Keidai Iiyama

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EDUCATION

M.S. The University of Tokyo, Japan April, 2019 – Present
Department of Aeronautics and Astronautics, School of Engineering
B.S. The University of Tokyo, Japan April, 2015 - March, 2019
Department of Aeronautics and Astronautics, School of Engineering

SKILLS

- C, C++, Python, MATLAB
- English (Professional proficiency, TOFEL iBT 105/120), Japanese (Native)
- Autodesk Inventor
- Thermal Desktop

RESEARCH EXPERIENCE

Intelligent Space Systems Laboratory, The University of Tokyo April, 2018 - Present
Optimization of Staged Development Process of Lunar Navigation Satellite System (LNSS)

- Implemented a Multi-Objective Monte-Carlo Tree Search Algorithm to optimize the staged development sequence of navigation satellite constellation for LNSS

Batcheler Thesis Project (Advisor: Assoc. Prof. Ryu Funase, Ph.D.)
Thesis Title: "Navigation Satellite Constellation and Monitoring Station Arrangement for Lunar Global Navigation Satellite System (LGNSS) " (Japanese)

- Implemented a user positioning simulation model for LGNSS considering the orbit determination of the navigation satellites using range measurements at the lunar monitoring station. Conducted positioning performance analysis for several constellation and lunar monitoring station arrangement patterns.

Space Systems Optimization Laboratory, Georgia Institute of Technology
January 2020 – February 2020**,** Visiting Researcher
Development of a divert maneuver planning algorithm during planetary descent

- Developed an deep reinforcement learning agent that selects safe landing sites and plans divert maneuvers from Lidar DEM observations.

PUBLICATIONS and PRESENTATIONS

Journal Papers

Co-Author

- Funase, R., Ikari, S., Miyoshi, K., et al. (2020), " Mission to Earth-Moon Lagrange Point by a 6U CubeSat: EQUULEUS", IEEE Aerospace & Electro. Systems Magazine, Vol.35, No.3, pp.30-44 **(20th Author)**

Conference Papers

First Author

- **Iiyama, K,** Tomita, K., Jagatia, B.A., Nakagawa, T., and Ho, K. (2020), "Deep Reinforcement Learning for Safe Landing Site Selection with Concurrent Consideration of Divert Maneuvers", 2020 AAS/AIAA Astrodynamics Specialist Conference, USA
- **Iiyama, K.**, Ozaki, N., Kawabata, Y., Funase, R., and Nakasuka, S. (2019) "The Optimization of Staged Development of Lunar Navigation Satellite System", Space Sciences and Technology Conference, Tokushima, Japan P76 (Written in Japanese).
- **Iiyama, K** (2019), "Optimization of the Navigation satellite constellation and Lunar

Monitoring Station for Lunar Global Navigation Satellite System", 32nd International Symposium on Space Technology and Science, Japan, j-20s. (**Student session finalist**)

Co-Author

- Tomita, K., Jagatia, B.A., Nakagawa, T., **Iiyama, K.**, and Ho, K., "Real-Time Terrain Mapping and Processing for Safe Landing via Deep Neural Networks", ASCEND, Las Vegas, Nevada, The United States, November, 2020 (Scheduled)
- Shibukawa, T., Matsushita, S., **Iiyama, K.**, and Funase, R. (2019), "Reflection and Verification of Thermal Design under Tightly-Coupled Constraints to the 6U Deep Space CubeSat EQUULEUS", 32nd International Symposium on Space Technology and Science, Japan, i-10.
- Matsushita, S., Shibukawa, T., **Iiyama, K.**, and Funase, R. (2019), "Thermal Design and Validation for a 6U Cubesat EQUULEUS under Constraints Tightly Coupled with Orbital Design and Water Propulsion System", 49th International Conference on Environmental Systems, USA, #193.

FUNDING & AWARDS

- The University of Tokyo WINGS CFS program scholarship ¥18K/month 2019/10 - Present
- ARLISS (A Rocket Launch for International Student Satellites) comeback competition Overall Winner 2017/09

RESEACH INTERESTS

- Application of reinforcement learning algorithms to spacecraft guidance, navigation, and control problems
- Optimization of Space Systems under uncertainty
- Spacecraft Trajectory Design

TEACHING EXPERIENCE

- Teaching Assistant – to Assoc.Prof Ryu Funase in "Astrodynamics" 2019/09 – 2020/02

ACTIVITIES & PROJECTS

ARLISS (A Rocket Launch for International Student Satellites)

- ARLISS is a cansat competition in Black Rock, Nevada. Cansats that are developed by the participants are launched by rockets, going up high to 4km. In the comeback competition, the participating teams integrate autonomous system (including cases, parachutes and rovers) to direct the cansat back to designated location at launch site.
- Our team won the overall winner and best accuracy award (0 m) which is given to the team that successfully navigated the rover closest to the goal. I contributed as a member of software development team.

EQUULEUS

- EQUULEUS is a 6U cubesat lunar mission jointly proposed by JAXA and the University of Tokyo to NASA. It was selected as the secondary payload of the EM-1 Mission (First flight of the NASA's new rocket, SLS).
- Contributed as a member of thermal analysis team and the trajectory design team, for flight software developments, environment tests, thermal design analysis, trajectory analysis