

# Jongwon Lee

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## Interests

Spatial AI, Robotic Perception and Navigation, Sensor Fusion, Calibration, and Autonomous Systems.

## Education

- University of Illinois Urbana-Champaign (UIUC)** Aug 2020 - Aug 2025  
(Expected)  
*Ph.D. in Aerospace Engineering*
- Dissertation: “Robust and Reliable Sensor Fusion and Localization for Autonomous Robotic Systems”
  - Advisor: Dr. Timothy W. Bretl
- Korea Advanced Institute of Science and Technology (KAIST)** Mar 2014 - Aug 2020  
*B.S. in Mechanical Engineering*
- GPA: 4.11/4.3, *Summa Cum Laude*

## Experience

- Student Researcher** Mountain View, CA  
*Google* Sep 2024 - Dec 2024
- Prototyped a visual navigation pipeline using 3D Gaussian splatting (3DGS) for scene representation and understanding.
  - Initiated a patent filing for novel indoor image retrieval under scene changes, leveraging 3DGS and semantic segmentation.
- Graduate Research Assistant** Urbana, IL  
*Bretl Research Group, UIUC* Aug 2020 - Current
- Designed, developed, and validated navigation algorithms for flying vehicle takeoff and landing with visual and infrared fiducial markers, resulting in publications ([C5], [C3], [C2], [W1]).
  - Designed, developed, and validated extrinsic self-calibration algorithms for multiple inertial sensor systems, resulting in publications ([C4], [J1]).
  - Contributed to the design and implementation of a distributed inertial sensor system for CubeSat applications as part of NASA STTR-funded research.
- Research Intern** Seongnam, Korea  
*NAVER LABS* Feb 2020 - Aug 2020
- Examined the impact of learning-based image retrieval methods within a large-scale outdoor visual navigation pipeline.
- Research Intern** Daejeon, Korea  
*Intelligent Robotic Autonomy and Perception Laboratory, KAIST* Mar 2018 - Dec 2019
- Developed and validated depth estimation methods under low-light conditions using stereo infrared cameras, comparing conventional and learning-based approaches.
  - Developed and validated a learning-based image retrieval for urban environments under scene changes, leveraging fisheye images and resulting in a publication ([C1]).

## Publications

- [J2] David Hanley, **Jongwon Lee**, Su Yeon Choi, Timothy Bretl. “The MagPIE2 Dataset: Magnetic Field-Based Mapping, Localization, and SLAM”. *IEEE Transactions on Instrumentation and Measurement*, 2025 (submitted).
- [C5] Su Yeon Choi, **Jongwon Lee**, Timothy Bretl. “Design and Detection of an Infrared Fiducial Marker”. *IEEE International Conference on Robotics and Automation (ICRA)*, 2025. (submitted).
- [C4] **Jongwon Lee**, David Hanley, Timothy Bretl. “Efficient Extrinsic Self-Calibration of Multiple IMUs Using Measurement Subset Selection” [🔗](#). *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024.
- [C3] **Jongwon Lee**, Su Yeon Choi, Timothy Bretl. “The Use of Multi-Scale Fiducial Markers to Aid Rotorcraft Navigation” [🔗](#). *AIAA SciTech Forum*, 2024.
- [C2] Su Yeon Choi, **Jongwon Lee**, Timothy Bretl. “The Impact of Adverse Environmental Conditions on Fiducial Marker Detection from Rotorcraft” [🔗](#). *AIAA SciTech Forum*, 2024.
- [W1] **Jongwon Lee**, Su Yeon Choi, David Hanley, and Timothy Bretl. “Comparative Study of Visual SLAM-Based Mobile Robot Localization Using Fiducial Markers” [🔗](#). *IROS Workshop on Closing the Loop on Localization*, 2023.
- [J1] **Jongwon Lee**, David Hanley, Timothy Bretl. “Extrinsic Calibration of Multiple Inertial Sensors from Arbitrary Trajectories” [🔗](#). *IEEE Robotics and Automation Letters (RA-L)*, 2022. (Presented at ICRA 2022).
- [C1] **Jongwon Lee**, Ayoun Kim. “Neural Network-Based Long-Term Place Recognition from Omni-Images” [🔗](#). *IEEE*

## **Skills**

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**Programming:** Python, C++

**Libraries and Frameworks:** PyTorch, OpenCV, ROS, Optimization Libraries (Ceres, g2o, SymForce)

**Tools:** Docker, Git, 3D CAD (SolidWorks), LaTeX

## **Awards and Honors**

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Mavis Future Faculty Fellows Program. *College of Engineering (CoE), UIUC.* 2024 - 2025.

Academic Excellence Award for Class of 2021. *Mechanical Engineering (ME), KAIST.* 2021.

Seong-Bu Kim Creative Activity Initiative Award. *ME, KAIST.* 2021.

The Korean Government Scholarship Program for Study Overseas. *Korean Ministry of Education.* 2020 - 2022.

Engineering Innovation Award. *CoE, KAIST.* 2020.

Travel Grants (ACCV 2018, UR 2019, IROS 2019, CES 2020). *KAIST.*

National Science and Engineering Scholarship. *Korea Student Aid Foundation.* 2014 - 2019.

Dean's List. *CoE, KAIST.* 2014-2016, 2019.

Scholarship for Honors Students. *ME, KAIST.* Spring 2019.

Outstanding Achievement Award. *ME, KAIST.* 2014-2015, 2018.

Best Instructor Award. *KAIST Science Outreach Program.* 2018.

Bronze Prize, CEE-URP. *Civil and Environmental Engineering, KAIST.* 2018.

## **Professional Services**

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### **Reviewer**

- IEEE Transactions on Robotics (*T-RO*). 2024 - Current.
- IEEE Robotics and Automation Letters (*RA-L*). 2024 - Current.
- IEEE Transactions on Instrumentation and Measurement (*TIM*). 2022 - Current.
- IEEE International Conference on Robotics and Automation (*ICRA*). 2022 - Current.

### **Membership**

- American Institute of Aeronautics and Astronautics (*AIAA*)
- Academy of Model Aeronautics (*AMA*)
- Institute of Electrical and Electronics Engineers (*IEEE*)

### **Teaching Assistant**

- Aerospace Control Systems (AE 353). *UIUC.* Spring 2025.
- Autonomous Systems Lab (AE 483). *UIUC.* Fall 2022.

### **Mentorship**

- Geonwoo Kim, ME 497, *UIUC.* Jan 2024 - May 2024.
- Chris Schreiber, Jiho Sim, and Katherine Ruiz, AE 298, *UIUC.* Jan 2024 - May 2024.
- Parth Shrotri and Shivani Atre, AE 298, *UIUC.* Jan 2023 - Dec 2023.
- Pradyun Narkadamilli, ECE 297, *UIUC.* Sep 2022 - Dec 2022.
- Arjun Shah and Varun Sarabudla, PURE, *UIUC.* Sep 2021 - Dec 2021.
- Chaemin Na, CEE-URP, *KAIST.* Jun 2018 - Dec 2018.