

Virtex 5 User Guide

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Functional Verification of Dynamically Reconfigurable FPGA-based Systems -

Lingkan Gong 2014-10-08

This book analyzes the challenges in verifying Dynamically Reconfigurable Systems (DRS) with respect to the user design and the physical implementation of such systems. The authors describe the use of a simulation-only layer to emulate the behavior of target FPGAs and accurately model the characteristic features of reconfiguration. Readers are enabled with this simulation-only layer to maintain verification productivity by abstracting away the physical details of the FPGA fabric. Two implementations of the simulation-only layer are included: Extended Re Channel is a System C library that can be used to check DRS designs at a high level; ReSim is a library to support RTL simulation of a DRS reconfiguring both its logic and state. Through a number of case studies, the authors demonstrate how their approach integrates seamlessly with existing, mainstream DRS design flows and with well-established verification methodologies such as top-down modeling and coverage-driven verification.

Energy-Aware Communications - Ralf Lehnert 2011-09-01

This book constitutes the refereed proceedings of the 17th EUNICE 2011 Workshop on energy-aware communications, held in Dresden, in September 2011. The proceedings comprise 16 full papers and 7 poster papers which are presented together with the abstracts of the 3 invited talks. The topics covered are: network architectures; ad-hoc and wireless networks; system simulation; network planning, optimization, and migration; traffic engineering; quality of experience; and energy efficient

architectures.

Reconfigurable Computing: Architectures, Tools and Applications - Jürgen Becker

2009-03-07

This book constitutes the refereed proceedings of the 5th International Workshop on Applied Reconfigurable Computing, ARC 2009, held in Karlsruhe, Germany, in March 2009. The 21 full papers and 21 short papers presented together with the abstracts of 3 keynote lectures were carefully reviewed and selected from about 100 submissions. The papers are organized in topical sections on FPGA security and bitstream analysis, fault tolerant systems, architectures, place and route techniques, cryptography, and resource allocation and scheduling, as well as on applications.

Topics in Cryptology - CT-RSA 2012 - Orr Dunkelman 2012-01-30

This book constitutes the refereed proceedings of the Cryptographers' Track at the RSA Conference 2012, CT-RSA 2012, held in San Francisco, CA, USA, in February/March 2012. The 26 revised full papers presented were carefully reviewed and selected from 113 submissions. The papers are organized in topical sections on side channel attacks, digital signatures, public-key encryption, cryptographic protocols, secure implementation methods, symmetric key primitives, and secure multiparty computation.

Principal Concepts in Applied Evolutionary Computation: Emerging Trends - Hong, Wei-Chiang Samuelson 2012-06-30

Increasingly powerful and diverse computing technologies have the potential to tackle ever greater and more complex problems and dilemmas in engineering and science disciplines.

Principal Concepts in Applied Evolutionary Computation: Emerging Trends provides an introduction to the important interdisciplinary discipline of evolutionary computation, an artificial intelligence field that combines the principles of computational intelligence with the mechanisms of the theory of evolution.

Academics and practicing field professionals will find this reference useful as they break into the emerging and complex world of evolutionary computation, learning to harness and utilize this exciting new interdisciplinary field.

Reconfigurable Computing Systems Engineering - Lev Kirischian 2017-12-19

Reconfigurable Computing Systems Engineering: Virtualization of Computing Architecture describes the organization of reconfigurable computing system (RCS) architecture and discusses the pros and cons of different RCS architecture implementations. Providing a solid understanding of RCS technology and where it's most effective, this book: Details the architecture organization of RCS platforms for application-specific workloads Covers the process of the architectural synthesis of hardware components for system-on-chip (SoC) for the RCS Explores the virtualization of RCS architecture from the system and on-chip levels Presents methodologies for RCS architecture run-time integration according to mode of operation and rapid adaptation to changes of multi-parametric constraints Includes illustrative examples, case studies, homework problems, and references to important literature A solutions manual is available with qualifying course adoption. Reconfigurable Computing Systems Engineering: Virtualization of Computing Architecture offers a complete road map to the synthesis of RCS architecture, exposing hardware design engineers, system architects, and students specializing in designing FPGA-based embedded systems to novel concepts in RCS architecture organization and virtualization.

Trustworthy Reconfigurable Systems - Thomas Feller 2014-08-25

Thomas Feller sheds some light on trust anchor architectures for trustworthy reconfigurable systems. He is presenting novel concepts enhancing the security capabilities of reconfigurable hardware. Almost invisible to the

user, many computer systems are embedded into everyday artifacts, such as cars, ATMs, and pacemakers. The significant growth of this market segment within the recent years enforced a rethinking with respect to the security properties and the trustworthiness of these systems. The trustworthiness of a system in general equates to the integrity of its system components. Hardware-based trust anchors provide measures to compare the system configuration to reference measurements. Reconfigurable architectures represent a special case in this regard, as in addition to the software implementation, the underlying hardware architecture may be exchanged, even during runtime.

Field - George Dekoulis 2017-05-31

This edited volume "Field-Programmable Gate Array" is a collection of reviewed and relevant research chapters, offering a comprehensive overview of recent developments in the field of semiconductors. The book comprises single chapters authored by various researchers and edited by an expert active in the aerospace engineering systems research area. All chapters are complete within themselves but united under a common research study topic. This publication aims at providing a thorough overview of the latest research efforts by international authors and open new possible research paths for further novel developments.

FPGAs and Parallel Architectures for Aerospace Applications - Fernanda

Kastensmidt 2015-12-07

This book introduces the concepts of soft errors in FPGAs, as well as the motivation for using commercial, off-the-shelf (COTS) FPGAs in mission-critical and remote applications, such as aerospace. The authors describe the effects of radiation in FPGAs, present a large set of soft-error mitigation techniques that can be applied in these circuits, as well as methods for qualifying these circuits under radiation. Coverage includes radiation effects in FPGAs, fault-tolerant techniques for FPGAs, use of COTS FPGAs in aerospace applications, experimental data of FPGAs under radiation, FPGA embedded processors under radiation and fault injection in FPGAs. Since dedicated parallel processing architectures such as GPUs have become more desirable in aerospace applications due to high

computational power, GPU analysis under radiation is also discussed.

Energy Efficient Hardware-Software Co-Synthesis Using Reconfigurable Hardware - Jingzhao Ou 2009-10-14

Rapid energy estimation for energy efficient applications using field-programmable gate arrays (FPGAs) remains a challenging research topic. Energy dissipation and efficiency have prevented the widespread use of FPGA devices in embedded systems, where energy efficiency is a key performance metric. Helping overcome these challenges, *Energy Efficient Hardware-Software Co-Synthesis Using Reconfigurable Hardware* offers solutions for the development of energy efficient applications using FPGAs. The book integrates various high-level abstractions for describing hardware and software platforms into a single, consistent application development framework, enabling users to construct, simulate, and debug systems. Based on these high-level concepts, it proposes an energy performance modeling technique to capture the energy dissipation behavior of both the reconfigurable hardware platform and the target applications running on it. The authors also present a dynamic programming-based algorithm to optimize the energy performance of an application running on a reconfigurable hardware platform. They then discuss an instruction-level energy estimation technique and a domain-specific modeling technique to provide rapid and fairly accurate energy estimation for hardware-software co-designs using reconfigurable hardware. The text concludes with example designs and illustrative examples that show how the proposed co-synthesis techniques lead to a significant amount of energy reduction. This book explores the advantages of using reconfigurable hardware for application development and looks ahead to future research directions in the field. It outlines the range of aspects and steps that lead to an energy efficient hardware-software application synthesis using FPGAs.

Nanoscale Devices - Brajesh Kumar Kaushik 2018-11-16

The primary aim of this book is to discuss various aspects of nanoscale device design and their applications including transport mechanism, modeling, and circuit applications. .

Provides a platform for modeling and analysis of state-of-the-art devices in nanoscale regime, reviews issues related to optimizing the sub-nanometer device performance and addresses simulation aspect and/or fabrication process of devices Also, includes design problems at the end of each chapter

Reconfigurable System Design and Verification - Pao-Ann Hsiung 2018-10-08

Reconfigurable systems have pervaded nearly all fields of computation and will continue to do so for the foreseeable future. *Reconfigurable System Design and Verification* provides a compendium of design and verification techniques for reconfigurable systems, allowing you to quickly search for a technique and determine if it is appropriate to the task at hand. It bridges the gap between the need for reconfigurable computing education and the burgeoning development of numerous different techniques in the design and verification of reconfigurable systems in various application domains. The text explains topics in such a way that they can be immediately grasped and put into practice. It starts with an overview of reconfigurable computing architectures and platforms and demonstrates how to develop reconfigurable systems. This sets up the discussion of the hardware, software, and system techniques that form the core of the text. The authors classify design and verification techniques into primary and secondary categories, allowing the appropriate ones to be easily located and compared. The techniques discussed range from system modeling and system-level design to co-simulation and formal verification. Case studies illustrating real-world applications, detailed explanations of complex algorithms, and self-explaining illustrations add depth to the presentation. Comprehensively covering all techniques related to the hardware-software design and verification of reconfigurable systems, this book provides a single source for information that otherwise would have been dispersed among the literature, making it very difficult to search, compare, and select the technique most suitable. The authors do it all for you, making it easy to find the techniques that fit your system requirements, without having to surf the net or digital libraries to find the candidate techniques and compare

them yourself.

Handbook of Signal Processing Systems - Shuvra S. Bhattacharyya 2010-09-10

It gives me immense pleasure to introduce this timely handbook to the research/- velopment communities in the ?eld of signal processing systems (SPS). This is the ?rst of its kind and represents state-of-the-arts coverage of research in this ?eld. The driving force behind information technologies (IT) hinges critically upon the major advances in both component integration and system integration. The major breakthrough for the former is undoubtedly the invention of IC in the 50's by Jack S. Kilby, the Nobel Prize Laureate in Physics 2000. In an integrated circuit, all components were made of the same semiconductor material. Beginning with the pocket calculator in 1964, there have been many increasingly complex applications followed. In fact, processing gates and memory storage on a chip have since then grown at an exponential rate, following Moore's Law. (Moore himself admitted that Moore's Law had turned out to be more accurate, longer lasting and deeper in impact than he ever imagined.) With greater device integration, various signal processing systems have been realized for many killer IT applications. Further breakthroughs in computer sciences and Internet technologies have also catalyzed large-scale system integration. All these have led to today's IT revolution which has profound impacts on our lifestyle and overall prospect of humanity. (It is hard to imagine life today without mobiles or Internets!) The success of SPS requires a well-concerted integrated approach from mul- ple disciplines, such as device, design, and application.

Power Distribution Network Design

Methodologies - Istvan Novak 2008

A series of cogently written articles by 49 industry experts, this collection fills the void on Power Distribution Network (PDN) design procedures, and addresses such related topics as DC-DC converters, selection of bypass capacitors, DDR2 memory systems, powering of FPGAs, and synthesis of impedance profiles. Through these contributions from such leading companies as Sun Microsystems, Sanyo, IBM, Hewlett-Packard, Intel, and Rambus, readers will come to understand why books on power integrity are only now becoming available to the

public and can relate these topics to current industry trends.

Reconfigurable Architectures and Design Automation Tools for Application-Level

Network Security - Sascha Mühlbach 2015-04-30

The relevance of the Internet has dramatically grown in the past decades. However, the enormous financial impact attracts many types of criminals. Setting up proper security mechanisms (e.g., Intrusion Detection Systems (IDS)) has therefore never been more important than today. To further compete with today's data transfer rates (10 to 100 Gbit/s), dedicated hardware accelerators have been proposed to offload compute intensive tasks from general purpose processors. As one key technology, reconfigurable hardware architectures, e.g., the Field Programmable Gate Array (FPGA), are of particular interest to this end. This work addresses the use of such FPGAs in the context of interactive communication applications, which goes beyond the regular packet level operations often seen in this area. To support rapid prototyping, a novel FPGA platform (NetStage) has been designed and developed, which provides a communication core for Internet communication and a flexible connection bus for attaching custom applications modules. A hardware honeypot (the MalCoBox) has been set up as a proof-of-concept application.

Furthermore, to address the ongoing issue of hardware programming complexity, the domain-specific Malacoda language for abstractly formulating honeypot packet communication dialogs is presented and discussed. An associated compiler translates Malacoda into high-performance hardware modules for NetStage. Together, NetStage and Malacoda address some of the productivity deficiencies often recognized as major hindrances for the more widespread use of reconfigurable computing in communications applications. Finally, the NetStage platform has been evaluated in a real production environment.

VLSI-SoC: Advanced Topics on Systems on a Chip

- Ricardo Reis 2009-04-13
This book contains extended and revised versions of the best papers that were presented during the fifteenth edition of the IFIP/IEEE WG10.5 International Conference on Very Large

Scale Integration, a global System-on-a-Chip Design & CAD conference. The 15th conference was held at the Georgia Institute of Technology, Atlanta, USA (October 15-17, 2007). Previous conferences have taken place in Edinburgh, Trondheim, Vancouver, Munich, Grenoble, Tokyo, Gramado, Lisbon, Montpellier, Darmstadt, Perth and Nice. The purpose of this conference, sponsored by IFIP TC 10 Working Group 10.5 and by the IEEE Council on Electronic Design Automation (CEDA), is to provide a forum to exchange ideas and show industrial and academic research results in the field of microelectronics design. The current trend toward increasing chip integration and technology process advancements brings about stimulating new challenges both at the physical and system-design levels, as well in the test of these systems. VLSI-SoC conferences aim to address these exciting new issues.

Multiple Constant Multiplication Optimizations for Field Programmable Gate Arrays - Martin Kumm 2016-04-13

This work covers field programmable gate array (FPGA)-specific optimizations of circuits computing the multiplication of a variable by several constants, commonly denoted as multiple constant multiplication (MCM). These optimizations focus on low resource usage but high performance. They comprise the use of fast carry-chains in adder-based constant multiplications including ternary (3-input) adders as well as the integration of look-up table-based constant multipliers and embedded multipliers to get the optimal mapping to modern FPGAs. The proposed methods can be used for the efficient implementation of digital filters, discrete transforms and many other circuits in the domain of digital signal processing, communication and image processing.

Selected Areas in Cryptography - Alex Biryukov 2011-03-03

This book constitutes the thoroughly refereed post-proceedings of the 17th Annual International Workshop on Selected Areas in Cryptography, SAC 2010, held in Waterloo, Ontario, Canada in August 2010. The 24 revised full papers presented together with 2 invited papers were carefully reviewed and selected from 90 submissions. The papers are organized

in topical sections on hash functions, stream ciphers, efficient implementations, coding and combinatorics, block ciphers, side channel attacks, and mathematical aspects.

Handbook of Research on Mobility and Computing: Evolving Technologies and Ubiquitous Impacts - Cruz-Cunha, Maria Manuela 2011-04-30

Discusses the main issues, challenges, opportunities, and trends related to this explosive range of new developments and applications, in constant evolution, and impacting every organization and society as a whole. This two volume handbook supports post-graduate students, teachers, and researchers, as well as IT professionals and managers.

Embedded System Design - Peter Marwedel 2010-11-16

Until the late 1980s, information processing was associated with large mainframe computers and huge tape drives. During the 1990s, this trend shifted toward information processing with personal computers, or PCs. The trend toward miniaturization continues and in the future the majority of information processing systems will be small mobile computers, many of which will be embedded into larger products and interfaced to the physical environment. Hence, these kinds of systems are called embedded systems.

Embedded systems together with their physical environment are called cyber-physical systems. Examples include systems such as transportation and fabrication equipment. It is expected that the total market volume of embedded systems will be significantly larger than that of traditional information processing systems such as PCs and mainframes. Embedded systems share a number of common characteristics. For example, they must be dependable, efficient, meet real-time constraints and require customized user interfaces (instead of generic keyboard and mouse interfaces). Therefore, it makes sense to consider common principles of embedded system design. Embedded System Design starts with an introduction into the area and a survey of specification models and languages for embedded and cyber-physical systems. It provides a brief overview of hardware devices used for such systems and presents the essentials of system software for embedded systems, like real-time operating

systems. The book also discusses evaluation and validation techniques for embedded systems. Furthermore, the book presents an overview of techniques for mapping applications to execution platforms. Due to the importance of resource efficiency, the book also contains a selected set of optimization techniques for embedded systems, including special compilation techniques. The book closes with a brief survey on testing. Embedded System Design can be used as a text book for courses on embedded systems and as a source which provides pointers to relevant material in the area for PhD students and teachers. It assumes a basic knowledge of information processing hardware and software. Courseware related to this book is available at

<http://ls12-www.cs.tu-dortmund.de/~marwedel>.
Reconfigurable Computing: Architectures, Tools and Applications - Oliver Choy 2012-03-02

This book constitutes the refereed proceedings of the 8th International Symposium on Reconfigurable Computing: Architectures, Tools and Applications, ARC 2012, held in Hongkong, China, in March 2012. The 35 revised papers presented, consisting of 25 full papers and 10 poster papers were carefully reviewed and selected from 44 submissions. The topics covered are applied RC design methods and tools, applied RC architectures, applied RC applications and critical issues in applied RC.

Reconfigurable Computing: Architectures, Tools, and Applications - Diana Goehringer 2014-04-09

This book constitutes the thoroughly refereed conference proceedings of the 10th International Symposium on Reconfigurable Computing: Architectures, Tools and Applications, ARC 2014, held in Vilamoura, Portugal, in April 2014. The 16 revised full papers presented together with 17 short papers and 6 special session papers were carefully reviewed and selected from 57 submissions. The topics covered are applications; methods, frameworks and OS for debug, over-clocking, and relocation; memory architectures; methodologies and tools and architectures.

Embedded Systems Design with FPGAs - Peter Athanas 2012-12-05

This book presents the methodologies and for embedded systems design, using field

programmable gate array (FPGA) devices, for the most modern applications. Coverage includes state-of-the-art research from academia and industry on a wide range of topics, including applications, advanced electronic design automation (EDA), novel system architectures, embedded processors, arithmetic, and dynamic reconfiguration.

High Performance Integer Arithmetic Circuit Design on FPGA - Ayan Palchaudhuri 2015-07-06

This book describes the optimized implementations of several arithmetic datapath, controlpath and pseudorandom sequence generator circuits for realization of high performance arithmetic circuits targeted towards a specific family of the high-end Field Programmable Gate Arrays (FPGAs). It explores regular, modular, cascadable and bit-sliced architectures of these circuits, by directly instantiating the target FPGA-specific primitives in the HDL. Every proposed architecture is justified with detailed mathematical analyses. Simultaneously, constrained placement of the circuit building blocks is performed, by placing the logically related hardware primitives in close proximity to one another by supplying relevant placement constraints in the Xilinx proprietary "User Constraints File". The book covers the implementation of a GUI-based CAD tool named FlexiCore integrated with the Xilinx Integrated Software Environment (ISE) for design automation of platform-specific high-performance arithmetic circuits from user-level specifications. This tool has been used to implement the proposed circuits, as well as hardware implementations of integer arithmetic algorithms where several of the proposed circuits are used as building blocks. Implementation results demonstrate higher performance and superior operand-width scalability for the proposed circuits, with respect to implementations derived through other existing approaches. This book will prove useful to researchers, students and professionals engaged in the domain of FPGA circuit optimization and implementation.

Green Communications - Jinsong Wu 2016-04-19

Nowadays energy crisis and global warming problems are hanging over everyone's head, urging much research work on energy saving. In the ICT industry, which is becoming a major

consumer of global energy triggered by the telecommunication network operators experiencing energy cost as a significant factor in profit calculations, researchers have start **Computer Technology and Computer Programming** - James L. Antonakos 2016-04-19

Covering a broad range of new topics in computer technology and programming, this volume discusses encryption techniques, SQL generation, Web 2.0 technologies, and visual sensor networks. It also examines reconfigurable computing, video streaming, animation techniques, and more. Readers will learn about an educational tool and game to help students learn computer programming. The book also explores a new medical technology paradigm centered on wireless technology and cloud computing designed to overcome the problems of increasing health technology costs.

Smart Sensors and MEMS - S Nihtianov 2018-03-09

Smart Sensors and MEMS: Intelligent Devices and Microsystems for Industrial Applications, Second Edition highlights new, important developments in the field, including the latest on magnetic sensors, temperature sensors and microreaction chambers. The book outlines the industrial applications for smart sensors, covering direct interface circuits for sensors, capacitive sensors for displacement measurement in the sub-nanometer range, integrated inductive displacement sensors for harsh industrial environments, advanced silicon radiation detectors in the vacuum ultraviolet (VUV) and extreme ultraviolet (EUV) spectral range, among other topics. New sections include discussions on magnetic and temperature sensors and the industrial applications of smart micro-electro-mechanical systems (MEMS). The book is an invaluable reference for academics, materials scientists and electrical engineers working in the microelectronics, sensors and micromechanics industry. In addition, engineers looking for industrial sensing, monitoring and automation solutions will find this a comprehensive source of information. Contains new chapters that address key applications, such as magnetic sensors, microreaction chambers and temperature sensors Provides an in-depth information on a wide array of industrial applications for smart sensors and smart MEMS

Presents the only book to discuss both smart sensors and MEMS for industrial applications **Dynamic Reconfigurable Network-on-Chip Design: Innovations for Computational Processing and Communication** - Shen, Jih-Sheng 2010-06-30

Reconfigurable computing brings immense flexibility to on-chip processing while network-on-chip has improved flexibility in on-chip communication. Integrating these two areas of research reaps the benefits of both and represents the promising future of multiprocessor systems-on-chip. This book is the one of the first compilations written to demonstrate this future for network-on-chip design. Through dynamic and creative research into questions ranging from integrating reconfigurable computing techniques, to task assigning, scheduling and arrival, to designing an operating system to take advantage of the computing and communication flexibilities brought about by run-time reconfiguration and network-on-chip, it represents a complete source of the techniques and applications for reconfigurable network-on-chip necessary for understanding of future of this field.

Prototyping of Concurrent Control Systems Implemented in FPGA Devices - Remigiusz Wiśniewski 2016-09-30

This book focuses on prototyping aspects of concurrent control systems and their further implementation and partial reconfiguration in programmable devices. Further, it lays out a full prototyping flow for concurrent control systems. Based on a given primary specification, a system is described with an interpreted Petri net, which naturally reflects the concurrent and sequential relationships of the design. The book shows that, apart from the traditional option of static configuration of the entire system, the latest programmable devices (especially FPGAs) offer far more sophistication. Partial reconfiguration allows selected parts of the system to be replaced without having to reprogram the entire structure of the device. Approaches to dynamic and static partial reconfiguration of concurrent control systems are presented and described in detail. The theoretical work is illustrated by examples drawn from various applications, with a milling machine and a traffic-light controller highlighted as representative interpreted Petri

nets. Given the ubiquity of concurrent control systems in a huge variety of technological areas including transportation, medicine, artificial intelligence, manufacturing, security and safety and planetary exploration, the innovative software and hardware design methods described here will be of considerable interest to control engineers and systems and circuits researchers in many areas of industry and academia.

System-on-Chip Test Architectures - Laung-Terng Wang 2010-07-28

Modern electronics testing has a legacy of more than 40 years. The introduction of new technologies, especially nanometer technologies with 90nm or smaller geometry, has allowed the semiconductor industry to keep pace with the increased performance-capacity demands from consumers. As a result, semiconductor test costs have been growing steadily and typically amount to 40% of today's overall product cost. This book is a comprehensive guide to new VLSI Testing and Design-for-Testability techniques that will allow students, researchers, DFT practitioners, and VLSI designers to master quickly System-on-Chip Test architectures, for test debug and diagnosis of digital, memory, and analog/mixed-signal designs. Emphasizes VLSI Test principles and Design for Testability architectures, with numerous illustrations/examples. Most up-to-date coverage available, including Fault Tolerance, Low-Power Testing, Defect and Error Tolerance, Network-on-Chip (NOC) Testing, Software-Based Self-Testing, FPGA Testing, MEMS Testing, and System-In-Package (SIP) Testing, which are not yet available in any testing book. Covers the entire spectrum of VLSI testing and DFT architectures, from digital and analog, to memory circuits, and fault diagnosis and self-repair from digital to memory circuits. Discusses future nanotechnology test trends and challenges facing the nanometer design era; promising nanotechnology test techniques, including Quantum-Dots, Cellular Automata, Carbon-Nanotubes, and Hybrid Semiconductor/Nanowire/Molecular Computing. Practical problems at the end of each chapter for students.

Cellular Automata - Jaroslaw Was 2014-09-12

This book constitutes the proceedings of the 11th International Conference on Cellular

Automata for Research and Industry, ACRI 2014, held in Krakow, Poland, in September 2014. The 67 full papers and 7 short papers presented in this volume were carefully reviewed and selected from 125 submissions. They are organized in topical sections named: theoretical results on cellular automata; cellular automata dynamics and synchronization; modeling and simulation with cellular automata; cellular automata-based hardware and computing; cryptography, networks and pattern recognition with cellular automata. The volume also contains contributions from ACRI 2014 workshops on crowds and cellular automata; asynchronous cellular automata; traffic and cellular automata; and agent-based simulation and cellular automata.

Hardware for Soft Computing and Soft Computing for Hardware - Nadia Nedjah 2013-11-18

Single and Multi-Objective Evolutionary Computation (MOEA), Genetic Algorithms (GAs), Artificial Neural Networks (ANNs), Fuzzy Controllers (FCs), Particle Swarm Optimization (PSO) and Ant colony Optimization (ACO) are becoming omnipresent in almost every intelligent system design. Unfortunately, the application of the majority of these techniques is complex and so requires a huge computational effort to yield useful and practical results. Therefore, dedicated hardware for evolutionary, neural and fuzzy computation is a key issue for designers. With the spread of reconfigurable hardware such as FPGAs, digital as well as analog hardware implementations of such computation become cost-effective. The idea behind this book is to offer a variety of hardware designs for soft computing techniques that can be embedded in any final product. Also, to introduce the successful application of soft computing technique to solve many hard problems encountered during the design of embedded hardware designs. Reconfigurable embedded designs for GAs, ANNs, FCs and PSO are presented and evaluated. Also, the application of quantum-based evolutionary computation and multi-objective evolutionary computation as well as ACO are applied to solve hard problems related to circuit synthesis, IP assignment, mapping and routing of applications on Network-On-Chip infrastructures.

Guide to FPGA Implementation of Arithmetic Functions - Jean-Pierre Deschamps 2012-04-02

This book is designed both for FPGA users interested in developing new, specific components - generally for reducing execution times -and IP core designers interested in extending their catalog of specific components. The main focus is circuit synthesis and the discussion shows, for example, how a given algorithm executing some complex function can be translated to a synthesizable circuit description, as well as which are the best choices the designer can make to reduce the circuit cost, latency, or power consumption. This is not a book on algorithms. It is a book that shows how to translate efficiently an algorithm to a circuit, using techniques such as parallelism, pipeline, loop unrolling, and others. Numerous examples of FPGA implementation are described throughout this book and the circuits are modeled in VHDL. Complete and synthesizable source files are available for download.

[Design for Embedded Image Processing on FPGAs](#) - Donald G. Bailey 2011-06-13

Dr Donald Bailey starts with introductory material considering the problem of embedded image processing, and how some of the issues may be solved using parallel hardware solutions. Field programmable gate arrays (FPGAs) are introduced as a technology that provides flexible, fine-grained hardware that can readily exploit parallelism within many image processing algorithms. A brief review of FPGA programming languages provides the link between a software mindset normally associated with image processing algorithms, and the hardware mindset required for efficient utilization of a parallel hardware design. The design process for implementing an image processing algorithm on an FPGA is compared with that for a conventional software implementation, with the key differences highlighted. Particular attention is given to the techniques for mapping an algorithm onto an FPGA implementation, considering timing, memory bandwidth and resource constraints, and efficient hardware computational techniques. Extensive coverage is given of a range of low and intermediate level image processing operations, discussing efficient

implementations and how these may vary according to the application. The techniques are illustrated with several example applications or case studies from projects or applications he has been involved with. Issues such as interfacing between the FPGA and peripheral devices are covered briefly, as is designing the system in such a way that it can be more readily debugged and tuned. Provides a bridge between algorithms and hardware Demonstrates how to avoid many of the potential pitfalls Offers practical recommendations and solutions Illustrates several real-world applications and case studies Allows those with software backgrounds to understand efficient hardware implementation Design for Embedded Image Processing on FPGAs is ideal for researchers and engineers in the vision or image processing industry, who are looking at smart sensors, machine vision, and robotic vision, as well as FPGA developers and application engineers. The book can also be used by graduate students studying imaging systems, computer engineering, digital design, circuit design, or computer science. It can also be used as supplementary text for courses in advanced digital design, algorithm and hardware implementation, and digital signal processing and applications. Companion website for the book: www.wiley.com/go/bailey/fpga

Principles and Structures of FPGAs - Hideharu Amano 2018-09-03

This comprehensive textbook on the field programmable gate array (FPGA) covers its history, fundamental knowledge, architectures, device technologies, computer-aided design technologies, design tools, examples of application, and future trends. Programmable logic devices represented by FPGAs have been rapidly developed in recent years and have become key electronic devices used in most IT products. This book provides both complete introductions suitable for students and beginners, and high-level techniques useful for engineers and researchers in this field. Differently developed from usual integrated circuits, the FPGA has unique structures, design methodologies, and application techniques. Allowing programming by users, the device can dramatically reduce the rising cost of development in advanced semiconductor chips.

The FPGA is now driving the most advanced semiconductor processes and is an all-in-one platform combining memory, CPUs, and various peripheral interfaces. This book introduces the FPGA from various aspects for readers of different levels. Novice learners can acquire a fundamental knowledge of the FPGA, including its history, from Chapter 1; the first half of Chapter 2; and Chapter 4. Professionals who are already familiar with the device will gain a deeper understanding of the structures and design methodologies from Chapters 3 and 5. Chapters 6-8 also provide advanced techniques and cutting-edge applications and trends useful for professionals. Although the first parts are mainly suitable for students, the advanced sections of the book will be valuable for professionals in acquiring an in-depth understanding of the FPGA to maximize the performance of the device.

Computational Intelligence in Digital and Network Designs and Applications - Mourad Fakhfakh 2015-07-14

This book explains the application of recent advances in computational intelligence - algorithms, design methodologies, and synthesis techniques - to the design of integrated circuits and systems. It highlights new biasing and sizing approaches and optimization techniques and their application to the design of high-performance digital, VLSI, radio-frequency, and mixed-signal circuits and systems. This second of two related volumes addresses digital and network designs and applications, with 12 chapters grouped into parts on digital circuit design, network optimization, and applications. It will be of interest to practitioners and researchers in computer science and electronics engineering engaged with the design of electronic circuits.

Advances in Information and Computer Security - Kanta Matsuura 2008-11-13

The Third International Workshop on Security (IWSEC 2008) was held at Kagawa International Conference Hall, Kagawa, Japan, November 25-27, 2008. The workshop was co-sponsored jointly by CSEC, a special interest group on computer security of IPSJ (Information Processing Society of Japan) and ISEC, a technical group on information security of the IEICE (The Institute of Electronics, Information

and Communication Engineers). The excellent Local Organizing Committee was led by the IWSEC 2008 General Co-chairs, Masato Terada and Kazuo Ohta. This year, there were 94 paper submissions from all over the world. We would like to thank all the authors who submitted papers to IWSEC 2008. Each paper was reviewed at least three reviewers. In addition to the members of the Program Committee, many external reviewers joined the review process of papers in their particular areas of expertise. We were fortunate to have this energetic team of experts, and are grateful to all of them for their hard work. The hard work includes very active discussion; the discussion phase was almost as long as the initial individual reviewing. The review and discussion were supported by a very nice Web-based system, iChair. We appreciate its developers. After all the review phases, 18 papers were accepted for publication in this volume of Advances in Information and Computer Security. In the workshop, the contributed papers were supplemented by one invited talk from eminent researcher Alfred Menezes (the Centre for Applied Cryptographic Research, The University of Waterloo). There are many people who contributed to the success of IWSEC 2008. We wish to express our deep appreciation for their contribution to information and computer security.

Intelligent Technical Systems - Natividad Martínez Madrid 2009-02-18

Intelligent technical systems are networked, embedded systems incorporating real-time capacities that are able to interact with and adapt to their environments. These systems need innovative approaches in order to meet requirements like cost, size, power and memory consumption, as well as real-time compliance and security. Intelligent Technical Systems covers different levels like multimedia systems, embedded programming, middleware platforms, sensor networks and autonomous systems and applications for intelligent engineering. Each level is discussed by a set of original articles summarizing the state of the art and presenting a concrete application; they include a deep discussion of their model and explain all design decisions relevant to obtain a mature solution.

Extreme Environment Electronics - John D. Cressler 2012-11-26

Unfriendly to conventional electronic devices, circuits, and systems, extreme environments represent a serious challenge to designers and mission architects. The first truly comprehensive guide to this specialized field, *Extreme Environment Electronics* explains the essential aspects of designing and using devices, circuits, and electronic systems intended to operate in extreme environments, including across wide temperature ranges and in radiation-intense scenarios such as space. The Definitive Guide to *Extreme Environment Electronics* Featuring contributions by some of the world's foremost experts in extreme environment electronics, the book provides in-depth information on a wide array of topics. It begins by describing the extreme conditions and then delves into a description of suitable semiconductor technologies and the modeling of devices within those technologies. It also discusses reliability issues and failure mechanisms that readers need to be aware of, as well as best practices for the design of these electronics. Continuing beyond just the "paper design" of building blocks, the book rounds out coverage of the design realization process with verification techniques and chapters on electronic packaging for extreme environments. The final set of chapters describes actual chip-level designs for applications in energy and space exploration.

Requiring only a basic background in electronics, the book combines theoretical and practical aspects in each self-contained chapter. Appendices supply additional background material. With its broad coverage and depth, and the expertise of the contributing authors, this is an invaluable reference for engineers, scientists, and technical managers, as well as researchers and graduate students. A hands-on resource, it explores what is required to successfully operate electronics in the most demanding conditions.

FPGAs - Juan Jose Rodriguez Andina 2017-07-28

Field Programmable Gate Arrays (FPGAs) are currently recognized as the most suitable platform for the implementation of complex digital systems targeting an increasing number of industrial electronics applications. They cover a huge variety of application areas, such as: aerospace, food industry, art, industrial automation, automotive, biomedicine, process control, military, logistics, power electronics, chemistry, sensor networks, robotics, ultrasound, security, and artificial vision. This book first presents the basic architectures of the devices to familiarize the reader with the fundamentals of FPGAs before identifying and discussing new resources that extend the ability of the devices to solve problems in new application domains. Design methodologies are discussed and application examples are included for some of these domains, e.g., mechatronics, robotics, and power systems.