# Hang Woon Lee


CONTACT INFORMATION

Assistant Professor
Director, Space Systems Operations Research Laboratory
Department of Mechanical and Aerospace Engineering
Benjamin M. Statler College of Engineering and Mineral Resources
West Virginia University

1306 Evansdale Drive
Morgantown, WV 26506

*Office:* +1 (304) 293-2119
*Email:* hangwoon.lee@mail.wvu.edu
*Website:* https://hangwoonlee.faculty.wvu.edu/


CITIZENSHIP

USA

ACADEMIC APPOINTMENTS

**Assistant Professor of Space Systems** Aug. 2022 – Present
Department of Mechanical and Aerospace Engineering
West Virginia University

EDUCATION

**Georgia Institute of Technology**, Atlanta, GA
Ph.D., Aerospace Engineering, Aug. 2022
Minor in Mathematics
Advisor: Koki Ho

**University of Illinois at Urbana-Champaign**, Urbana, IL
M.S., Aerospace Engineering, Aug. 2018

**Massachusetts Institute of Technology**, Cambridge, MA
S.B., Aerospace Engineering, June 2015

AWARDS

**NASA Early Career Faculty Award**, 2023

**John V. Breakwell Award**, 2020
- Space Flight Mechanics Committee, American Astronautical Society
- Awarded for [C11], presented at the *2020 AAS/AIAA Astrodynamics Specialist Conference*

**Molly K. Macauley Award**, 2020
- American Astronautical Society
- Invited to give an award-winning talk at the *2020 AAS John Glenn Memorial Symposium*

**National Science Foundation Graduate Research Fellowship (NSF GRFP)**, 2018 – 2022
- Completed with Degree

**Graduate College Conference Travel Award**, 2017
- University of Illinois at Urbana-Champaign
- Awarded for [C14], presented at the *9th International Workshop on Satellite Constellations and Formation Flying*

JOURNAL PUBLICATIONS

[J1] **H. Lee** and K. Ho, "Regional Constellation Reconfiguration Problem: Integer Linear Programming Formulation and Lagrangian Heuristic Method," *Journal of Spacecraft and Rockets*, In press.

[J2] **H. Lee**, S. Shimizu, S. Yoshikawa, and K. Ho, "Satellite Pattern Constellation Optimization for Complex Regional Coverage," *Journal of Spacecraft and Rockets*, Vol. 57, No. 6, pp. 1309-1327, 2020. doi:10.2514/1.A34657

[J3] H. Chen, **H. Lee**, and K. Ho, "Space Transportation System and Mission Planning for Regular Interplanetary Missions," *Journal of Spacecraft and Rockets*, Vol. 56, No. 1, pp. 12-20, 2019. doi:10.2514/1.A34168

[J4] **H. Lee**, P. Jakob, K. Ho, S. Shimizu, and S. Yoshikawa, "Optimization of Satellite Constellation Deployment Strategy Considering Uncertain Areas of Interest," *Acta Astronautica*, Vol. 153, pp. 213-228, 2018. doi:10.1016/j.actaastro.2018.03.054

CONFERENCE PAPERS

[C1] S. N. Paul and **H. Lee**, "Hypothesis Surface-Based Sensor Tasking for LEO Objects: Leveraging Space Sensor Data for Ground-Based Optical Observations," *AIAA SciTech*, Orlando, FL, Jan. 2024. (Accepted)

[C2] **D. Williams Rogers**, S. Kim, M. Lee, Y. Kim, and **H. Lee**, "Designing Optimal Satellite Constellation Patterns with Facility Location Problem Models and Mixed Integer Linear Programming," *AIAA ASCEND*, Las Vegas, NV, Oct. 2023.

[C3] **T. H. Clareson**, **M. Fox**, **D. Amato**, and **H. Lee**, "Optimization Framework for Multi-Sensor Systems in Cislunar Space Domain Awareness," *2023 AAS/AIAA Astrodynamics Specialist Conference*, Big Sky, MT, Aug. 2023.

[C4] **B. Pearl**, **L. Gold**, and **H. Lee**, "Comparing the Effectiveness of Agility and Reconfigurability in Earth Observation Satellite Systems for Disaster Response," *2023 AAS/AIAA Astrodynamics Specialist Conference*, Big Sky, MT, Aug. 2023.

[C5] M. Patel, Y. Shimane, **H. Lee**, and K. Ho "Cislunar Satellite Constellation Design Via Integer Linear Programming," *2023 AAS/AIAA Astrodynamics Specialist Conference*, Big Sky, MT, Aug. 2023.

[C6] **H. Lee** and Z. Liu, "A Novel Formulation for the Multi-Stage Satellite Constellation Reconfiguration Problem: Initial Results," *33rd AAS/AIAA Space Flight Mechanics Meeting*, Austin, TX, Jan. 2023.

[C7] **H. Lee**, H. Chen, and K. Ho, "Maximizing Observation Throughput via Multi-Stage Satellite Constellation Reconfiguration," *2022 AAS/AIAA Astrodynamics Specialist Conference*, Charlotte, NC, Aug. 2022.

[C8] P. Clifton, **H. Lee**, A. Honda, S. Yoshikawa, and K. Ho, "Optimization Framework for Minimal Conjunction Satellite Constellation Design and Post Mission Disposal Trajectories," *IEEE Aerospace Conference*, Big Sky, MT, Mar. 2022.

[C9] H. Chen and **H. Lee**, "Distributed In-Situ Resource Utilization System Optimization for Multi-Mission Space Exploration," *AIAA ASCEND*, Las Vegas, NV, Nov. 2021.

[C10] **H. Lee** and K. Ho, "A Lagrangian Relaxation-Based Heuristic Approach to Regional Constellation Reconfiguration Problem," *2021 AAS/AIAA Astrodynamics Specialist Conference*, Virtual, Aug. 2021.

[C11] **H. Lee** and K. Ho, "Binary Integer Linear Programming Formulation for Optimal Satellite Constellation Reconfiguration," *2020 AAS/AIAA Astrodynamics Specialist Conference*, Virtual, Aug. 2020.

[C12] **H. Lee**, K. Ho, S. Shimizu, and S. Yoshikawa, "A Semi-Analytical Approach to Satellite Constellation Design for Regional Coverage," *2018 AAS/AIAA Astrodynamics Specialist Conference*, Snowbird, UT, Aug. 2018.

[C13] H. Chen, **H. Lee**, and K. Ho, "Space Transportation System and Infrastructure Design for Regular Interplanetary Cargo Missions," *AIAA SPACE Conference and Exposition*, Orlando, FL, Sep. 2017.

[C14] **H. Lee**, P. Jakob, K. Ho, S. Shimizu, and S. Yoshikawa, "Optimization of Satellite Constellation Deployment Strategy Considering Uncertain Areas of Interest," *9th International Workshop on Satellite Constellations and Formation Flying*, Boulder, CO, Jun. 2017.

[C15] M. Prinkey, D. Miller, P. Bauer, K. Cahoy, E. Wise, C. Pong, R. Kingsbury, A. Marinan, **H. Lee**, and E. Main, "CubeSat Attitude Control Testbed Design: Merritt 4-Coil per axis Helmholtz Cage and Spherical Air Bearing," *AIAA Guidance, Navigation, and Control Conference*, Boston, MA, Aug. 2013.

THESES

**H. Lee**, "Design and Operations of Satellite Constellations for Complex Regional Coverage," Georgia Institute of Technology, Atlanta, GA, Aug. 2022.

**H. Lee**, "Optimization of Satellite Constellation Deployment Strategy Considering Uncertain Areas of Interest," University of Illinois at Urbana-Champaign, Urbana, IL, Aug. 2018.

INVITED TALKS

**H. Lee**, "Recent Progress in Space Systems Operations Research," Center for KINETIC Plasma Physics, West Virginia University, Morgantown, WV, Nov. 2022.

**H. Lee**, "Regional constellations as alternative business strategy: Overcoming startups' challenges in the space-based communications industry," *AAS John Glenn Memorial Symposium*, Virtual, July 2020.

OTHER PUBLICATIONS

O. Gunasekara, **H. Lee**, and K. Ho, "Commercial human spaceflight leads year of firsts," *Aerospace America*, Vol. 58, No. 11, pp. 68, Dec. 2020.

**H. Lee** and K. Ho, "Supplying the space station, preparing to put humans back on the moon," *Aerospace America*, Vol. 57, No. 11, pp. 63, Dec. 2019.

GRANTS

**Awarded**

PI, "Rapid Response Debris Removal Using Reconfigurable Space-Based Laser Networks," NASA Early Career Faculty (ECF) Award, $599,792, Oct. 2023.

Co-PI, "Space Logistics Analysis and Incentive Design for Commercialization of Orbital Debris Remediation," NASA OSTP, $105,916, Aug. 2023.

Science-PI, "OrBNaV - Orbiter-assisted Balloon Navigation for Venus Exploration," NASA EPSCoR Rapid Response Research, $99,967, Aug. 2023 to July 2024.

PI, "Examining the Relationship between Orbital Stability and On-Orbit Servicing in Cislunar Space," NASA WV EPSCoR Research Seed Grant, $19,874 (NASA: $14,999 and cost-share: $4,875), June 2023 to May 2024.

PI, "A Mathematical Optimization-Based Satellite Constellation Design and Operational Framework," TelePIX, (undisclosed amount), Jan. 2023 to Jan. 2025.

ADVISING AND MENTORING

**Visiting Scholars**

- Dr. Jae-ik Park, Principal Researcher, Korea Aerospace Research Institute

**Ph.D. Students, Chair**

- David Williams Rogers, Aerospace Engineering (Spring 2023; In progress)
- Brycen Pearl, Aerospace Engineering (Fall 2023; In progress)

**M.S. Students, Chair**

- Thomas (Henry) Clareson, Mechanical Engineering, (Fall 2022; In progress)
- Matthew Fox, Aerospace Engineering, (Summer 2023; In progress)

**Ph.D. Students, Committee Member**

- Alfredo Cruz, Aerospace Engineering (Advisor: Dr. Piyush Mehta; In progress)
- Gerardo Rivera, Aerospace Engineering, (Advisor: Dr. Piyush Mehta; In progress)
- Rafael Planco, Aerospace Engineering, (Advisor: Dr. Piyush Mehta; In progress)

**M.S. Students, Committee Member**

- Joshua Daniell, Aerospace Engineering (Advisor: Dr. Piyush Mehta; In progress)
- Eamonn Payton, Aerospace Engineering (Advisor: Dr. Andrew Rhodes; In progress)

**Undergraduate Students**

- Logan Gold, Research Apprenticeship Program, 2022–
- Yimin Cai, Research Apprenticeship Program, 2022–
- Natasha Dickerman, Research Apprenticeship Program, 2022–
- Dominic Amato, 2023–
- Earle Boggs, 2023–
- Matthew Fox, 2022–2023; Advanced as an M.S. student.
- Jack Simmons, 2023

## TEACHING EXPERIENCE

**West Virginia University**, Morgantown, WV

*Instructor*

- MAE 476 – Space Flight and Systems (Undergraduate level)
  - Spring 2023: SEI score of 4.9/5.0
  - Fall 2023: On-going

## PROFESSIONAL SERVICE

**Referee Service: Journals**

- *Journal of Spacecraft and Rockets* (2023)
- *Journal of Guidance, Control, and Dynamics* (2021, 2022)
- *Journal of Aerospace Engineering* (2019, 2022, 2023)
- *IEEE Transactions on Aerospace and Electronic Systems* (2021, 2022, 2023)
- *IEEE Transactions on Wireless Communications* (2023)
- *IEEE Transactions on Wireless Communications* (2023)
- *IEEE Transactions on Geosciences and Remote Sensing* (2023)
- *The Journal of the Astronautical Sciences* (2022, 2023)
- *Advances in Space Research* (2023)
- *Acta Astronautica* (2021, 2023)
- *Defense Technology* (2022)
- *Systems Engineering* (2018)

**Referee Service: Conferences**

- *AAS/AIAA Space Flight Mechanics Meeting* (2023)

**Referee Service: Grants and Awards**

- *NSF* (2023)
- *John V. Breakwell Award* (2023)

**Conference Service**

- Session Co-chair, "TECH.EXPL-11" and "TECH.EXPL-17," *AIAA ASCEND*, Las Vegas, NV, Oct. 2022.
- Session Chair, "Satellite Constellations" and "Machine Learning and Artificial Intelligence Applied to Space Flight Problems 1," *33rd AAS/AIAA Space Flight Mechanics Meeting*, Austin, TX, Jan. 2023.

## PROFESSIONAL EXPERIENCE

**Planet**, San Francisco, CA

*Spacecraft Manufacturing Engineer*, Special Projects Group Oct. 2015 – Apr. 2016

- Management of design for manufacturing, assembly, and testing of Dove satellites
- Solar panel and battery pack manufacturing development and testing fixtures
- Spacecraft PCBA and sub-assembly, quality, testing, and fixture management

**Space Exploration Technologies Corporation (SpaceX)**, Hawthorne, CA

*Mission and Launch Operations Intern* June – Sept. 2015

- Crew Dragon preliminary procedures list and organization
- Universal numbering scheme for all Dragon procedures (CRS, Commercial Crew, CRS2, DragonLab)
- CRS-8 BEAM primary payload extraction procedure
- RF ground alarm background information and failure response guides
- Design of SpaceX mission control ground software Blue Alarm
- Dragon/ISS timeline constraint formulation between SpaceX and NASA mission control centers

**Satrec Initiative**, Daejeon, Korea

*Systems Engineering Team and Mechanical Design & Integration Team Intern* June – July 2012

- Manufacturing and testing of DubaiSat-2 flight model & Deimos-2 qualification model

## PROFESSIONAL MEMBERSHIPS

Member, American Institute of Aeronautics and Astronautics (AIAA)

Member, American Astronautical Society (AAS)

Member, American Society for Engineering Education (ASEE)

Last update: October 2023