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Professor

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Date: Friday April 22

Time: 1:00-1:50 PM CT

Zoom Meeting ID: 970 7656 5407

Password: 477211

Sensing and Data Analytics for Smart Additive Manufacturing

Abstract: Additive manufacturing (AM) enables seamless integration of product design and manufacturing phases and thus offers significant advantages over conventional manufacturing. Despite the enormous progress in recent AM technologies, certain intractable quality issues persist. These product defects lead to considerable rework and scrap rates and thus pose significant impediments to the sustainability of AM. Consequently, there is a vital need to advance online defect detection and mitigation methods in AM processes. Incipient process anomalies can be identified and possibly prevented at an early stage of manufacturing. With the above focus, this talk will introduce some of the ongoing research related to real-time in situ process monitoring for AM performed in the Smart Manufacturing Analytics Research and Technology (SMART) Laboratory at Virginia Tech. The topics cover: smart AM platform development, advanced optical sensing technique for AM; applications of machine learning for real-time process monitoring in AM; 3D point cloud-based dimensional integrity assessment for AM; and real-time sensing-based process monitoring for AM cybersecurity.

Biography: Dr. Zhenyu (James) Kong is a professor with the Grado Department of Industrial and Systems Engineering at Virginia Tech. He received his Ph.D. from the Department of Industrial and System Engineering at the University of Wisconsin-Madison in 2004 and the B.S. and M.S. in Mechanical Engineering from the Harbin Institute of Technology, China, in 1993 and 1995, respectively. His research focuses on sensing and analytics for smart manufacturing and modeling/synthesis/diagnosis for large and complex manufacturing systems. His external research funding amounts to over \$20M with a personal share of ~\$5M sponsored by the US federal agencies such as NSF, DoE, DoD, ONR, and DoEd, as well as industries. He has published over 100 journal and conference papers. His research contributions have been recognized by eight Best Paper/Poster-related awards in IISE annual conference, INFORMS annual meeting, and IISE Transactions, and featured five times by IISE magazines. He has been honored with several awards, including one of the 20 Most Influential Academics in Smart Manufacturing honored by SME's Smart Manufacturing Magazine in 2021; Fellow of ASME in 2022; Fellow of IISE in 2020; the Dean's Award for Research Excellence in 2019, College of Engineering, Virginia Tech. He is currently the Editor for IISE Transactions (Focused Issue on Design and Manufacturing).