Analog Vlsi Circuits For The Perception Of Visual Motion

Analog VLSI Neural NetworksAnalog Integrated Circuit DesignCMOS Nanoelectronics: Analog and RF VLSI CircuitsDesign of Analog CMOS Integrated CircuitsDistortion Analysis of Analog Integrated CircuitsFault Diagnosis of Analog Integrated CircuitsVLSI Analog Signal Processing CircuitsAnalog Design Issues in Digital VLSI Circuits and SystemsNovel Analogue VLSI Circuit of a Cortical NeuronDesign of Analog-digital VLSI Circuits for Telecommunications and Signal ProcessingEMC of Analog Integrated CircuitsAnalog VLSI DesignVLSI Analog Circuits: Algorithms, Architecture, Modeling, and Circuit ImplementationAnalog VLSI Design AutomationEssentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI CircuitsIntroduction to Analog VLSI Design AutomationA Computer-Aided Design and Synthesis Environment for Analog Integrated CircuitsAnalog VLSI and Neural SystemsStructural VLSI Analog Circuit Design - Principles, Problem Sets and Solution HintsDesign of Analog Integrated Circuits and SystemsSymbolic Analysis for Automated Design of Analog Integrated CircuitsTrade-Offs in Analog Circuit DesignThe Art and Science of Analog Circuit DesignMixed Analog-digital VLSI Devices and TechnologyAnalog VLSI Circuits for the Perception of Visual MotionAnalog VLSI Implementation of Neural SystemsVLSI Design Techniques for Analog and Digital CircuitsEvent-Based Neuromorphic SystemsAnalog and VLSI CircuitsVLSI for Artificial Intelligence and Neural NetworksAnalog

VLSINano-scale CMOS Analog CircuitsAnalog VLSI Integration of Massive Parallel Signal Processing SystemsAnalog Circuits and DevicesHigh-Frequency Analog Integrated Circuit DesignAnalog VLSIAnalogue IC DesignAnalog Design for CMOS VLSI SystemsAnalysis and Design of Analog Integrated CircuitsAn Analog VLSI System for Stereoscopic Vision

Analog VLSI Neural Networks

The modern electronic testing has a forty year history. Test professionals hold some fairly large conferences and numerous workshops, have a journal, and there are over one hundred books on testing. Still, a full course on testing is offered only at a few universities, mostly by professors who have a research interest in this area. Apparently, most professors would not have taken a course on electronic testing when they were students. Other than the computer engineering curriculum being too crowded, the major reason cited for the absence of a course on electronic testing is the lack of a suitable textbook. For VLSI the foundation was provided by semiconductor device techn- ogy, circuit design, and electronic testing. In a computer engineering curriculum, therefore, it is necessary that foundations should be taught before applications. The field of VLSI has expanded to systems-on-a-chip, which include digital, memory, and mixed-signalsubsystems. To our knowledge this is the first textbook to cover all three types of electronic circuits. We have written this textbook for an undergraduate “foundations” course on electronic testing. Obviously, it is too voluminous

for a one-semester course and a teacher will have to select from the topics. We did not restrict such freedom because the selection may depend upon the individual expertise and interests. Besides, there is merit in having a larger book that will retain its usefulness for the owner even after the completion of the course. With equal tenacity, we address the needs of three other groups of readers.

Analog Integrated Circuit Design

CMOS Nanoelectronics: Analog and RF VLSI Circuits

Reliability concerns and the limitations of process technology can sometimes restrict the innovation process involved in designing nano-scale analog circuits. The success of nano-scale analog circuit design requires repeat experimentation, correct analysis of the device physics, process technology, and adequate use of the knowledge database. Starting with the basics, Nano-Scale CMOS Analog Circuits: Models and CAD Techniques for High-Level Design introduces the essential fundamental concepts for designing analog circuits with optimal performances. This book explains the links between the physics and technology of scaled MOS transistors and the design and simulation of nano-scale analog circuits. It also explores the development of structured computer-aided design (CAD) techniques for architecture-level and circuit-level design of analog circuits. The book outlines the general trends

of technology scaling with respect to device geometry, process parameters, and supply voltage. It describes models and optimization techniques, as well as the compact modeling of scaled MOS transistors for VLSI circuit simulation. • Includes two learning-based methods: the artificial neural network (ANN) and the least-squares support vector machine (LS-SVM) method • Provides case studies demonstrating the practical use of these two methods • Explores circuit sizing and specification translation tasks • Introduces the particle swarm optimization technique and provides examples of sizing analog circuits • Discusses the advanced effects of scaled MOS transistors like narrow width effects, and vertical and lateral channel engineering Nano-Scale CMOS Analog Circuits: Models and CAD Techniques for High-Level Design describes the models and CAD techniques, explores the physics of MOS transistors, and considers the design challenges involving statistical variations of process technology parameters and reliability constraints related to circuit design.

Design of Analog CMOS Integrated Circuits

Analogue IC Design has become the essential title covering the current-mode approach to integrated circuit design. The approach has sparked much interest in analog electronics and is linked to important advances in integrated circuit technology, such as CMOS VLSI which allows mixed analog and digital circuits and high-speed GaAs processing.

Distortion Analysis of Analog Integrated Circuits

The explosive growth and development of the integrated circuit market over the last few years have been mostly limited to the digital VLSI domain. The difficulty of automating the design process in the analog domain, the fact that a general analog design methodology remained undefined, and the poor performance of earlier tools have left the analog

Fault Diagnosis of Analog Integrated Circuits

VLSI Analog Signal Processing Circuits

This book is based on a collection of the past exams for the VLSI Analog Signal Processing Circuits class (EEE598) the author offered in the School of Engineering at Arizona State University. The topics cover various aspects of the design, analysis and application of VLSI analog signal processing circuits. This book is intended to be used together with the VLSI Analog Signal Processing Circuits textbook by the same author. It can also be used alone for the experienced readers.

Analog Design Issues in Digital VLSI Circuits and Systems

Analog Design Issues in Digital VLSI Circuits and

Systems brings together in one place important contributions and up-to-date research results in this fast moving area. Analog Design Issues in Digital VLSI Circuits and Systems serves as an excellent reference, providing insight into some of the most challenging research issues in the field.

Novel Analogue VLSI Circuit of a Cortical Neuron

Very large scale integration (VLSI) technologies are now maturing with a current emphasis toward submicron structures and sophisticated applications combining digital as well as analog circuits on a single chip. Abundant examples are found on today's advanced systems for telecom munications, robotics, automotive electronics, image processing, intelli gent sensors, etc .. Exciting new applications are being unveiled in the field of neural computing where the massive use of analog/digital VLSI technologies will have a significant impact. To match such a fast technological trend towards single chip ana logi digital VLSI systems, researchers worldwide have long realized the vital need of producing advanced computer aided tools for designing both digital and analog circuits and systems for silicon integration. Ar chitecture and circuit compilation, device sizing and the layout genera tion are but a few familiar tasks on the world of digital integrated circuit design which can be efficiently accomplished by matured computer aided tools. In contrast, the art of tools for designing and producing analog or even analogi digital integrated circuits is quite primitive and still lack ing

the industrial penetration and acceptance already achieved by digital counterparts. In fact, analog design is commonly perceived to be one of the most knowledge-intensive design tasks and analog circuits are still designed, largely by hand, by expert intimately familiar with nuances of the target application and integrated circuit fabrication process. The techniques needed to build good analog circuits seem to exist solely as expertise invested in individual designers.

Design of Analog-digital VLSI Circuits for Telecommunications and Signal Processing

This book is an edited selection of the papers presented at the International Workshop on VLSI for Artifidal Intelligence and Neural Networks which was held at the University of Oxford in September 1990. Our thanks go to all the contributors and especially to the programme committee for all their hard work. Thanks are also due to the ACM-SIGARCH, the IEEE Computer Society, and the lEE for publicizing the event and to the University of Oxford and SUNY-Binghamton for their active support. We are particularly grateful to Anna Morris, Maureen Doherty and Laura Duffy for coping with the administrative problems. Jose Delgado-Frias Will Moore April 1991 vii PROLOGUE Artificial intelligence and neural network algorithms/computing have increased in complexity as well as in the number of applications. This in tum has posed a tremendous need for a larger computational power than can be provided by

conventional scalar processors which are oriented towards numeric and data manipulations. Due to the artificial intelligence requirements (symbolic manipulation, knowledge representation, non-deterministic computations and dynamic resource allocation) and neural network computing approach (non-programming and learning), a different set of constraints and demands are imposed on the computer architectures for these applications.

EMC of Analog Integrated Circuits

Neuromorphic electronic engineering takes its inspiration from the functioning of nervous systems to build more power efficient electronic sensors and processors. Event-based neuromorphic systems are inspired by the brain's efficient data-driven communication design, which is key to its quick responses and remarkable capabilities. This cross-disciplinary text establishes how circuit building blocks are combined in architectures to construct complete systems. These include vision and auditory sensors as well as neuronal processing and learning circuits that implement models of nervous systems. Techniques for building multi-chip scalable systems are considered throughout the book, including methods for dealing with transistor mismatch, extensive discussions of communication and interfacing, and making systems that operate in the real world. The book also provides historical context that helps relate the architectures and circuits to each other and that guides readers to the extensive literature. Chapters are written by founding experts

and have been extensively edited for overall coherence. This pioneering text is an indispensable resource for practicing neuromorphic electronic engineers, advanced electrical engineering and computer science students and researchers interested in neuromorphic systems. Key features: Summarises the latest design approaches, applications, and future challenges in the field of neuromorphic engineering. Presents examples of practical applications of neuromorphic design principles. Covers address-event communication, retinas, cochleas, locomotion, learning theory, neurons, synapses, floating gate circuits, hardware and software infrastructure, algorithms, and future challenges.

Analog VLSI Design

An introduction to the design of analog VLSI circuits. Neuromorphic engineers work to improve the performance of artificial systems through the development of chips and systems that process information collectively using primarily analog circuits. This book presents the central concepts required for the creative and successful design of analog VLSI circuits. The discussion is weighted toward novel circuits that emulate natural signal processing. Unlike most circuits in commercial or industrial applications, these circuits operate mainly in the subthreshold or weak inversion region. Moreover, their functionality is not limited to linear operations, but also encompasses many interesting nonlinear operations similar to those occurring in

natural systems. Topics include device physics, linear and nonlinear circuit forms, translinear circuits, photodetectors, floating-gate devices, noise analysis, and process technology.

VLSI Analog Circuits: Algorithms, Architecture, Modeling, and Circuit Implementation

Enables the reader to test an analog circuit that is implemented either in bipolar or MOS technology. Examines the testing and fault diagnosis of analog and analog part of mixed signal circuits. Covers the testing and fault diagnosis of both bipolar and Metal Oxide Semiconductor (MOS) circuits and introduces . Also contains problems that can be used as quiz or homework.

Analog VLSI Design Automation

An Analog VLSI System for Stereoscopic Vision investigates the interaction of the physical medium and the computation in both biological and analog VLSI systems by synthesizing a functional neuromorphic system in silicon. In both the synthesis and analysis of the system, a point of view from within the system is adopted rather than that of an omniscient designer drawing a blueprint. This perspective projects the design and the designer into a living landscape. The motivation for a machine-centered perspective is explained in the first chapter. The second chapter describes the evolution of the silicon retina. The retina accurately encodes visual

information over orders of magnitude of ambient illumination, using mismatched components that are calibrated as part of the encoding process. The visual abstraction created by the retina is suitable for transmission through a limited bandwidth channel. The third chapter introduces a general method for interchip communication, the address-event representation, which is used for transmission of retinal data. The address-event representation takes advantage of the speed of CMOS relative to biological neurons to preserve the information of biological action potentials using digital circuitry in place of axons. The fourth chapter describes a collective circuit that computes stereodisparity. In this circuit, the processing that corrects for imperfections in the hardware compensates for inherent ambiguity in the environment. The fifth chapter demonstrates a primitive working stereovision system. An Analog VLSI System for Stereoscopic Vision contributes to both computer engineering and neuroscience at a concrete level. Through the construction of a working analog of biological vision subsystems, new circuits for building brain-style analog computers have been developed. Specific neuropysiological and psychophysical results in terms of underlying electronic mechanisms are explained. These examples demonstrate the utility of using biological principles for building brain-style computers and the significance of building brain-style computers for understanding the nervous system.

Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits

The analysis and prediction of nonlinear behavior in electronic circuits has long been a topic of concern for analog circuit designers. The recent explosion of interest in portable electronics such as cellular telephones, cordless telephones and other applications has served to reinforce the importance of these issues. The need now often arises to predict and optimize the distortion performance of diverse electronic circuit configurations operating in the gigahertz frequency range, where nonlinear reactive effects often dominate. However, there have historically been few sources available from which design engineers could obtain information on analysis tech niques suitable for tackling these important problems. I am sure that the analog circuit design community will thus welcome this work by Dr. Wambacq and Professor Sansen as a major contribution to the analog circuit design literature in the area of distortion analysis of electronic circuits. I am personally looking forward to hav ing a copy readily available for reference when designing integrated circuits for communication systems.

Introduction to Analog VLSI Design Automation

Virtual Manufacturing presents a novel concept of combining human computer interfaces with virtual reality for discrete and continuous manufacturing systems. The authors address the relevant concepts of manufacturing engineering, virtual reality, and computer science and engineering, before embarking on a description of the methodology for building

augmented reality for manufacturing processes and manufacturing systems. Virtual Manufacturing is centered on the description of the development of augmented reality models for a range of processes based on CNC, PLC, SCADA, mechatronics and on embedded systems. Further discussions address the use of augmented reality for developing augmented reality models to control contemporary manufacturing systems and to acquire micro- and macro-level decision parameters for managers to boost profitability of their manufacturing systems. Guiding readers through the building of their own virtual factory software, Virtual Manufacturing comes with access to online files and software that will enable readers to create a virtual factory, operate it and experiment with it. This is a valuable source of information with a useful toolkit for anyone interested in virtual manufacturing, including advanced undergraduate students, postgraduate students and researchers.

A Computer-Aided Design and Synthesis Environment for Analog Integrated Circuits

Improve your circuit-design potential with this expert guide to the devices and technology used in mixed analog-digital VLSI chips for such high-volume applications as hard-disk drives, wireless telephones, and consumer electronics. The book provides you with a critical understanding of device models, fabrication technology, and layout as they apply to mixed analog-digital circuits.You will learn about the many device-

modeling requirements for analog work, as well as the pitfalls in models used today for computer simulators such as Spice. Also included is information on fabrication technologies developed specifically for mixed-signal VLSI chips, plus guidance on the layout of mixed analog-digital chips for a high degree of analog-device matching and minimum digital-to-analog interference.This reference book features an intuitive introduction to MOSFET operation that will enable you to view with insight any MOSFET model ? besides thorough discussions on valuable large-signal and small-signal models.Filled with practical information, this first-of-its-kind book will help you grasp the nuances of mixed-signal VLSI-device models and layout that are crucial to the design of high-performance chips.

Analog VLSI and Neural Systems

The last few years have seen a number of important advances in manufacturing technology for GaAs MESFET-based IC processing. The newfound ability to apply silicon design techniques to reliable GaAs materials and devices represents a boon to the communications industry in which high-speed processing is of the essence. As a consequence, there is a growing demand for engineers fully versed in GaAs design technology. Yet, until now, there was no practical guide to designing for this breakthrough technology.

Structural VLSI Analog Circuit Design - Principles, Problem Sets and Solution

Hints

VLSI Signal Processing Principles, Practices, and Applications This comprehensive resource shows how very-large-scale integration (VLSI) technology can be effectively deployed in real-world electronics to meet cost, power, function, and reliability requirements. VLSI Analog Circuits: Algorithm, Architecture, Modeling, and Circuit Implementation, Second Edition, is a textbook for advanced electrical engineering courses that shows, step-by-step, how to analyze and solve practical design problems using VLSI. You will get up-to-date discussions on VLSI passive, active-RC, MOS-C, Gm-C, CTI, SC, and SI analog filter circuits. Mixed-mode configurations, VLSI RF signal processing, and circuit tuning techniques are explained in full detail. Coverage includes: • VLSI continuous-time signal processing fundamentals • VLSI active-RC, MOS-C, and VLSI Gm-C circuits • VLSI continuous-time current-mode filters • VLSI discrete-time signal processing systems • VLSI switched-capacitor and switched-current circuits • Frequency-scaling and transformation techniques • Mixed-mode VLSI analog signal processing • Component and ladder simulation-based VLSI design • Practical design aspects of VLSI analog filters • VLSI RF signal processing circuits • Digital-based analog signal processing circuits

Design of Analog Integrated Circuits and Systems

In-depth coverage of integrated circuit design on the nanoscale level Written by international experts in

industry and academia, CMOS Nanoelectronics addresses the state of the art in integrated circuit design in the context of emerging systems. New, exciting opportunities in body area networks, wireless communications, data networking, and optical imaging are discussed. This cutting-edge guide explores emerging design concepts for very low power and describes design approaches for RF transceivers, high-speed serial links, PLL/DLL, and ADC/DAC converters. CMOS Nanoelectronics covers: Portable high-efficiency polar transmitters All-digital RF signal generation Frequency multiplier design Tunable CMOS RF filters GaAs HBT linear power amplifier design High-speed serial I/O design CDMA-based crosstalk cancellation Delta-sigma fractional-N PLL Delay locked loops Digital clock generators Analog design in deep submicron CMOS technologies 1/f noise reduction for linear analog CMOS ICs Broadband high-resolution bandpass sigma-delta modulators Analog/digital conversion specifications for power line communication systems Digital-to-analog converters for LCDs Sub-1-V CMOS bandgap reference design And much more

Symbolic Analysis for Automated Design of Analog Integrated Circuits

The 2nd Edition of Analog Integrated Circuit Design focuses on more coverage about several types of circuits that have increased in importance in the past decade. Furthermore, the text is enhanced with material on CMOS IC device modeling, updated processing layout and expanded coverage to reflect

technical innovations. CMOS devices and circuits have more influence in this edition as well as a reduced amount of text on BiCMOS and bipolar information. New chapters include topics on frequency response of analog ICs and basic theory of feedback amplifiers.

Trade-Offs in Analog Circuit Design

This volume contains the proceedings of a workshop on Analog Integrated Neural Systems held May 8, 1989, in connection with the International Symposium on Circuits and Systems. The presentations were chosen to encompass the entire range of topics currently under study in this exciting new discipline. Stringent acceptance requirements were placed on contributions: (1) each description was required to include detailed characterization of a working chip, and (2) each design was not to have been published previously. In several cases, the status of the project was not known until a few weeks before the meeting date. As a result, some of the most recent innovative work in the field was presented. Because this discipline is evolving rapidly, each project is very much a work in progress. Authors were asked to devote considerable attention to the shortcomings of their designs, as well as to the notable successes they achieved. In this way, other workers can now avoid stumbling into the same traps, and evolution can proceed more rapidly (and less painfully). The chapters in this volume are presented in the same order as the corresponding presentations at the workshop. The first two chapters are concerned with fmding solutions to complex optimization problems

under a predefmed set of constraints. The first chapter reports what is, to the best of our knowledge, the first neural-chip design. In each case, the physics of the underlying electronic medium is used to represent a cost function in a natural way, using only nearest-neighbor connectivity.

The Art and Science of Analog Circuit Design

The Principles and Application in Engineering Series is a new series of convenient, economical references sharply focused on particular engineering topics and subspecialties. Each volume in this series comprises chapters carefully selected from CRC's bestselling handbooks, logically organized for optimum convenience, and thoughtfully priced to fit

Mixed Analog-digital VLSI Devices and Technology

A graduate level text, this volume focuses on the components of analog VLSI design for high performance signal processing applications. There is equal emphasis on the principles of circuit and layout design, and new material on CMOS and BiCMOS building blocks is included. Each chapter provides basic introductory material, with examples of case studies at the circuit and/or system level, while also highlighting major challenges to analog circuit designers. Worked examples (from a realistic silicon chip) and end-of-chapter problems assist the learning proess. An instructor's manual is also available

(0-07-032387-9).

Analog VLSI Circuits for the Perception of Visual Motion

- Applicable for bookstore catalogue

Analog VLSI Implementation of Neural Systems

The Fifth Edition of this academically rigorous text provides a comprehensive treatment of analog integrated circuit analysis and design starting from the basics and through current industrial practices. The authors combine bipolar, CMOS and BiCMOS analog integrated-circuit design into a unified treatment that stresses their commonalities and highlights their differences. The comprehensive coverage of the material will provide the student with valuable insights into the relative strengths and weaknesses of these important technologies.

VLSI Design Techniques for Analog and Digital Circuits

Environmental electromagnetic pollution has drastically increased over the last decades. The omnipresence of communication systems, various electronic appliances and the use of ever increasing frequencies, all contribute to a noisy electromagnetic environment which acts detrimentally on sensitive electronic equipment. Integrated circuits must be able to operate satisfactorily while cohabiting

harmoniously in the same appliance, and not generate intolerable levels of electromagnetic emission, while maintaining a sound immunity to potential electromagnetic disturbances: analog integrated circuits are in particular more easily disturbed than their digital counterparts, since they don't have the benefit of dealing with predefined levels ensuring an innate immunity to disturbances. The objective of the research domain presented in EMC of Analog Integrated Circuits is to improve the electromagnetic immunity of considered analog integrated circuits, so that they start to fail at relevantly higher conduction levels than before.

Event-Based Neuromorphic Systems

Although it is now possible to integrate many millions of transistors on a single chip, traditional digital circuit technology is now reaching its limits, facing problems of cost and technical efficiency when scaled down to ever-smaller feature sizes. The analysis of biological neural systems, especially for visual processing, has allowed engineers to better understand how complex networks can effectively process large amounts of information, whilst dealing with difficult computational challenges. Analog and parallel processing are key characteristics of biological neural networks. Analog VLSI circuits using the same features can therefore be developed to emulate brain-style processing. Using standard CMOS technology, they can be cheaply manufactured, permitting efficient industrial and consumer applications in robotics and mobile electronics. This book explores the theory, design and

implementation of analog VLSI circuits, inspired by visual motion processing in biological neural networks. Using a novel approach pioneered by the author himself, Stocker explains in detail the construction of a series of electronic chips, providing the reader with a valuable practical insight into the technology. Analog VLSI Circuits for the Perception of Visual Motion: analyses the computational problems in visual motion perception; examines the issue of optimization in analog networks through high level processes such as motion segmentation and selective attention; demonstrates network implementation in analog VLSI CMOS technology to provide computationally efficient devices; sets out measurements of final hardware implementation; illustrates the similarities of the presented circuits with the human visual motion perception system; includes an accompanying website with video clips of circuits under real-time visual conditions and additional supplementary material. With a complete review of all existing neuromorphic analog VLSI systems for visual motion sensing, Analog VLSI Circuits for the Perception of Visual Motion is a unique reference for advanced students in electrical engineering, artificial intelligence, robotics and computational neuroscience. It will also be useful for researchers, professionals, and electronics engineers working in the field.

Analog and VLSI Circuits

This book brings together in one place important contributions and state-of-the-art research in the

rapidly advancing area of analog VLSI neural networks. The book serves as an excellent reference, providing insights into some of the most important issues in analog VLSI neural networks research efforts.

VLSI for Artificial Intelligence and Neural Networks

As the frequency of communication systems increases and the dimensions of transistors are reduced, more and more stringent performance requirements are placed on analog circuits. This is a trend that is bound to continue for the foreseeable future and while it does, understanding performance trade-offs will constitute a vital part of the analog design process. It is the insight and intuition obtained from a fundamental understanding of performance conflicts and trade-offs, that ultimately provides the designer with the basic tools necessary for effective and creative analog design. Trade-offs in Analog Circuit Design, which is devoted to the understanding of trade-offs in analog design, is quite unique in that it draws together fundamental material from, and identifies interrelationships within, a number of key analog circuits. The book covers ten subject areas: Design methodology, Technology, General Performance, Filters, Switched Circuits, Oscillators, Data Converters, Transceivers, Neural Processing, and Analog CAD. Within these subject areas it deals with a wide diversity of trade-offs ranging from frequency-dynamic range and power, gain-bandwidth, speed-dynamic range and phase noise, to tradeoffs in design

for manufacture and IC layout. The book has by far transcended its original scope and has become both a designer's companion as well as a graduate textbook. An important feature of this book is that it promotes an intuitive approach to understanding analog circuits by explaining fundamental relationships and, in many cases, providing practical illustrative examples to demonstrate the inherent basic interrelationships and trade-offs. Trade-offs in Analog Circuit Design draws together 34 contributions from some of the world's most eminent analog circuits-and-systems designers to provide, for the first time, a comprehensive text devoted to a very important and timely approach to analog circuit design.

Analog VLSI

Nano-scale CMOS Analog Circuits

It follows with a thorough treatment of design operational and operational transconductance amplifiers, and concludes with a unified presentation of sample-data and continuous-time signal processing systems.

Analog VLSI Integration of Massive Parallel Signal Processing Systems

It is a great honor to provide a few words of introduction for Dr. Georges Gielen's and Prof. Willy Sansen's book "Symbolic analysis for automated design of analog integrated circuits". The symbolic

analysis method presented in this book represents a significant step forward in the area of analog circuit design. As demonstrated in this book, symbolic analysis opens up new possibilities for the development of computer-aided design (CAD) tools that can analyze an analog circuit topology and automatically size the components for a given set of specifications. Symbolic analysis even has the potential to improve the training of young analog circuit designers and to guide more experienced designers through second-order phenomena such as distortion. This book can also serve as an excellent reference for researchers in the analog circuit design area and creators of CAD tools, as it provides a comprehensive overview and comparison of various approaches for analog circuit design automation and an extensive bibliography. The world is essentially analog in nature, hence most electronic systems involve both analog and digital circuitry. As the number of transistors that can be integrated on a single integrated circuit (IC) substrate steadily increases over time, an ever increasing number of systems will be implemented with one, or a few, very complex ICs because of their lower production costs.

Analog Circuits and Devices

When comparing conventional computing architectures to the architectures of biological neural systems, we find several striking differences. Conventional computers use a low number of high performance computing elements that are programmed with algorithms to perform tasks in a

time sequenced way; they are very successful in administrative applications, in scientific simulations, and in certain signal processing applications. However, the biological systems still significantly outperform conventional computers in perception tasks, sensory data processing and motory control. Biological systems use a completely dif ferent computing paradigm: a massive network of simple processors that are (adaptively) interconnected and operate in parallel. Exactly this massively parallel processing seems the key aspect to their success. On the other hand the development of VLSI technologies provide us with technological means to implement very complicated systems on a silicon die. Especially analog VLSI circuits in standard digital technologies open the way for the implement at ion of massively parallel analog signal processing systems for sensory signal processing applications and for perception tasks. In chapter 1 the motivations behind the emergence of the analog VLSI of massively parallel systems is discussed in detail together with the capabilities and !imitations of VLSI technologies and the required research and developments. Analog parallel signal processing drives for the development of very com pact, high speed and low power circuits. An important technologicallimitation in the reduction of the size of circuits and the improvement of the speed and power consumption performance is the device inaccuracies or device mismatch.

High-Frequency Analog Integrated Circuit Design

Analog VLSI

In the first part the AMGIE analog synthesis system is described. AMGIE is the first analog synthesis system that automates the full design process from specifications down to verified layout. It is targeted to the design of moderate-complexity circuits. It relies on design and circuit knowledge stored in the tool's libraries and can be used by both novice and experienced analog designers as well as system-level designers. The inner workings are explained in detail, with (practical) examples to demonstrate how the implemented algorithms and techniques work. Experimental results obtained with the AMGIE system are reported, including actual fabricated and measured circuits. The second approach, i.e. the systematic design of high-performance analog circuits, is discussed in the second part of the book. This approach is supported by tools to boost the productivity of the designer. An example of such a tool is Mondriaan, that is targeted towards the automatic layout generation of highly regular analog blocks. The proposed systematic design methodology is then applied to the design of high-accuracy current-steering digital to analog converters (DACs). The full design path is discussed in detail. Both complementary approaches increase analog design productivity. Design times of the different design experiments undertaken are reported throughout the book to demonstrate this.

Analogue IC Design

Featuring hundreds of illustrations and references, this volume in the third edition of the Circuits and Filters Handbook, provides the latest information on analog and VLSI circuits, omitting extensive theory and proofs in favor of numerous examples throughout each chapter. The first part of the text focuses on analog integrated circuits, presenting up-to-date knowledge on monolithic device models, analog circuit cells, high performance analog circuits, RF communication circuits, and PLL circuits. In the second half of the book, well-known contributors offer the latest findings on VLSI circuits, including digital systems, data converters, and systolic arrays.

Analog Design for CMOS VLSI Systems

In this companion text to Analog Circuit Design: Art, Science, and Personalities, seventeen contributors present more tutorial, historical, and editorial viewpoints on subjects related to analog circuit design. By presenting divergent methods and views of people who have achieved some measure of success in their field, the book encourages readers to develop their own approach to design. In addition, the essays and anecdotes give some constructive guidance in areas not usually covered in engineering courses, such as marketing and career development. *Includes visualizing operation of analog circuits *Describes troubleshooting for optimum circuit performance *Demonstrates how to produce a saleable product

Analysis and Design of Analog Integrated Circuits

An Analog VLSI System for Stereoscopic Vision

The first book to take VLSI into the analog domain and apply it to biology. It provides solid tools for research in artificial intelligence and neurobiology while illustrating powerful new applications for analog systems.