

Floating Point Design With Vivado Hls Xilinx

This book brings together a selection of the best papers from the eighteenth edition of the Forum on specification and Design Languages Conference (FDL), which took place on September 14-16, 2015, in Barcelona, Spain. FDL is a well-established international forum devoted to dissemination of research results, practical experiences and new ideas in the application of specification, design and verification languages to the design, modeling and verification of integrated circuits, complex hardware/software embedded systems, and mixed-technology systems.

This book constitutes the revised selected papers from the 14th International Conference on Risks and Security of Internet and Systems, CRISIS 2019, held in Hammamet, Tunisia, in October 2019. The 20 full papers and 4 short papers presented in this volume were carefully reviewed and selected from 64 submissions. They cover diverse research themes that range from classic topics, such as risk analysis and management, access control and permission; secure embedded systems; network and cloud security; information security policy; data protection and machine learning for security; distributed detection system and blockchain.

This book constitutes the 17th International Symposium on Applied Reconfigurable Computing, ARC 2021, held as a virtual event, in June 2021. The 14 full papers and 11 short presentations presented in this volume were carefully reviewed and selected from 40 submissions. The papers cover a broad spectrum of applications of reconfigurable computing, from driving assistance, data and graph processing acceleration, computer security to the societal relevant topic of supporting early diagnosis of Covid infectious conditions.

Coherent plane-wave compounding (CPWC) ultrasonography is an important imaging modality that allows for very high frame rates. During CPWC image reconstruction, computationally expensive delay-and-sum beamforming can be replaced by faster Fourier-domain remapping. The thesis deals with the MATLAB and hardware implementation of one of the recently proposed Fourier-domain CPWC reconstruction methods, namely, plane-wave (PW) Stolt's migration algorithm. We first present the floating- and fixed-point implementations of the said migration algorithm in MATLAB, and then perform quantitative evaluation of the reconstruction results, showing that it is feasible to obtain high-quality compounded images using hardware-oriented scaled fixed-point calculations, as opposed to more expensive software-oriented floating-point arithmetic. We also generate Xilinx FPGA-based implementations of both floating- and fixed-point MATLAB-based algorithms, using a high-level synthesis (HLS) design flow that collaboratively employs MATLAB Coder and Vivado HLS tool. MATLAB Coder can automatically convert a MATLAB code into a C program, while Vivado HLS can convert the resulting C program into a synthesizable Verilog/VHDL description. Results show that our fixed-point FPGA implementation is more resource and power efficient and can also operate at a higher clock frequency compared to its floating-point counterpart.

MCCS 2020

20th International Conference, SAMOS 2020, Samos, Greece, July 5–9, 2020, Proceedings

100 Power Tips for FPGA Designers

Using Vivado

Single Precision Floating Point Multiplier

Engineering Applications of FPGAs

This book provides a platform of scientific interaction between the three challenging and closely linked areas of ICT-enabled-application research and development: software intensive systems, complex systems and intelligent systems. Software intensive systems strongly interact with other systems, sensors, actuators, devices, other software systems and users. More and more domains are using software intensive systems, e.g. automotive and telecommunication systems, embedded systems in general, industrial automation systems and business applications. Moreover, web services offer a new platform for enabling software intensive systems. Complex systems research is focused on the overall understanding of systems rather than their components. Complex systems are characterized by the changing environments in which they interact. They evolve and adapt through internal and external dynamic interactions. The development of intelligent systems and agents, which are increasingly characterized by their use of ontologies and their logical foundations, offer impulses for both software intensive systems and complex systems. Recent research in the field of intelligent systems, robotics, neuroscience, artificial intelligence, and cognitive sciences are vital for the future development and innovation of software intensive and complex systems.

The year 2019 marked four decades of cluster computing, a history that began in 1979 when the first cluster systems using Components Off The Shelf (COTS) became operational. This achievement resulted in a rapidly growing interest in affordable parallel computing for solving compute intensive and large scale problems. It also directly led to the founding of the Parco conference series. Starting in 1983, the International Conference on Parallel Computing, ParCo, has long been a leading venue for discussions of important developments, applications, and future trends in cluster computing, parallel computing, and high-performance computing. ParCo2019, held in Prague, Czech Republic, from 10 – 13 September 2019, was no exception. Its papers, invited talks, and specialized mini-symposia addressed cutting-edge topics in computer architectures, programming methods for specialized devices such as field programmable gate arrays (FPGAs) and graphical processing units (GPUs), innovative applications of parallel computers, approaches to reproducibility in parallel computations, and other relevant areas. This book presents the proceedings of ParCo2019, with the goal of making the many fascinating topics discussed at the meeting accessible to a broader audience. The proceedings contains 57 contributions in total, all of which have been peer-reviewed after their presentation. These papers give a wide ranging overview of the current status of research, developments, and applications in parallel computing.

This book constitutes the 17th International Symposium on Applied Reconfigurable Computing, ARC 2021, held as a virtual event, in June 2021. The 14 full papers and 11 short presentations presented in this volume were carefully reviewed and selected from 40 submissions. The papers cover a broad spectrum of applications of reconfigurable computing, from driving assistance, data and graph processing acceleration, computer security to the societal relevant topic of supporting early diagnosis of Covid infectious conditions.

This book makes powerful Field Programmable Gate Array (FPGA) and reconfigurable technology accessible to software engineers by covering different state-of-the-art high-level synthesis approaches (e.g., OpenCL and several C-to-gates compilers). It introduces FPGA technology, its programming model, and how various applications can be implemented on FPGAs without going through low-level hardware design phases. Readers will get a realistic sense for problems that are suited for FPGAs and how to implement them from a software designer's point of view. The authors demonstrate that FPGAs and their programming model reflect the needs of stream processing problems much better than traditional CPU or GPU architectures, making them well-suited for a wide variety of systems, from embedded systems performing sensor processing to large setups for Big Data number crunching. This book serves as an invaluable tool for software designers and FPGA design engineers who are interested in high design productivity through behavioural synthesis, domain-specific compilation, and FPGA overlays. Introduces FPGA technology to software developers by giving an overview of FPGA programming models and design tools, as well as various application examples; Provides a holistic analysis of the topic and enables developers to tackle the architectural needs for Big data processing with FPGAs; Explains the reasons for the energy efficiency and performance benefits of FPGA processing; Provides a user-oriented approach and a sense for where and how to apply FPGA technology.

Introduction and Implementations of the Kalman Filter

14th International Conference, CRISIS 2019, Hammamet, Tunisia, October 29–31, 2019, Proceedings

Emerging Technology and Architecture for Big-data Analytics

Blue Book

17th International Symposium, ARC 2021, Virtual Event, June 29–30, 2021, Proceedings

Embedded Microprocessor System Design using FPGAs

The fields of computer vision and image processing are constantly evolving as new research and applications in these areas emerge. Staying abreast of the most up-to-date developments in this field is necessary in order to promote further research and apply these developments in real-world settings. Computer Vision: Concepts, Methodologies, Tools, and Applications is an innovative reference source for the latest academic material on development of computers for gaining understanding about videos and digital images. Highlighting a range of topics, such as computational models, machine learning, and image processing, this multi-volume book is ideally designed for academicians, technology professionals, students, and researchers interested in uncovering the latest innovations in the field.

Most computers today support binary floating-point in hardware. While suitable for many purposes, it should not be used for financial, commercial and user-centric applications or web services because the decimal data used in these applications cannot be represented exactly using binary floating-point. The problems of binary floating-point can be avoided by using base 10 (decimal) exponents and preserving those exponents where possible. The design performs addition and subtraction on 64-bit operands in a single path adder with exception handling fulfilling the released standard and it can easily be extended to also support operations on 128-bit decimal floating-point numbers. The overall performance of the decimal adder was compared from the point of view of area and speed for the same FPGA families. We synthesized the design for two families of Xilinx, Spartan II and Virtex II. Complete test and verification is performed on all the design versions fulfilling 3063 test vectors supplied by IBM Corp. and supporting 7 rounding modes (5 stated by the standard and 2 proposed by IBM) with exception handling for overflow, inexact and invalid operations.

This book constitutes the proceedings of the 14th International Conference on Applied Reconfigurable Computing, ARC 2018, held in Santorini, Greece, in May 2018. The 29 full papers and 22 short presented in this volume were carefully reviewed and selected from 78 submissions. In addition, the volume contains 9 contributions from research projects. The papers were organized in topical sections named: machine learning and neural networks; FPGA-based design and CGRA optimizations; applications and surveys; fault-tolerance, security and communication architectures; reconfigurable and adaptive architectures; design methods and fast prototyping; FPGA-based design and applications; and special session: research projects.

This book presents high-quality papers from the Fifth International Conference on Microelectronics, Computing & Communication Systems (MCCS 2020). It discusses the latest technological trends and advances in MEMS and nanoelectronics, wireless communication, optical communication, instrumentation, signal processing, image processing, bioengineering, green energy, hybrid vehicles, environmental science, weather forecasting, cloud computing, renewable energy, RFID, CMOS sensors, actuators, transducers, telemetry systems, embedded systems and sensor network applications. It includes papers based on original theoretical, practical and experimental simulations, development, applications, measurements and testing. The applications and solutions discussed here provide excellent reference material for future product development.

Real-Time Electromagnetic Transient Simulation of AC-DC Networks

Selected Contributions from FDL 2015

Communicating Process Architectures 2015 & 2016

Digital System Design with FPGA: Implementation Using Verilog and VHDL

Design of an APU-compatible, Double Precision Floating Point Unit for the Xilinx Virtex-4 FPGA

Chaotic Systems, Artificial Neural Networks, Random Number Generators, and Secure Communication Systems

XILINX FPGA Design for Implementation of IEEE Format 32-bit Floating-point Arithmetic [i.e. Arithmetic]Design of an APU-compatible, Double Precision Floating Point Unit for the Xilinx Virtex-4 FPGADesigning with Xilinx® FPGAsUsing VivadoSpringer

This book presents novel computer techniques, which combine a rigorous mathematical framework, novel program analyses and digital hardware design to advance current high-level synthesis tools and extend their scope beyond the industrial 'state of the art'. Implementing computation on customised digital hardware plays an increasingly important role in the quest for energy-efficient high-performance computing. Field-programmable gate arrays (FPGAs) gain efficiency by encoding the computing task into the chip's physical circuitry and are gaining rapidly increasing importance in the processor market, especially after recent announcements of large-scale deployments in the data centre. This is driving, more than ever, the demand for higher design entry abstraction levels, such as the automatic circuit synthesis from high-level languages (high-level synthesis). The techniques in this book apply formal reasoning to high-level synthesis in the context of demonstrably practical applications. /pp

Get started with FPGA programming using SystemVerilog, and develop real-world skills by building projects, including a calculator and a keyboard Key FeaturesExplore different FPGA usage methods and the FPGA tool flowLearn how to design, test, and implement hardware circuits using SystemVerilogBuild real-world FPGA projects such as a calculator and a keyboard using FPGA resourcesBook Description Field Programmable Gate Arrays (FPGAs) have now become a core part of most modern electronic and computer systems. However, to implement your ideas in the real world, you need to get your head around the FPGA architecture, its toolset, and critical design considerations. FPGA Programming for Beginners will help you bring your ideas to life by guiding you through the entire process of programming FPGAs and designing hardware circuits using SystemVerilog. The book will introduce you to the FPGA and Xilinx architectures and show you how to work on your first project, which includes toggling an LED. You'll then cover SystemVerilog RTL designs and their implementations. Next, you'll get to grips with using the combinational Boolean logic design and work on several projects, such as creating a calculator and updating it using FPGA resources. Later, the book will take you through the advanced concepts of AXI and show you how to create a keyboard using PS/2. Finally, you'll be able to consolidate all the projects in the book to design a unified output using a Video Graphics Array (VGA) controller that you'll design. By the end of this SystemVerilog FPGA book, you'll have learned how to work with FPGA systems and be able to design hardware circuits and boards using SystemVerilog programming. What you will learnUnderstand the FPGA architecture and toolsetGet to grips with writing SystemVerilog RTLMake FPGA projects using SystemVerilog programmingWork with computer math basics, parallelism, and pipeliningExplore the advanced topics of AXI and keyboard interfacing with PS/2Discover how you can implement a VGA interface in your projectsWho this book is for This FPGA design book is for embedded system developers, engineers, and programmers who want to learn FPGA and SystemVerilog programming from scratch. FPGA designers looking to gain hands-on experience in working on real-world projects will also find this book useful.

This textbook for courses in Embedded Systems introduces students to necessary concepts, through a hands-on approach. It gives a great introduction to FPGA-based microprocessor system design using state-of-the-art boards, tools, and microprocessors from Altera/Intel® and Xilinx®. HDL-based designs (soft-core), parameterized cores (Nios II and MicroBlaze), and ARM Cortex-A9 design are discussed, compared and explored using many hand-on designs projects. Custom IP for HDMI coder, Floating-point operations, and FFT bit-swap are developed, implemented, tested and speed-up is measured. Downloadable files include all design examples such as basic processor synthesizable code for Xilinx and Altera tools for PicoBlaze, MicroBlaze, Nios II and ARMv7 architectures in VHDL and Verilog code, as well as the custom IP projects. Each Chapter has a substantial number of short quiz questions, exercises, and challenging projects. Explains soft, parameterized, and hard core systems design tradeoffs; Demonstrates design of popular KCP5M6 8 Bit microprocessor step-by-step; Discusses design of popular KCP5M6 8 Bit microprocessor step-by-step; Discusses the 32 Bit ARM Cortex-A9 and a basic processor is synthesized; Covers design flows for both FPGA Market leaders Nios II Altera/Intel and MicroBlaze Xilinx system; Describes Compiler-Compiler Tool development; Includes a substantial number of Homework's and FPGA exercises and design projects in each chapter.

Parallel Computing: Technology Trends

Proceedings of International Ethical Hacking Conference 2018

Field

Computational Modeling and Simulation Examples in Bioengineering

Compact and Fast Machine Learning Accelerator for IoT Devices

This book constitutes the thoroughly refereed post-conference proceedings of six international workshops held in the framework of the 7th Pacific-Rim Symposium on Image and Video Technology, PSIVT 2015, during November 23-24, 2015, in Auckland, New Zealand. The 29 revised full papers presented were carefully selected from 58 submissions. Their topics were widely ranged from well-established areas to novel current trends: robot vision, RV 2015; 2D and 3D geometric properties from incomplete data, GPID 2015; vision meets graphics, VG 2015; passive and active electro-optical sensors for aerial and space imaging, EO4AS 2015; mathematical and computational methods in biomedical imaging and image analysis, MCBMIA 2015; and video surveillance, VSW5 2015.

This book constitutes the refereed proceedings of the 17th International Symposium on Automated Technology for Verification and Analysis, ATVA 2019, held in Taipei, Taiwan in October 2019. The 24 regular papers presented together with 3 tool papers were carefully reviewed and selected from 65 submissions. The symposium is dedicated to the promotion of research on theoretical and practical aspects of automated analysis, verification and synthesis by providing a forum for interaction between the regional and the international research communities and industry in the field. The papers focus on cyber-physical systems; runtime techniques; testing; automata; synthesis; stochastic systems and model checking.

Sensor data fusion is the process of combining error-prone, heterogeneous, incomplete, and ambiguous data to gather a higher level of situational awareness. In principle, all living creatures are fusing information from their complementary senses to coordinate their actions and to detect and localize danger. In sensor data fusion, this process is transferred to electronic systems, which rely on some "awareness" of what is happening in certain areas of interest. By means of probability theory and statistics, it is possible to model the relationship between the state space and the sensor data. The number of ingredients of the resulting Kalman filter is limited, but its applications are not.

This book constitutes the refereed proceedings of the 20th International Conference on Embedded Computer Systems: Architectures, Modeling, and Simulation, SAMOS 2020, held in Samos, Greece, in July 2020. The 16 regular papers presented were carefully reviewed and selected from 35 submissions. In addition, 9 papers from two special sessions were included, which were organized on topics of current interest: innovative architectures for security and European projects on embedded and high performance computing for health applications. * The conference was held virtually due to the COVID-19 pandemic.*

Languages, Design Methods, and Tools for Electronic System Design

Complex, Intelligent, and Software Intensive Systems

Concepts, Methodologies, Tools, and Applications

Nanoscale VLSI

14th International Symposium, ARC 2018, Santorini, Greece, May 2-4, 2018, Proceedings

Computer Vision: Concepts, Methodologies, Tools, and Applications

This book features the Applications in Electronics Prevading Industry, Environment and Society—Sensing Systems and Pervasive Intelligence" of the MDPI journal Sensors. Most of the papers come from a selection of the best papers of the 2019 edition of the "Applications in Electronics Prevading Industry, Environment and Society" (APPLEPIES) Conference, which was held in November 2019. All these papers have been significantly enhanced with novel experimental results. The papers give an overview of the trends in research and development activities concerning the pervasive application of electronics in industry, the environment, and society. The focus of these papers is on cyber-physical systems (CPS), with research proposals for new sensor acquisition and ADC (analog to digital converter) methods, high-speed communication systems, cybersecurity, big data management, and data processing including emerging machine learning techniques. Physical implementation aspects are discussed as well as the trade-off found between functional performance and hardware/system costs.

This book discusses the implications of new technologies for a secured society. As such, it reflects the main focus of the International Conference on Ethical Hacking, ethaCon 2018, which is essentially in evaluating the security of computer systems using penetration testing techniques. Showcasing the most outstanding research papers presented at the conference, the book shares new findings on computer network attacks and defenses, commercial security solutions, and hands-on, real-world security experience. The respective sections include network security, ethical hacking, cryptography, digital forensics, cloud security, information security, mobile communications security, and cyber security.

This book helps readers to implement their designs on Xilinx® FPGAs. The authors demonstrate how to get the greatest impact from using the Vivado® Design Suite, which delivers a SoC-strength, IP-centric and system-centric, next generation development environment that has been built from the ground up to address the productivity bottlenecks in system-level integration and implementation. This book is a hands-on guide to the hardware acceleration and timing analysis tool (ISE) but are now moving to Vivado. Throughout the presentation, the authors focus on key concepts, major mechanisms for design entry, and methods to realize the most efficient implementation of the target design, with the least number of iterations.

This book describes the current state of the art in big-data analytics, from a technology and hardware architecture perspective. The presentation is designed to be accessible to a broad audience, with general knowledge of hardware design and some interest in big-data analytics. Coverage includes emerging technology and devices for data-analytics, circuit design for data-analytics, and architecture and algorithms to support data-analytics. Readers will benefit from the realistic context by the authors, which demonstrates what works, what doesn't work, and what are the fundamental problems, solutions, upcoming challenges and opportunities. Provides a single-source reference to hardware architectures for big-data analytics; Covers various levels of big-data analytics hardware design abstraction and flow, from device, to circuits and systems; Demonstrates how non-volatile memory (NVM) based hardware platforms can be a viable solution to existing challenges in hardware architecture for big-data analytics.

Programmable Gate Array

Smart Technology Applications in Business Environments

FPGA Programming for Beginners

Embedded Computer Systems: Architectures, Modeling, and Simulation

Designing with Xilinx® FPGAs

WoTUG-37 & WoTUG-38

An important working resource for engineers and researchers involved in the design, development, and implementation of signal processing systems The last decade has seen a rapid expansion of the use of field programmable gate arrays (FPGAs) for a wide range of applications beyond traditional digital signal processing (DSP) systems. Written by a team of experts working at the leading edge of the edition of FPGA-based implementation of Signal Processing Systems has been extensively updated and revised to reflect the latest iterations of FPGA theory, applications, and technology. Written from a system-level perspective, it features expert discussions of contemporary methods and tools used in the design, optimization and implementation of DSP systems using programmable FPGA hardware along with illustrative case studies and timely real-world examples of critical concern in the design and development of DSP systems for radio, telecommunications, audio-visual, and security applications, as well as bioinformatics, Big Data applications, and more. Inside you will find up-to-date coverage of FPGA solutions for Big Data Applications, especially as they are used in FPGAs and the transfer of FPGAs towards heterogeneous computing platforms The evolution of High Level Synthesis tools—including new sections on Xilinx's HLS Vivado tool flow and Altera's OpenCL approach Developments in Graphical Processing Units (GPUs), which are rapidly replacing more traditional DSP systems FPGA-based Implementation of Signal Processing Systems, 2nd Edition

This book describes methodologies in the design of VLSI devices, circuits and their applications at nanoscale levels. The book begins with the discussion on the dominant role of power dissipation in highly scaled devices. The 15 Chapters of the book are classified under four sections that cover design, modeling, and simulation of electronic, magnetic and compound semiconductors for their applica comprehensive volume eloquently presents the design methodologies for ultra-low power VLSI design, potential post-CMOS devices, and their applications from the architectural and system perspectives. The book shall serve as an invaluable reference book for the graduate students, PhD/ M.S./ M.Tech. Scholars, researchers, and practicing engineers working in the frontier areas of nanoscale VLSI design.

This book offers readers a clear guide to implementing engineering applications with FPGAs, from the mathematical description to the hardware synthesis, including discussion of VHDL, programming and co-simulation issues. Coverage includes FPGA realizations such as: chaos generators that are described from their mathematical models; artificial neural networks (ANNs) to predict chaotic time series; and chaotic systems that are described from their mathematical models. Finally, optimized chaotic oscillators are synchronized and realized to implement a secure communication system that processes black and white and grey level VHDL programming guidelines and computer arithmetic issues, along with co-simulation examples with Active-HDL and Simulink. The whole book provides a practical guide to implementing a variety of engineering applications from VHDL, programming and co-simulation issues, to FPGA realizations of chaos generators, ANNs for chaotic time-series prediction, RNGs and chaotic secure communication.

Master FPGA digital system design and implementation with Verilog and VHDL. This practical guide explores the development and deployment of FPGA-based digital systems using the two most popular hardware description languages, Verilog and VHDL. Written by a pair of digital circuit design experts, the book offers a solid grounding in FPGA principles, practices, and applications and provides an important concepts are demonstrated through real-world examples, ready-to-run code, and inexpensive start-to-finish projects for both the Baysys and Arty boards. Digital System Design with FPGA: Implementation Using Verilog and VHDL covers: • Field programmable gate array fundamentals • Baysys and Arty FPGA boards • The Vivado design suite • Verilog and VHDL • Data types and operators • Image and Video Technology – PSIVT 2015 Workshops

Proceedings of the 12th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS-2018)

Sensing Systems and Pervasive Intelligence

FPGAs for Software Programmers

Applications in Electronics Prevading Industry, Environment and Society

High-level Synthesis

The first of two volumes in the Electronic Design Automation for Integrated Circuits Handbook, Second Edition, Electronic Design Automation for IC System Design, Verification, and Testing thoroughly examines system-level design, microarchitectural design, logic verification, and testing. Chapters contributed by leading experts authoritatively discuss processor modeling and design tools, using performance metrics to select microprocessor cores for integrated circuit (IC) designs, design and verification languages, digital simulation, and hardware acceleration and much more. New to this Edition: Major updates appearing in the initial phases of the design flow, where the level of abstraction keeps rising to support more functionality with lower non-recurring engineering (NRE) costs Significant revisions reflected in the final phases of the design flow, where the complexity due to smaller and smaller geometries is compounded by the slow progress of shorter wavelength lithography New coverage of cutting-edge applications and approaches realized in the decade since publication of the previous edition—these are illustrated by new chapters on high-level synthesis, system-on-chip (SoC) block-based design, and back-annotating system-level models Offering improved depth and modernity, Electronic Design Automation for IC System Design, Verification, and Testing provides a valuable, state-of-the-art reference for electronic design automation (EDA) students, researchers, and professionals.

The Floating Point Multiplier is a wide variety for increasing accuracy, high speed and high performance in reducing delay, area and power consumption. The floating point is used for algorithms of Digital Signal Processing and Graphics. Many floating point multipliers are used to reduce the area that perform in both the single precision and the double precision in multiplication, addition and subtraction. Here, the scientific notations sign bit, mantissa and exponent are used. The real numbers are divided into two components: fixed component of significant range (lack of dynamic range) and exponential component in floating point (largest dynamic range). The authors convert decimal to floating point and normalize the exponent part and rounding operation to reduce latency. The mantissa of two values are multiplied and the exponent part is added. The sign results with exclusive-or are obtained. Then, the final result of shift and add floating point multiplier is compared with both multiplication.

The book covers various aspects of VHDL programming and FPGA interfacing with examples and sample codes giving an overview of VLSI technology, digital circuits design with VHDL, programming, components, functions and procedures, and arithmetic designs followed by coverage of the core of external I/O programming, algorithmic state machine based system design, and real-world interfacing examples. • Focus on real-world applications and peripherals interfacing for different applications like data acquisition, control, communication, display, computing, instrumentation, digital signal processing and top module design • Aims to be a quick reference guide to design digital architecture in the FPGA and develop system with RTC, data transmission protocols

Explore a comprehensive and state-of-the-art presentation of real-time electromagnetic transient simulation technology by leaders in the field Real-Time Electromagnetic Transient Simulation of AC-DC Networks delivers a detailed exposition of field programmable gate array (FPGA) hardware based real-time electromagnetic transient (EMT) emulation for all fundamental equipment used in AC-DC power grids. The book focuses specifically on detailed device-level models for their hardware realization in a massively parallel and deeply pipelined manner as well as decomposition techniques for emulating large systems. Each chapter contains fundamental concepts, apparatus models, solution algorithms, and hardware emulation to assist the reader in understanding the material contained within. Case studies are peppered throughout the book, ranging from small didactic test circuits to realistically sized large-scale AC-DC grids. The book also provides introductions to FPGA and hardware-in-the-loop (HIL) emulation procedures, and large-scale networks constructed by the foundational components described in earlier chapters. With a strong focus on high-voltage direct-current power transmission grid applications, Real-Time Electromagnetic Transient Simulation of AC-DC Networks covers both system-level and device-level mathematical models. Readers will also enjoy the inclusion of: A thorough introduction to field programmable gate array technology, including the evolution of FPGAs, technology trends, hardware architectures, and programming tools An exploration of classical power system components, e.g., linear and nonlinear passive power system components, transmission lines, power transformers, rotating machines, and protective relays A comprehensive discussion of power semiconductor switches and converters, i.e., AC-DC and DC-DC converters, and specific power electronic apparatus such as DC circuit breakers An examination of decomposition techniques used at the equipment-level as well as the large-scale system-level for real-time EMT emulation of AC-DC networks Chapters that are supported by simulation results from well-defined test cases and the corresponding system parameters are provided in the Appendix Perfect for graduate students and professional engineers studying or working in electrical power engineering, Real-Time Electromagnetic Transient Simulation of AC-DC Networks will also earn a place in the libraries of simulation specialists, senior modeling and simulation engineers, planning and design engineers, and system studies engineers.

Fixed-point Hardware Design for CPWC Image Reconstruction

Bring your ideas to life by creating hardware designs and electronic circuits with SystemVerilog

Automated Technology for Verification and Analysis

Standard-Compliant Decimal Floating Point

Proceeding of Fifth International Conference on Microelectronics, Computing and Communication Systems

Devices, Circuits and Applications

This book presents the latest techniques for machine learning based data analytics on IoT edge devices. A comprehensive literature review on neural network compression and machine learning accelerator is presented from both algorithm level optimization and hardware architecture optimization. Coverage focuses on shallow and deep neural network with real applications on smart buildings. The authors also discuss hardware architecture design with coverage focusing on both CMOS based computing systems and the new emerging Resistive Random Access Memory (RRAM) based systems. Detailed case studies such as indoor positioning, energy management and intrusion detection are also presented for smart buildings.

This book focuses on biomedical engineering and its applications. More specifically, it provides the theoretical background for simulating pathological conditions in the area of bones, muscles, tissue, cardiovascular, cancer, lung, vertigo disease. The methodological approaches used for simulations include the finite element, dissipative particle dynamics and lattice boltzmann. Aside from the theoretical background and knowledge, the author provides additional material consisting of a software package for simulations for the theoretical problems. In this way, the book enhances the reader's learning capabilities in the field of biomedical engineering.

This book presents the proceedings of two conferences, the 37th and 38th in the WoTUG series: Communicating Process Architectures (CPA) 2015, held in Canterbury, England, in August 2015, and CPA 2016, held in Copenhagen, Denmark, in August 2016. Fifteen papers were accepted for presentation at the 2015 conference. They cover a spectrum of concurrency concerns: mathematical theory, programming languages, design and support tools, verification, multicore infrastructure and applications ranging from supercomputing to embedded. Three workshops and two evening fringe sessions also formed part of the conference, and the workshop position papers and fringe abstracts are included in this book. Fourteen papers covering the same broad spectrum of topics were presented at the 2016 conference, one of them in the form of a workshop. They are all included here, together with abstracts of the five fringe sessions from the conference.

Are you an RTL or system designer that is currently using, moving, or planning to move to an HLS design environment? Finally, a comprehensive guide for designing hardware using C++ is here. Michael Fingeroff's High-Level Synthesis Blue Book presents the most effective C++ synthesis coding style for achieving high quality RTL. Master a totally new design methodology for coding increasingly complex designs! This book provides a step-by-step approach to using C++ as a hardware design language, including an introduction to the Basics of HLS using concepts familiar to RTL designers. Each chapter provides easy-to-understand C++ examples, along with hardware and timing diagrams where appropriate. The book progresses from simple concepts such as sequential logic design to more complicated topics such as memory architecture and hierarchical sub-system design. Later chapters bring together many of the earlier HLS design concepts through their application in simplified design examples. These examples illustrate the fundamental principles behind C++ hardware design, which will translate to much larger designs. Although this book focuses primarily on C and C++ to present the basics of C++ synthesis, all of the concepts are equally applicable to SystemC when describing the core algorithmic part of a design. On completion of this book, readers should be well on their way to becoming experts in high-level synthesis.

Applied Reconfigurable Computing. Architectures, Tools, and Applications

Separation Logic for High-level Synthesis

FPGA-based Implementation of Signal Processing Systems

Digital Signal Processing with Field Programmable Gate Arrays

eHACON 2018, Kolkata, India

FPGA-Based Embedded System Developer's Guide

Technology continues to make great strides in society by providing opportunities for advancement, inclusion, and global competency. As new systems and tools arise, novel applications are created as well. Smart Technology Applications in Business Environments is an essential reference source for the latest scholarly research on the risks and opportunities of utilizing the latest technologies in different aspects of society such as education, healthcare systems, and corporations. Featuring extensive coverage on a broad range of topics and perspectives including virtual reality, robotics, and social media, this publication is ideally designed for academicians, researchers, students, and practitioners seeking current research on the improvement and increased productivity from the implementation of smart technologies.

Starts with an overview of today's FPGA technology, devices, and tools for designing state-of-the-art DSP systems. A case study in the first chapter is the basis for more than 30 design examples throughout. The following chapters deal with computer arithmetic concepts, theory and the implementation of FIR and IIR filters, multirate digital signal processing systems, DFT and FFT algorithms, and advanced algorithms with high future potential. Each chapter contains exercises. The VERILOG source code and a glossary are given in the appendices, while the accompanying CD-ROM contains the examples in VHDL and Verilog code as well as the newest Altera "Baseline" software. This edition has a new chapter on adaptive filters, new sections on division and floating point arithmetics, an up-date to the current Altera software, and some new exercises.

Risks and Security of Internet and Systems

XILINX FPGA Design for Implementation of IEEE Format 32-bit Floating-point Arithmetic [i.e. Arithmetic]

17th International Symposium, ATVA 2019, Taipei, Taiwan, October 28–31, 2019, Proceedings

RV 2015, GPID 2013, VG 2015, EO4AS 2015, MCBMIA 2015, and VSW5 2015, Auckland, New Zealand, November 23-27, 2015. Revised Selected Papers

Electronic Design Automation for IC System Design, Verification, and Testing