



## **MMAE SEMINAR**

**Wednesday, January 31, 2007**  
**E-1 BUILDING – CRAWFORD AUDITORIUM**  
**3:30 – 4:30 PM**

### **Design, Planning, and Control of Dynamic Robots in Challenging Environments**

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#### **Abstract**

My research is in the general area of robotics with specific attention to designing for, understanding, and exploiting the dynamics of mobile systems in the context of challenging environments. This talk presents two examples of my work in this area including a planning algorithm for high-speed rough-terrain unmanned ground vehicles (UGV) in emergency situations and the design of biomimetic robots that climb vertical surfaces.

The planning algorithm is based on the "trajectory space," a compact model-based representation of a robot's dynamic performance limits in rough, natural terrain. Simulation and experimental results on a small gasoline-powered UGV demonstrate the method's effectiveness on sloped and rough terrain.

Two climbing robots will be introduced, RiSE and Stickybot. Both robots employ three main design principles inspired by geckos: hierarchical compliance for distributing loads and conforming to surfaces over a range of length scales; a directional terrain contact model that permits smooth attachment and detachment; and force control that, in conjunction with compliance and the contact model, permits smooth reliable climbing.