1077-AH-2831   **Russ Tedrake*** (`russt@mit.edu`), 32 Vassar St., MIT 32-380, Cambridge, MA 02139. *Sum of Squares Optimization applied to Walking Robots and Robotic Birds.*

In this talk, I will present an algorithm which combines randomized motion planning algorithms, popular in robotics, with nonlinear region of attraction (ROA) estimation using sums of squares. I'll describe the application of these ideas to bipedal locomotion, quadrupedal locomotion over rough terrain, and small unmanned airplanes that dart through forests and land on a perch. These application domains have motivated a number extensions to the basic ROA analysis, include computations of finite-time invariance around trajectories, regions of attraction to limit cycles, and extensions to hybrid systems and stochastic systems. (Received September 22, 2011)