

# HYEONTAE SUNG

Daejeon, Republic of Korea — hyeonatae.sung@gmail.com, <https://hyeontaesung.github.io/> — +82) 10-2020-9591

## EDUCATION

---

**Korea Advanced Institute of Science & Technology (KAIST)**, Republic of Korea Daejeon, South Korea  
*Master of Science, School of Electrical Engineering* Feb 2023 — Feb 2025  
Advisor: Professor Heejin Ahn

**Konkuk University** Seoul, South Korea  
*Bachelor of Science, Department of Mechanical and Aerospace Engineering* Mar 2016 — Feb 2023  
GPA: 4.34/4.5, Rank: 1/45

## RESEARCH INTERESTS

---

Planetary Robotics; Safety Challenges of Autonomous Systems; AI Safety; Safety-critical, Stochastic, Optimal, and Learning-based Control;

## RESEARCH EXPERIENCE

---

**Safe and Intelligent Autonomy (SIA) Lab, Stanford University, Remote** July 2025 — Present  
*Research intern (Advisors: Professors Somil Bansal and Jason J. Choi)*

- Safety Filter for High-Dimensional Systems under Uncertainties
  - developed a probabilistic safety filter framework leveraging particle-based reachability control barrier value functions
  - enhanced safety of high-dimensional systems under uncertainties without relying on worst-case assumptions
  - validated our method on social navigating problems with chance-constrained model predictive control baseline
  - refined and trained a neural PDE solver to compute the particle value function of Hamilton-Jacobi Reachability

**Control and Intelligent Systems Laboratory, KAIST, Republic of Korea** Jan 2023 — Present  
*Research Assistant (Advisor: Professor Heejin Ahn)*

- Safe Chance-constrained Model Predictive Control (MPC)
  - designed an MPC framework for autonomous driving under Gaussian mixture model (GMM) uncertainty
  - theoretically guaranteed recursive feasibility under an assumption we proposed
  - proposed a probabilistically recursive feasible MPC without the assumption
  - conducted simulations with the CARLA simulator and the trajectory forecasting model, *Trajectron++*
- Optimal Acceleration Profiles of Multiple Robots
  - designed an acceleration planning system maximizing throughput per unit of time while preventing collision
  - a collaborated project with Samsung Electronics

**Systems Control and Multiagent Optimization Research, EPFL, Switzerland** Jun — Sep 2024  
*Research intern (Advisor: Professor Maryam Kamgarpour)*

- Real-time Chance-constrained MPC for Robot Trajectory Planning:
  - implemented the safe chance-constrained MPC framework on the robot testbed
  - addressed the sim-to-real gap by using transfer learning methods
  - improved computational time to enable real-time application

## In PREPARATION

---

**Prediction-conditioned Reach-avoid Control Barrier Function High-Dimensional Stochastic Systems**  
In collaboration with Zeyuan Feng, Jason J. Choi, and Somil Bansal (working title)  
Link: <https://hyeontaesung.github.io/Stochastic-DeepReach/>

## JOURNALS and CONFERENCES

---

### Sampling-Based Safety Filter with Probabilistic Restrictiveness Guarantee

Park, J., Sung, H., Ahn, H.

Submitted to the *IEEE Conference on Decision and Control (CDC) 2026*

### Probabilistic Recursively Feasible Model Predictive Control Under Uncertain Environments

Sung, H., Ham, H., Park, J., Ren, K., & Ahn, H.

Accepted to the *23rd IFAC World Congress* link: <https://hyeontaesung.github.io/PRF-MPC/>

### Recursively Feasible Chance-constrained Model Predictive Control under Gaussian Mixture Model Uncertainty

Ren, K., Chen, C., Sung, H., Ahn, H., Mitchell, I., & Kamgarpour, M.

*IEEE Transactions on Control Systems Technology*, 2024 link: <https://ieeexplore.ieee.org/document/10745535>

## Safety Filtering Using Sampling-Based Model Predictive Control

Park, J., Sung, H., & Ahn, H.

To appear in *International Conference on Robot Intelligence Technology and Applications*. Springer, 2025.

## Computational Analysis on Safe Chance-constrained Model Predictive Control under Gaussian Mixture Model Uncertainty

Sung, H., Kim, K., & Ahn, H.

*Institute of Control, Robotics and Systems (ICROS) 2024* (Best Paper Award, top 2.1%)

## Optimal Acceleration Profiles of Multiple Vehicles Using Model Predictive Control

Sung, H., Choi, E., & Ahn, H.

*Institute of Control, Robotics and Systems (ICROS) 2024*

## AWARDS AND SCHOLARSHIPS

---

**EPFL Excellence in Engineering (E3) Summer Fellowship** (1.9% over 2060 applicants) 2024

*École Polytechnique Fédérale de Lausanne (EPFL)*

*Lausanne, Switzerland*

**Best Paper Award — 1st Place** (8 out of 372, top 2.1%) 2024

*Institute of Control, Robotics and Systems (ICROS) 2024*

*Daejeon, South Korea*

**National Full Scholarship, KAIST** 2023 — 2024

*For master's degree*

*Daejeon, South Korea*

**UAM Vertiport Design Contest—3rd place** 2021

*Korea Airports Corporation*

*Seoul, South Korea*

**The 10th EDISON SW Utilization Contest—1st Place** 2020

*Minister of the Ministry of Science and ICT (Information and Communication Technology)*

*Seoul, South Korea*

*Optimizing the Main Wing of a High-Altitude Long-Endurance Unmanned Aerial Vehicle Based on Battery Location*

**Academic Excellence Scholarship for three semesters**

*Konkuk University*

*Seoul, South Korea*

**Dean's list for one semester** Fall 2020

*Konkuk University*

*Seoul, South Korea*

## SKILLS

---

- **Relevant Coursework:** Optimal Control Theory (A+), Convex Optimization (A+), Linear Systems (A)
- **Programming:** MATLAB, Python, C/C++.
- **Software:** CARLA Simulator, ROS 2, Inventor, Fusion 360, CATIA.
- **Hardware:** OptiTrack, NVIDIA Jetson Platforms (Jetbot - Mobile Robot, JetRover - Mobile Manipulator)

## TEACHING EXPERIENCE

---

### Teaching Assistant

- AI for Robot Intelligence: Perception, Planning and Control Fall 2025
- Signal and Systems Spring 2025
- Electronics Design Lab. <Robotic Manipulator > Fall 2024
- Introduction to Optimization Techniques Fall 2023

### Research Mentorship

- Undergraduate Research: Time-dependent Shortest Path Algorithm Winter 2023

## ADDITIONAL ACTIVITIES

---

**Reviewer:** IEEE Transactions on Control Systems Technology, IROS 2025 2024

**Student Lab Representative**

Dec 2023 — Jun 2024

**Exchange Student** in Mechanical Engineering at California State University, Sacramento

Sep — Dec 2021

**Military Service:** Served at Military Police Special Duty Team (SDT) as a squad leader

Jun 2017 — Feb 2019