Juyeop Han

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RESEARCH INTEREST

Decision Making under Uncertainty, Robotic Perception, Deep Learning, Control & Estimation Theory

EDUCATION

Massachusetts Institute of Technology (MIT) Cambridge, MA
Ph.D. Student at MIT Mechanical Engineering and LIDS *Sep. 2023 - Present*
- Advisor: Prof. Sertac Karaman

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea
M.S. in Aerospace Engineering *Mar. 2021 - Feb. 2023*
- Advisor: Prof. Han-Lim Choi
- Thesis: "Computation of Tight Forward Reachable Set for a Multirotor based on the Nonlinear Adaptive Controller"

Seoul National University (SNU) Seoul, South Korea
B.S. in Mechanical Engineering *Mar. 2015 - Feb. 2021*
- **Summa Cum Laude**
- Leave of Absence for Mandatory Military Service (2017 - 2019)

RESEARCH EXPERIENCE

Autonomy and Embedded Robotics Accelerated Lab, MIT Sep. 2023 - Present
Graduate Research Assistant | PI: Prof. Sertac Karaman *Cambridge, MA*
- Quantifying uncertainty of neural networks for robotics application [**P1**]
- Building large city-scale scenes through 3D neural scene representation with multi-modal sensor measurements

Autonomous Decision and Control Lab, CU Boulder Oct. 2022 - Mar. 2023
Visiting Scholar | PI: Prof. Zachary Sunberg *Boulder, CO*
- Engaged in developing decision making algorithm of control system with temporal logic and reachability

Lab for information and Control Systems, KAIST Jan. 2021 - Jul. 2023
Graduate Research Assistant | PI: Prof. Han-Lim Choi *Daejeon, South Korea*
- Proposed algorithm for kernel-based 3-dimensional dynamic occupancy grid map [**C1**]
- Proposed method for real-time computation of tighter forward reachable set (FRS) of multirotor with adaptive controllers [**C2**]
- Planned optimal trajectory in cluttered environment for quadrotors using pseudospectral method [**C3**]

Innovative Design and Integrated Manufacturing Lab, SNU Jun. 2020 - Aug. 2020
Undergraduate Research Intern | PI: Prof. Sung-Hoon Ahn *Seoul, South Korea*
- Implementing path planning and object recognition of 6 DOF robot actuator for surface cleaning

PUBLICATIONS

Preprints

[P1] **J.Han**, L.L.Beyer, G.V.Cavalheiro, and S.Karaman, "NVINS: Robust Visual Inertial Navigation Fused with NeRF-augmented Camera Pose Regressor and Uncertainty Quantification", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024 (**Submitted**) [arXiv]

Conferences

[C1] **J.Han***, Y.Min*, B.Jeong, H.Chae and H.Choi (*equal contribution), "DS-K3DOM: 3-D Dynamic Occupancy Grid Mapping with Kernel Inference and Dempster-Shafer Evidential Theory", *International Conference on Robotics and Automation (ICRA)*, 2023 [paper] [code] [video]

[C2] **J.Han**, and H.Choi, "Computation of Tight Forward Reachable Set for a Multirotor based on the Nonlinear Adaptive Controller", *American Control Conference (ACC)*, 2023 [paper]

[C3] **J.Han**, M. Tahk, and H. Choi, "Pseudospectral method-based safe motion planning for quadrotors in a cluttered environment", *AIAA Science and Technology Forum (Scitech)*, 2022 [paper]

Honors & Awards

Scholarships

Korean Government Scholarship, South Korean Government	Sep. 2023
Government-Funded Scholarship, KAIST	Mar. 2021
SNU Alumni-Funded Scholarship, SNU Alumni Foundation	Mar. 2020
Merit-Based Scholarship, SNU	Sep. 2015

Awards

Outstanding Award, SNU ME Materials and Manufacturing Process Course	Dec. 2019
Participation Award at Seoul Hackathon, Administration of Seoul	Jun. 2016
Creative Award, SNU ME Creative Engineering Design Course	Dec. 2015

Professional Activities

Organizer, IDMAV Workshop at Robotics: Science and Systems (RSS) conference	2023
Reviewer, IEEE Control System Letters (L-CSS)	2022

Technical Skills

Programming	C/C++, Python, MATLAB, CUDA
Libraries & Tools	ROS, Pytorch, OpenCV, Git, Nix, LaTeX, SolidWorks
Languages	Korean (Native), English (Fluent, 2 years in U.S. military)

Extracurricular Activities

Unit Supply Specialist (ROK Army Sergeant), 2nd Infantry Division, US Army	Nov. 2017 - Aug. 2019
Leadership Member, DALISHA (SNU Running Crew)	Sep. 2018 - Feb. 2021