

# Engineering Neuroscience & Health

Department of Biomedical Engineering

Division of Biokinesiology and Physical Therapy



## SEMINAR SERIES



**Presents:**

**Dr. Art Kuo**

University of Michigan

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**Monday**

**March 30, 2009**

**4:00 p.m.**

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

### **Mechanics and Control of Human Locomotion: Let Your Physics do the Walking**

A. D. Kuo,

Depts. of Mechanical Engineering & Biomedical Engineering

University of Michigan

Human walking requires considerable coordination, with the central nervous system orchestrating the activity of many muscles in the upper and lower body. The body expends effort both to control the motion and to provide energy. But just how much control is needed, and where does the energy go? To answer these questions we might consider just how little control and energy are needed. Passive walking machines are two-legged mechanisms that can walk down a gentle slope with no control whatsoever and no external energy input. They can also walk on level ground with a very small amount of power. We will consider whether humans harness the passive dynamic properties of the limbs when they walk. A series of experiments explores whether these properties can predict how much energy humans use during walking, and whether they can simplify the control of balance. Finally, we will examine applications to prosthetics and rehabilitation.

#### **BIOSKETCH**

##### **DEGREES**

Ph.D., Mechanical Engineering, Stanford University, 1993

M.S., Mechanical Engineering, Stanford University, 1993

B.S., Electrical Engineering, University of Illinois, 1987

##### **RESEARCH INTERESTS**

Dynamics and control of human movement; multi-body dynamics; sensorimotor control models of human balance; automatic generation of dynamical equations of motion; passive dynamic walking; age-related changes in balance control.

#### **Locations:**

*Seminar is simultaneously presented*

**UPC: HNB 100 – LIVE**

**Hedco Neurosciences Building**

UPC Campus Map/Directions:

<http://www.usc.edu/about/visit/upc/>

**HSC: CHP 147 - Video Conference**

**Center for the Health Professional**

HSC Campus Map/Directions:

<http://www.usc.edu/about/visit/hsc/>

#### **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>