

Mechanical Engineering Faculty Candidate Seminar

Fault Diagnostics and Failure Prognostics for Predictive Maintenance of Engineered Systems

Tuesday, January 28, 11am-12pm; EIS-320

Abstract: Failures of engineered systems could not only result in enormous repair/replacement costs, but also cause lifethreatening consequences such as explosion and fire. Since the 1980s, major industries and government agencies worldwide have faced increasing challenges in ensuring the reliability and safety of engineered systems, including lithium-ion batteries and rolling-element bearings. In response to these challenges, a number of prognostics and health management (PHM) techniques have recently been developed. These techniques utilize sensor signals collected from an operating system to monitor the system's health, predict its remaining useful life, and ultimately prevent catastrophic failures from occurring via predictive maintenance. This talk will give an overview of PHM and discuss several core techniques for fault diagnostics and failure prognostics. Two industrial applications, namely i) modelbased prognostics of lithium-ion battery and ii) data-driven diagnostics of rolling-element bearings, will be used for the demonstration of the techniques.



Dr. Chao Hu

BIO: Dr. Chao Hu received his B.E. degree in Engineering Physics from Tsinghua University in Beijing, China in 2007 and the Ph.D. degree in Mechanical Engineering at the University of Maryland, College Park in Maryland in 2011. He worked as a Principal Scientist at Medtronic, Inc. in Minnesota from 2011 to 2015. He is currently an Assistant Professor of Mechanical Engineering at Iowa State University. His research interests are engineering design under uncertainty, state-of-health and state-of-life estimation of lithium-ion batteries, and prognostics and health management (PHM). Dr. Hu has received several awards and recognitions for his research, including: the Best Track Paper Award at the IISE Annual Conference & Expo in 2019; the ASME Design Automation Young Investigator Award in 2018; the Highly Cited Research Paper 2012-2013 in the Journal of Applied Energy in 2015; the Star of Excellence Individual Award at Medtronic in 2014; and the Best Paper Awards at the ASME Design Automation Conference and the IEEE PHM Conference in 2013 and 2012, respectively.

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