

# Daeun Song

Computer Science and Engineering · Robotics

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## Research Interests

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Robot Path and Motion Planning, Human-Robot Interaction, Machine Learning

## Education

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**Ewha Womans University, Seoul, Korea**

2017 - 2023    **Ph.D. Computer Science and Engineering**

- Dissertation titled “Artistic Robotic Pen Drawing System using High-DoF Manipulators”
- Focus: Path and Motion Planning | Advisor: Dr. Young J. Kim

2013 - 2017    **B.S. Computer Science and Engineering**

## Research Experience

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**George Mason University, VA, USA**

SEP 2024 -    **Postdoctoral Associate @ Robotixx** (Advisor: Dr. Xuesu Xiao)

*Present*    • Working on robot navigation in challenging scenarios, focused on social robot navigation [C09-13].

**University of Maryland, MD, USA**

AUG 2023 -    **Postdoctoral Associate @ GAMMA** (Advisor: Dr. Dinesh Manocha)

- AUG 2024    • Funded by Maryland Robotics Center Postdoctoral Fellowship [H11].
- Worked on robot navigation in challenging scenarios, such as mapless navigation [C07-08] and social robot navigation, particularly focused on leveraging Vision-Language Models [J04-05].

**LAAS-CNRS, Toulouse, France**

JUN 2019 -    **Student Internship @ Gepetto** (Advisor: Dr. Steve Tonneau)

- SEP 2019    • Worked on footstep planning for legged robots. An optimization-based approach that reformulates the problem into l1-norm problem [J02], [C03] and reinforcement learning approach [C04].

**Ewha Womans University, Seoul, Korea**

MAR 2023 -    **Postdoctoral Associate @ Ewha ITRC Center** (Advisor: Dr. Young J. Kim)

- JUN 2023    • Worked on dual-arm robotic drawing system [C05-06], [P02], focused on dual-arm manipulation in a shared space, incorporating tool changes. Showcased our robotic drawing systems as an art exhibition.

MAR 2017 -    **Graduate Research Assistant @ Computer Graphics Lab** (Advisor: Dr. Young J. Kim)

- FEB 2023    • Worked on a robotic drawing system for large, arbitrary surfaces using a mobile manipulator [J03].
- Worked on a robotic drawing system that creates precise, undistorted drawings on unknown, arbitrarily shaped surfaces [C01-02], [P01], [H09].

JAN 2016 -    **Undergraduate Researcher @ Computer Graphics Lab** (Advisor: Dr. Young J. Kim)

- FEB 2017    • Developed a robotic drawing project to reproduce the user's input drawing from a tablet PC. Worked on a robot part to operate KUKA iiwa. Led the team composed of three undergraduate students [H06].
- Participated in a research project on a physics-based character animation under reduced gravity [J01].

## Patents

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[P02] Y. J. Kim, **D. Song**, Robot Path Creating Method, Computing Device for Performing the Method, Korean intellectual Property Office, *under review*.

[P01] Y. J. Kim, **D. Song**, J. Kim, Robotic apparatus and method for artistic pen drawing on an arbitrary surface, Korean intellectual Property Office, 1019356400000.

# Publications

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## International Journals

- [J05] **D. Song\***, J. Liang\*, X. Xiao, and D. Manocha, **VL-TGS: Trajectory Generation and Selection using Vision Language Models in Mapless Outdoor Environments**, *IEEE Robotics and Automation Letters (RA-L)*, 2025. [🏠](#) [📄](#) [📺](#)
- [J04] **D. Song**, J. Liang, A. Payandeh, X. Xiao, and D. Manocha, **VLM-Social-Nav: Socially Aware Robot Navigation through Scoring Using Vision-Language Models**, *IEEE Robotics and Automation Letters (RA-L)*, 2024. [🏠](#) [📄](#) [📺](#)
- [J03] **D. Song**, J. Kim, Y. J. Kim, **SSK: Robotic Pen-art System for Large, Non-planar Canvas**, *IEEE Transactions on Robotics (T-RO)*, 2023. [🏠](#) [📄](#) [📺](#) [🔄](#)
- [J02] **D. Song**, P. Fernbach, T. Flayols, A. D. Prete, N. Mansard, S. Tonneau, Y. J. Kim, **Solving Footstep Planning as a Feasibility Problem using L1-norm Minimization**, *IEEE Robotics and Automation Letters (RA-L)*, 2021. [🏠](#) [📄](#) [📺](#) [🔄](#)
- [J01] Y.-h. Kim, T. Kwon, **D. Song**, Y. J. Kim, **Full-body Animation of Human Locomotion in Reduced Gravity using Physics-based Control**, *IEEE Computer Graphics and Applications (CG&A)*, (Special issue on Physically Based Animation), 2017. [🏠](#) [📄](#) [📺](#)

## International Conference Papers

- [C13] A. Payandeh, A. Pokhrel, **D. Song**, M. Zampieri, X. Xiao, **Narrate2Nav: Real-Time Visual Navigation with Implicit Language Reasoning in Human-Centric Environments**, *under review*. [📄](#)
- [C12] Y. Kong, **D. Song**, J. Liang, Z. Yao, D. Manocha, X. Xiao, **AutoSpatial: Visual-Language Reasoning for Social Robot Navigation through Efficient Spatial Reasoning Learning**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025. [📄](#)
- [C11] A. Payandeh, **D. Song**, M. Nazeri, J. Liang, P. Mukherjee, A. H. Raj, Y. Kong, D. Manocha, X. Xiao, **Social-LLaVA: Enhancing Robot Navigation through Human-Language Reasoning in Social Spaces**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025. [🏠](#) [📄](#)
- [C10] J. Liang, K. Weerakoon, **D. Song**, S. Kirubakaran, X. Xiao, and D. Manocha, **MOSU: Autonomous Long-range Robot Navigation with Multi-modal Scene Understanding**, 19th International Symposium on Experimental Robotics (ISER), 2025. [📄](#)
- [C09] J. Liang\*, D. Das\*, **D. Song\***, M. N. H. Shuvo, M. Durrani, K. Taranath, I. Penskiy, D. Manocha, X. Xiao, **GND: Global Navigation Dataset with Multi-Modal Perception and Multi-Category Traversability in Outdoor Campus Environments**, *IEEE International Conference on Robotics and Automation (ICRA)*, 2025. [🏠](#) [📄](#) [📺](#) [🔄](#)
- [C08] T. Guan, R. Xian, X. Wang, X. Wu, M. Elnoor, **D. Song**, and D. Manocha, **AGL-NET: Aerial-Ground Cross-Modal Global Localization with Varying Scales**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024. [📄](#) [🔄](#)
- [C07] J. Liang, A. Payandeh, **D. Song**, X. Xiao, and D. Manocha, **DTG : Diffusion-based Trajectory Generation for Mapless Global Navigation**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024. [📄](#) [📺](#) [🔄](#)
- [C06] **D. Song**, E. Lim, J. Park, M. Jung, Y. J. Kim, **TSP-Bot: Robotic TSP Pen Art using High-DoF Manipulators**, *International Conference on Ubiquitous Robots (UR)*, 2024. [🏠](#) [📄](#) [📺](#)
- [C05] I. Ilinkin, **D. Song**, Y. J. Kim, **Stroke-based Rendering and Planning for Robotic Performance of Artistic Drawing**, *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023. [📄](#) [📺](#)
- [C04] J. Chemin, P. Fernbach, **D. Song**, G. Saurel, N. Mansard, S. Tonneau, **Learning to steer a locomotion contact planner**, *IEEE International Conference on Robotics and Automation (ICRA)*, 2021. [📄](#) [📺](#)
- [C03] S. Tonneau, **D. Song**, P. Fernbach, N. Mansard, M. Taix, A. D. Prete, **SL1M: Sparse L1-norm Minimization for contact planning on uneven terrain**, *IEEE International Conference on Robotics and Automation (ICRA)*, 2020. [🏠](#) [📄](#) [📺](#)
- [C02] **D. Song**, Y. J. Kim, **Distortion-free Robotic Surface-drawing using Conformal Mapping**, *IEEE International Conference on Robotics and Automation (ICRA)*, 2019. [🏠](#) [📄](#) [📺](#)
- [C01] **D. Song**, T. Lee, Y. J. Kim, **Artistic Pen Drawing on an Arbitrary Surface using an Impedance-controlled Robot**, *IEEE International Conference on Robotics and Automation (ICRA)*, 2018. [🏠](#) [📄](#) [📺](#)

\* : Equally Contributed

## Selected Extended Abstract

- [S02] E. Lim, J. Kim, **D. Song**, Y. J. Kim, TSP Pen Art using a Mobile Collaborative Robot, *Korea Computer Graphics Society Annual Conference (KCGS)*, 2021. [🏠](#) [📺](#) (**Best Undergrad Paper Award [H10]**)
- [S01] **D. Song**, T. Lee, Y. J. Kim, Artistic Pen Drawing on an Arbitrary Surface using an Impedance-controlled Robot (extended abstract of [C01]), *Korea Robotics Society Annual Conference (KRoC)*, 2018. (**Best Paper Award [H06]**)

## Honors & Awards

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- [H12] **RAS Travel Award** | International Conference on Intelligent Robots and Systems (IROS 2024)
- [H11] **MRC Postdoctoral Fellowship** | Maryland Robotics Center, University of Maryland (2023 - 2024)
- [H10] **Best Undergrad Paper Award** | Korea Computer Graphics Society Annual Conference (KCGS 2021)
- [H09] **Solvay Scholarship Award** | Outstanding Academic Performance (2019 - 2020)
- [H08] **RAS Travel Award** | International Conference on Robotics and Automation (ICRA 2019)
- [H07] **RAS Travel Award** | International Conference on Robotics and Automation (ICRA 2018)
- [H06] **Best Paper Award** | The 13th Korea Robotics Society Annual Conference (KRoC 2018)
- [H05] **Honorable Mention** | Hanium Expo Contest 2016
- [H04] **Honorable Mention** | Capston Awards (Engineering Education Festa 2016)
- [H03] **1st Place** | Ewha Engineering Capstone Design Contest 2016
- [H02] **1st Place** | Ewha Engineering Student Portfolio Contest 2016
- [H01] **2nd Place** | Ewha Power ProgrammER(E-PPER) Contest 2016

## Activities

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### Talks & Demos

- **TALK** | Invited talk @GLAB, Ewha Womans University, Seoul, KR *OCT 2024*
- **TALK** | Invited talk @Pebblous, Daejeon, KR *NOV 2023*
- **TALK** | Invited talk @SGVR Lab, KAIST, Daejeon, KR *NOV 2023*
- **DEMO** | Drawing simulation demo, ITRC Forum 2022, KR *APR 2022*
- **DEMO** | Drawing robot demo, Engineering Education Festa 2016, KR *NOV 2016*
- **DEMO** | Drawing robot demo, Hanium Expo 2016, KR *NOV 2016*

### Academic

- **Teaching Assistant** | Introduction to Physically-based Animation (Graduate) *Spring 2023*
- **Teaching Assistant** | Numerical Methods (Undergrad) *Spring 2022*
- **Teaching Assistant** | Computer Programming (Undergrad) *Spring 2016*

### Service

- **Chair** | IEEE ICRA 2025 Session, Learning for Navigation
- **Organizer** | IEEE ICRA 2025 BARN Challenge
- **Reviewer** | IEEE IROS, IEEE ICRA, IEEE Humanoids, IEEE RA-L, ISRR, Autonomous Robots *since 2019*

### Other

- **Robotic Art Exhibition** | Artist, CO-DRAW, Collaborative Robotic Art Exhibition *MAY 2023*