

Smart Factory Applications In Discrete Manufacturing

The book focuses on analyzing and proposing costing and pricing models to be used in autonomous manufacturing systems with respect to different effective parameters and factors in such a high tech environment within some applied cases. This book constitutes the revised selected papers from the 22nd International Conference on Information Security Applications, WISA 2021, which took place on Jeju Island, South Korea, during August 2021. The 23 papers included in this book were carefully reviewed and selected from 66 submissions. They were organized in topical sections as follows: machine learning security; cryptography; hardware security; and application security.

This book provides a review of advanced topics relating to the theory, research, analysis and implementation in the context of big data platforms and their applications, with a focus on methods, techniques, and performance evaluation. The explosive growth in the volume, speed, and variety of data being produced every day requires a continuous increase in the processing speeds of servers and of entire network infrastructures, as well as new resource management models. This poses significant challenges (and provides striking

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development opportunities) for data intensive and high-performance computing, i.e., how to efficiently turn extremely large datasets into valuable information and meaningful knowledge. The task of context data management is further complicated by the variety of sources such data derives from, resulting in different data formats, with varying storage, transformation, delivery, and archiving requirements. At the same time rapid responses are needed for real-time applications. With the emergence of cloud infrastructures, achieving highly scalable data management in such contexts is a critical problem, as the overall application performance is highly dependent on the properties of the data management service.

This book constitutes the refereed proceedings of the 6th International Conference on Industrial Applications of Holonic and Multi-Agent Systems, HoloMAS 2013, held in Prague, Czech Republic, in August 2013, in conjunction with DEXA 2013. The 25 revised full papers presented together with two invited talks were carefully reviewed and selected from 37 submissions. The papers are organized in the following topical sections: MAS in automation and manufacturing; design, simulation and validation; MAS in transportation systems; industrial applications; and new trends.

This book reports innovative deep learning and big data analytics technologies for smart manufacturing

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applications. In this book, theoretical foundations, as well as the state-of-the-art and practical implementations for the relevant technologies, are covered. This book details the relevant applied research conducted by the authors in some important manufacturing applications, including intelligent prognosis on manufacturing processes, sustainable manufacturing and human-robot cooperation. Industrial case studies included in this book illustrate the design details of the algorithms and methodologies for the applications, in a bid to provide useful references to readers. Smart manufacturing aims to take advantage of advanced information and artificial intelligent technologies to enable flexibility in physical manufacturing processes to address increasingly dynamic markets. In recent years, the development of innovative deep learning and big data analytics algorithms is dramatic. Meanwhile, the algorithms and technologies have been widely applied to facilitate various manufacturing applications. It is essential to make a timely update on this subject considering its importance and rapid progress. This book offers a valuable resource for researchers in the smart manufacturing communities, as well as practicing engineers and decision makers in industry and all those interested in smart manufacturing and Industry 4.0.

The two-volume set IFIP AICT 591 and 592

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constitutes the refereed proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems, APMS 2020, held in Novi Sad, Serbia, in August/September 2020. The 164 papers presented were carefully reviewed and selected from 199 submissions. They discuss globally pressing issues in smart manufacturing, operations management, supply chain management, and Industry 4.0. The papers are organized in the following topical sections: Part I: advanced modelling, simulation and data analytics in production and supply networks; advanced, digital and smart manufacturing; digital and virtual quality management systems; cloud-manufacturing; cyber-physical production systems and digital twins; IIOT interoperability; supply chain planning and optimization; digital and smart supply chain management; intelligent logistics networks management; artificial intelligence and blockchain technologies in logistics and DSN; novel production planning and control approaches; machine learning and artificial intelligence; connected, smart factories of the future; manufacturing systems engineering: agile, flexible, reconfigurable; digital assistance systems: augmented reality and virtual reality; circular products design and engineering; circular, green, sustainable manufacturing; environmental and social lifecycle assessments; socio-cultural aspects in production systems; data-driven

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manufacturing and services operations management; product-service systems in DSN; and collaborative design and engineering Part II: the Operator 4.0: new physical and cognitive evolutionary paths; digital transformation approaches in production management; digital transformation for more sustainable supply chains; data-driven applications in smart manufacturing and logistics systems; data-driven services: characteristics, trends and applications; the future of lean thinking and practice; digital lean manufacturing and its emerging practices; new reconfigurable, flexible or agile production systems in the era of industry 4.0; operations management in engineer-to-order manufacturing; production management in food supply chains; gastronomic service system design; product and asset life cycle management in the circular economy; and production ramp-up strategies for product

In this book, theory of large scale optimization is introduced with case studies of real-world problems and applications of structured mathematical modeling. The large scale optimization methods are represented by various theories such as Benders' decomposition, logic-based Benders' decomposition, Lagrangian relaxation, Dantzig–Wolfe decomposition, multi-tree decomposition, Van Roy' cross decomposition and parallel decomposition for mathematical programs such as

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mixed integer nonlinear programming and stochastic programming. Case studies of large scale optimization in supply chain management, smart manufacturing, and Industry 4.0 are investigated with efficient implementation for real-time solutions. The features of case studies cover a wide range of fields including the Internet of things, advanced transportation systems, energy management, supply chain networks, service systems, operations management, risk management, and financial and sales management. Instructors, graduate students, researchers, and practitioners, would benefit from this book finding the applicability of large scale optimization in asynchronous parallel optimization, real-time distributed network, and optimizing the knowledge-based expert system for convex and non-convex problems.

This two-volume set of LNAI 11775 and LNAI 11776 constitutes the refereed proceedings of the 12th International Conference on Knowledge Science, Engineering and Management, KSEM 2019, held in Athens, Greece, in August 2019. The 77 revised full papers and 23 short papers presented together with 10 poster papers were carefully reviewed and selected from 240 submissions. The papers of the first volume are organized in the following topical sections: Formal Reasoning and Ontologies; Recommendation Algorithms and Systems; Social Knowledge Analysis and Management ; Data

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Processing and Data Mining; Image and Video Data Analysis; Deep Learning; Knowledge Graph and Knowledge Management; Machine Learning; and Knowledge Engineering Applications. The papers of the second volume are organized in the following topical sections: Probabilistic Models and Applications; Text Mining and Document Analysis; Knowledge Theories and Models; and Network Knowledge Representation and Learning.

FOCAPD-19/Proceedings of the 9th International Conference on Foundations of Computer-Aided Process Design, July 14 - 18, 2019, compiles the presentations given at the Ninth International Conference on Foundations of Computer-Aided Process Design, FOCAPD-2019. It highlights the meetings held at this event that brings together researchers, educators and practitioners to identify new challenges and opportunities for process and product design. Combines presentations from the Ninth International Conference on Foundations of Computer-Aided Process Design, FOCAPD-2019 This book debates and discusses the present and future of Disruptive Technologies in general and military Disruptive Technologies in particular. Its primary goal is to discuss various critical and advanced elucidations on strategic technologies. The focus is less on extrapolating the future of technology in a strict sense, and more on understanding the Disruptive Technology paradigm.

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It is widely accepted that technology alone cannot win any military campaign or war. However, technological superiority always offers militaries an advantage. More importantly, technology also has a great deterrent value. Hence, on occasion, technology can help to avoid wars. Accordingly, it is important to effectively manage new technologies by identifying their strategic utility and role in existing military architectures and the possible contributions they could make towards improving overall military capabilities. This can also entail doctrinal changes, so as to translate these new technologies into concrete advantages.

This book first provides a comprehensive review of state-of-the-art IoT technologies and applications in different industrial sectors and public services. The authors give in-depth analyses of fog computing architecture and key technologies that fulfill the challenging requirements of enabling computing services anywhere along the cloud-to-thing continuum. Further, in order to make IoT systems more intelligent and more efficient, a fog-enabled service architecture is proposed to address the latency requirements, bandwidth limitations, and computing power issues in realistic cross-domain application scenarios with limited priori domain knowledge, i.e. physical laws, system statuses, operation principles and execution rules. Based on this fog-enabled architecture, a series of data-driven

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self-learning applications in different industrial sectors and public services are investigated and discussed, such as robot SLAM and formation control, wireless network self-optimization, intelligent transportation system, smart home and user behavior recognition. Finally, the advantages and future directions of fog-enabled intelligent IoT systems are summarized. Provides a comprehensive review of state-of-the-art IoT technologies and applications in different industrial sectors and public services Presents a fog-enabled service architecture with detailed technical approaches for realistic cross-domain application scenarios with limited prior domain knowledge Outlines a series of data-driven self-learning applications (with new algorithms) in different industrial sectors and public services Build your first digital twin MVP and gain first-hand experience of using the technology, the challenges it presents, and its impact on your organization Key Features Create a digital twin prototype using Microsoft Azure Digital Twin Explore the digital twin approach to the design, operations, and maintenance of industrial assets and products Understand key characteristics and components of a digital twin through practical use cases and business scenarios Book Description Digital twin technology enables organizations to create digital representations of physical entities such as assets, systems, and processes throughout their life cycle. It

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improves asset performance, utilization, and safe operations and reduces manufacturing, operational, and maintenance costs. The book begins by introducing you to the concept of digital twins and sets you on a path to develop a digital twin strategy to positively influence business outcomes in your organization. You'll understand how digital twins relate to physical assets, processes, and technology and learn about the prerequisite conditions for the right platform, scale, and use case of your digital twins. You'll then get hands-on with Microsoft's Azure Digital Twins platform for your digital twin development and deployment. The book equips you with the knowledge to evaluate enterprise and specialty platforms, including the cloud and industrial IoT required to set up your digital twin prototype. Once you've built your prototype, you'll be able to test and validate it relative to the intended purpose of the twin through pilot deployment, full deployment, and value tracking techniques. By the end of this book, you'll have developed the skills to build and deploy your digital twin prototype, or minimum viable twin, to demonstrate, assess, and monitor your asset at specific stages in the asset life cycle. What you will learn

- Identify key criteria for the applicability of digital twins in your organization
- Explore the RACI matrix and rapid experimentation for choosing the right tech stack for your digital twin system
- Evaluate public cloud, industrial IoT, and enterprise platforms

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to set up your prototype Develop a digital twin prototype and validate it using a unit test, integration test, and functional test Perform an RoI analysis of your digital twin to determine its economic viability for the business Discover techniques to improve your digital twin for future enhancements Who this book is for The digital twin book is for mid-career subject experts, including engineers and operations managers, building their first prototype (MVP) using digital twin technology. The book will help professionals responsible for mechanical, process, and reliability engineering domains. You don't have to be a developer or programmer, but beginner-level programming skills will be helpful.

Industry 4.0 refers to fourth generation of industrial activity characterized by smart systems and internet-based solutions. This book describes the fourth revolution based on instrumented, interconnected and intelligent assets. The different book chapters provide a perspective on technologies and methodologies developed and deployed leading to this concept. With an aim to increase performance, productivity and flexibility, major application area of maintenance through smart system has been discussed in detail. Applicability of 4.0 in transportation, energy and infrastructure is explored, with effects on technology, organisation and operations from a systems perspective.

This book comprises the select proceedings of the

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2nd International Conference on Future Learning Aspects of Mechanical Engineering (FLAME) 2020. In particular, this volume discusses different topics of industrial and production engineering such as sustainable manufacturing processes, logistics, Industry 4.0 practices, circular economy, lean six sigma, agile manufacturing, additive manufacturing, IoT and Big Data in manufacturing, 3D printing, simulation, manufacturing management and automation, surface roughness, multi-objective optimization and modelling for production processes, developments in casting, welding, machining, and machine tools. The contents of this book will be useful for researchers as well as industry professionals.

This book aims at addressing the challenges of contemporary manufacturing in Industry 4.0 environment and future manufacturing (aka Industry 5.0), by implementing soft computing as one of the major sub-fields of artificial intelligence. It contributes to development and application of the soft computing systems, including links to hardware, software and enterprise systems, in resolving modern manufacturing issues in complex, highly dynamic and globalized industrial circumstances. It embraces heterogeneous complementary aspects, such as control, monitoring and modeling of different manufacturing tasks, including intelligent robotic systems and processes, addressed by various

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machine learning and fuzzy techniques; modeling and parametric optimization of advanced conventional and non-conventional, eco-friendly manufacturing processes by using machine learning and evolutionary computing techniques; cybersecurity framework for Internet of Things-based systems addressing trustworthiness and resilience in machine-to-machine and human-machine collaboration; static and dynamic digital twins integration and synchronization in a smart factory environment; STEP-NC technology for a smart machine vision system, and integration of Open CNC with Service-Oriented Architecture for STEP-NC monitoring system in a smart manufacturing. Areas of interest include but are not limited to applications of soft computing to address the following: dynamic process/system modeling and simulation, dynamic process/system parametric optimization, dynamic planning and scheduling, smart, predictive maintenance, intelligent and autonomous systems, improved machine cognition, effective digital twins integration, human-machine collaboration, robots, and cobots.

This fourth edition of the book provides readers with a detailed explanation of PLM, enabling them to gain a full understanding and the know-how to implement PLM within their own business environment. This new and expanded edition has been fully updated to reflect the numerous technological and management

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advances made in PLM since the release of the third edition in 2014, including chapters on both the Internet of Things and Industry 4.0. The book describes the environment in which products are ideated, developed, manufactured, supported and retired before addressing the main components of PLM and PLM Initiatives. These include product-related business processes, product data, product data management (PDM) systems, other PLM applications, best practices, company objectives and organisation. Key activities in PLM Initiatives include Organisational Change Management (OCM) and Project Management. Lastly, it addresses the PLM Initiative, showing the typical steps and activities of a PLM project or initiative. Enhancing readers' understanding of PLM, the book enables them to develop the skills needed to implement PLM successfully and achieve world-class product performance across the lifecycle.

SPECTRUM SHARING IN COGNITIVE RADIO NETWORKS Discover the latest advances in spectrum sharing in wireless networks from two internationally recognized experts in the field *Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments* delivers an in-depth and insightful examination of hybrid spectrum access techniques with advanced frame structures designed for efficient spectrum utilization. The accomplished authors present the energy and spectrum efficient frameworks used in

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high-demand distributed architectures by relying on the self-scheduled medium access control (SMC-MAC) protocol in cognitive radio networks. The book begins with an exploration of the fundamentals of recent advances in spectrum sharing techniques before moving onto advanced frame structures with spectrum accessing approaches and the role of spectrum prediction and spectrum monitoring to eliminate interference. The authors also cover spectrum mobility, interference, and spectrum management for connected environments in substantial detail. *Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments* offers readers a recent and rational theoretical mathematical model of spectrum sharing strategies that can be used for practical simulation of future generation wireless communication technologies. It also highlights ongoing trends, revealing fresh research outcomes that will be of interest to active researchers in the area. Readers will also benefit from: An inclusive study of connected environments, 3GPP Releases, and the evolution of wireless communication generations with a discussion of advanced frame structures and access strategies in cognitive radio networks A treatment of cognitive radio networks using spectrum prediction and monitoring techniques An analysis of the effects of imperfect spectrum monitoring on cognitive radio networks An exploration of spectrum mobility in cognitive radio networks using spectrum prediction and monitoring techniques An examination of MIMO-based CR-NOMA communication systems for spectral and interference efficient designs Perfect for senior undergraduate and

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graduate students in Electrical and Electronics Communication Engineering programs, Spectrum Sharing in Cognitive Radio Networks: Towards Highly Connected Environments will also earn a place in the libraries of professional engineers and researchers working in the field, whether in private industry, government, or academia.

Digital Twin Driven Smart Manufacturing examines the background, latest research, and application models for digital twin technology, and shows how it can be central to a smart manufacturing process. The interest in digital twin in manufacturing is driven by a need for excellent product reliability, and an overall trend towards intelligent, and connected manufacturing systems. This book provides an ideal entry point to this subject for readers in industry and academia, as it answers the questions: (a) What is a digital twin? (b) How to construct a digital twin? (c) How to use a digital twin to improve manufacturing efficiency? (d) What are the essential activities in the implementation of a digital twin? (e) What are the most important obstacles to overcome for the successful deployment of a digital twin? (f) What are the relations between digital twin and New Technologies? (g) How to combine digital twin with the New Technologies to achieve high efficiency and smartness in manufacturing? This book focuses on these problems as it aims to help readers make the best use of digital twin technology towards smart manufacturing. Analyzes the differences, synergies and possibilities for integration between digital twin technology and other technologies, such as big data, service and Internet of Things Discuss

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new requirements for a traditional three-dimension digital twin and proposes a methodology for a five-dimension version Investigates new models for optimized manufacturing, prognostics and health management, and cyber-physical fusion based on the digital twin Christoph Jan Bartodziej examines by means of an empirical study which potential Industry 4.0 technologies do have regarding end-to-end digital integration in production logistics based on their functions. According to the relevance of the concept Industry 4.0 and its early stage of implementation it is essential to clarify terminology, explain relations and identify drivers and challenges for an appropriate use of Industry 4.0 technologies. The results will constitute a profound basis to formulate recommendations for action for technology suppliers and technology users.

The Industry 4.0 paradigm has led to the creation of new opportunities for taking advantage of a set of diverse technologies in the manufacturing domain. This book touches on a series of advanced technologies and research fields, including Internet of Things, Augmented and Virtual Reality, Machine Learning, Advanced Robotics, Additive Manufacturing, System and Process Simulation, Computer-Aided Design/Engineering/Manufacturing/Process Planning Systems as well as Product Lifecycle Management Platforms. The topics covered span a series of diverse areas related to a) product design and development, b) manufacturing systems and operations, c) process engineering, and d) Industry 4.0 technologies review and realization.

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The volume set LNAI 11740 until LNAI 11745 constitutes the proceedings of the 12th International Conference on Intelligent Robotics and Applications, ICIRA 2019, held in Shenyang, China, in August 2019. The total of 378 full and 25 short papers presented in these proceedings was carefully reviewed and selected from 522 submissions. The papers are organized in topical sections as follows: Part I: collective and social robots; human biomechanics and human-centered robotics; robotics for cell manipulation and characterization; field robots; compliant mechanisms; robotic grasping and manipulation with incomplete information and strong disturbance; human-centered robotics; development of high-performance joint drive for robots; modular robots and other mechatronic systems; compliant manipulation learning and control for lightweight robot. Part II: power-assisted system and control; bio-inspired wall climbing robot; underwater acoustic and optical signal processing for environmental cognition; piezoelectric actuators and micro-nano manipulations; robot vision and scene understanding; visual and motional learning in robotics; signal processing and underwater bionic robots; soft locomotion robot; teleoperation robot; autonomous control of unmanned aircraft systems. Part III: marine bio-inspired robotics and soft robotics: materials, mechanisms, modelling, and control; robot intelligence technologies and system integration; continuum mechanisms and robots; unmanned underwater vehicles; intelligent robots for environment detection or fine manipulation; parallel robotics; human-robot collaboration; swarm intelligence and multi-robot cooperation; adaptive and learning

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control system; wearable and assistive devices and robots for healthcare; nonlinear systems and control. Part IV: swarm intelligence unmanned system; computational intelligence inspired robot navigation and SLAM; fuzzy modelling for automation, control, and robotics; development of ultra-thin-film, flexible sensors, and tactile sensation; robotic technology for deep space exploration; wearable sensing based limb motor function rehabilitation; pattern recognition and machine learning; navigation/localization. Part V: robot legged locomotion; advanced measurement and machine vision system; man-machine interactions; fault detection, testing and diagnosis; estimation and identification; mobile robots and intelligent autonomous systems; robotic vision, recognition and reconstruction; robot mechanism and design. Part VI: robot motion analysis and planning; robot design, development and control; medical robot; robot intelligence, learning and linguistics; motion control; computer integrated manufacturing; robot cooperation; virtual and augmented reality; education in mechatronics engineering; robotic drilling and sampling technology; automotive systems; mechatronics in energy systems; human-robot interaction.

This book gathers the peer-reviewed papers presented at the 8th edition of the International Workshop “Service Orientation in Holonic and Multi-Agent Manufacturing – SOHOMA’18” held at the University of Bergamo, Italy on June 11–12, 2018. The objective of the SOHOMA annual workshops is to foster innovation in smart and sustainable manufacturing and logistics systems by promoting new concepts, methods and solutions that use

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service orientation of agent-based control technologies with distributed intelligence. Reflecting the theme of SOHOMA'18: "Digital transformation of manufacturing with agent-based control and service orientation of Internet-scale platforms", the research included focuses on how the digital transformation, as advocated by the "Industry 4.0", "Industrial Internet of Things", "Cyber-Physical Production Systems" and "Cloud Manufacturing" frameworks, improves the efficiency, agility and sustainability of manufacturing processes, products, and services, and how it relates to the interaction between the physical and informational worlds, which is implemented in the virtualization of products, processes and resources managed as services.

Research efforts in the past ten years have led to considerable advances in the concepts and methods of smart manufacturing. *Smart Manufacturing: Concepts and Methods* puts these advances in perspective, showing how process industries can benefit from these new techniques. The book consolidates results developed by leading academic and industrial groups in the area, providing a systematic, comprehensive coverage of conceptual and methodological advances made to date. Written by leaders in the field from around the world, *Smart Manufacturing: Concepts and Methods* is essential reading for graduate students, researchers, process engineers, and managers. It is complemented by a companion book titled *Smart Manufacturing: Applications and Case Studies*, which covers the applications of smart manufacturing concepts and

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methods in process industries and beyond. Takes a process-systems engineering approach to design, monitoring, and control of smart manufacturing systems Brings together the key concepts and methods of smart manufacturing, including the advances made in the past decade Includes coverage of computation methods for process optimization, control, and safety, as well as advanced modelling techniques

Nanosensors for Smart Manufacturing provides information on the fundamental design concepts and emerging applications of nanosensors in smart manufacturing processes. In smart production, if the products and machines are integrated, embedded, or equipped with sensors, the system can immediately collect the current operating parameters, predict the product quality, and then feed back the optimal parameters to machines in the production line. In this regard, smart sensors and their wireless networks are important components of smart manufacturing.

Nanomaterials-based sensors (nanosensors) offer several advantages over their microscale counterparts, including lower power consumption, fast response time, high sensitivity, lower concentration of analytes, and smaller interaction distance between sensors and products. With the support of artificial intelligence (AI) tools such as fuzzy logic, genetic algorithms, neural networks, and ambient intelligence, sensor systems have become smarter. This is an important reference source for materials scientists and engineers who want to learn more about how nanoscale sensors can enhance smart manufacturing techniques and processes. Outlines the

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smart nanosensor classes used in manufacturing applications Shows how nanosensors are being used to make more efficient manufacturing systems Assesses the major obstacles to designing nanosensor-based manufacturing systems at an industrial scale This book provides energy efficiency quantitative analysis and optimal methods for discrete manufacturing systems from the perspective of global optimization. In order to analyze and optimize energy efficiency for discrete manufacturing systems, it uses real-time access to energy consumption information and models of the energy consumption, and constructs an energy efficiency quantitative index system. Based on the rough set and analytic hierarchy process, it also proposes a principal component quantitative analysis and a combined energy efficiency quantitative analysis. In turn, the book addresses the design and development of quantitative analysis systems. To save energy consumption on the basis of energy efficiency analysis, it presents several optimal control strategies, including one for single-machine equipment, an integrated approach based on RWA-MOPSO, and one for production energy efficiency based on a teaching and learning optimal algorithm. Given its scope, the book offers a valuable guide for students, teachers, engineers and researchers in the field of discrete manufacturing systems. The three-volume set CCIS 923, CCIS 924, and CCIS 925 constitutes the thoroughly refereed proceedings of the First International Conference on Intelligent Manufacturing and Internet of Things, and of the 5th International Conference on Intelligent Computing for

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Sustainable Energy and Environment, ICSEE 2018, held in Chongqing, China, in September 2018. The 135 revised full papers presented were carefully reviewed and selected from over 385 submissions. The papers of this volume are organized in topical sections on: digital manufacturing; industrial product design; logistics, production and operation management; manufacturing material; manufacturing optimization; manufacturing process; mechanical transmission system; robotics. Smart manufacturing uses big data, the Internet of things (IoT) and the Internet of Services (IoS), and flexible and dynamic workforces to cope with ever-increasing demand in low-volume, high-mix production. Companies worldwide are already pivoting towards dynamic and reconfigurable production as a smarter way to build and make things. As such, this book discusses the next generation of manufacturing, which will involve the transformational convergence of intelligent machines, powerful computing and analytics, and unprecedented networking of people, products, and services. Industrial internet of things (IIoT) is changing the face of industry by completely redefining the way stakeholders, enterprises, and machines connect and interact with each other in the industrial digital ecosystem. Smart and connected factories, in which all the machinery transmits real-time data, enable industrial data analytics for improving operational efficiency, productivity, and industrial processes, thus creating new business opportunities, asset utilization, and connected services. IIoT leads factories to step out of legacy environments and arcane processes towards open digital industrial

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ecosystems. Innovations in the Industrial Internet of Things (IIoT) and Smart Factory is a pivotal reference source that discusses the development of models and algorithms for predictive control of industrial operations and focuses on optimization of industrial operational efficiency, rationalization, automation, and maintenance. While highlighting topics such as artificial intelligence, cyber security, and data collection, this book is ideally designed for engineers, manufacturers, industrialists, managers, IT consultants, practitioners, students, researchers, and industrial industry professionals. Advances in Mathematics for Industry 4.0 examines key tools, techniques, strategies, and methods in engineering applications. By covering the latest knowledge in technology for engineering design and manufacture, chapters provide systematic and comprehensive coverage of key drivers in rapid economic development. Written by leading industry experts, chapter authors explore managing big data in processing information and helping in decision-making, including mathematical and optimization techniques for dealing with large amounts of data in short periods. Focuses on recent research in mathematics applications for Industry 4.0 Provides insights on international and transnational scales Identifies mathematics knowledge gaps for Industry 4.0 Describes fruitful areas for further research in industrial mathematics, including forthcoming international studies and research

This book develops the core system science needed to enable the development of a complex industrial internet of things/manufacturing cyber-physical systems (IIoT/M-

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CPS). Gathering contributions from leading experts in the field with years of experience in advancing manufacturing, it fosters a research community committed to advancing research and education in IIoT/M-CPS and to translating applicable science and technology into engineering practice. Presenting the current state of IIoT and the concept of cybermanufacturing, this book is at the nexus of research advances from the engineering and computer and information science domains. Readers will acquire the core system science needed to transform to cybermanufacturing that spans the full spectrum from ideation to physical realization.

This updated, second edition of the book offers an understanding of the management of technology and innovation, not in isolation, but as a dynamic integrated system connected to organizational culture, knowledge management and value creation. To enhance the understanding of the hypercompetitive industrial markets of the globe, this edition carries two new chapters focusing on how technological innovation can lead to wealth creation. In doing so, it weaves wealth creation with other seminal concepts of social capital, human capital and knowledge management. An additional appendix outlines a few technologies and approaches that are useful in technology management. Management of Technology and Innovation: Competing through Technological Excellence provides a synoptic account of the diverse dimensions of technology management, from incremental innovation, integration of design and manufacture to technological innovation and creation of

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hybrid technologies. It provides an outline of the rationale of the strategic evaluation of investments in technology, and brings about its contrast with the conventional accounting framework of net present value (NPV) and discount cash flow (DCF) analyses. It also discusses the national technological/industrial policies of USA and Japan. This book will be an invaluable resource for management students and teachers studying the theory and practice of technology management.

The five-volume set IFIP AICT 630, 631, 632, 633, and 634 constitutes the refereed proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems, APMS 2021, held in Nantes, France, in September 2021.* The 378 papers presented were carefully reviewed and selected from 529 submissions. They discuss artificial intelligence techniques, decision aid and new and renewed paradigms for sustainable and resilient production systems at four-wall factory and value chain levels. *The conference was held online.

For the past couple of years, network automation techniques that include software-defined networking (SDN) and dynamic resource allocation schemes have been the subject of a significant research and development effort. Likewise, network functions virtualization (NFV) and the foreseeable usage of a set of artificial intelligence techniques to facilitate the processing of customers' requirements and the subsequent design, delivery, and operation of the corresponding services are very likely to dramatically

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distort the conception and the management of networking infrastructures. Some of these techniques are being specified within standards developing organizations while others remain perceived as a “buzz” without any concrete deployment plans disclosed by service providers. An in-depth understanding and analysis of these approaches should be conducted to help internet players in making appropriate design choices that would meet their requirements as well as their customers. This is an important area of research as these new developments and approaches will inevitably reshape the internet and the future of technology. Design Innovation and Network Architecture for the Future Internet sheds light on the foreseeable yet dramatic evolution of internet design principles and offers a comprehensive overview on the recent advances in networking techniques that are likely to shape the future internet. The chapters provide a rigorous in-depth analysis of the promises, pitfalls, and other challenges raised by these initiatives, while avoiding any speculation on their expected outcomes and technical benefits. This book covers essential topics such as content delivery networks, network functions virtualization, security, cloud computing, automation, and more. This book will be useful for network engineers, software designers, computer networking professionals, practitioners, researchers,

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academicians, and students looking for a comprehensive research book on the latest advancements in internet design principles and networking techniques.

This book relates research being implemented in three main research areas: secure connectivity and intelligent systems, real-time analytics and manufacturing knowledge and virtual manufacturing. Manufacturing SMEs and MNCs want to see how Industry 4.0 is implemented. On the other hand, groundbreaking research on this topic is constantly growing. For the aforesaid reason, the Singapore Agency for Science, Technology and Research (A*STAR), has created the model factory initiative. In the model factory, manufacturers, technology providers and the broader industry can (i) learn how I4.0 technologies are implemented on real-world manufacturing use-cases, (ii) test process improvements enabled by such technologies at the model factory facility, without disrupting their own operations, (iii) co-develop technology solutions and (iv) support the adoption of solutions at their everyday industrial operation. The book constitutes a clear base ground not only for inspiration of researchers, but also for companies who will want to adopt smart manufacturing approaches coming from Industry 4.0 in their pathway to digitization.

This book provides a new perspective on modeling cyber-physical systems (CPS), using a data-driven

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approach. The authors cover the use of state-of-the-art machine learning and artificial intelligence algorithms for modeling various aspect of the CPS. This book provides insight on how a data-driven modeling approach can be utilized to take advantage of the relation between the cyber and the physical domain of the CPS to aid the first-principle approach in capturing the stochastic phenomena affecting the CPS. The authors provide practical use cases of the data-driven modeling approach for securing the CPS, presenting novel attack models, building and maintaining the digital twin of the physical system. The book also presents novel, data-driven algorithms to handle non- Euclidean data. In summary, this book presents a novel perspective for modeling the CPS.

Being the premier forum for the presentation of new advances and research results in the fields of Industrial Engineering, IEEM 2015 aims to provide a high-level international forum for experts, scholars and entrepreneurs at home and abroad to present the recent advances, new techniques and applications face and face, to promote discussion and interaction among academics, researchers and professionals to promote the developments and applications of the related theories and technologies in universities and enterprises, and to establish business or research relations to find global partners for future collaboration in the field of Industrial

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Engineering. All the goals of the international conference are to fulfill the mission of the series conference which is to review, exchange, summarize and promote the latest achievements in the field of industrial engineering and engineering management over the past year, and to propose prospects and vision for the further development. This volume is the first of the two proceedings volumes from this conference.

The five-volume set IFIP AICT 630, 631, 632, 633, and 634 constitutes the refereed proceedings of the International IFIP WG 5.7 Conference on Advances in Production Management Systems, APMS 2021, held in Nantes, France, in September 2021.* The 378 papers presented were carefully reviewed and selected from 529 submissions. They discuss artificial intelligence techniques, decision aid and new and renewed paradigms for sustainable and resilient production systems at four-wall factory and value chain levels. The papers are organized in the following topical sections: Part I: artificial intelligence based optimization techniques for demand-driven manufacturing; hybrid approaches for production planning and scheduling; intelligent systems for manufacturing planning and control in the industry 4.0; learning and robust decision support systems for agile manufacturing environments; low-code and model-driven engineering for production system; meta-heuristics and optimization techniques for

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energy-oriented manufacturing systems; metaheuristics for production systems; modern analytics and new AI-based smart techniques for replenishment and production planning under uncertainty; system identification for manufacturing control applications; and the future of lean thinking and practice Part II: digital transformation of SME manufacturers: the crucial role of standard; digital transformations towards supply chain resiliency; engineering of smart-product-service-systems of the future; lean and Six Sigma in services healthcare; new trends and challenges in reconfigurable, flexible or agile production system; production management in food supply chains; and sustainability in production planning and lot-sizing Part III: autonomous robots in delivery logistics; digital transformation approaches in production management; finance-driven supply chain; gastronomic service system design; modern scheduling and applications in industry 4.0; recent advances in sustainable manufacturing; regular session: green production and circularity concepts; regular session: improvement models and methods for green and innovative systems; regular session: supply chain and routing management; regular session: robotics and human aspects; regular session: classification and data management methods; smart supply chain and production in society 5.0 era; and supply chain risk management

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under coronavirus Part IV: AI for resilience in global supply chain networks in the context of pandemic disruptions; blockchain in the operations and supply chain management; data-based services as key enablers for smart products, manufacturing and assembly; data-driven methods for supply chain optimization; digital twins based on systems engineering and semantic modeling; digital twins in companies first developments and future challenges; human-centered artificial intelligence in smart manufacturing for the operator 4.0; operations management in engineer-to-order manufacturing; product and asset life cycle management for smart and sustainable manufacturing systems; robotics technologies for control, smart manufacturing and logistics; serious games analytics: improving games and learning support; smart and sustainable production and supply chains; smart methods and techniques for sustainable supply chain management; the new digital lean manufacturing paradigm; and the role of emerging technologies in disaster relief operations: lessons from COVID-19 Part V: data-driven platforms and applications in production and logistics: digital twins and AI for sustainability; regular session: new approaches for routing problem solving; regular session: improvement of design and operation of manufacturing systems; regular session: crossdock and transportation issues; regular session:

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maintenance improvement and lifecycle management; regular session: additive manufacturing and mass customization; regular session: frameworks and conceptual modelling for systems and services efficiency; regular session: optimization of production and transportation systems; regular session: optimization of supply chain agility and reconfigurability; regular session: advanced modelling approaches; regular session: simulation and optimization of systems performances; regular session: AI-based approaches for quality and performance improvement of production systems; and regular session: risk and performance management of supply chains *The conference was held online.

Fast advances in information technology have led to a smarter world vision with ubiquitous interconnection and intelligence. Smart Manufacturing Innovation and Transformation: Interconnection and Intelligence covers both theoretical perspectives and practical approaches to smart manufacturing research and development triggered by ubiquitous interconnection and intelligence. This reference work discusses the transformation of manufacturing, the latest developments in smart manufacturing innovation, current and emerging technology opportunities, and market imperatives that enable manufacturing innovation and transformation, useful tools for

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readers in industry, academia, and government.

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