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## KEY=LEVEL - KASH GAMBLE

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### HIGH-LEVEL MODELING AND SYNTHESIS OF ANALOG INTEGRATED SYSTEMS

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Springer Science & Business Media **Various approaches for finding optimal values for the parameters of analog cells have made their entrance in commercial applications. However, a larger impact on the performance is expected if tools are developed which operate on a higher abstraction level and consider multiple architectural choices to realize a particular functionality. This book examines the opportunities, conditions, problems, solutions and systematic methodologies for this new generation of analog CAD tools.**

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### MODELING AND SIMULATION OF MIXED ANALOG-DIGITAL SYSTEMS

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Springer Science & Business Media **Modeling and Simulation of Mixed Analog-Digital Systems brings together in one place important contributions and state-of-the-art research results in this rapidly advancing area. Modeling and Simulation of Mixed Analog-Digital Systems serves as an excellent reference, providing insight into some of the most important issues in the field.**

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### COMPUTER-AIDED DESIGN OF ANALOG CIRCUITS AND SYSTEMS

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Springer Science & Business Media **Computer-Aided Design of Analog Circuits and Systems brings together in one place important contributions and state-of-the-art research results in the rapidly advancing area of computer-aided design of analog circuits and systems. This book serves as an excellent reference, providing insights into some of the most important issues in the field.**

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### A COMPUTER-AIDED DESIGN AND SYNTHESIS ENVIRONMENT FOR ANALOG INTEGRATED CIRCUITS

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Springer Science & Business Media **This text addresses the design methodologies and CAD tools available for the systematic design and design automation of analogue integrated circuits. Two complementary approaches discussed increase analogue design productivity, demonstrated throughout using design times of the different design experiments undertaken.**

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### VLSI-SOC: ADVANCED TOPICS ON SYSTEMS ON A CHIP

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### A SELECTION OF EXTENDED VERSIONS OF THE BEST PAPERS OF THE FOURTEENTH INTERNATIONAL CONFERENCE ON VERY LARGE SCALE INTEGRATION OF SYSTEM ON CHIP (VLSI-SOC2007), OCTOBER 15-17, 2007, ATLANTA, USA

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Springer Science & Business Media **This book contains extended and revised versions of the best papers that were presented during the fifteenth edition of the IFIP/IEEE WG10.5 International Conference on Very Large Scale Integration, a global System-on-a-Chip Design & CAD conference. The 15th conference was held at the Georgia Institute of Technology, Atlanta, USA (October 15-17, 2007). Previous conferences have taken place in Edinburgh, Trondheim, Vancouver, Munich, Grenoble, Tokyo, Gramado, Lisbon, Montpellier, Darmstadt, Perth and Nice. The purpose of this conference, sponsored by IFIP TC 10 Working Group 10.5 and by the IEEE Council on Electronic Design Automation (CEDA), is to provide a forum to exchange ideas and show industrial and academic research results in the field of microelectronics design. The current trend toward increasing chip integration and technology process advancements brings about stimulating new challenges both at the physical and system-design levels, as well in the test of these systems. VLSI-SoC conferences aim to address these exciting new issues.**

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### ANALOG AND MIXED-SIGNAL HARDWARE DESCRIPTION LANGUAGE

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Springer Science & Business Media **Hardware description languages (HDL) such as VHDL and Verilog have found their way into almost every aspect of the design of digital hardware systems. Since their inception they gradually proved to be an essential part of modern design methodologies and design automation tools, ever exceeding their original goals of being description and simulation languages. Their use for automatic synthesis, formal proof, and testing are good examples. So far, HDLs have been mainly dealing with digital systems. However, integrated systems designed today require more and more analog parts such as A/D and D/A converters, phase locked loops, current mirrors, etc. The**

verification of the complete system therefore asks for the use of a single language. Using VHDL or Verilog to handle analog descriptions is possible, as it is shown in this book, but the real power is coming from true mixed-signal HDLs that integrate discrete and continuous semantics into a unified framework. Analog HDLs (AHDL) are considered here a subset of mixed-signal HDLs as they intend to provide the same level of features as HDLs do but with a scope limited to analog systems, possibly with limited support of discrete semantics. Analog and Mixed-Signal Hardware Description Languages covers several aspects related to analog and mixed-signal hardware description languages including: The use of a digital HDL for the description and the simulation of analog systems The emergence of extensions of existing standard HDLs that provide true analog and mixed-signal HDLs. The use of analog and mixed-signal HDLs for the development of behavioral models of analog (electronic) building blocks (operational amplifier, PLL) and for the design of microsystems that do not only involve electronic parts. The use of a front-end tool that eases the description task with the help of a graphical paradigm, yet generating AHDL descriptions automatically. Analog and Mixed-Signal Hardware Description Languages is the first book to show how to use these new hardware description languages in the design of electronic components and systems. It is necessary reading for researchers and designers working in electronic design.

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## **SYSTEMS ANALYSIS AND MODELING**

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### **A MACRO-TO-MICRO APPROACH WITH MULTIDISCIPLINARY APPLICATIONS**

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[Elsevier](#) **Systems Analysis and Modeling** presents a fresh, new approach to systems analysis and modeling with a systems science flavor that stimulates systems thinking. After introducing systems modeling principles, the ensuing wide selection of examples aptly illustrate that anything which changes over time can be modeled as a system. Each example begins with a knowledge base that displays relevant information obtained from systems analysis. The diversity of examples clearly establishes a new protocol for synthesizing systems models. Macro-to-micro, top-down approach Multidisciplinary examples Incorporation of human knowledge to synthesise a systems model Clear and concise systems delimitation Complex systems using simple mathematics "Exact" reproduction of historical data plus model generated secondary data Systems simulation via systems models

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### **ANALOG/RF AND MIXED-SIGNAL CIRCUIT SYSTEMATIC DESIGN**

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[Springer Science & Business Media](#) Despite the fact that in the digital domain, designers can take full benefits of IPs and design automation tools to synthesize and design very complex systems, the analog designers' task is still considered as a 'handcraft', cumbersome and very time consuming process. Thus, tremendous efforts are being deployed to develop new design methodologies in the analog/RF and mixed-signal domains. This book collects 16 state-of-the-art contributions devoted to the topic of systematic design of analog, RF and mixed signal circuits. Divided in the two parts Methodologies and Techniques recent theories, synthesis techniques and design methodologies, as well as new sizing approaches in the field of robust analog and mixed signal design automation are presented for researchers and R/D engineers.

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### **ELECTRONIC DESIGN AUTOMATION OF ANALOG ICS COMBINING GRADIENT MODELS WITH MULTI-OBJECTIVE EVOLUTIONARY ALGORITHMS**

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[Springer Science & Business Media](#) This book applies to the scientific area of electronic design automation (EDA) and addresses the automatic sizing of analog integrated circuits (ICs). Particularly, this book presents an approach to enhance a state-of-the-art layout-aware circuit-level optimizer (GENOM-POF), by embedding statistical knowledge from an automatically generated gradient model into the multi-objective multi-constraint optimization kernel based on the NSGA-II algorithm. The results showed allow the designer to explore the different trade-offs of the solution space, both through the achieved device sizes, or the respective layout solutions.

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## **ANALOG CIRCUIT DESIGN**

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### **OPERATIONAL AMPLIFIERS, ANALOG TO DIGITAL CONVERTORS, ANALOG COMPUTER AIDED DESIGN**

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[Springer Science & Business Media](#) This volume of **Analog Circuit Design** concentrates on three topics: **Operational Amplifiers**, **A-to-D converters** and **Analog CAD**. The book comprises six papers on each topic written by internationally recognised experts. These papers have a tutorial nature aimed at improving the design of analog circuits. The book is divided into three parts. Part I, **Operational Amplifiers**, presents new technologies for the design of Op-Amps in both bipolar and CMOS technologies. Two papers demonstrate techniques for improving frequency and gain behavior at high voltage. Low voltage bipolar Op-Amp design is treated in another paper. The realization high-speed and high gain VLSI building blocks in CMOS is demonstrated in two papers. The final paper shows how to provide output power with CMOS buffer amplifiers. Part II, **Analog-to-Digital Conversion**, presents papers which address very high conversion speeds and very high resolution implementations using sigma-delta modulation architectures. Analog to Digital converters provide the link between the analog world of transducers and the digital world of signal processing and computing. High-performance bipolar and MOS technologies result in high-resolution or high-speed convertors which can be applied in digital audio or video systems. Furthermore, the advanced high-speed bipolar technologies show an increase in conversion speed into the gigahertz range. Part III, **Analog Computer Aided Design**, presents the latest research towards providing analog circuit designers with the tools needed to automate much of the design process. The techniques and methodologies described demonstrate the advances being made in developing analog design tools

comparable with those already available for digital design. The papers in this volume are based on those presented at the Workshop on Advances in Analog Circuit Design held in Delft, The Netherlands in 1992. The main intention of the workshop was to brainstorm with a group of about 100 analog design experts on the new possibilities and future developments on the above topics. The result of this brainstorming is contained in Analog Circuit Design, which is thus an important reference for researchers and design engineers working in the forefront of analog circuit design and research.

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### **SYSTEM-ON-CHIP METHODOLOGIES & DESIGN LANGUAGES**

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Springer Science & Business Media **System-on-Chip Methodologies & Design Languages** brings together a selection of the best papers from three international electronic design language conferences in 2000. The conferences are the Hardware Description Language Conference and Exhibition (HDLCon), held in the Silicon Valley area of USA; the Forum on Design Languages (FDL), held in Europe; and the Asia Pacific Chip Design Language (APChDL) Conference. The papers cover a range of topics, including design methods, specification and modeling languages, tool issues, formal verification, simulation and synthesis. The results presented in these papers will help researchers and practicing engineers keep abreast of developments in this rapidly evolving field.

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### **MECHATRONIC SYSTEMS, SENSORS, AND ACTUATORS**

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#### **FUNDAMENTALS AND MODELING**

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CRC Press The first comprehensive and up-to-date reference on mechatronics, Robert Bishop's **The Mechatronics Handbook** was quickly embraced as the gold standard for the field. With updated coverage on all aspects of mechatronics, **The Mechatronics Handbook, Second Edition** is now available as a two-volume set. Each installment offers focused coverage of a particular area of mechatronics, supplying a convenient and flexible source of specific information. This seminal work is still the most exhaustive, state-of-the-art treatment of the field available. **Mechatronics Systems, Sensors, and Actuators: Fundamentals and Modeling** presents an overview of mechatronics, providing a foundation for those new to the field and authoritative support for seasoned professionals. The book introduces basic definitions and the key elements and includes detailed descriptions of the mathematical models of the mechanical, electrical, and fluid subsystems that comprise mechatronic systems. New chapters include **Mechatronics Engineering Curriculum Design** and **Numerical Simulation**. Discussion of the fundamental physical relationships and mathematical models associated with commonly used sensor and actuator technologies complete the coverage. **Features** Introduces the key elements of mechatronics and discusses new directions Presents the underlying mechanical and electronic mathematical models comprising many mechatronic systems Provides a detailed discussion of the process of physical system modeling Covers time, frequency, and sensor and actuator characteristics

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### **INTRODUCTION TO MIXED-SIGNAL, EMBEDDED DESIGN**

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Springer Science & Business Media This textbook is written for junior/senior undergraduate and first-year graduate students in the electrical and computer engineering departments. Using PSoC mixed-signal array design, the authors define the characteristics of embedded design, embedded mixed-signal architectures, and top-down design. Optimized implementations of these designs are included to illustrate the theory. Exercises are provided at the end of each chapter for practice. Topics covered include the hardware and software used to implement analog and digital interfaces, various filter structures, amplifiers and other signal-conditioning circuits, pulse-width modulators, timers, and data structures for handling multiple similar peripheral devices. The practical exercises contained in the companion laboratory manual, which was co-authored by Cypress Staff Applications Engineer Dave Van Ess, are also based on PSoC. PSoC's integrated microcontroller, highly configurable analog/digital peripherals, and a full set of development tools make it an ideal learning tool for developing mixed-signal embedded design skills.

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### **EDA FOR IC IMPLEMENTATION, CIRCUIT DESIGN, AND PROCESS TECHNOLOGY**

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CRC Press Presenting a comprehensive overview of the design automation algorithms, tools, and methodologies used to design integrated circuits, the **Electronic Design Automation for Integrated Circuits Handbook** is available in two volumes. The second volume, **EDA for IC Implementation, Circuit Design, and Process Technology**, thoroughly examines real-time logic to GDSII (a file format used to transfer data of semiconductor physical layout), analog/mixed signal design, physical verification, and technology CAD (TCAD). Chapters contributed by leading experts authoritatively discuss design for manufacturability at the nanoscale, power supply network design and analysis, design modeling, and much more. Save on the complete set.

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### **AUTOMATIC ANALOG IC SIZING AND OPTIMIZATION CONSTRAINED WITH PVT CORNERS AND LAYOUT EFFECTS**

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Springer This book introduces readers to a variety of tools for automatic analog integrated circuit (IC) sizing and optimization. The authors provide a historical perspective on the early methods proposed to tackle automatic analog circuit sizing, with emphasis on the methodologies to size and optimize the circuit, and on the methodologies to estimate the circuit's performance. The discussion also includes robust circuit design and optimization and the most recent advances in layout-aware analog sizing approaches. The authors describe a methodology for an automatic flow for analog IC design, including details of the inputs and interfaces, multi-objective optimization techniques, and the enhancements made in the base implementation by using machine learning techniques. The Gradient model is discussed in detail, along with the methods to include layout effects in the circuit sizing. The concepts and algorithms

of all the modules are thoroughly described, enabling readers to reproduce the methodologies, improve the quality of their designs, or use them as starting point for a new tool. An extensive set of application examples is included to demonstrate the capabilities and features of the methodologies described.

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### **1997 IEEE/ACM INTERNATIONAL CONFERENCE ON COMPUTER-AIDED DESIGN, NOVEMBER 9-13, 1997 SAN JOSE, CALIFORNIA**

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#### **DIGEST OF TECHNICAL PAPERS**

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[IEEE Computer Society](#) This text covers the 1997 International Conference on Computer-Aided Design. It is suitable for students, professors, researchers and other computing professionals."

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#### **MODEL ENGINEERING IN MIXED-SIGNAL CIRCUIT DESIGN**

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#### **A GUIDE TO GENERATING ACCURATE BEHAVIORAL MODELS IN VHDL-AMS**

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[Springer Science & Business Media](#) For the first time, this up-to-date text combines the main issues of the hardware description language VHDL-AMS aimed at model representation of mixed-signal circuits and systems, characterization methods and tools for the extraction of model parameters, and modelling methodologies for accurate high-level behavioural models.

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#### **COMPUTER-AIDED DESIGN OF ANALOG INTEGRATED CIRCUITS AND SYSTEMS**

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[Wiley-IEEE Press](#) The tools and techniques you need to break the analog design bottleneck! Ten years ago, analog seemed to be a dead-end technology. Today, System-on-Chip (SoC) designs are increasingly mixed-signal designs. With the advent of application-specific integrated circuits (ASIC) technologies that can integrate both analog and digital functions on a single chip, analog has become more crucial than ever to the design process. Today, designers are moving beyond hand-crafted, one-transistor-at-a-time methods. They are using new circuit and physical synthesis tools to design practical analog circuits; new modeling and analysis tools to allow rapid exploration of system level alternatives; and new simulation tools to provide accurate answers for analog circuit behaviors and interactions that were considered impossible to handle only a few years ago. To give circuit designers and CAD professionals a better understanding of the history and the current state of the art in the field, this volume collects in one place the essential set of analog CAD papers that form the foundation of today's new analog design automation tools. Areas covered are: Analog synthesis Symbolic analysis Analog layout Analog modeling and analysis Specialized analog simulation Circuit centering and yield optimization Circuit testing Computer-Aided Design of Analog Integrated Circuits and Systems is the cutting-edge reference that will be an invaluable resource for every semiconductor circuit designer and CAD professional who hopes to break the analog design bottleneck.

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#### **2022 18TH INTERNATIONAL CONFERENCE ON SYNTHESIS, MODELING, ANALYSIS AND SIMULATION METHODS AND APPLICATIONS TO CIRCUIT DESIGN (SMACD)**

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The International Conference on Synthesis, Modeling, Analysis and Simulation Methods, and Applications to Circuit Design (SMACD) is a forum devoted to modeling, simulation, and synthesis for Analog, Mixed signal, RF (AMS RF), and multi domain (MEMs, nanoelectronics, optoelectronics, biological, etc ) integrated circuits and systems Open source tool and methods for analog IC design and experiences with modeling, simulation, and synthesis techniques in diverse application areas are also welcomed Objective technologies include CMOS, beyond CMOS, and More than Moore such as MEMs, power devices, sensors, passives, etc

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#### **ANALOG CIRCUIT DESIGN**

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#### **STRUCTURED MIXED-MODE DESIGN, MULTI-BIT SIGMA-DELTA CONVERTERS, SHORT RANGE RF CIRCUITS**

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[Springer Science & Business Media](#) In the 11th edition in this successful series, the topics are structured-mixed-mode design, multi-bit sigma-delta converters and short range RF circuits. The book provides valuable information and excellent overviews of analogue circuit design, CAD and RF systems.

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#### **ANALOG INTEGRATED CIRCUIT DESIGN AUTOMATION**

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#### **PLACEMENT, ROUTING AND PARASITIC EXTRACTION TECHNIQUES**

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[Springer](#) This book introduces readers to a variety of tools for analog layout design automation. After discussing the placement and routing problem in electronic design automation (EDA), the authors overview a variety of automatic layout generation tools, as well as the most recent advances in analog layout-aware circuit sizing. The discussion includes different methods for automatic placement (a template-based Placer and an optimization-based Placer), a fully-automatic Router and an empirical-based Parasitic Extractor. The concepts and algorithms of all the modules are thoroughly described, enabling readers to reproduce the methodologies, improve the quality of their designs, or use them as starting point for a new tool. All the methods described are applied to practical examples for a 130nm design process, as well as placement and routing benchmark sets.

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## GENETIC PROGRAMMING THEORY AND PRACTICE IV

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Springer Science & Business Media **Genetic Programming Theory and Practice IV** was developed from the fourth workshop at the University of Michigan's Center for the Study of Complex Systems. The workshop was convened in May 2006 to facilitate the exchange of ideas and information related to the rapidly advancing field of Genetic Programming (GP). The text explores the synergy between theory and practice, producing a comprehensive view of the state of the art in GP application.

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## ANALOG CIRCUITS

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### FUNDAMENTALS, SYNTHESIS AND PERFORMANCE

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**Editor Biography:** Esteban Tlelo-Cuautle received a B.Sc. degree from Instituto Tecnológico de Puebla (ITP), México in 1993. He then received both M.Sc. and Ph.D. degrees from Instituto Nacional de Astrofísica, Óptica y Electrónica (INAOE), México, in 1995 and 2000, respectively. He has published 13 books and more than 250 works in book chapters, journals and conferences. He is an associate editor of IEEE Transactions on Circuits and Systems I: Regular Papers, and Integration - the VLSI Journal. His research interests include modeling and simulation of circuits and systems, design and applications of chaotic oscillators, symbolic analysis, multi-objective evolutionary algorithms, and analogue/radio frequency (RF) and mixed-signal design automation tools. **Book Description:** This book includes recent research that focuses on analog integrated circuits and covers three main topics, namely: fundamentals, synthesis and performance. Eleven chapters are divided among these three topics as follows: Chapters One to Four are a part of fundamentals. The first chapter ("The Next Generation of Nanomaterials for Designing Analog Integrated Circuits") describes new directions for applying nanomaterials for the design of modern analog circuits. Chapter Two ("Application of Nullors in Designing Analog Circuits for Frequency Bandwidth") uses the pathological circuit element known as a nullor to design analog integrated circuits with frequency specifications to accomplish a desired bandwidth. Chapter Three ("RC and RL to LC Circuit Conversion, and its Application in Poles and Zeros Identification") details an important property from circuit theory to estimate roots by performing conversions of passive elements. Chapter Four ("Enhanced and Improved Symbolic Circuit Analysis Using MATLAB") relays the development of symbolic circuit analysis and focuses on enhancing an already developed symbolic tool to allow the symbolic analysis of large circuits. The synthesis of analog integrated circuits has been a challenge because there is no way to establish general rules to cover the gap between the behavioral and transistor circuit levels of abstraction. In this book, the second topic includes four chapters, from Five to Eight. Chapter Five ("On the Synthesis of Sinusoidal Oscillators Using Nullors"), just as in Chapter Two, uses the pathological circuit element known as a nullor to perform the synthesis of sinusoidal oscillators, which are quite useful in many electronic systems. Other kinds of oscillators are described in Chapter Six ("Synthesis of SRCOs and Multi-Phase Oscillators from State Variables to their Implementation Using CMOS IC Technology") where the synthesis process identifies the resistor that controls the oscillating frequency and applies a state variable approach. Chapter Seven ("Evolutionary Optimization in the Design of CMOS Analog Integrated Circuits") shows the application of heuristics for circuit optimization, and how it can be extended to bigger analog integrated circuits. Chapter Eight provides details on the synthesis and design of a CMOS harmonic mixer with output power management for narrowband and wideband wireless communications: the Bluetooth and UWB cases. The third part of this book is devoted to analog circuit performances and includes three chapters. Chapter Nine details the FPGA realization of radio frequency (RF) power amplifier models. In this case, the system is modeled in the analog domain and implemented in the digital one. Chapter Ten "White-Box Models of Optimal-Sized Solutions of Analog Integrated Circuits") generates analytical expressions for modeling the dominant behavior of CMOS analog circuits. Finally, Chapter Eleven ("Radial Basis Function Surrogate Modeling for the Accurate Design of Analog Circuits") applies modern modeling approaches to accomplish real target specifications and to improve the design of reliable circuits. **Target Audience:** Electrical and Electronics Engineers, Integrated Circuits Designers, Electronic Design Automation Developers

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### DESIGN OF ANALOG CIRCUITS THROUGH SYMBOLIC ANALYSIS

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Bentham Science Publishers "Symbolic analyzers have the potential to offer knowledge to sophomores as well as practitioners of analog circuit design. Actually, they are an essential complement to numerical simulators, since they provide insight into circuit behavior which numerical "

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### STATISTICAL PERFORMANCE MODELING AND OPTIMIZATION

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Now Publishers Inc **Statistical Performance Modeling and Optimization** reviews various statistical methodologies that have been recently developed to model, analyze and optimize performance variations at both transistor level and system level in integrated circuit (IC) design. The following topics are discussed in detail: sources of process variations, variation characterization and modeling, Monte Carlo analysis, response surface modeling, statistical timing and leakage analysis, probability distribution extraction, parametric yield estimation and robust IC optimization. These techniques provide the necessary CAD infrastructure that facilitates the bold move from deterministic, corner-based IC design toward statistical and probabilistic design. **Statistical Performance Modeling and Optimization** reviews and compares different statistical IC analysis and optimization techniques, and analyzes their trade-offs for practical industrial applications. It serves as a valuable reference for researchers, students and CAD practitioners.

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### DESIGN AND MODELING OF LOW POWER VLSI SYSTEMS

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**IGI Global** 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 VLSI 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.

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## **DESIGN METHODOLOGIES FOR SECURE EMBEDDED SYSTEMS**

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### **FESTSCHRIFT IN HONOR OF PROF. DR.-ING. SORIN A. HUSS**

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**Springer Science & Business Media** Embedded systems have been almost invisibly pervading our daily lives for several decades. They facilitate smooth operations in avionics, automotive electronics, or telecommunication. New problems arise by the increasing employment, interconnection, and communication of embedded systems in heterogeneous environments: How secure are these embedded systems against attacks or breakdowns? Therefore, how can embedded systems be designed to be more secure? How can embedded systems autonomically react to threats? Facing these questions, Sorin A. Huss is significantly involved in the exploration of design methodologies for secure embedded systems. This Festschrift is dedicated to him and his research on the occasion of his 60th birthday.

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## **INTELLIGENT COMPUTATIONAL OPTIMIZATION IN ENGINEERING**

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### **TECHNIQUES & APPLICATIONS**

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**Springer** We often come across computational optimization virtually in all branches of engineering and industry. Many engineering problems involve heuristic search and optimization, and, once discretized, may become combinatorial in nature, which gives rise to certain difficulties in terms of solution procedure. Some of these problems have enormous search spaces, are NP-hard and hence require heuristic solution techniques. Another difficulty is the lack of ability of classical solution techniques to determine appropriate optima of non-convex problems. Under these conditions, recent advances in computational optimization techniques have been shown to be advantageous and successful compared to classical approaches. This Volume presents some of the latest developments with a focus on the design of algorithms for computational optimization and their applications in practice. Through the chapters of this book, researchers and practitioners share their experience and newest methodologies with regard to intelligent optimization and provide various case studies of the application of intelligent optimization techniques in real-world applications. This book can serve as an excellent reference for researchers and graduate students in computer science, various engineering disciplines and the industry.

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## **THE SYSTEM DESIGNER'S GUIDE TO VHDL-AMS**

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### **ANALOG, MIXED-SIGNAL, AND MIXED-TECHNOLOGY MODELING**

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**Elsevier** The demand is exploding for complete, integrated systems that sense, process, manipulate, and control complex entities such as sound, images, text, motion, and environmental conditions. These systems, from hand-held devices to automotive sub-systems to aerospace vehicles, employ electronics to manage and adapt to a world that is, predominantly, neither digital nor electronic. To respond to this design challenge, the industry has developed and standardized VHDL-AMS, a unified design language for modeling digital, analog, mixed-signal, and mixed-technology systems. VHDL-AMS extends VHDL to bring the successful HDL modeling methodology of digital electronic systems design to these new design disciplines. Gregory Peterson and Darrell Teegarden join best-selling author Peter Ashenden in teaching designers how to use VHDL-AMS to model these complex systems. This comprehensive tutorial and reference provides detailed descriptions of both the syntax and semantics of the language and of successful modeling techniques. It assumes no previous knowledge of VHDL, but instead teaches VHDL and VHDL-AMS in an integrated fashion, just as it would be used by designers of these complex, integrated systems. Explores the design of an electric-powered, unmanned aerial vehicle system (UAV) in five separate case studies to illustrate mixed-signal, mixed-technology, power systems, communication systems, and full system modeling.

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## **SYSTEMATIC MODELING AND ANALYSIS OF TELECOM FRONTENDS AND THEIR BUILDING BLOCKS**

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**Springer Science & Business Media** To meet the demands of today's highly competitive market, analog electronics designers must develop their IC designs in a minimum of time. The difference between first- and second-time right seriously affects a company's share of the market. Analog designers are therefore in need for structured design methods together with the theory and tools to support them, especially when pushing the performance limits in high-performance designs. Systematic Modeling and Analysis of Telecom Frontends and Their Building Blocks aims to help designers in speeding up telecommunication frontend design by offering an in-depth understanding of the frontend's behavior together with methods and algorithms that support designers in bringing this understanding to practice. The book treats topics such as time-varying phase-locked loop stability, noise in mixing circuits, oscillator injection locking, oscillator phase noise behavior, harmonic oscillator dynamics and many more. In doing so, it always starts from a theoretical foundation that is both rigorous and general. Phase-locked loop and mixer analysis, for example, are grounded upon a general framework for time-varying small-signal analysis. Likewise, analysis of harmonic oscillator transient behavior and oscillator phase noise analysis are treated as particular applications of a general framework for

oscillator perturbation analysis. In order to make the book as easy to read as possible, all theory is always accompanied by numerous examples and easy-to-catch intuitive explanations. As such, the book is suited for both computer-aided design engineers looking for general theories and methods, either as background material or for practical implementation in tools, as well as for practicing circuit designers looking for help and insight in dealing with a particular application or a particular high-performance design problem.

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### **HANDBOOK OF RESEARCH ON APPLIED OPTIMIZATION METHODOLOGIES IN MANUFACTURING SYSTEMS**

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[IGI Global](#) Today's manufacturing systems are undergoing significant changes in the aspects of planning, production execution, and delivery. It is imperative to stay up-to-date on the latest trends in optimization to efficiently create products for the market. The Handbook of Research on Applied Optimization Methodologies in Manufacturing Systems is a pivotal reference source including the latest scholarly research on heuristic models for solving manufacturing and supply chain related problems. Featuring exhaustive coverage on a broad range of topics such as assembly ratio, car sequencing, and color constraints, this publication is ideally designed for practitioners seeking new comprehensive models for problem solving in manufacturing and supply chain management.

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### **ELECTRONIC DESIGN AUTOMATION OF MULTI-SCROLL CHAOS GENERATORS**

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[Bentham Science Publishers](#) "This book is unique when compared with books on non-linear circuits and systems. The book introduces novel concepts of physics, computer and electrical engineering. The synthesis of Multi-scroll chaotic oscillators is performed through three hierarchical "

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### **AUTOMATED HIERARCHICAL SYNTHESIS OF RADIO-FREQUENCY INTEGRATED CIRCUITS AND SYSTEMS**

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#### **A SYSTEMATIC AND MULTILEVEL APPROACH**

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[Springer Nature](#) This book describes a new design methodology that allows optimization-based synthesis of RF systems in a hierarchical multilevel approach, in which the system is designed in a bottom-up fashion, from the device level up to the (sub)system level. At each level of the design hierarchy, the authors discuss methods that increase the design robustness and increase the accuracy and efficiency of the simulations. The methodology described enables circuit sizing and layout in a complete and automated integrated manner, achieving optimized designs in significantly less time than with traditional approaches.

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### **ADVANCES IN ANALOG CIRCUITS**

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[BoD - Books on Demand](#) This book highlights key design issues and challenges to guarantee the development of successful applications of analog circuits. Researchers around the world share acquired experience and insights to develop advances in analog circuit design, modeling and simulation. The key contributions of the sixteen chapters focus on recent advances in analog circuits to accomplish academic or industrial target specifications.

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### **NANO-SCALE CMOS ANALOG CIRCUITS**

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#### **MODELS AND CAD TECHNIQUES FOR HIGH-LEVEL DESIGN**

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[CRC Press](#) 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.

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### **USING ARTIFICIAL NEURAL NETWORKS FOR ANALOG INTEGRATED CIRCUIT DESIGN AUTOMATION**

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[Springer Nature](#) This book addresses the automatic sizing and layout of analog integrated circuits (ICs) using deep learning (DL) and artificial neural networks (ANN). It explores an innovative approach to automatic circuit sizing where ANNs learn patterns from previously optimized design solutions. In opposition to classical optimization-based sizing strategies, where computational intelligence techniques are used to iterate over the map from devices' sizes to circuits' performances provided by design equations or circuit simulations, ANNs are shown to be capable of solving

analog IC sizing as a direct map from specifications to the devices' sizes. Two separate ANN architectures are proposed: a Regression-only model and a Classification and Regression model. The goal of the Regression-only model is to learn design patterns from the studied circuits, using circuit's performances as input features and devices' sizes as target outputs. This model can size a circuit given its specifications for a single topology. The Classification and Regression model has the same capabilities of the previous model, but it can also select the most appropriate circuit topology and its respective sizing given the target specification. The proposed methodology was implemented and tested on two analog circuit topologies.

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## INTELLECTUAL PROPERTY FOR ELECTRONIC SYSTEMS

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### AN ESSENTIAL INTRODUCTION

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Intl. Engineering Consortiu Featuring articles by top experts from such companies as Rambus, IBM, Hewlett-Packard, and FreeScale, this collection addresses the issues that concern those in the ICT field looking to keep systems safe and secure without sacrificing quality or ease of use. This book cogently addresses verification, standards, handoff, and legal issues to create a comprehensive look at one of the most important, yet sometimes under-appreciated, topics in the industry.

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## THE ELECTRICAL ENGINEERING HANDBOOK - SIX VOLUME SET

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CRC Press In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has grown into a set of six books carefully focused on specialized areas or fields of study. Each one represents a concise yet definitive collection of key concepts, models, and equations in its respective domain, thoughtfully gathered for convenient access. Combined, they constitute the most comprehensive, authoritative resource available. Circuits, Signals, and Speech and Image Processing presents all of the basic information related to electric circuits and components, analysis of circuits, the use of the Laplace transform, as well as signal, speech, and image processing using filters and algorithms. It also examines emerging areas such as text to speech synthesis, real-time processing, and embedded signal processing. Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Sensors, Nanoscience, Biomedical Engineering, and Instruments provides thorough coverage of sensors, materials and nanoscience, instruments and measurements, and biomedical systems and devices, including all of the basic information required to thoroughly understand each area. It explores the emerging fields of sensors, nanotechnologies, and biological effects. Broadcasting and Optical Communication Technology explores communications, information theory, and devices, covering all of the basic information needed for a thorough understanding of these areas. It also examines the emerging areas of adaptive estimation and optical communication. Computers, Software Engineering, and Digital Devices examines digital and logical devices, displays, testing, software, and computers, presenting the fundamental concepts needed to ensure a thorough understanding of each field. It treats the emerging fields of programmable logic, hardware description languages, and parallel computing in detail. Systems, Controls, Embedded Systems, Energy, and Machines explores in detail the fields of energy devices, machines, and systems as well as control systems. It provides all of the fundamental concepts needed for thorough, in-depth understanding of each area and devotes special attention to the emerging area of embedded systems. Encompassing the work of the world's foremost experts in their respective specialties, The Electrical Engineering Handbook, Third Edition remains the most convenient, reliable source of information available. This edition features the latest developments, the broadest scope of coverage, and new material on nanotechnologies, fuel cells, embedded systems, and biometrics. The engineering community has relied on the Handbook for more than twelve years, and it will continue to be a platform to launch the next wave of advancements. The Handbook's latest incarnation features a protective slipcase, which helps you stay organized without overwhelming your bookshelf. It is an attractive addition to any collection, and will help keep each volume of the Handbook as fresh as your latest research.

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## SYSTEM-ON-CHIP

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### NEXT GENERATION ELECTRONICS

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IET System-on-Chip (SoC) represents the next major market for microelectronics, and there is considerable interest world-wide in developing effective methods and tools to support the SoC paradigm. SoC is an expanding field, at present the technical and technological literature about the overall state-of-the-art in SoC is dispersed across a wide spectrum which includes books, journals, and conference proceedings. The book provides a comprehensive and accessible source of state-of-the-art information on existing and emerging SoC key research areas, provided by leading experts in the field. This book covers the general principles of designing, validating and testing complex embedded computing systems and their underlying tradeoffs. The book has twenty five chapters organised into eight parts, each part focuses on a particular topic of SoC. Each chapter has some background covering the basic principles, and extensive list of references. It is aimed at graduate students, designers and managers working in Electronic and Computer engineering.

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## **INTELLIGENT TECHNICAL SYSTEMS**

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Springer Science & Business Media **Intelligent technical systems are networked, embedded systems incorporating real-time capacities that are able to interact with and adapt to their environments. These systems need innovative approaches in order to meet requirements like cost, size, power and memory consumption, as well as real-time compliance and security. Intelligent Technical Systems covers different levels like multimedia systems, embedded programming, middleware platforms, sensor networks and autonomous systems and applications for intelligent engineering. Each level is discussed by a set of original articles summarizing the state of the art and presenting a concrete application; they include a deep discussion of their model and explain all design decisions relevant to obtain a mature solution.**