UNIVERSITY OF CENTRAL FLORIDA | ORLANDO

College of Engineering and Computer Science

FACULTY RESEARCH TALKS

LISTEN. LEARN. COLLABORATE.

Zoom talk | Friday, March 5, 2021 | Noon to 1 p.m.

PRESENTER 1:
ERIC J. RUGGIERO
Engineering Leader, GE Aviation

Industry Partner Spotlight: GE Aviation

In the past five years, the intersection of high speed microprocessors, inexpensive data storage and wireless communication technology has led to a paradigm shift in how physical assets are operated and monitored. While the use of prognostic health monitoring has been commonplace in military aircraft products over the past two decades or more, this paradigm shift has now bridged and expanded into the commercial aviation marketspace. Leveraging GE's deep domain knowledge with data streams from engine assets is at the heart of the digital industrial revolution.

Digital industrial is more than just data. It's maximizing value for customer fleets in several ways, including: asset monitoring to help reduce unplanned maintenance and inspection burden; fleet optimization to ensure flight paths and fuel burn are as efficient as possible; and improved reliability to understand changes in operation severity that may adversely affect the performance of the product.

Advanced manufacturing, including the advent of large-scale 3D printing, encompasses the intersection of digital and manufacturing technologies. The initial performance and geometry of aircraft engine components is the beginning of the digital twin life of every asset deployed in the field. Digital twin asset models thereby demand integration of sensor and inspection technology on the manufacturing shop floor, at levels never before demanded of supply chains.

This presentation will illustrate the framework that makes the digital industrial possible in the aircraft engine industry, connecting the dots between sensors, digital twin models and analytics to provide additional value to the customer. Examples will be provided to illustrate how analytics are used to help the customer and product. The presentation will also discuss some of the challenges facing industry today, providing context for future research directions.

Dr. Ruggiero received his Ph.D. from Virginia Polytechnic Institute in mechanical engineering in 2005 as a National Science Foundation graduate research fellow. Upon graduation, he started his industrial research career at GE Research in Niskayuna, NY, where he led global research teams on the innovation, design, testing and validation of advanced cooling schemes for gas turbines. In 2014, he moved to GE Aviation in Cincinnati, OH where he led aero and thermal engineering teams in services engineering, advanced military engineering and most recently, advanced military pursuits within GE Edison Works. He has published more than 30 peer-reviewed manuscripts, issued more than 30 patents and has received numerous awards from AIAA and ASME, including the 2013 AIAA Lawrence Sperry Award and an invitation to the 2013 and 2017 NAE EU-US Frontiers of Engineering Forums. He is an associate fellow of the AIAA and a fellow of the ASME. You can follow him on Twitter @EricRuggieroGE.

ZOOM LINK: https://bit.ly/35unuVe | QUESTIONS? Email Jennifer.Sutton@ucf.edu

For more information, and to see previous talks, visit www.cecs.ucf.edu/faculty-research-talks

UNIVERSITY OF CENTRAL FLORIDA | ORLANDO

College of Engineering and Computer Science

FACULTY RESEARCH TALKS

LISTEN. LEARN. COLLABORATE.

Zoom talk | Friday, March 5, 2021 | Noon to 1 p.m.

PRESENTER 2:

YOAV PELES

Professor and Chair, Mechanical and Aerospace Engineering

Thermal Management: Leveraging the Micro Scale to Solve Macro-Scale Problems

This presentation will discuss the need for better and more effective methods to support the ever-increasing capabilities of high-power electronics, including the main research endeavors pertinent to convective cooling at the micro scale. These include single-phase flow, flow boiling, flow condensation, supercritical flow and various enhancement techniques, such as jet impingement, surface modifications, synthetic jets, pin fins, etc.

Dr. Peles is an international leader in the field of convective heat transfer in micro domains. Before joining UCF, he was the director of the mechanical engineering program and the associate department head for graduate studies in the Department of Mechanical, Aerospace and Nuclear Engineering at Rensselaer Polytechnic Institute. He has helped advance fundamental and applied knowledge pertinent to single-phase, flow boiling, flow condensation and adiabatic two-phase flow at the micro scale. He has published 120 peer reviewed journal papers, 60 conference papers, has several patents, written four book chapters and is the author of a book titled Contemporary Perspective on Flow Boiling Instabilities in Microchannels. Dr. Peles has organized numerous international conferences and workshops. Most recently, he served as chair of the NSF Workshop on New Frontiers of Thermal Transport. He received the ONR Young Investigator Award in 2005 and the DARPA/MTO Young Faculty Award in 2007. He is also a fellow of the American Society of Mechanical Engineering.

PRESENTER 3:

RICHARD BLAIR

Professor, Florida Space Institute, Renewable Energy and Chemical Transformations Cluster

Mechanically Facilitated Chemistry: Challenges and Opportunities

Mechanochemical processes can greatly improve catalytic and synthetic chemistry. The implementation of these processes requires an understanding of the mechanical behavior of reaction components as well as surface chemistry. Enhanced reactivity is realized through the generation of defects and high surface energies. Under mechanical force, h-BN becomes an active hydrogenation catalyst. Scale-up requires understanding of these mechanical interactions. Several processes, developed in the Blair lab, have been scaled to industrially-relevant multi-ton levels.

Dr. Blair earned his B.S. in chemistry and mathematics from Hope College in Holland, MI. After receiving an M.S. in physical chemistry from the University of California Berkeley, he continued his graduate education at the University of California Los Angeles and received a Ph.D. in materials chemistry. He is developing new defect-laden heterogeneous catalysts for hydrogenation, CO_2 reduction, hydrodenitrogenation and oxidative methane coupling. Additionally, he is seeking to address scalability in mechanochemical syntheses for the realization of industrially-relevant processes and investigating solid-state heat sources for future NASA missions.

ZOOM LINK: https://bit.ly/35unuVe | QUESTIONS? Email Jennifer.Sutton@ucf.edu

For more information, and to see previous talks, visit www.cecs.ucf.edu/faculty-research-talks