

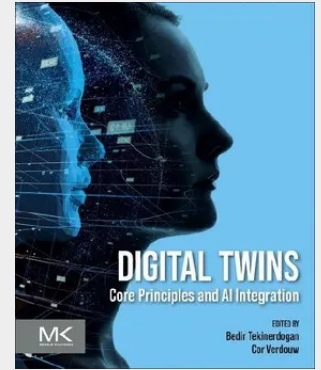
Digital Twins

Core Principles and AI Integration

Digital Twins: Core Principles and AI Integration offers a structured and up-to-date overview of digital twin technology, combining foundational principles with the rapidly growing role of artificial intelligence (AI). This book introduces the core concepts, modeling approaches, and software and systems engineering foundations needed to design and implement digital twins effectively. It then explores architectural methods, lifecycle management, interoperability, and the alignment between physical systems and their digital representations. A central part of this book focuses on data science and AI-enabled digital twins, demonstrating how machine learning, deep learning, generative AI, and autonomous agents enhance predictive analytics, optimization, anomaly detection, and automated decision-making. Integration with Internet of Things (IoT), cloud-edge infrastructures, big data analytics, and XR technologies further shows how intelligent digital twins evolve into adaptive and interactive systems. Real-world applications from manufacturing, agriculture, food systems, energy, mobility, healthcare, and urban environments illustrate the practical value of AI-driven digital twins. This book concludes with key challenges and future directions, including trustworthy AI, security, data governance, and the scaling of digital twin ecosystems.

Digital Twins: Core Principles, System Engineering, and AI Integration provides a comprehensive overview of digital twin technology, a cutting-edge innovation that bridges the physical and digital worlds. The book addresses common challenges such as data integration, security, scalability, and the alignment of digital twin models with actual physical processes. After presenting core concepts of digital twins for software engineering, the book discusses integration with advanced digital solutions such as AI, IoT, Cloud computing, Big Data Analytics, and Extended Reality (XR). Next, the authors provide readers with a thorough presentation of digital twins' applications in a variety of settings and industry/research topics.

Finally, the book concludes with a discussion of challenges and solutions, along with future trends in digital twins research and development. As digital twin technology evolves, its integration with various advanced digital solutions is becoming essential for achieving real-time insights and autonomous decision-making. Challenges include understanding the interoperability of these technologies, managing data complexity, ensuring security, and optimizing for low-latency environments.



164,50 €

164,50 € (zzgl. MwSt.)

*vorbestellbar, Erscheinungstermin ca.
Juni 2026*

Artikelnummer: 9780443455735

Medium: Buch

ISBN: 978-0-443-45573-5

Verlag: Elsevier Science

Erscheinungstermin: 01.06.2026

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2026

Produktform: Kartoniert

Gewicht: 449 g

Seiten: 394

Format (B x H): 216 x 276 mm

