

# LOW-POWER VLSI DESIGN TECHNIQUES AND APPLICATIONS

LOW-POWER VLSI DESIGN: TECHNIQUES AND APPLICATIONS



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# Low Power Vlsi Design And Technology

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## **Low Power Vlsi Design And Technology:**

**Low Power Vlsi Design And Technology** Farid N Najm, Garey K-h Yeap, 1996-08-30 Low power and low energy VLSI has become an important issue in today's consumer electronics. This book is a collection of pioneering applied research papers in low power VLSI design and technology. A comprehensive introductory chapter presents the current status of the industry and academic research in the area of low power VLSI design and technology. Other topics cover logic synthesis, floorplanning, circuit design and analysis from the perspective of low power requirements. The readers will have a sampling of some key problems in this area as the low power solutions span the entire spectrum of the design process. The book also provides excellent references on up-to-date research and development issues with practical solution techniques.

**Low-Power VLSI Circuits and Systems** Ajit Pal, 2014-11-17 The book provides a comprehensive coverage of different aspects of low power circuit synthesis at various levels of design hierarchy starting from the layout level to the system level. For a seamless understanding of the subject, basics of MOS circuits have been introduced at transistor, gate and circuit level, followed by various low power design methodologies such as supply voltage scaling, switched capacitance minimization techniques and leakage power minimization approaches. The content of this book will prove useful to students, researchers as well as practicing engineers.

**Low Power VLSI Design** Angsuman Sarkar, Swapnadip De, Manash Chanda, Chandan Kumar Sarkar, 2016-08-08 This book teaches basic and advanced concepts, new methodologies and recent developments in VLSI technology with a focus on low power design. It provides insight on how to use Tanner, Spice, Cadence tools, Xilinx tools, VHDL programming and Synopsis to design simple and complex circuits using latest state-of-the-art technologies. Emphasis is placed on fundamental transistor circuit level design concepts.

**Design and Modeling of Low Power VLSI Systems** Sharma, Manoj, Gautam, Ruchi, Khan, Mohammad Ayoub, 2016-06-06 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.

**Practical Low Power Digital VLSI Design** Gary K. Yeap, 2012-12-06 Practical Low Power Digital VLSI Design emphasizes the optimization and trade-off techniques that involve power dissipation in the hope that the readers are better prepared the next time they are presented with a low power design problem. The book highlights the basic principles, methodologies and techniques that are common to most CMOS digital designs. The advantages and disadvantages of a particular low power technique are discussed. Besides the classical area performance trade-off, the impact to design cycle

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

**Low Power VLSI Circuits and Systems** Mr. Rohit Manglik, 2024-04-06

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**Low-Power Digital VLSI Design** Abdellatif Bellaouar, Mohamed Elmasry, 2012-12-06

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

*The Electrical Engineering Handbook* Wai Kai Chen, 2004-11-16

The Electrical Engineer s Handbook is an invaluable reference source for all practicing electrical engineers and students Encompassing 79 chapters this book is intended to enlighten and refresh knowledge of the practicing engineer or to help educate engineering students This text will most likely be the engineer s first choice in looking for a solution extensive complete references to other sources are provided throughout No other book has the breadth and depth of

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Energy Systems Design for Low-Power Computing Gatti, Rathishchandra Ramachandra, Singh, Chandra, P., Srividya, Bhat, Sandeep, 2023-03-07 With the advancement in computing technologies the need for power is also increasing Approximately 3% of the total power consumption is spent by data centers and computing devices This percentage will rise when more internet of things IoT devices are connected to the web The handling of this data requires immense power Energy Systems Design for Low Power Computing disseminates the current research and the state of the art technologies topologies standards and techniques for the deployment of energy intelligence in edge computing distributed computing and centralized computing infrastructure Covering topics such as electronic cooling stochastic data analysis and energy consumption this premier reference source is an excellent resource for data center designers VLSI designers network developers students and teachers of higher education librarians researchers and academicians

Gain-Cell Embedded DRAMs for Low-Power VLSI Systems-on-Chip Pascal Meinerzhagen, Adam Teman, Robert Gitterman, Noa Edri, Andreas Burg, Alexander Fish, 2017-07-06 This book pioneers the field of gain cell embedded DRAM GC eDRAM design for low power VLSI systems on chip SoCs Novel GC eDRAMs are specifically designed and optimized for a range of low power VLSI SoCs ranging from ultra low power to power aware high performance applications After a detailed review of prior art GC eDRAMs an analytical retention time distribution model is introduced and validated by silicon measurements which is key for low power GC eDRAM design The book then investigates supply voltage scaling and near threshold voltage NTV operation of a conventional gain cell GC before presenting novel GC circuit and assist techniques for NTV operation including a 3 transistor full transmission gate write port reverse body biasing RBB and a replica technique for optimum refresh timing Next conventional GC bitcells are evaluated under aggressive technology and voltage scaling down to the subthreshold domain before novel bitcells for aggressively scaled CMOS nodes

and soft error tolerance as presented including a 4 transistor GC with partial internal feedback and a 4 transistor GC with built in redundancy

**Low Power Design Methodologies** Jan M. Rabaey, Massoud Pedram, 2012-12-06 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

*Intelligent Systems Design and Applications* Ajith Abraham, Aswani Kumar Cherukuri, Patricia Melin, Niketa Gandhi, 2019-04-11 This book highlights recent research on Intelligent Systems and Nature Inspired Computing It presents 212 selected papers from the 18th International Conference on Intelligent Systems Design and Applications ISDA 2018 and the 10th World Congress on Nature and Biologically Inspired Computing NaBIC which was held at VIT University India ISDA NaBIC 2018 was a premier conference in the field of Computational Intelligence and brought together researchers engineers and practitioners whose work involved intelligent systems and their applications in industry and the real world Including contributions by authors from over 40 countries the book offers a valuable reference guide for all researchers students and practitioners in the fields of Computer Science and Engineering

**Smart Intelligent Computing and Communication Technology** V.D. Ambeth Kumar, S. Malathi, V.E. Balas, 2021-10-07 Recent developments in the fields of intelligent computing and communication have paved the way for the handling of current and upcoming problems and brought about significant technological advancements This book presents the proceedings of IConIC 2021 the 4th International Conference on Intelligent Computing held on 26 and 27 March 2021 in Chennai India The principle objective of the annual IConIC conference is to provide an international scientific forum where participants can exchange innovative ideas in relevant fields and interact in depth through discussion with their peer group The theme of the 2021 conference and this book is Smart Intelligent Computing and Communication Technology and the 109 papers included here focus on the technological innovations and trendsetting initiatives in medicine industry education and security that are improving and optimizing business and technical processes and enabling inclusive growth The papers are grouped under 2 headings Evolution of Computing Intelligence and Computing and Communication and cover a broad range of intelligent computing research and applications The book provides an overview of the cutting edge developments and emerging areas of study in the technological fields of intelligent computing and will be of interest to researchers and practitioners from both academia and industry

Proceedings of Third International Conference on Computational Electronics for Wireless Communications Sanyog Rawat, Arvind Kumar, Ashish Raman, Sandeep Kumar, Parul

Pathak,2024-10-19 This book includes high quality papers presented at Third International Conference on Computational Electronics for Wireless Communications ICCWC 2023 held at Dr B R Ambedkar National Institute of Technology Jalandhar India during October 20 21 2023 The book presents original research work of academics and industry professionals to exchange their knowledge of the state of the art research and development in computational electronics with an emphasis on wireless communications The topics covered in the book are radio frequency and microwave signal processing microelectronics and wireless networks

**Very-Large-Scale Integration** Kim Ho Yeap,Humaira Nisar,2018-02-28 In this book a variety of topics related to Very Large Scale Integration VLSI is extensively discussed The topics encompass the physics of VLSI transistors the process of integrated chip design and fabrication and the applications of VLSI devices It is intended to provide information on the latest advancement of VLSI technology to researchers physicists as well as engineers working in the field of semiconductor manufacturing and VLSI design

**Smart Computing** Mohammad Ayoub Khan,Sanjay Gairola,Bhola Jha,Pushkar Praveen,2021-05-12 The field of SMART technologies is an interdependent discipline It involves the latest burning issues ranging from machine learning cloud computing optimisations modelling techniques Internet of Things data analytics and Smart Grids among others that are all new fields It is an applied and multi disciplinary subject with a focus on Specific Measurable Achievable Realistic Timely system operations combined with Machine intelligence Real Time computing It is not possible for any one person to comprehensively cover all aspects relevant to SMART Computing in a limited extent work Therefore these conference proceedings address various issues through the deliberations by distinguished Professors and researchers The SMARTCOM 2020 proceedings contain tracks dedicated to different areas of smart technologies such as Smart System and Future Internet Machine Intelligence and Data Science Real Time and VLSI Systems Communication and Automation Systems The proceedings can be used as an advanced reference for research and for courses in smart technologies taught at graduate level

**Software Radio** Jeffrey Hugh Reed,2002 This guide to radio engineering covers every technique DSP and RF engineers need to build software radios for a wide variety of wireless systems using DSP techniques Included are practical guidelines for choosing DSP microprocessors and systematic object oriented software design techniques

Logic Synthesis and Verification Soha Hassoun,Tsutomu Sasao,2012-12-06 Research and development of logic synthesis and verification have matured considerably over the past two decades Many commercial products are available and they have been critical in harnessing advances in fabrication technology to produce today s plethora of electronic components While this maturity is assuring the advances in fabrication continue to seemingly present unwieldy challenges Logic Synthesis and Verification provides a state of the art view of logic synthesis and verification It consists of fifteen chapters each focusing on a distinct aspect Each chapter presents key developments outlines future challenges and lists essential references Two unique features of this book are technical strength and comprehensiveness The book chapters are written by twenty eight recognized leaders in the field and reviewed by equally

qualified experts The topics collectively span the field Logic Synthesis and Verification fills a current gap in the existing CAD literature Each chapter contains essential information to study a topic at a great depth and to understand further developments in the field The book is intended for seniors graduate students researchers and developers of related Computer Aided Design CAD tools From the foreword The commercial success of logic synthesis and verification is due in large part to the ideas of many of the authors of this book Their innovative work contributed to design automation tools that permanently changed the course of electronic design by Aart J de Geus Chairman and CEO Synopsys Inc     Micro and Nanoelectronics Devices, Circuits and Systems Trupti Ranjan Lenka,Samar K. Saha,Lan Fu,2023-09-02 This book presents select proceedings of the International Conference on Micro and Nanoelectronics Devices Circuits and Systems MNDSCS 2023 The book includes cutting edge research papers in the emerging fields of micro and nanoelectronics devices circuits and systems from experts working in these fields over the last decade The book is a unique collection of chapters from different areas with a common theme and is immensely useful to academic researchers and practitioners in the industry who work in this field     '*Advances in Microelectronics: Reviews*', Vol\_1 Sergey Yurish,2017-12-24 The 1st volume of Advances in Microelectronics Reviews Book Series contains 19 chapters written by 72 authors from academia and industry from 16 countries With unique combination of information in each volume the Advances in Microelectronics Reviews Book Series will be of value for scientists and engineers in industry and at universities In order to offer a fast and easy reading of the state of the art of each topic every chapter in this book is independent and self contained All chapters have the same structure first an introduction to specific topic under study second particular field description including sensing applications Each of chapter is ending by well selected list of references with books journals conference proceedings and web sites This book ensures that readers will stay at the cutting edge of the field and get the right and effective start point and road map for the further researches and developments



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