Daeun Song

Computer Science and Engineering · **Robotics**

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Research Interests

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

Education

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

George Mason University, VA, USA

SEP 2024 - *Present* **Postdoctoral Associate** @ Robotixx (Advisor: Dr. Xuesu Xiao)
- Working on robot navigation in challenging scenarios, focused on social robot navigation [C09-12].

University of Maryland, MD, USA

AUG 2023 - AUG 2024 **Postdoctoral Associate** @ GAMMA (Advisor: Dr. Dinesh Manocha)
- 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 - SEP 2019 **Student Internship** @ Gepetto (Advisor: Dr. Steve Tonneau)
- 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 - JUN 2023 **Postdoctoral Associate** @ Ewha ITRC Center (Advisor: Dr. Young J. Kim)
- 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 - FEB 2023 **Graduate Research Assistant** @ Computer Graphics Lab (Advisor: Dr. Young J. Kim)
- 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 - FEB 2017 **Undergraduate Researcher** @ Computer Graphics Lab (Advisor: Dr. Young J. Kim)
- 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

[P02] Y. J. Kim, **D. Song**, Robot Path Creating Method, Computing Device for Performing the Method, Korean Intellectual Property Office, 1020250062677, *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

Preprint

[A03] H. Chen, A. Datar, T. Xu, F. Cancelliere, H. Rangwala, M. B. Rao, **D. Song**, D. Eichinger, and X. Xiao, **Verti-Arena: A Controllable and Standardized Indoor Testbed for Multi-Terrain Off-Road Autonomy**, *under review.*

[A02] X. Xiao, Z. Xu, S. Abdul Ghani, A. Datar, **D. Song**, P. Stone, A. Mazen, K. Yazdipaz, I. Mateyaunga, M. Faied, M. Krishnan, Y. Lu, T. Xu, N. Mohammad, W. Kim, J. Reasoner, and N. Bezzo, **Autonomous Ground Navigation in Highly Constrained Spaces: Lessons Learned from The Forth BARN Challenge at ICRA 2025**, *under review.*

[A01] 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.*

International Journal

[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

[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. Kirubaharan, 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 uneventerrain**, *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

[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

Talks & Demos

- **TALK** | Invited talk @J-WOSMARS, IEEE RO-MAN 2025 *AUG 2025*
- **TALK** | Invited talk and demo @Edu-Futuro 2025, robotics session for K-12 students *JUL 2025*
- **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, IEEE TCSVT, IEEE T-ASE, AAAI, Autonomous Robots *since 2019*

Other

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