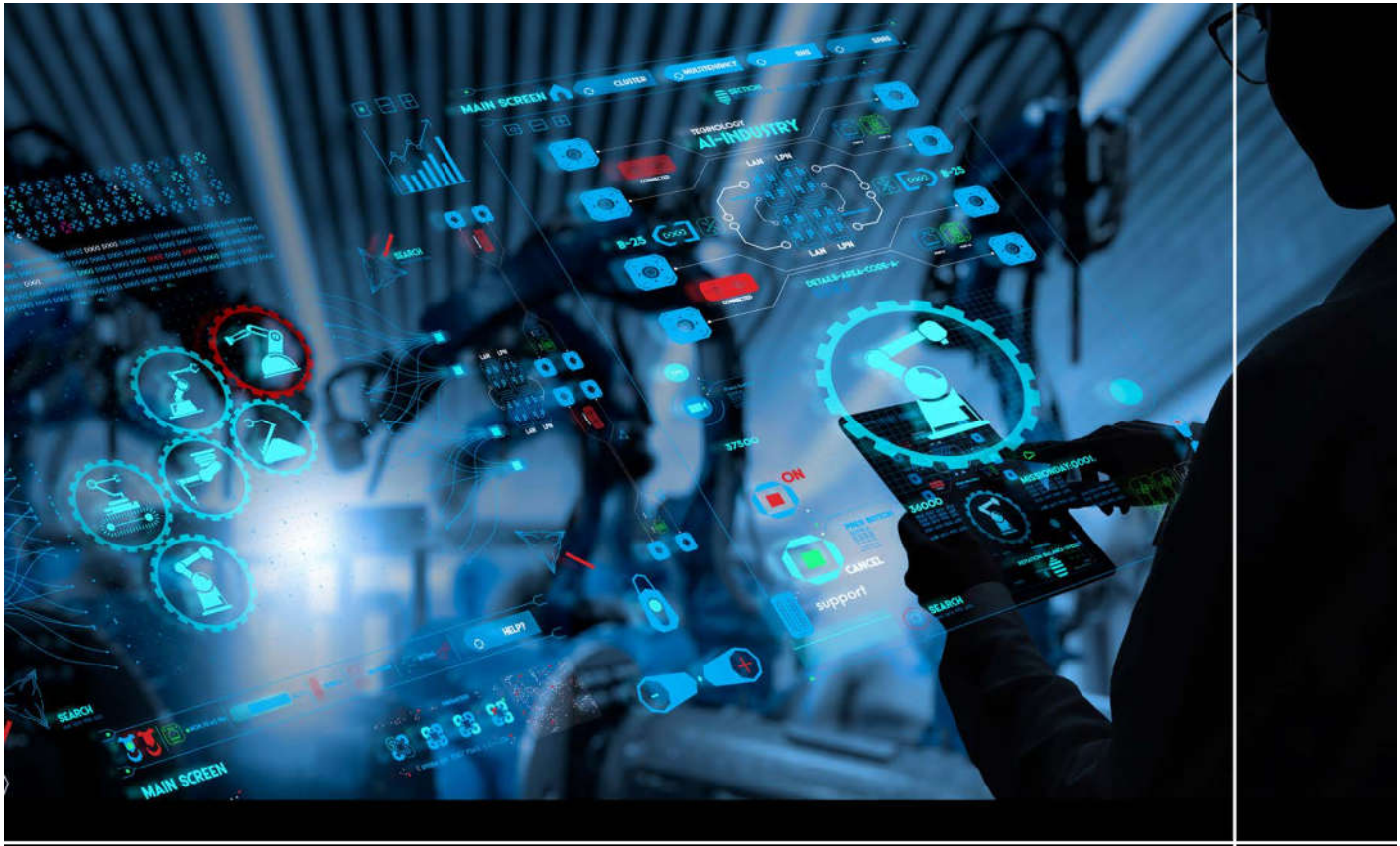

SMART SYSTEMS

Methodological Approaches and Applications

Edited by
Faisal Talib and Muhammed Muaz

CRC Press
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Smart Systems

The focus of this book is to cover the fundamentals, methodological approaches, and diverse applications of smart systems. **Smart Systems** discusses important topics such as the Internet of Things—enabled smart systems, artificial intelligence, ergonomics, digital twin, and quality assurance frameworks in smart systems. It addresses methodological approaches in diverse sectors such as service, agriculture, product design, and development.

This book:

- Discusses important concepts such as customer satisfaction, product design, and product lifestyle management in a comprehensive manner.
- Presents methodological techniques like optimization approaches, qualitative approaches, and multi-criteria decision-making.
- Examines critical issues, including sustainability, ergonomics, quality assurance, and accuracy.
- Covers the Internet of Things–enabled smart systems and artificial intelligence in smart systems.
- Elaborates on management strategies and quality assurance frameworks for smart systems.

The text is primarily written for senior undergraduate/graduate students and academic researchers in the fields of mechanical engineering, manufacturing engineering, industrial engineering, production engineering, and aerospace engineering.

Dr. Faisal Talib is a Professor in the Department of Mechanical Engineering, Zakir Husain College of Engineering & Technology, Aligarh Muslim University (AMU), Aligarh, (U.P.), India. He holds a Ph.D. degree from IIT Roorkee and Masters in Industrial Engineering from AMU. He has over 26 years of teaching and research experience and has more than 115 publications to his credit in national/international journals and published 10 Book Chapters. He has successfully guided 04 PhDs. His work has been published and cited in various peer-reviewed refereed journals. Additionally, he is a member of various advisory boards/editorial boards of International Journals and serving as an expert reviewer in the review panel of several International Journals of repute. He is also a member of notable professional bodies some of which includes Indian Society for Technical Education (ISTE), The Institution of Engineers (IEI), International Association of Engineers (IAENG) and International Engineering and Technology Institute (IETI).

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Preface

With the advent of interdisciplinary technological approaches and solutions, manufacturing industries as well as research institutes face challenges in integrating different technologies and diverse components into one system. This system approach calls for the design and manufacturing of smart systems with resilience, reconfigurability, and intelligence, resulting in the evolution of novel capabilities. These capabilities have significantly changed the manufacturing ecosystem by addressing environmental, societal, and economic challenges. The prime objective of this book is to provide a comprehensive and effective exchange of information on current developments and advancements in smart system applications. The book covers a broad range of topics about smart systems from a multidisciplinary point of view, starting with its critical review and continuing on smart tools, sustainable approaches, integration, Industry 4.0 aspects, and strategies in smart systems and their management. It also covers opportunities, challenges, and methodological approaches used by smart systems in the field of agriculture in order to enable growth toward smart agriculture context. It also focuses on knowledge transfer methodologies, smart design, and development in other innovative areas like biohumus, aroma culture, ergonomics, the pharmaceutical industry, and spiritual personality development. The book will be of interest to researchers, postgraduate students, academicians, practitioners, and engineers working in application areas such as agriculture, the automobile industry, healthcare, education, and others.

About the editors

Faisal Talib is a professor in the Department of Mechanical Engineering, Zakir Husain College of Engineering and Technology, Aligarh Muslim University (AMU), Aligarh, U.P., India. He holds a Ph.D. degree from IIT Roorkee and a masters in industrial engineering from AMU. He has over 27 years of teaching and research experience and more than 115 publications to his credit in national/international journals and conferences, including 45 papers in SCI/SCIE/Scopus journals and 8 book chapters. He serves as a research guide for Ph.D. scholars (four have successfully doctorate and three are in progress). His work has been published and cited in various peer-reviewed refereed journals, including the *Journal of Cleaner Production*, *Environmental Science and Pollution Research*, *Sustainability*, the *International Journal of Sustainable Engineering*, *Total Quality Management & Business Excellence*, the *International Journal of Health Planning and Management*, the *International Journal of Quality & Reliability Management*, the *International Journal of Sustainable Engineering*, the *International Journal of Service Business, Benchmarking: An International Journal*, the *International Journal of Productivity & Quality Management*, and the *International Journal of Mobile Communications*, to name a few. His special interests include Quality 4.0, total quality management (TQM), sustainable practices, operations management, multi-criteria decision-making (MCDM) techniques, and quantitative research. Additionally, he is a member of various advisory boards/editorial boards of international journals and serves as an expert reviewer in the review panel of several international journals of repute, including the *International Journal of E-Entrepreneurship and Innovation*, *International Journal of Productivity Management and Assessment Technologies*, *International Journal of Information Systems in the Service Sector*, *International Journal of Business Intelligence Research*, and *International Journal of Service Science, Management, Engineering, and Technology*. He is also a member of notable professional bodies, including the Indian Society for Technical Education (ISTE), The Institution of Engineers (IEI), the International Association of Engineers (IAENG), and the International

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Quality assurance framework for smart drug delivery systems in pharmaceutical industries and its applications

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Book Smart Systems

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ABSTRACT

Quality assurance is a key term used in manufacturing industries to ensure the safety, efficacy, stability, reliability, potency, purity, and quality of the products that are delivered to the customers. It ensures that the final product is physically, chemically, and biologically fit for the purpose for which it is developed. Quality assurance framework is basically a method to monitor the quality of a process or the product throughout the process i.e., from the selection of raw material till the production of the required product/drug and prevent mistakes and defects during production and development. Smart systems refer to novel systems or approaches to design and deliver desired drugs/products with minimum side effects, maximum therapeutic potency, and improved patient compliance/acceptability. Hence, the quality-assured framework in smart systems is intended to assure that established quality standards of the final product are met when novel approaches are employed in the development/production of drug delivery systems.