

Rabaey Chandrakasan Digital Integrated Circuits

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[Digital Integrated Circuit Design](#) Springer Science & Business Media

Low-Energy FPGAs: Architecture and Design is a primary resource for both researchers and practicing engineers in the field of digital circuit design. The book addresses the energy consumption of Field-Programmable Gate Arrays (FPGAs). FPGAs are becoming popular as embedded components in computing platforms. The programmability of the FPGA can be used to customize implementations of functions on an application basis. This leads to performance gains, and enables reuse of expensive silicon. Chapter 1 provides an overview of digital circuit design and FPGAs. Chapter 2 looks at the implication of deep-submicron technology on FPGA power dissipation. Chapter 3 describes the exploration environment to guide and evaluate design decisions. Chapter 4 discusses the architectural optimization process to evaluate the trade-offs between the flexibility of the architecture, and the effect on the performance metrics. Chapter 5 reviews different circuit techniques to reduce the performance overhead of some of the dominant components. Chapter 6 shows methods to configure FPGAs to minimize the programming overhead. Chapter 7 addresses the physical realization of some of the critical components and the final implementation of a specific low-energy FPGA. Chapter 8 compares the prototype array to an equivalent commercial architecture.

Logical Effort Cambridge University Press

This updated printing of the leading text and reference in digital systems testing and testable design provides comprehensive, state-of-the-art coverage of the field. Included are extensive discussions of test generation, fault modeling for classic and new technologies, simulation, fault simulation, design for testability, built-in self-test, and diagnosis. Complete with numerous problems, this book is a must-have for test engineers, ASIC and system designers, and CAD developers, and advanced engineering students will find this book an invaluable tool to keep current with recent changes in the field.

[Low Power Design Methodologies](#) Springer Science & Business Media

Beginning with discussions on the operation of electronic devices and analysis of the nucleus of digital design, the text addresses: the impact of interconnect, design for low power, issues in timing and clocking, design methodologies, and the effect of design automation on the digital design perspective.

[Introduction to Microelectronic Fabrication](#) Wiley

Based on the work of MIT graduate students Alice Wang and Benton Calhoun, this book surveys the field of sub-threshold and low-voltage design and explores such aspects of sub-threshold circuit design as modeling, logic and memory circuit design. One important chapter of the book is dedicated to optimizing energy dissipation - a key metric for energy constrained designs. This book also includes invited chapters on the subject of analog sub-

threshold circuits.

[CMOS Digital Integrated Circuits](#) Morgan Kaufmann

Beginning with an introduction to VLSI systems and basic concepts of MOS transistors, this second edition of the book then proceeds to describe the various concepts of VLSI, such as the structure and operation of MOS transistors and inverters, standard cell library design and its characterization, analog and digital CMOS logic design, semiconductor memories, and BiCMOS technology and circuits. It then provides an exhaustive step-wise discussion of the various stages involved in designing a VLSI chip (which includes logic synthesis, timing analysis, floor planning, placement and routing, verification, and testing). In addition, the book includes chapters on FPGA architecture, VLSI process technology, subsystem design, and low power logic circuits.

Digital Integrated Circuits Springer Science & Business Media

This practical, tool-independent guide to designing digital circuits takes a unique, top-down approach, reflecting the nature of the design process in industry. Starting with architecture design, the book comprehensively explains the why and how of digital circuit design, using the physics designers need to know, and no more.

[Energy Scavenging for Wireless Sensor Networks](#) Morgan Kaufmann

This book conveys an understanding of CMOS technology, circuit design, layout, and system design sufficient to the designer. The book deals with the technology down to the layout level of detail, thereby providing a bridge from a circuit to a form that may be fabricated. The early chapters provide a circuit view of the CMOS IC design, the middle chapters cover a sub-system view of CMOS VLSI, and the final section illustrates these techniques using a real-world case study.

[Principles of CMOS VLSI Design](#) Springer Science & Business Media

Exponential improvement in functionality and performance of digital integrated circuits has revolutionized the way we live and work. The continued scaling down of MOS transistors has broadened the scope of use for circuit technology to the point that texts on the topic are generally lacking after a few years. The second edition of *Digital Integrated Circuits: Analysis and Design* focuses on timeless principles with a modern interdisciplinary view that will serve integrated circuits engineers from all disciplines for years to come. Providing a revised instructional reference for engineers involved with Very Large Scale Integrated Circuit design and fabrication, this book delves into the dramatic advances in the field, including new applications and changes in the physics of operation made possible by relentless miniaturization. This book was conceived in the versatile spirit of the field to bridge a void that had existed between books on transistor electronics and those covering VLSI design and fabrication as a separate topic. Like the first edition, this volume is a crucial link for integrated circuit engineers and those studying the field, supplying the cross-disciplinary connections they require for guidance in more advanced work. For pedagogical reasons, the author uses SPICE level 1 computer simulation models but introduces BSIM models that are indispensable for VLSI design. This enables users to develop a strong and intuitive sense of device and circuit design by drawing direct connections between the hand analysis and the SPICE models. With four new chapters, more than 200 new illustrations, numerous worked examples, case studies, and support provided on a dynamic website, this text significantly expands concepts presented in the first edition.

Computer Architecture Pearson

This book contains all the topics of importance to the low power designer. It first lays the foundation and then goes on to detail the design process. The book also discusses such special topics as power management and modal design, ultra low power, and low power design methodology and flows. In addition, coverage includes projections of the future and case studies.

[CMOS: Analysis and Design of Analog Integrated Circuits](#) Springer Science & Business Media

ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS Authoritative and comprehensive textbook on the fundamentals of analog integrated circuits, with learning aids included throughout. Written in an accessible style to ensure complex content can be appreciated by both students and professionals, this Sixth Edition of *Analysis and Design of Analog Integrated Circuits* is a highly comprehensive textbook on analog design, offering in-depth coverage of the fundamentals of circuits in a single volume. To aid in reader comprehension and retention, supplementary material includes end of chapter problems, plus a Solution Manual for instructors. In addition to the well-established concepts, this Sixth Edition introduces a new super-source follower circuit and its large-signal behavior, frequency response, stability, and noise properties. New material also introduces replica biasing, describes and analyzes two op amps with replica biasing, and provides coverage of weighted zero-value time constants as a method to estimate the location of dominant zeros, pole-zero doublets (including their effect on settling time and three examples of circuits that create doublets), the effect of feedback on pole-zero doublets, and MOS transistor noise performance (including a thorough treatment on thermally induced gate noise). Providing complete coverage of the subject, *Analysis and Design of Analog Integrated Circuits* serves as a valuable reference for readers from many different types of backgrounds, including senior undergraduates and first-year graduate students in electrical and computer engineering, along with analog integrated-circuit designers.

Chip Design for Submicron VLSI Springer Science & Business Media

By helping students develop an intuitive understanding of the subject, *Microelectronics* teaches them to think like engineers. The second edition of Razavi's *Microelectronics* retains its hallmark emphasis on analysis by inspection and building students' design intuition, and it incorporates a host of new pedagogical features that make it easier to teach and learn from, including: application sidebars, self-check problems with answers, simulation problems with SPICE and MULTISIM, and an expanded problem set that is organized by degree of difficulty and more clearly associated with specific chapter sections.

Analysis and Design of Analog Integrated Circuits Wiley-IEEE Press

CD-ROM contains: AIM SPICE (from AIM Software) -- Micro-Cap 6 (from Spectrum Software) -- Silos III Verilog Simulator (from Simucad) -- Adobe Acrobat Reader 4.0 (from Adobe).

[Electronic Circuit & System Simulation Methods \(SRE\)](#) John Wiley & Sons

High Speed CMOS Design Styles is written for the graduate-level student or practicing engineer who is primarily interested in circuit design. It is

intended to provide practical reference, or 'horse-sense', to mechanisms typically described with a more academic slant. This book is organized so that it can be used as a textbook or as a reference book. *High Speed CMOS Design Styles* provides a survey of design styles in use in industry, specifically in the high speed microprocessor design community. Logic circuit structures, I/O and interface, clocking, and timing schemes are reviewed and described. Characteristics, sensitivities and idiosyncrasies of each are highlighted. *High Speed CMOS Design Styles* also pulls together and explains contributors to performance variability that are associated with process, applications conditions and design. Rules of thumb and practical references are offered. Each of the general circuit families is then analyzed for its sensitivity and response to this variability. *High Speed CMOS Design Styles* is an excellent source of ideas and a compilation of observations that highlight how different approaches trade off critical parameters in design and process space.

Fundamentals of Modern VLSI Devices Pearson

For courses in Theory and Fabrication of Integrated Circuits. The author's goal in writing this text was to present a concise survey of the most up-to-date techniques in the field. It is devoted exclusively to processing, and is highlighted by careful explanations, clear, simple language, and numerous fully-solved example problems. This work assumes a minimal knowledge of integrated circuits and of terminal behavior of electronic components such as resistors, diodes, and MOS and bipolar transistors.

Low Power Digital CMOS Design John Wiley & Sons

The impact of digital integrated circuits on our modern society has been pervasive. They are the enabling technology of the current computer and information-technology revolution. This is largely true because of the immense amount of signal and computer processing that can be realized in a single integrated circuit; modern IC's may contain millions of logic gates. This text book is intended to take a reader having only a minimal background and knowledge in electronics to the point where they can design state-of-the-art digital integrated circuits. Designing high-performance digital integrated circuits requires expertise in many different areas. These include semiconductor physics, integrated circuit processing, transistor-level design, logic-level design, system-level design, testing, etc. Aspects of these topics are covered throughout this text, although the emphasis is on transistor-level design of digital integrated circuits and systems. This is in contrast to the perspective in many other texts, which takes a system-level or VLSI approach where transistor-level details are minimized. It is the author's belief that before system-level considerations can be properly evaluated, an in-depth transistor-level understanding must first be obtained. Important system-level considerations such as timing, pipe-lining, clock distribution, and system building blocks are covered in detail, but the emphasis on transistors first. Throughout the book, physical and intuitive explanations are given, and although mathematical quantitative analysis of many circuits have necessarily been presented, Martin has attempted not to "miss seeing the forest because of the trees". This book presents the critical underlying concepts without becoming entangled in tedious and over-complicated circuit analyses. It is intended for senior/graduate level students in electrical and computer engineering. This course assumes the Sedra/Smith *Microelectronic Circuits* course as a prerequisite.

[Digital Integrated Circuits](#) Addison Wesley

Until the 1990s, the reduction of the minimum feature sizes used to fabricate integrated circuits, called "scaling", has highlighted serious advantages as integration density, speed, power consumption, functionality and cost. Direct consequence was the decrease of cost-per-function, so the electronic productivity has largely progressed in this period. Another usually cited trend is the evolution of the integration density as expressed by the well-known Moore's Law in 1975: the number of devices per chip doubles every 2 years. This evolution has allowed improving significantly the circuit complexity, offering a great computing power in the case of microprocessor, for example. However, since few years, significant issues appeared such as the increase of the circuit heating, device complexity, variability and difficulties to improve the integration density. These new trends generate an important growth in development and production costs. Though it is, since 40 years, the evolution of the microelectronics always followed the Moore's law and each difficulty has found a solution.

Low-Energy FPGAs — Architecture and Design Springer Science & Business Media

This book teaches the principles of physical design, layout, and simulation of CMOS integrated circuits. It is written around a very powerful CAD program called Microwind that is available on the accompanying CD-ROM. Featuring a friendly interface, Microwind is both educational and useful for designing CMOS chips.

CMOS: MIXED-SIGNAL CIRCUIT DESIGN Oxford University Press on Demand

A current trend in digital design—the integration of the MATLAB® components Simulink® and Stateflow® for model building, simulations, system testing, and fault detection—allows for better control over the design flow process and, ultimately, for better system results. *Digital Integrated Circuits: Design-for-Test Using Simulink® and Stateflow®* illustrates the construction of Simulink models for digital project test benches in certain design-for-test fields. The first two chapters of the book describe the major tools used for design-for-test. The author explains the process of Simulink model building, presents the main library blocks of Simulink, and examines the development of finite-state machine modeling using Stateflow diagrams. Subsequent chapters provide examples of Simulink modeling and simulation for the latest design-for-test fields, including combinational and sequential circuits, controllability, and observability; deterministic algorithms; digital circuit dynamics; timing verification; built-in self-test (BIST) architecture; scan cell operations; and functional and diagnostic testing. The book also discusses the automatic test pattern generation (ATPG) process, the logical determinant theory, and joint test action group (JTAG) interface models. *Digital Integrated Circuits* explores the possibilities of MATLAB's tools in the development of application-specific integrated circuit (ASIC) design systems. The book shows how to incorporate Simulink and Stateflow into the process of modern digital design.

Low Power Design Essentials Springer Science & Business Media

Special Features: · Written by the author of the best-seller, *CMOS: Circuit Design, Layout, and Simulation* · Fills a hole in the technical literature for an advanced-tutorial book on mixed-signal circuit design from a circuit designer's point of view · Presents more advanced topics, and will be an excellent companion to the first volume *About The Book: This book will fill a hole in the technical literature for an advanced-tutorial book on mixed-signal circuit design. There are no competitors in this area. Mixed-signal design is performed in industry by a select few gurus. The techniques can be found in*

hard-to-digest technical papers.

[CMOS Logic Circuit Design](#) Springer Science & Business Media

Timing, timing, timing! That is the main concern of a digital designer charged with designing a semiconductor chip. What is it, how is it described, and how does one verify it? The design team of a large digital design may spend months architecting and iterating the design to achieve the required timing target. Besides functional verification, the timing closure is the major milestone which dictates when a chip can be released to the

semiconductor foundry for fabrication. This book addresses the timing verification using static timing analysis for nanometer designs. The book has originated from many years of our working in the area of timing verification for complex nanometer designs. We have come across many design engineers trying to learn the background and various aspects of static timing analysis. Unfortunately, there is no book currently available that can be used by a working engineer to get acquainted with the details of static timing analysis. The chip designers lack a central reference for information on timing, that covers the basics to the advanced timing verification procedures and techniques.

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