DECISION & CONTROL LECTURE SERIES

EFFICIENT ALGORITHMS FOR AGILE MULTI-CONTACT LOCOMOTION

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3:00PM-4:00PM
CSL Auditorium | BO2
Opening Reception 2:30PM RM 154 CSL

ABSTRACT:
Interaction with objects and environments is at the core of any manipulation or locomotion behavior, yet, robots mostly try to avoid physical interaction at all costs. This is in stark contrast with humans or animals, that not only constantly interact with their environment but also exploit these interactions to their advantage. Reasoning about contact interactions is a computationally daunting task and constitutes one of the main obstacle to robots seamlessly interacting with their environments. This talk will present our recent efforts towards breaking this complexity, leveraging both optimal control and reinforcement learning algorithms. First, we will show how the structure of physical interactions can be exploited to devise computationally efficient algorithms. Then we will present recent results using Bayesian optimization and reinforcement learning to render such solutions robust to environmental uncertainty. We will present experimental results for biped and quadruped robots as well as applications to manipulation.

BIO:
Ludovic Righetti is an Associate Professor in the Electrical and Computer Engineering Department and in the Mechanical and Aerospace Engineering Department at the Tandon School of Engineering of New York University and a Senior Researcher at the Max-Planck Institute for Intelligent Systems in Germany. He holds an engineering diploma in Computer Science and a Doctorate in Science from the Ecole Polytechnique Fédérale de Lausanne, Switzerland. He was previously a postdoctoral fellow at the University of Southern California prior to starting the Movement Generation and Control Group at the Max-Planck Institute for Intelligent Systems in Germany. He has received several awards, most notably the 2010 Georges Giralt PhD Award, the 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems Best Paper Award, the 2016 IEEE Robotics and Automation Society Early Career Award and the 2016 Heinz Maier-Leibnitz Prize. His research focuses on the planning and control of movements for autonomous robots, with a special emphasis on legged locomotion and manipulation. He is more broadly interested in questions at the intersection of decision making, automatic control, optimization, applied dynamical systems and machine learning and their applications to physical systems.

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