Minhyuk Jang

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Education

University of Illinois Urbana-Champaign (UIUC) **Aug. 2025 – Present**
Ph.D. Student in Mechanical Science and Engineering - (GPA: 4.0/4.0)

- **Research Interests: Robotics, Learning-based control, Machine Learning, Safe autonomy**
- **Advanced Controls Research Laboratory - Advisor: Prof. Naira Hovakimyan**

Seoul National University (SNU) **2019 – 2025**
B.S. in Artificial Intelligence and Mechanical Engineering (Robotics Track)

- **(GPA : 3.99/4.0), Summa Cum Laude**
- College of Engineering Outstanding Graduate Award, Outstanding B.S. Thesis Presentation Award
- 18 months of military service included

Publications

- **Minhyuk Jang**[*], Thinh Nguyen[*], Vivek Khatana, Sandeep Banik, Naira Hovakimyan, and Petros G. Voulgaris. ***Uncertainty-Aware Vision-Based Autonomous Aerial Refueling*, (Submitted to IEEE ICRA 2027)**
- Dohyun Lee, **Minhyuk Jang**, Vincent Kurtz, Joel Burdick, and Naira Hovakimyan. ***Safe Flow Expansion: Discovering Safe Robot Behaviors in Out-of-Distribution Motion Planning*, (Submitted to IEEE ICRA 2027)**
- **Minhyuk Jang**, Astghik Hakobyan, Jungjin Lee, Naira Hovakimyan, and Insoon Yang. ***WRAP: Wasserstein-Robust Adaptive Plug-in for Robot Localization*, (Submitted to IEEE RA-L)**, [arXiv]
- **Minhyuk Jang**[*], Jungjin Lee[*], Astghik Hakobyan, Naira Hovakimyan, and Insoon Yang. ***Residual-Aware Distributionally Robust EKF: Absorbing Linearization Mismatch via Wasserstein Ambiguity*, IEEE Control and Decision Conference (CDC)**, 2026, [arXiv]
- **Minhyuk Jang**[*], Astghik Hakobyan[*], and Insoon Yang. ***Distributionally Robust Kalman Filter***, [arXiv]
- **Minhyuk Jang**[*], Astghik Hakobyan[*], and Insoon Yang. ***On the Steady-State Distributionally Robust Kalman Filter*, IEEE Control and Decision Conference (CDC)**, 2025, [arXiv]
- **Minhyuk Jang**, Astghik Hakobyan, and Insoon Yang. ***Distributionally Robust Control and State Estimation for Linear Stochastic Systems***, [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

[*] Equal contribution.

Experience

Advanced Controls Research Laboratory **Aug. 2025 – Present**
Research Assistant - Advisor: Naira Hovakimyan *Illinois, United States*

- Investigate uncertainty-aware aerial autonomy and safe motion planning, including vision-based aerial refueling and $\mathcal{L}_1$ adaptive control for aerial physical interaction.
- Develop distributionally robust state estimation and robot localization methods that account for noise-distribution mismatch and linearization error.

SNU Learning and Decision Systems (LDS) Lab **Mar. 2023 – Aug. 2025**

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

- Proposed a steady-state Distributionally Robust Kalman Filter that accounts for distributional uncertainties in disturbances and measurement noise
- Developed a unified framework for Distributionally Robust Control and State Estimation, leveraging game-theoretic methods to address uncertainties in disturbance and noise distributions

NEARTHLAB **Jan. 2024 – Feb. 2024**

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

- Implemented 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, implemented DOB+LQR and DOB+PID trajectory tracking controllers, and conducted extensive outdoor flight experiments

Teaching Experience & Professional Service

- **Teaching Experience:** Teaching Assistant (TA), UIUC TAM 210/211, Statics (Spring 2026, Fall 2026).
- **Professional Service:** Reviewer, *IEEE Transactions on Signal Processing*, *IEEE Transactions on Control of Network Systems*.

Selected Projects (See more at HERE)

VTOL (Vertical Take-off and Landing) Projects **Mar. 2024 – Sep. 2024**

Team Leader – Korea Robot Aircraft Competition (Grand Award) *Taean, South Korea*

- Constructed two A-tail Quadplane VTOLs with autonomous flight capabilities, each with wingspans of 1.5m and 2.0m
- Oversaw the full system engineering process, from selecting electronic components (servos, motors, flight controller, batteries, GPS, PDB, RC, etc.) to wiring, sensor calibration, and mission task planning

Leadership / Extracurricular activities

Bulnabi - SNU Drone Club **Sep. 2023 – Feb. 2025**

Team Leader *Seoul, South Korea*

- Organized and conducted over five Quadrotor Build/Fly seminars, teaching hardware assembly, sensor calibration, Ground Control Station usage, flight experiments, and flight log analysis
- Led a 25-member team for the Korea Robot Aircraft Competition, focusing on VTOL system design and autonomous flight missions; conducted over 30 outdoor fixed-wing missions and successfully stabilized all flight phases.

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

Squad Leader – Sergeant, 8th Army, Camp Humphreys *Pyeongtaek, South Korea*

- Led and managed a 10-soldier squad, ensuring their training, well-being, and mission preparedness
- Provided essential translation and interpretation support during Combined Exercises, leveraging language proficiency
- Engaged in daily collaboration with American colleagues within a U.S. Army office

G.I.V - SNU Volunteering Club **Mar. 2019 – Sep. 2020**

Vice President *Seoul, South Korea*

- Delivered educational support in math, science, and art to teenagers in rural areas, emphasizing experiential learning
- Organized and engaged in various volunteer activities, including secondhand markets, mural painting, and food drives

Technical Skills

Programming: C/C++, Python, MATLAB/Simulink

Libraries/Software: PX4 Autopilot, ROS 2, Gazebo, MuJoCo, PyTorch, Vicon, Arduino, Fusion 360, LaTeX

Robotics Hardware: Robotic system prototyping and testing, electronics integration (wiring and soldering), laser cutting, and 3D printing

UAS Experience: FAA Part 107 Remote Pilot Certificate; autonomous VTOL development and flight testing; quadrotor, hexacopter, FPV drone, and Crazyflie operation

Languages: English (TOEFL iBT: 113/120), Korean (native)

Honors / Awards

College of Engineering Outstanding Graduate Award **2025**
One of the Top 24 Graduates across the entire College of Engineering *SNU College of Engineering Alumni Association*

Grand Award - Korea Robot Aircraft Competition **2024**
1st Place among 39 University Teams *Minister of Commerce, Industry and Energy*

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*

Excellence Award - Mechatronics Competition **2023**
Department of Mechanical Engineering *Seoul National University*

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

Kwanjeong Scholarship **2021**
Recipient of a full tuition scholarship along with a stipend for two years *Kwanjeong Educational Foundation*

Merit-based Scholarship **Spring 2020, Fall 2020**
Department of Mechanical Engineering *Seoul National University*

Relevant Coursework

Control: Game Theory, Nonlinear and Adaptive Control, Nonlinear System Theory, Robust Adaptive Control, Advanced Control Techniques, Mechanical System Modeling and Control

Machine Learning: MDP and Reinforcement Learning, Basics of Deep Learning, Artificial Intelligence, Machine Learning Fundamentals and Applications in Electrical and Computer Engineering, Machine Listening

Robotics: Autonomous Vehicle Systems Engineering, Introduction to Robotics, Mechanical Product Design, Mechatronics, Materials and Manufacturing Processes

Talks

- **Invited Talks:** *Are you confident your sensor is tuned correctly? – Robust Kalman filtering under noise uncertainty*, Korean-American Robotics Association (KARA), 2026
- **Invited Talks:** *Design and Development of a Lightweight, 3D-Printed VTOL Aircraft with Autonomous Flight Capabilities,* Center for Scientific Innovation and Education (CSIE), Yerevan, Armenia, 2024 (online)
- **Invited Talks:** *Design and Development of a Lightweight, 3D-Printed VTOL Aircraft with Autonomous Flight Capabilities for Advanced Air Mobility (AAM),* Unmanned Vehicle Systems Symposium, Daejeon, South Korea, 2024