Low Voltage Low Power Vlsi Subsystems

This book introduces the origin of biomedical signals and the operating principles behind them and introduces the characteristics of common biomedical signals for subsequent signal measurement and judgment. Since biomedical signals are captured by wearable devices, sensor devices, or implanted devices, these devices are all battery-powered to maintain long working time. We hope to reduce their power consumption to extend service life, especially for implantable devices, because battery replacement can only be done through surgery. Therefore, we must understand how to design low-power integrated circuits. Both implantable and in-vitro medical signal detectors require two basic components to collect and transmit biomedical signals: an analog-to-digital converter and a frequency synthesizer because these measured biomedical signals are wirelessly transmitted to the relevant receiving unit. The core unit of wireless transmission is the frequency synthesizer, which provides a wide frequency range and stable frequency to demonstrate the quality and performance of the wireless transmitter. Therefore, the basic operating principle and model of the frequency synthesizer are introduced. We also show design examples and measurement results of a low-power low-voltage integer-N frequency synthesizer for biomedical applications. The detection of biomedical signals needs to be converted into digital signals by an analog-to-digital converter to facilitate subsequent signal processing and recognition. Therefore, the operating principle of the analog-to-digital converter is introduced. We also show implementation examples and measurement results of low-power low-voltage analog-to-digital converters for biomedical applications.

PLEASE PROVIDE COURSE INFORMATION PLEASE PROVIDE

Design considerations for low-power operations and robustness with respect to variations typically impose contradictory requirements. Low-power design techniques such as voltage scaling, dual-threshold assignment and gate sizing can have large negative impact on parametric yield under process variations. This book focuses on circuit/architectural design techniques for achieving low power operation under parameter variations. We consider both logic and memory design aspects and cover modeling and analysis, as well as design methodology to achieve simultaneously low power and variation tolerance, while minimizing design overhead. This book will discuss current industrial practices and emerging challenges at future technology nodes.

Taught at the elective junior/senior and grad level, most of these courses have between 20 and 30 students. Purdue is a leading US school in the area, as are USC, Rutgers, Berkeley, Penn State, and the University of Minnesota.

INTERNATIONAL: Much of the cutting work in this area is done in Asia. Given Dr. Yeo's standing at Nangyang University, it should have a warm reception in the territory

Power-Aware Testing and Test Strategies for Low Power Devices

Logic Synthesis for Low Power VLSI Designs

Gain-Cell Embedded DRAMs for Low-Power VLSI Systems-on-Chip

Low-Power VLSI Circuits and Systems

Low Power Methodology Manual

Low Voltage, Low Power

This book pioneers the field of gain-cell embedded DRAM (GC-eDRAM) design for low-power VLSI systems-on-chip (SoCs). Novel GC-eDRAMs are specifically designed and optimized for a range of low-power VLSI SoCs, ranging from ultra-low power to power-aware high-performance applications. After a detailed review of prior-art GC-eDRAMs, an analytical retention time distribution model is introduced and validated by silicon measurements, which is key for low-power GC-eDRAM design. The book then investigates supply voltage scaling and near-threshold voltage (NTV) operation of a conventional gain cell (GC), before presenting novel GC circuit and assist techniques for NTV operation, including a 3-transistor full transmission-gate write port, reverse body biasing (RBB), and a replica technique for optimum refresh timing. Next, conventional GC bitcells are evaluated under aggressive technology and voltage scaling (down to the subthreshold domain), before novel bitcells for aggressively scaled CMOS nodes and soft-error tolerance as presented, including a 4-transistor GC with partial internal feedback and a 4-transistor GC with built-in redundancy.

A practical, comprehensive survey of SOI CMOS devices and circuitsfor microelectronics engineers The microelectronics industry is becoming increasingly dependent onSOI CMOS VLSI devices and circuits. This book is the first toaddress this important topic with a practical focus on devices andcircuits. It provides an up-to-date survey of the current knowledgeregarding SOI device behaviors and describes state-of-the-artlow-voltage CMOS VLSI analog and digital circuit techniques. Low-Voltage SOI CMOS VLSI Devices and Circuits covers the entirefield, from basic concepts to the most advanced ideas. Topicsinclude: * SOI device behavior: fundamental and floating body effects, hotcarrier effects, sensitivity, reliability, self-heating, breakdown,ESD, dual-gate devices, accumulation-mode devices, short channeleffects, and narrow channel effects * Low-voltage SOI digital circuits: floating body effects, DRAM,SRAM, static logic, dynamic logic, gate array, CPU, frequencydivider, and DSP * Low-voltage SOI analog circuits: op amps, filters, ADC/DAC,sigma-delta modulators, RF circuits, VCO, mixers, low-noiseamplifiers, and high-temperature circuits With over 300 references to the state of the art and over 300important figures on low-voltage SOI CMOS devices and circuits,this volume serves as an authoritative, reliable resource forengineers designing these circuits in high-tech industries.

Practical Low Power Digital VLSI Design emphasizes the optimization and trade-off techniques that involve power dissipation, in the hope that the readers are better prepared the next time they are presented with a low power design problem. The book highlights the basic principles, methodologies and techniques that are common to most CMOS digital designs. The advantages and disadvantages of a particular low power technique are discussed. Besides the classical area-performance trade-off, the impact to design cycle time, complexity, risk, testability and reusability are discussed. The wide impacts to all aspects of design are what make low power problems challenging and interesting.

Heavy emphasis is given to top-down structured design style, with occasional coverage in the semicustom design methodology. The examples and design techniques cited have been known to be applied to production scale designs or laboratory settings. The goal of Practical Low Power Digital VLSI Design is to permit the readers to practice the low power techniques using current generation design style and process technology. Practical Low Power Digital VLSI Design considers a wide range of design abstraction levels spanning circuit, logic, architecture and system. Substantial basic knowledge is provided for qualitative and quantitative analysis at the different design abstraction levels. Low power techniques are presented at the circuit, logic, architecture and system levels. Special techniques that are specific to some key areas of digital chip design are discussed as well as some of the low power techniques that are just appearing on the horizon. Practical Low Power Digital VLSI Design will be of benefit to VLSI design engineers and students who have a fundamental knowledge of CMOS digital design.

Low Power Design Methodologies presents the first in-depth coverage of all the layers of the design hierarchy, ranging from the technology, circuit, logic and architectural levels, up to the system layer. The book gives insight into the mechanisms of power dissipation in digital circuits and presents state of the art approaches to power reduction. Finally, it introduces a global view of low power design methodologies and how these are being captured in the latest design automation environments. The individual chapters are written by the leading researchers in the area, drawn from both industry and academia. Extensive references are included at the end of each chapter. Audience: A broad introduction for anyone interested in low power design. Can also be used as a text book for an advanced graduate class. A starting point for any aspiring researcher.

Low Power VLSI Design and Technology

Design of Low-Voltage, Low-Power Operational Amplifier Cells

Ultra Low Power Bioelectronics

Low-Voltage Mixed-Signal Circuits

Low-Voltage CMOS VLSI Circuits

Low Power VLSI Design

The book provides a comprehensive coverage of different aspects of low power circuit synthesis at various levels of design hierarchy; starting from the layout level to the system level. For a seamless understanding of the subject, basics of MOS circuits has been introduced at transistor, gate and circuit level; followed by various low-power design methodologies, such as supply voltage scaling, switched capacitance minimization techniques and leakage power minimization approaches. The content of this book will prove useful to students, researchers, as well as practicing engineers.

Designers developing the low voltage, low power chips that enable small, portable devices, face a very particular set of challenges. This monograph details cutting-edge design techniques for the low power circuitry required by the many new miniaturized business and consumer products driving the electronics market.

Low Power Consumption is one of the critical issues in the performance of small battery-powered handheld devices. Mobile terminals feature an ever increasing number of wireless communication alternatives including GPS, Bluetooth, GSM, 3G, WiFi or DVB-H. Considering that the total power available for each terminal is limited by the relatively slow increase in battery performance expected in the near future, the need for efficient circuits is now critical. This book presents the basic techniques available to design low power RF CMOS analogue circuits. It gives circuit designers a complete guide of alternatives to optimize power consumption and explains the application of these rules in the most common RF building blocks: LNA, mixers and PLLs. It is set out using practical examples and offers a unique perspective as it targets designers working within the standard CMOS process and all the limitations inherent in these technologies.

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.

Ultra-Low-Voltage Frequency Synthesizer and Successive-Approximation Analog-to-Digital Converter for Biomedical Applications

Current Mode Approaches to Low Voltage/power VLSI Design for Portable Mixed Signal System Circuits and Systems

Low-Power Low-Voltage, Integrated Filters and Smart Power

Circuit Design, Comparative Study, and Sensitivity Analysis

CMOS VLSI Subsystems for Low-voltage Low-power Applications

The realization of signal sampling and quantization at high sample rates with low power dissipation is an important goal in many applications, includ ing portable video devices such as camcorders, personal communication devices such as wireless LAN transceivers, in the read channels of magnetic storage devices using digital data detection, and many others. This paper describes architecture and circuit approaches for the design of high-speed, low-power pipeline analog-to-digital converters in CMOS. Here the term high speed is taken to imply sampling rates above 1 Mhz. In the first section the dif ferent *conversion techniques applicable in this range of sample rates is dis cussed. Following that the particular problems associated with power minimization in video-rate pipeline ADCs is discussed. These include optimi zation of capacitor sizes, design of low-voltage transmission gates, and opti mization of switched capacitor gain blocks and operational amplifiers for minimum power dissipation. As an example of the application of these tech niques, the design of a power-optimized lO-bit pipeline AID converter (ADC) that achieves =1. 67 mW per MS/s of sampling rate from 1 MS/s to 20 MS/s is described. 2. Techniques for CMOS Video-Rate AID Conversion Analog-to-digital conversion techniques can be categorized in many ways. One convenient means of comparing techniques is to examine the number of "analog clock cycles" required to produce one effective output sample of the signal being quantized.*

Electrical Engineering Low-Voltage/Low-Power Integrated Circuits and Systems Low-Voltage Mixed-Signal Circuits Leading experts in the field present this collection of original contributions as a practical approach to low-power analog and digital circuit theory and design, illustrated with important applications and examples. Low-Voltage/Low-Power Integrated Circuits and Systems features comprehensive coverage of the latest techniques for the design, modeling, and characterization of low-power analog and digital circuits. Low-Voltage/Low-Power Integrated Circuits and Systems will help you improve your understanding of the trade-offs between analog and digital circuits and systems. It is an invaluable resource for enhancing your designs. This book is intended for senior and graduate students. It is also intended as a key reference for designers in the semiconductor and communication industries. Highlighted applications include: Low-voltage analog filters Low-power multiplierless YUV to RGB based on human vision perception Micropower systems for implantable defibrillators and pacemakers Neuromorphic systems Low-power design in telecom circuits

Low-power and low-energy VLSI has become an important issue in today's consumer electronics.This book is a collection of pioneering applied research papers in low power VLSI design and technology.A comprehensive introductory chapter presents the current status of the industry and academic research in the area of low power VLSI design and technology.Other topics cover logic synthesis, floorplanning, circuit design and analysis, from the perspective of low power requirements.The readers will have a sampling of some key problems in this area as the low power solutions span the entire spectrum of the design process. The book also provides excellent references on up-to-date research and development issues with practical solution techniques.

Oversampling techniques based on sigma-delta modulation are widely used to implement the analog/digital interfaces in CMOS VLSI technologies. This approach is relatively insensitive to imperfections in the manufacturing process and offers numerous advantages for the realization of high-resolution analog-to-digital (A/D) converters in the low-voltage environment that is increasingly demanded by advanced VLSI technologies and by portable electronic systems. In The Design of Low-Voltage, Low-Power Sigma-Delta Modulators, an analysis of power dissipation in sigma-delta modulators is presented, and a low-voltage implementation of a digital-audio performance A/D converter based on the results of this analysis is described. Although significant power savings can typically be achieved in digital circuits by reducing the power supply voltage, the power dissipation in analog circuits actually tends to increase with decreasing supply voltages. Oversampling architectures are a potentially power-efficient means of implementing high-resolution A/D converters because they reduce the number and complexity of the analog circuits in comparison with Nyquist-rate converters. In fact, it is shown that the power dissipation of a sigma-delta modulator can approach that of a single integrator with the resolution and bandwidth required for a given application. In this research the influence of various parameters on the power dissipation of the modulator has been evaluated and strategies for the design of a power-efficient implementation have been identified. The Design of Low-Voltage, Low-Power Sigma-Delta Modulators begins with an overview of A/D conversion, emphasizing sigma-delta modulators. It includes a detailed analysis of noise in sigma-delta modulators, analyzes power dissipation in integrator circuits, and addresses practical issues in the circuit design and testing of a high-resolution modulator. The Design of Low-Voltage, Low-Power Sigma-Delta Modulators will be of interest to practicing engineers and researchers in the areas of mixed-signal and analog integrated circuit design.

The Design of Low-Voltage, Low-Power Sigma-Delta Modulators

Low-Power CMOS Design

Low Voltage,Low Power Vlsi

From VLSI Architectures to CMOS Fabrication

Low-voltage, Low-power Digital BiCMOS Circuits

Low-Power CMOS Circuits

Logic Synthesis for Low Power VLSI Designs presents a systematic and comprehensive treatment of power modeling and optimization at the logic level. More precisely, this book provides a detailed presentation of methodologies, algorithms and CAD tools for power modeling, estimation and analysis, synthesis and optimization at the logic level. Logic Synthesis for Low Power VLSI Designs contains detailed descriptions of technology-dependent logic transformations and optimizations, technology decomposition and mapping, and post-mapping structural optimization techniques for low power. It also emphasizes the trade-off techniques for two-level and multi-level logic circuits that involve power dissipation and circuit speed, in the hope that the readers can better understand the issues and ways of achieving their power dissipation goal while meeting the timing constraints. Logic Synthesis for Low Power VLSI Designs is written for VLSI design engineers, CAD professionals, and students who have had a basic knowledge of CMOS digital design and logic synthesis.

This book describes methodologies in the design of VLSI devices, circuits and their applications at nanoscale levels. The book begins with the discussion on the dominant role of power dissipation in highly scaled devices.The 15 Chapters of the book are classified under four sections that cover design, modeling, and simulation of electronic, magnetic and compound semiconductors for their applications in VLSI devices, circuits, and systems. This comprehensive volume eloquently presents the design methodologies for ultra–low power VLSI design, potential post–CMOS devices, and their applications from the architectural and system

perspectives. The book shall serve as an invaluable reference book for the graduate students, Ph.D./ M.S./ M.Tech. Scholars, researchers, and practicing engineers working in the frontier areas of nanoscale VLSI design.

This book provides, for the first time, a broad and deep treatment of the fields of both ultra low power electronics and bioelectronics. It discusses fundamental principles and circuits for ultra low power electronic design and their applications in biomedical systems. It also discusses how ultra energy efficient cellular and neural systems in biology can inspire revolutionary low power architectures in mixed-signal and RF electronics. The book presents a unique, unifying view of ultra low power analog and digital electronics and emphasizes the use of the ultra energy efficient subthreshold regime of transistor operation in both. Chapters on batteries, energy harvesting, and the future of energy provide an understanding of fundamental relationships between energy use and energy generation at small scales and at large scales. A wealth of insights and examples from brain implants, cochlear implants, bio-molecular sensing, cardiac devices, and bio-inspired systems make the book useful and engaging for students and practicing engineers.

Intellectual Property for Integrated Circuits provides inventors with the know-how to effectively search for and interpret prior arts and equips them with the knowledge to be granted exclusive rights to control the results of their creativity and to benefit financially from those rights.

Low-Power Digital VLSI Design

Low-Power Variation-Tolerant Design in Nanometer Silicon

Devices, Circuits and Applications

CMOS/BiCMOS ULSI

Low Power Digital CMOS Design

Design and Modeling of Low Power VLSI Systems

This book provides a practical guide for engineers doing low power System-on-Chip (SoC) designs. It covers various aspects of low power design from architectural issues and design techniques to circuit design of power gating switches. In addition to providing a theoretical basis for these techniques, the book addresses the practical issues of implementing them in today's designs with today's tools.

Power consumption has become a major design consideration for battery-operated, portable systems as well as high-performance, desktop systems. Strict limitations on power dissipation must be met by the designer while still meeting ever higher computational requirements. A comprehensive approach is thus required at all levels of system design, ranging from algorithms and architectures to the logic styles and the underlying technology. Potentially one of the most important techniques involves combining architecture optimization with voltage scaling, allowing a trade-off between silicon area and low-power operation. Architectural optimization enables supply voltages of the order of 1 V using standard CMOS technology. Several techniques can also be used to minimize the switched capacitance, including representation, optimizing signal correlations, minimizing spurious transitions, optimizing sequencing of operations, activity-driven power down, etc. The high- efficiency of DC-DC converter circuitry required for efficient, low-voltage and low-current level operation is described by Stratakos, Sullivan and Sanders. The application of various low-power techniques to a chip set for multimedia applications shows that orders-of-magnitude reduction in power consumption is possible. The book also features an analysis by Professor Meindl of the fundamental limits of power consumption achievable at all levels of the design hierarchy. Svensson, of ISI, describes emerging adiabatic switching techniques that can break the CV2f barrier and reduce the energy per computation at a fixed voltage. Srivastava, of AT&T, presents the application of aggressive shut-down techniques to microprocessor applications.

Very Large Scale Integration (VLSI) Systems refer to the latest development in computer microchips which are created by integrating hundreds of thousands of transistors into one chip. Emerging research in this area has the potential to uncover further applications for VSLI technologies in addition to system advancements. Design and Modeling of Low Power VLSI Systems analyzes various traditional and modern low power techniques for integrated circuit design in addition to the limiting factors of existing techniques and methods for optimization. Through a research-based discussion of the technicalities involved in the VLSI hardware development process cycle, this book is a useful resource for researchers, engineers, and graduate-level students in computer science and engineering.

This concise and modern book on current conveyors considers first and second-generation devices in a general environment and for low-voltage low-power applications. It constitutes an excellent reference for analogue designers and researchers and is suitable as a textbook in an advanced course on microelectronics.

Fundamentals

Mixed Signal VLSI Wireless Design

Low Power RF Circuit Design in Standard CMOS Technology

Low-Power Electronics Design

Semiconductor Devices and Technologies for Future Ultra Low Power Electronics

Low Voltage, Low Power VLSI Subsystems

Geared to the needs of engineers and designers in the field, this unique volume presents a remarkably detailed analysis of one of the hottest and most compelling research topics in microelectronics today - namely, low-voltage CMOS VLSI circuit techniques for VLSI systems. It features complete guidelines to diversified low-voltage and low-power circuit techniques, emphasizing the role of submicron and CMOS processing technology and device modeling in the circuit designs of low-voltage CMOS VLSI.

The power consumption of integrated circuits is one of the most problematic considerations affecting the design of high-performance chips and portable devices. The study of power-saving design methodologies now must also include subjects such as systems on chips, embedded software, and the future of microelectronics. Low-Power Electronics Design covers all major aspects of low-power design of ICs in deep submicron technologies and addresses emerging topics related to future design. This volume explores, in individual chapters written by expert authors, the many low-power techniques born during the past decade. It also discusses the many different domains and disciplines that impact power consumption, including processors, complex circuits, software, CAD tools, and energy sources and management. The authors delve into what many specialists predict about the future by presenting techniques that are promising but are not yet reality. They investigate nanotechnologies, optical circuits, ad hoc networks, e-textiles, as well as human powered sources of energy. Low-Power Electronics Design delivers a complete picture of today's methods for reducing power, and also illustrates the advances in chip design that may be commonplace 10 or 15 years from now.

This is the first book devoted to low power circuit design, and its authors have been among the first to publish papers in this area.· Low-Power CMOS VLSI Design· Physics of Power Dissipation in CMOS FET Devices· Power Estimation· Synthesis for Low Power· Design and Test of Low-Voltage CMOS Circuits· Low-Power Static Ram Architectures· Low-Energy Computing Using Energy Recovery Techniques· Software Design for Low Power

Low-Power Digital VLSI Design: Circuits and Systems addresses both process technologies and device modeling. Power dissipation in CMOS circuits, several practical circuit examples, and low-power techniques are discussed. Low-voltage issues for digital CMOS and BiCMOS circuits are emphasized. The book also provides an extensive study of advanced CMOS subsystem design. A low-power design methodology is presented with various power minimization techniques at the circuit, logic, architecture and algorithm levels. Features: Low-voltage CMOS device modeling, technology files, design rules Switching activity concept, low-power guidelines to engineering practice Pass-transistor logic families Power dissipation of I/O circuits Multi- and low-VT CMOS logic, static power reduction circuit techniques State of the art design of low-voltage BiCMOS and CMOS circuits Low-power techniques in CMOS SRAMS and DRAMS Low-power on-chip voltage down converter design Numerous advanced CMOS subsystems (e.g. adders, multipliers, data path, memories, regular structures, phase-locked loops) with several design options trading power, delay and area Low-power design methodology, power estimation techniques Power reduction techniques at the logic, architecture and algorithm levels More than 190 circuits explained at the transistor level.

Low-Voltage/Low-Power Integrated Circuits and Systems

Sub-threshold Design for Ultra Low-Power Systems

Low-Voltage SOI CMOS VLSI Devices and Circuits

Nanoscale VLSI

Practical Low Power Digital VLSI Design

For System-on-Chip Design

"Wireless is coming" was the message received by VLSI designers in the early 1990's. They believed it. But they never imagined that the wireless wave would be coming with such intensity and speed. Today one of the most challenging areas for VLSI designers is VLSI circuit and system design for wireless applications. New generation of wireless systems, which includes multimedia, put severe constraints on performance, cost, size, power and energy. The challenge is immense and the need for new generation of VLSI designers, who are fluent in wireless communication and are masters of mixed signal design, is great. No single text or reference book contains the necessary material to educate such needed new generation of VLSIdesigners. There are gaps. Excellent books exist on communication theory and systems, including wireless applications and others treat well basic digital, analog and mixed signal VLSI design. We feel that this book is the first of its kind to fill that gap. In the first half of this book we offer the reader (the VLSI designer) enough material to understand wireless communication systems. We start with a historical account. And then we present an overview of wireless communication systems. This is followed by detailed treatment of related topics; the mobile radio, digital modulation and schemes, spread spectrum and receiver architectures. The second half of the book deals with VLSI design issues related to mixed-signal design. These include analog-to-digital conversion, transceiver design, digital low-power techniques, amplifier design, phase locked loops and frequency synthesizers.

Design of Low-Voltage, Low-Power CMOS Operational Amplifier Cells describes the theory and design of the circuit elements that are required to realize a low-voltage, low-power operational amplifier. These elements include constant-gm rail-to-rail input stages, class-AB rail-to-rail output stages and frequency compensation methods. Several examples of each of these circuit elements are investigated. Furthermore, the book illustrates several silicon realizations, giving their measurement results. The text focuses on compact low-voltage low-power operational amplifiers with good performance. Six simple high-performance class-AB amplifiers are realized using a very compact topology making them particularly suitable for use as VLSI library cells. All of the designs can use a supply voltage as low as 3V. One of the amplifier designs dissipates only 50µW with a unity gain frequency of 1.5 MHz. A second set of amplifiers run on a supply voltage slightly above 1V. The amplifiers combine a low power consumption with a gain of 120 dB. In addition, the design of three fully differential operational amplifiers is addressed. Design of Low-Voltage, Low-Power CMOS Operational Amplifier Cells is intended for professional designers of analog circuits. It is also suitable for use as a text book for an advanced course in CMOS operational amplifier design.

This book covers the fundamentals and significance of 2-D materials and related semiconductor transistor technologies for the next-generation ultra low power applications. It provides comprehensive coverage on advanced low power transistors such as NCFETs, FinFETs, TFETs, and flexible transistors for future ultra low power applications owing to their better subthreshold swing and scalability. In addition, the text examines the use of field-effect transistors for biosensing applications and covers design considerations and compact modeling of advanced low power transistors such as NCFETs, FinFETs, and TFETs. TCAD simulation examples are also provided. FEATURES Discusses the latest updates in the field of ultra low power semiconductor transistors Provides both experimental and analytical solutions for TFETs and NCFETs Presents synthesis and fabrication processes for FinFETs Reviews details on 2-D materials and 2-D transistors Explores the application of FETs for biosensing in the healthcare field This book is aimed at researchers, professionals, and graduate students in electrical engineering, electronics and communication engineering, electron devices, nanoelectronics and nanotechnology, microelectronics, and solid-state circuits.

Top-down approach to practical, tool-independent, digital circuit design, reflecting how circuits are designed.

Low Power Design Essentials

Analog Circuit Design

Digital Integrated Circuit Design

Technology, Logic Design and CAD Tools

Low Power Design Methodologies

Intellectual Property for Integrated Circuits

Managing the power consumption of circuits and systems is now considered one of the most important challenges for the semiconductor industry. Elaborate power management strategies, such as dynamic voltage scaling, clock gating or power gating techniques, are used today to control the power dissipation during functional operation. The usage of these strategies has various implications on manufacturing test, and power-aware test is therefore increasingly becoming a major consideration during design-for-test and test preparation for low power devices. This book explores existing solutions for power-aware test and design-for-test of conventional circuits and systems, and surveys test strategies and EDA solutions for testing low power devices.

The power consumption of microprocessors is one of the most important challenges of high-performance chips and portable devices. In chapters drawn from Piguet's recently published Low-Power Electronics Design, Low-Power CMOS Circuits: Technology, Logic Design, and CAD Tools addresses the design of low-power circuitry in deep submicron technologies. It provides a focused reference for specialists involved in designing low-power circuitry, from transistors to logic gates. The book is organized into three broad sections for convenient access. The first examines the history of low-power electronics along with a look at emerging and possible future technologies. It also considers other technologies, such as nanotechnologies and optical chips, that may be useful in designing integrated circuits. The second part explains the techniques used to reduce power consumption at low levels. These include clock gating, leakage reduction, interconnecting and communication on chips, and adiabatic circuits. The final section discusses various CAD tools for designing low-power circuits. This section includes three chapters that demonstrate the tools and low-power design issues at three major companies that produce logic synthesizers. Providing detailed examinations contributed by leading experts, Low-Power CMOS Circuits: Technology, Logic Design, and CAD Tools supplies authoritative information on how to design and model for high performance with low power consumption in modern integrated circuits. It is a must-read for anyone designing modern computers or embedded systems.

For upper level and graduate level Electrical and Computer Engineering courses in Integrated Circuit Design as well as professional circuit designers, engineers and researchers working in portable wireless communications hardware. This book presents the fundamentals of Complementary Metal Oxide Semiconductor (CMOS) and Bipolar compatible Complementary Metal Oxide Semiconductor (BiCMOS) technology, as well as the latest technological advances in the field. It discusses the concepts and techniques of new integrated circuit design for building high performance and low power circuits and systems for current and future very-large-scale-integration (VLSI) and giga-scale-integration (GSI) applications. CMOS/BiCMOS ULSI: Low-Voltage Low-Power is an essential resource for every professional moving toward lower voltage, lower power, and higher performance VLSI circuits and subsystems design.

This collection of important papers provides a comprehensive overview of low-power system design, from component technologies and circuits to architecture, system design, and CAD techniques. LOW POWER CMOS DESIGN summarizes the key low-power contributions through papers written by experts in this evolving field.

Low-Power Cmos Vlsi Circuit Design

Low-Voltage Low-Power CMOS Current Conveyors

Fundamentals, Biomedical Applications, and Bio-Inspired Systems

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.

This book teaches basic and advanced concepts, new methodologies and recent developments in VLSI technology with a focus on low power design. It provides insight on how to use Tanner Spice, Cadence tools, Xilinx tools, VHDL programming and Synopsis to design simple and complex circuits using latest state-of-the art technologies. Emphasis is placed on fundamental transistor circuit-level design concepts.