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"The Convergence of Nanomanufacturing and Artificial Intelligence: Current and Future Challenges and Opportunities"

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Bio: Kira Barton is a Professor in the Robotics and Mechanical Engineering Departments at the University of Michigan. She received her B.Sc. in Mechanical Engineering from the University of Colorado at Boulder in 2001, and her M.Sc. and Ph.D. in Mechanical Engineering from the University of Illinois at Urbana-Champaign in 2006 and 2010. She is also serving as the Associate Director for the Automotive Research Center, a University-based U.S. Army Center of Excellence for modeling and simulation of military and civilian ground systems. She was a Miller Faculty Scholar for the University of Michigan from 2017 – 2020. Prof. Barton's research specializes in advancements in modeling, sensing, and control for applications in smart manufacturing and robotics, with a specialization in learning and micro/nano additive manufacturing systems. Kira is the recipient of an NSF CAREER Award in 2014, 2015 SME Outstanding Young Manufacturing Engineer Award, the 2015 University of Illinois, Department of Mechanical Science and Engineering Outstanding Young Alumni Award, the 2016 University of Michigan, Department of Mechanical Engineering Department Achievement Award, and the 2017 ASME Dynamic Systems and Control Young Investigator Award. Kira was named 1 of 25 leaders transforming manufacturing by SME in 2022, and was selected as one of the 2022 winners of the Manufacturing Leadership Award from the Manufacturing Leadership Council. She became an ASME fellow in 2024.

Abstract: Advancements in high-fidelity / high-speed sensing, data processing, and computational power have created new opportunities for digital additive manufacturing. This is particularly true for nanomanufacturing processes, for which the fundamental physics are represented by complex nonlinear dynamics, rendering data-driven techniques a promising approach for characterizing the interactions between materials-process-part functionality. Artificial intelligence tools represent a broad range of algorithms capable of leveraging data to synthesize new materials, optimize process parameters, and characterize complex material-process interactions. This talk provides examples of the incorporation of AI in nanomanufacturing. Opportunities and challenges associated with the convergence of AI and nanomanufacturing will be discussed.