FPGAs can be found in applications such as smartphones, mp3 players, medical imaging devices, and for aerospace and defense technology. FPGAs consist of logic blocks and trenches expert authors assure the most applicable advice to practicing engineers. Dual focus on successfully making critical decisions and avoiding common pitfalls appeals to engineers pressured for speed and perfection. Show designers exactly how they can cut time off production cycles and save their companies money drained by costly mistakes, via prototyping designs with FPGAs first. Reading it will take a designer with a basic understanding of FPGAs, which are faster, denser, and more cost-effective than traditional programmable logic devices (PLDs), to quickly become one of the most widespread tools that embedded system developers, engineers, and programmers who want to learn FPGA and SystemVerilog programming from scratch. These FPGA-based system design books are for engineers who are looking to gain hands-on experience in working on real-world projects. The push to move products to market as quickly and cheaply as possible is fiercer than ever, and accordingly, engineers are always looking for new ways to provide their companies with the edge over the competition.

This book presents essential perspectives on digital convolutions in wireless communications systems and illustrates their corresponding efficient real-time field-programmable gate array (FPGA) implementations. FPGAs or generic all programmable devices will soon become widespread, serving as the “brains” of all types of real-time smart signal processing systems, like smart networks, smart homes and smart cities. The book examines digital convolution by bringing together the following main elements: the fundamental theory behind the mathematical formulae together with corresponding physical phenomena; virtualized algorithm simulation together with benchmark real-time FPGA implementations; and detailed, state-of-the-art case studies on wireless applications, including popular linear convolution in digital front ends (DFEs); nonlinear convolution in digital pre-distortion (DPD) enabled high-efficiency wireless RF transceivers; and fast linear convolution in massive multiple-input multiple-output (MIMO) systems. After reading this book, students and professionals will be able to understand digital convolution with insight and information: discover what convolution is, why it is important and how it works. Enhance their FPGA design skills, i.e., enhance their FPGA-related prototyping capability with model-based hands-on examples. Rapidly expand their digital signal processing (DSP) blocks: to examine how to rapidly and efficiently create (DSP) functional blocks on a programmable FPGA chip as a reusable intellectual property (IP) core. Upgrade their expertise as both “thinkers” and “doers”: minimize/close the gap between mathematical equations and FPGA implementations for existing and emerging wireless applications.
programmable interconnects. This allows an engineer to start with a blank slate and program the FPGA for a specific task, for instance, digital signal processing, or a specific device, for example, a software-defined radio. Due to the short time to market and ability to reprogram to fix bugs without having to respin FPGAs are in increasingly high demand. This book is for the engineer that has not yet had any experience with this electrifying and growing field. The complex issue of FPGA design is broken down into four distinct phases: Design, Synthesis, Simulation, and Place & Route. Numerous step-by-step examples along with source code accompany the discussion. A brief primer of one of the popular FPGA and hardware languages, VHDL, is incorporated for a simple yet comprehensive learning tool. While a general technology background is assumed, no direct hardware development understanding is needed. Also, included are details on tool set-up, verification techniques, and test benches. Reference material consists of a quick reference guide, reserved words, and common VHDL/FPGA terms. Learn how to design and develop FPGAs -- no prior experience necessary! Breaks down the complex design and development of FPGAs into easy-to-learn building blocks: Contains examples, helpful tips, and step-by-step tutorials for synthesis, implementation, simulation, and programming phases.

Implement Finite-Field Arithmetic in Specific Hardware (FPGA and ASIC) Master cutting-edge electronic circuit synthesis and design with help from this detailed guide. Hardware Implementation of Finite-Field Arithmetic describes algorithms and circuits for executing finite-field operations, including addition, subtraction, multiplication, squaring, exponentiation, and division. This comprehensive resource begins with an overview of mathematics, covering algebra, number theory, finite fields, and cryptography. The book then presents algorithms which can be executed and verified with actual input data. Logic schemes and VHDL models are described in such a way that the corresponding circuits can be easily simulated and synthesized. The book concludes with a real-world example of a finite-field application -- elliptic-curve cryptography. This is an essential guide for hardware engineers involved in the development of embedded systems. Get detailed coverage of M modulo m reduction, Modulo m addition, subtraction, multiplication, and exponentiation Operations over GF(p) and GF(pm) Operations over the commutative ring Z[<br>](x) Operations over the binary field GF(2m) using normal, polynomial, dual, and triangular.

This book takes a practical hands-on approach to developing low complexity algorithms and transforming them into working hardware. It follows a complete design approach -- from algorithms to hardware architectures and addresses some of the challenges associated with their design, providing insight into implementing innovative architectures based on low complexity algorithms. The reader will learn: Modern techniques to design, model, and analyze low complexity algorithms as well as their hardware implementation. How to reduce computational complexity and power consumption using computer-aided design techniques. All aspects of the design spectrum from algorithms to hardware implementation and performance trade-offs. Provides extensive treatment of LDPC decoding algorithms and hardware implementations. It gives a systematic guidance, giving a basic understanding of LDPC codes and decoding algorithms and providing practical skills in implementing efficient LDPC decoders in hardware Companion website containing C-Programs and MATLAB models for simulating the algorithms, and <br>VHDL code for hardware modeling and synthesis.


This book introduces the FPGA technology used in the laboratory sessions, and provides a step-by-step guide for designing and simulation of digital circuits. It utilizes the VHDL language, which is one of the most common languages used to describe the design of digital systems. The Quartus II, Xilinx ISE 14.7, and ModelSim software are used to process the VHDL code and make simulations, and then the Altera and Xilinx FPGA platforms are employed to implement the simulated digital designs. The book is composed of four parts. The first part of this book has two chapters and covers various aspects: FPGA architectures, ASIC vs FPGA comparison, FPGA design flow and basic VHDL concepts necessary to describe the design of digital systems. The second part of the book includes three chapters that deal with the design of digital circuits such as combinational logic circuits, sequential logic circuits, and finite state machines. The third part of the book is reserved for laboratory projects carried out on the FPGA platform. It is a largely hands-on lab class for design digital circuits and implementing their designs on the Altera FPGA platform. Finally, the fourth part of this book is devoted to recent applications carried out on FPGAs, in particular advanced techniques in renewable energy systems. The book is primarily intended for students, scholars, and industrial practitioners interested in the design of modern digital systems.

This book provides insight into the practical design of VLSI circuits. It is aimed at novice VLSI designers and other enthusiasts who would like to understand VLSI design flows. Coverage includes key concepts in CMOS digital design, design of DSP and communication blocks on FPGAs, ASIC front end and physical design, and analog and mixed signal design. The approach is designed to focus on practical implementation of key elements of the VLSI design process, in order to make the topic accessible to novices. The design concepts are demonstrated using software from M at hworks, Xilinx, Mentor Graphics, Synopsys, and Cadence.

The book covers various aspects of VLSI hardware programming and 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.

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/fpgas
This book presents a selection of papers representing current research on using field programmable gate arrays (FPGAs) for realising image processing algorithms. These papers are reprints of papers selected for a Special Issue of the Journal of Imaging on image processing using FPGAs. A diverse range of topics is covered, including parallel soft processors, memory management, image filters, segmentation, clustering, image analysis, and image compression. Applications include traffic sign recognition for autonomous driving, cell detection for histopathology, and video compression. Collectively, they represent the current state-of-the-art on image processing using FPGAs.

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.

Field Programmable Gate Arrays (FPGAs) are increasingly becoming the platform of choice to implement DSP algorithms. This book is designed to allow DSP students or DSP engineers to achieve FPGA implementation of DSP algorithms in a one-semester DSP laboratory course or in a short design cycle time based on the LabVIEW FPGA module. Features: - The first DSP laboratory book that uses the FPGA platform instead of the DSP platform for implementation of DSP algorithms - Incorporating introductions to LabVIEW and VHDL - Lab experiments covering FPGA implementation of basic DSP topics including convolution, digital filtering, fixed-point data representation, adaptive filtering, frequency domain processing - Hardware FPGA implementation applications including wavelet transform, software-defined radio, and MP3 player - Website providing downloadable LabVIEW FPGA codes

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.

What if you could use software to design hardware? Not just any hardware--imagine specifying the behavior of a complex parallel computer, sending it to a chip, and having it run on that chip--all without any manufacturing? With Field-Programmable Gate Arrays (FPGAs), you can design such a machine with your mouse and keyboard. When you deploy it to the FPGA, it immediately takes on the behavior that you defined. Want to create something that behaves like a display driver integrated circuit? How about a CPU with an instruction set you dreamed up? Or your very own Bitcoin miner? You can do all this with FPGAs. Because you're not writing programs--rather, you're designing a chip whose sole purpose is to do what you tell it--it's faster than anything you can do in code. With Make: FPGAs, you'll learn how to break down problems into something that can be solved on an FPGA, design the logic that will run on your FPGA, and hook up electronic components to create finished projects.

This textbook is designed for a second course on digital systems, focused on the design of digital circuits. It was originally designed to accompany a MOOC (Massive Open Online Course) created at the Autonomous University of Barcelona (UAB), currently available on the Coursera platform. Readers will learn to develop complex digital circuits, starting from a functional specification, will know the design alternatives that a development engineer can choose to reach the specified circuit performance, and will understand which design tools are available to develop a new circuit.

This book constitutes the refereed proceedings of the 12th International Symposium on Applied Reconfigurable Computing, ARC 2016, held in Rio de Janeiro, Brazil, in March 2016. The 20 full papers presented in this volume were carefully reviewed and selected from 47 submissions. They are organized in topical headings named: video and image processing; fault-tolerant systems; tools and architectures; signal processing; and multicore systems. In addition, the book contains 3 invited papers and 8 poster papers on funded RD running and completed projects.

This is the first book to focus on designing run-time reconfigurable systems on FPGAs, in order to gain resource and power efficiency, as well as to improve speed. Case studies in partial reconfiguration guide readers through the FPGA jungle, straight toward a working system. The discussion of partial reconfiguration is comprehensive and practical, with models introduced together with methods to implement efficiently the corresponding systems. Coverage includes concepts for partial module integration and corresponding communication architectures, floorplanning of the on-FPGA resources, physical implementation aspects starting from constraining primitive placement and routing all the way down to the bitstream required to configure the FPGA, and verification of reconfigurable systems.

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.

Field-programmable gate arrays (FPGAs), which are pre-fabricated, programmable digital integrated circuits (ICs), provide easy access to state-of-the-art integrated circuit process technology, and in doing so, democratize this technology of our time. This book is about comparing the qualities of FPGA - their speed performance, area and power consumption, against custom-fabricated ICs, and exploring ways of mitigating their deficiencies. This work began as a question that many have asked, and few had the resources to answer – how much worse is an FPGA compared to a custom-designed chip? As we dealt with that question, we found that it was far more difficult to answer than we anticipated, but that the results were rich basic insights on fundamental understandings of FPGA architecture. It also encouraged us to nd ways to leverage those insights to seek ways to make FPGA technology better, which is what the second half of the book is about. While the question “How much worse is an FPGA than an ASIC?” has been a constant sub-theme of all research on FPGAs,
it was posed most directly, some time around May 2004, by Professor Abbas El Gamal from Stanford University to us - he was working on a 3D FPGA, and was wondering if any real measurements had been made in this kind of comparison. Shortly thereafter we took it up and tried to answer in a serious way.

During the 1980s and early 1990s there was significant work in the design and implementation of hardware neurocomputers. Nevertheless, most of these efforts may be judged to have been unsuccessful: at no time have hardware neurocomputers been in wide use. This lack of success may be largely attributed to the fact that earlier work was almost entirely aimed at developing custom neurocomputers, based on ASIC technology, but for such a niche - e.g. this technology was never sufficiently developed or competitive enough to justify large-scale adoption. On the other hand, gate-arrays of the period mentioned were never large enough or fast enough for serious artificial-neur-network (ANN) applications. But technology has now improved: the capacity and performance of current FPGAs are such that they present a much more realistic alternative. Consequently neurocomputers based on FPGAs are now a much more practical proposition than they have been in the past. This book summarizes some works towards this goal and consists of 12 papers that were selected, after review, from a number of submissions. The book is nominally divided into three parts: Chapters 1 through 4 deal with foundational issues; Chapters 5 through 11 deal with a variety of implementations; and Chapter 12 looks at the lessons learned from a large-scale project and also reconsider design issues in light of current and future technology.

Learn how to design digital circuits with FPGAs (field-programmable gate arrays), the devices that reconfigure themselves to become the very hardware circuits you set out to program. With this practical guide, author Justin Rajewski shows you hands-on how to create FPGA projects, whether you’re a programmer, engineer, product designer, or maker. You’ll quickly go from the basics to designing your own processor. Designing digital circuits used to be a long and costly endeavor that only big companies could pursue. FPGAs make the process much easier, and now they’re affordable enough even for hobbyists. If you’re familiar with electricity and basic electrical components, this book starts simply and progresses through increasingly complex projects. Set up your environment by installing Xilinx ISE and the author’s Mojo IDE. Learn how hardware designs are broken into modules, comparable to functions in a software program. Create digital hardware designs and learn the basics on how they’ll be implemented by the FPGA. Build your projects with Lucid, a beginner-friendly hardware description language, based on Verilog, with syntax similar to C/C++ and Java.

Acquire the Design Information, Methods, and Skills Needed to Master the New VLIW Architecture! VLIW Microprocessor Hardware Design offers you a complete guide to VLIW hardware design—providing state-of-the-art coverage of microarchitectures, RTL coding, ASIC flow, and FPGA flow of design. The book also contains a wide range of skills-building examples, all worked using Verilog, that equip you with a practical, hands-on tutorial for understanding each step in the VLIW microprocessor design process. Written by Yang Fook Lee, an internationally renowned expert in the field of microprocessor design, this cutting-edge hardware design tool presents unsurpassed coverage of the latest in VLIW microprocessing. Authoritative and comprehensive, VLIW Microprocessor Hardware Design features:
• Step-by-step instruction on the VLIW hardware design process
• A wealth of Verilog-based designs
• ASIC and FPGA implementations
• Expert guidance on the best-known methods for RTL coding
• Over 75 detailed illustrations that clarify each aspect of VLIW design

Inside this Complete VLIW Microprocessor Toolkit:
• Introduction
• Design Methodology
• RTL Coding, Testbenching, and Simulation
• FPGA Implementation
• Testbenches and Simulation Results
• Synthesis Results and Gate Level Netlist

Field Programmable Gate Arrays (FPGAs) are devices that provide a fast, low-cost way for embedded system designers to customize products and deliver new versions with upgraded features, because they can handle very complicated functions, and be reconfigured an infinite number of times. In addition to introducing the various architectural features available in the latest generation of FPGAs, The Design Warrior’s Guide to FPGAs also covers different design tools and flows. This book provides information ranging from schematic-driven entry, through traditional HDL/RTL-based simulation and logic synthesis, all the way up to the current state-of-the-art in pure C/C++ design capture and synthesis technology. Also discussed are specialist areas such as mixed hardware/software and DSP-based design flows, along with innovative new devices such as field programmable gate arrays (FPGAs). C. The “M” in M field is a bestselling author and engineer with a large following in the electronic design automation (EDA) and embedded systems industry. In this comprehensive book, he covers all the issues of interest to designers working with, or contemplating a move to, FPGAs in their product designs. While other books cover fragments of FPGA technology or applications this is the first to focus exclusively and comprehensively on FPGA use for embedded systems. First book to focus exclusively and comprehensively on FPGA use in embedded designs World-renowned best-selling author Will help engineers get familiar and succeed with this new technology by providing much-needed advice on choosing the right FPGA for any design project.

This book provides step-by-step guidance on how to design VLSI systems using Verilog. It shows the way to design systems that are device, vendor and technology independent. Coverage presents new material and theory as well as synthesis of recent work with complete Project Designs using industry standard CAD tools and FPGA boards. The reader is taken step by step through different designs, from implementing a single digital gate to a massive design consuming well over 100,000 gates. All the design codes developed in this book are Register Transfer Level (RTL) compliant and can be readily used or amended to suit new projects.

This book provides the advanced issues of FPGA design as the underlying theme of the work. In practice, an engineer typically needs to be mentored for several years before these principles are appropriately utilized. The topics that will be discussed in this book are essential to designing FPGA’s beyond moderate complexity. The goal of the book is to present practical design techniques that are otherwise only available through mentorship and real-world experience.

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 designers and circuits researchers in many areas of industry and academia.
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 for both users who are new to FPGA designs, as well as those currently using the legacy Xilinx tool set (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.

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 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 overview of more complex topics. Important concepts are demonstrated through real-world examples, ready-to-run code, and inexpensive start-to-finish projects for both the Basys and Arty boards. Digital System Design with FPGA: Implementation Using Verilog and VHDL covers: • Field programmable gate array fundamentals • Basys and Arty FPGA boards • The Vivado design suite • Verilog and VHDL • Data types and operators • Combinational circuits and circuit blocks • Data storage elements and sequential circuits • Soft-core microcontroller and digital interfacing • Advanced FPGA applications • The future of FPGA

Use Arduino's affordable and breadboard-friendly FPGA development board (BeMico MAX 10) to create a light sensor, temperature sensor, motion sensor, and the KITT car display from Knight Rider. You don't need an electronics engineering degree or even any programming experience to get the most out of Beginning FPGA: Programming Metal. Just bring your curiosity and your Field-Programmable Gate Array. This book is for those who have tinkered with Arduino or Raspberry Pi, and want to get more hands-on experience with hardware or for those new to electronics who just want to dive in. You'll learn the theory behind FPGAs and electronics, including the math and logic you need to understand what's happening - all explained in a fun, friendly, and accessible way. It also doesn't hurt that you'll be learning VHDL, a hardware description language that is also an extremely marketable skill. What you'll learn: Learn what an FPGA is and how it's different from a microcontroller or ASIC. Set up your toolchain. Use VHDL, a popular hardware description language, to tell your FPGA what to be. Explore the theory behind FPGA and electronics. Use your FPGA with a variety of sensors and to talk to a Raspberry Pi. Who this book is for: Arduino, Raspberry Pi, and other electronics enthusiasts who want a clear and practical introduction to FPGA.

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 Vivado. Complete and synthesizable source files are available for download.

A new approach to the study of arithmetic circuits. In Synthesis of Arithmetic Circuits: FPGA, ASIC, and Embodied Systems, the authors take a novel approach of presenting methods and examples for the synthesis of arithmetic circuits that better reflects the needs of today's computer system designers and engineers. Unlike other publications that discuss traditional arithmetic units for general-purpose computers, this text features practical applications on embedded systems. Following an introductory chapter, the publication is divided into two parts. The first part, Mathematical Aspects and Algorithms, includes mathematical background, number representation, addition and subtraction, multiplication, division, other arithmetic operations, and operations in finite fields. The second part, Synthesis of Arithmetic Circuits, includes hardware platforms, general principles of synthesis, adders and subtractors, multipliers, dividers, and other arithmetic primitives. In addition, the publication distinguishes itself with: * A separate treatment of algorithms and circuits - a more useful presentation for both software and hardware implementations * Complete executable and synthesizable VHDL models available on the book's accompanying Web site, allowing readers to generate synthesizable descriptions * Proposed FPGA implementation examples, namely synthesizable low-level VHDL models for the Spartan II and Virtex families * Two chapters dedicated to finite field operations

This book covers selected topics of automated logic synthesis dedicated to FPGAs. The authors focused on two main problems: decomposition of the multioutput functions and technology mapping. Additionally, the idea of using binary decision diagrams (BDD) in these processes was presented. The book is a scientific monograph summarizing the authors' many years of research. As a result, it contains a large number of experimental results, which makes it a valuable source for other researchers. The book has a significant didactic value: its arrangement allows for a gradual transition from basic things (e.g., description of logic functions) to much more complex issues. This approach allows less advanced readers to better understand the described problems. In addition, the authors made sure that the issues described in the book were supported by practical examples, thanks to which the reader can independently analyze even the most complex problems described in the book.

Real-time testing and simulation of open- and closed-loop radio frequency (RF) systems for signal generation, signal analysis and digital signal processing require deterministic, low-latency, high-throughput capabilities afforded by user reconfigurable field programmable gate arrays (FPGAs). This comprehensive book introduces LabVIEW FPGA, provides best practices for multi-FPGA solutions, and guidance for developing high-throughput, low-latency FPGA based RF systems. Written by a recognized expert with a wealth of real-world experience in the field, this is the first book written on the subject of FPGAs for radar and other RF applications.

The area of VLSI design has gained enormous popularity over the past few decades due to the rapid advancements in integrated circuit (IC) design and technology. The ability to produce miniaturized circuits with high performance in terms of power and speed is the reason for its popularity. Low production cost and advanced techniques for reduced time-to-market adds to the ever-growing demand for ICs. The two major IC design flows - FPGA and ASIC - have their own advantages and disadvantages. FPGAs are widely used for quick prototyping and also implementation of various multimedia applications by compromising power, area and speed performance with substantially reduced time-to-market and cost factors. Using ASIC technology, it has been possible to develop high performance multi-core processors. Verification and testing of such complex designs is
Given that the subject of VLSI design is vast, it is quite complex to find and comprehend the complete details about the design process. This book provides an insight into practical design of VLSI circuits with minimal theoretical arguments. The content of the book is focused for novice VLSI designers and other enthusiasts who would like to understand the VLSI practical design flows. The design concepts are demonstrated using software from Mathworks(r), Xilinx(r), Mentor Graphics(r), Synopsys(r) and Cadence(r). This book presents concepts on (1) CMOS characteristics and digital design (2) Design of DSP and communication blocks on FPGA (3) ASIC front end and physical design (4) Analog and mixed signal design (5) IC fabrication and facility requirements.

This book constitutes the thoroughly refereed post-workshop proceedings of the 8th International Workshop on the Arithmetic of Finite Field, WAIFI 2020, held in Rennes, France in July 2020. Due to the COVID-19, the workshop was held online. The 12 revised full papers and 3 invited talks presented were carefully reviewed and selected from 22 submissions. The papers are organized in topical sections on invited talks, Finite Field Arithmetic, Coding Theory, Network Security and much more.

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