Dong Ho Lee

Curriculum Vitae

291 Daehak-ro, Yuseong-gu, Daejeon, Korea
leedh0124.github.io | leedh0124@kaist.ac.kr | | | |

Research Interests

Autonomous Mission Planning and Intelligent Decision-making
- Learning-based route planning and scheduling of multiple agents under dynamic environments

Deep Reinforcement Learning for Optimization Problems
- Efficient learning of heuristics to combinatorial optimization with physical constraints

Mathematical Programming Formulation and Techniques
- Application of optimization priciples and algorithms for *intelligent transportation systems*, *safe planning of multi-agent systems*, and *autonomomous systems*

Education

Korea Advanced Institute of Science & Technology (KAIST) Daejeon, Korea
Master of Science (MS) in Aerospace Engineering (Advisor: Prof. Jae-myung Ahn) *Sep. 2020 – Aug. 2022*
- Thesis: Multiple UAV Routing for Re-planning under Dynamic Environment using Deep Reinforcement Learning
- GPA: 4.11/4.30

Bachelor of Science (BS) in Aerospace Engineering *Sep. 2012 – Feb. 2017*
- GPA: 3.92/4.30, *Magna Cum Laude*
- Class Rank: 56/573, Top 9.8%

Research Experiences

Strategic Aerospace Initiative, KAIST Daejeon, Korea
Research Assistant (Advisor: Prof. Jae-myung Ahn) *Sep. 2020 - Present*

1. **Routing Problems Considering Value System for Exploration Missions**
   - Proposed a data-efficient deep reinforcement learning algorithm to train a Transformer-based policy network for solving routing problems [JR1], [C1-2]
2. **Data-driven Flow Modeling and Analysis**
   - Developed a deep-learning model for efficient prediction of aerodynamic coefficients under extreme flow conditions [JR2], [C3]

Aerospace Technology Research Institute, ADD Daejeon, Korea
First Lieutenant (Research Officer for National Defense[†]) (Mentor: Dr. Woohyuk Chang) *Jun. 2017 – May. 2020*

1. **Autonomous Navigation and Mission Management Technology**
   - Developed mission planning algorithm for UAVs operating in dynamic environment [J1], [C4-5]
   - Formulated UAV planning problem as MILP and solved via Gurobi optimizer
   - Developed a parallel genetic algorithm for fast online planning on GPU
2. **Autonomous Mission Planning System Simulator**
   - Developed an autonomous mission planning program for UAV simulator on Linux [P1]

Unmanned Systems Research Group, KAIST Daejeon, Korea
Undergraduate Research Intern (Advisor: Prof. David Hyun-chul Shim) *Dec. 2015 – Sep. 2016*

1. **Development of Modular Drone with Self-Configuration**
   - Designed and constructed a 3D-printable modular drone that can configure itself before flight
   - Received *Excellent Award* among 53 projects in Undergraduate Research Participation (URP) program

Journal Publications

[J1] **Lee, D. H.**, Jang, H., Kim, S. H., & Chang, W. (2020). Multi-UAV Mission Allocation and Optimization Technique Based on Discrete-Event Modeling and Simulation. *Journal of the Korean Society for Aeronautical & Space Sciences*, 48(2), 159-166.

[†] Rond: Korean research program modeled after Israel's Talpiot program, selecting 20 undergraduates across the country to serve their military duties as research officers at Agency for Defense Development (ADD)

Journals Under Review

[JR1] **Lee, D. H.** & Ahn, J. (2022). Multi-Start Team Orienteering Problem for UAS Mission Re-Planning with Data-Efficient Deep Reinforcement Learning. *Journal of Intelligent & Robotic Systems*.

Conference Proceedings

[C1] **Lee, D. H.**, & Ahn, J. A Deep Reinforcement Learning Approach to solve the Vehicle Routing Problem with Resource Constraints. In *AIAA Scitech Forum 2023*, Maryland, USA. (Session: Autonomy IV, to appear)

[C2] Moon, C. H., **Lee, D. H.**, & Ahn, J. Truck-Drone Delivery Using Heterogeneous Vehicle Routing Problem Based on Deep Reinforcement Learning. In *AIAA Scitech Forum 2023*, Maryland, USA. (Session: Autonomous Mission Management Concepts and Technologies II, to appear)

[C3] **Lee, D. H.**, Lee, D. U., Lee, J., Lee, B. J., & Ahn, J. Prediction of Multiple Aerodynamic Coefficients of Missiles using CNN. In *AIAA Scitech Forum 2022*, San Diego, USA. (Session: Learning, Reasoning, and Data Driven Systems III)

[C4] **Lee, D. H.**, Chang, W., & Byun, J. An Optimization Technique for Discrete Event Model-based UAV Real-Time Heterogeneous Mission Allocation. In 2018 *Proceedings of the Korean Society for Aeronautical and Space Sciences, Fall Conference*, Jeju, Korea.

[C5] **Lee, D. H.**, Chang, W., & Byun, J. Discrete-event Modeling and Simulation of Autonomous Multi-UAV Mission Management. In 2018 *Avionics Systems Symposium Korea (ASSK)*, Yeosu, Korea.

Patents (Registered)

[P1] Chang, W., **Lee, D. H.**, Jang, H., Method and apparatus for optimization of unmanned vehicle mission allocation, KR102063851 (Jan. 2020)

Awards & Honors

- **Excellent Paper Award**, ASSK 2018 *July. 2018*
- **Excellence in Leadership & Volunteer Activity**, KAIST *Mar. 2016*
  - Granted to top 5% students with active participation in the leadership programs.
- **Excellent Award in URP**, KAIST *Aug. 2016*
- **Dean's List**, College of Engineering, KAIST *Feb. 2016*
  - Awarded to top 3% (GPA: 4.22/4.3)

Scholarships

- **National Scholarship for Graduate Study**, KAIST *2020 - 2022*
  - Full support for graduate school tuition and monthly stipends
- **Department Honors Scholarship**, KAIST *Feb. 2016*
  - Dean's list for 2015 Fall
- **The Boeing Company-KAIST Undergraduate Scholarship**, KAIST *2014 - 2016*
  - Merit-based scholarship which offered $1,500 per semester for academic excellence
- **National Scholarship for Science & Engineering**, Korea Student Aid Foundation (KOSAF) *2015 - 2016*
  - Full support for university tuition and $8,700 scholarship as a *ROND* cadet
- **National Scholarship for Undergraduate Study**, KAIST *2012 - 2014*

Teaching

Teaching Assistant @KAIST

- AE201 Introductory Flight Project *Spring 2021*
- HSS024 Advanced English Writing *Spring 2015–Spring 2016*
- HSS025 Advanced English Reading *Spring 2015–Spring 2016*

– LG-KAIST Science Camp *Summer 2015*
– Academic English Camp *Winter 2014; Winter 2015*

Leadership Experiences

Graduate Student Association, Department of AE
Vice President *Feb. 2021 - Feb. 2022*

ROND Cadet Association
President *Aug. 2015 - Mar. 2017*

Undergraduate Student Council, KAIST
Student Representative, Bureau of International Relations *Aug. 2014 - Dec. 2014*

KISA(KAIST International Students Association)**,** KAIST
Head, Bureau of Public Relations *2015*

Extracurricular Activities

KAIST-Saudi Aramco Mentoring Program
Mentor *Feb. 2015 - Dec. 2015*
– Mentor for prospective freshmen from Saudi Arabia and UAE during their preparatory first year

Languages

Fluent in **English** and native in **Korean**
– GRE: 326 (Verbal: 159, Quantitative: 167, Writing: 4.5)
– TOEFL: 115 (Reading: 29, Listening: 29, Speaking: 27, Writing: 30)

Programming Skills

Python {PyTorch, NumPy, Matplotlib}, MATLAB, C/C++, NVIDIA CUDA, LaTeX