

## Mining experimental data for dynamical invariants – from cognitive robotics to biomechanics and computational biology

### *Abstract*

This talk will describe new active learning processes for automated modeling of dynamical systems across a number of disciplines. One of the long-standing challenges in robotics is achieving robust and adaptive performance under uncertainty. One approach to adaptive behavior based on self-modeling, where a system continuously evolves multiple simulators of itself in order to make useful predictions. The robot is rewarded for actions that cause disagreement among predictions of different candidate simulators, thereby elucidating uncertainties. The concept of self modeling will then be generalized to other systems, demonstrating how analytical invariants can be derived automatically for physical systems purely from observation. Application to modeling physical and biological systems will be shown.

## Engineering Neuroscience & Health

### Seminar Series

#### Presents:

**Dr. Hod Lipson**  
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**Monday**  
**September 8, 2008**  
**4:00 p.m.**

**Refreshments will be served 3– 4 p.m.**

#### Locations:

*Seminar is simultaneously presented*

**UPC: HNB 100 - LIVE**  
**Hedco Neurosciences Building**

UPC Campus Map/Directions:  
<http://www.usc.edu/about/visit/upc/>

**HSC: 147 - Video Conference**  
**Center for the Health Professional**

HSC Campus Map/Directions:  
<http://www.usc.edu/about/visit/hsc/>

### *Biography*



Hod Lipson is an Associate Professor of Mechanical & Aerospace Engineering and Computing & Information Science at Cornell University in Ithaca, NY. He directs the Computational Synthesis group, which focuses on novel ways for automatic design, fabrication and adaptation of virtual and physical machines. He has led work in areas such as evolutionary robotics, multi-material functional rapid prototyping, machine self-replication and programmable self-assembly. Lipson received his Ph.D. from the Technion - Israel Institute of Technology in 1998, and continued to a postdoc at Brandeis University and MIT. His research focuses primarily on biologically-inspired approaches, as they bring new ideas to engineering and new engineering insights into biology. For more information visit

<http://www.mae.cornell.edu/lipson>.

### Web Cast

<http://capture.usc.edu/college/Catalog/?cid=af180d48-ceff-42b9-a35c-eb199daed320>

**Information about all seminars can be found at**

<http://www-clmc.usc.edu/~heiko/ENH>