The Department of Mechanical Engineering/College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar

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Lecture Title: Computing with Geometry

Friday, April 11, 2008, 11:30 AM, Room 301 Engineering Building

Abstract

In this talk I will describe our current efforts aimed at bridging the gap between function and shape in engineering design. In particular, I will focus on some of the fundamental geometric problems in the generation, editing and analysis of geometric objects. I will describe classes of functionally equivalent parts that satisfy prescribed functional requirements, that are computable, may be represented unambiguously by maximal elements in each class, and contain all other functional designs that perform the same function. Furthermore, our work in constrained geometric deformations of solid models provides an intuitive way to create and edit solid models while preserving geometric invariants in a manner independent of any existing parametrization. At the same time, our efforts in detecting, quantifying and eliminating malfunctions of mechanical systems due to geometric singularities (i.e., singularities in the envelopes of moving geometric objects) provide the first known solutions to some of the important open problems in sweeping moving solids without requiring any envelope computations. Finally, I will review our current (but necessarily long term) research efforts aimed at turning synthetic proteins into functional nano-machines.

Biography

Horea Ilies has been an Assistant Professor of Mechanical Engineering at the University of Connecticut since August 2004, where he established the Computational Design Laboratory. Prior to that, he spent several years with Ford Motor Company in research, manufacturing, and product design and development. He holds a Ph.D. degree in Mechanical Engineering from University of Wisconsin -Madison, and received M.S. degrees in Mechanics and ME from Michigan State University, and Technical University of Cluj, Romania. His current research interests include geometric and physical computing, shape synthesis and geometric reasoning, as well as biomolecular simulations. Horea received the NSF CAREER award in 2007.

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