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 in Computer Science and Engineering**

- Advisor: Prof. Young J. Kim
- Dissertation titled "Artistic Robotic Pen Drawing System using High-DoF Manipulators"
- Graduate student representative of CSE department in 2020

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

Research Experience

George Mason University, VA, USA

SEP 2024 - Present **RobotiXX, Postdoctoral Associate** [C10,11]

- Advisor: Prof. Xuesu Xiao
- Working on robot navigation in challenging scenarios

University of Maryland, MD, USA

AUG 2023 - AUG 2024 **GAMMA, Postdoctoral Associate** [C07-09], [J04], [H11]

- Advisor: Prof. Dinesh Manocha
- Worked on social robot navigation using a Vision-Language Model
- Developed a map-based outdoor robot navigation pipeline

Ewha Womans University, Seoul, Korea

MAR 2023 - JUN 2023 **Simulated Reality Ewha ITRC Center, Postdoctoral Associate** [C06], [S08-09], [P02]

- Advisor: Prof. Young J. Kim
- Worked on dual-arm robotic drawing using tool-change
- Showcased our robotic drawing work in an art exhibition, participated as an artist

MAR 2017 - FEB 2023 **Computer Graphics Lab, Research Assistant** [J03], [C01,02,05], [S02-07], [P01], [H06-10]

- Advisor: Prof. Young J. Kim
- Worked on a distortion-free robotic drawing on an arbitrary surface
- Worked on a large-scale robotic drawing using a high DoF mobile manipulator
- Participated as an assistant advisor for undergraduate/graduate robotic research projects

JAN 2016 - FEB 2017 **Computer Graphics Lab, Undergraduate Researcher** [J01], [S01], [H04,05]

- Advisor: Prof. Young J. Kim
- Worked on a robotic drawing project to reproduce the user's input drawing from a tablet PC, led the team composed of three undergraduate students
- Participated in a research project on a physics-based character animation under reduced gravity

LAAS-CNRS, Toulouse, France

JUN 2019 - SEP 2019 **Gepetto Team, Student Internship** [J02], [C03,04]

- Advisor: Prof. Steve Tonneau
- Worked on multi-contact footstep planning for legged robots on uneven terrain

Publications

International Journals

[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** , *under review.*

[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.

* : SCI (Science Citation Index)-listed journals

International Conference Papers

[C11] A. Payandeh, **D. Song**, M. Nazeri, J. Liang, P. Mukherjee, A. Hossain Raj, Y. Kong, D. Manocha, X. Xiao, **Social-LLaVA: Enhancing Robot Navigation through Human-Language Reasoning in Social Spaces**, *under review.*

[C10] 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**, *under review.*

[C09] **D. Song***, J. Liang*, X. Xiao, and D. Manocha, **TGS: Trajectory Generation and Selection using Vision Language Models in Mapless Outdoor Environments**, *under review.*

[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. **[H08]**

[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. **[H07]**

Short Papers

[S09] **D. Song**, Y. J. Kim, Compliant Robotic Pen-Drawing, *IEEE International Conference on Robotics and Automation (ICRA) 2nd Workshop on Compliant Robot Manipulation*, 2023.

[S08] **D. Song**, Y. J. Kim, Creative Robotic Pen-Art System (stand-alone video), *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.

[S07] **D. Song**, Y. J. Kim, Mobile Coverage Planning for Large-Scale Robotic Pen Drawing (poster), *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.

[S06] **D. Song**, Y. J. Kim, Robotic Pen-art System for Large, Non-planar Canvas (extended abstract of [J03]), *Korea Computer Graphics Society Annual Conference (KCGS)*, 2022.

[S05] 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])**

[S04] **D. Song**, Y. J. Kim, Distortion-free Robotic Surface-drawing using Conformal Mapping (extended abstract of [C02]), *Korea Robotics Society Annual Conference (KRoC)*, 2020.

[S03] **D. Song**, Y. J. Kim, Hi-fidelity Robotic Pen Drawing on a Bumpy Surface, *IEEE International Conference on Robotics and Automation (ICRA) Robots and Art Forum*, 2018.

[S02] **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])**

[S01] **D. Song**, T. Lee, J. Kim, S. Sohn, Y. J. Kim, Artistic Pen Drawing on an Arbitrary Surface using an Impedance-controlled Robot (extended abstract of [C01]), *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop on Artistically Skilled Robots*, 2016.

Patents

[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.

Honors & Awards

[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 @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

- **Reviewer** | IEEE IROS, IEE ICRA, IEEE RA-L, ISRR

Other

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