Robophysics: physics meets robotics

About the talk

Nov 4, 10:30-11:30am

College Avenue Commons (CAVC) Auditorium

Robots will soon move from the factory floor and into our lives (e.g. autonomous cars, package delivery drones, and search-and-rescue devices). However, compared to living systems, robot capabilities in complex environments are limited. I believe the mindset and tools of physics can help facilitate the creation of robust self-propelled autonomous systems. This “robophysics” approach – the systematic search for novel dynamics and principles in robotic systems -- can aid the computer science and engineering approaches which have proven successful in less complex environments. The rapidly decreasing cost of constructing sophisticated robot models with easy access to significant computational power bodes well for such interactions. Drawing from examples in the work of my group and our collaborators, I will discuss how robophysical studies have inspired new physics questions in low dimensional dynamical systems (e.g. creation of analog quantum mechanics and gravity systems) and soft matter physics (e.g. emergent capabilities in ensembles of active “particles”), have been useful to develop insight for biological locomotion in complex terrain (e.g. control targets via optimizing geometric phase), and have begun to aid engineers in the creation of devices that begin to achieve life-like locomotor abilities on and within complex environments (e.g. semi-soft myriapod robots).

About the speaker

Daniel I. Goldman, PhD
Dunn Family Professor, School of Physics, Georgia Institute of Technology

Dan Goldman's research program broadly investigates the interaction of biological and physical systems with complex materials like granular media. In particular, he integrates laboratory experiment, computer simulation, and physical and mathematical models to discover principles of movement of a diversity of animals and robots in controlled laboratory substrates. Dr. Goldman joined Georgia Tech in 2007, where he is now a Georgia Power Professor of Excellence. Dr. Goldman is an adjunct member of the School of Biology and a member of the Interdisciplinary Bioengineering Graduate Program. He is a Fellow of the American Physical Society (2014), and has received an NSF CAREER/ PECASE award, a DARPA Young Faculty Award, a Burroughs Wellcome Fund Career Award at the Scientific Interface, and the UT Austin Outstanding PhD Dissertation in Physics (2002-2003).

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