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Engineering Embedded SystemsA New Family of CMOS Cascode-Free Amplifiers with High Energy-Efficiency and Improved Gain2020 33rd International Conference on VLSI Design and 2020 19th International Conference on Embedded Systems (VLSID)CMOS Digital Integrated CircuitsCurrent Sense Amplifiers for Embedded SRAM in High-Performance System-on-a-Chip DesignsProceedingsIEEE International Workshop on IDDQ TestingOperational AmplifiersIEICE Transactions on ElectronicsNanoelectronic DevicesEDNProceedingsEmbedded Flash Memory for Embedded Systems: Technology, Design for Sub-systems, and InnovationsMillimeter-Wave Digitally Intensive Frequency Generation in CMOSEmbedded Computing and Mechatronics with the PIC32 MicrocontrollerDesigning Embedded Hardware2001 4th International Conference on ASICVLSI Memory Chip DesignVLSI Design and TestRecords of the 2002 IEEE International Workshop on Memory Technology, Design and TestingAnalog Interfacing to Embedded Microprocessor SystemsWearable Electronics and Embedded Computing Systems for Biomedical ApplicationsHydrodynamic LubricationOp Amps for EveryoneReal-Time Embedded SystemsElectric

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Microelectronics
Circuits, Systems, and Motors
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Nanoscale Semiconductor Memories
Ultra-Wideband Pulse-based Radio
Electronics - Circuits and Systems
CMOS Digital Integrated Circuits Analysis & Design

Engineering Embedded Systems

This book provides readers with the knowledge in fundamentals of nanoelectronic devices. The authors build the principles of nanoelectronic devices based on those of microelectronic devices wherever possible and introduce the inherently nanoelectronic principles gradually. They briefly review quantum mechanics and solid-state physics that can form the basis of semiconductor device physics. The book also covers the basics of electron transport and p-n junctions, develops the operations of MOS capacitors and MOSFETs, and introduces some basic CMOS circuits. The last chapter is devoted to the nano-biotechnology application of field-effect transistors.

A New Family of CMOS Cascode-Free

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Amplifiers with High Energy-Efficiency and Improved Gain

Embedded Systems Architecture is a practical and technical guide to understanding the components that make up an embedded system's architecture. This book is perfect for those starting out as technical professionals such as engineers, programmers and designers of embedded systems; and also for students of computer science, computer engineering and electrical engineering. It gives a much-needed 'big picture' for recently graduated engineers grappling with understanding the design of real-world systems for the first time, and provides professionals with a systems-level picture of the key elements that can go into an embedded design, providing a firm foundation on which to build their skills. Real-world approach to the fundamentals, as well as the design and architecture process, makes this book a popular reference for the daunted or the inexperienced: if in doubt, the answer is in here! Fully updated with new coverage of FPGAs, testing, middleware and the latest programming techniques in C, plus complete source code and sample code, reference designs and tools online make this the complete package Visit the companion web site at <http://booksite.elsevier.com/9780123821966/> for source code, design examples, data sheets and more A true introductory book, provides a comprehensive get up and running reference for those new to the field, and updating skills: assumes no prior knowledge beyond undergrad level electrical engineering Addresses the needs of practicing engineers, enabling

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it to get to the point more directly, and cover more ground. Covers hardware, software and middleware in a single volume Includes a library of design examples and design tools, plus a complete set of source code and embedded systems design tutorial materials from companion website

2020 33rd International Conference on VLSI Design and 2020 19th International Conference on Embedded Systems (VLSID)

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CMOS Digital Integrated Circuits

This text presents the proceedings of the IEEE 4th International Conference on ASIC.

Current Sense Amplifiers for Embedded SRAM in High-Performance System-on-a-Chip Designs

Proceedings

IEEE International Workshop on IDDQ Testing

This is a textbook for graduate and final-year-

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undergraduate computer-science and electrical-engineering students interested in the hardware and software aspects of embedded and cyberphysical systems design. It is comprehensive and self-contained, covering everything from the basics to case-study implementation. Emphasis is placed on the physical nature of the problem domain and of the devices used. The reader is assumed to be familiar on a theoretical level with mathematical tools like ordinary differential equation and Fourier transforms. In this book these tools will be put to practical use. Engineering Embedded Systems begins by addressing basic material on signals and systems, before introducing to electronics. Treatment of digital electronics accentuating synchronous circuits and including high-speed effects proceeds to micro-controllers, digital signal processors and programmable logic. Peripheral units and decentralized networks are given due weight. The properties of analog circuits and devices like filters and data converters are covered to the extent desirable by a systems architect. The handling of individual elements concludes with power supplies including regulators and converters. The final section of the text is composed of four case studies: • electric-drive control, permanent magnet synchronous motors in particular; • lock-in amplification with measurement circuits for weight and torque, and moisture; • design of a simple continuous wave radar that can be operated to measure speed and distance; and • design of a Fourier transform infrared spectrometer for process applications. End-of-chapter exercises will assist the student to assimilate the tutorial material and these are supplemented by a

downloadable solutions manual for instructors. The “pen-and-paper” problems are further augmented with laboratory activities. In addition to its student market, Engineering Embedded Systems will assist industrial practitioners working in systems architecture and the design of electronic measurement systems to keep up to date with developments in embedded systems through self study.

Operational Amplifiers

IEICE Transactions on Electronics

Nanoscale memories are used everywhere. From your iPhone to a supercomputer, every electronic device contains at least one such type. With coverage of current and prototypical technologies, Nanoscale Semiconductor Memories: Technology and Applications presents the latest research in the field of nanoscale memories technology in one place. It also covers a myriad of applications that nanoscale memories technology has enabled. The book begins with coverage of SRAM, addressing the design challenges as the technology scales, then provides design strategies to mitigate radiation induced upsets in SRAM. It discusses the current state-of-the-art DRAM technology and the need to develop high performance sense amplifier circuitry. The text then covers the novel concept of capacitorless 1T DRAM, termed as Advanced-RAM or A-RAM, and presents a discussion on quantum dot (QD) based flash memory.

Building on this foundation, the coverage turns to STT-RAM, emphasizing scalable embedded STT-RAM, and the physics and engineering of magnetic domain wall "racetrack" memory. The book also discusses state-of-the-art modeling applied to phase change memory devices and includes an extensive review of RRAM, highlighting the physics of operation and analyzing different materials systems currently under investigation. The hunt is still on for universal memory that fits all the requirements of an "ideal memory" capable of high-density storage, low-power operation, unparalleled speed, high endurance, and low cost. Taking an interdisciplinary approach, this book bridges technological and application issues to provide the groundwork for developing custom designed memory systems.

Nanoelectronic Devices

This volume contains papers from the 1997 IEEE International Workshop on IDDQ testing.

EDN

This book is a printed edition of the Special Issue "Real-Time Embedded Systems" that was published in Electronics

Proceedings

.. the ninth in a series of annual workshops "--P. vii.

Embedded Flash Memory for Embedded

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Systems: Technology, Design for Sub-systems, and Innovations

Incredible demand on functionality in a chip in a given power thermal envelope forcing transistor geometries go smaller which is imposing newer challenges in VLSI design and associated EDA tools flows methodologies In 33rd International Conference of VLSI Design and 19th International Conference on Embedded Design, we plan to bring together all the leaders from industries, academia, industry bodies, government, standard organizations to go over all technology enablers in an outside in approach to design VLSI which includes intelligent systems design, new techniques in algorithms, HW SW Protocol standards, core VLSI design, EDA tools flows methodologies and core silicon technologies

Millimeter-Wave Digitally Intensive Frequency Generation in CMOS

This book provides a comprehensive introduction to embedded flash memory, describing the history, current status, and future projections for technology, circuits, and systems applications. The authors describe current main-stream embedded flash technologies from floating-gate 1Tr, floating-gate with split-gate (1.5Tr), and 1Tr/1.5Tr SONOS flash technologies and their successful creation of various applications. Comparisons of these embedded flash technologies and future projections are also provided. The authors demonstrate a variety of embedded applications for auto-motive, smart-IC cards, and low-

power, representing the leading-edge technology developments for eFlash. The discussion also includes insights into future prospects of application-driven non-volatile memory technology in the era of smart advanced automotive system, such as ADAS (Advanced Driver Assistance System) and IoE (Internet of Everything). Trials on technology convergence and future prospects of embedded non-volatile memory in the new memory hierarchy are also described. Introduces the history of embedded flash memory technology for micro-controller products and how embedded flash innovations developed; Includes comprehensive and detailed descriptions of current main-stream embedded flash memory technologies, sub-system designs and applications; Explains why embedded flash memory requirements are different from those of stand-alone flash memory and how to achieve specific goals with technology development and circuit designs; Describes a mature and stable floating-gate 1Tr cell technology imported from stand-alone flash memory products - that then introduces embedded-specific split-gate memory cell technologies based on floating-gate storage structure and charge-trapping SONOS technology and their eFlash sub-system designs; Describes automotive and smart-IC card applications requirements and achievements in advanced eFlash beyond 4 0nm node.

Embedded Computing and Mechatronics with the PIC32 Microcontroller

This textbook provides an introduction to circuits,

systems, and motors for students in electrical engineering as well as other majors that need an introduction to circuits. Unlike most other textbooks that highlight only circuit theory, this book goes into detail on many practical aspects of working with circuits, including electrical safety and the proper method to measure the relevant circuit parameters using modern measurement systems. Coverage also includes a detailed discussion of motors and generators, including brushless DC motors, as these are critical topics in the robotic and mechatronics industries. Lastly, the book discusses A/D and D/A converters given their importance in modern measurement and control systems. In addition to covering the basic circuit concepts, the author also provides the students with the necessary mathematics to analyze correctly the circuit concepts being presented. The chapter on phasor domain circuit analysis begins with a detailed review of complex numbers as many students are weak in this area. Likewise, before discussing filters and Bode Diagrams, the Fourier Transform and later the Laplace Transform are explained.

Designing Embedded Hardware

2001 4th International Conference on ASIC

VLSI Memory Chip Design

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This book describes the digitally intensive time-domain architectures and techniques applied to millimeter-wave frequency synthesis, with the objective of improving performance and reducing the cost of implementation. Coverage includes system architecture, system level modeling, critical building block design, and digital calibration techniques, making it highly suitable for those who want to learn about mm-wave frequency generation for communication and radar applications, integrated circuit implementation, and time-domain circuit and system techniques. Highlights the challenges of frequency synthesis at mm-wave band using CMOS technology Compares the various approaches for mm-wave frequency generation (pros and cons) Introduces the digitally intensive synthesizer approach and its advantages Discusses the proper partitioning of the digitally intensive mm-wave frequency synthesizer into mm-wave, RF, analog, digital and software components Provides detailed design techniques from system level to circuit level Addresses system modeling, simulation techniques, design-for-test, and layout issues Demonstrates the use of time-domain techniques for high-performance mm-wave frequency synthesis

VLSI Design and Test

This book is a printed edition of the Special Issue "Wearable Electronics and Embedded Computing Systems for Biomedical Applications" that was published in Electronics

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Records of the 2002 IEEE International Workshop on Memory Technology, Design and Testing

The first comprehensive text on ferroelectric memories, this book by Prof Scott of Cambridge University, author of 300 publications on ferroelectrics and the most cited papers on ferroelectric thin-film science, contains chapters on device design, processing, testing, and device physics - breakdown, leakage currents, switching mechanisms, and fatigue. State of the art device designs are illustrated among the books many figures. More than 500 up-to-date references and 76 problems for students make it useful both as a research reference and as a text for graduate or advanced undergraduate students.

Analog Interfacing to Embedded Microprocessor Systems

This book addresses the need for energy-efficient amplifiers, providing gain enhancement strategies, suitable to run in parallel with lower supply voltages, by introducing a new family of single-stage cascode-free amplifiers, with proper design, optimization, fabrication and experimental evaluation. The authors describe several topologies, using the UMC 130 nm CMOS technology node with standard-VT devices, for proof-of-concept, achieving results far beyond what is achievable with a classic single-stage folded-cascode amplifier. Readers will learn about a new family of circuits with a broad range of applications, together with the familiarization with a state-of-the-art

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electronic design automation methodology used to explore the design space of the proposed circuit family.

Wearable Electronics and Embedded Computing Systems for Biomedical Applications

This text contains information on designing and testing computer hardware as presented at the 2002 IEEE International Memory Technology, Design and Testing (MTDT 2002).

Hydrodynamic Lubrication

For the first time in a single reference, this book provides the beginner with a coherent and logical introduction to the hardware and software of the PIC32, bringing together key material from the PIC32 Reference Manual, Data Sheets, XC32 C Compiler User's Guide, Assembler and Linker Guide, MIPS32 CPU manuals, and Harmony documentation. This book also trains you to use the Microchip documentation, allowing better life-long learning of the PIC32. The philosophy is to get you started quickly, but to emphasize fundamentals and to eliminate "magic steps" that prevent a deep understanding of how the software you write connects to the hardware. Applications focus on mechatronics: microcontroller-controlled electromechanical systems incorporating sensors and actuators. To support a learn-by-doing approach, you can follow the examples throughout the book using the sample code and your PIC32

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development board. The exercises at the end of each chapter help you put your new skills to practice. Coverage includes: A practical introduction to the C programming language Getting up and running quickly with the PIC32 An exploration of the hardware architecture of the PIC32 and differences among PIC32 families Fundamentals of embedded computing with the PIC32, including the build process, time- and memory-efficient programming, and interrupts A peripheral reference, with extensive sample code covering digital input and output, counter/timers, PWM, analog input, input capture, watchdog timer, and communication by the parallel master port, SPI, I2C, CAN, USB, and UART An introduction to the Microchip Harmony programming framework Essential topics in mechatronics, including interfacing sensors to the PIC32, digital signal processing, theory of operation and control of brushed DC motors, motor sizing and gearing, and other actuators such as stepper motors, RC servos, and brushless DC motors For more information on the book, and to download free sample code, please visit <http://www.nu32.org> Extensive, freely downloadable sample code for the NU32 development board incorporating the PIC32MX795F512H microcontroller Free online instructional videos to support many of the chapters

Op Amps for Everyone

Hydrodynamic lubrication plays an important role in mechanical engineering, although not very many books have been published on the subject. This book was written with graduate students, researchers and

designers in view. The first four chapters are preparations for the following five chapters, where several most important subjects in hydrodynamic lubrication are discussed in detail, based on the author's own researches. Examples are oil whip (stability of rotating shafts), foil bearings in connection with magnetic tape storages, squeeze film between rigid surfaces and visco-elastic surfaces, theoretical and experimental analyses of temperature rise in bearings, those of turbulent lubricating film using the k-epsilon model.

Real-Time Embedded Systems

In a previous volume (ICT-Energy-Concepts Towards Zero-Power ICT; referenced below as Vol. 1), we addressed some of the fundamentals related to bridging the gap between the amount of energy required to operate portable/mobile ICT systems and the amount of energy available from ambient sources. The only viable solution appears to be to attack the gap from both sides, i.e. to reduce the amount of energy dissipated during computation and to improve the efficiency in energy-harvesting technologies. In this book, we build on those concepts and continue the discussion on energy efficiency and sustainability by addressing the minimisation of energy consumption at different levels across the ICT system stack, from hardware to software, as well as discussing energy consumption issues in high-performance computing (HPC), data centres and communication in sensor networks. This book was realised thanks to the contribution of the project

'Coordinating Research Efforts of the ICT-Energy Community' funded from the European Union under the Future and Emerging Technologies (FET) area of the Seventh Framework Programme for Research and Technological Development (grant agreement n. 611004).

Electric Circuits, Systems, and Motors

This book constitutes the refereed proceedings of the 17th International Symposium on VLSI Design and Test, VDAT 2013, held in Jaipur, India, in July 2013. The 44 papers presented were carefully reviewed and selected from 162 submissions. The papers discuss the frontiers of design and test of VLSI components, circuits and systems. They are organized in topical sections on VLSI design, testing and verification, embedded systems, emerging technology.

Nanometer Variation-Tolerant SRAM

The operational amplifier ("op amp") is the most versatile and widely used type of analog IC, used in audio and voltage amplifiers, signal conditioners, signal converters, oscillators, and analog computing systems. Almost every electronic device uses at least one op amp. This book is Texas Instruments' complete professional-level tutorial and reference to operational amplifier theory and applications. Among the topics covered are basic op amp physics (including reviews of current and voltage division, Thevenin's theorem, and transistor models), idealized op amp operation and configuration, feedback theory

and methods, single and dual supply operation, understanding op amp parameters, minimizing noise in op amp circuits, and practical applications such as instrumentation amplifiers, signal conditioning, oscillators, active filters, load and level conversions, and analog computing. There is also extensive coverage of circuit construction techniques, including circuit board design, grounding, input and output isolation, using decoupling capacitors, and frequency characteristics of passive components. The material in this book is applicable to all op amp ICs from all manufacturers, not just TI. Unlike textbook treatments of op amp theory that tend to focus on idealized op amp models and configuration, this title uses idealized models only when necessary to explain op amp theory. The bulk of this book is on real-world op amps and their applications; considerations such as thermal effects, circuit noise, circuit buffering, selection of appropriate op amps for a given application, and unexpected effects in passive components are all discussed in detail. *Published in conjunction with Texas Instruments *A single volume, professional-level guide to op amp theory and applications *Covers circuit board layout techniques for manufacturing op amp circuits.

Ferroelectric Memories

System-on-a-chip (SoC) designs result in a wide range of high-complexity, high-value semiconductor products. As the technology scales towards smaller feature sizes and chips grow larger, a speed limitation arises due to an increased RC delay associated with

interconnection wires. Innovative circuit techniques are required to achieve the speed needed for high-performance signal processing. Current sensing is considered as a promising circuit class since it is inherently faster than conventional voltage sense amplifiers. However, especially in SRAM, current sensing has rarely been used so far. Practical implementations are challenging because they require sophisticated analog circuit techniques in a digital environment. The objective of this book is to provide a systematic and comprehensive insight into current sensing techniques. Both theoretical and practical aspects are covered. Design guidelines are derived by systematic analysis of different circuit principles. Innovative concepts like compensation of the bit line multiplexer and auto-power-down will be explained based on theory and experimental results. The material will be interesting for design engineers in industry as well as researchers who want to learn about and apply current sensing techniques. The focus is on embedded SRAM but the material presented can be adapted to single-chip SRAM and to any other current-providing memory type as well. This includes emerging memory technologies like magnetic RAM (MRAM) and Ovonic Unified Memory (OUM). Moreover, it is also applicable to array like structures such as CMOS camera chips and to circuits for signal transmission along highly capacitive busses.

1993 IEEE International Solid-State Circuits Conference

Variability is one of the most challenging obstacles for IC design in the nanometer regime. In nanometer technologies, SRAM show an increased sensitivity to process variations due to low-voltage operation requirements, which are aggravated by the strong demand for lower power consumption and cost, while achieving higher performance and density. With the drastic increase in memory densities, lower supply voltages, and higher variations, statistical simulation methodologies become imperative to estimate memory yield and optimize performance and power. This book is an invaluable reference on robust SRAM circuits and statistical design methodologies for researchers and practicing engineers in the field of memory design. It combines state of the art circuit techniques and statistical methodologies to optimize SRAM performance and yield in nanometer technologies. Provides comprehensive review of state-of-the-art, variation-tolerant SRAM circuit techniques; Discusses Impact of device related process variations and how they affect circuit and system performance, from a design point of view; Helps designers optimize memory yield, with practical statistical design methodologies and yield estimation techniques.

Index to IEEE Publications

IEICE Transactions on Communications, Electronics, Information, and Systems

Issues for 1973- cover the entire IEEE technical literature.

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ICT - Energy Concepts for Energy Efficiency and Sustainability

Analog Interfacing to Embedded Microprocessors addresses the technologies and methods used in interfacing analog devices to microprocessors, providing in-depth coverage of practical control applications, op amp examples, and much more. A companion to the author's popular Embedded Microprocessor Systems: Real World Design, this new embedded systems book focuses on measurement and control of analog quantities in embedded systems that are required to interface to the real world. At a time when modern electronic systems are increasingly digital, a comprehensive source on interfacing the real world to microprocessors should prove invaluable to embedded systems engineers, students, technicians, and hobbyists. Anyone involved in connecting the analog environment to their digital machines, or troubleshooting such connections will find this book especially useful. Stuart Ball is also the author of Debugging Embedded Microprocessor Systems, both published by Newnes. Additionally, Stuart has written articles for periodicals such as Circuit Cellar INK, Byte, and Modern Electronics. *

- * Provides hard-to-find information on interfacing analog devices and technologies to the purely digital world of embedded microprocessors
- * Gives the reader the insight and perspective of a real embedded systems design engineer, including tips that only a hands-on professional would know
- * Covers important considerations for both hardware and software systems when linking analog and digital

Comparators in Nanometer CMOS Technology

Operational Amplifiers - Theory and Design is the first book to present a systematic circuit design of operational amplifiers. Containing state-of-the-art material as well as the essentials, the book is written to appeal to both the experienced practitioner and the less initiated circuit designer. It is shown that the topology of all operational amplifiers can be divided into nine main overall configurations. These configurations range from one gain stage up to four or more gain stages. Many famous designs are evaluated in depth. High-frequency compensation techniques are presented for all nine configurations. Special emphasis is placed on low-power low-voltage architectures with rail-to-rail input and output ranges. Operational Amplifiers - Theory and Design also develops on the theme of the design of fully differential operational amplifiers and operational floating amplifiers. In addition, the characterization of operational amplifiers by macromodels and error matrices is presented, together with measurement techniques for their parameters. Carefully structured and enriched by numerous figures, problems and simulation exercises the book is ideal for the purposes of self-study and self-evaluation.

Embedded Memory Design for Multi-Core and Systems on Chip

The fourth edition of CMOS Digital Integrated Circuits: Analysis and Design continues the well-established tradition of the earlier editions by offering the most comprehensive coverage of digital CMOS circuit design, as well as addressing state-of-the-art technology issues highlighted by the widespread use of nanometer-scale CMOS technologies. In this latest edition, virtually all chapters have been re-written, the transistor model equations and device parameters have been revised to reflect the significant changes that must be taken into account for new technology generations, and the material has been reinforced with up-to-date examples.

Embedded Systems Architecture

Intelligent readers who want to build their own embedded computer systems-- installed in everything from cell phones to cars to handheld organizers to refrigerators-- will find this book to be the most in-depth, practical, and up-to-date guide on the market. Designing Embedded Hardware carefully steers between the practical and philosophical aspects, so developers can both create their own devices and gadgets and customize and extend off-the-shelf systems. There are hundreds of books to choose from if you need to learn programming, but only a few are available if you want to learn to create hardware. Designing Embedded Hardware provides software and hardware engineers with no prior experience in embedded systems with the necessary conceptual and design building blocks to understand the architectures of embedded systems. Written to

provide the depth of coverage and real-world examples developers need, *Designing Embedded Hardware* also provides a road-map to the pitfalls and traps to avoid in designing embedded systems. *Designing Embedded Hardware* covers such essential topics as: The principles of developing computer hardware Core hardware designs Assembly language concepts Parallel I/O Analog-digital conversion Timers (internal and external) UART Serial Peripheral Interface Inter-Integrated Circuit Bus Controller Area Network (CAN) Data Converter Interface (DCI) Low-power operation This invaluable and eminently useful book gives you the practical tools and skills to develop, build, and program your own application-specific computers.

Proceedings of the IEEE 1999 Custom Integrated Circuits Conference

A systematic description of microelectronic device design. Topics range from the basics to low-power and ultralow-voltage designs, subthreshold current reduction, memory subsystem designs for modern DRAMs, and various on-chip supply-voltage conversion techniques. It also covers process and device issues as well as design issues relating to systems, circuits, devices and processes, such as signal-to-noise and redundancy.

Nanoscale Semiconductor Memories

This book covers the complete spectrum of the fundamentals of clocked, regenerative comparators,

their state-of-the-art, advanced CMOS technologies, innovative comparators inclusive circuit aspects, their characterization and properties. Starting from the basics of comparators and the transistor characteristics in nanometer CMOS, seven high-performance comparators developed by the authors in 120nm and 65nm CMOS are described extensively. Methods and measurement circuits for the characterization of advanced comparators are introduced. A synthesis of the largely differing aspects of demands on modern comparators and the properties of devices being available in nanometer CMOS, which are posed by the so-called nanometer hell of physics, is accomplished. The book summarizes the state of the art in integrated comparators. Advanced measurement circuits for characterization will be introduced as well as the method of characterization by bit-error analysis usually being used for characterization of optical receivers. The book is compact, and the graphical quality of the illustrations is outstanding. This book is written for engineers and researchers in industry as well as scientists and Ph.D students at universities. It is also recommendable to graduate students specializing on nanoelectronics and microelectronics or circuit design.

Ultra-Wideband Pulse-based Radio

Today's booming expanse of personal wireless radio communications is a rich source of new challenges for the designer of the underlying enabling technologies. Personal communication networks are designed from

a fundamentally different perspective than broadcast service networks, such as radio and television. While the focus of the latter is on reliability and user comfort, the emphasis of personal communication devices is on throughput and mobility. However, because the wireless channel is a shared transmission medium with only very limited resources, a trade-off has to be made between mobility and the number of simultaneous users in a confined geographical area. According to Shannon's theorem on channel capacity, the overall data throughput of a communication channel benefits from either a linear increase of the transmission bandwidth, or an (equivalent) exponential increase in signal quality. Consequently, it is more beneficial to think in terms of channel bandwidth than it is to pursue a high transmission power. All the above elements are embodied in the concept of spatial efficiency. By describing the throughput of a system in terms of bits/s/Hz/m², spatial efficiency takes into account that the use of a low transmission power reduces the operational range of a radio transmission, and as such enables a higher reuse rate of the same frequency spectrum.

Electronics - Circuits and Systems

The second edition of this comprehensive text contains extensive revisions to reflect recent advances in technology and in circuit design practices. Recognizing that the area of digital integrated circuit design is evolving at an increasingly fast pace, every effort has been made to present

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state-of-the-art material on all subjects covered in the book. This book is primarily designed as a comprehensive text for senior level and first-year graduate level digital circuit design classes, as well as a reference for practicing engineers in the areas of IC design and VLSI.

CMOS Digital Integrated Circuits Analysis & Design

This book describes the various tradeoffs systems designers face when designing embedded memory. Readers designing multi-core systems and systems on chip will benefit from the discussion of different topics from memory architecture, array organization, circuit design techniques and design for test. The presentation enables a multi-disciplinary approach to chip design, which bridges the gap between the architecture level and circuit level, in order to address yield, reliability and power-related issues for embedded memory.

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