College of Engineering
Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

3:00-3:50pm, Friday, March 18th, 2016
Frank H. Walk Design Presentation Room

Additive Manufacturing: Strategies for Improved Manufacturability and Security

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The growth rate of 3D printing market from 2011 onward is evaluated to be over 20% each year, fastest of any R&D and industrial manufacturing sector. On demand manufacturing, customization of every manufactured part, cloud-based global supply chain, and use of the same machine to print a variety of parts are some of the strengths of this manufacturing technique. This presentation is focused on two aspects of additive manufacturing (AM) challenges: manufacturability and security. First, there are several useful compositions of composite materials that cannot be manufactured by traditional methods. Examples of such composite materials will be discussed with the AM techniques that have successfully manufactured them. Second, a new paradigm is proposed to insert security features in AM techniques through innovative CAD designs. Examples of CAD design features that can only be printed with a specific setting are discussed for use as security measures. These innovative CAD design strategies can be used in addition to file encryption and other cybersecurity tools. Security of cyber-physical systems such as 3D printing is a significant challenges as inside or outside attaches can go undetected but cause havoc on the manufacturing process and the quality of the component.

* Dr. Nikhil Gupta obtained his Ph.D. from LSU in 2003. Currently, he is an Associate Professor in the Mechanical and Aerospace Engineering Department at the New York University Tandon School of Engineering. He directs the Composite Materials and Mechanics Laboratory. His research interests include developing lightweight advanced composite materials, dynamic properties of materials, and additive manufacturing methods. His research is supported by The Office of Naval Research, National Science Foundation, Department of Energy and industry. Dr. Gupta has two issued patents, authored over 130 journal papers and book chapters, four books, and presented over 50 keynote and invited lectures. His research has been covered in videos produced by Discovery Channel, Scientific American, Reuters and articles published by National Geographic, Scientific American, American Ceramic Society, Wards Auto, and numerous popular news outlets.