, scikit-learn, CVXPY, CasADi, GPyTorch, PySINDy
- **Simulation:** Gazebo, AirSim, Simulink Aerospace Blockset, X-Plane

FLIGHT / EMBEDDED PLATFORMS

- **Autopilot stacks:** PX4, ArduPilot (Copter / Plane / VTOL)
- **Embedded / companion computing:** LattePanda, NVIDIA Jetson, Raspberry Pi, STM32, Red Pitaya (FPGA-DSP)
- **Flight control computer (FCC):** Hardware design (OrCAD), HILS / PILS verification

NAVIGATION & SENSOR HARDWARE

- **INS / GNSS:** VectorNav VN-200, u-blox ZED-F9P dual-antenna RTK, CUAUV C-RTK 2HP, DJI D-RTK 3
- **Design tools:** CATIA, SolidWorks, OrCAD (PCB)

References

The following distinguished scholars have agreed to serve as references and may be contacted for further assessment.

Department of Aerospace Engineering, KAIST

Daejeon, Republic of Korea

PROF. HYOCHOONG BANG

(PH.D. & M.S. ADVISOR)

- Email: hcbang@kaist.ac.kr
- Expertise: Flight dynamics, guidance, navigation, and control; spacecraft attitude control; UAV systems.
- Relationship: Doctoral and M.S. thesis advisor; current AITA InnoCORE postdoctoral supervisor.

Department of Aerospace Engineering, Chungnam National University (CNU)

Daejeon, Republic of Korea

PROF. SEUNG-KEUN KIM

- Email: skim78@cnu.ac.kr
- Expertise: Autonomous flight, UAV guidance and control, defense-funded unmanned systems research.
- Relationship: Professional collaborator in the Korean UAV / autonomous-flight research community.

Department of Intelligent Robotics, College of Electrical and Computer Engineering, Chungbuk National University (CBNU)

Cheongju, Republic of Korea

PROF. SUNGTAE MOON

- Email: stmoon@cbnu.ac.kr
- Expertise: Swarm drone operation systems, multi-UAV coordination, defense-applicable unmanned aerial vehicle technology.
- Relationship: Research collaborator in the Unmanned Mobility Vehicle (UMV) R&D program — joint researcher on swarm-drone / defense UAV operation studies.