MIT Industrial Liaison Program Faculty Knowledgebase Report

COVID-19 and Manufacturing: Digital Twins

June 16, 2020 11:00 am - 12:00 pm

11:00am - 12:00pm

Digital Twins: The Vision. And Demystified.
Brian W Anthony

Associate Director, MIT.nano
Director of Technical Operations, Center for Clinical and Translational Research

Brian W Anthony

Associate Director, MIT.nano
Director of Technical Operations, Center for Clinical and Translational Research

Dr. Brian Anthony is a leading expert in the design of intelligent, or smart, instruments and methodologies for monitoring, measuring, and controlling complex physical systems. His interdisciplinary work spans mechanical, electrical, and optical engineering, seamlessly integrated with computer science and optimization, to deliver innovative solutions across manufacturing, healthcare, and other industries.

At the core of Dr. Anthony's research is computational instrumentation—the development of advanced tools and techniques to observe and manage intricate systems, particularly in manufacturing and medical diagnostics. His contributions include pioneering measurement and imaging technologies that enhance precision and performance in both industrial and clinical settings.

With over 30 years of experience, Dr. Anthony combines deep academic insight with practical industry expertise in technology innovation, product development, and entrepreneurship. He has successfully guided market-driven solutions from concept to commercialization, especially at the intersection of information technology and advanced manufacturing. His achievements include receiving an Emmy Award from the Academy of Television Arts and Sciences for technical innovation in broadcast engineering.

In the classroom, Dr. Anthony is dedicated to teaching the modeling and analysis of large-scale systems to support decision-making in domains such as manufacturing, medicine, and entertainment. He also leads efforts in developing optimization algorithms and software tools for system design and evaluation.

Dr. Anthony's dual roles in academia and industry position him as a bridge between cutting-edge research and real-world application, driving impactful technologies that shape the future of engineering and innovation.

View full bio
View on LinkedIn

The Vision: With the proliferation of digital technologies and a rapidly changing global market, manufacturing paradigms will shift from automated to autonomous operations with more flexible flow chains. This in turn enables a more rapid realization of products from concepts in commercially viable ways, shorter time to market and faster throughput.

The digital thread of sensors, data, computation, and information is required to fully realize the potential of digitally-native production systems, with high-value, customized, products. The digitally native production system includes digital twins of the product, materials, manufacturing process, supply chain and production line.

A full framework of digital twins assist in simulating and integrating sensor data for data analytics. Digital twins enable greater throughput, early identification of bottleneck processes, supply chain issues and identification of novel process and production level opportunities.

And Demystified: Digital twins are, simply, physics-based and data driven models. They are design and decision tools. Let's explore some examples.