**COLLOQUIUM**

Department of Computer Science and Engineering

University of South Carolina

### **Sampling-Based Motion Planning: From**

### **Intelligent CAD to Crowd Simulation to Protein Folding**

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Time: **1700-1800 (5:00pm-6:00pm)**

Place: **Swearingen 1A03 (Faculty Lounge)**

# Abstract

Motion planning arises in many application domains such as computer animation (digital actors), mixed reality systems and intelligent CAD (virtual prototyping and training), and even computational biology and chemistry (protein folding and drug design).  Surprisingly, one type of sampling-based planner, the probabilistic roadmap method (PRM), has proven effective on problems from all these domains.

In this talk, we describe the PRM framework and give an overview of some PRM variants developed in our group.  We describe in more detail our work related to virtual prototyping, crowd simulation, and protein folding.  For virtual prototyping, we show that in some cases a hybrid system incorporating both an automatic planner and haptic user input leads to superior results.  For crowd simulation, we describe PRM-based techniques for pursuit evasion, evacuation planning and architectural design.  Finally, we describe our application of PRMs to simulate molecular motions, such as protein and RNA folding.  More information regarding our work, including movies, can be found at http://parasol.tamu.edu/~amato/.

**Nancy M. Amato** is Unocal Professor and Interim Department Head of the Department of Computer Science and Engineering at Texas A&M University where she co-directs the Parasol Lab. Her main areas of research focus are motion planning and robotics, computational biology and geometry, and parallel and distributed computing. She received undergraduate degrees in Mathematical Sciences and Economics from Stanford University, and M.S. and Ph.D. degrees in Computer Science from UC Berkeley and the University of Illinois at Urbana-Champaign, respectively. She was an AT&T Bell Laboratories PhD Scholar, received an NSF CAREER Award, is a Distinguished Speaker for the ACM Distinguished Speakers Program, and was a Distinguished Lecturer for the IEEE Robotics and Automation Society. She served as the Editor-in-Chief of the IEEE/RSJ IROS Conference Paper Review Board and will be program chair for IEEE ICRA 2015. She was co-Chair of the National Center for Women in Information Technology (NCWIT) Academic Alliance, and currently serves on the CRA-W, CRA-E, and CDC committees. She is a Fellow of the American Association for the Advancement of Science (AAAS), a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), a Fellow of the World Technology Network (WTN).