

Sehoon Ha

CONTACT INFORMATION

Assistant Professor
School of Interactive Computing
Georgia Institute of Technology

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RESEARCH INTERESTS

Computer Graphics (Physics-based Animation, Fabrication),
Robotics (Deep Reinforcement Learning, Design Optimization, Optimal Control).

EDUCATION

Georgia Institute of Technology Atlanta, Georgia

Ph.D. in Computer Science, Aug, 2015

- Thesis: *Developing agile motor skills on virtual and real humanoids*
- Advisor: Dr. C. Karen Liu
- Area of Study: Computer Graphics

Korea Advanced Institute of Science and Technology Daejeon, South Korea

B.S. in Computer Science, Aug. 2009

- *Summa Cum Laude*, GPA: 4.0/4.3
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EMPLOYMENT HISTORY

Georgia Institute of Technology Jan. 2020 – present
Assistant Professor

Google Brain Aug. 2018 – Dec. 2019
Research Scientist

Carnegie Mellon University Dec. 2017 – Jul. 2018
Postdoctoral Fellow. Advisor: Jessica K. Hodgins

Disney Research Pittsburgh Sep. 2015 – Nov. 2017
Associate Research Scientist. Advisor: Katsu Yamane

Disney Research Pittsburgh May. 2014 – Aug. 2014
Research Intern. Advisor: Katsu Yamane

Adobe Creative Technology Lab May. 2012 – Aug. 2012
Research Intern. Advisors: J. McCann and J. Popović

Georgia Institute of Technology, College of Computing Aug. 2010 – Aug. 2015
Graduate Research Assistant. Advisor: C. Karen Liu

REFERRED
JOURNAL
PUBLICATIONS

- [J10] Maks Sorokin, Jie Tan, C. Karen Liu, **Sehoon Ha**, *Learning to Navigate Sidewalks in Outdoor Environments*, In *IEEE Robotics and Automation Letters (RA-L) 2022*
- [J9] Maks Sorokin, Wenhao Yu, **Sehoon Ha**, C. Karen Liu, *Learning Human Search Behavior from Egocentric Visual Inputs*, In *Computer Graphics Forum 2021*
- [J8] Wenhao Yu, Jie Tan, Yunfei Bai, Erwin Coumans, **Sehoon Ha**, *Learning Fast Adaptation with Meta Strategy Optimization*, In *IEEE Robotics and Automation Letters (RA-L) 2020*
- [J7] **S. Ha**, S. Coros, A. Alspach, J. Bern, J. Kim, K. Yamane, *Computational Design of Robotic Devices from High-Level Motion Specifications*, In *IEEE Transactions on Robotics (IF: 4.036)*, 2018
- [J6] **S. Ha**, S. Coros, A. Alspach, J. Kim, and K. Yamane, *Computational Co-Optimization of Design Parameters and Motion Trajectories for Robotic Systems*, In *International Journal of Robotics Research (IF: 5.301)*, 2019 (**Accepted, 30% extension of [C6]**)
- [J5] J. Lee, M. X. Grey, **S. Ha**, T. Kunz, S. Jain, Y. Ye, S. S. Srinivasa, M. Stilman, and C. K. Liu, *DART: Dynamic animation and robotics toolkit*, In *The Journal of Open Source Software (JOSS)*, 2018
- [J4] Y.S. Song, **S. Ha**, H. Hsu, L.H. Ting, and C. K. Liu, *Stair Negotiation Made Easier Using Novel Interactive Energy-Recycling Assistive Stairs (IF: 2.806)*, In *PLoS One*, 2017
- [J3] **S. Ha** and C. K. Liu, *Iterative Training Of Dynamic Skills Inspired By Human Coaching Techniques*, In *ACM Transactions on Graphics (IF: 4.088)*, 2014
- [J2] **S. Ha**, J. McCann, C. K. Liu, and J. Popović, *Physics Storyboards*, In *Computer Graphics Forum (Proceedings of Eurographics, IF:1.611)*, 2013
- [J1] **S. Ha**, Y. Ye, and C. K. Liu, *Falling and Landing Motion Control for Character Animation*, In *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia, IF:4.088)*, 2012

REFERRED
CONFERENCE
PUBLICATIONS

- [C25] Hao-Lun Hsu, Qihua Huang, **Sehoon Ha**, *Improving Safety in Deep Reinforcement Learning using Unsupervised Action Planning*, In *IEEE International Conference on Robotics and Automation (ICRA) 2022*
- [C24] K. Niranjan Kumar, Irfan Essa, **Sehoon Ha**, *Graph-based Cluttered Scene Generation and Interactive Exploration using Deep Reinforcement Learning*, In *IEEE International Conference on Robotics and Automation (ICRA) 2022*
- [C23] Laura Smith, Chase Kew, Xue Bin Peng, **Sehoon Ha**, Jie Tan, Sergey Levine, *Legged Robots that Keep on Learning: Fine-Tuning Locomotion Policies in the Real World*, In *IEEE International Conference on Robotics and Automation (ICRA) 2022*
- [C22] Zuoxin Tang, Donghyun Kim, **Sehoon Ha**, *Learning Agile Motor Skills on Quadrupedal Robots using Curriculum Learning*, In *The 9th International Conference on Robot Intelligence Technology and Applications (RiTA 2021)*
- [C21] Wenhao Yu, Deepali Jain, Alejandro Escontrela, Atil Iscen, Peng Xu, Erwin Coumans, **Sehoon Ha**, Jie Tan, and Tingnan Zhang, *Visual-Locomotion: Learning to Walk on Complex Terrains with Vision*, In *Conference on Robot Learning (CoRL) 2021*

- [C20] Naoki Yokoyama, **Sehoon Ha**, Dhruv Batra, *Success Weighted by Completion Time: A Dynamics-Aware Evaluation Criteria for Embodied Navigation*, In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2021
- [C19] Visak C.V. Kumar, **Sehoon Ha**, C. Karen Liu, *Error-Aware Policy Learning: Zero-Shot Generalization in Partially Observable Dynamic Environments*, In *Proceedings of Robotics: Science and Systems (RSS) 2021*
- [C18] Miguel Angel Zamora Mora, Momchil Peychev, **Sehoon Ha**, Martin Vechev, Stelian Coros, *PODS: Policy Optimization via Differentiable Simulation*, In *International Conference on Machine Learning (ICML) 2021*
- [C17] Qian Luo, Maks Sorokin, **Sehoon Ha**, *A Few Shot Adaptation of Visual Navigation Skills to New Observations using Meta-Learning*, In *IEEE International Conference on Robotics and Automation (ICRA) 2021*
- [C16] Joanne Taery Kim and **Sehoon Ha**, *Observation Space Matters: Benchmark and Optimization Algorithm*, In *IEEE International Conference on Robotics and Automation (ICRA) 2021*
- [C15] **Sehoon Ha**, Peng Xu, Zhenyu Tan, Sergey Levine, Jie Tan, *Learning to Walk in the Real World with Minimal Human Effort*, In *Conference on Robot Learning (CoRL) 2020*
- [C14] Xinlei Pan, Tingnan Zhang, Brian Ichter, Aleksandra Faust, Jie Tan, **Sehoon Ha**, *Zero-shot Imitation Learning from Demonstrations for Legged Robot Visual Navigation*, In *IEEE International Conference on Robotics and Automation (ICRA) 2020*
- [C13] Visak C.V. Kumar, **Sehoon Ha**, Gergory Sawicki, C. Karen Liu, *Learning a Control Policy for Fall Prevention on an Assistive Walking Device*, In *IEEE International Conference on Robotics and Automation (ICRA) 2020*
- [C12] Tuomas Haarnoja*, **Sehoon Ha***, Aurick Zhou, Jie Tan, George Tucker, Sergey Levine, *Learning to Walk via Deep Reinforcement Learning*, In *Robotics Science & Systems 2019*. *Two First Authors equally contributed.
- [C11] V. C. V. Kumar, **S. Ha**, C. K. Liu, *Expanding Motor Skills through Relay Neural Networks*, In *Conference on Robot Learning (CoRL)*, 2018
- [C10] K. Chen, **S. Ha**, K. Yamane, *Learning Hardware Dynamics Model from Experiments for Locomotion Optimization*, In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2018
- [C9] **S. Ha**, J. Kim, K. Yamane, *Automated Deep Reinforcement Learning Environment for Hardware of a Modular Legged Robot*, In *International Conference on Ubiquitous Robots*, 2018
- [C8] V. C. V. Kumar, **S. Ha**, K. Yamane, *Improving Model-Based Balance Controllers using Reinforcement Learning and Adaptive Sampling*, In *International Conference on Robotics and Automation (ICRA)*, 2018
- [C7] V. C. V. Kumar, **S. Ha**, C. K. Liu, *Learning a Unified Control Policy for Safe Falling*, In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2017
- [C6] **S. Ha**, S. Coros, A. Alspach, J. Kim, and K. Yamane, *Joint Optimization of Robot Design and Motion Parameters using the Implicit Function Theorem*, In *Proceedings of Robotics: Science and Systems (RSS)*, 2017 **Best Paper Finalist (Top 3)**

- [C5] S. Ha, S. Coros, A. Alspach, J. Kim, and K. Yamane, *Task-based Limb Optimization for Legged Robots*, In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2016
- [C4] S. Ha and C. K. Liu, *Evolutionary Optimization for Parameterized Whole-body Dynamic Motor Skills*, In *IEEE International Conference on Robotics and Automation (ICRA)*, 2016
- [C3] S. Ha and C. K. Liu, *Multiple Contact Planning for Minimizing Damage of Humanoid Falls*, In *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2015
- [C2] S. Ha and K. Yamane, *Reducing Hardware Experiments for Model Learning and Policy Optimization*, In *IEEE International Conference on Robotics and Automation (ICRA)*, 2015
- [C1] S. Ha, Y. Bai, and C. K. Liu, *Human Motion Reconstruction from Force Sensors*, In *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)*, 2011
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PATENTS

- [P1] S. Ha, S. Coros, K. Yamane, A. Alspach, J. Kim, *Computational Design Of Robots from High-level Task Specifications*, Filing Date: 10/23/2016.
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THESIS

- [PHDTHESIS] S. Ha, *Developing Agile Motor Skills on Virtual and Real Humanoids*, College of Computing, Georgia Institute of Technology
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TEACHING
EXPERIENCE

- | | |
|---|--------------|
| Instructor, CS 8803 Deep Reinforcement Learning for Intel. Systems | Spring 2022 |
| Instructor, CS 4801/8801 Programming Interview Preparation | Fall 2020 |
| Instructor, CS 4496/7496 Computer Animation | Spring 2020- |
| Guest Lecturer, Simulation Methods for Animation and Digital Fabrication (CS15-467 at Carnegie Mellon University) | Spring 2016 |
| Guest Lecturer, Computer Animation (CS4496/CS7496 at Georgia Tech) | Spring 2015 |
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GRANT, AWARDS,
FELLOWSHIP AND
HONORS

- [A8] *Collaborative Project: Developing a Fast, Scalable, and Reliable Simulation Model for Quadrupedal Locomotion*, \$107,328, MORAI, PI March. 2022
- [A7] *Collaborative Project: Cross-morphology skill transfer for everyday household tasks*, \$100,000, META, PI March. 2022
- [A6] First place at the iGibson Challenge at CVPR 2021, June. 2021
- [A5] *Machine Learning Algorithms for Computer Vision and Robot*, \$60,000, Korea Ministry of Science and ICT, PI May. 2021
- [A4] *Buoyancy-assisted Collaborative Robots That are Cheap, Safe, and Never Fall Down.*, \$497,023.00, National Science Foundation, PI Oct. 2020
- [A3] 2020 IEEE Robotics and Automation Letters Outstanding Reviewer Award Sep. 2020
- [A2] A finalist in RSS Best Conference Paper Award (Top 3) Jul. 2017
- [A1] Korea Presidential Science Scholarship Jul. 2003
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PROFESSIONAL
ACTIVITIES

Program Committee: SIGGRAPH 2021, 2022, SIGGRAPH Asia 2019, AAAI 2020, 2021, CoRL 2022, MIG 2016

Conference Review: SIGGRAPH, SIGGRAPH Asia, Eurographics, RSS, ICRA, IROS, CoRL, AAAI

Journal Review: Science Robotics, Transactions on Graphics, Transactions on Robotics, International Journal of Robotics Research, Robotics and Automation Letter, Transactions on Visualization and Computer Graphics, PLOS One

MEDIA COVERAGE

[M7] Researchers develop a new robot that can efficiently navigate sidewalks in urban environments, In *Techxplore*

[M6] The Clever Clumsiness of a Robot Teaching Itself to Walk, In *Wired*

[M5] New Assistive Stairs Put a Spring in Your Step, In *Smithsonian*

[M4] These stairs recycle your energy so theyre easier to climb, In *PBS News Hours*

[M3] Robots Learning Judo Techniques to Fall Down Without Exploding, In *IEEE Spectrum*

[M2] An Algorithm Helps Robots Fall Safely, In *MIT Technology Review*

[M1] How to Fall Gracefully If Youre a Robot, In *Georgia Tech News Center*

OPEN SOURCE
SOFTWARE

[S2] PyDART, A Python Binding of Dynamic Animation and Robotics Toolkit, <http://pydart2.readthedocs.io>

[S1] DART, Dynamic Animation and Robotics Toolkit, <http://dartsim.github.io/>

Last update: March, 2022