An Introduction to Structural Health Monitoring

to be held at
Arizona State University
Tempe Campus
University Club (Traditions Room)
February 23, 2010
8:00 AM - 5:00 PM

About the Instructors

Dr. Charles “Chuck” Farrar

Dr. Farrar is currently the director of the Engineering Institute at Los Alamos National Laboratory, which focuses on developing SHM and model validation technology.

Dr. Gyuhae Park

Dr. Park is currently a Technical Staff Member assigned to the Engineering Institute at Los Alamos National Laboratory where he develops active-sensing approaches for damage detection.

Prof. Michael Todd

Prof. Todd is currently Associate Professor of Structural Engineering and lead for Engineering Institute activities at UC San Diego. Mike was awarded the SHM “Person of the Year” award at the 2005 International Workshop on SHM.

Location, Lodging & Transportation Information

Attendees are responsible for their own transportation and lodging. Local lodging info will be available on the AIMS website by January 8th:

http://aims.engineering.asu.edu/

Parking information will be sent to registrants in February.

Registration Form

Direct questions to Kay.Vasley@asu.edu

Fax to: Mail to:
Attn: Kay Vasley Arizona State University
(480) 727-9321 OR P.O. Box 876106
Early Registration* Tempe, AZ 85287-6106
Non ASU Student Registration Fee** Attn: Kay Vasley
US $500
US $200

Please circle one:
Full Registration Fee: US $600
Early Registration* US $500
Non ASU Student Registration Fee** US $200
ASU Student Registration Fee** US $100

** Reduced fee applies only to fulltime students
(Class size limited to 50 participants.)

Course Fees Include:
Course notes (hardcopy & CD-ROM), lunch and afternoon refreshments, certificate of completion, meeting facilities, and individual consultation with instructors.

Name: ____________________________
E-mail Address: ____________________________
Company: ____________________________
Mailing Address: ____________________________
City/State/ZIP: ____________________________
Phone Number: ____________________________
FAX Number: ____________________________

Make Checks (US Dollars) Payable to: ASU

* To qualify for early registration discount, form must be received by FAX or postmarked by January 25, 2010
An Introduction to Structural Health Monitoring

Structural Health Monitoring Using Statistical Pattern Recognition will introduce engineers to the most recently developed techniques for detection and location of damage in structures from changes in their measured dynamic properties. In addition to the historical motivation and development of the methods, the course will cover the theory, application, and computerized implementation of this technology. Many real-world examples and results will be presented from the fields of aerospace, civil, and mechanical engineering. The application of techniques involving statistical pattern recognition will be emphasized.

Course Outline

Introduction
- Motivation for SHM
- Fundamental Axioms of SHM
- Statistical pattern recognition paradigm for SHM
- Brief Historical overview
- Operational evaluation

Data Acquisition Overview
- Excitation
- Sensing
- Data storage
- Telemetry
- Sensor network paradigms
- Embedded Sensing (passive and active)
- Sensor System Power Consideration & Energy Harvesting
- Emerging Sensing Technologies

Sensing System Examples
- Optimizing excitation and sensors for damage observability
- Wireless sensor networks
- Wireless energy delivery
- Fiber optic networks for bridge applications

Extracting Damage Sensitive Features from Sensor Data
- Feature selection criteria
- Waveform Comparisons
- Physical model parameters
- Data-Based model parameters
- Residual errors from model predictions

Statistical Classification of Features
- Unsupervised Learning Methods
- Supervised Learning Methods
- Data Normalization

Examples/Applications
- 8 DOF mass and spring systems
- A fast patrol boat
- A three story building model
- Amusement Park Ride

To ensure top-quality content, the instructors reserve the right to alter the course schedule.