Curriculum Vitae

Seungmoon Song

seungmoon.song@gmail.com
http://seungmoon.com

Current Position

Stanford University		Jun 2018 – present
Postdoctoral Fellow	Mechanical Engineering	Stanford, CA
Research	Exoskeletons for locomotion assistance	Jun 2017 – May 2018
Advisors	Steve Collins (Stanford University)	Pittsburgh, PA
	Chris Atkeson (Carnegie Mellon University)	

Education

Carnegie Mellon University		Aug 2010 – May 2017
Ph.D.	Robotics	Pittsburgh, PA
Research	Neuromuscular human locomotion control	
Advisor	Hartmut Geyer	
Virginia Tech		Aug 2008 – Aug 2010
M.S.	Electrical and Computer Engineering	Blacksburg, VA
Research	Walking controllers for humanoid robots	
Advisor	Dennis Hong	
ICU (*KAIST)	*summa cum laude*	Feb 2004 – Feb 2008
B.E.	Electrical and Communications Engineering	Daejeon, S. Korea
Minor	IT Business	
Research	Wireless communications	
Advisor	Jeongseok Ha	

* ICU (Information and Communications University) was Korea's IT-specialized university that merged with KAIST (Korea Advanced Institute of Science and Technology) in 2009.

Publications

Journal papers

S Song and H Geyer, "Predictive neuromechanical simulations indicate why walking performance declines with aging" *The Journal of Physiology*, 2018.

S Song and H Geyer, "Evaluation of a neuromechanical walking control model using disturbance experiments," *Frontiers in Computational Neuroscience*, 2017.

S Song and H Geyer, "A neural circuitry that emphasizes spinal feedback generates diverse behaviours of human locomotion," *The Journal of Physiology*, 2015.

Conference papers

A Rai, R Antonova, **S Song**, W Martin, H Geyer, CG Atkeson "Bayesian optimization using domain knowledge on the ATRIAS biped," *IEEE ICRA*, 2018.

S Song "Towards a hierarchical neuromuscular control model with reflex-based spinal control – a study with a simple running model," *International Symposium on Advanced Intelligent Systems*, 2015.

S Song and H Geyer, "Regulating speed in a neuromuscular human running model," *IEEE Humanoids*, 2015.

Z Batts, **S Song**, and H Geyer, "Toward a virtual neuromuscular control for robust walking in bipedal ro-

bots," *IEEE IROS*, 2015.
S Song, J Kim, and K Yamane, "Development of a bipedal robot that walks like an animation character," *IEEE ICRA*, 2015.
S Song, R Desai, and H Geyer, "Integration of an adaptive swing control into a neuromuscular human walking model," *IEEE EMBC*, 2013.
S Song and H Geyer, "Generalization of a muscle-reflex control model to 3D walking," *IEEE EMBC*, 2013.
S Song, C LaMontagna, SH Collins, and H Geyer, "The effect of foot compliance encoded in the windlass mechanism on the energetics of human walking," *IEEE EMBC*, 2013.
S Song and H Geyer, "Regulating speed and generating large transitions in a neuromuscular human walking model," *IEEE ICRA*, 2012.
S Song and H Geyer, "The energetic cost of adaptive feet in walking," *IEEE ROBIO*, 2011.
S Song, Y Ryoo, and D Hong, "Development of an omnidirectional walking engine for full-sized light-weight humanoid robots," *ASME IDETC*, 2011.
S Song, D Hwang, S Seo, J Ha, "Linear-Time Encodable Rate-Compatible Punctured LDPC Codes with Low Error Floors," *IEEE VTC*, 2008.

Conference abstracts
S Song, H Geyer, SH Collins, and CG Atkeson, "Towards predictive neuromechanical simulations for pathological gait and assistive devices," *World Congress of Biomechanics*, 2018.
A Falisse, G Serrancoli, C Dembia, **S Song**, I Jonkers, and F De Groote, "Computationally efficient predictive muscle-driven simulations of 3D walking," *World Congress of Biomechanics*, 2018.
S Song, Y Aucie, and G Torres-Oviedo, "Can split-belt treadmill walking be explained with a reflex-based model," *Neuroscience*, 2017.
S Song and H Geyer, "Modeling and exploring elderly walking with neuromechanical simulations," *Dynamic Walking*, 2017.
S Song and H Geyer, "A spinal reflex based neuromuscular model of human locomotion investigated against unexpected disturbances," *Neuroscience*, 2016.
S Song and H Geyer, "Testing a neuromuscular locomotion control model against human experiments," *Dynamic Walking*, 2016.
S Song and H Geyer, "Using a neuromuscular model of human locomotion to control bipedal robots," *Dynamic Walking*, 2015.
S Song and H Geyer, "Robust 3D locomotion models using primarily reflex control," *Dynamic Walking*, 2013.

Patents
J Kim, K Yamane, and **S Song**, Method for developing and controlling a robot to have movements matching an animation character, United States Patent 9427868, 2016.
J Nam, J An, D Hwang, J Ha, and **S Song**, Apparatus and method for encoding low density parity check code, Korean patent 10-0999272-00-00, 2010.

Invited talks
Universities in Europe, July 2018. EPFL, U Tübingen, U Stuttgart, Heidelberg U, TU Darmstadt, KU Leuven, U Twente. (1 hour)
Universities and research institutes in Korea, July 2017. Seoul National University, Korea Institute of Industrial Technology, Pohang University of Science and Technology, Korea Institute of Machinery and Materials, Inha University. (1 hour)
Universities and companies in Korea, November 2015. Chung-Ang University, Samsung Advanced Institute of Technology, KAIST, ROBOTIS, Seoul National University. (1 hour)
The 10th workshop on humanoid soccer robots at IEEE Humanoids, November 2015. (30 min)

Thesis papers
"The development, evaluation and applications of a neuromechanical control model of human locomotion," Ph.D. thesis, Robotics Institute, Carnegie Mellon University, 2017.
"Development of an Omni-directional Gait Generator and a Stabilization Feedback Controller for Humanoid Robots," M.S. thesis, ECE, Virginia Tech, 2010.

Other technical writings (in Korean)
"Understanding the control of human locomotion through simulation and its application to robotic assistive devices," MATERIC (research information center), February, 2016.
"Robotic lower-limb prosthetics related technical issues – 2. Control algorithm," ROBOT (monthly magazine), May, 2013.
"Robotic lower-limb prosthetics related technical issues – 1. Hardware," ROBOT (monthly magazine) April, 2013.

Related Professional Experience

Stanford University and **Carnegie Mellon University** Jun 2017 – present
Postdoctoral Fellow Mechanical Engineering (SU) Stanford, CA
Robotics (CMU) Pittsburgh, PA
Projects National Robotics Initiative, NSF
Tactical Assault Light Operator Suit, DARPA

Carnegie Mellon University Aug 2010 – May 2017
Research Associate Robotics Pittsburgh, PA
Projects ERC on Quality of Life Technology, NSF
National Center for Medical Rehabilitation Research, NICHD, NIH
Maximum Mobility and Manipulation Program, DARPA

Disney Research May 2014 – Aug 2014
Lab Associate Robotics (summer intern) Pittsburgh, PA
Research Develop and control animation-like bipedal robot

Carnegie Mellon University Aug 2013 – Dec 2013
Teaching Assistant Robotics Pittsburgh, PA
Class 16868 - Biomechanics and motor control of legged locomotion
Graduate level, 12 units (21 students)
Task: give lectures, design class projects, assist students, grade

Electrical and Telecommunications Research Institute Jan 2008 – Mar 2008
Student Intern Daejeon, S. Korea
Task Review real-time robot-motion-control interface programs

Honors & Competitions

2016~7 Richard King Mellon Foundation Presidential Fellowship in the Life Sciences at Carnegie Mellon University
2014~6 Hima and Jive Fellowship in Computer Science for International Students
2010 3rd place in the adult-size and 4th place in the kid-size humanoid league, RoboCup 2010
2010 Ford Engineering Scholarship from the Golden Key International Honour Society
2009 Tau Beta Pi Engineering Honor Society
2009 Golden Key International Honour Society
2008 Summa cum laude, ICU
2006 Science and Engineering National Scholarship, Korea Science and Engineering Foundation
2005,6 Finalist in the Competition of Radio & Wireless Engineering Prototypes
Radio Education and Research Center, South Korea
: Building Power Control System (2005), Ubiquitous Medical Information System (2006)

2004~6 Academic Scholarship, ICU
2004~7 All-expense scholarship, Ministry of Information and Communication, S. Korea

Service

Ad-hoc journal reviewer: Journal of the Royal Society Interface, Scientific Reports, ACM Transactions on Graphics, Advances in Mechanical Engineering, Human Movement Science
Ad-hoc conference reviewer: IEEE ICRA, IEEE IROS, IEEE Humanoids, IEEE BioRob, IEEE URAI