2009-2010

Graduate Seminar Series

The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

Assistant Professor Bo Chen
Michigan Technological University

Dr. Bo Chen is an Assistant Professor in the Department of Mechanical Engineering – Engineering Mechanics and the Department of Electrical & Computer Engineering at Michigan Technological University. She received her Ph.D. degree in mechanical engineering from the University of California, Davis, in 2005. Dr. Chen conducts interdisciplinary researches in the areas of artificial immune systems, pattern recognition, mobile agent systems, sensor networks, and vehicle controllers. Dr. Chen has authored or co-authored over 45 refereed journal and conference papers. She received the Best Paper Award at 2008 IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications. Dr. Chen has been very active in ASME and IEEE societies and served as Symposium Chair or Session Chair for several international conferences. She is a member of the executive committee of the technical committee on MESA (Mechatronic and Embedded Systems and Applications), Division of Design Engineering of ASME.

Thursday, Jan. 14, 2010 3:00 – 4:00 p.m. Room 112, ME-EM Bldg.

Building Adaptive Monitoring Networks: Applying Lessons Learned from Biological Systems

This presentation introduces research activities in the Laboratory of Intelligent Mechatronics and Embedded Systems in the Department of Mechanical Engineering – Engineering Mechanics at Michigan Tech, with a focus on the development of adaptive monitoring networks using biological system concepts and mechanisms. Technology is taking us to a world where numerous networked devices interact with the physical world in multiple ways and at multiple scales. The future distributed systems will need to possess much higher quality comparing to those of today in terms of adaptability, autonomy, and reliability due to the increased complexity of systems and unpredictable working conditions. The fundamental research challenge is to establish robust decentralized computing systems that interact with physical world, be capable of operating under changing environments, and exhibit the desired response behavior under physical constraints. The biological systems are able to handle many of these challenges much more efficient than engineered systems. Motivated by the adaptive sensing and emergent pattern recognition capabilities of the natural immune system, we employ an immune-inspired approach to achieve adaptive monitoring and anomaly detection. The presented approach establishes a new monitoring paradigm by embodying desirable immune attributes, such as adaptation, immune pattern recognition, and self-organization, into monitoring networks. In the immune-inspired monitoring paradigm, a group of autonomous mobile monitoring agents mimic immune cells (such as B-cells) in the natural immune system, interact locally with monitoring environment, and respond to emerging problems through simulated immune responses.

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