Verilog Digital Computer Design Algorithms Into Hardware

The skills and guidance needed to master RTL hardware design This book teaches readers how to systematically design efficient,portable, and scalable Register Transfer Level (RTL) digitalcircuits using the VHDL hardware description language and synthesissoftware. Focusing on the module-level design, which is composed offunctional units, routing circuit, and storage, the bookillustrates the relationship between the VHDL constructs and theunderlying hardware components, and shows how to develop codes thatfaithfully reflect the module-level design and can be synthesizedinto efficient gate-level implementation. Several unique features distinguish the book: * Coding style that shows a clear relationship between VHDLconstructs and hardware components * Conceptual diagrams that illustrate the realization of VHDLcodes * Emphasis on the code reuse * Practical examples that demonstrate and reinforce designconcepts, procedures, and techniques * Two chapters on realizing sequential algorithms in hardware * Two chapters on scalable and parameterized designs andcoding * One chapter covering the synchronization and interface betweenmultiple clock domains Although the focus of the book is RTL synthesis, it also examinesthe synthesis task from the perspective of the overall developmentprocess. Readers learn good design practices and guidelines toensure that an RTL design can accommodate future simulation,verification, and

testing needs, and can be easily incorporatedinto a larger system or reused. Discussion is independent oftechnology and can be applied to both ASIC and FPGA devices. With a balanced presentation of fundamentals and practicalexamples, this is an excellent textbook for upper-levelundergraduate or graduate courses in advanced digital logic.Engineers who need to make effective use of today's synthesissoftware and FPGA devices should also refer to this book.

This book serves both as an introduction to computer architecture and as a guide to using a hardware description language (HDL) to design, model and simulate real digital systems. The book starts with an introduction to Verilog - the HDL chosen for the book since it is widely used in industry and straightforward to learn. Next, the instruction set architecture (ISA) for the simple VeSPA (Very Small Processor Architecture) processor is defined - this is a real working device that has been built and tested at the University of Minnesota by the authors. The VeSPA ISA is used throughout the remainder of the book to demonstrate how behavioural and structural models can be developed and intermingled in Verilog. Although Verilog is used throughout, the lessons learned will be equally applicable to other HDLs. Written for senior and graduate students, this book is also an ideal introduction to Verilog for practising engineers.

The contents of this book are designed on the basis of the problem- based-learning (PBL) approach and follow the paradigm: design -> entry (in both schematic and HDL) -> verification as well as implementation. Based on

this paradigm, we develop an incremental learn-by-doing method to help the student to build a sound understanding in both the design principles and the implementa-tions of digital systems based on FPGA devices. Features of this book include - Lab projects are exercised with schematic entry first and then Verilog HDL entry. - Both functional and timing verification are performed in each entry method to ensure the resulting design can work properly in FPGA devices. - The incremental learn-by-doing method is applied to gradually introduce new concepts and hardware resources and increase the depth of lab projects. - The paradigm, design -> entry (in both schematic and HDL) -> verification as well as implementation, is employed to familiarize the reader with the right concept and use of the HDL entry method. - Optional lab projects are provided for readers to make realistic tests on FPGA devices. - Extended lab projects to broaden the reader's background knowledge and ca-pability. This book can be used as the textbook for the following courses: Digital Logic Design Practice, Introduction to FPGA-Based System Design, Introduction to Digital System Practice, and Introduction to Verilog HDL.

This book was written for new designers looking for a solid foundation in PCB design although designers with more experience will find the reference material, software, and explanations of the values that manufacturers use invaluable as well.

This practical introduction explains exactly how digital circuits are designed, from the basic circuit to the advanced system. It covers combinational logic circuits,

which collect logic signals, to sequential logic circuits, which embody time and memory to progress through sequences of states. The primer also highlights digital arithmetic and the integrated circuits that implement the logic functions.Based on the author's extensive experience in teaching digital electronics to undergraduates, the book translates theory directly into practice and presents the essential information in a compact, digestible style. Worked problems and examples are accompanied by abbreviated solutions, with demonstrations to ensure that the design material and the circuits' operation are fully understood.This is essential reading for any electronic or electrical engineering student new to digital electronics and requiring a succinct yet comprehensive introduction. Madhavan Swaminathanreceived his B.E. in Electronics and Communication from Regional Engineering College, Tiruchirapalli in 1985 and his M.S. and Ph.D. degrees in Electrical Engineering from Syracuse University in 1989 and 1991, respectively. He is currently the Joseph M. Pettit Professor in Electronics in the School of Electrical and Computer Engineering and Deputy Director of the Packaging Research Center, Georgia Tech. He is also the cofounder of Jacket Micro Devices, a company specializing in RF modules for wireless applications. Prior to joining Georgia Tech he was with IBM where he worked on packaging for super computers. His work on Power Integrity has won several awards and he was made an IEEE Fellow for his contributions in this area. Ege Enginreceived his B.S. and M.S. degrees in electrical engineering from Middle East Technical

University, Ankara, Turkey, and from University of Paderborn, Germany. From 2001 to 2004 he was with the Fraunhofer-Institute for Reliability and Microintegration in Berlin. During this time he also received his Ph.D. from the University of Hannover, Germany. He is currently a Research Engineer in the School of Electrical and Computer Engineering and an Assistant Research Director of the Packaging Research Center at Georgia Tech. He has more than 40 publications in refereed journals and conferences in the areas of signal and power integrity modeling and simulation. The First Comprehensive, Example-Rich Guide to Power Integrity Modeling Professionals need to thoroughly understand signal and power integrity issues in order to successfully design packages and boards for high-speed systems. Now, for the first time, there's a complete guide to power integrity modeling: everything you need to know, from the basics through the state of the art. Using realistic case studies and downloadable software examples, two leading experts demonstrate today's best techniques for designing and modeling interconnects to efficiently distribute power and minimize noise. The authors carefully introduce the core concepts of power distribution design, systematically present and compare leading techniques for modeling noise, and link these techniques to specific applications. Their many examples range from the simplest (using analytical equations to compute power supply noise) through complex system-level applications. The authors Introduce power delivery network components, analysis, high-frequency measurement, and modeling

requirements Thoroughly explain plane modeling, including plane behavior, lumped modeling, distributed circuit-based approaches, and much more Offer in-depth coverage of simultaneous switching noise, including modeling for time- and frequency-domain analysis Introduce three leading time domain simulation methods: rational function methods, signal flow graphs, and MNA Present these and other advanced case studies: high-speed servers, high-speed differential signaling, chip package analysis, embedded decoupling capacitors, and electromagnetic bandgap structures This book's system-level focus and practical examples will make it indispensable for every professional concerned with power integrity, including electrical engineers, system designers, signal integrity engineers, and materials scientists. It will also be valuable to developers building software that takes advantage of high-speed systems. During my (M.S) undergraduate days in a little town called Tiruchirapalli in Southern India, we used to have frequent voltage and current surges that knocked out all the electrical equipment such as fans and lights in our rooms. Frustrated, my friend once remarked, "We are Powerless to solve the Current problem." Of course, he meant this in jest, but little did I realize that this would become the theme of my research for many years. Though my area is on Semiconductors and computer system & Describes the engineering needs addressed by the individual EDA tools and covers EDA from both the provider and user viewpoints. & & Learn the importance of marketing and business trends in the EDA industry. &

& The EDA consortium is made up of major corporations including SUN, HP, and Intel. DIGITAL SYSTEMS DESIGN USING VERILOG integrates coverage of logic design principles, Verilog as a hardware design language, and FPGA implementation to help electrical and computer engineering students master the process of designing and testing new hardware configurations. A Verilog equivalent of authors Roth and John's previous successful text using VHDL, this practical book presents Verilog constructs side-by-side with hardware, encouraging students to think in terms of desired hardware while writing synthesizable Verilog. Following a review of the basic concepts of logic design, the authors introduce the basics of Verilog using simple combinational circuit examples, followed by models for simple sequential circuits. Subsequent chapters ask readers to tackle more and more complex designs. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version. Embedded Systems: A Contemporary Design Tool, Second Edition Embedded systems are one of the foundational elements of today's evolving and growing computer technology. From operating our cars, managing our smart phones, cleaning our homes, or cooking our meals, the special computers we call embedded systems are quietly and

unobtrusively making our lives easier, safer, and more connected. While working in increasingly challenging environments, embedded systems give us the ability to put increasing amounts of capability into ever-smaller and more powerful devices. Embedded Systems: A Contemporary Design Tool, Second Edition introduces you to the theoretical hardware and software foundations of these systems and expands into the areas of signal integrity, system security, low power, and hardware-software co-design. The text builds upon earlier material to show you how to apply reliable, robust solutions to a wide range of applications operating in today's often challenging environments. Taking the user's problem and needs as your starting point, you will explore each of the key theoretical and practical issues to consider when designing an application in today's world. Author James Peckol walks you through the formal hardware and software development process covering: Breaking the problem down into major functional blocks; Planning the digital and software architecture of the system; Utilizing the hardware and software co-design process; Designing the physical world interface to external analog and digital signals; Addressing security issues as an integral part of the design process; Managing signal integrity problems and reducing power demands in contemporary systems; Debugging and testing throughout the design and

development cycle; Improving performance. Stressing the importance of security, safety, and reliability in the design and development of embedded systems and providing a balanced treatment of both the hardware and the software aspects, Embedded Systems: A Contemporary Design Tool, Second Edition gives you the tools for creating embedded designs that solve contemporary real-world challenges.

This textbook is intended to serve as a practical guide for the design of complex digital logic circuits such as digital control circuits, network interface circuits, pipelined arithmetic units, and RISC microprocessors. It is an advanced digital logic design textbook that emphasizes the use of synthesizable Verilog code and provides numerous fully worked-out practical design examples including a Universal Serial Bus interface, a pipelined multiply-accumulate unit, and a pipelined microprocessor for the ARM THUMB architecture.

System-on-a-chip (SoC) has become an essential technique to lower product costs and maximize power efficiency, particularly as the mobility and size requirements of electronics continues to grow. It has therefore become increasingly important for electrical engineers to develop a strong understanding of the key stages of hardware description language (HDL) design flow based on cell-based libraries or field-programmable gate array

(FPGA) devices. Honed and revised through years of classroom use, Lin focuses on developing, verifying, and synthesizing designs of practical digital systems using the most widely used hardware description Language: Verilog HDL. Explains how to perform synthesis and verification to achieve optimized synthesis results and compiler times Offers complete coverage of Verilog syntax Illustrates the entire design and verification flow using an FPGA case study Presents real-world design examples such as LED and LCD displays, GPIO, UART, timers, and CPUs Emphasizes design/implementation tradeoff options, with coverage of ASICs and FPGAs Provides an introduction to design for testability Gives readers deeper understanding by using problems and review questions in each chapter Comes with downloadable Verilog HDL source code for most examples in the text Includes presentation slides of all book figures for student reference Digital System Designs and Practices Using Verilog HDL and FPGAs is an ideal textbook for either fundamental or advanced digital design courses beyond the digital logic design level. Design engineers who want to become more proficient users of Verilog HDL as well as design FPGAs with greater speed and accuracy will find this book indispensable.
A Signal Integrity Engineer's Companion Real-Time Test and Measurement and Design Simulation Geoff

Lawday David Ireland Greg Edlund Foreword by Chris Edwards, Editor, IET Electronics Systems and Software magazine Prentice Hall Modern Semiconductor Design Series Prentice Hall Signal Integrity Library Use Real-World Test and Measurement Techniques to Systematically Eliminate Signal Integrity Problems This is the industry's most comprehensive, authoritative, and practical guide to modern Signal Integrity (SI) test and measurement for high-speed digital designs. Three of the field's leading experts guide you through systematically detecting, observing, analyzing, and rectifying both modern logic signal defects and embedded system malfunctions. The authors cover the entire life cycle of embedded system design from specification and simulation onward, illuminating key techniques and concepts with easy-to-understand illustrations. Writing for all electrical engineers, signal integrity engineers, and chip designers, the authors show how to use real-time test and measurement to address today's increasingly difficult interoperability and compliance requirements. They also present detailed, start-to-finish case studies that walk you through commonly encountered design challenges, including ensuring that interfaces consistently operate with positive timing margins without incurring excessive cost; calculating total jitter budgets; and managing complex tradeoffs in high-speed serial interface

design. Coverage includes Understanding the complex signal integrity issues that arise in today's high-speed designs Learning how eye diagrams, automated compliance tests, and signal analysis measurements can help you identify and solve SI problems Reviewing the electrical characteristics of today's most widely used CMOS IO circuits Performing signal path analyses based on intuitive Time-Domain Reflectometry (TDR) techniques Achieving more accurate real-time signal measurements and avoiding probe problems and artifacts Utilizing digital oscilloscopes and logic analyzers to make accurate measurements in high-frequency environments Simulating real-world signals that stress digital circuits and expose SI faults Accurately measuring jitter and other RF parameters in wireless applications About the Authors: Dr. Geoff Lawday is Tektronix Professor in Measurement at Buckinghamshire New University, England. He delivers courses in signal integrity engineering and high performance bus systems at the University Tektronix laboratory, and presents signal integrity seminars throughout Europe on behalf of Tektronix. David Ireland, European and Asian design and manufacturing marketing manager for Tektronix, has more than 30 years of experience in test and measurement. He writes regularly on signal integrity for leading technical journals. Greg Edlund, Senior Engineer, IBM Global Engineering

Solutions division, has participated in development and testing for ten high-performance computing platforms. He authored Timing Analysis and Simulation for Signal Integrity Engineers (Prentice Hall).

Uses Verilog HDL to illustrate computer architecture and microprocessor design, allowing readers to readily simulate and adjust the operation of each design, and thus build industrially relevant skills • Introduces the computer principles, computer design, and how to use Verilog HDL (Hardware Description Language) to implement the design • Provides the skills for designing processor/arithmetic/cpu chips, including the unique application of Verilog HDL material for CPU (central processing unit) implementation • Despite the many books on Verilog and computer architecture and microprocessor design, few, if any, use Verilog as a key tool in helping a student to understand these design techniques • A companion website includes color figures, Verilog HDL codes, extra test benches not found in the book, and PDFs of the figures and simulation waveforms for instructors

Ideal for graduate and senior undergraduate courses in computer arithmetic and advanced digital design, Computer Arithmetic: Algorithms and Hardware Designs, Second Edition, provides a balanced, comprehensive treatment of computer arithmetic. It covers topics in arithmetic unit design and circuit

implementation that complement the architectural and algorithmic speedup techniques used in high-performance computer architecture and parallel processing. Using a unified and consistent framework, the text begins with number representation and proceeds through basic arithmetic operations, floating-point arithmetic, and function evaluation methods. Later chapters cover broad design and implementation topics-including techniques for high-throughput, low-power, fault-tolerant, and reconfigurable arithmetic. An appendix provides a historical view of the field and speculates on its future. An indispensable resource for instruction, professional development, and research, Computer Arithmetic: Algorithms and Hardware Designs, Second Edition, combines broad coverage of the underlying theories of computer arithmetic with numerous examples of practical designs, worked-out examples, and a large collection of meaningful problems. This second edition includes a new chapter on reconfigurable arithmetic, in order to address the fact that arithmetic functions are increasingly being implemented on field-programmable gate arrays (FPGAs) and FPGA-like configurable devices. Updated and thoroughly revised, the book offers new and expanded coverage of saturating adders and multipliers, truncated multipliers, fused multiply-add units, overlapped quotient digit selection, bipartite and

multipartite tables, reversible logic, dot notation, modular arithmetic, Montgomery modular reduction, division by constants, IEEE floating-point standard formats, and interval arithmetic. Features: * Divided into 28 lecture-size chapters * Emphasizes both the underlying theories of computer arithmetic and actual hardware designs * Carefully links computer arithmetic to other subfields of computer engineering * Includes 717 end-of-chapter problems ranging in complexity from simple exercises to mini-projects * Incorporates many examples of practical designs * Uses consistent standardized notation throughout * Instructor's manual includes solutions to text problems * An author-maintained website http://www.ece.ucsb.edu/ parhami/text comp arit.htm contains instructor resources, including complete lecture slides

The role of arithmetic in datapath design in VLSI design has been increasing in importance over the last several years due to the demand for processors that are smaller, faster, and dissipate less power. Unfortunately, this means that many of these datapaths will be complex both algorithmically and circuit wise. As the complexity of the chips increases, less importance will be placed on understanding how a particular arithmetic datapath design is implemented and more importance will be given to when a product will be placed on the market. This is because many tools that are available today, are automated to help the digital system designer maximize their efficiently. Unfortunately, this may lead to problems when implementing particular datapaths. The design of high-performance architectures is becoming more

compli cated because the level of integration that is capable for many of these chips is in the billions. Many engineers rely heavily on software tools to optimize their work, therefore, as designs are getting more complex less understanding is going into a particular implementation because it can be generated automati cally. Although software tools are a highly valuable asset to designer, the value of these tools does not diminish the importance of understanding datapath ele ments. Therefore, a digital system designer should be aware of how algorithms can be implemented for datapath elements. Unfortunately, due to the complex ity of some of these algorithms, it is sometimes difficult to understand how a particular algorithm is implemented without seeing the actual code.
Complicated concepts explained succinctly and in laymen's terms to both experienced and novice PCB designers. Numerous examples allow reader to visualize how high-end software simulators see various types of SI problems and then their solutions. Author is a frequent and recognized seminar leader in the industry.
?????????Verilog??????????,??????????????,???????????? ????????????
The annual Kes International Conference in Knowledge-based Intelligent Information Engineering Systems and Allied Technologies has become an event that is held in high regard by the intelligent systems community. The proceedings of the fifth conference represents a comprehensive survey of research on the theory and application of knowledge-based intelligent systems including topics such as: generic intelligent techniques - artificial neural networks, machine learning fuzzy and neuro-fuzzy techniques, and artificial life; applications of intelligent systems - condition monitoring, fault diagnosis, image processing, and high voltage systems; and allied technologies - communications, the Internet and web-based

technologies, e-commerce, and computer pets. The
proceedings should be of interest to those in the intelligent
systems field, such as engineers, researchers and students.
This book focuses on a specific engineering problem that is
and will continue to be important in the forth-coming
information age: namely, the need for highly integrated radio
systems that can be embedded in wireless devices for
various applications, including portable mobile multimedia
wireless communications, wireless appliances, digital cellular,
and digital cordless. Traditionally, the design of radio IC's
involves a team of engineers trained in a wide range of fields
that include networking, communication systems, radio
propagation, digital/analog circuits, RF circuits, and process
technology. However as radio IC's become more integrated,
the need for a diverse skill set and knowledge becomes
essential for professionals as well as students to broaden
beyond their trained area of expertise and to become
proficient in related areas. The key to designing an optimized,
economical solution for radio systems on a chip hinges on the
designer's thorough understanding of the complex trade-offs
from communication systems down to circuits. To acquire the
insight and understanding of the complex system and circuit
trade-offs, a designer must digest volumes of books covering
diverse topics, such as communications theory, radio
propagation, and digital/analog/RF circuits. While books are
available today that cover the individual areas, they tend to
be narrowly focused and do not provide the necessary insight
in the specific problem of integrating a complete radio system
on a chip.
Emphasizing the detailed design of various Verilog projects,
Verilog HDL: Digital Design and Modeling offers students a
firm foundation on the subject matter. The textbook presents
the complete Verilog language by describing different
modeling constructs supported by Verilog and by providing

numerous design examples and problems in each chapter. Examples include counters of different moduli, half adders, full adders, a carry lookahead adder, array multipliers, different types of Moore and Mealy machines, and much more. The text also contains information on synchronous and asynchronous sequential machines, including pulse-mode asynchronous sequential machines. In addition, it provides descriptions of the design module, the test bench module, the outputs obtained from the simulator, and the waveforms obtained from the simulator illustrating the complete functional operation of the design. Where applicable, a detailed review of the topic's theory is presented together with logic design principles, including state diagrams, Karnaugh maps, equations, and the logic diagram. Verilog HDL: Digital Design and Modeling is a comprehensive, self-contained, and inclusive textbook that carries all designs through to completion, preparing students to thoroughly understand this popular hardware description language.

It is a great pleasure to write a preface to this book. In my view, the content is unique in that it blends traditional teaching approaches with the use of mathematics and a mainstream Hardware Design Language (HDL) as formalisms to describe key concepts. The book keeps the "machine" separate from the "application" by strictly following a bottom-up approach: it starts with transistors and logic gates and only introduces assembly language programs once their execution by a processor is clearly de ned. Using a HDL, Verilog in this case, rather than static circuit diagrams is a big deviation from traditional books on computer architecture. Static circuit diagrams cannot be explored in a hands-on way like the corresponding Verilog model can. In order to understand why I consider this shift so important, one must consider how computer architecture, a subject that has been studied for more than 50 years, has evolved. In the pioneering days

computers were constructed by hand. An entire computer could (just about) be described by drawing a circuit diagram. Initially, such d- grams consisted mostly of analogue components before later moving toward d- ital logic gates. The advent of digital electronics led to more complex cells, such as half-adders, ip- ops, and decoders being recognised as useful building blocks.

Digital Design of Signal Processing Systems discusses a spectrum of architectures and methods for effective implementation of algorithms in hardware (HW). Encompassing all facets of the subject this book includes conversion of algorithms from floating-point to fixed-point format, parallel architectures for basic computational blocks, Verilog Hardware Description Language (HDL), SystemVerilog and coding guidelines for synthesis. The book also covers system level design of Multi Processor System on Chip (MPSoC); a consideration of different design methodologies including Network on Chip (NoC) and Kahn Process Network (KPN) based connectivity among processing elements. A special emphasis is placed on implementing streaming applications like a digital communication system in HW. Several novel architectures for implementing commonly used algorithms in signal processing are also revealed. With a comprehensive coverage of topics the book provides an appropriate mix of examples to illustrate the design methodology. Key Features: A practical guide to designing efficient digital systems, covering

the complete spectrum of digital design from a digital signal processing perspective Provides a full account of HW building blocks and their architectures, while also elaborating effective use of embedded computational resources such as multipliers, adders and memories in FPGAs Covers a system level architecture using NoC and KPN for streaming applications, giving examples of structuring MATLAB code and its easy mapping in HW for these applications Explains state machine based and Micro-Program architectures with comprehensive case studies for mapping complex applications The techniques and examples discussed in this book are used in the award winning products from the Center for Advanced Research in Engineering (CARE). Software Defined Radio, 10 Gigabit VoIP monitoring system and Digital Surveillance equipment has respectively won APICTA (Asia Pacific Information and Communication Alliance) awards in 2010 for their unique and effective designs.

Provides comprehensive coverage of 3D vision systems, from vision models and advanced algorithms to their hardware architectures for implementation on DSPs, FPGA and ASIC chips, and GPUs. This title aims to fill the gaps between computer vision algorithms and real-time digital circuit implementations, especially with Verilog HDL design.

From ASICs to SOCs: A Practical Approach, by

Farzad Nekoogar and Faranak Nekoogar, covers the techniques, principles, and everyday realities of designing ASICs and SOCs. Material includes current issues in the field, front-end and back-end designs, integration of IPs on SOC designs, and low-power design techniques and methodologies. Appropriate for practicing chip designers as well as graduate students in electrical engineering.
Digital Design: An Embedded Systems Approach Using Verilog provides a foundation in digital design for students in computer engineering, electrical engineering and computer science courses. It takes an up-to-date and modern approach of presenting digital logic design as an activity in a larger systems design context. Rather than focus on aspects of digital design that have little relevance in a realistic design context, this book concentrates on modern and evolving knowledge and design skills. Hardware description language (HDL)-based design and verification is emphasized--Verilog examples are used extensively throughout. By treating digital logic as part of embedded systems design, this book provides an understanding of the hardware needed in the analysis and design of systems comprising both hardware and software components. Includes a Web site with links to vendor tools, labs and tutorials. Presents digital logic design as an activity in a larger systems design context Features extensive use of Verilog examples to demonstrate HDL (hardware

description language) usage at the abstract behavioural level and register transfer level, as well as for low-level verification and verification environments Includes worked examples throughout to enhance the reader's understanding and retention of the material Companion Web site includes links to tools for FPGA design from Synplicity, Mentor Graphics, and Xilinx, Verilog source code for all the examples in the book, lecture slides, laboratory projects, and solutions to exercises High-Speed Signal Propagation: Advanced Black Magic brings together state-of-the-art techniques for building digital devices that can transmit faster and farther than ever before. Dr. Howard Johnson presents brand-new examples and design guidance, and a complete, unified theory of signal propagation for all metallic media. Coverage includes: understanding signal impairments; managing speed/distance tradeoffs; differential signaling; inter-cabinet connections; clock distribution; simulation, and much more. Useful for introductory-level courses in Verilog Hardware Description Language, this book introduces the Verilog Hardware Description Language as a different way to explore concepts in digital and computer design. It shows how synthesis is a tool for automatically converting source code into hardware, using ASM charts and examples. For an advanced course in digital design for seniors

and first-year graduate students in electrical engineering, computer engineering and computer science. This book builds on the student's background from a first course in logic design and focuses on developing, verifying and synthesizing designs of digital circuits. The Verilog language is introduced in an integrated, but selective manner, only as needed to support design examples (includes appendices for additional language details). It addresses the design of several important circuits used in computer systems, digital signal processing, image processing and other applications.

Traditional wireless sensor networks (WSNs) capture scalar data such as temperature, vibration, pressure, or humidity. Motivated by the success of WSNs and also with the emergence of new technology in the form of low-cost image sensors, researchers have proposed combining image and audio sensors with WSNs to form wireless multimedia sensor networks (WMSNs). This introduces practical and research challenges, because multimedia sensors, particularly image sensors, generate huge amounts of data to be processed and distributed within the network, while sensor nodes have restricted battery power and hardware resources. This book describes how reconfigurable hardware technologies such as field-programmable gate arrays (FPGAs) offer cost-

effective, flexible platforms for implementing WMSNs, with a main focus on developing efficient algorithms and architectures for information reduction, including event detection, event compression, and multicamera processing for hardware implementations. The authors include a comprehensive review of wireless multimedia sensor networks, a complete specification of a very low-complexity, low-memory FPGA WMSN node processor, and several case studies that illustrate information reduction algorithms for visual event compression, detection, and fusion. The book will be of interest to academic researchers, R&D engineers, and computer science and engineering graduate students engaged with signal and video processing, computer vision, embedded systems, and sensor networks.

This thorough review of the fundamental principles associated with signal integrity provides engineering principles behind signal integrity effects, and applies this understanding to solving problems.

This book is about digital system testing and testable design. The concepts of testing and testability are treated together with digital design practices and methodologies. The book uses Verilog models and testbenches for implementing and explaining fault simulation and test generation algorithms. Extensive use of Verilog and Verilog PLI for test applications is what distinguishes this book from other test and

testability books. Verilog eliminates ambiguities in test algorithms and BIST and DFT hardware architectures, and it clearly describes the architecture of the testability hardware and its test sessions. Describing many of the on-chip decompression algorithms in Verilog helps to evaluate these algorithms in terms of hardware overhead and timing, and thus feasibility of using them for System-on-Chip designs. Extensive use of testbenches and testbench development techniques is another unique feature of this book. Using PLI in developing testbenches and virtual testers provides a powerful programming tool, interfaced with hardware described in Verilog. This mixed hardware/software environment facilitates description of complex test programs and test strategies.
Verilog Hardware Description Language (HDL) is the state-of-the-art method for designing digital and computer systems. Ideally suited to describe both combinational and clocked sequential arithmetic circuits, Verilog facilitates a clear relationship between the language syntax and the physical hardware. It provides a very easy-to-learn and practical means to model a digital system at many levels of abstraction. Computer Arithmetic and Verilog HDL Fundamentals details the steps needed to master computer arithmetic for fixed-point, decimal, and floating-point number representations

for all primary operations. Silvaco International's SILOS, the Verilog simulator used in these pages, is simple to understand, yet powerful enough for any application. It encourages users to quickly prototype and de-bug any logic function and enables single-stepping through the Verilog source code. It also presents drag-and-drop abilities. Introducing the three main modeling methods—dataflow, behavioral, and structural—this self-contained tutorial— Covers the number systems of different radices, such as octal, decimal, hexadecimal, and binary-coded variations Reviews logic design fundamentals, including Boolean algebra and minimization techniques for switching functions Presents basic methods for fixed-point addition, subtraction, multiplication, and division, including the use of decimals in all four operations Addresses floating-point addition and subtraction with several numerical examples and flowcharts that graphically illustrate steps required for true addition and subtraction for floating-point operands Demonstrates floating-point division, including the generation of a zero-biased exponent Designed for electrical and computer engineers and computer scientists, this book leaves nothing unfinished, carrying design examples through to completion. The goal is practical proficiency. To this end, each chapter includes problems of varying complexity to be designed by the reader.

Comprehensive and self contained, this tutorial covers the design of a plethora of combinational and sequential logic circuits using conventional logic design and Verilog HDL. Number systems and number representations are presented along with various binary codes. Several advanced topics are covered, including functional decomposition and iterative networks. A variety of examples are provided for combinational and sequential logic, computer arithmetic, and advanced topics such as Hamming code error correction. Constructs supported by Verilog are described in detail. All designs are continued to completion. Each chapter includes numerous design issues of varying complexity to be resolved by the reader.

This is the eBook of the printed book and may not include any media, website access codes, or print supplements that may come packaged with the bound book. Advanced Digital Design with the Verilog HDL, 2e, is ideal for an advanced course in digital design for seniors and first-year graduate students in electrical engineering, computer engineering, and computer science. This book builds on the student's background from a first course in logic design and focuses on developing, verifying, and synthesizing designs of digital circuits. The Verilog language is introduced in an integrated, but selective manner, only as needed to support design examples (includes appendices for additional

language details). It addresses the design of several important circuits used in computer systems, digital signal processing, image processing, and other applications.

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