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## LILIA HUERTA

*Digital Integrated Circuits* Nova Publishers  
This book contains the papers presented at the 9th International Workshop on Field Programmable Logic and Applications (FPL'99), hosted by the University of Strathclyde in Glasgow, Scotland, August 30 - September 1, 1999. FPL'99 is the ninth in the series of annual FPL workshops. The FPL'99 programme committee has been fortunate to have received a large number of high-quality papers addressing a wide range of topics. From these, 33 papers have been selected for presentation at the workshop and a further 32 papers have been accepted for the poster sessions. A total of 65 papers from 20 countries are included in this volume. FPL is a subject area that attracts researchers from both electronic engineering and computer science. Whether we are engaged in research into soft hardware or hard software seems to be primarily a question of perspective. What is unquestionable is that the interaction of groups of researchers from different backgrounds results in stimulating and productive research. As we prepare for the new millennium, the premier European forum for researchers in field programmable logic remains the FPL workshop. Next year the FPL series of workshops will celebrate its tenth anniversary. The contribution of so many overseas researchers has been a particularly attractive feature of these events, giving them a truly international perspective, while the informal and convivial atmosphere that pervades the workshops have been their hallmark. We look forward to preserving these features in the future while continuing to expand the size and quality of the events.

**Circadian Rhythms for Future Resilient Electronic Systems** Springer Science & Business Media

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. The broad-ranging coverage of this textbook starts with the fundamentals of CMOS process technology, and continues with MOS transistor models, basic CMOS gates, interconnect effects, dynamic circuits, memory circuits, arithmetic building blocks, clock and I/O circuits, low power design techniques, design for manufacturability and design for testability.

**Crosstalk in Modern On-Chip Interconnects** Morgan Kaufmann

*Field-Programmable Custom Computing Technology: Architectures, Tools, and Applications* brings together in one place important contributions and up-to-date research results in this fast-moving area. In seven selected chapters, the book describes the latest advances in architectures, design methods, and applications of field-programmable devices for high-performance reconfigurable systems. The contributors to this work were selected from the leading researchers and practitioners in the field. It will be valuable to anyone working or researching in the field of custom computing technology. It serves as an excellent reference, providing insight into some of the most challenging issues being examined today.

**A Computer-Aided Design and Synthesis Environment for Analog Integrated Circuits** Pearson Education India

*Digital Integrated Circuits: A Design Perspective*

**Design with Operational Amplifiers and Analog Integrated Circuits** Springer

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

automation on the digital design perspective.

**FPGA Prototyping by VHDL Examples** John Wiley & Sons

This book focuses on increasing the energy-efficiency of electronic devices so that portable applications can have a longer stand-alone time on the same battery. The authors explain the energy-efficiency benefits that ultra-low-voltage circuits provide and provide answers to tackle the challenges which ultra-low-voltage operation poses. An innovative design methodology is presented, verified, and validated by four prototypes in advanced CMOS technologies. These prototypes are shown to achieve high energy-efficiency through their successful functionality at ultra-low supply voltages.

**Power Aware Computing** Springer Science & Business Media

With the advent of portable and autonomous computing systems, power consumption has emerged as a focal point in many research projects, commercial systems and DoD platforms. One current research initiative, which drew much attention to this area, is the Power Aware Computing and Communications (PAC/C) program sponsored by DARPA. Many of the chapters in this book include results from work that have been supported by the PACIC program. The performance of computer systems has been tremendously improving while the size and weight of such systems has been constantly shrinking. The capacities of batteries relative to their sizes and weights has been also improving but at a rate which is much slower than the rate of improvement in computer performance and the rate of shrinking in computer sizes. The relation between the power consumption of a computer system and its performance and size is a complex one which is very much dependent on the specific system and the technology used to build that system. We do not need a complex argument, however, to be convinced that energy and power, which is the rate of energy consumption, are becoming critical components in computer systems in general, and portable and autonomous systems, in particular. Most of the early research on power consumption in computer systems addressed the issue of

minimizing power in a given platform, which usually translates into minimizing energy consumption, and thus, longer battery life.

**Digital Integrated Circuits** Springer Science & Business Media

This book gathers high-quality research papers presented at the Second International Conference on Innovative Computing and Communication (ICICC 2019), which was held at the VSB - Technical University of Ostrava, Czech Republic, on 21–22 March 2019. Highlighting innovative papers by scientists, scholars, students, and industry experts in the fields of computing and communication, the book promotes the transformation of fundamental research into institutional and industrialized research, and the translation of applied research into real-world applications.

**Field Programmable Logic and Applications** Springer Science & Business Media

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

**Analysis and Solutions for Switching Noise Coupling in Mixed-Signal ICs**

Springer Nature

This book uses a "learn by doing" approach to introduce the concepts and techniques of VHDL and FPGA to designers through a series of hands-on experiments. FPGA Prototyping by VHDL Examples provides a collection of clear, easy-to-follow templates for quick code development; a large number of practical examples to illustrate and reinforce the concepts and design techniques; realistic projects that can be implemented and tested on a Xilinx prototyping board; and a thorough exploration of the Xilinx PicoBlaze soft-core microcontroller.

**Embedded Cryptographic Hardware** Pearson

In today's world, people are using more and more digital systems in daily life. Such systems utilize the elementariness of Boolean values. A Boolean variable can carry only two different Boolean values: FALSE or TRUE (0 or 1), and has the best interference resistance in technical systems. However, a Boolean function exponentially depends on the number of its variables. This exponential complexity is the cause of major problems in the process of design and realization of circuits. According to Moore's Law, the complexity of digital systems

approximately doubles every 18 months. This requires comprehensive knowledge and techniques to solve very complex Boolean problems. This book summarizes the recent progress in the Boolean domain in solving such issues. Part 1 describes the most powerful approaches in solving exceptionally complex Boolean problems. It is shown how an extremely rare solution could be found in a gigantic search space of more than  $10^{195}$  (this is a number of 196 decimal digits) different color patterns. Part 2 describes new research into digital circuits that realize Boolean functions. This part contains the chapters "Design" and "Test", which present solutions to problems of power dissipation, and the testing of digital circuits using a special data structure, as well as further topics. Part 3 contributes to the scientific basis of future circuit technologies, investigating the need for completely new design methods for the atomic level of quantum computers. This section also concerns itself with circuit structures in reversible logic as the basis for quantum logic.

**Low Power Design Methodologies** Springer Science & Business Media

This volume describes the design of relay-based circuit systems from device fabrication to circuit micro-architectures. This book is ideal for both device engineers as well as circuit system designers, and highlights the importance of co-design across design hierarchies when trying to optimize system performance (in this case, energy-efficiency). The book will also appeal to researchers and engineers focused on semiconductor, integrated circuits, and energy efficient electronics.

**Accelerated Active Self-Healing for Integrated Circuits** Digital Integrated Circuits A Design Perspective Beginning with discussions on the operation of electronic devices and analysis of the nucleus of digital design, the text addresses: the impact of interconnect, design for low power, issues in timing and clocking, design methodologies, and the effect of design automation on the digital design perspective. CMOS Digital Integrated Circuits Analysis and Design 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. The broad-ranging coverage of this textbook starts with the fundamentals of CMOS process technology, and continues with MOS transistor models, basic CMOS gates, interconnect effects, dynamic circuits, memory circuits, arithmetic building blocks, clock and I/O circuits, low power design techniques, design for manufacturability and design for testability. Embedded SoPC Design with Nios II Processor and Verilog Examples Explores the unique hardware programmability of FPGA-based embedded systems, using a learn-by-doing approach to introduce the concepts and techniques for embedded SoPC design with Verilog An SoPC (system on a programmable chip) integrates a processor, memory modules, I/O peripherals, and custom hardware accelerators into a single FPGA (field-programmable gate array) device. In addition to the customized software, customized hardware can be developed and incorporated into the embedded system as well—allowing us to configure the soft-core processor, create tailored I/O interfaces, and develop specialized hardware accelerators for computation-intensive tasks. Utilizing an Altera FPGA prototyping board and its Nios II soft-core processor, Embedded SoPC Design with Nios II Processor and Verilog Examples takes a "learn by doing" approach to illustrate the hardware and software design and development process by including realistic projects that can be implemented and tested on the board. Emphasizing hardware design and integration throughout, the book is divided into four major parts: Part I covers HDL and synthesis of custom hardware Part II introduces the Nios II processor and provides an overview of embedded software development Part III demonstrates the design and development of hardware and software of several complex I/O peripherals, including a PS2 keyboard and mouse, a graphic video controller, an audio codec, and an SD (secure digital) card Part IV provides several case studies of the integration of hardware accelerators, including a custom GCD (greatest common divisor) circuit, a Mandelbrot set fractal circuit, and an audio synthesizer based on DDFS (direct digital frequency synthesis) methodology While designing and developing an embedded SoPC can be rewarding, the learning can be a long and winding journey. This book shows the trail ahead and guides readers

through the initial steps to exploit the full potential of this emerging methodology. Cryptographic Engineering Springer Science & Business Media

Field-programmable gate arrays (FPGAs), which are pre-fabricated, programmable digital integrated circuits (ICs), provide easy access to state-of-the-art integrated circuit process technology, and in doing so, democratize this technology of our time. This book is about comparing the qualities of FPGA – their speed performance, area and power consumption, against custom-fabricated ICs, and exploring ways of mitigating their deficiencies. This work began as a question that many have asked, and few had the resources to answer – how much worse is an FPGA compared to a custom-designed chip? As we dealt with that question, we found that it was far more difficult to answer than we anticipated, but that the results were rich basic insights on fundamental understandings of FPGA architecture. It also encouraged us to find ways to leverage those insights to seek ways to make FPGA technology better, which is what the second half of the book is about. While the question “How much worse is an FPGA than an ASIC?” has been a constant sub-theme of all research on FPGAs, it was posed most directly, some time around May 2004, by Professor Abbas El Gamal from Stanford University to us – he was working on a 3D FPGA, and was wondering if any real measurements had been made in this kind of comparison. Shortly thereafter we took it up and tried to answer in a serious way.

Embedded SoPC Design with Nios II Processor and VHDL Examples John Wiley & Sons

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.

Integrated Circuit and System Design. Power and Timing Modeling, Optimization and Simulation John Wiley & Sons

Low Power Design in Deep Submicron Electronics deals with the different aspects of low power design for deep submicron electronics at all levels of abstraction from system level to circuit level and technology. Its objective is to guide industrial and academic engineers and researchers in the selection of methods, technologies and tools and to provide a baseline for further developments. Furthermore the book has been written to serve as a textbook for postgraduate student courses. In order to achieve both goals, it is structured into different chapters each of which addresses a different phase of the design, a particular level of abstraction, a unique design style or technology. These design-related chapters are amended by motivations in Chapter 2, which presents visions both of future low power applications and technology advancements, and by some advanced case studies in Chapter 9. From the Foreword: ‘... This global nature of design for low power was well understood by Wolfgang Nebel and Jean Mermet when organizing the NATO workshop which is the origin of the book. They invited the best experts in the field to cover all aspects of low power design. As a result the chapters in this book are covering deep-submicron CMOS digital system design for low power in a systematic way from process technology all the way up to software design and embedded software systems. Low Power Design in Deep Submicron Electronics is an excellent guide for the practicing engineer, the researcher and the student interested in this crucial aspect of actual CMOS design. It contains about a thousand references to all aspects of the recent five years of feverish activity in this exciting aspect of design.’ Hugo de Man Professor, K.U. Leuven, Belgium Senior Research Fellow, IMEC, Belgium

Field-Programmable Custom Computing Technology: Architectures, Tools, and Applications Springer

Uncertainty in key parameters within a chip and between different chips in the deep sub micron area plays a more and more important role. As a result, manufacturing process spreads need to be considered during the design process. Quantitative methodology is needed to ensure faultless functionality, despite existing process variations within given bounds, during product development. This book presents the technological, physical, and mathematical fundamentals for a design paradigm shift, from a deterministic process to a probability-orientated design process for microelectronic circuits. Readers will learn to evaluate the different sources of variations in the design flow in order to establish different design variants, while applying appropriate methods and tools to evaluate and optimize their design.

**Secure Smart Embedded Devices, Platforms and Applications** Springer

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

Digital Integrated Circuits Springer Nature

Design and Analysis of High Efficiency Line Drivers for xDSL covers the most important building block of an xDSL (ADSL, VDSL, ...) system: the line driver. Traditional Class AB line drivers consume more than 70% of the total power budget of state-of-the-art ADSL modems. This book describes the main difficulties in designing line drivers for xDSL. The most important specifications are elaborated starting from the main properties of the channel and the signal properties. The traditional (class AB), state-of-the-art (class G) and future technologies (class K) are discussed. The main part of Design and Analysis of High Efficiency Line Drivers for xDSL describes the design of a novel architecture: the Self-Oscillating Power Amplifier or SOPA.

*The Design and Analysis of VLSI Circuits*  
 Springer Science & Business Media  
 With vastly increased complexity and functionality in the "nanometer era" (i.e. hundreds of millions of transistors on one chip), increasing the performance of integrated circuits has become a challenging task. Connecting effectively (interconnect design) all of these chip elements has become the greatest determining factor in overall performance. 3-D integrated circuit design may offer the best solutions in the near future. This is the first book on 3-D integrated circuit

design, covering all of the technological and design aspects of this emerging design paradigm, while proposing effective solutions to specific challenging problems concerning the design of 3-D integrated circuits. A handy, comprehensive reference or a practical design guide, this book provides a sound foundation for the design of 3-D integrated circuits. \* Demonstrates how to overcome "interconnect bottleneck" with 3-D integrated circuit design...leading edge design techniques offer solutions to problems (performance/power

consumption/price) faced by all circuit designers \* The FIRST book on 3-D integrated circuit design...provides up-to-date information that is otherwise difficult to find \* Focuses on design issues key to the product development cycle...good design plays a major role in exploiting the implementation flexibilities offered in the 3-D \* Provides broad coverage of 3-D integrated circuit design, including interconnect prediction models, thermal management techniques, and timing optimization...offers practical view of designing 3-D circuits