Jihoon Lee

Staff ML Engineer building production ML, LLM systems, and AI agents for semiconductor engineering, with a Ph.D. in aerospace flight control

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SUMMARY

I build production ML, LLM systems, and AI agents for semiconductor engineering at Samsung Electronics. Before that, my Ph.D. in aerospace engineering focused on flight control, guidance, and optimization for UAVs. The common thread is reliable decisions for complex physical systems under uncertainty.

EXPERIENCE

Memory MTC AX/PI Team, Samsung Electronics Mar 2023 – Present

Staff Engineer — Production AI & ML Systems

- Own end-to-end delivery of production ML systems for advanced memory semiconductor engineering — from problem scoping with engineers through modeling, validation, release, and post-release monitoring.
- Work embedded with process and equipment engineering teams across technology development and mass production as a forward-deployed AI/ML partner, turning ambiguous engineering questions into deployable model-based tools and iterating on user feedback.
- Build predictive and optimization models that hold up under real manufacturing conditions — tool-to-tool variation, drift, measurement noise, and scarce experimental data.
- Serve self-hosted LLMs on in-house GPU supercomputing infrastructure, keeping engineering data inside controlled environments, and contribute to the team's agent-based AI for process development — LLM agents for engineering knowledge retrieval and multi-step investigations (RAG, tool calling, Model Context Protocol, multi-agent orchestration with long-term memory), traced and evaluated in production.
- Establish evaluation practice for engineering ML — held-out test sets, cross-condition comparisons, worst-case analysis, and SHAP-based interpretability — and communicate model behavior and limits to engineers through validation reports.
- Integrate heterogeneous manufacturing data into reusable, quality-checked ML-ready datasets, and build and operate production Python pipelines (SQL/NoSQL, Apache Airflow, HPC/GPU training, MLflow).

Flight Dynamics and Control Lab, Seoul National University Sep 2014 – Feb 2023

Graduate Student Researcher — Aerospace GNC & Autonomous Systems

- Conducted doctoral research in guidance, navigation, and control for UAVs and aerospace systems, with emphasis on morphing-aircraft modeling, nonlinear and LPV control, and optimization.
- Developed and validated algorithms for autonomous carrier landing, lunar-orbiter attitude control, target tracking, and indoor search-and-rescue path planning.
- Applied MATLAB/Simulink, Python, C/C++, numerical optimization, machine learning, and high-fidelity simulation to research prototypes and source-code deliverables.
- Contributed to funded research programs with government and industry partners, including ADD, MOTIE, KFI, and LIG Nex1; results were disseminated through journal and conference publications.

EDUCATION

Seoul National University Sep 2014 – Feb 2023

Ph.D., Aerospace Engineering (MS-PhD Integrated Course) — Department of Mechanical and Aerospace Engineering, College of Engineering. Flight Dynamics and Control Lab (Advisor: Prof. Youdan Kim). Dissertation: "Self-Scheduled Parameter-Varying Control of Asymmetric Variable-Span Morphing Unmanned Aerial Vehicle"

Yonsei University Feb 2010 – Aug 2014

B.S., Mechanical Engineering (Advisor: Prof. Woongsup Yoon) — Thesis: "Modeling and PIDE Control Simulation of a Quadrotor" (Advisor: Prof. Jongsoo Lee)

Yonsei University Mar 2013 – Aug 2014
B.S., Astronomy (Double Major Program)

SKILLS

LLM Systems & Agents	Self-Hosted LLM Serving (vLLM) on GPU Supercomputing, LLM Gateway & Routing (LiteLLM), Multi-Agent Orchestration & Agent Memory, Retrieval-Augmented Generation, Tool Calling / Model Context Protocol (MCP), LLM Tracing & Evaluation (Langfuse), Human-in-the-Loop Decision Support, AI Coding Agents (Claude Code, OpenCode)
Production ML & MLOps	PyTorch, scikit-learn, Predictive Modeling & Uncertainty Quantification, Model Validation, Drift & Monitoring, Training → Release → Retraining Pipelines, MLflow, Docker, HPC / GPU Clusters, TensorFlow
Data Engineering	PostgreSQL / MySQL, ClickHouse, MongoDB / Neo4j, Apache Airflow, Feature Engineering, Data Integration & Cleansing
Programming	Python, SQL, C / C++, MATLAB / Simulink, TypeScript / JavaScript, Linux / Shell
Domains	Semiconductor Manufacturing (Memory), Machine Learning, Control, Optimization, Modeling & Simulation, Motion Planning, Filtering, Statistical Modeling & Time-Series Analysis
Web & Product Engineering	React / Next.js, React Native (Expo), Node.js, Supabase / PostgreSQL, Playwright / Vitest
Languages	English (Advanced), Korean (Native)
Methods	Guidance, Navigation & Control (GNC), Sliding Mode Control, LPV / Gain-Scheduling Control, Nonlinear Dynamic Inversion, Model Predictive Control, Reinforcement Learning, Neural Networks / Deep Learning, Gaussian Processes, Mixed-Integer Linear Programming, Path Planning, Sensor Fusion & Target Tracking, Control Allocation, Adaptive Dynamic Programming, Disturbance & Extended State Observers

AWARDS

Grand Prize (Transport Minister's Award) — 3rd Aviation-Specialized University Conference, Mayfield Hotel, Seoul, Republic of Korea (Feb 2016) — for "Risk Evaluation Scheme in Automatic Aircraft Carrier Landing Using Artificial Neural Network"

RESEARCH PROJECTS

Development of Ground Control and Communication System for VTOL Fixed-Wing Drone Mar 2021 – Feb 2022
Agency for Defense Development (ADD)

Development of Location System for Firefighters Based on Wireless Communication Jan 2021 – Dec 2022
Korea Fire Institute (KFI)

Development of Target Tracking Algorithms Jan 2020 – Aug 2020
LIG Nex1 Company Ltd.

Development of an SMPC Flap Module for Morphing Wings Jun 2016 – Dec 2020
Ministry of Trade, Industry and Energy

Development of Guidance, Navigation, and Control Algorithms and Corresponding Source Code for Experimental Lunar Orbiter Sep 2014 – Jun 2017
Ministry of Science, ICT and Future Planning

Guidance/Control Study for Take-off and Landing on a Ship Nov 2014 – Dec 2015
Agency for Defense Development (ADD)

PUBLICATIONS

43 publications (8 journal articles, 34 conference papers, Ph.D. dissertation); 239 citations, h-index 9 (Google Scholar, Nov. 2026).

International Journal Articles (7)

1. Hanna Lee, Seong-hun Kim, **Jihoon Lee**, Youdan Kim, "**Control Design Using Policy-Gradient-Based Integral Reinforcement Learning and Extended State Observer for Morphing Aircraft**," *IEEE Transactions on Aerospace and Electronic Systems, Vol. 60, No. 5, pp. 6447-6460, 2024*. doi:10.1109/TAES.2024.3403543 [12 citations]
2. **Jihoon Lee**, Heein Park, Youdan Kim, Chan Gook Park, Jae Hong Lee, "**Multi-level indoor path planning and clearance-based path optimization for search and rescue operations**," *IEEE Access, Vol. 11, pp. 40930-40943, 2023*. doi:10.1109/ACCESS.2023.3269981 [19 citations]
3. **Jihoon Lee**, Seong-hun Kim, Hanna Lee, Youdan Kim, "**Self-scheduled LPV control of asymmetric variable-span morphing UAV**," *Sensors, Vol. 23, No. 6, 3075, 2023*. doi:10.3390/s23063075 [9 citations]
4. Sangmin Lee, Hyeonggwan Kang, **Jihoon Lee**, Youdan Kim, "**Optimal policy of pitch-hold phase for mine detection of UAV based on mixed-integer linear programming**," *International Journal of Aeronautical and Space Sciences, Vol. 23, pp. 746-754, 2022*. doi:10.1007/s42405-022-00454-7 [6 citations]
5. **Jihoon Lee**, Suwon Lee, Youngjun Lee, Youdan Kim, Yongjun Heo, Taedong Yoon, "**Performance verification of a target tracking system with a laser rangefinder**," *IEEE Access, Vol. 9, pp. 30993-31009, 2021*. doi:10.1109/ACCESS.2021.3060061 [9 citations]
6. **Jihoon Lee**, Youdan Kim, "**Neural network-based nonlinear dynamic inversion control of variable-span morphing aircraft**," *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering, Vol. 234, No. 10, pp. 1624-1637, 2020*. doi:10.1177/0954410019846713 [30 citations]
7. Seokwon Lee, **Jihoon Lee**, Somang Lee, Hyunjin Choi, Youdan Kim, Seungkeun Kim, Jinyoung Suk, "**Sliding mode guidance and control for UAV carrier landing**," *IEEE Transactions on Aerospace and Electronic Systems, Vol. 55, No. 2, pp. 951-966, 2019*. doi:10.1109/TAES.2018.2867259 [87 citations]

Domestic Journal Articles (1)

1. **Jihoon Lee**, Suwon Lee, Euichan Yoon, "**Gain Scheduling Using Deep Neural Network for Morphing Aircraft**," (in Korean) *Journal of the Korean Society for Aeronautical & Space Sciences, Vol. 52, No. 4, pp. 297-306, 2024*. doi:10.5139/jksas.2024.52.4.297

International Conference Papers (14)

1. Hyeonggwan Kang, Sangmin Lee, **Jihoon Lee**, Youdan Kim, Jinyoung Suk, Seungkeun Kim, "**Altitude tracking of UAV with pitch-hold constraint based on model predictive control for mine detection**," *21st International Conference on Control, Automation and Systems (ICCAS), Jeju, Korea, Oct. 2021*. doi:10.23919/ICCAS52745.2021.9649884 [8 citations]
2. **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Hanna Lee, Youdan Kim, "**Aircraft Autopilot Design Using Asymmetric Variable-Span Wing Morphing**," *32nd Congress of the International Council of the Aeronautical Sciences (ICAS), Shanghai, China, Sep. 2021*. [1 citations]
3. Sangmin Lee, Hyeonggwan Kang, **Jihoon Lee**, Youdan Kim, "**Optimal Policy of Pitch-Hold Phase for Mine Detection of UAV based on Mixed-Integer Linear Programming**," *12th Asia-Pacific International Symposium on Aerospace Technology (APISAT), Jeju, Korea, Nov. 2021*.
4. Seungyun Jung, **Jihoon Lee**, Seong-hun Kim, Hanna Lee, Youdan Kim, "**Disturbance observer-based pitch autopilot for morphing UAV during transition phase**," *AIAA SciTech 2020 Forum, Orlando, FL, USA, Jan. 2020*. doi:10.2514/6.2020-1087 [5 citations]
5. **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Hanna Lee, Youdan Kim, "**Linear parameter-varying control of variable span-sweep morphing aircraft**," *AIAA SciTech 2019 Forum, San Diego, CA, USA, Jan. 2019*. doi:10.2514/6.2019-0106 [30 citations]
6. Seong-hun Kim, **Jihoon Lee**, Seungyun Jung, Hanna Lee, Youdan Kim, "**Deep neural network-based feedback control for dynamic soaring of unpowered aircraft**," *21st IFAC Symposium on Automatic Control in Aerospace (ACA), Cranfield, UK, Aug. 2019*. doi:10.1016/j.ifacol.2019.11.079 [12 citations]
7. Hanna Lee, **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Youdan Kim, "**Adaptive control allocation-based control design for non-affine morphing aircraft system**," *8th European Conference for Aeronautics and Space Sciences (EUCASS), Madrid, Spain, Jul. 2019*. doi:10.13009/EUCASS2019-163 [2 citations]
8. **Jihoon Lee**, Seungyun Jung, Seong-hun Kim, Hanna Lee, Youdan Kim, "**Flight control of asymmetric variable-span morphing aircraft using nonlinear dynamic inversion**," *11th Asia-Pacific International Symposium on Aerospace Technology (APISAT), Gold Coast, Australia, Dec. 2019*.

9. **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Hanna Lee, Youdan Kim, "**Sliding mode control design for a multidimensional morphing UAV**," *16th European Control Conference (ECC), Limassol, Cyprus, Jun. 2018*. doi:10.23919/ECC.2018.8550259 [9 citations]
10. Hanna Lee, **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Youdan Kim, "**Control Design for Morphing Aircraft Based on Frequency-Apportioned Control Allocation**," *10th Asia-Pacific International Symposium on Aerospace Technology (APISAT), Chengdu, China, Oct. 2018*.
11. **Jihoon Lee**, Youdan Kim, "**Quasi-LPV Modeling and Parameter-dependent Optimal Control of Morphing Wing Aircraft**," *31st Congress of the International Council of the Aeronautical Sciences (ICAS), Belo Horizonte, Brazil, Sep. 2018*.
12. **Jihoon Lee**, Youdan Kim, "**Neural network-based nonlinear dynamic inversion control of variable-span morphing aircraft**," *7th European Conference for Aeronautics and Space Sciences (EUCASS), Milan, Italy, Jul. 2017*. doi:10.13009/eucass2017-195
13. **Jihoon Lee**, Seokwon Lee, Somang Lee, Youdan Kim, Jungha Park, Seungkeun Kim, Jinyoung Suk, "**Stochastic Risk Evaluation Scheme for Wave-off Decision Making in Automatic Aircraft Carrier Landing**," *7th Asia-Pacific International Symposium on Aerospace Technology (APISAT), Cairns, Australia, Nov. 2015*.
14. Somang Lee, **Jihoon Lee**, Seokwon Lee, Youdan Kim, Jinyoung Suk, Seungkeun Kim, "**A Study on Autonomous UAV Take-off and Landing on a Carrier**," *7th Asia-Pacific International Symposium on Aerospace Technology (APISAT), Cairns, Australia, Nov. 2015*.

Domestic Conference Papers (20)

1. Heein Park, **Jihoon Lee**, Youdan Kim, Chan Gook Park, Jae Hong Lee, "**Development of an Indoor Path Planning System for Search and Rescue Operations of the Firefighters**," (in Korean) *2021 IPNT Conference (IPNT 2021), Gangneung, Korea, Nov. 2021*.
2. **Jihoon Lee**, Hyeonggwan Kang, Sangmin Lee, Youdan Kim, Jinyoung Suk, Seungkeun Kim, "**Control Surface Modeling and Control Authority Analysis for Longitudinal Motion of Control-Configured Vehicle**," (in Korean) *2021 KSAS Fall Conference (KSAS 2021F), Jeju, Korea, Nov. 2021*.
3. **Jihoon Lee**, Suwon Lee, Youngjun Lee, Youdan Kim, Young-jun Heo, Tae-dong Yoon, "**Maneuvering Target Tracking with Anomalous Measurement Errors of Laser Range Finder**," (in Korean) *2020 KSAS Spring Conference (KSAS 2020S), Goseong, Korea, Jul. 2020*.
4. **Jihoon Lee**, Seungyun Jung, Seong-hun Kim, Hanna Lee, Youdan Kim, "**Modeling and Simulation of Asymmetric Variable-Span Morphing Aircraft**," (in Korean) *2019 KSAS Fall Conference (KSAS 2019F), Jeju, Korea, Nov. 2019*.
5. Hanna Lee, Seong-hun Kim, **Jihoon Lee**, Seungyun Jung, Youdan Kim, "**Partially Model-Free Control Design for Morphing Aircraft using Adaptive Dynamic Programming**," (in Korean) *2019 KSAS Fall Conference (KSAS 2019F), Jeju, Korea, Nov. 2019*.
6. Hanna Lee, Seong-hun Kim, **Jihoon Lee**, Youdan Kim, "**Morphing Aircraft Inverse Dynamics Learning and Control Based on Gaussian Processes**," (in Korean) *2019 KSAS Spring Conference (KSAS 2019S), Buan, Korea, Apr. 2019*.
7. **Jihoon Lee**, Seungyun Jung, Seong-hun Kim, Hanna Lee, Youdan Kim, Jaesung Bae, "**Hierarchical Flight Control System for Morphing Aircraft**," (in Korean) *2018 SASE Fall Conference (SASE 2018F), Gyeongju, Korea, Nov. 2018*.
8. Hanna Lee, **Jihoon Lee**, Yongjun Seo, Youdan Kim, "**Robust Closed-loop Control Allocation for Morphing Aircraft**," (in Korean) *2018 KSAS Fall Conference (KSAS 2018F), Jeju, Korea, Nov. 2018*.
9. **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Hanna Lee, Youdan Kim, "**Performance Map of Morphing Aircraft for Hierarchical Control**," (in Korean) *2018 KSAS Fall Conference (KSAS 2018F), Jeju, Korea, Nov. 2018*.
10. Hanna Lee, **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Youdan Kim, "**Control Design of Variable Span-Sweep Morphing Wing UAV Using Control Allocation**," (in Korean) *2018 KSAS Spring Conference (KSAS 2018S), Goseong, Korea, Apr. 2018*.
11. **Jihoon Lee**, Seungyun Jung, Seong-hun Kim, Hanna Lee, Youdan Kim, "**Quasi-Linear Parameter-Varying Modeling of Variable-Span Morphing Aircraft Longitudinal Motion**," (in Korean) *2017 KSAS Fall Conference (KSAS 2017F), Jeju, Korea, Nov. 2017*.

12. **Jihoon Lee**, Seong-hun Kim, Seungyun Jung, Jaesung Bae, Seungkeun Kim, Youdan Kim, "**Flight Control of a Variable Span Morphing Wing UAV**," (in Korean) *2017 KSAS Spring Conference (KSAS 2017S), Samcheok, Korea, Apr. 2017*.
13. Seungyun Jung, Seong-hun Kim, **Jihoon Lee**, Jaesung Bae, Seungkeun Kim, Youdan Kim, "**Flight Control of a Variable Span Morphing Aircraft during Transition Phase**," (in Korean) *2017 KSAS Spring Conference (KSAS 2017S), Samcheok, Korea, Apr. 2017*.
14. Byunghoon Kim, Suwon Lee, Jaeho Lee, Somang Lee, **Jihoon Lee**, Namhoon Cho, Youdan Kim, Gwanghyeok Ju, "**Conceptual Study of an AOCS Simulator and Three Dimensional Visualization Environment for Lunar Orbiter**," (in Korean) *2017 KSAS Spring Conference (KSAS 2017S), Samcheok, Korea, Apr. 2017*.
15. Suwon Lee, **Jihoon Lee**, Byunghoon Kim, Youdan Kim, Gwanghyeok Ju, "**Grid Modeling of Solar Radiation Pressure and Effect on Earth-Lunar Transfer Trajectory**," (in Korean) *2017 KSAS Spring Conference (KSAS 2017S), Samcheok, Korea, Apr. 2017*.
16. Seong-hun Kim, **Jihoon Lee**, Seungyun Jung, Youdan Kim, "**Spectral Analysis of Model Reference Adaptive Control System**," (in Korean) *2017 KSAS Fall Conference (KSAS 2017F), Jeju, Korea, Nov. 2017*.
17. **Jihoon Lee**, Suwon Lee, Byunghoon Kim, Youdan Kim, Gwanghyeok Ju, "**Spacecraft Attitude Maneuver Control Using Linear Model Following Nonlinear Adaptive Controller**," (in Korean) *2016 KSAS Spring Conference (KSAS 2016S), Goseong, Korea, Apr. 2016*.
18. Byunghoon Kim, Namhoon Cho, Jaeho Lee, Somang Lee, **Jihoon Lee**, Suwon Lee, Youdan Kim, Gwanghyeok Ju, "**A Primary Study on the Control System for Lunar Orbiter Using Autocode Generation**," (in Korean) *2016 KSAS Spring Conference (KSAS 2016S), Goseong, Korea, Apr. 2016*.
19. **Jihoon Lee**, Somang Lee, Seokwon Lee, Donghae Kim, Youdan Kim, "**Risk Evaluation Scheme in Automatic Aircraft Carrier Landing Using Artificial Neural Network**," (in Korean) *3rd Aviation-Specialized University Conference, Seoul, Korea, Feb. 2016*.
20. **Jihoon Lee**, Seokwon Lee, Jungha Park, Youdan Kim, Seungkeun Kim, Jinyoung Suk, "**A Decision Making Technique for UAV Automatic Carrier Landing System**," (in Korean) *2015 KSAS Spring Conference (KSAS 2015S), Jeongseon, Korea, Apr. 2015*.

Ph.D. Dissertation (1)

1. **Jihoon Lee**, "**Self-Scheduled Parameter-Varying Control of Asymmetric Variable-Span Morphing Unmanned Aerial Vehicle**," *Ph.D. Dissertation, Seoul National University (Advisor: Prof. Youdan Kim), 2023*.