HIGH-PERFORMANCE DIGITAL VLSI CIRCUIT DESIGN

by

Richard X. Gu
University of Waterloo

Khaled M. Sharaf
University of Waterloo

Mohamed I. Elmasry
University of Waterloo

High Performance Digital Vlsi Circuit Design

Zhe Xu

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 High-Performance Digital VLSI Circuit Design Richard X. Gu,Khaled Sharaf,Mohamed I. Elmasry,2012-10-08 High Performance Digital VLSI Circuit Design is the first book devoted entirely to the design of digital high performance VLSI circuits CMOS BiCMOS and bipolar ciruits are covered in depth including state of the art circuit structures Recent advances in both the computer and telecommunications industries demand high performance VLSI digital circuits Digital processing of signals demands high speed circuit techniques for the GHz range The design of such circuits represents a great challenge one that is amplified when the power supply is scaled down to 3 3 V Moreover the requirements of low power high performance circuits adds an extra dimension to the design of such circuits High Performance Digital VLSI Circuit Design is a self contained text introducing the subject of high performance VLSI circuit design and explaining the speed power tradeoffs The first few chapters of the book discuss the necessary background material in the area of device design and device modeling respectively High performance CMOS circuits are then covered especially the new all N logic dynamic circuits Propagation delay times of high speed bipolar CML and ECL are developed analytically to give a thorough understanding of various interacting process device and circuit parameters High current phenomena of bipolar devices are also addressed as these devices typically operate at maximum currents for limited device area Different new high performance BiCMOS circuits are presented and compared to their conventional counterparts These new circuits find direct applications in the areas of high speed adders frequency dividers sense amplifiers level shifters input output clock buffers and PLLs The book concludes with a few system application examples of digital high performance VLSI circuits Audience A vital reference for practicing IC designers Can be used as a text for graduate and senior undergraduate students in the area

 High-Performance Digital VLSI Circuit Design Richard X. Gu,Khaled M. Sharaf,Mohamed I. Elmasry,2012-12-06 High Performance Digital VLSI Circuit Design is the first book devoted entirely to the design of digital high performance VLSI circuits CMOS BiCMOS and bipolar ciruits are covered in depth including state of the art circuit structures Recent advances in both the computer and telecommunications industries demand high performance VLSI digital circuits Digital processing of signals demands high speed circuit techniques for the GHz range The design of such circuits represents a great challenge one that is amplified when the power supply is scaled down to 3 3 V Moreover the requirements of low power high performance circuits adds an extra dimension to the design of such circuits High Performance Digital VLSI Circuit Design is a self contained text introducing the subject of high performance VLSI circuit design and explaining the speed power tradeoffs The first few chapters of the book discuss the necessary background material in the area of device design and device modeling respectively High performance CMOS circuits are then covered especially the new all N logic dynamic circuits Propagation delay times of high speed bipolar CML and ECL are developed analytically to give a thorough understanding of various interacting process device and circuit parameters High current phenomena of bipolar devices are

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Digital Systems Engineering William J. Dally,John W. Poulton,2008-04-24 What makes some computers slow Why do some digital systems operate reliably for years while others fail mysteriously every few hours How can some systems dissipate kilowatts while others operate off batteries These questions of speed reliability and power are all determined by the system level electrical design of a digital system Digital Systems Engineering presents a comprehensive treatment of these topics It combines a rigorous development of the fundamental principles in each area with real world examples of circuits and methods The book not only serves as an undergraduate textbook filling the gap between circuit design and logic design but can also help practising digital designers keep pace with the speed and power of modern integrated circuits The techniques described in this book once used only in supercomputers are essential to the correct and efficient operation of any type of digital system **High Performance Clock Distribution Networks** Eby G. Friedman,2012-12-06 A number of fundamental topics in the field of high performance clock distribution networks is covered in this book High Performance Clock Distribution Networks is composed of ten contributions from authors at academic and industrial institutions Topically these contributions can be grouped within three primary areas The first topic area deals with exploiting the localized nature of clock skew The second topic area deals with the implementation of these clock distribution networks while the third topic area considers more long range aspects of next generation clock distribution networks High Performance Clock Distribution Networks presents a number of interesting strategies for designing and building high performance clock distribution networks Many aspects of the ideas presented in these contributions are being developed and applied today in next generation high performance microprocessors Analog Design Issues in Digital VLSI Circuits and Systems Juan J. Becerra,Eby G. Friedman,2012-12-06 Analog Design Issues in Digital VLSI Circuits and Systems brings together in one place important contributions and up to date research results in this fast moving area Analog Design Issues in Digital VLSI Circuits and Systems serves as an excellent reference providing insight into some of the most challenging research issues in the field **Advanced Low-Power Digital Circuit Techniques** Muhammad S. Elrabaa,Issam S. Abu-Khater,Mohamed I. Elmasry,2012-10-28 Advanced Low Power Digital Circuit Techniques presents several novel high performance digital circuit designs that emphasize low power and low voltage operation These circuits represent a wide range of circuits that are used in state of the art VLSI systems and hence serve as good examples for low power design Each chapter contains a brief introduction that serves as a quick background and gives the motivation behind the design Each chapter also ends with a

summary that briefly explains the contributions contained therein This makes the book very readable The reader can skim through the chapters very quickly to get a feel for the design problems presented in the book and the solutions proposed by the authors Examples of circuits used in systems where low power is important from reliability and portability points of view such as general purpose and DSP processors are presented in Chapters 2 3 and 4 Chapters 5 and 7 give examples of circuits used in systems where reliability and more system integration are the main driving forces behind lowering the power consumption Chapter 6 gives an example of a general purpose high performance low power circuit design Advanced Low Power Digital Circuit Techniques is a real designer s book It investigates alternative circuit styles as well as architectural alternatives and gives quantitative results for comparison in realistic technologies Several of the circuits presented have been fabricated so that simulations can be checked The circuits covered are the most important building blocks for many designs so the text will be of direct use to designers MOS designs are covered as well as BiCMOS and there are several novel circuits *VLSI Technology* Wai-Kai Chen,2003-03-19 As their name implies VLSI systems involve the integration of various component systems While all of these components systems are rooted in semiconductor manufacturing they involve a broad range of technologies This volume of the Principles and Applications of Engineering series examines the technologies associated with VLSI systems including **Journal of VLSI Signal Processing Systems for Signal, Image, and Video Technology** ,1996 The VLSI Handbook Wai-Kai Chen,2019-07-17 Over the years the fundamentals of VLSI technology have evolved to include a wide range of topics and a broad range of practices To encompass such a vast amount of knowledge The VLSI Handbook focuses on the key concepts models and equations that enable the electrical engineer to analyze design and predict the behavior of very large scale integrated circuits It provides the most up to date information on IC technology you can find Using frequent examples the Handbook stresses the fundamental theory behind professional applications Focusing not only on the traditional design methods it contains all relevant sources of information and tools to assist you in performing your job This includes software databases standards seminars conferences and more The VLSI Handbook answers all your needs in one comprehensive volume at a level that will enlighten and refresh the knowledge of experienced engineers and educate the novice This one source reference keeps you current on new techniques and procedures and serves as a review for standard practice It will be your first choice when looking for a solution Mixed Analog-digital VLSI Devices and Technology Yannis Tsividis,2002 Improve your circuit design potential with this expert guide to the devices and technology used in mixed analog digital VLSI chips for such high volume applications as hard disk drives wireless telephones and consumer electronics The book provides you with a critical understanding of device models fabrication technology and layout as they apply to mixed analog digital circuits You will learn about the many device modeling requirements for analog work as well as the pitfalls in models used today for computer simulators such as Spice Also included is information on fabrication technologies developed specifically for mixed signal VLSI chips plus guidance on

the layout of mixed analog digital chips for a high degree of analog device matching and minimum digital to analog interference This reference book features an intuitive introduction to MOSFET operation that will enable you to view with insight any MOSFET model besides thorough discussions on valuable large signal and small signal models Filled with practical information this first of its kind book will help you grasp the nuances of mixed signal VLSI device models and layout that are crucial to the design of high performance chips **Advances in AI for Biomedical Instrumentation, Electronics and Computing** Vibhav Sachan,Shahid Malik,Ruchita Gautam,Parvin Kumar,2024-06-13 This book contains the proceedings of 5th International Conference on Advances in AI for Biomedical Instrumentation Electronics and Computing ICABEC 2023 which provided an international forum for the exchange of ideas among researchers students academicians and practitioners It presents original research papers on subjects of AI Biomedical Communications Computing Systems Some interesting topics it covers are enhancing air quality prediction using machine learning optimization of leakage power consumption using hybrid techniques multi robot path planning in complex industrial dynamic environment enhancing prediction accuracy of earthquake using machine learning algorithms and advanced machine learning models for accurate cancer diagnostics Containing work presented by a diverse range of researchers this book will be of interest to students and researchers in the fields of Electronics and Communication Engineering Computer Science Engineering Information Technology Electrical Engineering Electronics and Instrumentation Engineering Computer applications and all interdisciplinary streams of Engineering Sciences **Scientific and Technical Aerospace Reports** ,1995 **High-Speed Digital System Design** Anatoly Belous,Vitali Saladukha,2019-11-13 This book describes for readers the entire interconnected complex of theoretical and practical aspects of designing and organizing the production of various electronic devices the general and main distinguishing feature of which is the high speed of processing and transmitting of digital signals The authors discuss all the main stages of design from the upper system level of the hierarchy telecommunications system 5G mobile communications to the lower level of basic semiconductor elements printed circuit boards Since the developers of these devices in practice deal with distorted digital signals that are transmitted against a background of interference the authors not only explain the physical nature of such effects but also offer specific solutions as to how to avoid such parasitic effects even at the design stage of high speed devices Low-Power CMOS Circuits Christian Piguet,2018-10-03 The power consumption of microprocessors is one of the most important challenges of high performance chips and portable devices In chapters drawn from Piguet s recently published Low Power Electronics Design Low Power CMOS Circuits Technology Logic Design and CAD Tools addresses the design of low power circuitry in deep submicron technologies It provides a focused reference for specialists involved in designing low power circuitry from transistors to logic gates The book is organized into three broad sections for convenient access The first examines the history of low power electronics along with a look at emerging and possible future technologies It also considers other technologies such as

nanotechnologies and optical chips that may be useful in designing integrated circuits The second part explains the techniques used to reduce power consumption at low levels These include clock gating leakage reduction interconnecting and communication on chips and adiabatic circuits The final section discusses various CAD tools for designing low power circuits This section includes three chapters that demonstrate the tools and low power design issues at three major companies that produce logic synthesizers Providing detailed examinations contributed by leading experts Low Power CMOS Circuits Technology Logic Design and CAD Tools supplies authoritative information on how to design and model for high performance with low power consumption in modern integrated circuits It is a must read for anyone designing modern computers or embedded systems **Timing Optimization Through Clock Skew Scheduling** Ivan S. Kourtev,Eby G. Friedman,Baris Taskin,2012-12-06 History of the Book The last three decades have witnessed an explosive development in integrated circuit fabrication technologies The complexities of cur rent CMOS circuits are reaching beyond the 100 nanometer feature size and multi hundred million transistors per integrated circuit To fully exploit this technological potential circuit designers use sophisticated Computer Aided Design CAD tools While supporting the talents of innumerable microelectronics engineers these CAD tools have become the enabling factor responsible for the successful design and implemen tation of thousands of high performance large scale integrated circuits This research monograph originated from a body of doctoral disserta tion research completed by the first author at the University of Rochester from 1994 to 1999 while under the supervision of Prof Eby G Friedman This research focuses on issues in the design of the clock distribution net work in large scale high performance digital synchronous circuits and particularly on algorithms for non zero clock skew scheduling During the development of this research it has become clear that incorporating timing issues into the successful integrated circuit design process is of fundamental importance particularly in that advanced theoretical de velopments in this area have been slow to reach the designers desktops   Simulation and Optimization of Digital Circuits Vazgen Melikyan,2018-04-12 This book describes new fuzzy logic based mathematical apparatus which enable readers to work with continuous variables while implementing whole circuit simulations with speed similar to gate level simulators and accuracy similar to circuit level simulators The author demonstrates newly developed principles of digital integrated circuit simulation and optimization that take into consideration various external and internal destabilizing factors influencing the operation of digital ICs The discussion includes factors including radiation ambient temperature electromagnetic fields and climatic conditions as well as non ideality of interconnects and power rails   *Introduction to Microelectronics to Nanoelectronics* Manoj Kumar Majumder,Vijay Rao Kumbhare,Aditya Japa,Brajesh Kumar Kaushik,2020-11-24 Focussing on micro and nanoelectronics design and technology this book provides thorough analysis and demonstration starting from semiconductor devices to VLSI fabrication designing analog and digital on chip interconnect modeling culminating with emerging non silicon nano devices It gives detailed description of both theoretical as well as industry standard HSPICE Verilog Cadence

simulation based real time modeling approach with focus on fabrication of bulk and nano devices Each chapter of this proposed title starts with a brief introduction of the presented topic and ends with a summary indicating the futuristic aspect including practice questions Aimed at researchers and senior undergraduate graduate students in electrical and electronics engineering microelectronics nanoelectronics and nanotechnology this book Provides broad and comprehensive coverage from Microelectronics to Nanoelectronics including design in analog and digital electronics Includes HDL and VLSI design going into the nanoelectronics arena Discusses devices circuit analysis design methodology and real time simulation based on industry standard HSPICE tool Explores emerging devices such as FinFETs Tunnel FETs TFETs and CNTFETs including their circuit co designing Covers real time illustration using industry standard Verilog Cadence and Synopsys simulations

Proceedings of International Conference on ICT for Sustainable Development Suresh Chandra Satapathy,Amit Joshi,Nilesh Modi,Nisarg Pathak,2016-02-25 The two volumes of this book collect high quality peer reviewed research papers presented in the International Conference on ICT for Sustainable Development ICT4SD 2015 held at Ahmedabad India during 3 4 July 2015 The book discusses all areas of Information and Communication Technologies and its applications in field for engineering and management The main focus of the volumes are on applications of ICT for Infrastructure e Governance and contemporary technologies advancements on Data Mining Security Computer Graphics etc The objective of this International Conference is to provide an opportunity for the researchers academicians industry persons and students to interact and exchange ideas experience and expertise in the current trend and strategies for Information and Communication Technologies **Soft Computing and Signal Processing** Hushairi Zen,Naga M. Dasari,Y. Madhavee Latha,S. Srinivasa Rao,2025-05-16 This book presents selected research papers on current developments in the fields of soft computing and signal processing from the Seventh International Conference on Soft Computing and Signal Processing ICSCSP 2024 organized by Malla Reddy College of Engineering Technology Hyderabad India The book covers topics such as soft sets rough sets fuzzy logic neural networks genetic algorithms and machine learning and discusses various aspects of these topics e g technological considerations product implementation and application issues The Electronics Handbook Jerry C. Whitaker,2018-10-03 During the ten years since the appearance of the groundbreaking bestselling first edition of The Electronics Handbook the field has grown and changed tremendously With a focus on fundamental theory and practical applications the first edition guided novice and veteran engineers along the cutting edge in the design production installation operation and maintenance of electronic devices and systems Completely updated and expanded to reflect recent advances this second edition continues the tradition The Electronics Handbook Second Edition provides a comprehensive reference to the key concepts models and equations necessary to analyze design and predict the behavior of complex electrical devices circuits instruments and systems With 23 sections that encompass the entire electronics field from classical devices and circuits to emerging technologies and applications The Electronics Handbook Second Edition not only covers the engineering

aspects but also includes sections on reliability safety and engineering management The book features an individual table of contents at the beginning of each chapter which enables engineers from industry government and academia to navigate easily to the vital information they need This is truly the most comprehensive easy to use reference on electronics available

The Top Books of the Year High Performance Digital Vlsi Circuit Design The year 2023 has witnessed a remarkable surge in literary brilliance, with numerous compelling novels captivating the hearts of readers worldwide. Lets delve into the realm of top-selling books, exploring the engaging narratives that have captivated audiences this year. High Performance Digital Vlsi Circuit Design : Colleen Hoovers "It Ends with Us" This poignant tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover expertly weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can triumph. High Performance Digital Vlsi Circuit Design : Taylor Jenkins Reids "The Seven Husbands of Evelyn Hugo" This captivating historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reids compelling storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens weaves a tale of resilience, survival, and the transformative power of nature, captivating readers with its evocative prose and mesmerizing setting. These bestselling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of compelling stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a exceptional and thrilling novel that will keep you speculating until the very end. The novel is a warning tale about the dangers of obsession and the power of evil.

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Table of Contents High Performance Digital Vlsi Circuit Design

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