Minhyuk Jang

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Education

Seoul National University (SNU) **Mar 2019 – PRESENT**

B.S. in Mechanical Engineering, Interdisciplinary Major in Artificial Intelligence *Seoul, South Korea*

- **GPA : 3.99/4.0**, Outstanding B.S. Thesis Presentation Award
- 18 months of military service included

Research Interests

- Control Theory (Robust Control, Optimal Control, Adaptive Control, Nonlinear Control)
- Safety-Critical Systems (Multirotor, VTOL, Robotics, etc), Safety Guarantee, Multi-Agent Systems

Publications

- **Minhyuk Jang**, Astghik Hakobyan, and Insoon Yang. *Wasserstein Distributionally Robust Control and State Estimation for Partially Observable Linear Systems*, Advances in Neural Information Processing Systems (**NeurIPS**), 2024 (submitted) [**arXiv**]
- **Minhyuk Jang**. *Stability Analysis of Disturbance Observer under Model Uncertainty with Different System Degrees between True and Nominal Systems*, Institute of Control, Robotics and Systems (**ICROS**), 2024

Experience

SNU Control and Optimization Research (CORE) Lab **Mar 2023 – PRESENT**

Research Intern - Advisor : Prof. Insoon Yang *Seoul, South Korea*

- Developed unified algorithm for Wasserstein Distributionally Robust Control and State Estimation in partially observable linear stochastic systems, addressing unknown probability distributions of disturbances and measurement noises
- Formulated a tractable semidefinite programming problem that iteratively determines the worst-case covariance matrices of all uncertainties, significantly enhancing the scalability and efficiency of the proposed algorithm

NEARTHLAB **Jan 2024 – Feb 2024**

Aerospace Engineering Intern, GNC Team *Seoul, South Korea*

- Developed DOB and LQR based position/velocity controllers in C++ & ROS2 and tested through Gazebo simulation
- Integrated a flight controller with a companion computer for quadrotor offboard control, implementing DOB+LQR and DOB+PID trajectory tracking controllers, and conducted extensive outdoor flight experiments

Selected Projects (See more at HERE)

Automated Hyperparameter Tuning Algorithm for MPPI Control (B.S. Thesis) **Sep 2023 – Jun 2024**

- Developed an adaptive algorithm to tune the hyperparameter λ (Inverse Temperature) for MPPI control, minimizing state fluctuation while maintaining low control cost
- Implemented the proposed algorithm in the MuJoCo MPC (MJPC) framework, proving its effectiveness in improving control performance and reducing fluctuation in quadrotor hovering and racing tasks

VTOL Projects **Mar 2024 – Sep 2024**

- Developed two Standard Quadplane type A-tail VTOLs, each with wingspans of 1.5m and 2.0m
- Conducted the complete system engineering process, including the selection of electronic components (servo, motor, flight controller, batteries, GPS, PDB, RC, etc), wiring, sensor calibration, and mission task design

Leadership / Extracurricular activities

Bulnabi - SNU Drone Club **Sep 2023 – PRESENT**

Team Leader *Seoul, South Korea*

- Led and developed over three Quadrotor Build/Fly seminars, teaching hardware assembly, sensor calibration, Ground Control Station usage, flight experiments, and flight log analysis
- Directed a 25-member team for the Korea Robot Aircraft Competition, focusing on VTOL system design and autonomous flight missions, conducting extensive outdoor tests to stabilize all flight phases

Senior KATUSA (Korean Augmentation to the United States Army) **Sep 2021 – Mar 2023**

Sergeant, 8th Army, Camp Humphreys *Pyeongtaek, South Korea*

- Led and managed a 10-solider squad, ensuring their training, well-being, and mission preparedness
- Operated within a U.S. Army office, collaborating extensively with American colleagues on a daily basis
- Applied language proficiency to deliver crucial translation and interpretation support during Combined Exercises

Relevant Coursework

- Nonlinear System Theory (Graduate, A+)
- Advanced Control Techniques (A+)

Honors / Awards

Outstanding B.S. Thesis Presentation Award **2024**
Department of Mechanical Engineering *Seoul National University*

Outstanding Materials and Manufacturing Processes Award **2024**
Materials and Manufacturing Processes Contest *Seoul National University*

Kwanjeong Scholarship **2021**
Recipient of a full tuition scholarship along with a stipend for two years *Seoul, South Korea*

ARCOM (Army Commendation Medal) **2022**
United States Department of the Army *Camp Humphreys*

Technical Skills

Programming: C/C++, Python, MATLAB
Libraries/Softwares: PX4-Autopilot, ROS2, SolidWorks, MuJoCo, PyTorch, LaTeX
Languages: Korean (native), English (TOEFL 106)