

Department of Systems Engineering and Engineering Management

Seminar Series

Physical Model-based Engineering Products and Systems Design with Assured Reliability and Resilience: Methodologies and Applications

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Assistant Professor

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Date: 4 July 2019 (Thursday)

Time: 10:30am-11:30am

Venue: P7303, Yeung Kin Man Academic Building (YEUNG), City University of Hong Kong

Abstract

Computer simulation models have been extensively used for various purposes. Unfortunately, there is no perfect model that can approximate the real physical systems without any error. In model-based reliability analysis, significant design errors could be introduced if ignoring the model error. To ensure required reliability, methodologies and strategies are proposed considering various uncertainty sources under realistic scenarios. Furthermore, most engineering systems are currently designed with a passive and fixed design capacity and, therefore, may become unreliable in the presence of adverse events. Recently, proactive maintenance decisions have been enabled through the development of Prognostics and Health Management (PHM) methods that detect, diagnose, and predict the effects of adverse events. Capitalizing on PHM technology at an early design stage can transform passively reliable systems into adaptively reliable (or resilient) systems while considerably reducing their life cycle cost. Methodologies in statistical model validation and PHM are hence proposed to design reliable and resilient engineering systems. Case studies including the vehicle structure design, lithium-ion battery, microgrid design, and additive manufacturing will be presented to demonstrate the proposed methodology.

About the Speaker

Zhimin Xi is an Assistant Professor in the Department of Industrial and Systems Engineering at the Rutgers University – New Brunswick. He received his B.S. and M.S. degree in Mechanical Engineering at the University of Science and Technology Beijing in 2001 and 2004, respectively. He obtained his Ph.D. in Reliability Engineering at the University of Maryland – College Park in 2010. His research interests include reliability and safety for energy storage systems, design for reliable energy systems, prognostics and health management for engineering systems, model validation under uncertainty, and system reliability analysis. He has published more than 60 papers in prestigious journals and peer-reviewed conference proceedings. He is the recipient of 2016 DARPA (Defense Advanced Research Projects Agency) - Young Faculty Award. He is the winners of multiple (including twice Top 10) Best Paper Awards from ASME – Design Automation Conference in 2008, 2011, 2013, and 2015 respectively. His research has been supported by National Science Foundation, DARPA, Department of Energy, Ford Motor Company, Denso North American Foundation, and The Woodbridge Group. He is a member of IISE, ASME, and IEEE and currently serves as an associate editor for the journal of Energy Systems.

All are Welcome!