UCLA Samueli School of Engineering

Mechanical & Aerospace Engineering Special Robotics Seminar

Thursday, March 2nd, 2023, 12 PM – 1 PM Engineering IV, 38-138



Toward digital motor clones predictive neuromechanical simulation of human locomotion

Seungmoon Song

Assistant Professor Department of Mechanical and Industrial Engineering Northeastern University

ABSTRACT: This seminar will provide an overview and outlook of our research on neuromechanical simulations of human locomotion. Our long-term goal is to develop digital motor clones that predict how individuals move in novel scenarios, with significant implications for studying human physiology, testing assistive devices, and controlling robotic systems. We proposed a reflex-based control model that generates diverse human-like locomotion using a musculoskeletal model in physics simulations. The model has been extended to explain elderly gait, predict the performance of gait assistive ankle exoskeletons, and control robotic systems. I will discuss how we plan to customize these simulations to predict and explain assisted gaits of individuals, and develop versatile motor control models using deep reinforcement learning to cover atypical locomotion behaviors.

BIO: Seungmoon Song is an assistant professor in Mechanical and Industrial Engineering at Northeastern University. He directs the Neuromechanics of Movement Laboratory (NeuMove) where his team conduct research on modeling the biomechanics and motor control of human movement for improved physical performance and rehabilitation. Prof. Song received his B.E. with summa cum laude in Electrical and Communications Engineering in 2008 from KAIST (ICU) in South Korea. He received his M.S. in Electrical and Computer Engineering in 2010 from Virginia Tech, where he developed walking controllers for humanoid robots. He received his Ph.D. in Robotics in 2017 from Carnegie Mellon University and won the Presidential Fellowship for his research on computational neuromechanical models of human locomotion. As a postdoctoral fellow at Stanford University, he conducted research on human-in-the-loop optimization frameworks for gait assistive exoskeletons, organized the NeurIPS 2019: Learn to Move competition, and received the NIH Pathway to Independence Award (K99/R00)

Host: Tyler Clites, MAE, clites@ucla.edu