

IMPLEMENTING DIGITAL PRODUCT THREADS FOR SEAMLESS DATA CONNECTIVITY ACROSS THE PRODUCT LIFECYCLE

Balachandar Ramalingam¹, Satish Vadlamani², Ashish Kumar³, Om Goel⁴, Raghav Agarwal⁵ & Shalu Jain⁶

¹Scholar, University of Iowa, Thiruthangal (VIA), Sivakasi - 626130, Tamil Nadu, India

²Scholar, Osmania University, West Palladio Place, Middletown, DE, USA

³Scholar, Tufts University, Medford, MA, 02155 USA

⁴Independent Researcher, ABES Engineering College Ghaziabad

⁵Independent Researcher, Mangal Pandey Nagar, Meerut (U.P.) India 250002

⁶Independent Researcher, Maharaja Agrasen Himalayan Garhwal University, Pauri Garhwal, Uttarakhand, India

ABSTRACT

In the contemporary landscape of manufacturing and product development, the implementation of digital product threads has emerged as a transformative approach to achieving seamless data connectivity throughout the product lifecycle. Digital product threads enable the integration of disparate data sources and systems, facilitating a continuous flow of information from concept through design, production, and into service. This connectivity not only enhances collaboration among stakeholders but also drives data-driven decision-making and innovation.

This paper explores the critical components of digital product threads, including their architecture, data standards, and interoperability frameworks. By leveraging advanced technologies such as IoT, AI, and cloud computing, organizations can create a cohesive digital ecosystem that captures real-time data, fosters traceability, and ensures compliance with regulatory requirements. The seamless exchange of information empowers manufacturers to optimize operations, reduce time-to-market, and improve product quality.

Moreover, the paper discusses practical case studies that illustrate the successful implementation of digital product threads across various industries, highlighting the challenges faced and the strategies employed to overcome them. The findings underscore the necessity of cultivating a culture of digital transformation, emphasizing the role of leadership, workforce training, and strategic partnerships in realizing the full potential of digital product threads. Ultimately, this research provides valuable insights for organizations aiming to enhance their product lifecycle management processes, drive innovation, and maintain competitive advantage in an increasingly digital marketplace.

KEYWORDS: *Digital Product Threads, Data Connectivity, Product Lifecycle Management, IoT Integration, AI Technologies, Cloud Computing, Real-Time Data Exchange, Interoperability, Manufacturing Innovation, Traceability, Digital Transformation, Regulatory Compliance, Optimization Strategies.*

Article History

Received: 15 Nov 2023 | Revised: 19 Nov 2023 | Accepted: 24 Nov 2023
