

# Sanghyun Hahn

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## EDUCATION

**Seoul National University** (2020.02 ~ Present)

Department of Mechanical and Aerospace Engineering (Major)

Artificial Intelligence (Interdisciplinary Major)

GPA: 4.13/4.30

**Seoul Science High School** (2017.03 ~ 2020.02)

GPA: 4.16/4.30

## RESEARCH INTERESTS

Dexterous Manipulation, Manipulation, Robot Learning, SLAM, Computer Vision

## RESEARCH EXPERIENCE

**Robust Perception and Mobile Robotics Lab.** (2023.07 ~ 2024.07)

**Advisor: Ayoung Kim**

**LiDAR–Thermal HUSKY UGV Platform** (2023)

- Hardware development for LiDAR–Thermal camera system on HUSKY UGV
- LiDAR, thermal camera, HUSKY UGV setup via ROS
- LiDAR–Camera Calibration

**Quantitative 3D Map Accuracy Evaluation Hardware and Algorithm for LiDAR SLAM** (2024)

- Target based accuracy evaluation for 3D point cloud maps generated by SLAM
- Algorithm development for target segmentation and error calculation
- Introduced absolute & relative error metrics

**Lab for Autonomous Robotics Research (LARR).** (2024.09 ~ 2025.03)

**Advisor: Hyoun Jin Kim**

**Enhanced Initialization for Gaussian Splatting**

- Random Initialization works better than COLMAP in sparsely reconstructed regions
- Added Extra initial points at sparse regions with clustering and seeding
- Gaussian Opacity Initialization from 3D reconstruction error

**SNU Machine Perception and Reasoning Lab.** (2025.03~Present)

**Advisor: Jonghyun Choi**

**Gaussian Splatting as SE(3) Equivariant Features for Imitation Learning** (~2025.07)

- Parallel gripper imitation learning can be transformed into an 3D matching problem.
- Gaussian features enhance SE(3) alignment of objects
- One-shot imitation learning is available from feature matching.

**Action Chunking Proximal Policy Optimization for Universal Robotic Dexterous Grasping**

- Action chunking can be applied to dexterous manipulation via reinforcement learning
- Chunked actor allows temporally coherent exploration, leading to policy improvement

## **PUBLICATIONS**

"Quantitative 3D Map Accuracy Evaluation Hardware and Algorithm for LiDAR(-Inertial) SLAM"

**Sanghyun Hahn**, Seunghun Oh, Minwoo Jung, Ayoung Kim, Sangwoo Jung

Co-first Author, ICCAS 2024: <https://www.arxiv.org/abs/2408.09727>

"Action Chunking Proximal Policy Optimization for Universal Robotic Dexterous Grasping"

**Sanghyun Hahn**, Jonghyun Choi

First Author, IEEE Humanoids 2025 Workshop on Dexterous Human Manipulation

Under Review. ICLR 2026

## **SERVICES**

**Reviewer:** IEEE RA-L

## **AWARDS & HONORS**

**The National Scholarship for Science and Engineering** (2020 ~ 2024)

**SNU Student-Directed Education Undergraduate Research Program** (2024)

## **EXTRACURRICULAR EXPERIENCE**

**SNU Baja/FormulaE Student Team RunToYou** (2020 ~ 2021)

**Baja Powertrain Team Leader (2021)**

- Frame design and simulation via SolidWorks
- Frame construction, Engine wiring, and more hardware development

**KSAE Baja Participant (2020)**

**SNU Undergraduate Tutoring** (2021)

**Military Service at ROKA** (2022)

## SELECTED COURSES

### **Aerospace/Mechanical Engineering**

- Solid Mechanics, Thermodynamics, Dynamics, Aerodynamics, Control Theory, Jet Propulsion, Compressible Fluid Flow, Space Dynamics, Sensor Systems, Robot Vision, SLAM 101

### **Mathematics**

- Calculus, Linear Algebra, Stochastic Processes, Math for Deep Neural Networks

### **Programming**

- Machine Learning Theory, 3D Computer Vision, Deep Learning, Algorithm

## PROJECTS

### **Forward Facing 3D Gaussian Splatting as Markov Chain Monte Carlo** (2024.12)

- Removed floating artifacts in forward facing scenarios for 3DGS-MCMC
- Introduced two loss terms: Depth Supervision, Near Gaussian Regularizers

### **3D Scene Interpolation via 4D Gaussian Splatting** (2024.6)

- Novel view synthesis via 4D Gaussian Splatting (3D-GS + Gaussian Deformation Network)
- Introduced a novel loss term: Blended Gaussian Loss
- Outperformed the baseline model

### **Initial Kernel Estimation for Image Deblurring** (2023.12)

- Deblurred images are a combination of the original image and the blurring kernel
- Obtained the blurring kernel via MAP estimation with gaussian priors
- Initializing the kernel via neural network enhanced the deblurring performance

### **OceanGate Titan Analysis** (2023.12)

- ANSYS simulation for the OceanGate Titan Implosion
- Simulated effects of thermal shock and vertical impact

### **SNUGLITE-I Tracking** (2023.6)

- Tracking cube satellite via GPS position data
- Keplerian Orbit Element estimation via MATLAB

### **Steady Flow Simulation for NACA 4-digit Airfoils**

- EDISON simulation for different NACA 4-digit airfoils
- Grid refinement tests for optimum simulation
- Simulations for analyzing the effect of digits in NACA 4-digit Airfoils

### **Optimum Patterns of Lattice Structure for Tensile Test** (2021.06.)

- SOLIDWORKS Analysis for tensile testing
- Simulations for lattice structure design