



<http://www.navair.navy.mil/>



Center of Excellence in Structural Health Monitoring

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Associate Professor of Engng Science & Mech

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Professor of Aerospace Engng

WELCOME



Meeting Purpose

- Introduce the new Center
- Showcase ongoing projects
- Provide membership information
- Update on the state of the art, recent breakthroughs, future directions, and technology needs



<http://infohost.nmt.edu/~armiller/bridgefu.htm>



Yona Power Plant
(Courtesy of Yona Power)





What is SHM?



- Act of assessing the well-being of a **structure or system** to decide if its functionality has been diminished
- Analysis of SHM data is used to determine **fitness-for-service** (diagnostics) and **remaining useful life** (prognostics)
- Goal of SHM is to keep the public as **safe** as practical using **cost effective technologies**

Sensor technologies are key!

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What is SHM?

- Structural Health Monitoring (SHM)
- Health and Usage Monitoring Systems (HUMS)
- Structural Integrity Prognosis Systems (SIPS)
- Integrated Vehicle Health Management (IVHM)
- Condition Based Maintenance (CBM)
- Nondestructive Evaluation (NDE) upon demand and with a baseline

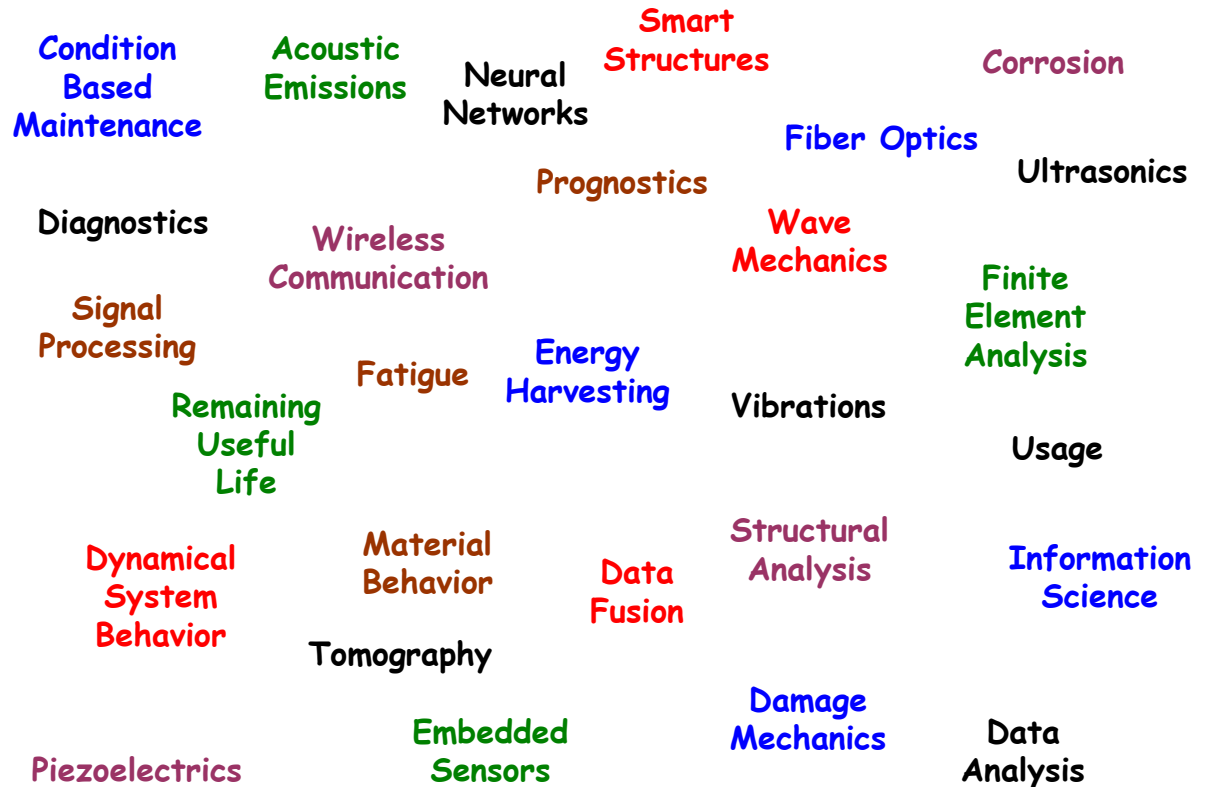
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SHM is Multidisciplinary



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SHM is Dynamic & Growing

- **Journals**
 - Structural Health Monitoring
 - Journal of Intelligent Material Systems
 - Smart Materials and Structures
 - Structural Control and Systems
 - Phil Trans Roy Soc A Vol 365 Issue 1851 (2007)
- **Conferences/Meetings**
 - International Workshop September 11-13, 2007
Stanford, CA USA
 - Asia-Pacific Workshop December 4-6, 2006 at
Yokohama, Japan
 - European Workshop July 5-7, 2006 at Granada,
Spain
 - Integrated Systems Health Management August 6-
9, 2007
 - SPIE, QNDE, ASME, ASNT, etc.

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SHM is Dynamic & Growing

- Others

- Energy Harvesting for Structural Health Monitoring Sensor Networks, Los Alamos National Laboratory Report LA-14314-MS, 2007
- A Review of Structural Health Monitoring Literature: 1996-2001, Los Alamos National Laboratory Report LA-13976-MS, 2003
- Staszewski, W., Boller, C., and Tomlinson, G.R., 2004, *Health Monitoring of Aerospace Structures: Smart Sensor Technologies and Signal Processing*, John Wiley Publishers
- ASCE Structural Health Monitoring Committee
<http://cive.seas.wustl.edu/wusceel/asce.shm/>

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CoE SHM



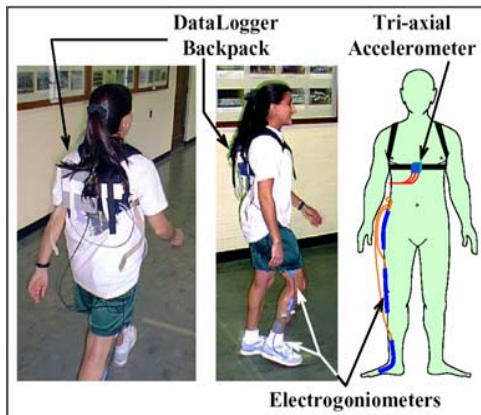
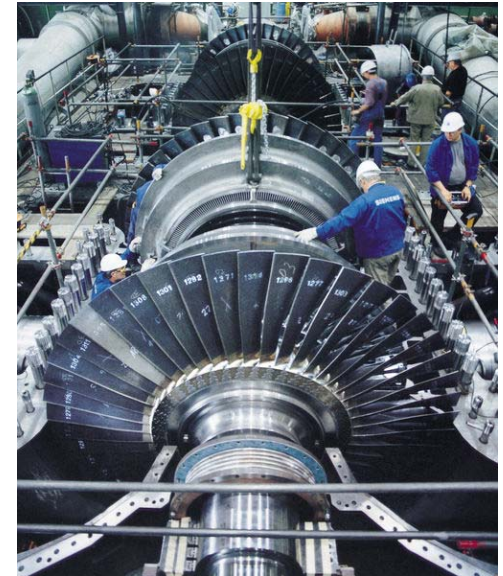
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- **Mission**
 - Improve public safety by advancing the state of the art in SHM and providing engineering technology for member companies doing business in SHM
- **Objectives**
 - Spur the research and development of new technologies that will improve public safety
 - Transfer technology to member companies to give them a competitive advantage
 - Make PA a hotspot for structural health monitoring, creating a new high tech job market that will provide jobs for residents and draw people to PA
 - Train students to provide an outstanding workforce pool

CoE SHM Working Groups

- Aerospace
- Machine Diagnostics
- Civil Infrastructure
- Biomedical



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Penn State Faculty Participants

- ESM – Lissenden, Rose, Cusumano, Tittmann, Todd, Urquidi-Macdonald, Costanzo
- AERSP – Smith
- ARL – Reichard, Conlon
- CE – Lopez de Murphy, Chehab, Sinha
- ME - Trethewey
- EE – Zhang
- Food Science - Coupland

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Corporate Membership

- **Full Membership** – voting rights, 1 day consulting visit, visibility through corporate profile on website, short courses, newsletter, meetings
 - Large Companies - \$20,000/year
 - Small Companies - \$8,000/year
- **Associate Membership** – short courses, newsletter, meetings
 - Large Companies - \$10,000/year
 - Small Companies - \$4,000/year

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We Want Your Feedback

- Break Out Groups
 - Defining SHM needs
 - Benefits of Center Participation
- Wrap Up Session
- Informally

Enjoy The Meeting!