Chaehyeon Song

Github | Website | Linkedin | chaehyeon@snu.ac.kr

Summary

"Understanding the space where we live" is the central research objective. I am interested in 3D vision, Visual SLAM, Perception, and Radiance field.

Education

2023 - present Master's Degree at **Seoul National University** (GPA: 4.1/4.3)
- RPM Robotics lab, advised by Prof. Ayoung Kim

2016 - 2022 Bachelor's Degree at **Seoul National University** (GPA: 4.0/4.3)
- Double major: Mechanical Engineering, Artificial Intelligence
- *Summa Cum Laude*
- Two-years leave of absence for military service

2013 - 2016 Gyeonggi Science High School for the Gifted
- Major: Physics

Publications

[1] **C. Song**, D. lee, M.-H. Jeon, J. Lim, and A. Kim. "Conic-based Camera Calibration and its Uncertainty". In: *IEEE Transactions on pattern analysis and machine intelligence(TPAMI)*. **On progress**.

[2] S. Oh, Y. Kim, **C. Song**, and A. Kim. " LiDAR Data Processing Algorithm for Robust 6-DoF Estimation Using Circular Patterns". In: *Journal of Korea Robotics Society*. 2025.

[3] V. Ramtekkar, L. Dahiya, N. Shah, K. Nishimiya, T. Kuroki1, **C. Song**, A. Kim, and M.-H. Jeon. "Robust Depth-Aided Segmentation for Drivable Region Detection in Challenging Environments". In: *ICRA 2024 Workshop on Resilient Off-road Autonomy*. Yokohama, May 2024.

[4] **C. Song**, J. Shin, M.-H. Jeon, J. Lim, and A. Kim. "Unbiased Estimator for Distorted Conic in Camera Calibration". In: *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. Seattle, June 2024.

[5] **C. Song**, S. Yoon, M. Heo, A. Kim, and S. Kim. "Camera Agnostic Two-Head Network for Ego-Lane Inference". In: *IEEE Intelligent Vehicles Symposium (IV)*. Jeju, June 2024.

Review experience

Robotics and Automation Letters (RA-L) 2024

International Conference on Intelligent Robots and Systems (IROS) 2023

Awards and Honors

Outstanding MS Thesis Presentation Award Dec. 2024

CVPR 2024 Highlight paper Jun. 2024

Teaching and Research Assistant Scholarship 2023

First Place AI Classification Competition Dec. 2021
During "Theory and Lab of IoT, AI, and Big Data" course(1/80)

Yangyoung Foundation Scholarship 2020 - 2021
Merit-based scholarship, High G.P.A, 100% of tuition

Academic Excellence Scholarship, SNU 2016 - 2017
Merit-based scholarship, High G.P.A, 100% of tuition

Training Lineup for IPhO (International Physics Olympiad) 2014

Talks

OpenCV Webinar 19. Jul. 2024
https://www.youtube.com/live/MTMMoN6ogcY

Teaching Experience

Research Advisor of UROP Program Jun. 2024 - Nov. 2024
Supervised undergraduate students conducting research on LiDAR pose estimation

Head TA Mar. 2024 - Jul. 2024
Mechanical Design and Robot Programming

Tutor for Core Courses Mar. 2020 - Jun. 2021
Fluid Mechanics Mar. 2020 - Jun. 2020
Solid Mechanics Sep. 2020 - Dec. 2020
Thermodynamics Mar. 2021 - Jun. 2021

Work Experience

Honda Jun. 2023 - Feb. 2024
Research contract project manager

Naverlabs Sep. 2022 - Feb. 2023
Full-time Research Intern

Anoto Korea / KaitSolutions Sep. 2021 - Apri. 2022
Principal Research Engineer

Samsung Electronics July 2021 - Sep. 2021
Full-time Research Intern

Projects

Camera calibration Github

Existing calibration method using circular-patterns has wrong projection models. We proposed the unbiased estimator using moments representation so that tracking circular patterns under polynomial distortion is now available.

Lane-level localization

Identifying ego-lane in the road is essential for an advanced navigation system. We build a neural network that estimates both ego-lane and uncertainty using evidential deep-learning theories

Visual localization with points and lines PL-Loc

PL-Loc is a probabilistic framework that combines low-level(points) and high-level(lines) features for visual localization. By filtering more reliable points based on line features via a sigmoid function, our method shows superior accuracy compared to point-only or line-only methods

Drivable region detection

Collaborating with Honda, we build a segmentation network determining a drivable region from an image in off-road environments. We proposed a novel idea about dataset distillation from high-quality small datasets to low-quality large datasets.

Map-based Knowledge tracing

Mathematical concepts are highly related to each others. Using the existing coherence map of Mathematics, we created a graph optimization algorithm that can track one's mathematical intelligence and knowledge.

Responsibility & Volunteering

Served as an executive member of Engineering Honor Society	2021
Served as an executive member of Alpine Climbing Club	2020
Completed two-years military service	2018-2019
Served as an executive member of Snowboarding Club	2017
International Educational Volunteer in Nepal for two week	2016
Tutoring underprivileged children	2014 -2015

Patent

U.S. 18/774,088	Method and Device for Camera Calibration Algorithm using Unbiased Conic Estimator Considering Distortion

Skills

Knowledge	Multiple-view geometry, SLAM, Lie-Algebra, Optimization, Dynamics, etc.
Programming Languages	C++, Java, Python, Pytorch, ROS, SQL, Latex, etc.