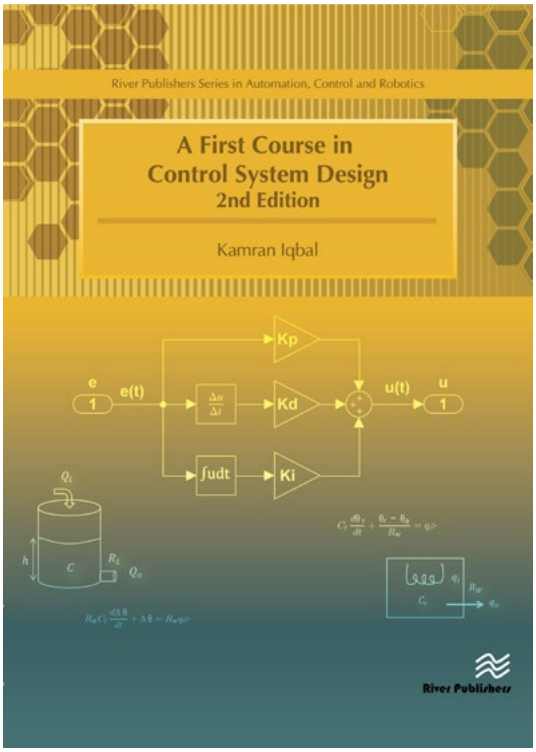
New Books from **River Publishers**

CONTENTS

A First Course in Control System Design, 2/e

Kamran Iqbal



Control systems are pervasive in our lives. Our homes have environmental controls. The appliances we use, such as the washing machine, microwave, etc. carry embedded controllers in them. We fly in airplanes and drive automobiles that extensively use control systems. The industrial plants that produce consumer goods run on process control systems. The recent drive toward automation has increased our reliance on control systems technology.

This book discusses control systems design from a model-based perspective for dynamic system models of single-input single-output type. The emphasis in this book is on understanding and applying the techniques that enable the design of effective control systems in multiple engineering disciplines. The book covers both time-domain and the frequency-domain design methods, as well as controller design for both continuous-time and discrete-time systems. MATLAB© and its Control Systems Toolbox are extensively used for design.

Technical topics discussed in the book include:

- Mathematical models of physical systems
- Analysis of transfer function and state variable models
- Control systems design objectives
- Control system design with root locus
- Control system design in the state-space
- Control system design of sampled-data systems
- Compensator design with frequency response methods

THE AUTHOR:

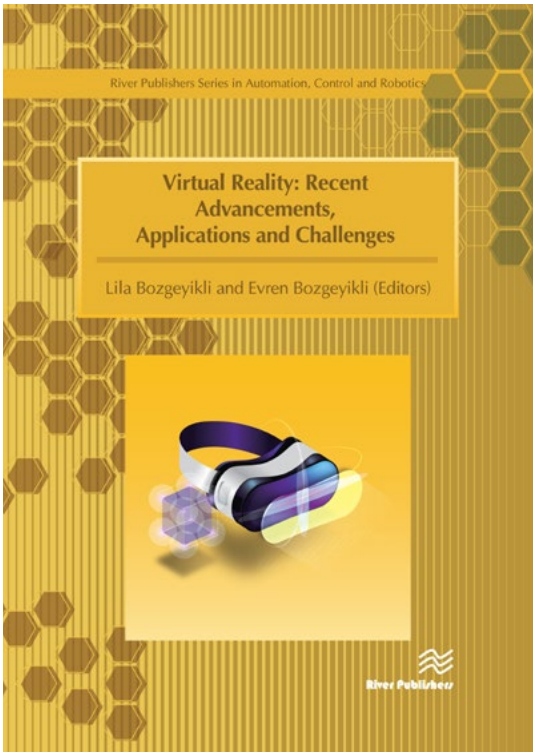
Kamran Iqbal is Professor of Systems Engineering at the University of Arkansas at Little Rock.

August 2020
250 pp, 6 in x 9.5 in
Cloth, 978 8 77022 152 8, $115.00
Lib E-book, 978 8 77022 151 1, $115.00

Virtual Reality

Recent Advancements, Applications and Challenges

Edited by Lila Bozgeyikli and Ren Bozgeyikli



Although the emergence of virtual reality (VR) goes back to the 1960s, with the recent availability of low-cost and high-accuracy systems it has become increasingly prevalent in a wide variety of areas; with uses ranging from training and education to rehabilitation and entertainment. Nowadays, there are many companies that have their own VR systems with various types of headsets and controllers. This has shaped how VR is being used today and how we interact with the latest generation VR systems.

With the rapidly evolving dynamics gained through technological advancements, VR is projected to grow and transform the way humans do everyday tasks both in the workplace and in personal lives. In addition to the VR headsets, there are now augmented reality (AR) headsets that allow the user to see their real-world surroundings while also viewing computer generated imagery. This leads to an enhanced user experience. This book aims to provide a comprehensive update of the latest scientific research, mainly in VR and partly in AR, from the last five years. The content is themed around the application areas of training, education, robotics, health and well-being, and user experience.

THE EDITORS:

Lila Bozgeyikli is an assistant professor at the University of Arizona, College of Social and Behavioral Sciences, School of Information.

Ren Bozgeyikli is an assistant professor at the University of Arizona, College of Social and Behavioral Sciences, School of Information.

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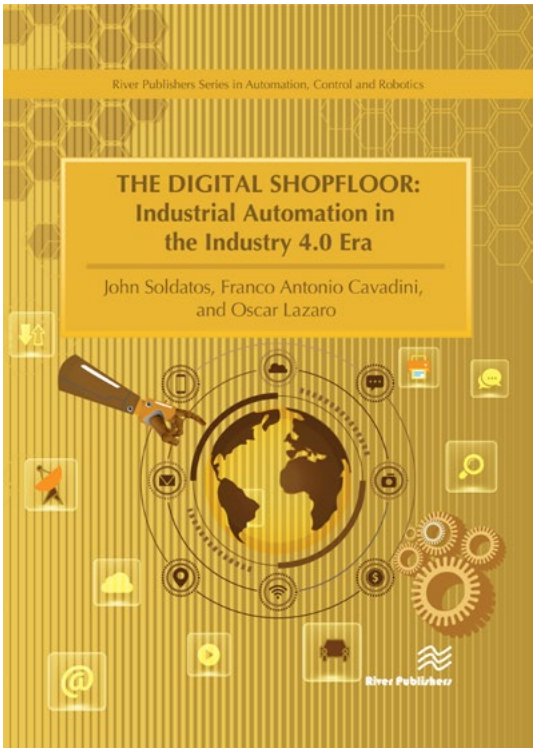
The Digital Shopfloor

Industrial Automation in the Industry 4.0 Era
Performance Analysis and Applications

Edited by John Soldatos, Oscar Lazaro and Franco Cavadini



In today's competitive global environment, manufacturers are offered unprecedented opportunities to build hyper-efficient and highly flexible plants, towards meeting variable market demand, while at the same time supporting new production models such as make-to-order (MTO), configure-to-order (CTO) and engineer-to-order (ETO). During the last couple of years, the digital transformation of industrial processes is propelled by the emergence and rise of the fourth industrial revolution (Industry 4.0). The latter is based on the extensive deployment of Cyber-Physical Production Systems (CPPS) and Industrial Internet of Things (IIoT) technologies on the manufacturing shopfloor, as well as on the seamless and timely exchange of digital information across supply chain participants. The benefits of Industry 4.0 have already been proven in the scope of pilot and production deployments in a number of different use cases including flexibility in automation, predictive maintenance, zero defect manufacturing and more.

The book is structured in three parts as follows:

- The first part of the book is devoted to digital automation platforms. Following an introduction to Industry 4.0 in general and digital automation platforms in particular, this part presents the digital automation platforms of the FAR-EDGE, AUTOWARE and DAEDALUS projects.
- The second part of the book focuses on the presentation of digital simulation and digital twins' functionalities. These include information about the models that underpin digital twins, as well as the simulators that enable experimentation with these processes over these digital models.
- The third part of the book provides information about complementary assets and supporting services that boost the adoption of digital automation functionalities in the Industry 4.0 era. Training services, migration services and ecosystem building services are discussed based on the results of the three projects of the Digital Shopfloor Alliance.

THE EDITORS:

John Soldatos is with Athens Information Technology, Greece.

Oscar Lazaro is with Innovalia Association, Spain.

Franco Cavadini is with Synesis-Consortium, Italy.

May 2019
300 pp, 6.125 in x 9.5 in
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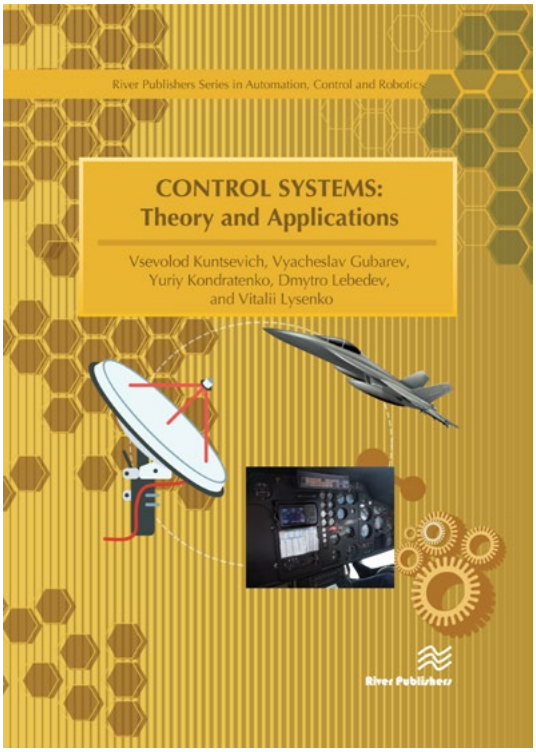
Control Systems – Theory and Applications

Edited by Vsevolod Kuntsevich, Vyacheslav Gubarev, Yuriy Kondratenko, Dmytro Lebedev and Vitalii Lysenko



In recent years, a considerable amount of effort has been devoted, both in industry and academia, towards the development of advanced methods of control theory with focus on its practical implementation in various fields of human activity such as space control, robotics, control applications in marine systems, control processes in agriculture and food production.

Control Systems: Theory and Applications consists of selected best papers which were presented at the XXIV International Conference on Automatic Control "Automatics 2017" (September 13-15, 2017, Kyiv, Ukraine).

The book is divided into two main parts, the first on Theory of Automatic Control (5 chapters) and the second on Control Systems Applications (8 chapters). The selected chapters provide an overview of challenges in the area of control systems design, modeling, engineering and implementation and the approaches and techniques that relevant research groups within this area are employing to try to resolve these.

This book on advanced methods of control theory and successful cases in the practical implementation is ideal for personnel in modern technological processes automation and SCADA systems, robotics, space and marine industries as well as academic staff and master/research students in computerized control systems, automatized and computer-integrated systems, electrical and mechanical engineering.

THE EDITORS:

Vsevolod Kuntsevich is with Space Research Institute of NAS and NSA of Ukraine.

Vyacheslav Gubarev is with Space Research Institute of NAS and NSA of Ukraine.

Yuriy Kondratenko is with Petro Mohyla Black Sea National University, Ukraine.

Dmytro Lebedev is with National Academy of Sciences and Ministry of Education and Sciences of Ukraine.

Vitalii Lysenko is with National University of Life and Environmental Sciences, Ukraine.

February 2019
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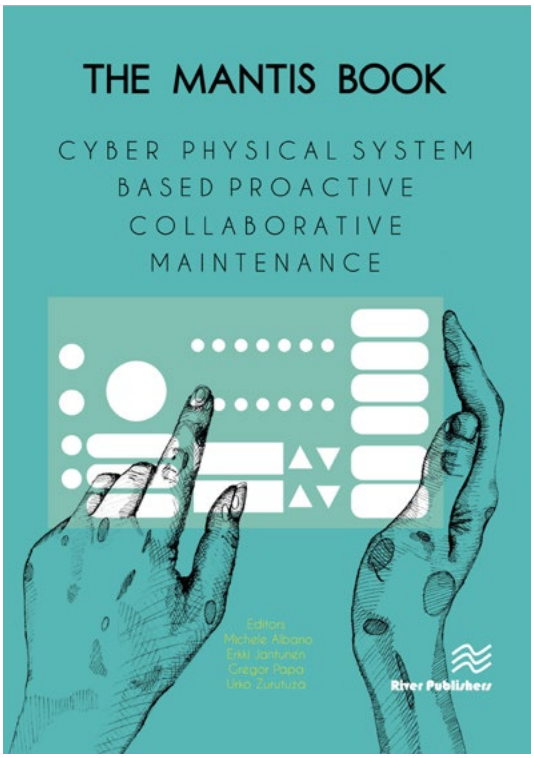
The MANTIS Book

Cyber Physical System Based Proactive Collaborative Maintenance

Edited by Michele Albano, Erkki Jantunen, Gregor Papa and Urko Zurutuza



A considerable amount of effort has been devoted, both in industry and academia, to improving maintenance. Time is a critical factor in maintenance, and efforts are placed to monitor, analyze, and visualize machine or asset data in order to anticipate to any possible failure, prevent damage, and save costs.

The MANTIS Book highlights the underpinning fundamentals of Condition-Based Maintenance related conceptual ideas, an overall idea of preventive maintenance, the economic impact and technical solution.

The core content of this book describes the outcome of the Cyber-Physical System based Proactive Collaborative Maintenance project, also known as MANTIS. The ambition has been to support the creation of a maintenance-oriented reference architecture that supports the maintenance data lifecycle, to enable the use of novel kinds of maintenance strategies for industrial machinery. The key enabler has been the fine blend of collecting data through Cyber-Physical Systems, and the usage of machine learning techniques and advanced visualization for the enhanced monitoring of the machines.

Topics discussed include, in the context of maintenance: Cyber-Physical Systems, Communication Middleware, Machine Learning, Advanced Visualization, Business Models, Future Trends. An important focus of the book is the application of the techniques in real world context, and in fact all the work is driven by the pilots, all of them centered on real machines and factories.

This book is suitable for industrial and maintenance managers that want to implement a new strategy for maintenance in their companies. It should give readers a basic idea on the first steps to implementing a maintenance-oriented platform or information system.

THE EDITORS:

Michele Albano is at Polytechnic Institute of Porto, Portugal.

Erkki Jantunen is with VTT Technical Research Centre of Finland Ltd., Finland.

Gregor Papa is at Jožef Stefan Institute, Slovenia.

Urko Zurutuza is at Mondragon Unibertsitatea, Spain.

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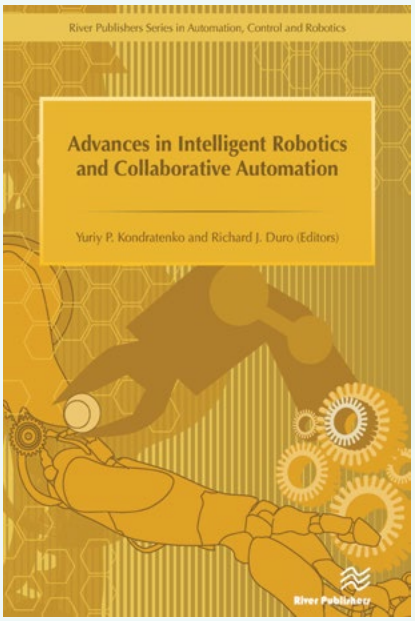

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Richard J. Duro & Yuriy Kondratenko, eds.

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Emmanouil Amolochitis

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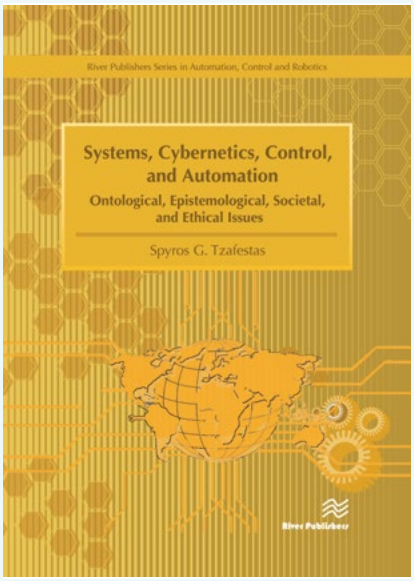

Systems, Cybernetics, Control, and Automation

Spyros G. Tzafestas

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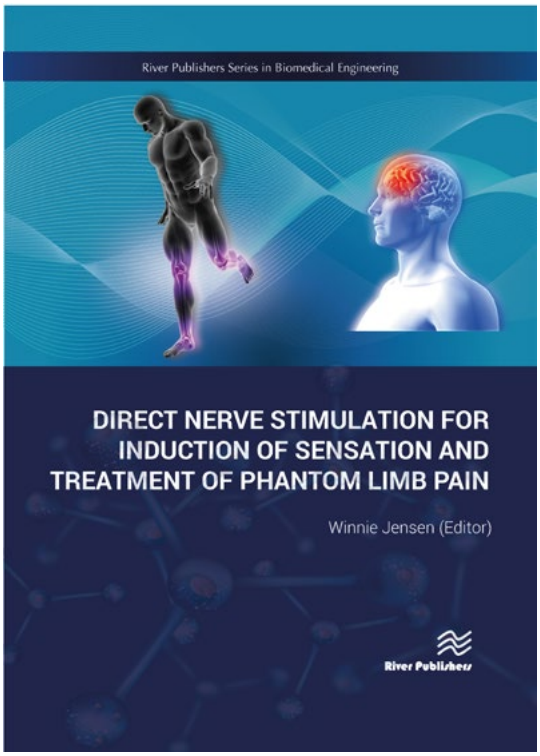
Direct Nerve Stimulation for Induction of Sensation and Treatment of Phantom Limb Pain

Edited by Winnie Jensen

The amputation of a limb is a surgical intervention used as a last resort to remove irreparably damaged, diseased, or congenitally malformed limbs where retention of the limb is a threat to the well-being of the individual. The procedure traumatically alters the body image, but often leaves sensations that refer to the missing body part, the phantom limb. In 50-80% of cases, these sensations are perceived as painful and referred to as "Phantom Limb Pain."

Direct Nerve Stimulation for Induction of Sensation and Treatment of Phantom Limb Pain provides an overview of research, experiences and results for the design, development and test of hardware and software components, and the ambition to safely implant and evaluate a novel neural interface system to combat phantom limb pain in an amputee volunteer subject.



THE EDITOR:

Winnie Jensen is at Aalborg University, Denmark.

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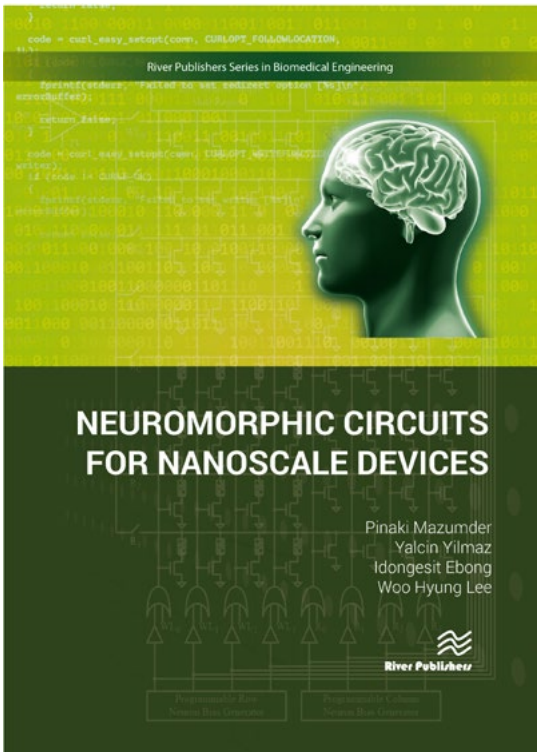
Neuromorphic Circuits for Nanoscale Devices

Pinaki Mazumder, Yalcin Yilmaz, Idongesit Ebong and Woo Hyung Lee



Nanoscale devices attracted significant research effort from the industry and academia due to their operation principals being based on different physical properties which provide advantages in the design of certain classes of circuits over conventional CMOS transistors.

Neuromorphic Circuits for Nanoscale Devices contains recent research papers presented in various international conferences and journals to provide insight into how the operational principles of the nanoscale devices can be utilized for the design of neuromorphic circuits for various applications of non-volatile memory, neural network training/learning, and image processing.

THE AUTHORS:

Pinaki Mazumder is at University of Michigan, Ann Arbor.

Yilcin Yilmaz is at University of Michigan, Ann Arbor.

Idongesit Ebong is at University of Michigan, Ann Arbor.

Woo Hyung Lee is at University of Michigan, Ann Arbor.

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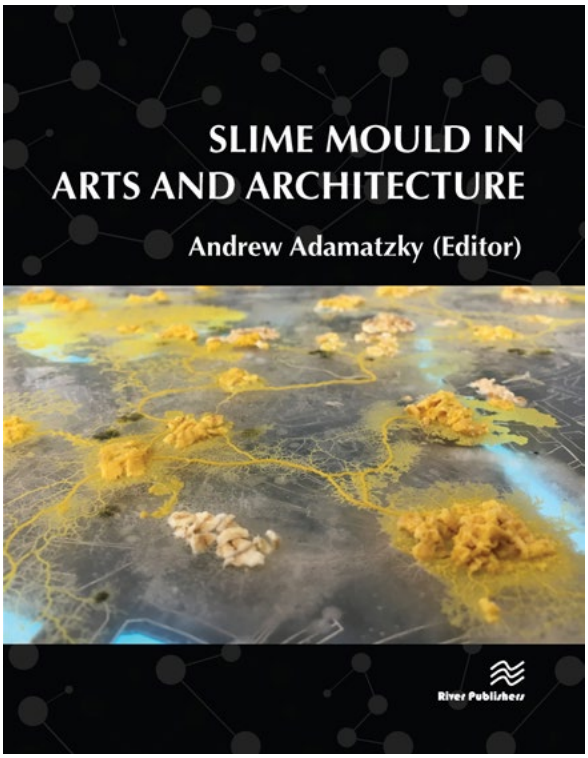
Slime Mould in Arts and Architecture

Edited by Andrew Adamatzky



The slime mold Physarum polycephalum was a source of explosive growth of bioengineered hybrid sensing and computing devices in the past decade. Being in its vegetative state--the plasmodium--the slime mold configures its protoplasmic network to optimize its geometry with relation to patterns of attractants and repellents.

The slime mold's adaptability, polymorphism and aesthetics inspired artists and architects. It has been seen as a self-conscious liquid form continuously changing its shape in response to external stimulation and due to interactions of thousands of micro-oscillators in its body. Elusiveness is a magic feature of the slime mold. One moment it gives you a solution to a mathematical problem by a shape of its body, the next moment it changes its shape and the solution disappears.

Slime Mould in Arts and Architecture presents a set of unique chapters written by leading artists, architects and scientists, which resulted from creative translations of slime mold behavior into forms and sounds, unconventional investigations and sensorial experiences and the slime mold ability to remove boundaries between living and artificial, solid and fluid, science and arts. The book gives readers unique tools for: designing architectural forms and creative works; understanding how pro-cognitive living substrates can be used in everyday life; and sparking new ideas and initiates further progress in many fields or arts, architecture, science and engineering.

THE EDITOR:

Andrew Adamatzky is at University of the West of England, Bristol, UK.

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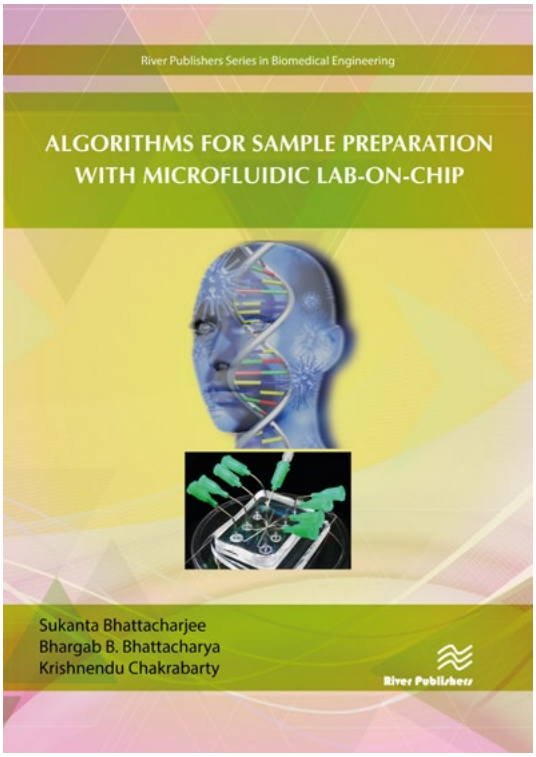
Algorithms for Sample Preparation with Microfluidic Lab-on-Chip

Sukanta Bhattacharjee, Bhargab B. Bhattacharya and Krishnendu Chakrabarty



Recent microfluidic technologies have brought a complete paradigm shift in automating biochemical processing on a tiny lab-on-chip (a.k.a. biochip) that replaces expensive and bulky instruments traditionally used in implementing bench-top laboratory protocols. Biochips have already made a profound impact on various application domains such as clinical diagnostics, DNA analysis, genetic engineering, and drug discovery, among others. They are capable of precisely manipulating micro-/pico-liter quantities of fluids, and provide integrated support for mixing, storage, transportation, and sensing, on-chip. In almost all bioprotocols, sample preparation plays an important role, which includes dilution and mixing of several fluids satisfying certain volumetric ratios. However, designing algorithms that minimize reactant-cost and sample-preparation time suited for microfluidic chips poses a great challenge from the perspective of protocol mapping, scheduling, and physical design.

Algorithms for Sample Preparation with Microfluidic Lab-on-Chip bridges the widening gap between biologists and engineers by introducing, from the fundamentals, several state-of-the-art computer-aided-design (CAD) algorithms for sample preparation with digital and flow-based microfluidic biochips.

THE AUTHORS:

Sukanta Bhattacharjee is with Indian Statistical Institute, India.

Bhargab B. Bhattacharya is with Indian Statistical Institute, India.

Krishnendu Chakrabarty teaches Computer Science at Duke University.

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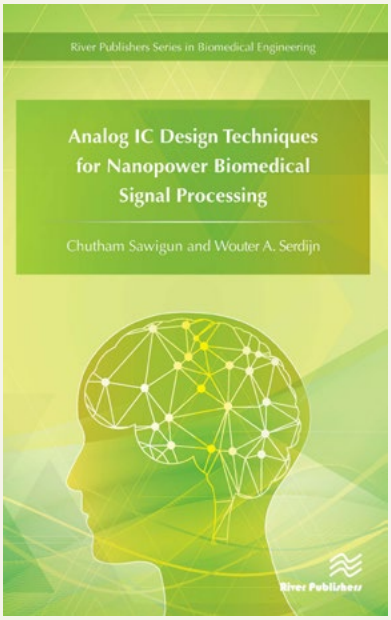

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Chutham Sawigun and Wouter A. Serdijn

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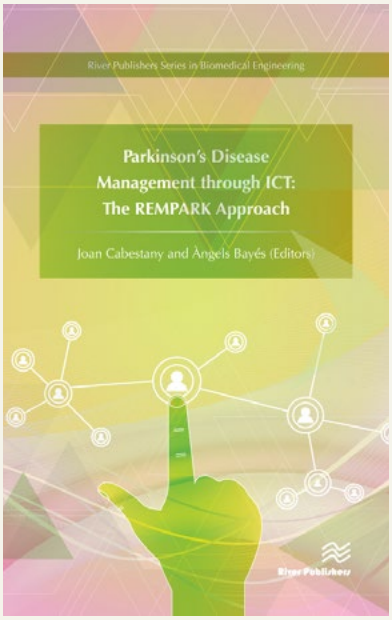

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Atlas of Cilia Bioengineering and Biocomputing

Edited by Richard Mayne and Jaap den Toonder

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Thyroid Systems Engineering

A Primer in Mathematical Modeling of the Hypothalamus-Pituitary-Thyroid Axis

Edited by Simon Goede and Melvin Khee-Shing Leow

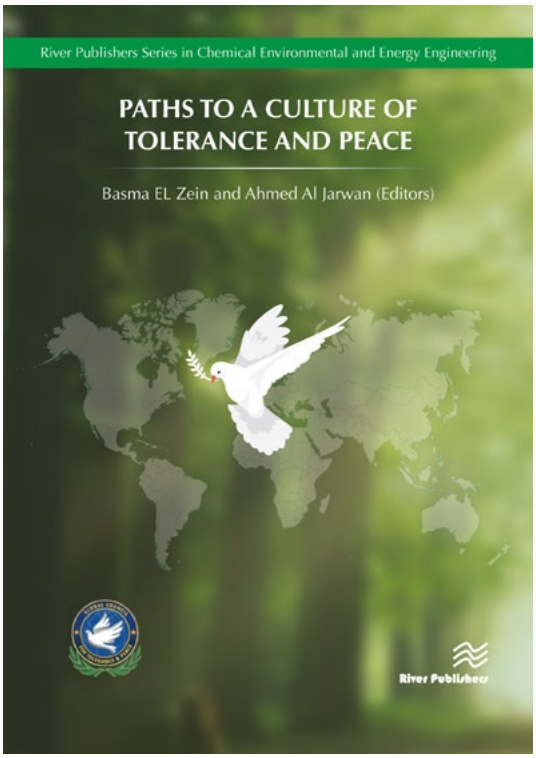
Cloth, 978 8 79360 959 4, $110.00
Lib E-book, 978 8 79360 958 7, $110.00

Paths to a Culture of Tolerance and Peace

Edited by Basma ElZein and Ahmed Al Jarwan

We are living today in a multicultural world, surrounded by people from different backgrounds, cultures and religions. Establishing tolerance and peace has become crucial. Without these qualities, social stability and communal harmony are threatened; and acceptance of each other remains elusive.

Spreading a culture of tolerance and peace is necessary to address contemporary issues of world peace, this includes reflection on the importance of refusing violence and adopting a more peaceful means for resolving disagreements and conflicts. This book, written by the world's foremost thinkers in this area, aims to increase feelings of openness and respect toward others, solidarity and sharing based on a sense of security in one's own identity and a capacity to recognize the many dimensions of being human in different cultural and social contexts.



THE EDITORS:

Basma EL Zein, University of Business and Technology, Saudi Arabia

Ahmed Al Jarwan, is with Global Council for Tolerance and Peace, Malta

December 2020
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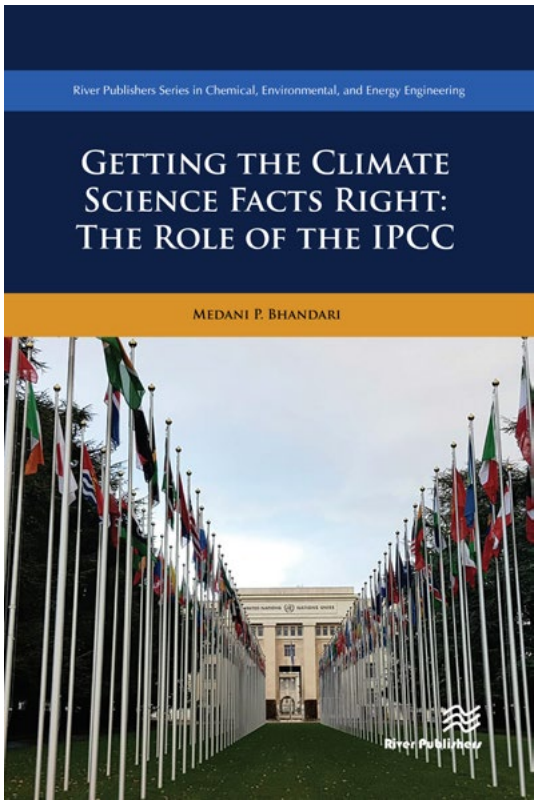
Getting the Climate Science Facts Right – The Role of the IPCC

Medani P. Bhandari



Getting the Climate Science Facts Right - The Role of the IPCC discusses climate change science with reference to the Intergovernmental Panel on Climate Change (IPCC). Addressing climate change is the most important public priority of the 21st Century. Unlike many issues, however, this one is being driven by both science and its interface with politics. The main institution for bridging this division between science and international politics is the IPCC. As such it is the main source of the facts from which climate change policy is developed. This book describes the ways in which the IPCC arrives at these facts and so can be sure they are complete and evidence based.

Seldom in history has science had such a direct relationship with politics. The negotiation of an international policy regime requires, at its outset, an agreement on the facts. In this case, the facts are scientific, complex and contentious. Governments have recognized this and have, by using the IPCC, set up institutional machinery to provide facts from a source and in a manner that they can accept. The way in which the IPCC functions is unique in that it melds the way in which science achieves consensus with the way governments does at the international level. Starting with a process to examine, review and debate scientific findings leading to a consensus about scientific fact, usually expressed as probabilities that the findings will hold over time, the IPCC then concludes by using the kind of consensus-development mechanism that the United Nations typically uses to achieve agreements leading to the formation of policy regimes.

THE AUTHOR:

Medani P. Bhandari is Professor of Social and Environmental research methods and Crisis Management at Sumy State University, Ukraine; Faculty and Deputy Program Director of Sustainability Studies at Akamai University, Hilo, Hawaii; and Professor of Natural Resources and the Environment at Arabian Gulf University, Bahrain.

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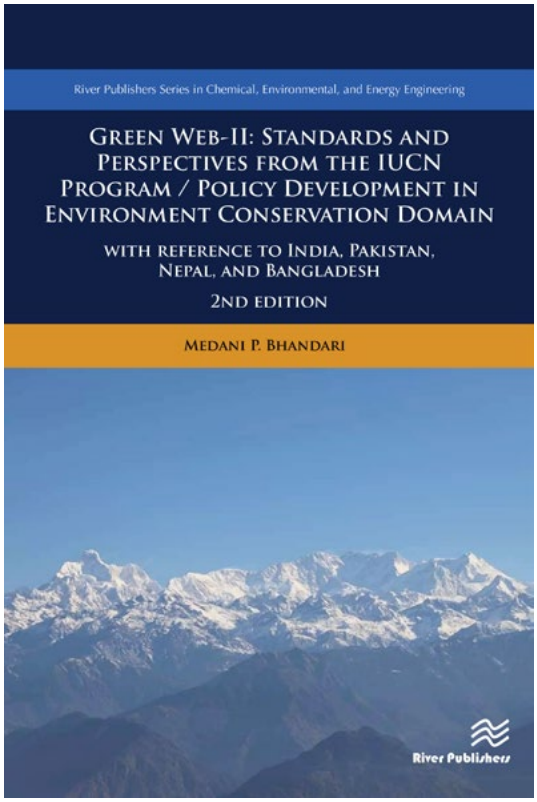
Green Web-II – Standards and Perspectives from the IUCN Program/Policy Development in Environment Conservation Domain

With Reference to India, Pakistan, Nepal, and Bangladesh

Second Edition

Medani P. Bhandari



This second edition of the book *Green Web-II - Standards and Perspectives from the IUCN Program / Policy Development in Environment Conservation Domain*: investigates the IUCN's role in global biodiversity conservation policy as well as in national program development in India, Pakistan, Nepal and Bangladesh. It explores how nature protection priorities and approaches are promoted or addressed by IUCN, and how environment conservation policies are created and maintained in states of South Asia with different capacities. It also evaluates IUCN's competency in biodiversity, climate change, nature conservation and environmental policy formulation at the global, regional and country levels.

This book adds to our knowledge firstly by contributing to a small but growing body of work on the sociology of international organizations. International Governmental Organizations (IGOs), have previously been mainly the subject of political science. Secondly, it critically explores one of the largest and most active nature conservation organizations in the world. Thirdly, it also explores how IUCN actually goes about building protectoral programs with individual member nations. Finally, the research also shows the historical development of global institutions and IUCN's activities with member nations in helping to define or redefine the concept of global governance. The outcomes of this research will also be beneficial for global collaboration, networking, and for the identification of common concerns among the many environmental and conservational organizations at the international and national level. In this broader sense, the research outcomes might be beneficial to constituencies of the global North as well as global South because of the nature and coverage of IUCN and its role in conservation policy formation. This effort may serve as a model for additional research on international organizations.

THE AUTHOR:

Medani P. Bhandari is Professor of Social and Environmental research methods and Crisis Management at Sumy State University, Ukraine; Faculty and Deputy Program Director of Sustainability Studies at Akamai University, Hilo, Hawaii; and Professor of Natural Resources and the Environment at Arabian Gulf University, Bahrain.

August 2020
250 pp, 6 in x 9 in
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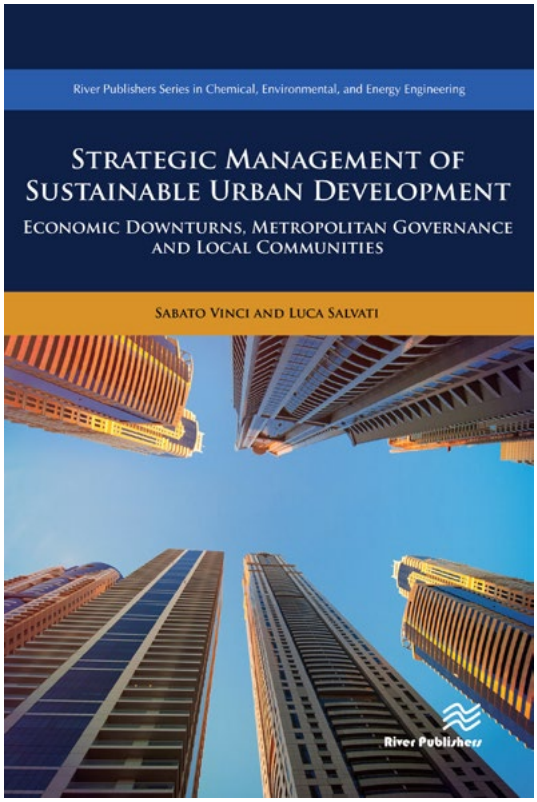
Lib E-book, 978 8 77022 191 7, $115.00

Strategic Management of Sustainable Urban Development

Economic Downturns, Metropolitan Governance and Local Communities

Sabato Vinci and Luca Salvati

If we assume recession as being the starting point for policy challenges, then we can interpret these economic downturns as opportunities for change and the reshaping of society, landscapes and the latent mechanisms of growth. This book illustrates different aspects of local strategic development introducing a novel interpretation of the intimate relationship between demographic and economic aspects in complex socio-environmental systems. A specific approach investigating the mechanisms of local development, cultural and environmental values within a strategic territorial vision, is proposed. Coming from and appealing to diverse academic backgrounds, our book addresses paradigmatic visions about regional and urban dynamics, focusing on landscape transformations and socioeconomic disparities.



THE AUTHORS:

Sabato Vinci is at the University of Roma Tre, Italy.

Luca Salvati is with CREA, Italy.

August 2020
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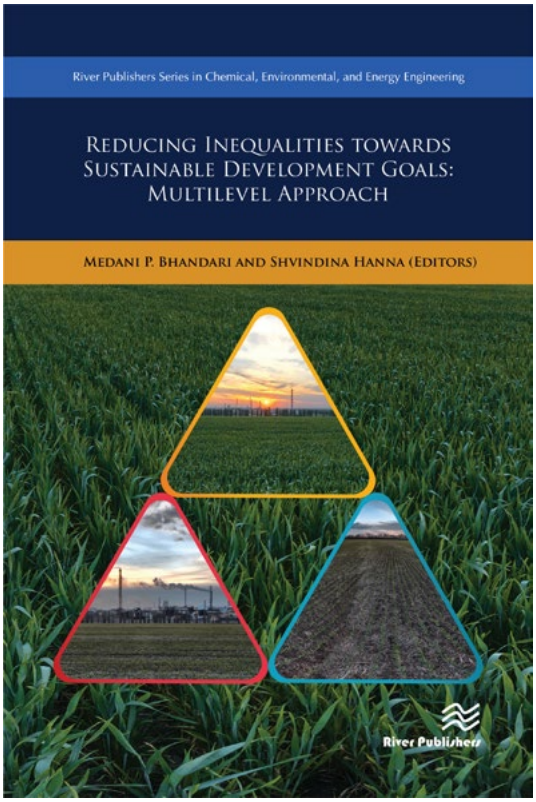
Cloth, 978 8 77022 166 5, $115.00
Lib E-book, 978 8 77022 165 8, $115.00

Reducing Inequalities Towards Sustainable Development Goals

Multilevel Approach

Edited by Medani P. Bhandari and Shvindina Hanna



The Sustainable Development Goals (SDGs) are a set of global goals that meet some of the most pressing challenges facing our world today. Goal 10 concerns reducing global inequalities. Inequality is currently seen in the social, political, and economic structures of communities at both the national and international level. The United Nation's approach to sustainable development is to create a set of goals and targets to try to minimize the accelerating gaps of inequality. The book presents new insights for evaluating the progress on SDGs (especially goal 10); it also boldly sets new economic, social and environmental targets for reducing inequality. Using case studies, this book encourages readers to view economic development through the lens of growing inequalities and disparities. Such inequalities are clearly becoming more obvious as the world is better connected, and information is quickly shared. The book's main aim is therefore to direct the efforts of scholars, practitioners and policymakers to swiftly find the balance between the three pillars of sustainable development. The main challenges and focus of each chapter are different and collectively they give an integrated understanding of the phenomenon of sustainable development and its diverse aspects.

THE EDITORS:

Medani P. Bhandari is Professor of Social and Environmental research methods and Crisis Management at Sumy State University, Ukraine; Faculty and Deputy Program Director of Sustainability Studies at Akamai University, Hilo, Hawaii; and Professor of Natural Resources and the Environment at Arabian Gulf University, Bahrain.

Shvindina Hanna is at Sumy State University, Ukraine.

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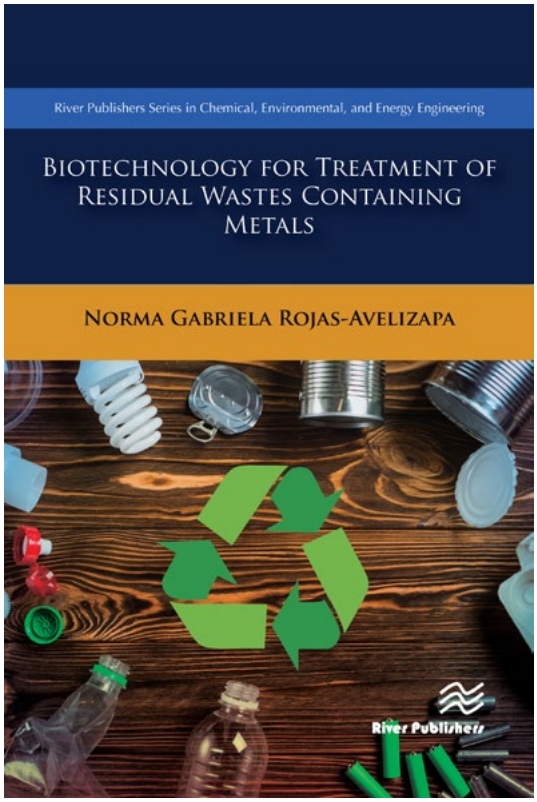
Biotechnology for Treatment of Residual Wastes Containing Metals

Edited by Norma G. Rojas-Avelizapa

Biotechnology for Treatment of Wastes Containing Metals addresses various aspects related to different wastes that have a metallic content and represent a serious risk for the environment and human health. These wastes, due to their physical and chemical characteristics, have been the object of studies which have led to the development of different technologies in recycling, reuse or adequate disposal, biotechnology being one of these alternatives. Biotechnology offers a range of options for the treatment of types of waste using microorganisms, biomass and their by-products. The mechanisms involved in these waste treatment processes are diverse and complex, and its optimization and efficiency is multifactorial.

This text contains nine chapters related to the problem of the metal contamination in the environment as well as some of the different biotechnological alternatives that have been applied for the reduction and/or recovery of metal contamination.



THE EDITOR:

Norma G. Rojas-Avelizapa is with Instituto Politecnico Nacional, Mexico.

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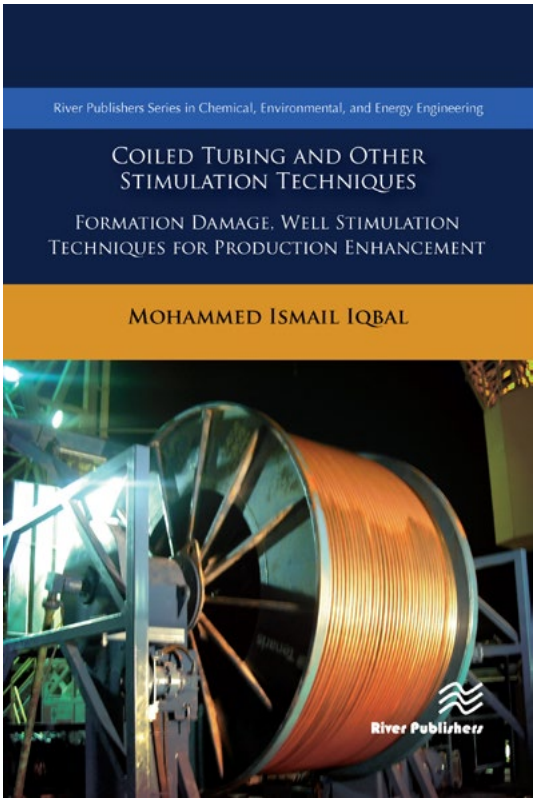
Coiled Tubing and Other Stimulation Techniques

Formation Damage, Well Stimulation Techniques for Production Enhancement

Mohammed Ismail Iqbal and Shohaib Khan



The two main activities of the production engineer in the petroleum and related industries are reservoir stimulation and artificial lift. The classic solution to maximizing a well's productivity is to stimulate it. The basis for selecting stimulation candidates should be a review of the well's actual and theoretical IPR. Low permeability wells often need fracturing on initial completion. In low permeability zones, additional post stimulation production can be significant to the economics, however, the production engineer needs to make management aware of the true long term potential or else overly optimistic projections can easily be made.

The main purpose of stimulation is to enhance the property value by the faster delivery of the petroleum fluid and/or to increase ultimate economic recovery. The aim of reservoir stimulation is to bypass near-wellbore damage and return a well to its "natural" productivity/injectivity, to extend a conductive path deep into a formation and thus increase productivity beyond the natural level and to produce hydrocarbon from tight formation.

Hence, to improve productivity of the well matrix stimulation and hydraulic fracturing are intended to remedy, or even improve, the natural connection of the wellbore with the reservoir, which could delay the need for artificial lift.

THE AUTHORS:

Mohammed Ismail Iqbal is at Ministry of Manpower, Nizwa College of Technology, Oman.

Shohaib Khan is with Saeed Bin Masoud International Group of Companies, Oman.

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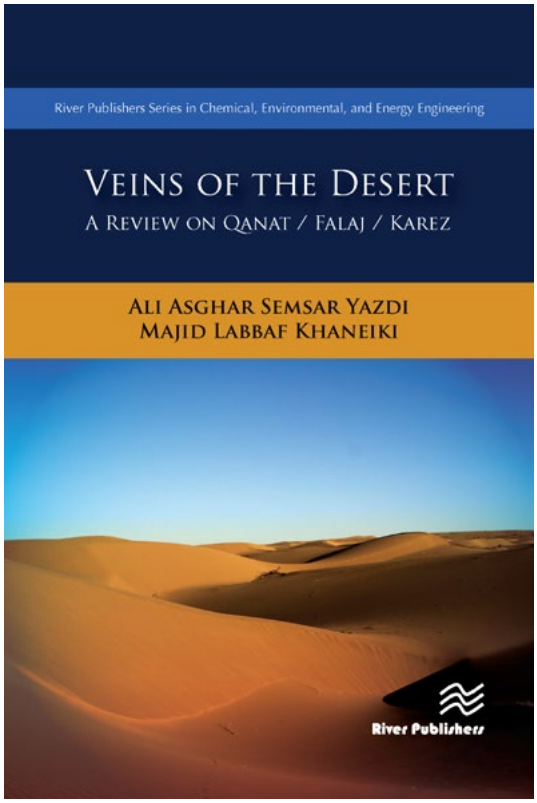
Veins of the Desert

A Review on Qanat / Falaj / Karez

Ali Asghar Semsar Yazdi and Majid Labbaf Khaneiki



A qanat is a gently sloping subterranean canal which taps a water-bearing zone located at a higher elevation than cultivated lands. It consists of a series of vertical shafts in sloping ground, interconnected at the bottom by a tunnel with a gradient flatter than that of the ground. From the air, this system looks like a line of anthills leading from the foothills across the desert to the greenery of an irrigated settlement. In a traditional realm, qanats are embraced by a socio-economic system which guarantees their sustainability. The facets of this socio-economic system operate closely together and make it possible for the qanats to remain into the future.

Veins of the Desert shows that digging a qanat requires a variety of sciences and technologies, though at a glance a qanat is just a horizontal tunnel which drains out groundwater. A qanat is a feat of technology left from our ancestors—hidden underground, but its technical importance is apparent and not less valuable than such surface structures as bridges, castles, towers, etc. A qanat enjoys extended structures and sometimes its length reaches tens of kilometers. It passes through geological formations and faces different conditions and obstacles; this has led to the accumulation of knowledge in terms of qanat construction over time, which has been handed down from generation to generation. A qanat is one of the most complicated traditional technologies, which requires knowledge on nature ranging from groundwater to management. This indigenous technology is used to bring water efficiently from tens of kilometers away to the thirsty lands.

This book also gives insight into the cultural and social heritages which have crystalized around this technique, still influencing the social life of the people living in such regions as the central plateau of Iran where qanats have been the only means of supplying water. This technology is the focal point of the genesis of a particular civilization in the arid and semi-arid regions of Iran. Thus, the qanat is not only an irrigational means, but it should be seen as a technical and cultural legacy which deserves more attention. This book is a small encyclopedia on the qanat system, providing readers with easy answers to their questions about different aspects of this ancient technology.

THE AUTHORS:

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Majid Labbaf Khaneiki is with UNESCO-ICQHS.

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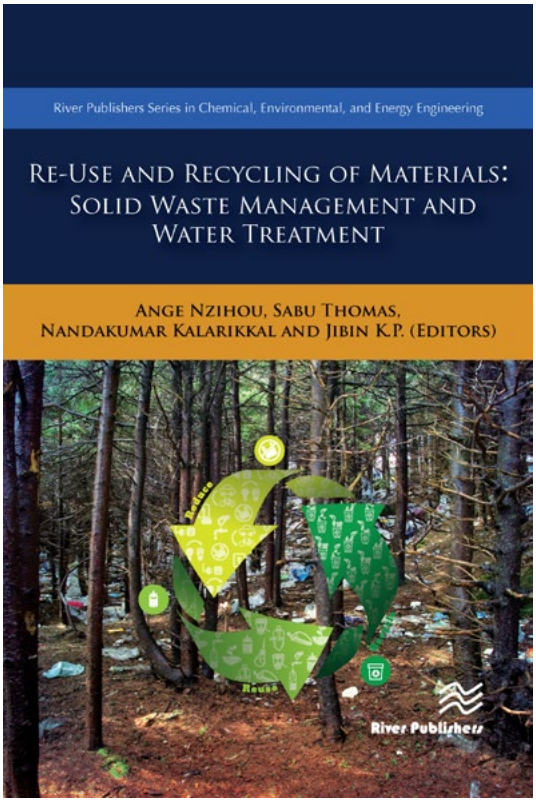
Re-Use and Recycling of Materials

Solid Waste Management and Water Treatment

Edited by Ange Nzihou, Sabu Thomas, Nandakumar Kalarikkal and Jibin K.P.

In recent years, a considerable amount of effort has been devoted, both in industry and academia, towards the recycling and reuse of materials. Most nations are now trying to reduce the amount of waste materials, through the proper recycling of materials.

Re-Use and Recycling of Materials will help readers to understand the current status in the field of waste management, as well as what research is taking place to deal with such issues.



THE EDITORS:

Ange Nzihou is with IMT Mines Albi CNRS, France.

Sabu Thomas teaches at Mahatma Gandhi University, India.

Nandakumar Kalarikkal is at School of Pure and Applied Physics; Mahatma Gandhi University, India.

Jibin K.P. is affiliated with Mahatma Gandhi University, India.

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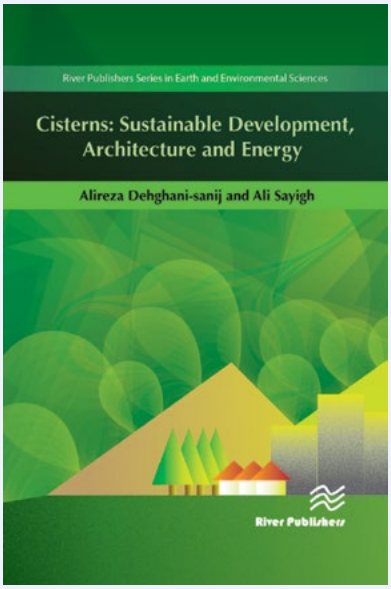
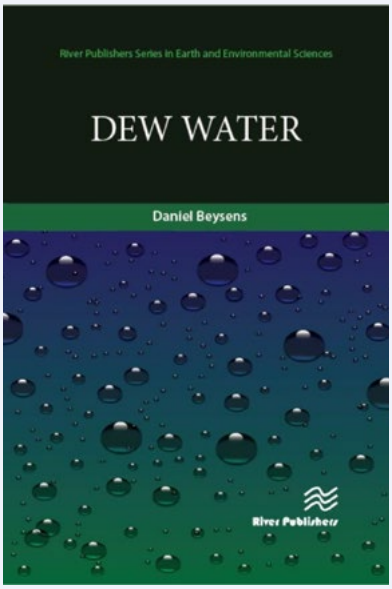
ALSO AVAILABLE:



Cisterns

Alireza Dehghani-sanij and Ali Sayigh

Cloth, 978 8 79337 952 7, $75.00
Lib E-book, 978 8 79337 951 0, $75.00



Dew Water

Daniel A. Beysens

Cloth, 978 8 79360 947 1, $95.00
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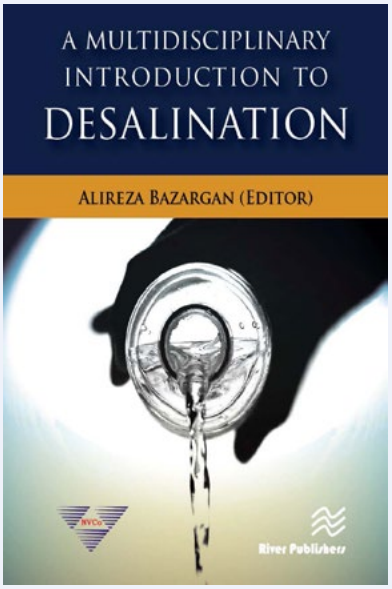


A Multidisciplinary Introduction to Desalination

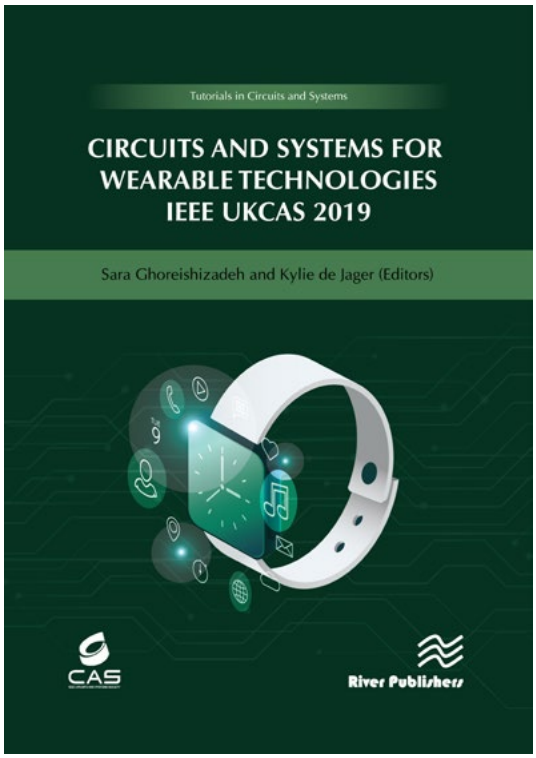
Edited by Alireza Bazargan

Cloth, 978 8 79337 954 1, $75.00
Lib E-book, 978 8 79337 953 4, $75.00
E-book, 978 8 79360 994 5, $18.75

Circuits and Systems for Wearable Technologies

IEEE UKCAS 2019

Edited by Sara Ghoreishizadeh and Kylie de Jager



This book is based on presentations given at the 2nd IEEE United Kingdom Circuits and Systems (UKCAS 2019) Workshop. It covers several advanced topics in the areas of semiconductor devices, circuits and systems, and energy harvesting; discussing their application in emerging implantable and wearable technologies and IoT. Notable application examples discussed include rapid infectious disease monitoring, in-situ tear fluid analysis, sleep engineering, chronic pain treatment, personalized anti-cancer therapy, fetus and neonate monitoring, monitoring of bone healing, orthopedic implants, magnetomyography and intelligent gesture recognition. Fundamental aspects of these topics are discussed, and state-of-the-art developments are presented.

THE EDITORS:

Sara Ghoreishizadeh teaches at University College London, UK.

Kylie de Jager teaches at University College London, UK.

September 2020
182 pp, 6 in x 9 in
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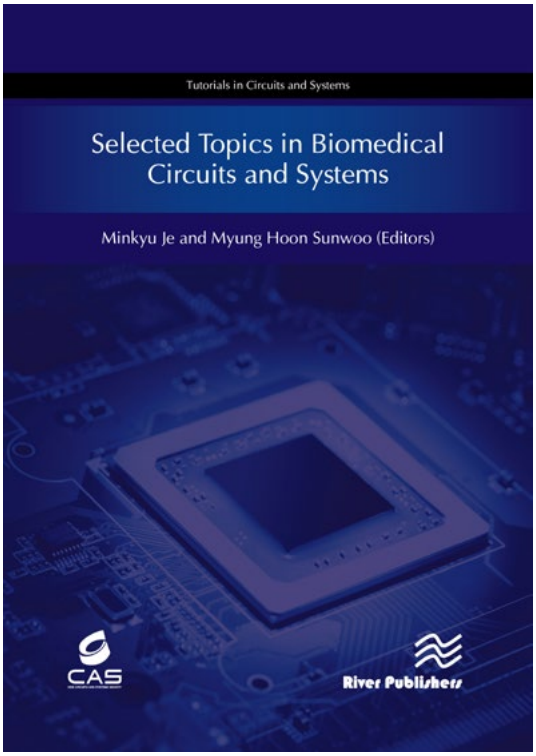
Lib E-book, 978 8 77022 131 3, $100.00

Selected Topics in Biomedical Circuits and Systems

Edited by Minkyu Je and Myung Hoon Sunwoo



Integrated circuits and microsystems play a vital role in a variety of biomedical applications including life-saving/changing miniature medical devices, surgical procedures with less invasiveness and morbidity, low-cost preventive healthcare solutions for daily life, solutions for effective chronic disease management, point-of-care diagnosis for early disease detection, high-throughput bio sequencing and drug screening and groundbreaking brain-machine interfaces based on a deep understanding of human intelligence. In response to such strong demands for biomedical circuits and systems, a considerable amount of effort has been devoted to the research and development in this area, both by industry and academia, over recent years.

This book, which belongs to the "Tutorials in Circuits and Systems" series, provides readers with an overview of new developments in the field of biomedical circuits and systems. It covers basic information about system-level and circuit-level requirements, operation principles, key factors of considerations, and design/implementation techniques, as well as recent advances in integrated circuits and microsystems for emerging biomedical applications.

THE EDITORS:

Minkyu Je is with KAIST, Korea.

Myung Hoon Sunwoo is affiliated with Ajou University, Korea.

September 2020
250 pp, 6 in x 9 in
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Lib E-book, 978 8 77022 147 4, $115.00

Advanced VLSI Technology

Technical Questions with Solutions

Cherry Bhargava and Gaurav Mani Khanal

The trend in design and manufacturing of very large-scale integrated (VLSI) circuits is towards smaller devices on increasing wafer dimensions. VLSI is the inter-disciplinary science of the process of creating an integrated circuit (IC) by combining thousands of transistors into a single chip. VLSI design can reduce the area of the circuit, making it less expensive and requiring less power.

The book gives an understanding of the underlying principles of the subject. It not only focuses on circuit design process obeying VLSI rules but also on technological aspects of prototyping and fabrication. All the clocking processes, interconnects, and circuits of CMOS are explained in this book in an understandable format. The book provides contents on VLSI Physical Design Automation, Design of VLSI Devices and also its Impact on Physical Design.

The latest technology used in VLSI design is discussed along with the available tools for FPGA prototyping as well as ASIC design. Each unit contains technical questions with solutions at the end.

THE AUTHORS:

Cherry Bhargava is at Lovely Professional University, India.

Gaurav Mani Khanal is at the University of Rome Tor Vergata, Italy.

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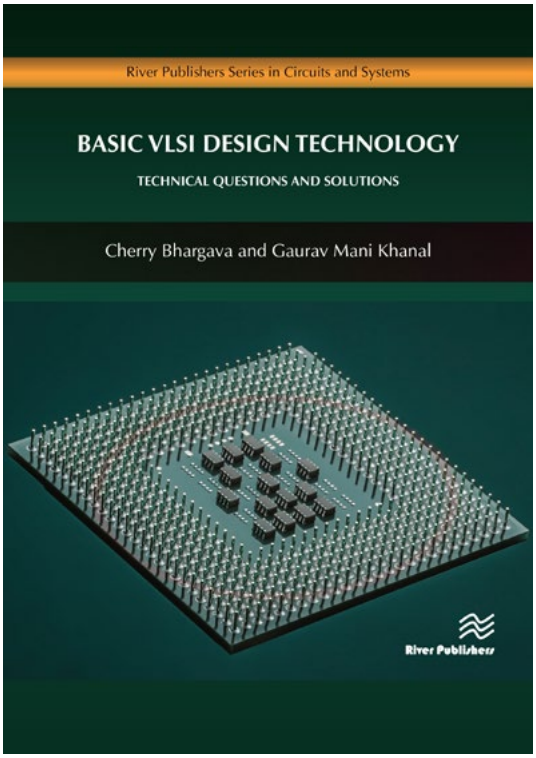
Basic VLSI Design Technology

Technical Questions and Solutions

Cherry Bhargava and Gaurav Mani Khanal



The current cutting-edge VLSI circuit design technologies provide end-users with many applications, increased processing power and improved cost effectiveness. This trend is accelerating, with significant implications on future VLSI and systems design. VLSI design engineers are always in demand for front-end and back-end design applications.

The book aims to give future and current VSLI design engineers a robust understanding of the underlying principles of the subject. It not only focuses on circuit design processes obeying VLSI rules but also on technological aspects of fabrication. The Hardware Description Language (HDL) Verilog is explained along with its modelling style. The book also covers CMOS design from the digital systems level to the circuit level. The book clearly explains fundamental principles and is a guide to good design practices.

The book is intended as a reference book for senior undergraduate, first-year post graduate students, researchers as well as academicians in VLSI design, electronics & electrical engineering and materials science. The basics and applications of VLSI design from digital system design to IC fabrication and FPGA Prototyping are each covered in a comprehensive manner. At the end of each unit is a section with technical questions including solutions which will serve as an excellent teaching aid to all readers.

THE AUTHORS:

Cherry Bhargava is at Lovely Professional University, India.

Gaurav Mani Khanal is at the University of Rome Tor Vergata, Italy.

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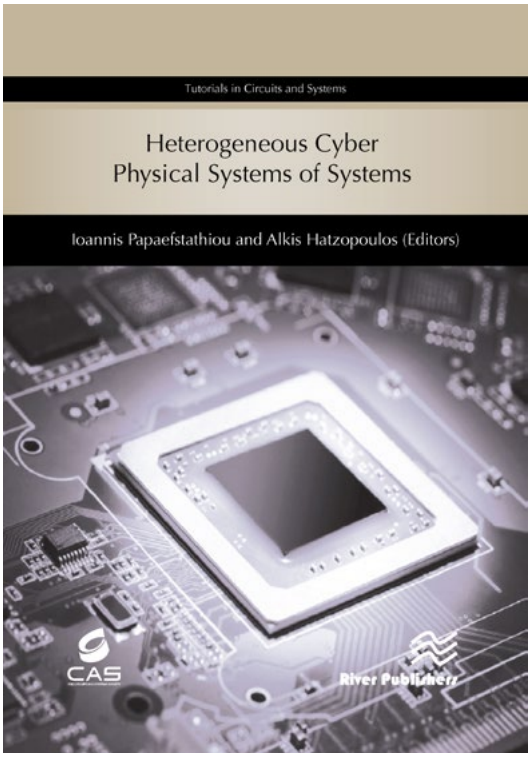
Heterogeneous Cyber Physical Systems of Systems

Edited by Ioannis Papaefstathiou and Alkis Hatzopoulos



Cyber-physical systems are the natural extension of the so-called "Internet of Things". They are "systems of collaborating computational elements controlling physical entities." Cyber Physical Systems of Systems (CPSoS) are considered "The Next Computing Revolution" after Mainframe computing (60's-70's), Desktop computing & Internet (80's-90's) and Ubiquitous computing (00's); because all aspects of daily life are rapidly evolving towards humans interacting among themselves as well as their environment via computational devices (often mobile), and because in most cases systems will employ their computational capabilities to interact among themselves.

CPSoS enable the physical world to merge with the cyber one. Using sensors, the embedded systems monitor and collect data from physical processes, such as the steering of a vehicle, energy consumption, or human health functions. The systems are networked making the data globally available. CPSoS make it possible for software applications to directly interact with events in the physical world, for example to measure and react to changes in blood pressure or peaks in energy consumption. Embedded hardware and software systems crucially expand the functionality and competitiveness of vehicles, aircraft, medical equipment, production plants and household appliances. Connecting these systems to a virtual environment of globally networked services and information systems opens completely new areas of innovation and novel business platforms.

Future CPSoS will have many sophisticated, interconnected parts that must instantaneously exchange, parse, and act on detailed data in a highly coordinated manner. Continued advances in science and engineering will be necessary to enable advances in design and development of these complex systems. Multi-scale, multi-layer, multi-domain, and multi-system integrated infrastructures will require new foundations in system science and engineering. Scientists and engineers with an understanding of otherwise physical systems will need to work in tandem with computer and information scientists to achieve effective, workable designs. In this tutorial, basic and advanced issues on the design of the future heterogeneous CPSoS are presented including relevant Blockchain technologies, reconfigurable systems, advanced sensor interfaces and human-centered design processes. Certain advanced tools for the design and implementation of the cyber parts of the CPSoS (i.e. FPGA design tools from Xilinx) are also covered.

THE EDITORS:

Ioannis Papaefstathiou, PhD, is Associate Professor in the Department of Electrical and Computer Engineering at Aristotle University of Thessaloniki, Greece.

Alkis Hatzopoulos, PhD, is a professor and Director of the Electronics Lab in the Department of Electrical and Computer Engineering at Aristotle University of Thessaloniki, Greece.

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Linear Electronics

Marcelo Sampaio de Alencar, Raphael Tavares de Alencar, Raissa Bezerra Rocha and

Ana Isabela Cunha

A considerable amount of effort has been devoted, both in industry and academia, towards the design, performance analysis and evaluation of amplification schemes and filters to be used in control systems, audio and video equipment, instrumentation and communication systems.

The book is suitable for the undergraduate as well as the initial graduate levels of Electrical and Electronics Engineering, Mecatronics, Telecommunications, Automation and Control courses, and is useful for the professional who wants to review or get acquainted with the modern exposition of the amplification theory. The book presents essential concepts in plain language and covers the most important applications of amplifier circuits.

The book has seven chapters, dealing with transistor modeling, linear amplification, types of amplifiers, operational amplifiers, electronic circuits with operational amplifiers, active filters, applications and tests with operational amplifiers and communication circuits. Four appendices are included: an appendix to detail the operational amplifier model; an appendix with specification data sheets; an appendix on Fourier transform and signal spectrum, including the concepts of convolution; and another one that presents and explains the usual electronics acronyms.

THE AUTHORS:

Marcelo Sampaio de Alencar is at the Institute of Advanced Studies in Communications, Federal University of Bahia, Brazil.

Raphael Tavares de Alencar is at Institut National Polytechnique de Grenoble, France.

Raissa Bezerra Rocha is at Federal University of Sergipe, Brazil.

Ana Isabela Cunha is at Federal University of Bahia, Brazil.

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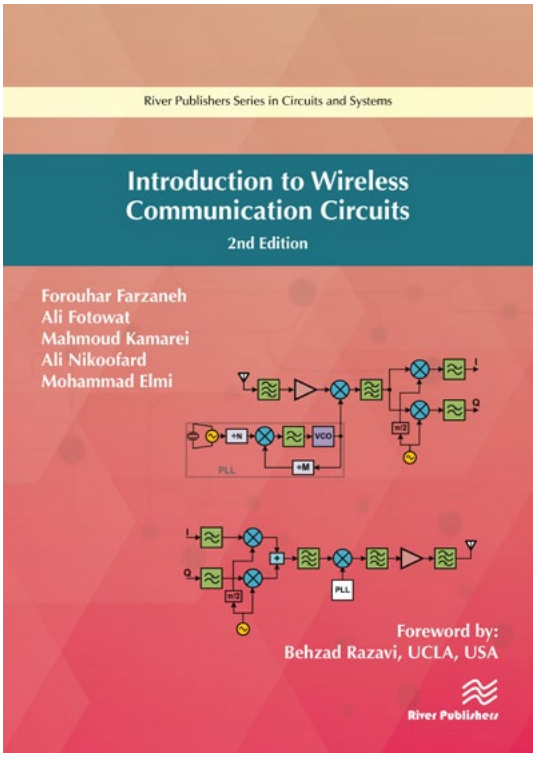
Introduction to Wireless Communication Circuits

Second Edition

Forouhar Farzaneh, Ali Fotowat, Mahmoud Kamarei, Ali Nikoofard and Mohammad Elmi

Foreword by Behzad Razavi



Over the past decade the tremendous development of wireless communications has changed human life incredibly. Considerable advancement has been made in the design and architecture of communications related RF and microwave circuits. This book is focused on special circuits dedicated to the RF level of wireless communications. From oscillators to modulation and demodulation and from mixers to RF and power amplifier circuits, the topics are presented in a sequential manner. A wealth of analysis is provided in the text alongside various worked out examples. Related problem sets are given at the end of each chapter. Basic concepts of RF analog circuit design are developed in the book.

THE AUTHORS:

Forouhar Farzaneh is with Sharif University of Technology, Iran.

Ali Fotowat is with Sharif University of Technology, Iran.

Mahmoud Kamarei is with University of Tehran, Iran.

Ali Nikoofard is with University of California at San Diego.

Mohammad Elmi is with KavoshCom Asia Co., Iran.

Behzad Razavi is professor of electrical engineering and the director of the Communications Circuits Laboratory at University of California, Los Angeles.

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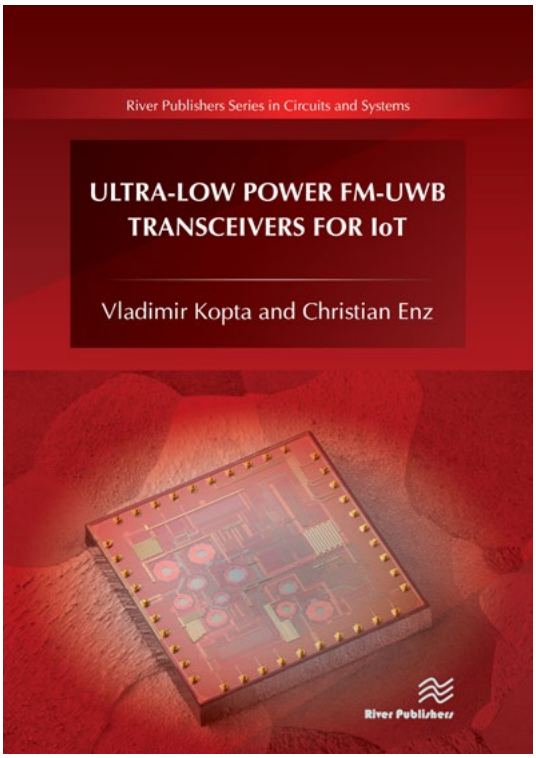
Lib E-book, 978 8 77022 139 9, $135.00

Ultra-Low Power FM-UWB Transceivers for IoT

Vladimir Kopta and Christian Enz



Over the past two decades we have witnessed the increasing popularity of the Internet of Things. The vision of billions of connected objects, able to interact with their environment, is the key driver directing the development of future communication devices. Today, power consumption as well as the cost and size of radios remain some of the key obstacles towards fulfilling this vision.

Ultra-Low Power FM-UWB Transceivers for IoT presents the latest developments in the field of low power wireless communication. It promotes the FM-UWB modulation scheme as a candidate for short range communication in different IoT scenarios. The FM-UWB has the potential to provide exactly what is missing today. This spread spectrum technique enables significant reduction in transceiver complexity, making it smaller, cheaper and more energy efficient than most alternative options.

The book provides an overview of both circuit-level and architectural techniques used in low power radio design, with a comprehensive study of state-of-the-art examples. It summarizes key theoretical aspects of FM-UWB with a glimpse at potential future research directions. Finally, it gives an insight into a full FM-UWB transceiver design, from system level specifications down to transistor level design, demonstrating the modern power reduction circuit techniques.

THE AUTHORS:

Vladimir Kopta is with CSEM SA, Switzerland.

Christian Enz is with EPFL, Switzerland.

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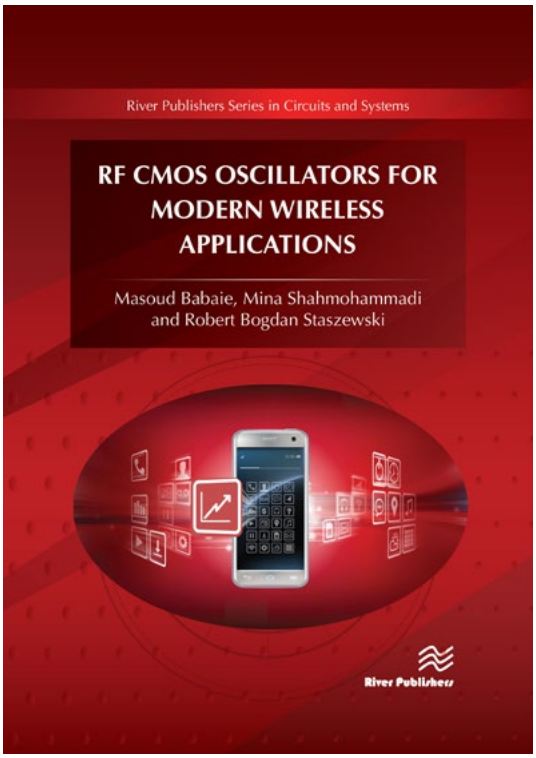
RF CMOS Oscillators for Modern Wireless Applications

Edited by Masoud Babaie, Mina Shahmohammadi and Robert Bogdan Staszewski



While mobile phones enjoy the largest production volume ever of any consumer electronics products, the demands they place on radio-frequency (RF) transceivers are particularly aggressive, especially on integration with digital processors, low area, low power consumption, while being robust against process-voltage-temperature variations. Since mobile terminals inherently operate on batteries, their power budget is severely constrained. To keep up with the ever increasing data-rate, an ever-decreasing power per bit is required to maintain the battery lifetime. The RF oscillator is the second most power-hungry block of a wireless radio (after power amplifiers). Consequently, any power reduction in an RF oscillator will greatly benefit the overall power efficiency of the cellular transceiver. Moreover, the RF oscillators' purity limits the transceiver performance. The oscillator's phase noise results in power leakage into adjacent channels in a transmit mode and reciprocal mixing in a receive mode. On the other hand, the multi-standard and multi-band transceivers that are now trending demand wide tuning range oscillators. However, broadening the oscillator's tuning range is usually at the expense of die area (cost) or phase noise.

THE EDITORS:

Masoud Babaie is at Delft University of Technology, the Netherlands.

Mina Shahmohammadi is at Catena, the Netherlands.

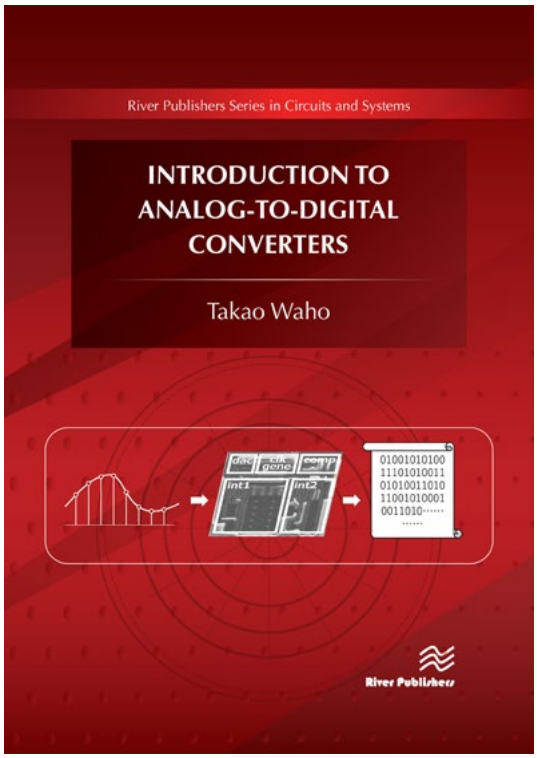
Robert Bogdan Staszewski is at University College Dublin, Ireland.

November 2019
250 pp, 6 in x 9 in
Cloth, 978 8 79360 949 5, $ 110.00 (S6)
Lib E-book, 978 8 79360 948 8, $ 110.00 (10)

Introduction to Analog-to-Digital Converters

Principles and Circuit Implementation

Takao Waho



Analog-to-digital (A/D) and digital-to-analog (D/A) converters, or data converters in short, play a critical role as interfaces between the real analog world and digital equipment. They are now indispensable in the field of sensor networks, internet of things (IoT), robots, and automatic driving vehicles, as well as high-precision instrumentation and wideband communication systems. As the world increasingly relies on digital information processing, the importance of data converters continues to increase.

The primary purpose of this book is to explain the fundamentals of data converters for students and engineers involved in this fascinating field as a newcomer.

Introduction to Analog-to-Digital Converters is not only for circuit designers, but also for engineers who are trying to develop their target by using A/D converters. The book will also help students who have learned the basics of analog circuit design to understand the state-of-the-art data converters. It is desirable for readers to be familiar with basic analog IC design and digital signal processing using z-transform.

THE AUTHOR:

Takao Waho is at Sophia University, Japan.

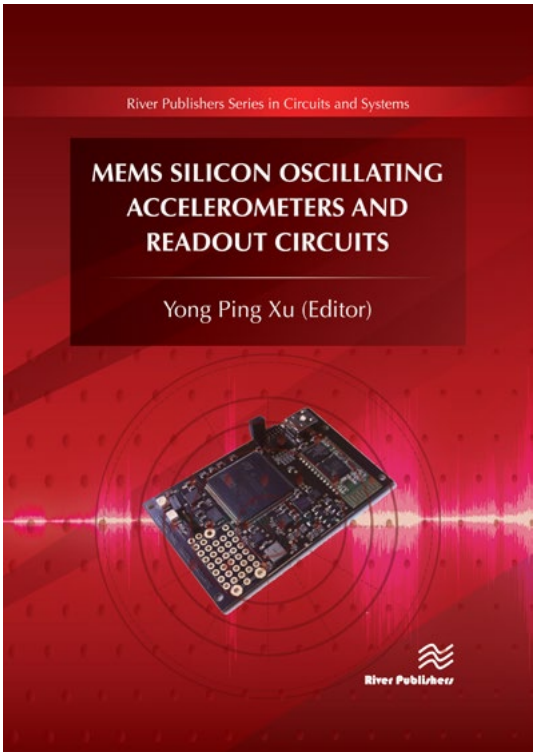
July 2019
300 pp, 6 in x 9 in
Cloth, 978 8 77022 102 3, $110.00
Lib E-book, 978 8 77022 101 6, $110.00

MEMS Silicon Oscillating Accelerometers and Readout Circuits

Edited by Yong Ping Xu

Most MEMS (Micro-Electro-Mechanical Systems) accelerometers on the market today are capacitive accelerometers that are based on the displacement sensing mechanism. This book is intended to cover recent developments of MEMS silicon oscillating accelerometers (SOA), also referred to as MEMS resonant accelerometer. As contrast to the capacitive accelerometer, the MEMS SOA is based on the force sensing mechanism, where the input acceleration is converted to a frequency output.

MEMS Silicon Oscillating Accelerometers and Readout Circuits consists of six chapters and covers both MEMS sensor and readout circuit, and provides an in-depth coverage on the design and modelling of the MEMS SOA with several recently reported prototypes. The book is not only useful to researchers and engineers who are familiar with the topic, but also appeals to those who have general interests in MEMS inertial sensors. The book includes extensive references that provide further information on this topic.



THE EDITOR:

Yong Ping Xu is at National University of Singapore, Singapore.

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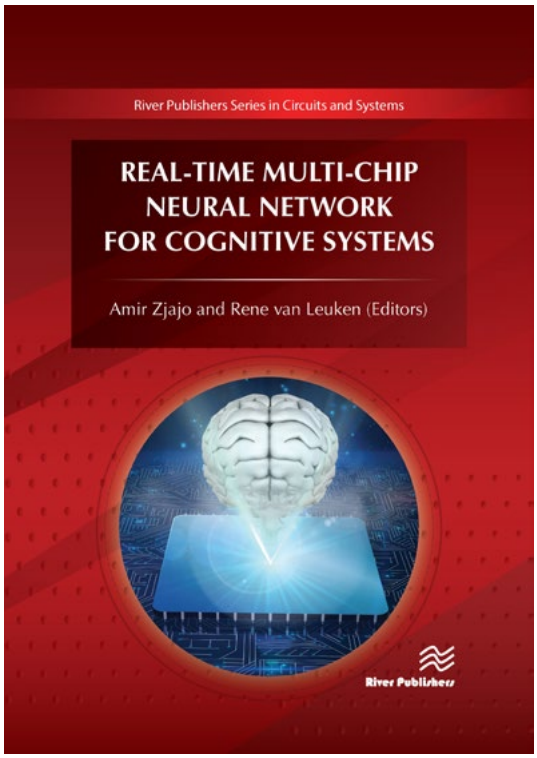
Real-Time Multi-Chip Neural Network for Cognitive Systems

Edited by Amir Zjajo and Rene van Leuken



Real-Time Multi-Chip Neural Network for Cognitive Systems presents novel real-time, reconfigurable, multi-chip SNN system architecture based on localized communication, which effectively reduces the communication cost to a linear growth. The system uses double floating-point arithmetic for the most biologically accurate cell behavior simulation, and is flexible enough to offer an easy implementation of various neuron network topologies, cell communication schemes, as well as models and kinds of cells. The system offers a high run-time configurability, which reduces the need for resynthesizing it. In addition, the simulator features configurable on- and off-chip communication latencies as well as neuron calculation latencies. All parts of the system are generated automatically based on the neuron interconnection scheme in use. The simulator allows exploration of different system configurations, e.g. the interconnection scheme between the neurons, the intracellular concentration of different chemical compounds (ions), which affect how action potentials are initiated and propagate.

THE EDITORS:

Amir Zjajo received M.Sc. and DIC degrees from the Imperial College London, London, U.K., in 2000 and a PhD from Eindhoven University of Technology, Eindhoven, \In 2018, he co-founded Innatera Nanosystems to commercialize bionic signal processing technology.

Rene van Leuken is a staff member of the Circuits and Systems Group at the Delft University of Technology in the Netherlands.

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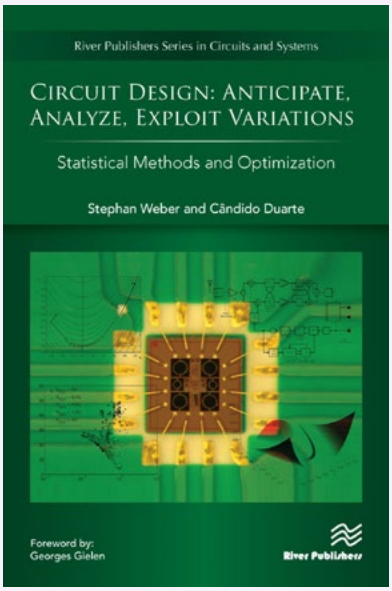

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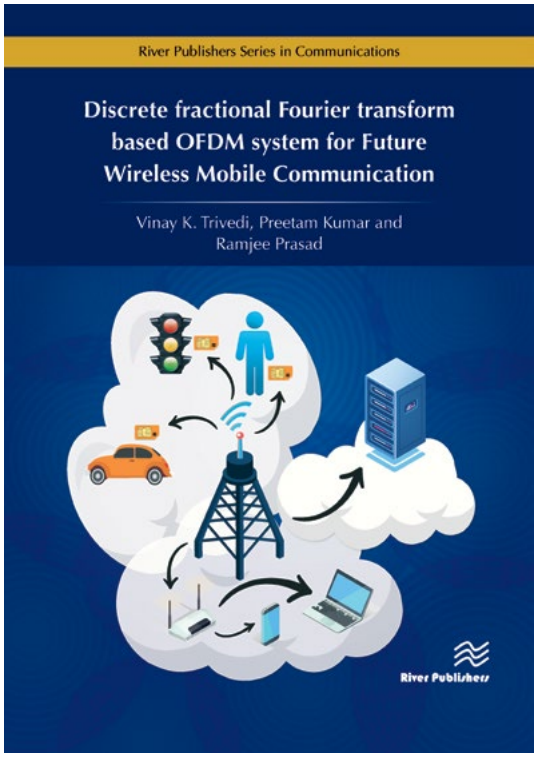
Discrete Fractional Fourier Transform Based OFDM System for Future Wireless Mobile Communication

Vinay K. Trivedi, Preetam Kumar and Ramjee Prasad



Orthogonal frequency division multiplexing (OFDM) is an attractive physical layer waveform candidate for wireless broadband communication. Apart from being spectrally efficient with overlapping subcarriers, the OFDM system enables simplified equalization at the receiver and effectively combats the inter-block interference with cyclic prefix. For achieving low peak-to-average power ratio (PAPR) in the uplink, single carrier frequency domain multiple access (SC-FDMA) is used for fourth-generation (4G), long term evolution (LTE). SC-FDMA achieves low PAPR compared to OFDMA using discrete Fourier transform (DFT) precoding. This book introduces both OFDM and SC-FDMA, similarities, and differences between their transmitter and receiver operations, time-frequency representations, and low complexity joint equalization and CFO compensation (JECC), etc. Advanced waveform candidates such as Filtered OFDM, FBMC, GFDM, etc. are also introduced. To improve the throughput of existing mobile communication, non-orthogonal multiple access (NOMA) system configurations based on OFDM are also covered.

Essentially, the performance of both the OFDMA and SC-FDMA is very sensitive to the presence of carrier frequency offset (CFO) arising from synchronization errors, Doppler, and manufacturing defects. This is because the multicarrier structure and the channel decomposition at the receiver based on DFT lose its optimal performance in the presence of CFO. This book discusses an elegant time-frequency signal processing tool for this purpose called fractional Fourier transform (FRFT). A discrete version of FRFT (or DFRFT) employing a chirp basis in place of the complex exponential basis of DFT can easily replace the existing multicarrier modulation/demodulation and channel decomposition. A detailed performance evaluation of the DFRFT based OFDM system that can significantly outperform the conventional DFT based OFDM system is also given. The study presented involves a detailed interference analysis of the DFRFT based OFDM system in the presence of CFO. This inter carrier interference (ICI) analysis is then used to devise Low complexity JECC for DFRFT based OFDM. Through the study and result presented in this book, the use of the DFRFT based OFDM system is motivated for wireless mobile communication especially in the presence of CFO.

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Preetam Kumar, Indian Institute of Technology Patna, India

Ramjee Prasad, Aarhus University, Denmark

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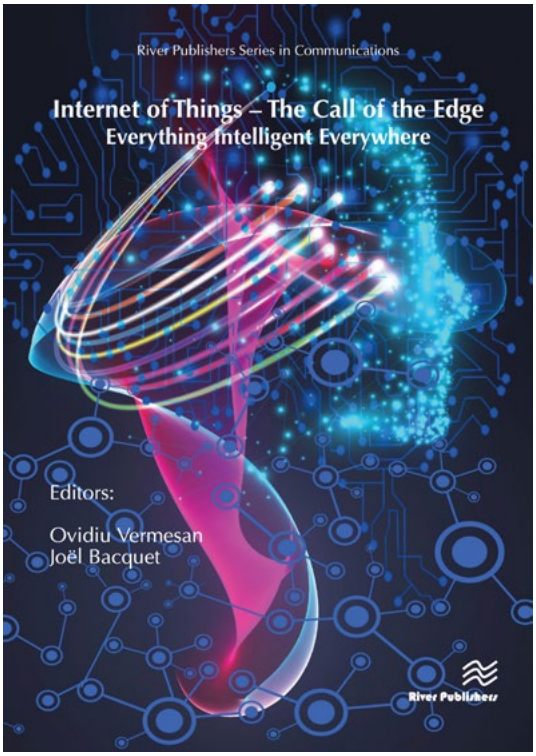
Internet of Things – The Call of the Edge

Everything Intelligent Everywhere

Edited by Ovidiu Vermesan and Joël Bacquet



This book provides an overview of the Internet of Things (IoT)—covering new ideas, concepts, research and innovation to enable the development of IoT technologies in a global context. The work is intended as a standalone book in a series covering the activities of the Internet of Things European Research Cluster (IERC)—including research, technological innovation, validation, and deployment.

The IoT and Industrial Internet of Things technologies are moving towards hyperautomated solutions—combining hyperconnectivity, artificial intelligence (AI), distributed ledger technologies and virtual/augmented extended reality, with edge computing and deep edge processing becoming an assertive factor across industries for implementing intelligent distributed computing resources and data to keep the efficient data exchange and processing local to reduce latency, exploit the sensing/actuating capabilities and enable greater autonomy.

Expanding the adoption of consumer, business, industrial and tactile IoT requires further development of hyperautomated IoT concepts for collaborative solutions involving machines and humans to expand augmented creativity at the application level using AI to optimise the industrial processes and progress towards a symbiotic economy based on distributed federated cloud/edge infrastructure allowing resource sharing in the form of computing, memory and analytics capabilities.

The new IoT technologies are essential for facilitating sustainable development, reducing energy consumption and, by supporting the optimisation of products and processes, mitigating unnecessary carbon emissions - thereby reducing the environmental impact through real-time data collection, analysis, exchange, and processing.

THE EDITORS:

Ovidiu Vermesan is with SINTEF, Norway

Joël Bacquet is a senior official of DG CONNECT of the European Commission.

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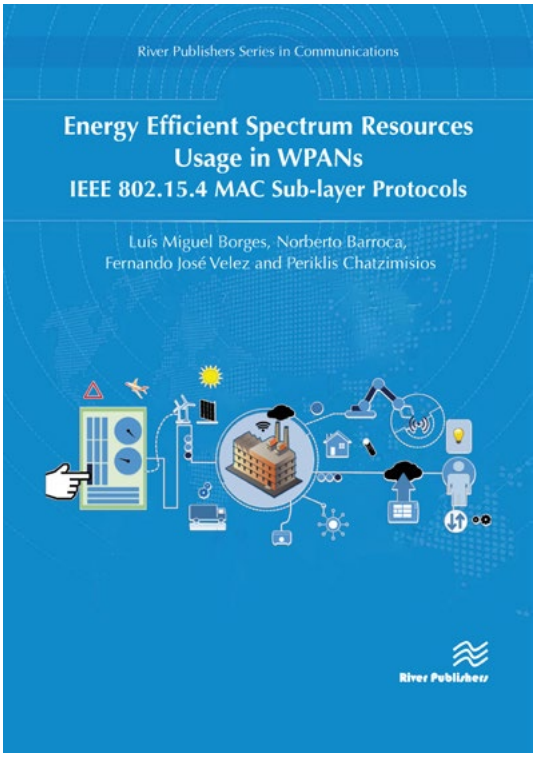
Energy Efficient Spectrum Resources Usage in WPANs

IEEE 802.15.4 MAC Sub-layer Protocols

Edited by Luís Miguel Borges, Norberto Barroca, Fernando José Velez and Penklis Chatzimisios



Wireless Sensor Networks (WSNs) and the Internet of Things are facing tremendous advances both in terms of energy-efficiency as well as in the number of available applications. Consequently, there are challenges that need to be tackled for the future generation of WSNs. After giving an overview of the WSN protocols and IEEE 802.15.4 standard, this book proposes IEEE 802.15.4 Medium Access Control (MAC) sub-layer performance enhancements by employing not only RTS/CTS combined with packet concatenation but also scheduled channel poling (MC-SCP). Results have shown that the use of the RTS/CTS mechanism improves channel efficiency by decreasing the deferral time before transmitting a data packet. Furthermore, the Sensor Block Acknowledgment MAC (SBACK-MAC) protocol enables more efficiency as it allows the aggregation of several acknowledgement responses in one special Block Acknowledgment (BACK) Response packet. The throughput and delay performance have been mathematically derived under both ideal conditions (a channel environment with no transmission errors) and non-ideal conditions (with transmission errors). Simulation results successfully validate the proposed analytical models.

This research reveals the importance of an appropriate design for the MAC sub-layer protocol for the desired WSN application. Depending on the mission of the WSN application, different protocols are required. Therefore, the overall performance of a WSN application certainly depends on the development and application of suitable e.g., MAC, network layer protocols.

THE EDITORS:

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Norberto Barroca, Instituto de Telecomunicações and Universidade da Beira Interior, DEM, Portugal

Fernando José Velez, Instituto de Telecomunicações and Universidade da Beira Interior, DEM, Portugal

Periklis Chatzimisios, International Hellenic University, Greece

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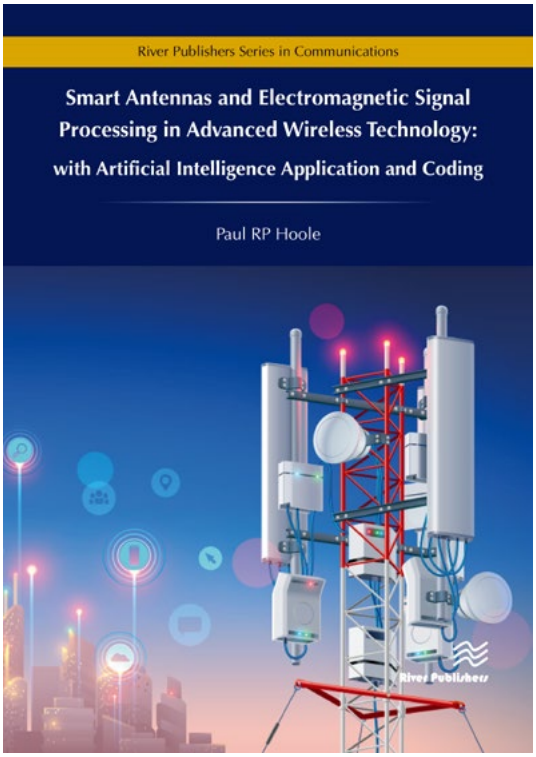
Smart Antennas and Electromagnetic Signal Processing in Advanced Wireless Technology: with Artificial Intelligence Application and Coding

Paul RP Hoole



The book addresses the current demand for a scientific approach to advanced wireless technology and its future developments, including the current move from 4G to 5G wireless systems (2020), and the future to 6G wireless systems (2030). It gives a clear and in-depth presentation of both antennas and the adaptive signal processing that makes antennas powerful, maneuverable, and necessary for advanced wireless technology. Moving towards the increasing demand for a scientific approach to smart antennas, the book presents electromagnetic signal processing techniques to both control the antenna beam and to track the moving station, which is required for effective, fast, dynamic beamforming. In addition to presenting new, memory efficient and fast algorithms for smart antennas, another helpful feature of the book is the inclusion of complete listings of MATLABTM codes for powerful techniques such as Artificial Intelligence (AI) beamforming, Analytical Phase Shift technique and the traditional Least Mean Square method, The student, researcher or engineer may readily use these codes to gain confidence in understanding, as well as to develop and deploy powerful, new smart antenna techniques.

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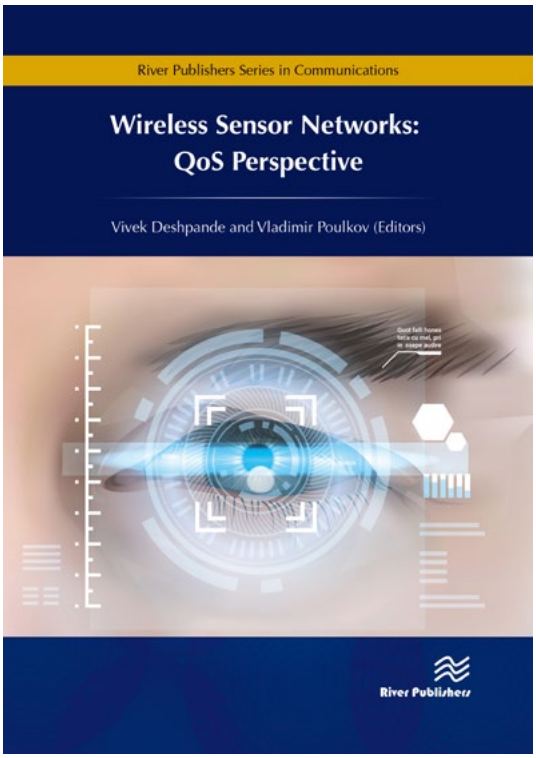
Wireless Sensor Networks

QoS Perspective

Edited by Vivek Deshpande and Vladimir Poulkov



Currently, Cyber Physical Systems (CPS) and/or IoT play predominant roles in the cloud communication domain. The main aspects of these types of systems are Wireless Sensor Networks (WSN), Cloud and Communication Networks. The data which needs to be disseminated from multiple sources to the destination base station, or sink, is of vital significance. There are many problems which can occur when data is conveyed to the sink. The sink is connected to the cloud via a communication network. The congestion, reliability, delay, fairness, etc. are all of main concern. These can be treated as Quality of Service (QoS) parameters that govern the performance of the CPS. Above all, energy consumption is the main constraint for WSN node. It is extremely difficult to obtain good QoS by keeping energy consumption low. Even the response of one of QoS parameter depends on the many other QoS parameters.

Care must be taken on all QoS parameters in order to improve the performance of the wireless sensor networks. This Quality of Services may improve the application base of the CPS. With the QoS parameters the data dissemination along with energy optimization is affected. The performance of the WSN needs to be regularly checked against the QoS metrics for different data inputs. This may contain the periodic- or non-periodic data, event based data, transient or busty data.

THE EDITORS:

Vivek Deshpande teaches at Technical University of Sofia, Bulgaria, and the Vishwakarma Institute of Technology, India.

Vladimir Poulkov teaches at Technical University of Sofia, Bulgaria.

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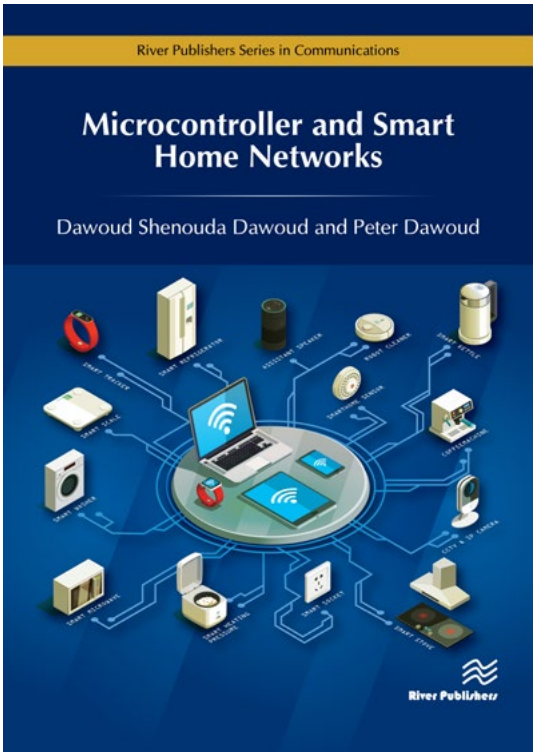
Microcontroller and Smart Home Networks



Dawoud Shenouda Dawoud and Peter Dawoud

Over recent years industries have faced the problem of how to connect devices to "speak" to each other with minimum wiring. Philips Semiconductors faced this problem when they needed to connect many ICs together. The automotive industry faced the same problem when it needed to connect tens of microcontrollers in each car. Recently, with smart homes, the problem has started to be part of each home. For instance, you may want to build your smart home with accessories from different manufacturers and you want the devices to "speak" to each other. Added to that, you may want to control them from a central App or voice assist.

Solutions for this problem started with the introduction of Inter Integrated Circuits (IIC) and Controller Area Networks (CAN). Both solutions are wired networks that allow ICs and microcontrollers to be connected in a network to communicate together. In smart home automation, a number of common smart home automation protocols that allow different devices to speak and communicate together have appeared during the last few decades. Some of the smart home protocols come under the umbrella of what is called the "Internet of Things (IoT)." The proposed protocols can be grouped into wired networks e.g. X10, UPB; wireless or radio networks as ZigBee, Z-Wave, Bluetooth; or dual (wired and radio) such as Insteon. This book introduces the reader to some of the most popular microcontroller and smart home networks.

THE AUTHORS:

Dawoud Shenouda Dawoud is at International University of East Africa, Uganda.

Peter Dawoud is Principal Program Manager at Microsoft.

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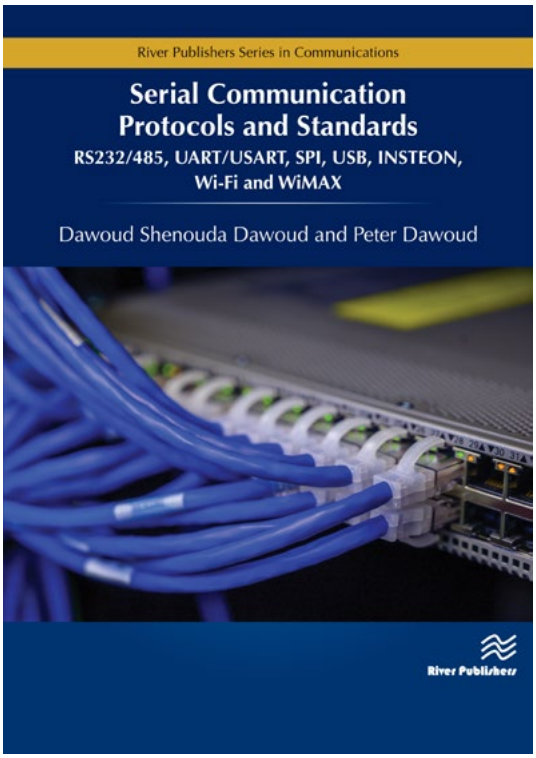
Serial Communication Protocols and Standards

RS232/485, UART/USART, SPI, USB, INSTEON, Wi-Fi and WiMAX

Dawoud Shenouda Dawoud and Peter Dawoud



Data communication standards are comprised of two components: The "protocol" and "signal/data/port specifications for the devices involved." The protocol describes the format of the message and the meaning of each part of the message. To connect any device to the bus, an external device must be used as an interface which will put the message in a form which fulfills all the electrical specifications of the port. These specifications are called the "Standard." The most famous such serial communication standard is the RS-232. In IT technology, communication can be serial or parallel. Serial communication is used for transmitting data over long distances. It is much cheaper to run the single core cable needed for serial communication over a long distance than the multicore cables that would be needed for parallel communication. It is the same in wireless communication: Serial communication needs one channel while parallel needs multichannel. Serial Communication can also be classified in many other ways, for example, synchronous and asynchronous; it can also be classified as simplex, duplex and half duplex.

Because of the wide spread of serial communication from home automation to sensor and controller networks, there is a need for a very large number of serial communication standards and protocols. These have been developed over recent decades and range from the simple to the highly complicated. This large number of protocols was necessary to guarantee the optimum performance for the targeted applications. It is important for communication engineers to have enough knowledge to match the right protocol and standard with the right application. The main aim of this book is to provide the reader with that knowledge.

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Dawoud Shenouda Dawoud is at International University of East Africa, Uganda.

Peter Dawoud is Principal Program Manager at Microsoft.

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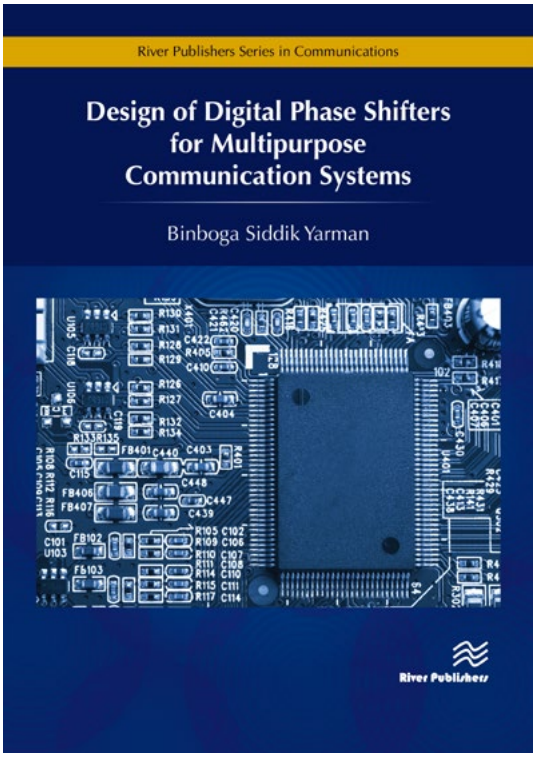
Design of Digital Phase Shifters for Multipurpose Communication Systems

Binboga Siddik Yarman



Design of Digital Phase Shifters for Multipurpose Communication Systems covers a new emerging need in designing digital phase shifters for modern communication systems.

With the advancement of new generation mobile communication systems, directed beams save a substantial amount of RF-power, and improve the noise immunity. In this regard, beam-forming circuits, namely, digital phase shifters constitute essential parts of the antenna arrays. Therefore, this book is devoted to design of digital phase shifters for various communications systems.

In the good old days, phase shifter design requirements used to demand narrow bandwidth with no physical size constraints. Nowadays, they must be compact and suitable for Very Large Scale Integrated Circuits (VLSI) or Microwave Monolithic Integrated Circuit (MMIC) implementation with Wide Phase Range (WPR) and Wide Frequency Band (WFB).

Since the 1980s, the author has been designing digital phase shifters for various applications. He started to work with loaded lines phase shifters, and then employed branch line couplers to achieve wider frequency bands. In order to reduce the physical size, he used a 3 element Symmetric LC ladder based T or PI configurations. In order to achieve broad frequency band with large phase range, usage of LC lattice structures is inevitable. Lately, the author has designed phase shifters using both lowpass and highpass LC ladder and lattice based switched-structures, which are suitable for monolithic implementation. In the course of design, MOS transistors were employed as switching elements. This book includes several novel digital phase shifter topologies, which provides wide phase range and wideband operation.

For each topology presented, explicit design equations are provided and programs to assess the electric performance of each topology is developed in a MatLab environment. It is expected that the reader will be self-sufficient to design and implement the digital phase shifters topologies presented in this book.

THE AUTHOR:

Binboga Siddik Yarman is with Istanbul University, Turkey, and the University of Lincoln, UK.

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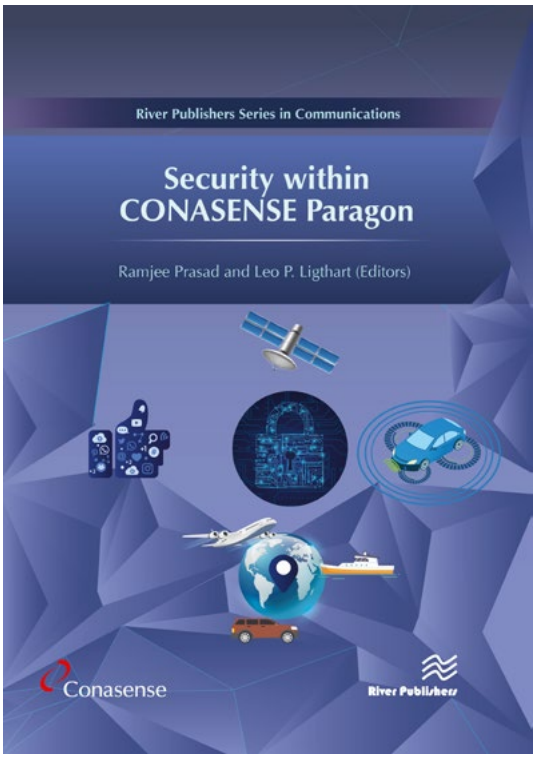
Security within CONASENSE Paragon

Edited by Ramjee Prasad and Leo P. Ligthart

Security within CONASENSE Paragon describes in particular the cyber security issues in the field of Communication, Navigation, Sensing and Services within the broad platform of CTIF Global Capsule (CGC). This covers future technologies and its enablers, smart cities, crowd computing, reliable and secure communication interface, satellite unnamed air vehicles, wireless sensor networks, data analytics and deep learning, remotely piloted aircraft system and public safety, network neutrality, business ecosystem innovation and so on.



THE EDITORS:

Ramjee Prasad is the founding chairman of the Global ICT Standardization Forum for India (GISFI) and founder president of the CTIF Global Capsule. He is also Wireless Information Multimedia Communications Chair, Department of Electronic Systems, Aalborg University, Denmark, June 1999-Present.

Leo P. Ligthart is the Chairman of CONASENSE, the Netherlands.

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Handbook on ICT in Developing Countries

Next Generation ICT Technologies

Edited by Knud Erik Skouby, Idongesit Williams and Albert Gyamfi

Handbook on ICT in Developing Countries: Next Generation ICT Technologies is the second volume of the Handbook of ICT in Developing Countries series. The first volume was on the potential implementation and service delivery of the forth-coming 5G networks. Here the focus is on the new technologies and services enabled by 5G networks or broadband Internet networks including artificial Intelligence (AI), machine learning, augmented reality, Internet of Things (IoT), autonomous driving, blockchain solutions, cloud solutions etc. Some of these are already globally experiencing growth in the existing networks and all of them are expected to grow substantially in the future.

Examples: currently, 5% of global organizations have fully adopted AI, but the penetration is expected to increase rapidly before 2025. IoT with 20.35 billion devices connected in 2017 is estimated to show 75.44 billion devices connected in 2025. The expected growth is based on delivering of new value to businesses and citizens.

It is, however, not obvious that this growth will also occur in developing countries. Currently, the digital divide between developing countries and developed countries is widening. This is mostly due to the lack of infrastructure and low level of awareness by the businesses and citizens of the value made possible by the new technologies for developing countries.

THE EDITORS:

Knud Erik Skouby is at CMI/Aalborg University, Denmark.

Idongesit Williams is at Aalborg University, Denmark.

Albert Gyamfi is at Aalborg University, Denmark.

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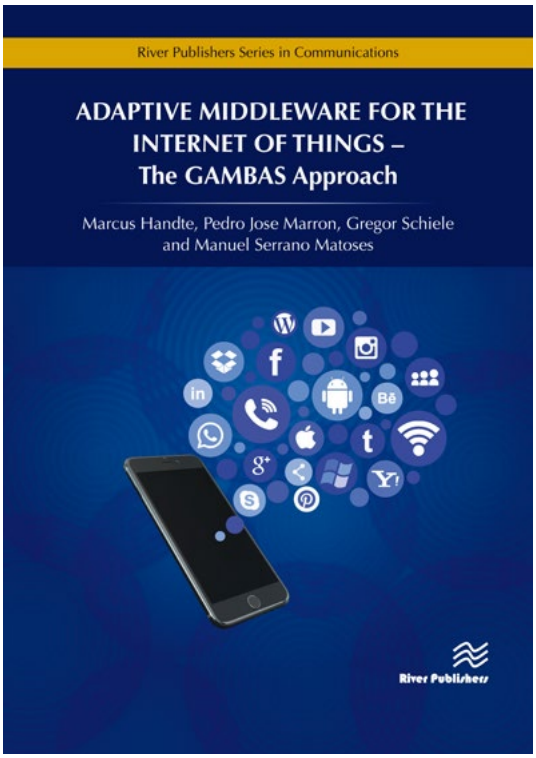
Adaptive Middleware for the Internet of Things

The GAMBAS Approach

Marcus Handte, Pedro Jose Marron, Gregor Schiele and Manuel Serrano Matoses



Over the past years, a considerable amount of effort has been devoted, both in industry and academia, towards the development of basic technology as well as innovative applications for the Internet of Things.

Adaptive Middleware for the Internet of Things introduces a scalable, inter-operable and privacy-preserving approach to realize IoT applications and discusses abstractions and mechanisms at the middleware level that simplify the realization of services that can adapt autonomously to the behavior of their users.

Adaptive Middleware for the Internet of Things summarizes the results of the GAMBAS research project funded by the European Commission under Framework Program 7. It provides an in-depth description of the middleware system developed by the project consortium. In addition, the book describes several innovative mobility and monitoring applications that have been built, deployed and operated to evaluate the middleware under realistic conditions with a large number of users.

THE AUTHORS:

Marcus Handte is at Universität Duisburg-Essen, Germany.

Pedro Jose Marron is at Universität Duisburg-Essen, Germany.

Gregor Schiele is at Universität Duisburg-Essen, Germany.

Manuel Serrano Matoses is at Etra Investigación Y Desarrollo, Spain.

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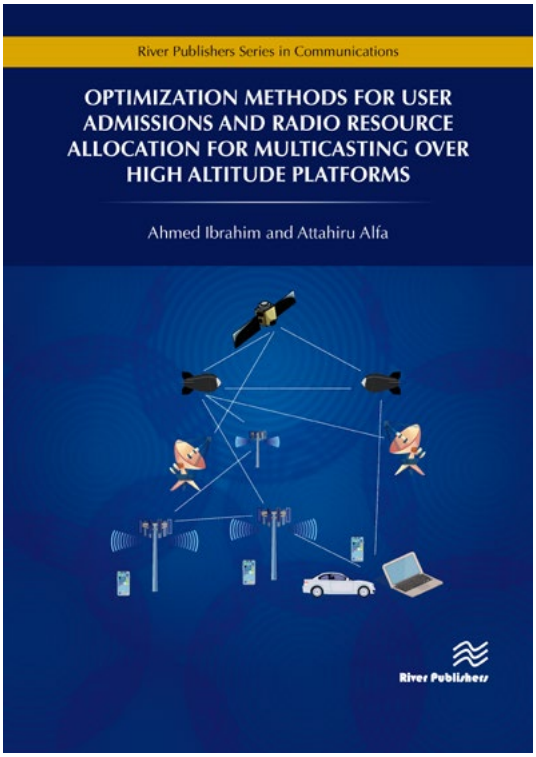
Optimization Methods for User Admissions and Radio Resource Allocation for Multicasting over High Altitude Platforms

Ahmed Ibrahim and Attahiru Alfa



This book examines the issue of optimizing radio resource allocation (RRA) and user admission control (AC) for multiple multicasting sessions on a single high altitude platform (HAP) with multiple antennas on-board. HAPs are quasi-stationary aerial platforms that carry a wireless communications payload to provide wireless communications and broadband services. They are meant to be located in the stratosphere layer of the atmosphere at altitudes in the range 17-22 km and have the ability to fly on demand to temporarily or permanently serve regions with unavailable telecommunications infrastructure.

An important requirement that the book focuses on is the development of an efficient and effective method for resource allocation and user admissions for HAPs, especially when it comes to multicasting. Power, frequency, space (antennas selection) and time (scheduling) are the resources considered in the problem over an orthogonal frequency division multiple access (OFDMA) HAP system.

Due to the strong dependence of the total number of users that could join different multicast groups, on the possible ways we may allocate resources to these groups, it is of significant importance to consider a joint user to session assignments and RRA across the groups. From the service provider's point of view, it would be in its best interest to be able to admit as many higher priority users as possible, while satisfying their quality of service requirements. High priority users could be users subscribed in and paying higher for a service plan that gives them preference of admittance to receive more multicast transmissions, compared to those paying for a lower service plan. Also, the user who tries to join multiple multicast groups (i.e. receive more than one multicast transmission), would have preferences for which one he would favor to receive if resources are not enough to satisfy the QoS requirements.

THE AUTHORS:

Ahmed Ibrahim is at Memorial University of Newfoundland, Canada.

Attahiru Alfa is with University of Pretoria, South Africa and University of Manitoba, Canada.

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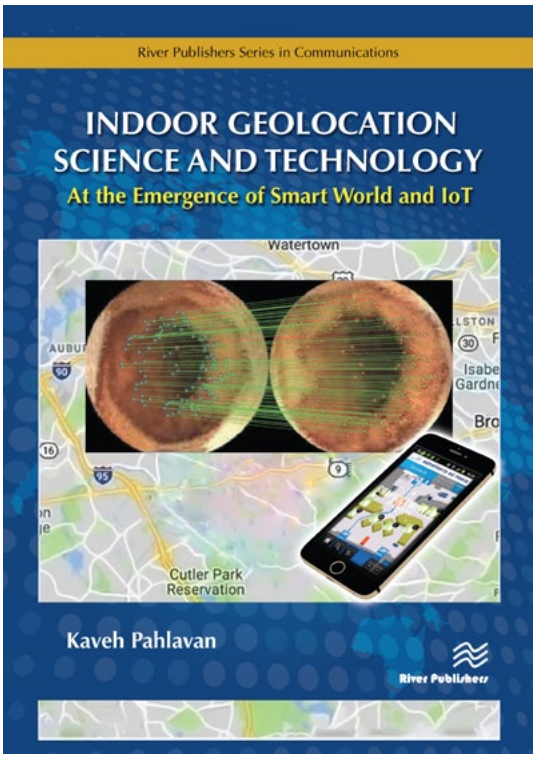
Indoor Geolocation Science and Technology at the Emergence of Smart World and IoT



Kaveh Pahlavan

Precise and accurate localization is one of the fundamental scientific and engineering technologies needed for the applications enabling the emergence of the Smart World and the Internet of Things (IoT). Popularity of localization technology began when the GPS became open for commercial applications in early 1990s. Since most commercial localization applications are for indoors and GPS does not work indoors, the discovery of opportunistic indoor geolocation technologies began in mid-1990s.

At the time of this writing, received signal strength (RSS) based Wi-Fi localization is dominating the commercial market complementing cell tower localization and GPS technologies using the time of arrival (TOA) technology. Wi-Fi localization technology takes advantage of the random deployment of Wi-Fi devices worldwide to support indoor and urban area localization for hundreds of thousands of applications on smart devices. Public safety and military applications demand more precise localization for first responders and military applications deploy specialized infrastructure for more precise indoor geolocation. To enhance the performance both industries are examining hybrid localization techniques. Hybrid algorithms use a variety of sensors to measure the speed and direction of movement and integrate them with the absolute radio frequency localization.

Indoor Geolocation Science and Technology is a multidisciplinary book that presents the fundamentals of opportunistic localization and navigation science and technology used in different platforms such as: smart devices, unmanned ground and flying vehicles, and existing cars operating as a part of intelligent transportation systems. Material presented in the book is beneficial for Electrical and Computer Engineering, Computer Science, Robotics Engineering, Biomedical Engineering or other disciplines who are interested in integration of navigation into their multi-disciplinary projects.

THE AUTHOR:

Kaveh Pahlavan teaches at Worcester Polytechnic Institute.

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Evolution of Air Interface Towards 5G

Radio Access Technology and Performance Analysis

Suvra Sekhar Das and Ramjee Prasad

Over the past few decades, wireless access networks have evolved extensively to support the tremendous growth of consumer traffic. This superlative growth of data consumption has come about due to several reasons, such as evolution of the consumer devices, the types of telephone and smartphone being used, convergence of services, digitization of economic transactions, tele-education, tele-medicine, m-commerce, virtual reality office, social media, e-governance, e-security, to name but a few.

Not only has the society transformed to a digital world, but also the expectations from the services provided have increased many fold. The last mile/meters of delivery of all e-services is now required to be wireless. It has always been known that wireless links are the bottleneck to providing high data rates and high quality of service. Several wireless signaling and performance analysis techniques to overcome the hurdles of wireless channels have been developed over the last decade, and these are fueling the evolution of 4G towards 5G. Evolution of Air Interface Towards 5G attempts to bring out some of the important developments that are contributing towards such growth.

THE AUTHORS:

Suvra Sekhar Das is at the Indian Institute of Technology Kharagpur, India.

Ramjee Prasad is the founding chairman of the Global ICT Standardization Forum for India (GISFI) and founder president of the CTIF Global Capsule. He is also Wireless Information Multimedia Communications Chair, Department of Electronic Systems, Aalborg University, Denmark, June 1999-Present.

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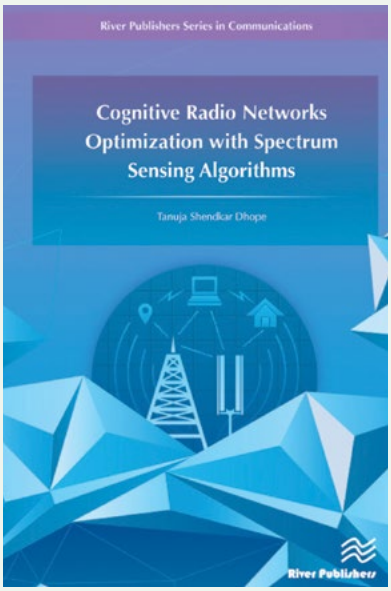

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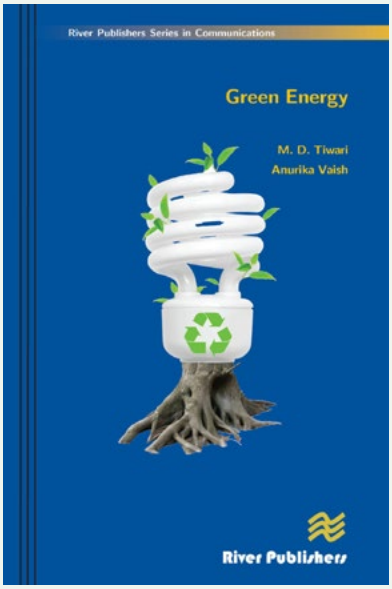

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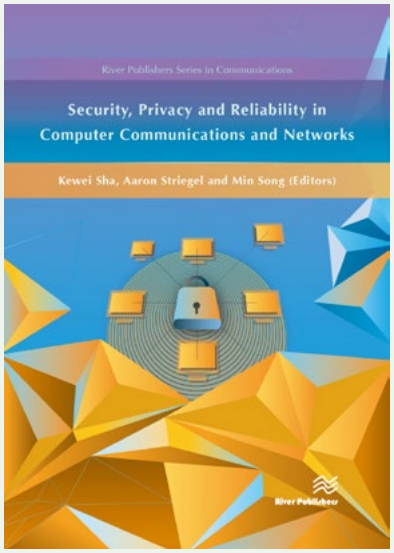

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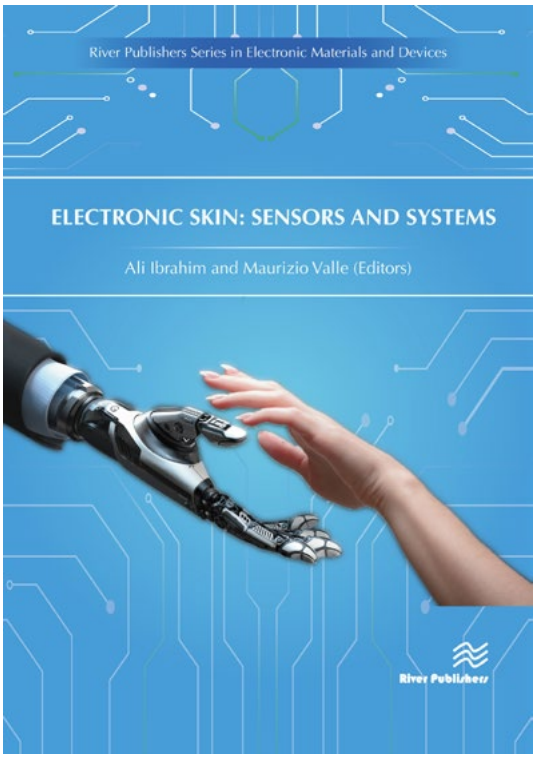

Considerable amount of effort has been devoted, over the recent years, towards the development of electronic skin (e-skin) for many application domains such as prosthetics, robotics, and industrial automation.

Electronic Skin: Sensors and Systems focuses on the main components constituting the e-skin system. The e-skin system is based on: i) sensing materials composing the tactile sensor array, ii) the front end electronics for data acquisition and signal conditioning, iii) the embedded processing unit performing tactile data decoding, and iv) the communication interface in charge of transmitting the sensors data for further computing.

The book takes into account not only sensing materials but it also provides a thorough assessment of the current state of the art at system level. The book addresses embedded electronics and tactile data processing and decoding, techniques for low power embedded computing, and the communication interface.

THE EDITORS:

Ali Ibrahim, Lebanese International University, Lebanon and University of Genoa, Italy

Maurizio Valle, University of Genoa, Italy

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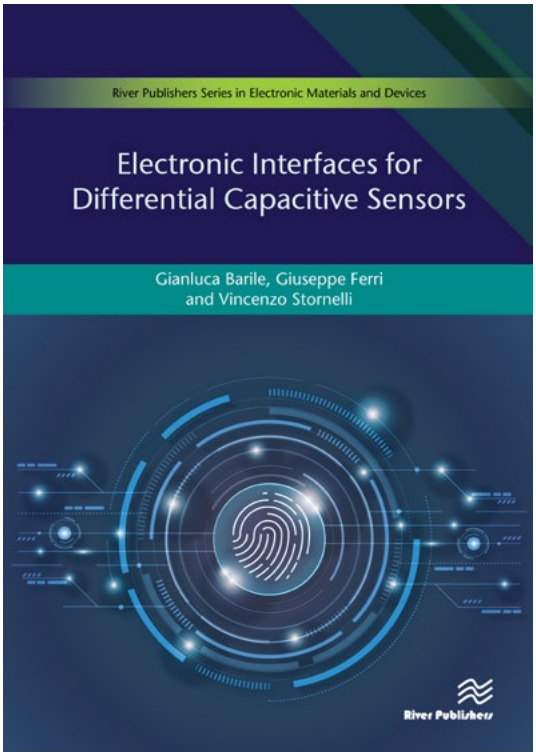
Electronic Interfaces for Differential Capacitive Sensors

Gianluca Barile, Giuseppe Ferri and Vincenzo Stornelli



In a world where great efforts are spent designing and creating more complex, yet efficient systems, sensing elements and related readout circuits, which constitute an integral part of them, need to be designed fulfilling these constraints, beside the common key parameters, such as high sensitivity, resolution and accuracy. Capacitive sensors and their differential subset provide virtually no energy dissipation, show insensitivity to temperature variations and have the capability to be micromachined directly onto a silicon substrate, together with the readout interface. Designing a readout circuit that takes advantage of these benefits, according to any specific application, is thus of utmost importance. This volume introduces the reader to state-of-the-art techniques and research achievements in interfacing differential capacitance sensors.

THE AUTHORS:

Gianluca Barile is at Università degli Studi dell'Aquila, Italy.

Giuseppe Ferri is at Università degli Studi dell'Aquila, Italy.

Vincenzo Stornelli is at Università degli Studi dell'Aquila, Italy.

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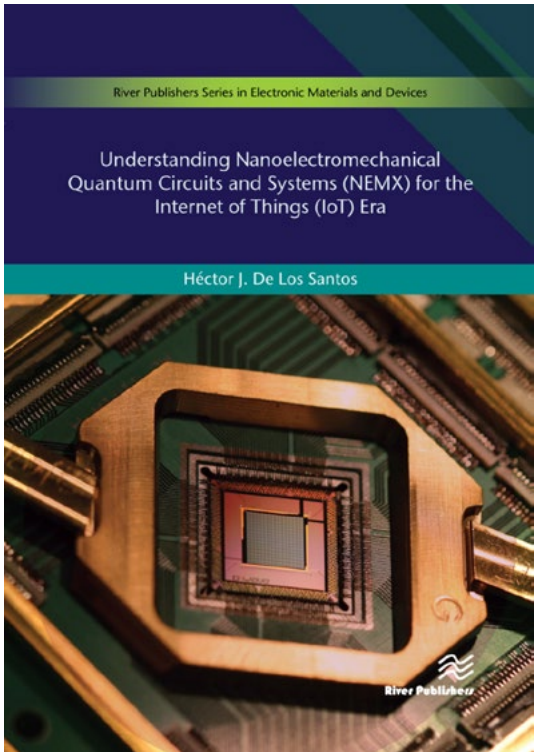
Understanding Nanoelectromechanical Quantum Circuits and Systems (NEMX) for the Internet of Things (IoT) Era



Hector J. De Los Santos

The operational theme permeating most definitions of the IoT concept is the wireless communication of networked objects, in particular, smart sensing devices and machines, exchanging data via the Internet. In this book, a detailed look is taken at the fundamental principles of devices and techniques whose exploitation will facilitate the development of compact, power-efficient, autonomous, smart, networked sensing nodes underlying and encompassing the emerging IoT era.

The book provides an understanding of nanoelectromechanical quantum circuits and systems (NEMX), as exemplified by first the uncovering of their origins, impetus and motivation, and secondly by developing an understanding of their device physics, including the topics of actuation, mechanical vibration and sensing. Next the fundamentals of key devices, namely, MEMS/NEMS switches, varactors and resonators are covered, including a wide range of implementations. The book then looks at their energy supply via energy harvesting, as derived from wireless energy and mechanical vibrations. Finally, after an introduction to the fundamentals of IoT networks and nodes, the book concludes with an exploration of how the NEMX components are encroaching in a variety of emerging IoT applications.

THE AUTHOR:

Hector J. De Los Santos is with NanoMEMS Research, LLC.

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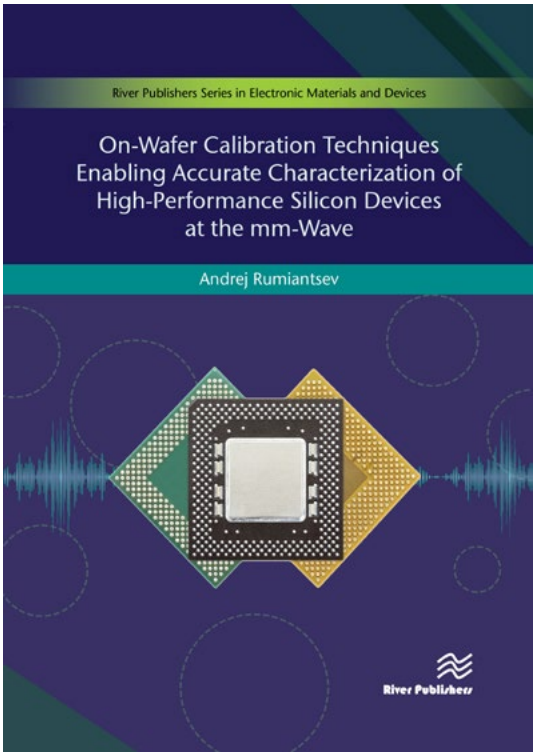
On-Wafer Calibration Techniques Enabling Accurate Characterization of High-Performance Silicon Devices at the mm-Wave Range

Andrej Rumiantsev



The increasing demand for more content, services, and security drives the development of high-speed wireless technologies, optical communication, automotive radar, imaging and sensing systems and many other mm-wave and THz applications. S-parameter measurement at mm-wave and sub-mm wave frequencies plays a crucial role in the modern IC design debug. Most importantly, however, is the step of device characterization for development and optimization of device model parameters for new technologies. Accurate characterization of the intrinsic device in its entire operation frequency range becomes extremely important and this task is very challenging.

THE AUTHOR:

Andrej Rumiantsev is with MPI Corporation, Taiwan.

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Sensors and Measurement Systems

Walter Lang

Sensors and Measurement Systems is an introduction to microsensors for engineering students in the final undergraduate or early graduate level, technicians who want to know more about the systems they are using, and anybody curious enough to want to know what microsystems and microsensors can do.

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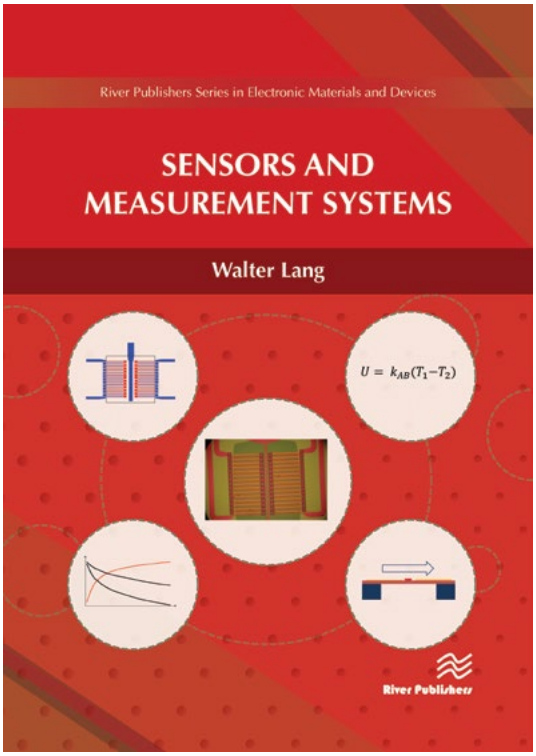

THE AUTHOR:

Walter Lang is a Professor at University of Bremen, Germany.

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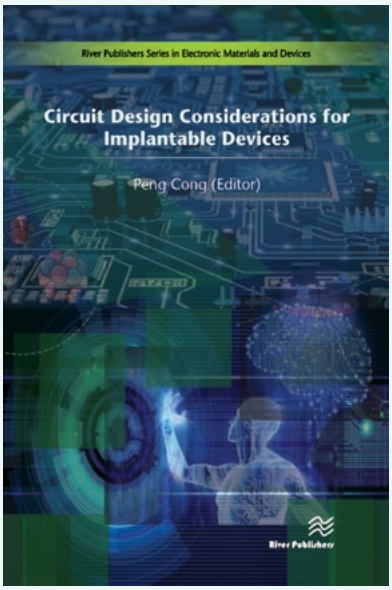

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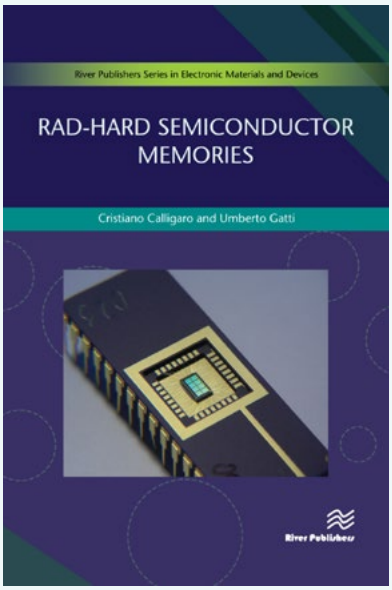

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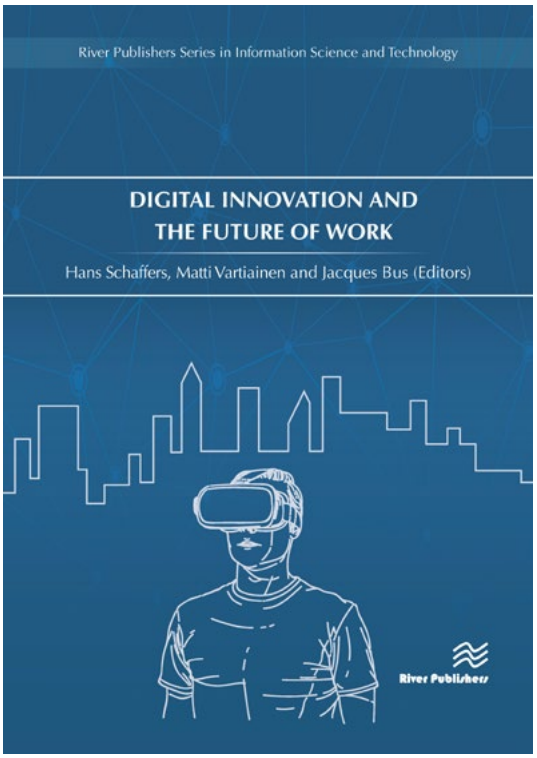

The concept of digitalization captures the widespread adoption of digital technologies in our lives, in the structure and functioning of organizations and in the transformation of our economy and society. Digital technologies for data processing and communication underlie high-impact innovations including the Internet of Things, wireless multimedia, artificial intelligence, big data, enterprise platforms, social networks and blockchain.

These digital innovations not only bring new opportunities for prosperity and wellbeing but also affect our behaviors, activities, and daily lives. They enable and shape new forms of production and new working practices in sectors such as manufacturing, healthcare, logistics and supply chains, energy, and public and business services. Digital innovations are not purely technological but form part of comprehensive systemic innovations of a sociotechnical and networked nature, requiring the alignment of technology, processes, organizations, and humans. Examples are platform-based work, customer driven value creating networks, and urban public service systems. Building on widespread networking, algorithmic decisions and sharing of personal data, these innovations raise intensive societal and ethical debates regarding key issues such as data sovereignty and privacy intrusion, business models based on data surveillance and negative externalization, quality of work and jobs, and market dominance versus regulation. In this context, this book focuses on the implications of digitalization for the domain of work. The book studies the changing nature of work as well as new forms of digitally enabled organizations, work practices and cooperation. The book sheds light on the technological, economic, and political forces shaping the new world of work and on the prospects for human-centric and responsible innovations.

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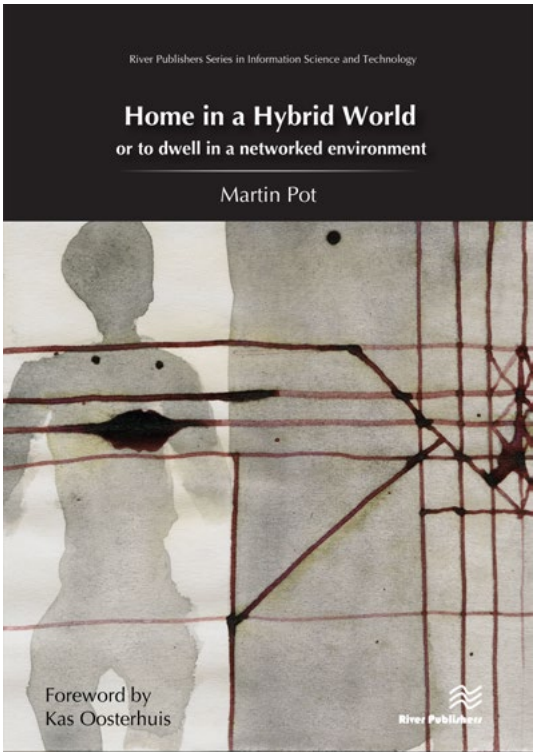
Home in a Hybrid World

Or to Dwell in a Networked Environment

Martin Pot

While our outside world is modifying into a more complex and hybrid networked world, our most intimate dwelling, our home, is at risk of falling behind as for many it seems to have remained the same as it has been for many decades. This book explores what it means to have a home in such a networked world. It describes what architecture can, or perhaps should, contribute to enable a more participatory role for inhabitants. This forward-thinking book will try to answer the question - What is the role and position of technology in our most intimate locations both now and what could it be like in the future?



THE AUTHOR:

Martin Pot is an independent researcher/thinker/writer; living and working in Rotterdam.

November 2020
200 pp, 6 in x 9 in
Cloth, 978 8 77022 211 2, $115.00
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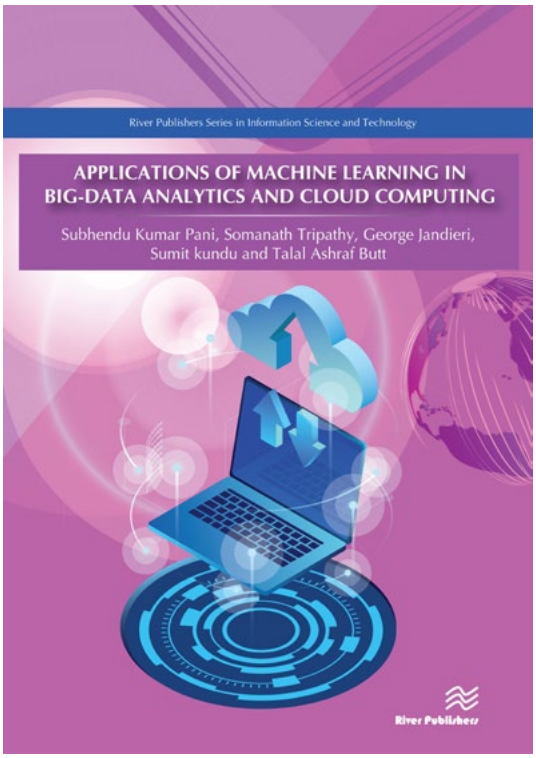
Applications of Machine Learning in Big-Data Analytics and Cloud Computing



Edited by Subhendu Kumar Pani, Somanath Tripathy, George Jandieri, Sumit Kundu and Talal Ashraf Butt

Cloud Computing and Big Data technologies have become the new descriptors of the digital age. The global amount of digital data has increased more than nine times in volume in just five years and by 2030 its volume may reach a staggering 65 trillion gigabytes. This explosion of data has led to opportunities and transformation in various areas such as healthcare, enterprises, industrial manufacturing and transportation. New Cloud Computing and Big Data tools endow researchers and analysts with novel techniques and opportunities to collect, manage and analyze the vast quantities of data.

In Cloud and Big Data Analytics, Swarm Intelligence and Deep Learning are two developing type of Machine Learning techniques that show enormous potential for solving complex business problems. Deep Learning enables computers to analyze large quantities of unstructured and binary data and to deduce relationships without requiring specific models or programming instructions.

This book introduces the state-of-the-art trends and advances in the use of Machine Learning in Cloud and Big Data Analytics. The book will serve as a reference for data scientists, systems architects, developers, new researchers and graduate level students in Computer and Data Science. The book will describe the concepts necessary to understand current Machine Learning issues, challenges and possible solutions as well as upcoming trends in Big Data Analytics.

THE EDITORS:

Subhendu Kumar Pani is at Biju Patnaik University of Technology, India.

Somanath Tripathy is at Indian Institute of Technology, India.

George Jandieri is at Georgian Technical University, Russia.

Sumit Kundu is at National Institute of Technology Durgapur, India.

Talal Ashraf Butt is at The American University in the Emirates, UAE.

September 2020
300 pp, 6 in x 9 in
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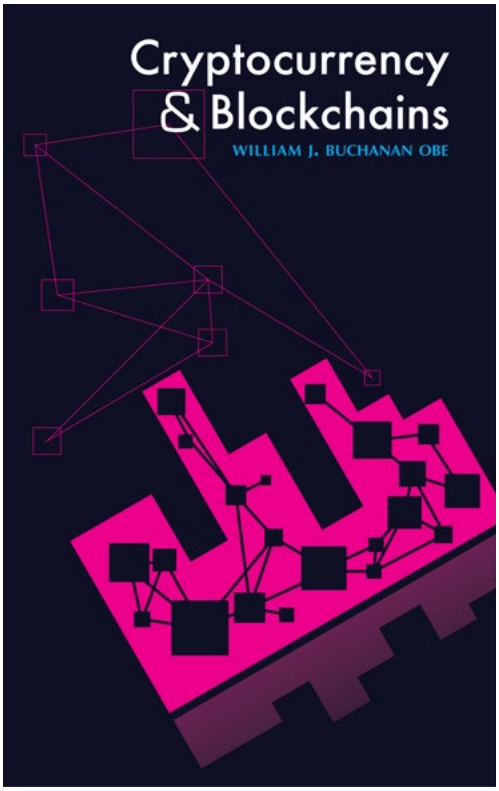
Cryptocurrency and Blockchains

William J. Buchanan



Cryptocurrency and Blockchains outlines many of the key developments in building a more trustworthy world. It includes a background within the main methods used in creating data infrastructure which use Blockchain methods, and how these will change existing methods of authentication and identity provision. This will include a discussion of a range of application areas including health care, law, finance and government services, and how smart contracts can be used to make transactions more trustworthy.

In discussing cryptocurrency, the book outlines the trust infrastructure within the main cryptocurrency methods and around the usage of electronic tokens to transfer credits.

An important element of the book is to look forward to a world where every transaction is made more trustworthy, and where privacy requirements are respected.

THE AUTHOR:

William J. Buchanan is at Edinburgh Napier University, UK.

September 2020
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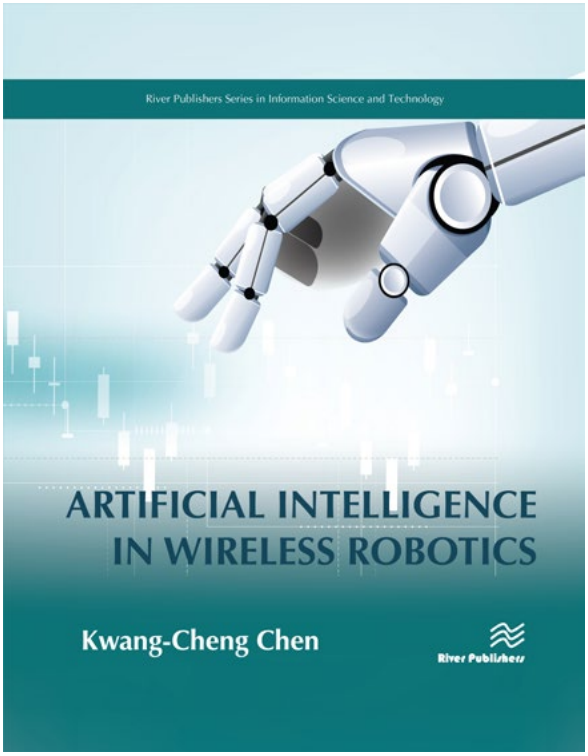
Artificial Intelligence in Wireless Robotics

Kwang-Cheng Chen



Robots, autonomous vehicles, unmanned aerial vehicles, and smart factories will significantly change human living style in digital society. *Artificial Intelligence in Wireless Robotics* introduces how wireless communications and networking technology enhances facilitation of artificial intelligence in robotics, which bridges basic multi-disciplinary knowledge among artificial intelligence, wireless communications, computing, and control in robotics. A unique aspect of the book is to introduce applying communication and signal processing techniques to enhance traditional artificial intelligence in robotics and multi-agent systems.

The technical contents of this book include fundamental knowledge in robotics, cyber-physical systems, artificial intelligence, statistical decision and Markov decision process, reinforcement learning, state estimation, localization, computer vision and multi-modal data fusion, robot planning, multi-agent systems, networked multi-agent systems, security and robustness of networked robots, and ultra-reliable and low-latency machine-to-machine networking. Examples and exercises are provided for easy and effective comprehension.

THE AUTHOR:

Dr. Kwang-Cheng Chen is a professor at the University of South Florida, College of Engineering.

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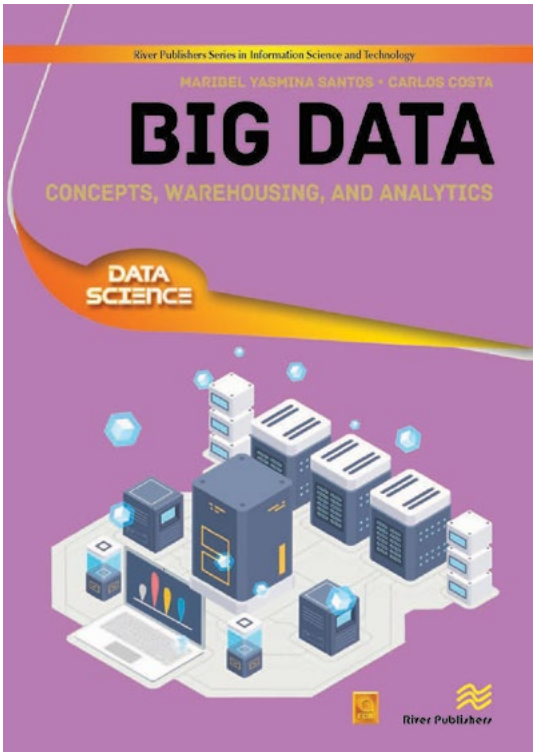
Big Data

Concepts, Warehousing, and Analytics

Maribel Yasmina Santos and Carlos Costa



Big Data is a concept of major relevance in today's world, sometimes highlighted as a key asset for productivity, growth, innovation, and customer relationships. Its popularity has increased considerably during recent years. Areas like smart cities, manufacturing, retail, finance, software development, environment, digital media, among others, can benefit from the collection, storage, processing, and analysis of Big Data, leveraging unprecedented data-driven workflows and considerably improved decision-making processes.

The concept of a Big Data Warehouse (BDW) is emerging as either an augmentation or a replacement of the traditional Data Warehouse (DW), a concept that has a long history as one of the most valuable enterprise data assets. Nevertheless, research in Big Data Warehousing is still in its infancy, lacking an integrated and validated approach for designing and implementing both the logical layer (data models, data flows, and interoperability between components) and the physical layer (technological infrastructure) of these complex systems.

This book addresses models and methods for designing and implementing Big Data

Systems to support mixed and complex decision processes, giving special attention to BDWs as a way of efficiently storing and processing batch or streaming data for structured or semi-structured analytical problems.

THE AUTHORS:

Maribel Yasmina Santos, PhD, is Associate Professor at the Department of Information Systems, University of Minho, Portugal; Senior Researcher of the ALGORITMI Research Centre; and leader of SEMAG, the Software-based Information Systems Engineering and Management Group at ALGORITMI.

Carlos Costa, PhD, is Invited Lecturer in the field of Information Systems, University of Minho, Portugal.

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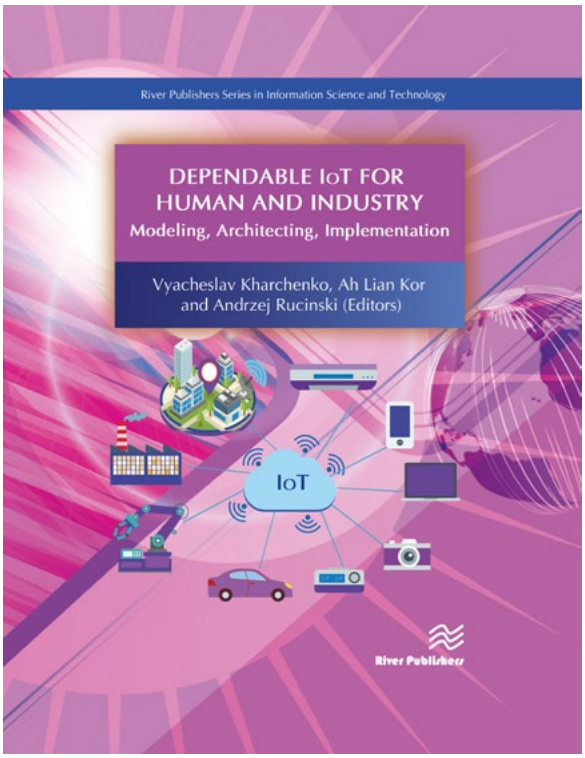
Dependable IoT for Human and Industry

Modeling, Architecting, Implementation

Edited by Vyacheslav Kharchenko, Ah Lian Kor and Andrzej Rucinski

Dependable IoT for Human and Industry covers the main aspects of Internet of Things (IoT) and IoT based systems such as global issues of applications, modeling, development and implementation of dependable IoT for different human and industry domains, providing a more profound understanding of the impact of the IoT on society.

The book contains chapters which have their roots in the International Conference IDAACS 2017, and Workshop on Cyber Physical Systems and IoT Dependability CyberIoT-DESSERT 2017.



THE EDITORS:

Vyacheslav Kharchenko is with National Aerospace University KhAI, Ukraine.

Ah Lian Kor is at Leeds Beckett University, UK.

Andrzej Rucinski is at University of New Hampshire.

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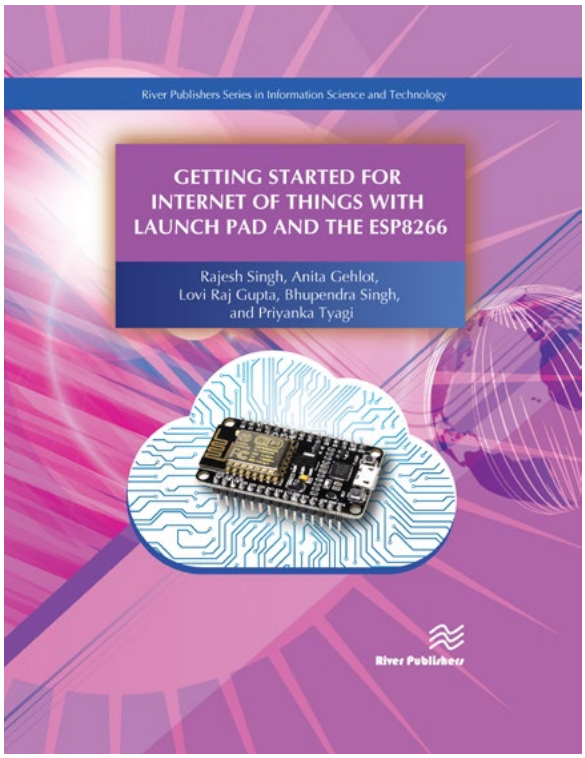
Getting Started for Internet of Things with Launch Pad and ESP8266

Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh and Priyanka Tyagi



Getting Started for Internet of Things with Launch Pad and ESP8266 provides a platform to get started with the Ti launch pad and IoT modules for Internet of Things applications. The book provides the basic knowledge of Ti launch Pad and ESP8266 based customized modules with their interfacing, along with the programming.

The book discusses the application of Internet of Things in different areas. Several examples for rapid prototyping are included to help the reader understand the concept of IoT.

The book is comprised of twenty-seven chapters, which are divided into four sections and which focus on the design of various independent prototypes. Section-A gives a brief introduction to Ti launch pad (MSP430) and Internet of Things platforms like GPRS, NodeMCU and NuttyFi (ESP8266 customized board), and it shows steps to program these boards. Examples on how to interface these boards with display units, analog sensors, digital sensors and actuators are also included to help make the reader comfortable with the platforms. Section-B discusses the communication modes to relay the data like serial out, PWM and I2C. Section-C explores the IoT data loggers and shows certain steps to design and interact with the servers. Section-D includes IoT based case studies in various fields.

THE AUTHORS:

Rajesh Singh is with Lovely Professional University, India.

Anita Gehlot is with Lovely Professional University, India.

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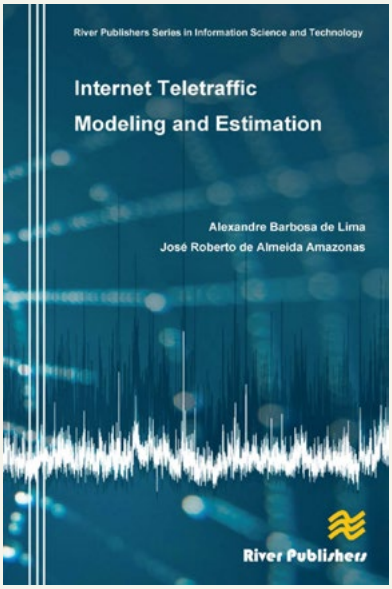

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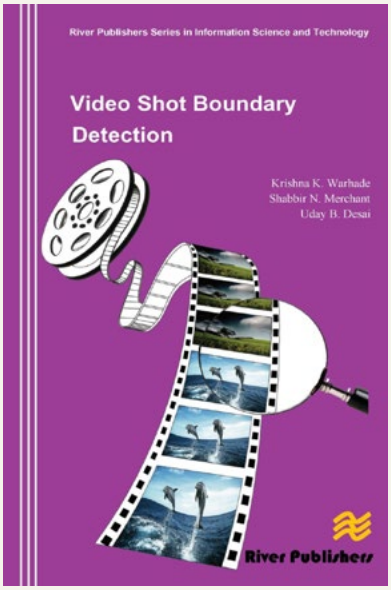

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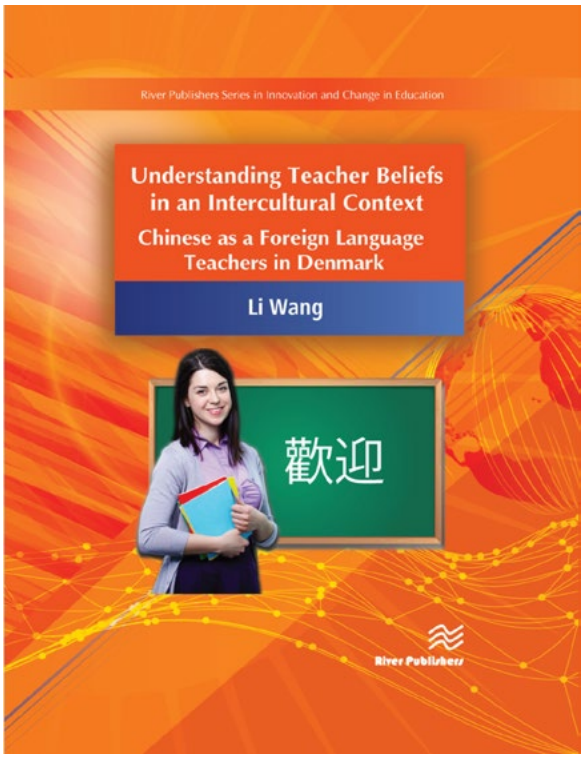
Understanding Teacher Beliefs in an Intercultural Context

Chinese as a Foreign Language Teacher in Denmark

Li Wang



The Teaching of Chinese as a Foreign Language (TCFL) is expanding rapidly worldwide, resulting in a substantial increase in the number of Chinese as a Foreign Language (CFL) teachers, which in turn draws greater attention to a variety of global aspects. In Denmark, TCFL is a newly established profession and CFL teachers face numerous challenges when adapting to their intercultural experience.

Using empirical data from 18 CFL teachers in different educational institutions in Denmark, this book explores the dynamics of factors shaping both Chinese and Danish CFL teachers' beliefs in the Danish classrooms, and their belief change during the course of teaching. Understanding Teacher Beliefs in an Intercultural Context presents state-of-the-art knowledge of the beliefs and experiences of the different groups of CFL teachers in the Danish context.

THE AUTHOR:

Li Wang is at Central China Normal University, China and Aalborg University, Denmark.

October 2020
200 pp, 6 in x 9 in
Cloth, 978 8 77022 086 6, $110.00
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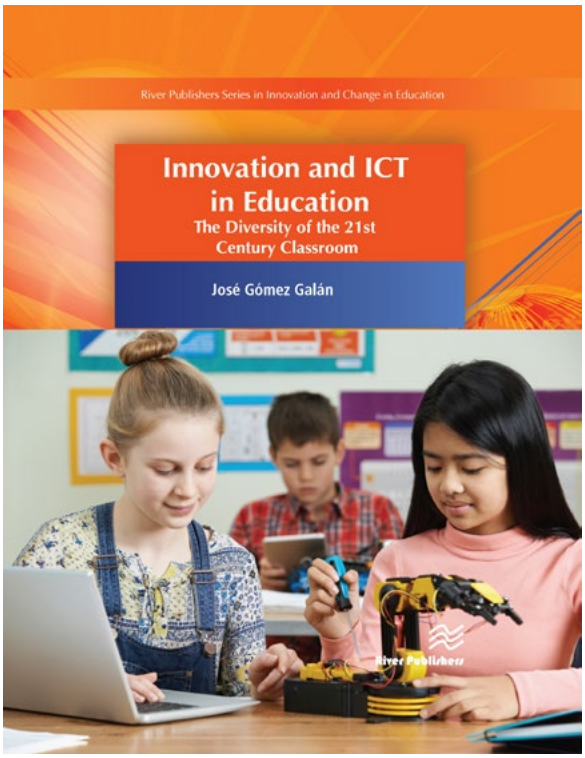
Innovation and ICT in Education

The Diversity of the 21st Century Classroom

Edited by José Gómez-Galán



The adequate integration of information and communication technologies (ICT) in educational and training processes is one of the biggest current challenges in education. The classroom of the present is very different from just a few decades ago, new technological tools are completely transforming its characteristics and activities. This internationally authored book offers a timely, effective and practical vision of this new educational scenario.

The book takes a multidisciplinary approach in looking at the problems and possible solutions that are faced by the educational professional of the 21st century when, by necessity or obligation, they face the use of ICT in their daily tasks.

Divided into two parts, one theoretical and another practical, this book offers the highlights of the most important lines of research that are being developed today in educational technology, and importantly presents the innovations which have had the most impact over recent years. From the profound transformations in the physical classroom to everything that involves new virtual scenarios, where online teaching requires innovative strategies and training processes, this book describes the diverse scenarios that ICT has generated and will continue to generate in the field of education. It presents a new and a very different type of education that can be adapted to the needs of the citizen of the digital society.

THE EDITOR:

José Gómez-Galán is Research Professor and Director of CICIDE, Metropolitan University, AGMUS, Puerto Rico and Catholic University of Avila, Spain. Professor of Theory and History of Education, University of Extremadura, Spain (on special leave).

August 2020
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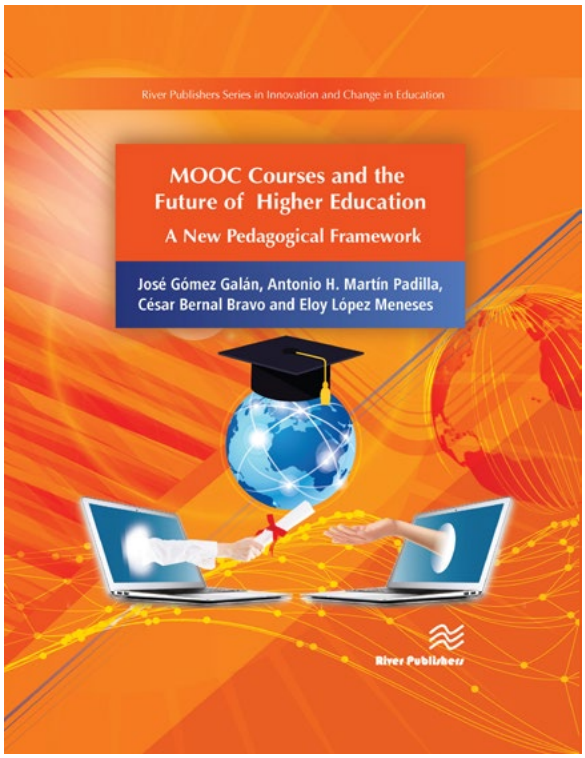
MOOC Courses and the Future of Higher Education

A New Pedagogical Framework

José Gómez-Galán, Antonio H. Martín Padilla, César Bernal Bravo and Eloy López Meneses



During the last decade, our society is witnessing an authentic revolution that, in a dizzying manner, has deeply influenced, modified, and transformed the way of life of human beings. This constant and unstoppable revolution is transmuting all areas of our life: social, cultural, personal, labor, economic, and training. This new society is characterized by a high generation of knowledge and the constant and fluid processing of information.

In this macro-context, the MOOC phenomenon emerged. MOOC (Massive Open Online Courses) courses are based on the principles of massive, free access to all materials and resources offered online. This new didactic path can be constituted in an innovative techno-social tendency, especially oriented in the panorama of Higher Education, to stimulate university improvement, to open opportunities at the same time for education and training, and, to shift universities towards a new business model. In addition to being an entry point for the popularization of science and knowledge, the future possibilities are enormous and are being studied in all their various dimensions. Many initiatives as a result have been developed to implement this new form of education.

THE AUTHORS:

José Gómez-Galán is Research Professor and Director of CICIDE, Metropolitan University, AGMUS, Puerto Rico and Catholic University of Avila, Spain. Professor of Theory and History of Education, University of Extremadura, Spain (on special leave).

Antonio H. Martín Padilla is with Pablo de Olavide University, Spain.

César Bernal Bravo is with King Juan Carlos University, Spain, and University of Almeria, Spain.

Eloy López Meneses is with Pablo de Olavide University, Spain.

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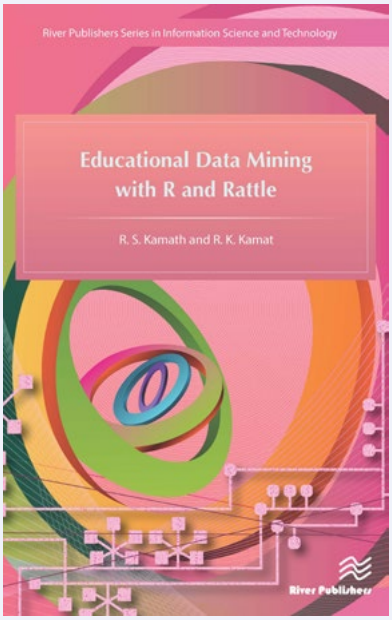

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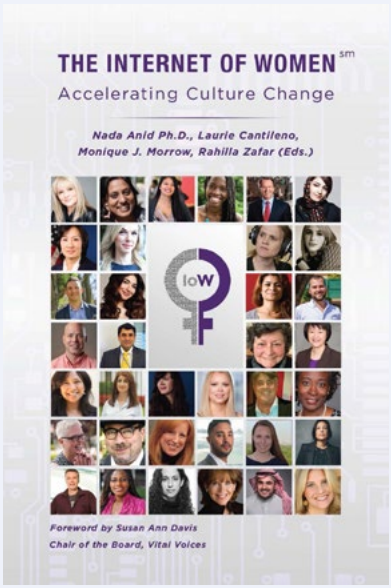

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University-Industry Collaboration and the Success Mechanism of Collaboration

Nian Zhiying

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The Use of Online Collaboration Tools for Employee Volunteering

Ayse Kok

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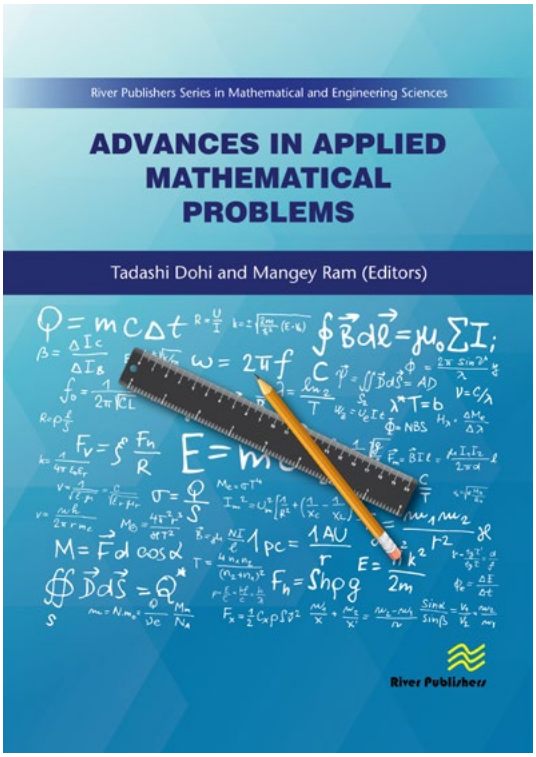
Advances in Applied Mathematical Problems

Edited by Tadashi Dohi and Mangey Ram



In recent years, applied mathematics has been used in all novel disciplines of scientific development. *Advances in Applied Mathematical Problems* summarizes interdisciplinary work within the field of applied mathematics.

The topics discussed in the book include:

- Similarity Solutions of Spherical Shock Waves in a Self-Gravitating Ideal Gas
- Dual Solutions for Finite Element Analysis of Unsteady Hydromagnetic Stagnation Point Flow of Cu-Water Nanofluid Generated by Stretching Sheet
- Multiparametric modeling of carbon cycle in temperate wetlands for regional climate change analysis using satellite data
- An Intelligent Neuro Fuzzy System for Pattern Classification
- Fuzzy inventory model with demand, deterioration and inflation: a comparative study through NGTFN and CNTFN
- Summability and its application for the stability of the system
- Design Of Manufacturing, Control, And Automation Systems
- SEIR – Application for Crop through Water and Soil Texture
- Advances in radial basis functions
- Modeling For Time Period Of Natural Frequency For Non-Homogeneous Square Plate With Variable Thickness And Temperature Effect
- A Study On Metric Fixed Point Theorems Satisfying Integral Type Contractions
- Objective Function – In Radiometric Studies – Application to Agrs Surveys Associated With Radon
- Modelling Kernel Function in Black body Radiation Inversion

THE EDITORS:

Tadashi Dohi is at Hiroshima University, Japan.

Mangey Ram is at Graphic Era University, Dehradun, India.

February 2020
250 pp, 6 in x 9 in
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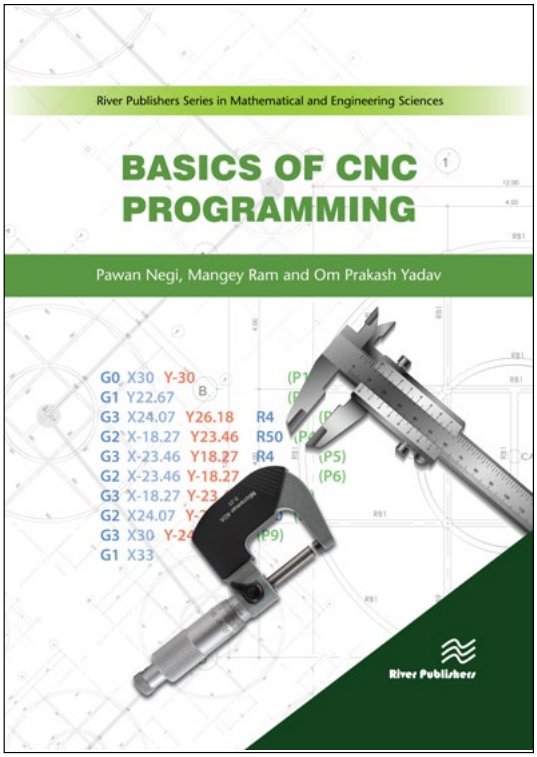
Basics of CNC Programming

Pawan Negi, Mangey Ram and Om Prakash Yadav



Before the introduction of automatic machines and automation, industrial manufacturing of machines and their parts for the key industries were made by manually operated machines. Due to this, manufacturers could not make complex profiles or shapes with high accuracy. As a result, the production rate tended to be slow, production costs were very high, rejection rates were high and manufacturers often could not complete tasks on time.

Industry was boosted by introduction of the semi-automatic manufacturing machine, known as the NC machine, which was introduced in the 1950s at the Massachusetts Institute of Technology. After these NC machine started to be used, typical profiles and complex shapes could get produced more readily, which in turn lead to an improved production rate with higher accuracy.

Thereafter, in the 1970s, an even larger revolutionary change was introduced to manufacturing, namely the use of the Computer Numerical Control (CNC) machine. Since then, CNC has become the dominant production method in most manufacturing industries, including automotive, aviation, defense, oil and gas, medical, electronics industry, and the optical industry.

Basics of CNC Programming describes how to design CNC programs, and what cutting parameters are required to make a good manufacturing program. The authors explain about cutting parameters in CNC machines, such as cutting feed, depth of cut, rpm, cutting speed etc., and they also explain the G codes and M codes which are common to CNC. The skill-set of CNC program writing is covered, as well as how to cut material during different operations like straight turning, step turning, taper turning, drilling, chamfering, radius profile, profile turning etc. In so doing, The Authors cover the level of CNC programming from basic to industrial format. Drawings and CNC programs to practice on are also included for the reader.

THE AUTHORS:

Pawan Negi is at Graphic Era University, Dehradun, India.

Mangey Ram is at Graphic Era University, Dehradun, India.

Om Prakash Yadav is at North Dakota State University.

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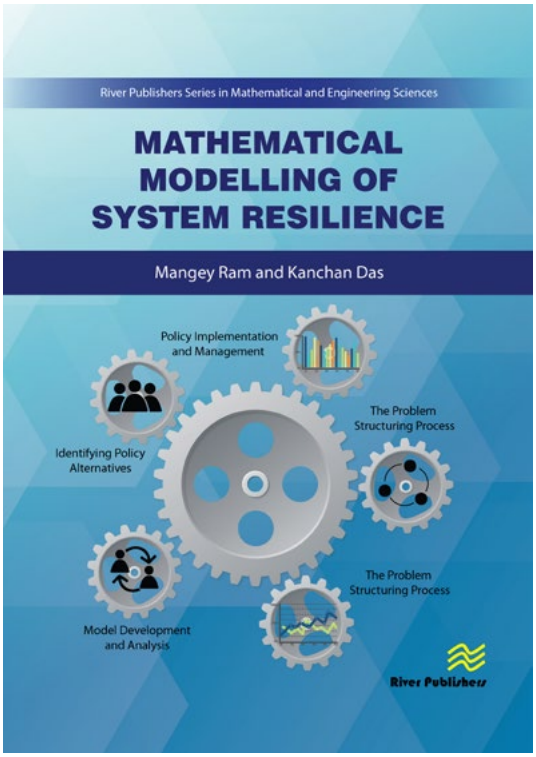
Mathematical Modelling of System Resilience

Kanchan Das and Mangey Ram



Almost all the systems in our world--including technical, social, economic, and environmental systems--are becoming interconnected and increasingly complex, and as such they are vulnerable to various risks. Due to this trend, resilience creation is becoming more important to system managers and decision makers, this to ensure sustained performance. In order to be able to ensure an acceptable sustained performance under such interconnectedness and complexity, resilience creation with a system approach is a requirement. Mathematical modeling based approaches are the most common approach for system resilience creation.

Mathematical Modelling of System Resilience covers resilience creation for various system aspects including a functional system of the supply chain, overall supply chain systems; various methodologies for modeling system resilience; satellite-based approach for addressing climate related risks, repair-based approach for sustainable performance of an engineering system, and modeling measures of the reliability for a vertical take-off and landing system. Each of the chapters contributes state-of-the-art research for the relevant resilience related topic covered in the chapter.

THE AUTHORS:

Kanchan Das is at East Carolina University.

Mangey Ram is at Graphic Era University, Dehradun, India.

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200 pp, 6 in x 9 in
Cloth, 978 8 77022 070 5, $115.00 (S6)
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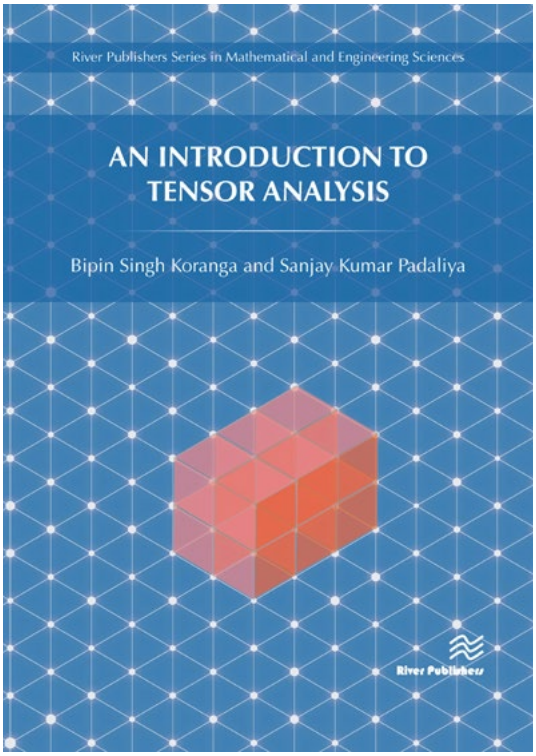
An Introduction to Tensor Analysis

Bipin Singh Koranga and Sanjay Kumar Padaliya



The subject of Tensor Analysis deals with the problem of the formulation of the relation between various entities in forms which remain invariant when we pass from one system of coordinates to another. The invariant form of equation is necessarily related to the possible system of coordinates with reference to which the equation remains invariant.

The primary purpose of this book is the study of the invariance form of equation relative to the totality of the rectangular co-ordinate system in the three-dimensional Euclidean space. We start with the consideration of the way the sets representing various entities are transformed when we pass from one system of rectangular co-ordinates to another. A Tensor may be a physical entity that can be described as a Tensor only with respect to the manner of its representation by means of multi-sux sets associated with different system of axes such that the sets associated with different system of co-ordinate obey the transformation law for Tensor. We have employed sux notation for tensors of any order, we could also employ single letter such A,B to denote Tensors.

THE AUTHORS:

Bipin Singh Koranga, Kirori Mal College, India

Sanjay Kumar Padaliya, S.G.R.R. (P.G) College, India

October 2020
160 pp, 6 in x 9 in
Cloth, 978 8 77022 581 6, $90.00
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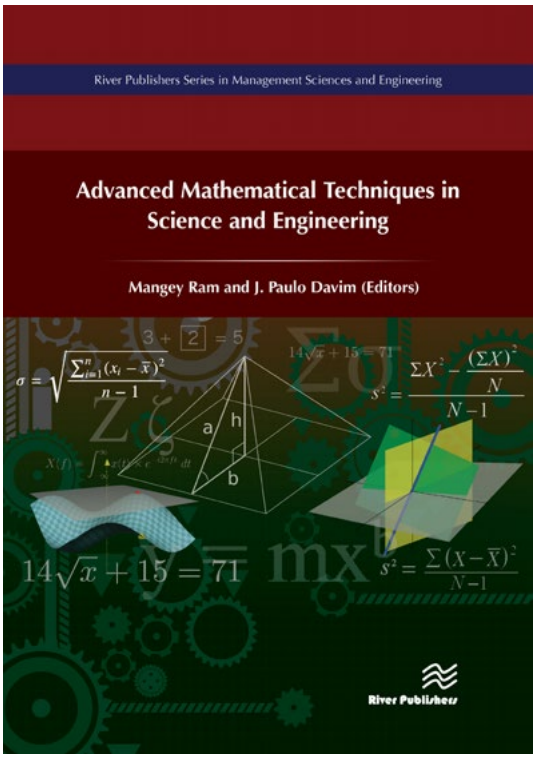
Advanced Mathematical Techniques in Science and Engineering

Edited by Mangey Ram and Joao Paulo Davim



In recent years, mathematical techniques applied to novel disciplines within science and engineering have experienced extraordinary growth. *Advanced Mathematical Techniques in Science and Engineering* focuses on a detailed range of mathematics applied within various fields of science and engineering for different tasks.

Topics of focus include:

- Analysis of Consensus-Building Time in Social Groups
- Modeling of intersystem accidents in critical infrastructure systems
- Stochastic approaches to analysis and modeling of multi-sources and big data
- Performance evaluation of computational DoS attack on access point in Wireless LANs
- Ranking methods for decision-making under uncertainty
- Understanding time delay based Modeling & Diffusion of technological products
- Role of soft computing in science and engineering
- Complex system reliability analysis and optimization
- Tree growth models in forest ecosystems modelling

THE EDITORS:

Mangey Ram is at Graphic Era University, Dehradun, India.

Joao Paulo Davim is with University of Aveiro, Portugal.

February 2020
200 pp, 6.125 in x 9.5 in
Cloth, 978 8 79360 934 1, $105.00
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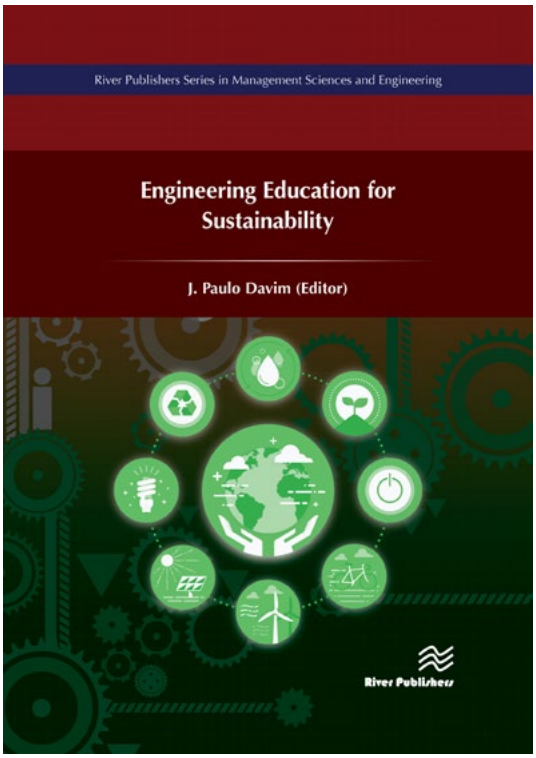
Engineering Education for Sustainability

Edited by Joao Paulo Davim



Understood to be a key issue in modern society, sustainability is characterized by its three essential pillars, namely: the environment, society and the economy. Education plays an important role in how people understand and accept sustainability. The integration of sustainability in engineering education is a relatively new phenomenon, and presenting information about engineering education for sustainability is of great interest to improve communication between professors, researchers and students at universities, institutes and research laboratories.

Topics discussed in the book include:

- Experiences from 5 years of educating sustainability to computer science students
- Review of decision support methods in green and sustainable supply chains
- Analyzing the drivers of engineering education for sustainability using the MCDM approach
- Visualization technologies in construction education: a comprehensive review of recent advances
- A legal framework and compliance with construction safety laws and regulations.

THE EDITOR:

Joao Paulo Davim is with University of Aveiro, Portugal.

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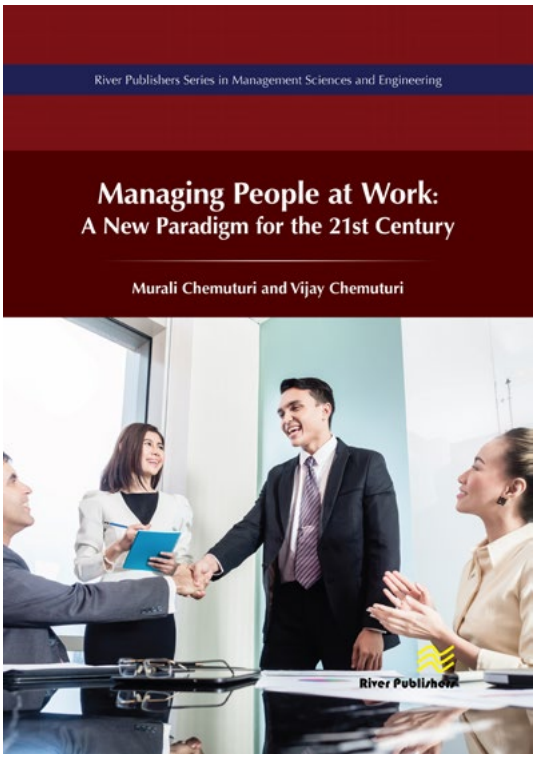
Managing People at Work

A New Paradigm for the 21st Century

Murali Chemuturi and Vijay Chemuturi

The organizational environment in the 21st century is not what it was in the 20th Century. It metamorphosed with bulk outsourcing and computer-based decision support tools, and easily coupled with low-cost PC hardware which has created improvements in the productivity of people, resulting in reduced numbers. Managers of today manage the results expected of the position rather than managing to get things done as it was expected.

In the physical sciences, academia leads the industry while in social sciences like management, marketing and economics, industry leads academia. To bridge the knowledge gap that exists between theory and practice, two practitioners from the industry have authored *Managing People at Work: A New Paradigm for the 21st Century*.



THE AUTHORS:

Murali Chemuturi is with Chemuturi Consultants

Vijay Chemuturi is with KPMG.

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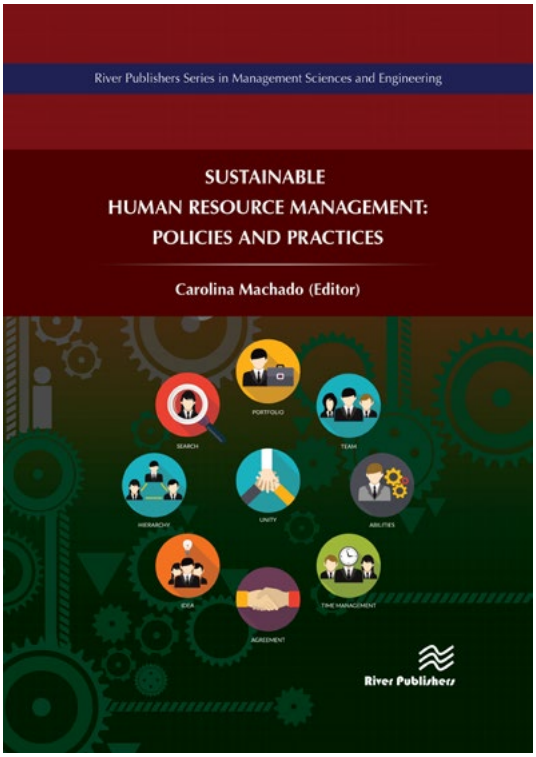
Sustainable Human Resource Management

Policies and Practices

Edited by Carolina Machado



Sustainable Human Resource Management: Policies and Practices covers issues related to sustainable human resource management in a context where organizations are continually facing significant challenges related to the continuous change in the market, as well as in the environment. Organized in different chapters, the book includes contributions from renowned international researchers in the field of sustainability and organizations, and human resource management.

Providing recent research advances on *Sustainable Human Resource Management*, it can be used in an undergraduate management and engineering course (for example, management, human resource management, industrial, manufacturing, economics, etc.), or as a subject on human resource management and industrial engineering at the postgraduate level. Also, this book can serve as a useful reference for academics, researchers, managers and manufacture and industrial engineers, as well as all professionals who work in fields related to management and human resource management, sustainability and industrial engineering.

THE EDITOR:

Carolina Machado is with University of Minho, Portugal.

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Benjamin Bobo

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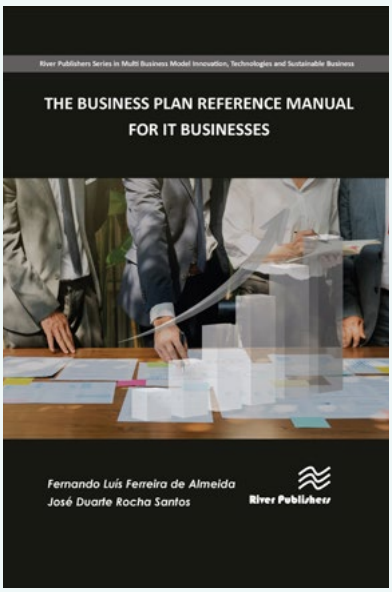

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Fernando Almeida and Jose Santos

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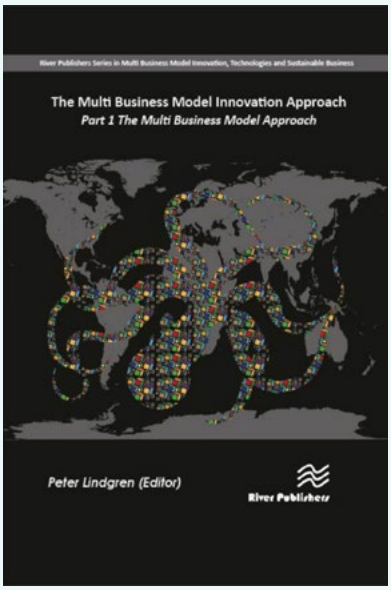

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Part 1

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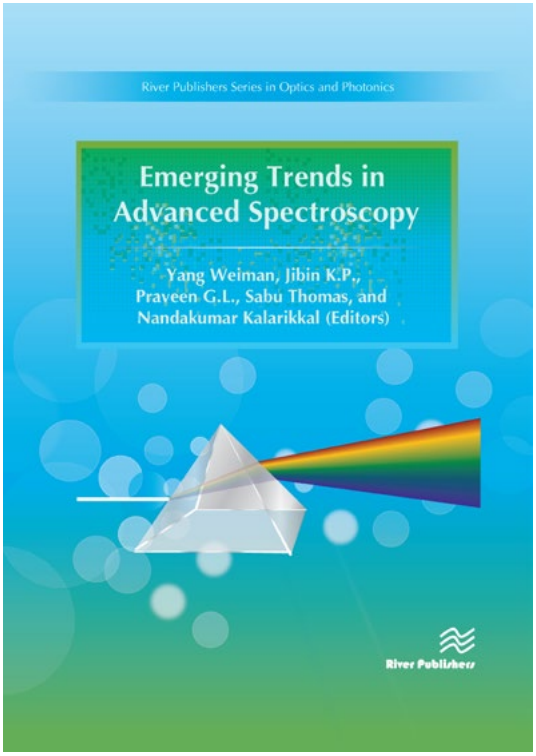
Emerging Trends in Advanced Spectroscopy

Edited by Yang Weiman, Jibin K.P., G.L., Sabu Thomas and Nandakumar Kalarikkal



Experimental studies carried out by a spectroscopic approach, and the techniques used for investigating the acquired information, can be given a robust modern analytical framework in the design of new materials, and for emphasis on the expansion of physical foundations of new materials.

Emerging Trends in Advanced Spectroscopy may help to understand the applications of spectroscopic tools in material characterization. The text also shows how different spectroscopic methods are used by researchers worldwide, and how we can correlate the experimental observations with structural information.

Technical topics discussed in the book include:

- Geometries, electronic structures and vibrational spectral studies
- Advanced spectroscopic techniques in polymer chemistry
- Spectroscopic portrayals of graphitic structures
- fluorescent metal nanoclusters as sensory probes for metal ions
- colorimetric chemo sensor
- Nano mixed ferrites and their applications to nanoelectronics
- Solid phase astrochemistry

THE EDITORS:

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Jibin K.P. is affiliated with Mahatma Gandhi University, India.

Praveen G.L. teaches at Mahatma Gandhi University, India.

Sabu Thomas teaches at Mahatma Gandhi University, India.

Nandakumar Kalarikkal is at School of Pure and Applied Physics; Mahatma Gandhi University, India.

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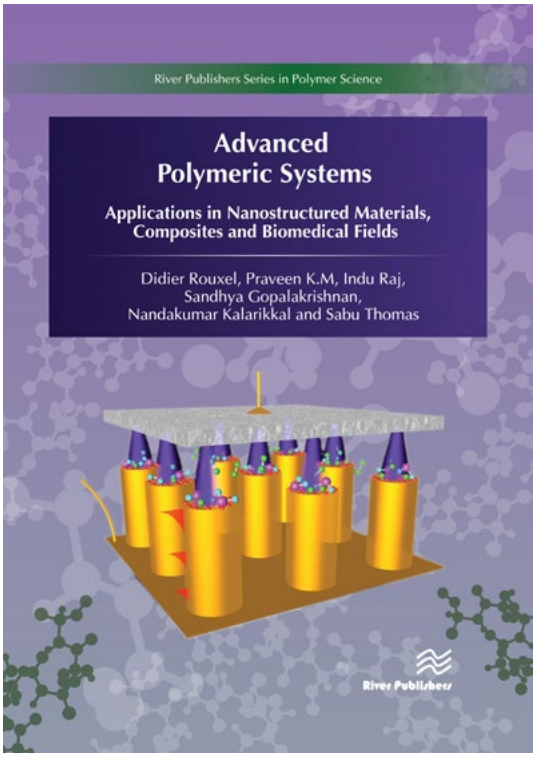
Advanced Polymeric Systems

Applications in Nanostructured Materials, Composites and Biomedical Fields

Didier Rouxel, Praveen K. M, Indu Raj, Sandhya Gopalakrishnan, Nandakumar Kalarikkal and Sabu Thomas



Over recent years a considerable amount of effort has been devoted, both in industry and academia, towards the incorporation of various macro, micro, and nano sized fillers into polymers. There is also much interest in the evaluation of various polymer properties with respect to a wide set of applications. The advances in nanotechnology together with the development in material sciences has improved the shortcomings of these materials over the decade. This book covers the latest advances in the field of polymer nanocomposites and polymer composites for varied applications.

The major topics discussed in the book include:

- Nanostructured materials for energy applications
- Nanostructured polymercomposites
- Bio-polymers
- Nanostructured polymers for biomedical applications

THE AUTHORS:

Didier Rouxel is with Université de Lorraine, France.

Praveen K. M is at Muthoot Institute of Technology & Science (MITS), India.

Indu Raj is at Government Dental College; International and Mahatma Gandhi University, India.

Sandhya Gopalakrishnan is at Government Dental College; Mahatma Gandhi University, India.

Nandakumar Kalarikkal is at School of Pure and Applied Physics; Mahatma Gandhi University, India.

Sabu Thomas teaches at Mahatma Gandhi University, India.

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Muralisrinivasan Natamai Subramanian

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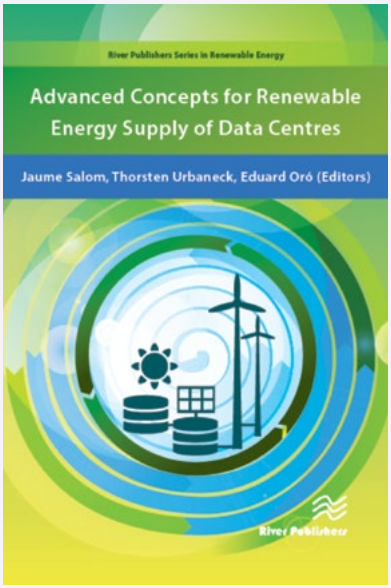

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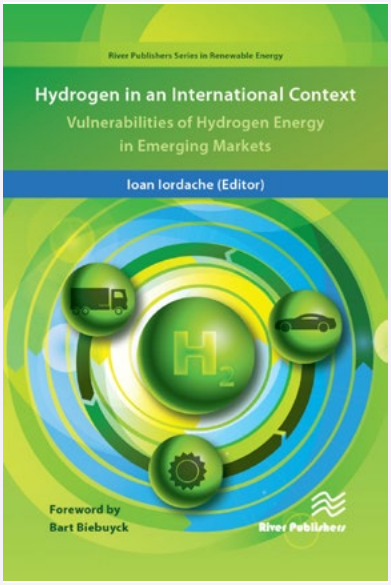

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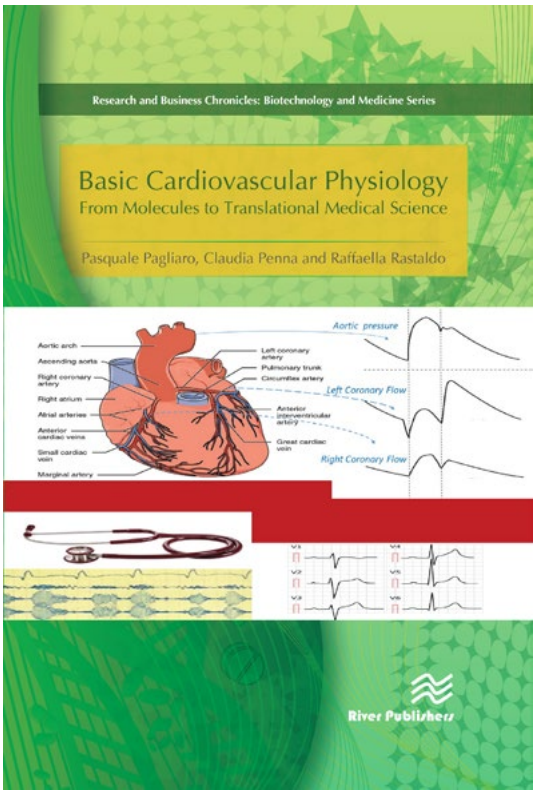
Basic Cardiovascular Physiology

From Molecules to Translational Medical Science

Pasquale Pagliaro, Claudia Penna and Raffaella Rastaldo



This book focuses on established cardiovascular principles and highlights some of the progress achieved by recent research in the cardiovascular field. The authors report the basic concepts related to the functioning of the cardiovascular system necessary for medical students to understand.

To foster learning, in each chapter the fundamental points are highlighted in italics and/or bold. In addition, there are added boxes that contain some more detailed information about physiological mechanisms or deeper analyses of clinical aspects. The book describes the structure and function of the heart and vascular system for the reader to understand how the cardiovascular system responds in both health and disease. Conveying a unified vision of the function of the heart and the vascular system, the authors explain the complexity of the system that goes far beyond the integrated connection between preload, afterload and cardiac contractility.

The endothelium covers the internal part of the whole cardiovascular system; therefore, endothelial physiology is treated in several chapters. Given the importance of coronary circulation in cardiac pathophysiology, this special circulation is described in detail and enriched with the most up-to-date information. Several paragraphs and boxes on clinical implications are dedicated to the principles of electrophysiology and the electrocardiogram. A space is also dedicated to myocardial ischemia/reperfusion injury and cardioprotective procedures. The book is written in a linear and simple language without compromising the scientific rigor of the various topics covered.

THE AUTHORS:

Pasquale Pagliaro, MD, PhD, is Professor of Physiology at the University of Turin, Italy.

Claudia Penna, PhD, is Associate Professor of Physiology at the University of Turin, Italy.

Raffaella Rastaldo, PhD, is Research Fellow at the Department of Clinical and Biological Sciences of the University of Turin, Italy.

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300 pp, 6 in x 9 in
Cloth, 978 8 77022 200 6, $115.00
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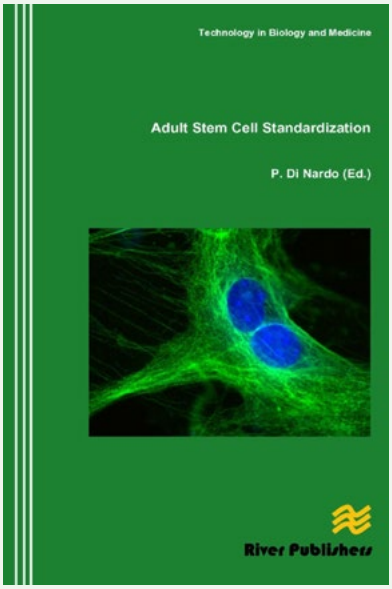

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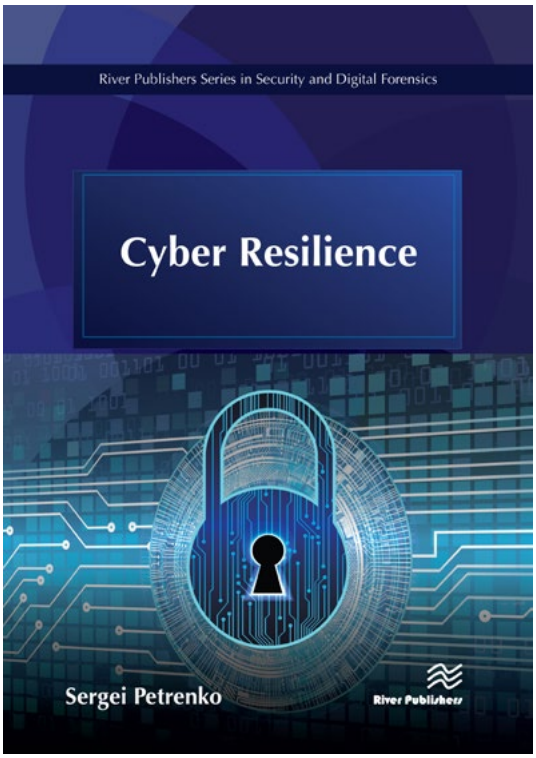
Cyber Resilience

Sergei Petrenko



Modern cyber systems acquire more emergent system properties, as far as their complexity increases: cyber resilience, controllability, self-organization, proactive cyber security and adaptability. Each of the listed properties is the subject of cybernetics research and each subsequent feature makes sense only if there is a previous one.

Cyber resilience is the most important feature of any cyber system, especially during the transition to the sixth technological stage and related Industry 4.0 technologies: Artificial Intelligence (AI), Cloud and foggy computing, 5G +, IoT/IIoT, Big Data and ETL, Q-computing, Blockchain, VR/AR, etc. We should even consider the cyber resilience as a primary one, because the mentioned systems cannot exist without it. Indeed, without the sustainable formation made of the interconnected components of the critical information infrastructure, it does not make sense to discuss the existence of 4.0 Industry cyber-systems. In cases when the cyber security of these systems is mainly focused on the assessment of the incidents' probability and prevention of possible security threats, the cyber resilience is mainly aimed at preserving the targeted behavior and cyber systems' performance under the conditions of known (about 45 %) as well as unknown (the remaining 55 %) cyber attacks.

THE AUTHOR:

Sergei Petrenko is at Innopolis University, Russia.

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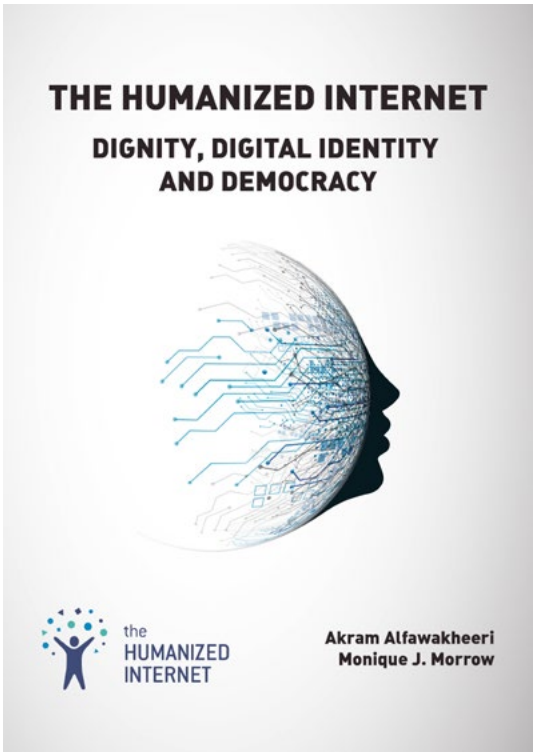
The Humanized Internet

Dignity, Digital Identity and Democracy

Akram Alfawakheeri and Monique J. Morrow



In reading this book, there are key themes that are constant such as the notion of identity and identity sets; e-sovereignty and privacy and most importantly the function of an Internet that is inclusive, not "controlled" by a few organizations for their own profitability. Certainly, "enterprising" the Internet has been a process over these past years, and there is no intent to set judgement here but rather pause for a moment and reflect on the impact of these technologies to individuals.

Yes, this is The Humanized Internet.

These tenets may sound libertarian, but in fact, we are speaking about core principles to guide the development and perhaps the return of the Internet to the people, especially those who are underserved.

"Do No Evil" should not be a company motto but rather foundational to the development of any technologies that do impact us as individual consumers of these technologies and corresponding products. Indeed there is a polarity between an Internet that is used for mass empowerment and one that can be used for mass destruction. Privacy, security, and the management of your digital footprint should be done by you.

With the progression of Human and Machine interaction due to advances in Biotech and Brain/Computer Interface Cloud, Virtual and Mixed Reality, we need to understand the impact of these technologies to identity overall. Do we require a new definition of identity? What is e-Sovereignty and its application moving forward if we posit that the institutions that exist today may indeed no longer be relevant in their current structure? We have read about the abuses when your data falls into the hands of other entities, intentionally or not.

The Humanized Internet is therefore a call to action, your action.

THE AUTHORS:

Akram Alfawakheeri is with The Humanized Internet Institute, Germany.

Monique J. Morrow is with The Humanized Internet Institute, Switzerland.

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Blockchain Technology and Applications

Ahmed Banafa

Blockchain is an emerging technology that can radically improve transactions security at banking, supply chain, and other transaction networks. It's estimated that Blockchain will generate $3.1 trillion in new business value by 2030. Essentially, it provides the basis for a dynamic distributed ledger that can be applied to save time when recording transactions between parties, remove costs associated with intermediaries, and reduce risks of fraud and tampering.

This book explores the fundamentals and applications of Blockchain technology. Readers will learn about the decentralized peer-to-peer network, distributed ledger, and the trust model that defines Blockchain technology. They will also be introduced to the basic components of Blockchain (transaction, block, block header, and the chain), its operations (hashing, verification, validation, and consensus model), underlying algorithms, and essentials of trust (hard fork and soft fork). Private and public Blockchain networks similar to Bitcoin and Ethereum will be introduced, as will concepts of Smart Contracts, Proof of Work and Proof of Stack, and cryptocurrency including Facebook's Libra will be elucidated. Also, the book will address the relationship between Blockchain technology, Internet of Things (IoT), Artificial Intelligence (AI), Cybersecurity, Digital Transformation and Quantum Computing.

THE AUTHOR:

Ahmed Banafa has extensive experience in research, operations and management, with focus on IoT, Blockchain, Cybersecurity and AI. He served as an instructor at well-known universities and colleges, including Stanford University, University of California, Berkeley; California State University-East Bay; San Jose State University; and University of Massachusetts..

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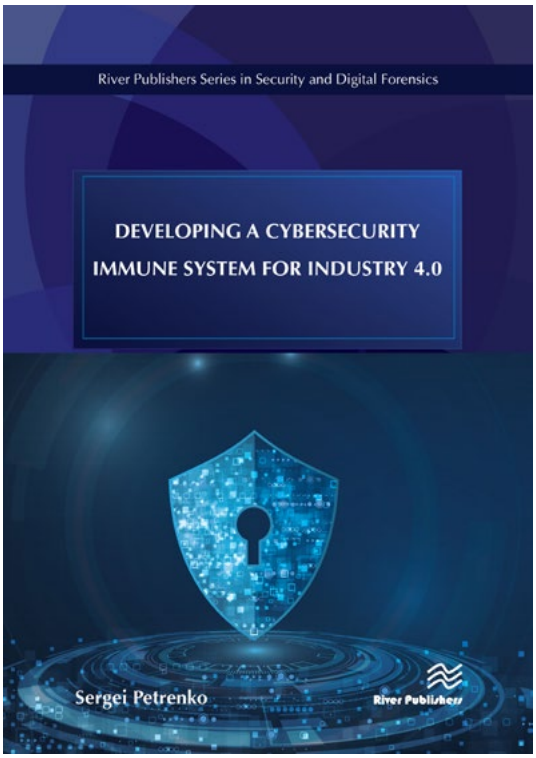
Developing a Cybersecurity Immune System for Industry 4.0



Sergei Petrenko

Cyber immune systems try to mimic the adaptive immune system of humans and animals because of their capability to detect and fend off new, unseen pathogens. Today's current cybersecurity systems provide an effective defense mechanism against known cyber-attacks but are not so good when it comes to defending against unknown attacks. This book describes the possible development and organization of self-healing computing based on cyber immunity techniques and aimed at working in the new realm of Industry 4.0. Industry 4.0 is the trend towards automation and data exchange in manufacturing technologies and processes which include cyber-physical systems (CPS), the internet of things (IoT), industrial internet of things (IIOT), cloud computing, cognitive computing and artificial intelligence. The book describes the author's research and development of cyber-immunity systems that will prevent the destruction of critical information infrastructure by future unknown cyber-attacks and thus avoid the significant or catastrophic consequences of such attacks. The book is designed for undergraduate and post-graduate students, for engineers in related fields as well as managers of corporate and state structures, chief information officers (CIO), chief information security officers (CISO), architects, and research engineers in the field of cybersecurity.

THE AUTHOR:

Sergei Petrenko is at Innopolis University, Russia.

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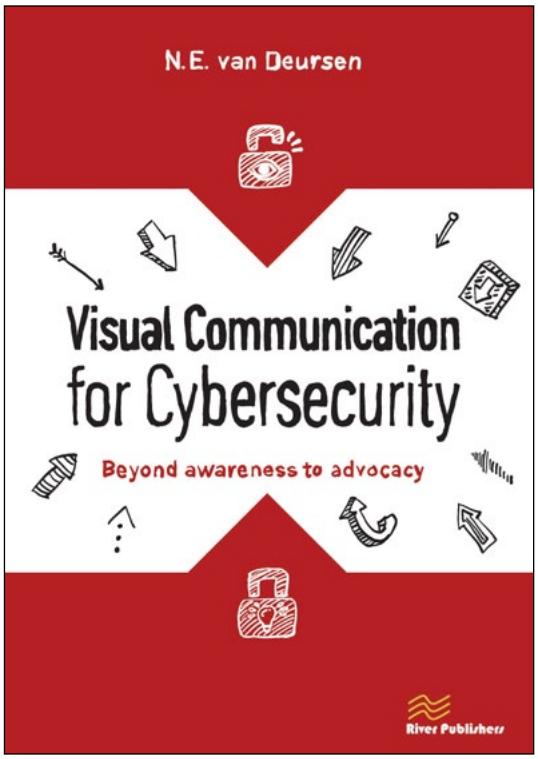
Visual Communication for Cybersecurity

Beyond Awareness to Advocacy

Nicole van Deursen



Cybersecurity needs a change in communication. It is time to show the world that cybersecurity is an exciting and diverse field to work in. Cybersecurity is not only about hackers and technical gobbledygook. It is a diverse field of work with a lot of collaboration with other disciplines. Over the years, security professionals have tried different awareness strategies to promote their work and to improve the knowledge of their audience but without much success. Communication problems are holding back advances in the field.

Visual Communication for Cybersecurity explores the possibilities of visual communication as a tool to improve the communication about cybersecurity and to better connect with non-experts. Visual communication is useful to explain complex topics and to solve complex problems. Visual tools are easy to share through social media and have the possibility to reach a wide audience. When applied strategically, visual communication can contribute to a people-centric approach to security, where employees are encouraged to actively engage in security activities rather than simply complying with the policies.

Cybersecurity education does not usually include communication theory or creative skills. Many experts think that it is not part of their job and is best left to the communication department or they think that they lack any creative talent. This book introduces communication theories and models, gives practical tips, and shows many examples. The book can support students in cybersecurity education and professionals searching for alternatives to bullet-point presentations and textual reports. On top of that, if this book succeeds in inspiring the reader to start creating visuals, it may also give the reader the pleasure of seeing new possibilities and improving their performance.

THE AUTHOR:

Nicole van Deursen is a consultant in the Netherlands.

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Sergei Petrenko

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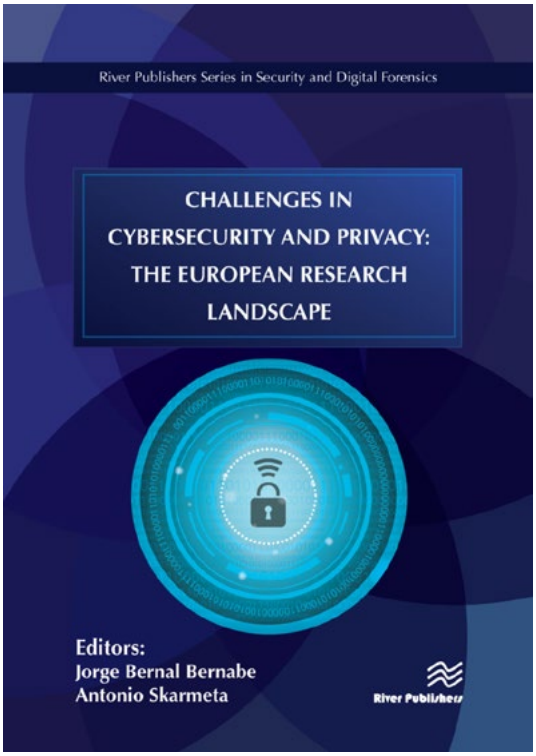
Challenges in Cybersecurity and Privacy

The European Research Landscape

Edited by Jorge Bernal Bernabe and Antonio Skarmeta



Cybersecurity and Privacy issues are becoming an important barrier for a trusted and dependable global digital society development. Cyber-criminals are continuously shifting their cyber-attacks especially against cyber-physical systems and IoT, since they present additional vulnerabilities due to their constrained capabilities, their unattended nature and the usage of potential untrustworthiness components. Likewise, identity-theft, fraud, personal data leakages, and other related cyber-crimes are continuously evolving, causing important damages and privacy problems for European citizens in both virtual and physical scenarios.

In this context, new holistic approaches, methodologies, techniques and tools are needed both to cope with those issues, and to mitigate cyberattacks, by employing novel cyber-situational awareness frameworks, risk analysis and modeling, threat intelligent systems, cyber-threat information sharing methods, advanced big-data analysis techniques as well as exploiting the benefits from latest technologies such as SDN/NFV and Cloud systems. In addition, novel privacy-preserving techniques, and crypto-privacy mechanisms, identity and eID management systems, trust services, and recommendations are needed to protect citizens' privacy while keeping usability levels.

The European Commission is addressing the challenge through different means, including the Horizon 2020 Research and Innovation program, thereby financing innovative projects that can cope with the increasing cyberthreat landscape. This book introduces several cybersecurity and privacy research challenges and how they are being addressed in the scope of 15 European research projects.

Each chapter is dedicated to a different funded European Research project, which aims to cope with digital security and privacy aspects, risks, threats and cybersecurity issues from a different perspective. Each chapter includes the project's overviews and objectives, the particular challenges they are covering, research achievements on security and privacy, as well as the techniques, outcomes, and evaluations accomplished in the scope of the EU project.

THE EDITORS:

Jorge Bernal Bernabe teaches at the University of Murcia, Spain.

Antonio Skarmeta teaches at the University of Murcia, Spain.

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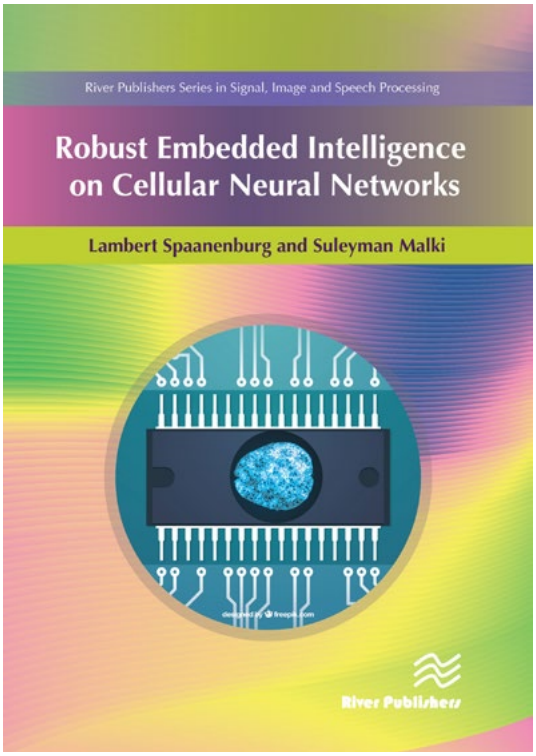
Robust Embedded Intelligence on Cellular Neural Networks

Lambert Spaanenburg and Suleyman Malki



Machine Intelligence (MI) is the motor that drives the modern information-rich society. Supercomputing and parallel coding have made MI programs feasible and the theoretical base of MI has matured. Graphical Processors (GPs) have found new life as carrier for low-cost supercomputing. The road towards lower cost and size leads to embedding systems, such as self-driving cars and intelligent houses.

Machine intelligence has not only opened many disruptive venues but given simultaneously a lot of anxiety. Compared to the many accidents in the early days of automotive traffic, the few problems with the TESLA cars are already sufficient for major concern. Evidently, research is still required to bring MI on the appropriate safety levels that rule the type tests for acceptance on the European automotive market.

In the ACM Turing Award 2018, Hennessey and Patterson prophesize the breakthrough of Domain-Specific Processor. A typical example is the modern vision hardware in the automotive domain. Such applications bring collectively self-driving in reach for safety concerns. It features a domain-specific mix of hardware and software. Hardware can be correctly designed and manufactured and will not change afterwards. Software can be formally proven but efficiency requires to keep it close to the platform.

Robust Embedded Intelligence on Cellular Neural Networks makes the reader familiar with the mathematical and electronic techniques to turn a data-driven problem into a safe embedded solution. In particular, it treats aspects on Cellular Neural Networks (CNN) for reliable visual recognition in a wide range of practical applications, highlighting vein feature extraction and license plate recognition.

THE AUTHORS:

Dr. Lambert Spaanenburg is with Comoray AB, Sweden and Lund University, Sweden.

Dr. Suleyman Malki is at Comoray AB, Sweden.

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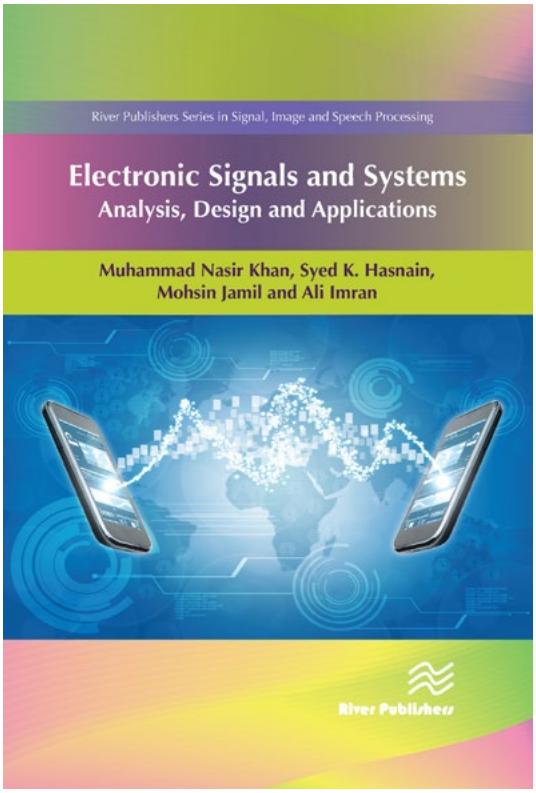
Electronic Signals and Systems

Analysis, Design and Applications

Muhammad Nasir Khan, Syed K. Hasnain, Mohsin Jamil and Ali Imran



The subject of Signals and Systems is enormously complex, involving many concepts such as signals, mathematics and filter design that are woven together in an intricate manner. To cope with this scope and complexity, many Signals and Systems texts are often organized around the "numerical examples" of a system. With such organization, students can see through the complexity of Signals and Systems, they can learn about the distinct concepts and protocols in one part of the communication system while seeing the big picture of how all parts fit together. From a pedagogical perspective, our personal experience has been that such approach indeed works well. Based on the authors extensive experience of teaching and research, the book is written with such a reader in mind. The Book is intended for a course on signals & systems at the senior undergraduate level and above. The authors consider all the requirements and tools used in analysis and design of discrete time systems for filter design and signal processing.

THE AUTHORS:

Muhammad Nasir Khan, PhD, is a professor in the Department of Electrical Engineering at the University of Lahore, Lahore campus, Pakistan.

Syed K. Hasnain is at Aalborg University, Denmark.

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Ali Imran, PhD, is an Assistant Professor in the Telecommunications Engineering Program at University of Oklahoma-Tulsa.

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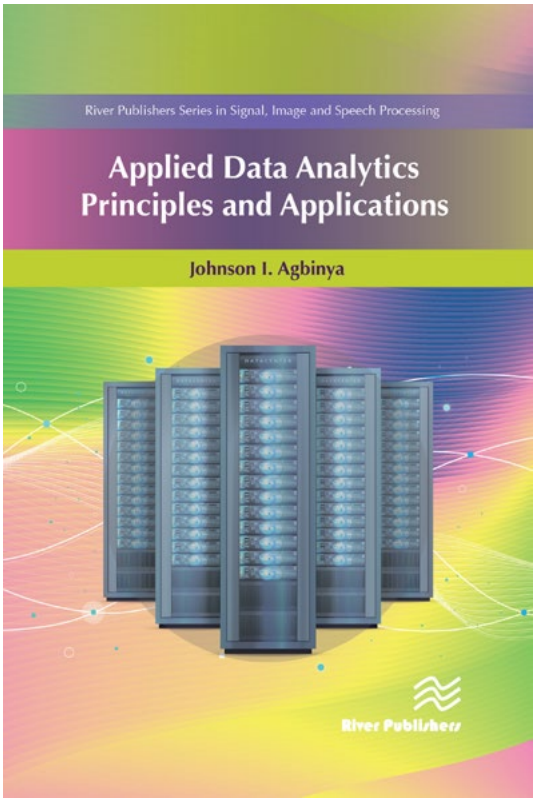
Applied Data Analytics – Principles and Applications



Johnson I. Agbinya

The emergence of huge amounts of data which require analysis and in some cases real-time processing has forced exploration into fast algorithms for handling very large data sizes. Analysis of x-ray images in medical applications, cyber security data, crime data, telecommunications and stock market data, health records and business analytics data are but a few areas of interest. Applications and platforms including R, RapidMiner and Weka provide the basis for analysis, often used by practitioners who pay little to no attention to the underlying mathematics and processes impacting the data. This often leads to an inability to explain results or correct mistakes, or to spot errors.

Applied Data Analytics – Principles and Applications seeks to bridge this missing gap by providing some of the most sought after techniques in big data analytics. Establishing strong foundations in these topics provides practical ease when big data analyses are undertaken using the widely available open source and commercially orientated computation platforms, languages and visualization systems. The book, when combined with such platforms, provides a complete set of tools required to handle big data and can lead to fast implementations and applications.

The book contains a mixture of machine learning foundations, deep learning, artificial intelligence, statistics and evolutionary learning mathematics written from the usage point of view with rich explanations on what the concepts mean. The author has thus avoided the complexities often associated with these concepts when found in research papers. The tutorial nature of the book and the applications provided are some of the reasons why the book is suitable for undergraduate, postgraduate and big data analytics enthusiasts.

This text should ease the fear of mathematics often associated with practical data analytics and support rapid applications in artificial intelligence, environmental sensor data modelling and analysis, health informatics, business data analytics, data from Internet of Things and deep learning applications.

THE AUTHOR:

Johnson I. Agbinya is at Melbourne Institute of Technology, Australia.

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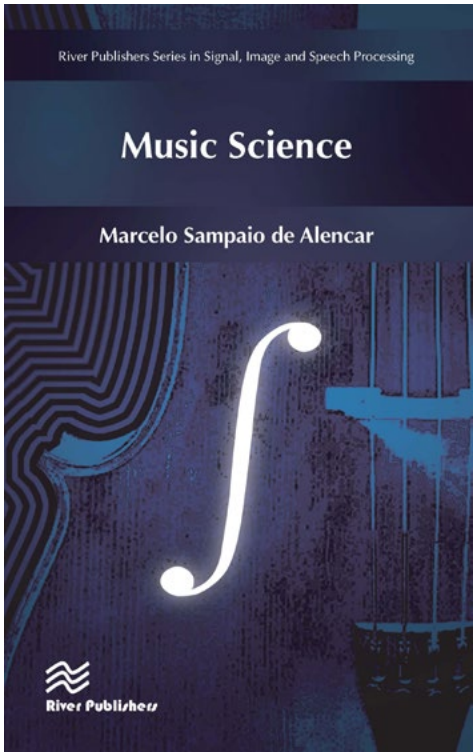
Music Science

Marcelo Sampaio de Alencar



The book presents the fundamentals of music science, followed by a discussion on the historical evolution of music. An introduction to the analysis of signals in time and frequency is presented, which includes sound and noise. Features and mathematical aspects of the sound are discussed, including vibration and timbre.

It serves as a review of existing voice models and discusses the voice production, sound perception, music characteristics and acoustics, tempo, rhythm and harmony. Musical theory is presented, including staff, notes, alterations, keys and intervals, tones and associated frequencies and wavelengths.

The creation of major and minor scales is emphasized, along with a study on consonance and dissonance, measure, metric, tempo markings, dynamics, modulation. The book also explains the chord formation, and discusses melody and composition.

It has four appendices, including an appendix on the basic differentiation and integration theorems, another with useful Fourier tables, and an appendix featuring the notes, their frequencies and wavelengths. The book also has a glossary of music terms.

THE AUTHOR:

Marcelo Sampaio de Alencar is at the Institute of Advanced Studies in Communications, Federal University of Bahia, Brazil.

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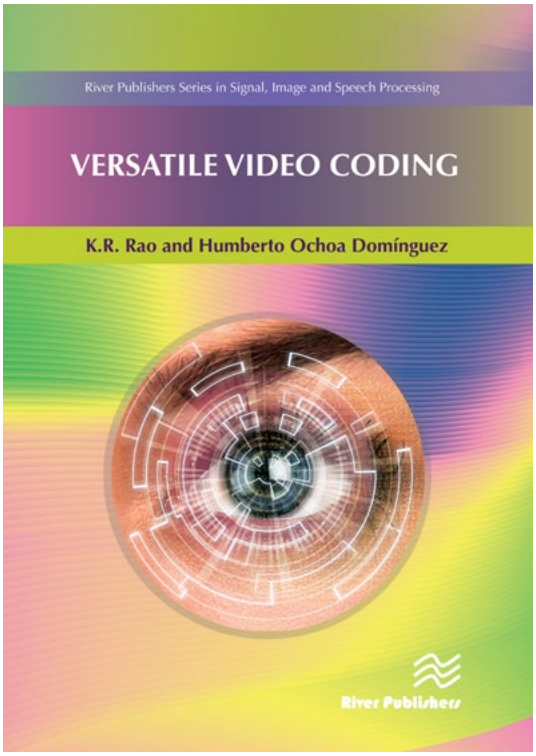
Versatile Video Coding

K. R. Rao and Humberto Ochoa Dominguez



Video is the main driver of bandwidth use, accounting for over 80 percent of consumer Internet traffic. Video compression is a critical component of many of the available multimedia applications: being necessary for storage or transmission of digital video over today's band-limited networks. The majority of this video is coded using international standards developed in collaboration with ITU-T Study Group and MPEG.

The MPEG family of video coding standards began in the early 1990s with MPEG-1, developed for video and audio storage on CD-ROMs, with support for progressive video. MPEG-2 was standardized in 1995 for applications of video on DVD, standard and high definition television, with support for interlaced and progressive video. MPEG-4 part 2, also known as MPEG-2 video, was standardized in 1999 for applications of low- bit rate multimedia on mobile platforms and the Internet, with the support of object-based or content based coding by modeling the scene as background and foreground. Since MPEG-1, the main video coding standards were based on the so-called macroblocks. However, research groups continued the work beyond the traditional video coding architectures and found that macroblocks could limit the performance of the compression when using high-resolution video. Therefore, in 2013 the high efficiency video coding (HEVC) also known as H.265, was released, with a structure similar to H.264/AVC but using coding units with more flexible partitions than the traditional macroblocks. HEVC has greater flexibility in prediction modes and transform block sizes, also it has a more sophisticated interpolation and deblocking filters.

In 2006 the VC-1 was released. VC-1 is a video code implemented by Microsoft and the Microsoft Windows Media Video (VMW) 9 and standardized by the Society of Motion Picture and Television Engineers (SMPTE). In 2017 the Joint Video Experts Team (JVET) released a call for proposals for a new video coding standard initially called Beyond the HEVC, Future Video Coding (FVC) or known as Versatile Video Coding (VVC). VVC is being built on top of HEVC for application on Standard Dynamic Range (SDR), High Dynamic Range (HDR) and 360° Video. The VVC is planned to be finalized by 2020.

THE AUTHORS:

K. R. Rao is with University of Texas at Arlington.

Humberto Ochoa Dominguez is with IIT-UACJ, Mexico.

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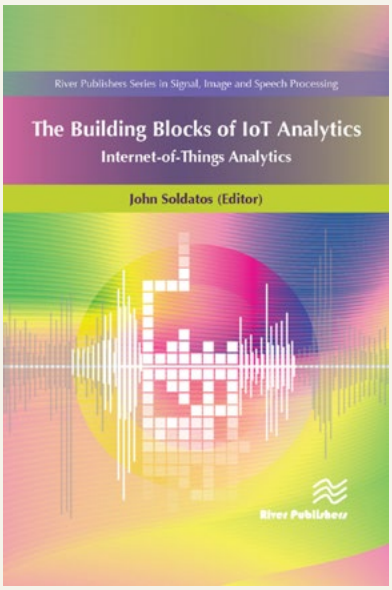

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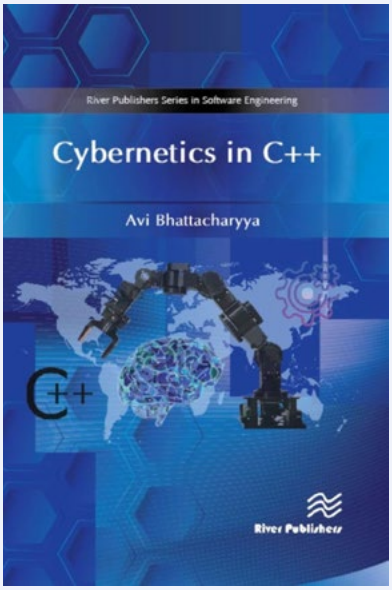

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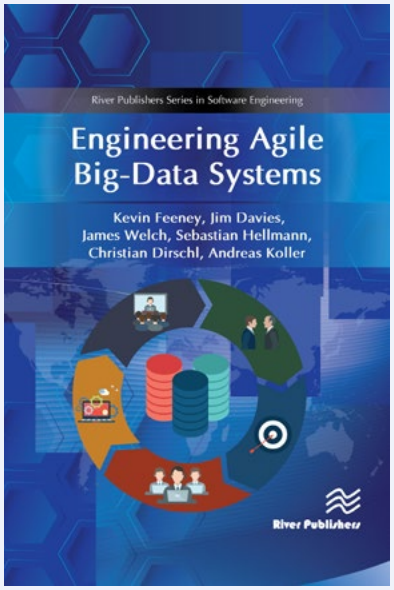

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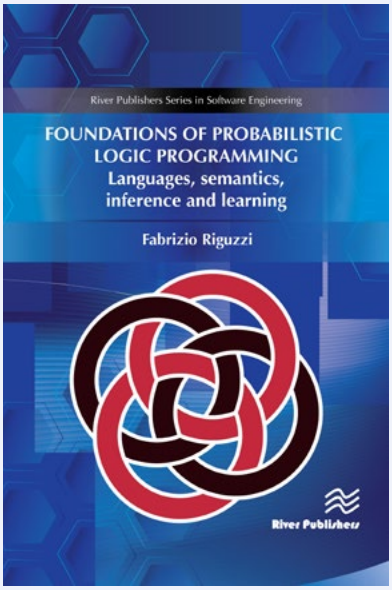

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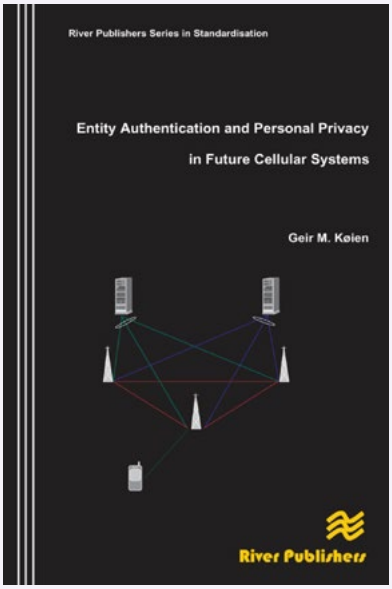

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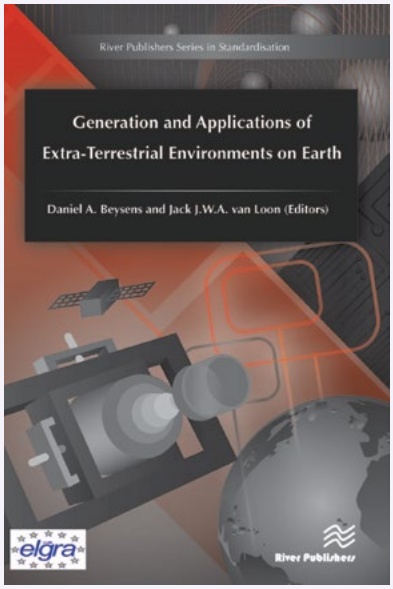

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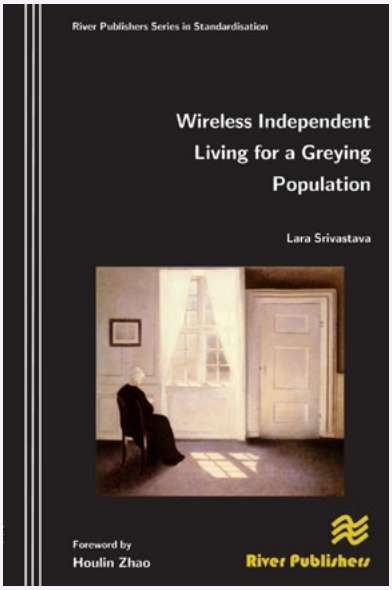

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Lara Srivastava

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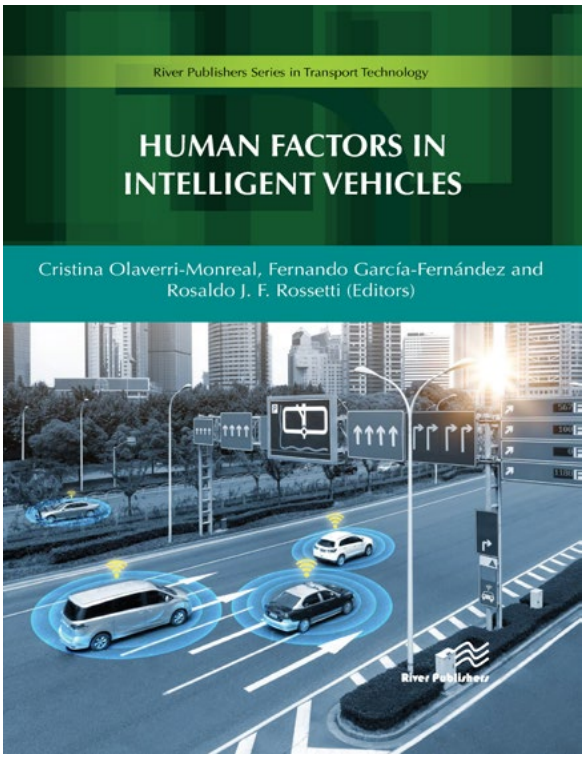

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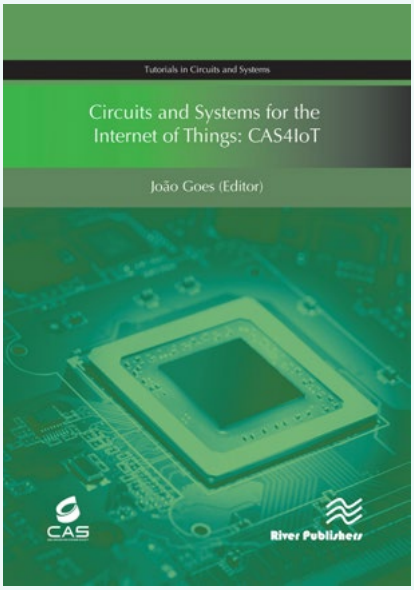

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