University of Rochester
Department of Electrical and Computer Engineering

Building Coordination into the Control of Robots

Dr. Matthew Travers

Wednesday, October 4th
12:00PM – 1:00PM
Computer Studies Building, Room 523

Abstract: Unmanned wheeled and tracked vehicles are great if the objective of a given deployment is to drive around relatively open terrains while avoiding obstacles. However, if we wish to place robots in complex environments, such as collapsed buildings, and hope that they will be able to move around to perform different tasks effectively, conventional robotic systems aren't necessarily that useful. This talk will support the belief that highly-articulated robots, such as snake-like systems, walking hexapods, humanoids, etc., provide possible solutions to the difficulties associated with successfully achieving high-level manipulation and locomotive objectives in complex, possibly unknown environments. However, while higher degrees of articulation theoretically provide greater movement capabilities (relative to those of wheeled and tracked vehicles), there is a direct tradeoff in terms of the complexity of having to simultaneously coordinate more degrees of freedom. This talk will present recent results that show how dynamic movement primitives, in which fixed joint-to-joint coordinated motion patterns in tasks as varied as object grasping, walking over piles of rocks, and slithering through unstructured terrains can be used to dramatically reduce the complexity of adaptively controlling the behaviors of different highly-articulated robots. A number of examples that demonstrate this concept implemented on different hardware platforms will be presented, as will future intended extensions to micro-scale locomotion.

Bio: Matt Travers is a Systems Scientist in the Robotics Institute at Carnegie Mellon, where he co-directs the Biorobotics Lab. He received his BS in Engineering Physics, as well as MS in Electrical and Computer Engineering from the University of Colorado at Boulder. Matt received his PhD from Northwestern, working in the former LIMs Laboratory. His research interests included biologically-inspired robots, optimal control and estimation, force control methods for novel platforms, motion planning, and micro-scale systems. He also has a very strong general interest in developing and deploying real systems in complex situations to solve difficult problems, e.g., search and rescue tasks following large-scale natural disasters.