

Dynamic Voltage Scaling And Power Management For Portable

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Handbook of Energy-Aware and Green Computing - Two Volume Set - Ishfaq Ahmad 2016-02-03
Implementing energy-efficient CPUs and peripherals as well as reducing

resource consumption have become emerging trends in computing. As computers increase in speed and power, their energy issues become more and more prevalent. The need to

develop and promote environmentally friendly computer technologies and systems has also come to the forefront

Power Management for Wearable Electronic Devices - Dima Kilani
2020-01-17

This book describes power management integrated circuits (PMIC), for power converters and voltage regulators necessary for energy efficient and small form factor systems. The authors discuss state-of-the-art PMICs not only for battery powered wearable devices, but also energy harvesting-based devices. The circuits presented support voltage scaling to reduce the overall average power consumption of a wearable device, resulting in longer device operating time. The discussion includes many designs, control techniques and approaches to distribute efficiently the power among different blocks in the device.

- Demonstrates for readers how to

innovate in designing power management integrated circuits (PMIC) suitable for wearable devices, powered by either battery or harvesting energy; • Introduces a dual outputs switched capacitor, using a single voltage regulator to minimize the area overhead and discusses the effect of having more than two outputs on the area and power efficiency; • Introduces a novel clock-less digital LDO regulator that eliminates the use of the clocked comparator and serial shift register in the conventional design; • Presents experimental results of energy harvesting-based power management units (PMU), using different combinations of power converters and voltage regulators, providing a guide for designers to select the appropriate option based on device requirements.

Controlling Energy Demand in Mobile Computing Systems - Carla Schlatter Ellis 2007

This lecture provides an introduction to the problem of managing the energy demand of mobile devices. Reducing energy consumption, primarily with the goal of extending the lifetime of battery-powered devices, has emerged as a fundamental challenge in mobile computing and wireless communication. The focus of this lecture is on a systems approach where software techniques exploit state-of-the-art architectural features rather than relying only upon advances in lower-power circuitry or the slow improvements in battery technology to solve the problem. Fortunately, there are many opportunities to innovate on managing energy demand at the higher levels of a mobile system. Increasingly, device components offer low power modes that enable software to directly affect the energy consumption of the system. The challenge is to design resource management policies to effectively use these capabilities.

Power-Aware Testing and Test Strategies for Low Power Devices -

Patrick Girard 2010-03-11

Managing the power consumption of circuits and systems is now considered one of the most important challenges for the semiconductor industry. Elaborate power management strategies, such as dynamic voltage scaling, clock gating or power gating techniques, are used today to control the power dissipation during functional operation. The usage of these strategies has various implications on manufacturing test, and power-aware test is therefore increasingly becoming a major consideration during design-for-test and test preparation for low power devices. This book explores existing solutions for power-aware test and design-for-test of conventional circuits and systems, and surveys test strategies and EDA solutions for testing low power devices.

Energy Efficient Servers - Corey

Gough 2015-04-07

Energy Efficient Servers: Blueprints for Data Center Optimization introduces engineers and IT professionals to the power management technologies and techniques used in energy efficient servers. The book includes a deep examination of different features used in processors, memory, interconnects, I/O devices, and other platform components. It outlines the power and performance impact of these features and the role firmware and software play in initialization and control. Using examples from cloud, HPC, and enterprise environments, the book demonstrates how various power management technologies are utilized across a range of server utilization. It teaches the reader how to monitor, analyze, and optimize their environment to best suit their needs. It shares optimization techniques used by data center administrators and system optimization experts at

the world's most advanced data centers.

Advances in Computer Systems Architecture - Pen-Chung Yew
2004-08-19

On behalf of the program committee, we were pleased to present this year's program for ACSAC: Asia-Pacific Computer Systems Architecture Conference. Now in its ninth year, ACSAC continues to provide an excellent forum for researchers, educators and practitioners to come to the Asia-Pacific region to exchange ideas on the latest developments in computer systems architecture. This year, the paper submission and review processes were semiautomated using the free version of CyberChair. We received 152 submissions, the largest number ever. Each paper was assigned at least three, mostly four, and in a few cases seven committee members for review. All of the papers were reviewed in a two-month period, during which the program chair

rsregularlymonitoredtheprogress of the review process. When reviewers claimed inadequate expertise, additional reviewers were solicited. In the end, we received a total of 594 reviews (3.9 per paper) from committee members as well as 248 coreviewers whose names are acknowledged in the proceedings. We would like to thank all of them for their time and e?ort in providing us with such timely and high-quality reviews, some of them on extremely short notice.

Introduction to VLSI Systems - Ming-Bo Lin 2011-11-28

With the advance of semiconductors and ubiquitous computing, the use of system-on-a-chip (SoC) has become an essential technique to reduce product cost. With this progress and continuous reduction of feature sizes, and the development of very large-scale integration (VLSI) circuits, addressing the harder problems requires fundamental

understanding of circuit and layout design issues. Furthermore, engineers can often develop their physical intuition to estimate the behavior of circuits rapidly without relying predominantly on computer-aided design (CAD) tools. Introduction to VLSI Systems: A Logic, Circuit, and System Perspective addresses the need for teaching such a topic in terms of a logic, circuit, and system design perspective. To achieve the above-mentioned goals, this classroom-tested book focuses on: Implementing a digital system as a full-custom integrated circuit Switch logic design and useful paradigms that may apply to various static and dynamic logic families The fabrication and layout designs of complementary metal-oxide-semiconductor (CMOS) VLSI Important issues of modern CMOS processes, including deep submicron devices, circuit optimization, interconnect modeling and optimization, signal integrity, power

integrity, clocking and timing, power dissipation, and electrostatic discharge (ESD) Introduction to VLSI Systems builds an understanding of integrated circuits from the bottom up, paying much attention to logic circuit, layout, and system designs. Armed with these tools, readers can not only comprehensively understand the features and limitations of modern VLSI technologies, but also have enough background to adapt to this ever-changing field.

Power Management Techniques for Integrated Circuit Design - Ke-Horng Chen 2016-09-26

This book begins with the premise that energy demands are directing scientists towards ever-greener methods of power management, so highly integrated power control ICs (integrated chip/circuit) are increasingly in demand for further reducing power consumption. A timely and comprehensive reference guide for IC designers dealing with the

increasingly widespread demand for integrated low power management Includes new topics such as LED lighting, fast transient response, DVS-tracking and design with advanced technology nodes Leading author (Chen) is an active and renowned contributor to the power management IC design field, and has extensive industry experience Accompanying website includes presentation files with book illustrations, lecture notes, simulation circuits, solution manuals, instructors' manuals, and program downloads

VLSI-SoC: Forward-Looking Trends in IC and Systems Design - Jose L. Ayala 2012-02-24

This book contains extended and revised versions of the best papers presented at the 18th IFIP WG 10.5/IEEE International Conference on Very Large Scale Integration, VLSI-SoC 2010, held in Madrid, Spain, in September 2010. The 14 papers included in the book were carefully

reviewed and selected from the 52 full papers presented at the conference. The papers cover a wide variety of excellence in VLSI technology and advanced research. They address the current trend toward increasing chip integration and technology process advancements bringing about stimulating new challenges both at the physical and system-design levels, as well as in the test of these systems.

Integrated Power Devices and TCAD Simulation - Yue Fu 2017-12-19

From power electronics to power integrated circuits (PICs), smart power technologies, devices, and beyond, *Integrated Power Devices and TCAD Simulation* provides a complete picture of the power management and semiconductor industry. An essential reference for power device engineering students and professionals, the book not only describes the physics inside integrated power semiconductor

devices such as lateral double-diffused metal oxide semiconductor field-effect transistors (LDMOSFETs), lateral insulated-gate bipolar transistors (LIGBTs), and super junction LDMOSFETs but also delivers a simple introduction to power management systems. Instead of abstract theoretical treatments and daunting equations, the text uses technology computer-aided design (TCAD) simulation examples to explain the design of integrated power semiconductor devices. It also explores next generation power devices such as gallium nitride power high electron mobility transistors (GaN power HEMTs). Including a virtual process flow for smart PIC technology as well as a hard-to-find technology development organization chart, *Integrated Power Devices and TCAD Simulation* gives students and junior engineers a head start in the field of power semiconductor devices while helping to fill the gap between

power device engineering and power management systems.

Handbook of Energy-Aware and Green Computing, Volume 1 - Ishfaq Ahmad
2012-01-24

Implementing energy-efficient CPUs and peripherals as well as reducing resource consumption have become emerging trends in computing. As computers increase in speed and power, their energy issues become more and more prevalent. The need to develop and promote environmentally friendly computer technologies and systems has also come to the forefront

Power-Aware Computer Systems - Babak Falsafi
2003-08-01

This book constitutes the thoroughly refereed post-proceedings of the Second International Workshop on Power-Aware Computer Systems, PACS 2002, held in Cambridge, MA, USA, in February 2002. The 13 revised full papers presented were carefully selected for inclusion in the book

during two rounds of reviewing and revision. The papers are organized in topical sections on power-aware architecture and microarchitecture, power-aware real-time systems, power modeling and monitoring, and power-aware operating systems and compilers.

Power-Aware Computer Systems - Mass.)

Pacs 2002 (2002 (Cambridge 2003-04-07

This book constitutes the thoroughly refereed post-proceedings of the Second International Workshop on Power-Aware Computer Systems, PACS 2002, held in Cambridge, MA, USA, in February 2002. The 13 revised full papers presented were carefully selected for inclusion in the book during two rounds of reviewing and revision. The papers are organized in topical sections on power-aware architecture and microarchitecture, power-aware real-time systems, power modeling and monitoring, and power-aware operating systems and compilers.

Smart Sensors Networks - Fatos Xhafa
2017-06-14

Smart Sensors Networks: Communication Technologies and Intelligent Applications explores the latest sensor and sensor networks techniques and applications, showing how networked wireless sensors are used to monitor and gather intelligence from our surrounding environment. It provides a systematic look at the unique characteristics of wireless sensor networks through their usage in a broad range of areas, including healthcare for the elderly, energy consumption, industrial automation, intelligent transportation systems, smart homes and cities, and more. The book shows how sensor-networks work and how they are applied to monitor our surrounding environment. It explores the most important aspects of modern sensors technologies, providing insights on the newest technologies and the systems needed to operate them. Readers will find

the book to be an entry point for understanding the fundamental differences between the various sensor technologies and their use in for different scenarios. Indexing: The books of this series are submitted to EI-Compendex and SCOPUS Presents numerous specific use-cases throughout, showing practical applications of concepts Contains contributions from leading experts around the globe Collects, in one place, the latest thinking on an emerging topic Addresses the security and privacy issues inherent in sensor deployment

Power-Aware Computer Systems - Babak Falsafi 2005-12-24

Welcome to the proceedings of the Power-Aware Computer Systems (PACS 2004) workshop held in conjunction with the 37th Annual International Symposium on Microarchitecture (MICRO-37). The continued increase of power and energy dissipation in computer systems has resulted in

higher cost, lower re-ability, and reduced battery life in portable systems. Consequently, power and energy have become first-class constraints at all layers of modern computer systems. PACS 2004 is the fourth workshop in its series to explore techniques to reduce power and energy at all levels of computer systems and brings together academic and industry researchers. The papers in these proceedings span a wide spectrum of areas in power-aware systems. We have grouped the papers into the following categories: (1) microarchitecture- and circuit-level techniques, (2) power-aware memory and interconnect systems, and (3) frequency- and voltage-scaling techniques. The first paper in the microarchitecture group proposes banking and write-back filtering to reduce register file power. The second paper in this group optimizes both delay and power of the issue queue by packing two instructions in each

issue queue entry and by memorizing upper-order bits of the wake-up tag. The third paper proposes bit slicing the datapath to exploit narrow width operations, and the last paper proposes to migrate application threads from one core to another in a multi-core chip to address thermal problems.

Advances in Computers - Marvin Zelkowitz 2005-05-19

The term computation gap has been defined as the difference between the computational power demanded by the application domain and the computational power of the underlying computer platform. Traditionally, closing the computation gap has been one of the major and fundamental tasks of computer architects. However, as technology advances and computers become more pervasive in the society, the domain of computer architecture has been extended. The scope of research in the computer architecture is no longer restricted

to the computer hardware and organization issues. A wide spectrum of topics ranging from algorithm design to power management is becoming part of the computer architecture. Based on the aforementioned trend and to reflect recent research efforts, attempts were made to select a collection of articles that covers different aspects of contemporary computer architecture design. This volume of the *Advances in Computers* contains six chapters on different aspects of computer architecture. Key features:

- Wide range of research topics
- Coverage of new topics such as power management, Network on Chip, Load balancing in distributed systems, and pervasive computing

Simple writing style

Reconfigurable Switched-Capacitor Power Converters - Dongsheng Ma
2012-07-25

This book provides readers specializing in ultra-low power supply design for self-powered applications an invaluable reference on reconfigurable switched capacitor power converters. Readers will benefit from a comprehensive introduction to the design of robust power supplies for energy harvesting and self-power applications, focusing on the use of reconfigurable switched capacitor based DC-DC converters, which is ideal for such applications. Coverage includes all aspects of switched capacitor power supply designs, from fundamentals, to reconfigurable power stages, and sophisticated controller designs.

Advances in GPU Research and Practice - Hamid Sarbazi Azad 2016-09-15

Advances in GPU Research and Practice focuses on research and practices in GPU based systems. The topics treated

cover a range of issues, ranging from hardware and architectural issues, to high level issues, such as application systems, parallel programming, middleware, and power and energy issues. Divided into six parts, this edited volume provides the latest research on GPU computing. Part I: Architectural Solutions focuses on the architectural topics that improve on performance of GPUs, Part II: System Software discusses OS, compilers, libraries, programming environment, languages, and paradigms that are proposed and analyzed to help and support GPU programmers. Part III: Power and Reliability Issues covers different aspects of energy, power, and reliability concerns in GPUs. Part IV: Performance Analysis illustrates mathematical and analytical techniques to predict different performance metrics in GPUs. Part V: Algorithms presents how to design efficient algorithms and analyze

their complexity for GPUs. Part VI: Applications and Related Topics provides use cases and examples of how GPUs are used across many sectors. Discusses how to maximize power and obtain peak reliability when designing, building, and using GPUs Covers system software (OS, compilers), programming environments, languages, and paradigms proposed to help and support GPU programmers Explains how to use mathematical and analytical techniques to predict different performance metrics in GPUs Illustrates the design of efficient GPU algorithms in areas such as bioinformatics, complex systems, social networks, and cryptography Provides applications and use case scenarios in several different verticals, including medicine, social sciences, image processing, and telecommunications

Power Management Integrated Circuits
– Mona M. Hella 2017-12-19
Power Management Integrated Circuits

and Technologies delivers a modern treatise on mixed-signal integrated circuit design for power management. Comprised of chapters authored by leading researchers from industry and academia, this definitive text: Describes circuit- and architectural-level innovations that meet advanced power and speed capabilities Explores hybrid inductive-capacitive converters for wide-range dynamic voltage scaling Presents innovative control techniques for single inductor dual output (SIDO) and single inductor multiple output (SIMO) converters Discusses cutting-edge design techniques including switching converters for analog/RF loads Compares the use of GaAs pHEMTs to CMOS devices for efficient high-frequency switching converters Thus, Power Management Integrated Circuits and Technologies provides comprehensive, state-of-the-art coverage of this exciting and emerging field of engineering.

Energy Harvesting Technologies - Shashank Priya 2008-11-28
Energy Harvesting Technologies provides a cohesive overview of the fundamentals and current developments in the field of energy harvesting. In a well-organized structure, this volume discusses basic principles for the design and fabrication of bulk and MEMS based vibration energy systems, theory and design rules required for fabrication of efficient electronics, in addition to recent findings in thermoelectric energy harvesting systems. Combining leading research from both academia and industry onto a single platform, Energy Harvesting Technologies serves as an important reference for researchers and engineers involved with power sources, sensor networks and smart materials.
Advanced Techniques for Power, Energy, and Thermal Management for Clustered Manycores - Santiago Pagani 2018-04-26

This book focuses on two of the most relevant problems related to power management on multicore and manycore systems. Specifically, one part of the book focuses on maximizing/optimizing computational performance under power or thermal constraints, while another part focuses on minimizing energy consumption under performance (or real-time) constraints.

Power Management Techniques for Integrated Circuit Design - Ke-Horng Chen 2016-05-10

This book begins with the premise that energy demands are directing scientists towards ever-greener methods of power management, so highly integrated power control ICs (integrated chip/circuit) are increasingly in demand for further reducing power consumption. A timely and comprehensive reference guide for IC designers dealing with the increasingly widespread demand for integrated low power management

Includes new topics such as LED lighting, fast transient response, DVS-tracking and design with advanced technology nodes Leading author (Chen) is an active and renowned contributor to the power management IC design field, and has extensive industry experience Accompanying website includes presentation files with book illustrations, lecture notes, simulation circuits, solution manuals, instructors' manuals, and program downloads

EDA for IC System Design, Verification, and Testing - Louis Scheffer 2018-10-03

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 first volume, EDA for IC System Design, Verification, and Testing, thoroughly examines system-level design,

microarchitectural design, logical verification, and testing. Chapters contributed by leading experts authoritatively discuss processor modeling and design tools, using performance metrics to select microprocessor cores for IC designs, design and verification languages, digital simulation, hardware acceleration and emulation, and much more. Save on the complete set.

Machine Learning-based Dynamic Voltage and Frequency Scaling for Power Optimization in Modern

Processors - Avishek Mazumder 2022
As modern processors become more and more feature packed, the power utilization of these processors too go up exponentially. Power Management Techniques are gradually becoming the limelight for research in today's date and in the days to come. Amongst the various Power Management Techniques, Dynamic Voltage and Frequency Scaling (DVFS) has a very promising future since using this

method we can not only optimize the power utilization of the processor by varying the core voltage and frequency dynamically, but also since it has very little to no impact on the performance of the processor. Most traditional DVFS techniques use a reactive or control system-based approach to dynamically vary the voltage and frequency of the processor core based on the requirement of the core. However, a reactive approach often leads to transitional delays, thus impacting the performance of the processor. In this paper, we have tried to go for a predictive approach where we use Machine Learning to predict the voltage and frequency requirement for the processor cores based on the task scheduling and core utilization and then dynamically group cores having similar voltage and frequency requirements and supply them with the same voltage and frequency.
Embedded Computing for High

Performance - João Manuel Paiva
Cardoso 2017-06-13
Embedded Computing for High
Performance: Design Exploration and
Customization Using High-level
Compilation and Synthesis Tools
provides a set of real-life example
implementations that migrate
traditional desktop systems to
embedded systems. Working with
popular hardware, including Xilinx
and ARM, the book offers a
comprehensive description of
techniques for mapping computations
expressed in programming languages
such as C or MATLAB to high-
performance embedded architectures
consisting of multiple CPUs, GPUs,
and reconfigurable hardware (FPGAs).
The authors demonstrate a domain-
specific language (LARA) that
facilitates retargeting to multiple
computing systems using the same
source code. In this way, users can
decouple original application code
from transformed code and enhance

productivity and program portability.
After reading this book, engineers
will understand the processes,
methodologies, and best practices
needed for the development of
applications for high-performance
embedded computing systems. Focuses
on maximizing performance while
managing energy consumption in
embedded systems Explains how to
retarget code for heterogeneous
systems with GPUs and FPGAs
Demonstrates a domain-specific
language that facilitates migrating
and retargeting existing applications
to modern systems Includes
downloadable slides, tools, and
tutorials

**Fundamentals of Wireless Sensor
Networks** - Walteneagus Dargie
2010-11-05

In this book, the authors describe
the fundamental concepts and
practical aspects of wireless sensor
networks. The book provides a
comprehensive view to this rapidly

evolving field, including its many novel applications, ranging from protecting civil infrastructure to pervasive health monitoring. Using detailed examples and illustrations, this book provides an inside track on the current state of the technology. The book is divided into three parts. In Part I, several node architectures, applications and operating systems are discussed. In Part II, the basic architectural frameworks, including the key building blocks required for constructing large-scale, energy-efficient sensor networks are presented. In Part III, the challenges and approaches pertaining to local and global management strategies are presented - this includes topics on power management, sensor node localization, time synchronization, and security. At the end of each chapter, the authors provide practical exercises to help students strengthen their grip on the

subject. There are more than 200 exercises altogether. Key Features: Offers a comprehensive introduction to the theoretical and practical concepts pertaining to wireless sensor networks Explains the constraints and challenges of wireless sensor network design; and discusses the most promising solutions Provides an in-depth treatment of the most critical technologies for sensor network communications, power management, security, and programming Reviews the latest research results in sensor network design, and demonstrates how the individual components fit together to build complex sensing systems for a variety of application scenarios Includes an accompanying website containing solutions to exercises (http://www.wiley.com/go/dargie_fundamentals) This book serves as an introductory text to the field of wireless sensor networks at both

graduate and advanced undergraduate level, but it will also appeal to researchers and practitioners wishing to learn about sensor network technologies and their application areas, including environmental monitoring, protection of civil infrastructure, health care, precision agriculture, traffic control, and homeland security.

Dynamic Power Management - Luca Benini 2012-12-06

Dynamic power management is a design methodology aiming at controlling performance and power levels of digital circuits and systems, with the goal of extending the autonomous operation time of battery-powered systems, providing graceful performance degradation when supply energy is limited, and adapting power dissipation to satisfy environmental constraints. **Dynamic Power Management: Design Techniques and CAD Tools** addresses design techniques and computer-aided design solutions for

power management. Different approaches are presented and organized in an order related to their applicability to control-units, macro-blocks, digital circuits and electronic systems, respectively. All approaches are based on the principle of exploiting idleness of circuits, systems, or portions thereof. They involve both the detection of idleness conditions and the freezing of power-consuming activities in the idle components. The book also describes some approaches to system-level power management, including Microsoft's OnNow architecture and the 'Advanced Configuration and Power Management' standard proposed by Intel, Microsoft and Toshiba. These approaches migrate power management to the software layer running on hardware platforms, thus providing a flexible and self-configurable solution to adapting the power/performance tradeoff to the needs of mobile (and fixed) computing

and communication. Dynamic Power Management: Design Techniques and CAD Tools is of interest to researchers and developers of computer-aided design tools for integrated circuits and systems, as well as to system designers.

Computers as Components - Wayne Wolf
2008-07-08

Computers as Components, Second Edition, updates the first book to bring essential knowledge on embedded systems technology and techniques under a single cover. This edition has been updated to the state-of-the-art by reworking and expanding performance analysis with more examples and exercises, and coverage of electronic systems now focuses on the latest applications. It gives a more comprehensive view of multiprocessors including VLIW and superscalar architectures as well as more detail about power consumption. There is also more advanced treatment of all the components of the system

as well as in-depth coverage of networks, reconfigurable systems, hardware-software co-design, security, and program analysis. It presents an updated discussion of current industry development software including Linux and Windows CE. The new edition's case studies cover SHARC DSP with the TI C5000 and C6000 series, and real-world applications such as DVD players and cell phones. Researchers, students, and savvy professionals schooled in hardware or software design, will value Wayne Wolf's integrated engineering design approach. * Uses real processors (ARM processor and TI C55x DSP) to demonstrate both technology and techniques...Shows readers how to apply principles to actual design practice. * Covers all necessary topics with emphasis on actual design practice...Realistic introduction to the state-of-the-art for both students and practitioners. * Stresses necessary fundamentals which

can be applied to evolving technologies...helps readers gain facility to design large, complex embedded systems that actually work.

Power Aware Computing - Robert Graybill 2013-04-17

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.

Power Management in Mobile Devices - Findlay Shearer 2011-04-01
Sealed Lead Acid...Nickel

Cadmium...Lithium Ion... How do you balance battery life with performance and cost? This book shows you how! Now that "mobile" has become the standard, the consumer not only expects mobility but demands power longevity in wireless devices. As more and more features, computing power, and memory are packed into mobile devices such as iPods, cell phones, and cameras, there is a large and growing gap between what devices can do and the amount of energy engineers can deliver. In fact, the main limiting factor in many portable designs is not hardware or software, but instead how much power can be delivered to the device. This book describes various design approaches to reduce the amount of power a circuit consumes and techniques to effectively manage the available power. Power Management Advice On:

- Low Power Packaging Techniques
- Power and Clock Gating
- Energy Efficient Compilers
- Various Display

Technologies

- Linear vs. Switched Regulators
- Software Techniques and Intelligent Algorithms

* Addresses power versus performance that each newly developed mobile device faces *

Robust case studies drawn from the author's 30 plus years of extensive real world experience are included *

Both hardware and software are discussed concerning their roles in power

Green Mobile Devices and Networks - Hrishikesh Venkataraman 2016-04-19

While battery capacity is often insufficient to keep up with the power-demanding features of the latest mobile devices, powering the functional advancement of wireless devices requires a revolution in the concept of battery life and recharge capability. Future handheld devices and wireless networks should be able to recharge themselves automaticall

Advances in Computers - Marvin Zelkowitz 2005

The term computation gap has been

defined as the difference between the computational power demanded by the application domain and the computational power of the underlying computer platform. Traditionally, closing the computation gap has been one of the major and fundamental tasks of computer architects. However, as technology advances and computers become more pervasive in the society, the domain of computer architecture has been extended. The scope of research in the computer architecture is no longer restricted to the computer hardware and organization issues. A wide spectrum of topics ranging from algorithm design to power management is becoming part of the computer architecture. Based on the aforementioned trend and to reflect recent research efforts, attempts were made to select a collection of articles that covers different aspects of contemporary computer architecture design. This volume of

the Advances in Computers contains six chapters on different aspects of computer architecture. Key features:

- Wide range of research topics.
- Coverage of new topics such as power management, Network on Chip, Load balancing in distributed systems, and pervasive computing.
- Simple writing style.
- Wide range of research topics.
- Coverage of new topics such as power management, Network on Chip, Load balancing in distributed systems, and pervasive computing.
- Simple writing style

Low-Power CMOS Wireless Communications - Samuel Sheng
2012-12-06
Low-Power CMOS Wireless Communications: A Wideband CDMA System Design focuses on the issues behind the development of a high-bandwidth, silicon complementary metal-oxide silicon (CMOS) low-power transceiver system for mobile RF wireless data communications. In the design of any RF communications

system, three distinct factors must be considered: the propagation environment in question, the multiplexing and modulation of user data streams, and the complexity of hardware required to implement the desired link. None of these can be allowed to dominate. Coupling between system design and implementation is the key to simultaneously achieving high bandwidth and low power and is emphasized throughout the book. The material presented in Low-Power CMOS Wireless Communications: A Wideband CDMA System Design is the result of broadband wireless systems research done at the University of California, Berkeley. The wireless development was motivated by a much larger collaborative effort known as the Infopad Project, which was centered on developing a mobile information terminal for multimedia content - a wireless 'network computer'. The desire for mobility, combined with the need to support potentially

hundreds of users simultaneously accessing full-motion digital video, demanded a wireless solution that was of far lower power and higher data rate than could be provided by existing systems. That solution is the topic of this book: a case study of not only wireless systems designs, but also the implementation of such a link, down to the analog and digital circuit level.

Applications of Artificial Intelligence Techniques in

Engineering - Hasmat Malik 2018-09-28

The book is a collection of high-quality, peer-reviewed innovative research papers from the International Conference on Signals, Machines and Automation (SIGMA 2018) held at Netaji Subhas Institute of Technology (NSIT), Delhi, India. The conference offered researchers from academic and industry the opportunity to present their original work and exchange ideas, information, techniques and applications in the

field of computational intelligence, artificial intelligence and machine intelligence. The book is divided into two volumes discussing a wide variety of industrial, engineering and scientific applications of the emerging techniques.

Recent Progress in the Boolean Domain
- Bernd Steinbach 2014-04-23

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.

Energy Efficient High Performance

Processors - Jawad Haj-Yahya

2018-03-22

This book explores energy efficiency techniques for high-performance computing (HPC) systems using power-management methods. Adopting a step-by-step approach, it describes power-management flows, algorithms and mechanism that are employed in modern processors such as Intel Sandy Bridge, Haswell, Skylake and other architectures (e.g. ARM). Further, it includes practical examples and recent studies demonstrating how modern processors dynamically manage wide power ranges, from a few milliwatts in the lowest idle power state, to tens of watts in turbo state. Moreover, the book explains how thermal and power deliveries are managed in the context this huge

power range. The book also discusses the different metrics for energy efficiency, presents several methods and applications of the power and energy estimation, and shows how by using innovative power estimation methods and new algorithms modern processors are able to optimize metrics such as power, energy, and performance. Different power estimation tools are presented, including tools that break down the power consumption of modern processors at sub-processor core/thread granularity. The book also investigates software, firmware and hardware coordination methods of reducing power consumption, for example a compiler-assisted power management method to overcome power excursions. Lastly, it examines firmware algorithms for dynamic cache resizing and dynamic voltage and frequency scaling (DVFS) for memory sub-systems.

Autonomic Computing - Manish Parashar

2018-10-03

The complexity of modern computer networks and systems, combined with the extremely dynamic environments in which they operate, is beginning to outpace our ability to manage them. Taking yet another page from the biomimetics playbook, the autonomic computing paradigm mimics the human autonomic nervous system to free system developers and administrators from performing and overseeing low-level tasks. Surveying the current path toward this paradigm, *Autonomic Computing: Concepts, Infrastructure, and Applications* offers a comprehensive overview of state-of-the-art research and implementations in this emerging area. This book begins by introducing the concepts and requirements of autonomic computing and exploring the architectures required to implement such a system. The focus then shifts to the approaches and infrastructures, including control-

based and recipe-based concepts, followed by enabling systems, technologies, and services proposed for achieving a set of "self-*" properties, including self-configuration, self-healing, self-optimization, and self-protection. In the final section, examples of real-world implementations reflect the potential of emerging autonomic systems, such as dynamic server allocation and runtime reconfiguration and repair. Collecting cutting-edge work and perspectives from leading experts, *Autonomic Computing: Concepts, Infrastructure, and Applications* reveals the progress made and outlines the future challenges still facing this exciting and dynamic field.

Wireless Sensor Networks - C.S.

Raghavendra 2006-09-01

Wireless Sensor Networks presents a comprehensive and tightly organized compilation of chapters that surveys

many of the exciting research developments taking place in this field. Chapters are written by several of the leading researchers exclusively for this book. Authors address many of the key challenges faced in the design, analysis and deployment of wireless sensor networks.

Multi-Core Embedded Systems - Georgios Kornaros 2018-10-08
Details a real-world product that applies a cutting-edge multi-core architecture increasingly demanding modern applications—such as those used in telecommunications networking and real-time processing of audio, video, and multimedia streams—require multiple processors to achieve computational performance at the rate of a few giga-operations per second. This necessity for speed and manageable power consumption makes it likely that the next generation of embedded processing systems will include hundreds of cores, while

being increasingly programmable, blending processors and configurable hardware in a power-efficient manner. *Multi-Core Embedded Systems* presents a variety of perspectives that elucidate the technical challenges associated with such increased integration of homogeneous (processors) and heterogeneous multiple cores. It offers an analysis that industry engineers and professionals will need to understand the physical details of both software and hardware in embedded architectures, as well as their limitations and potential for future growth. Discusses the available programming models spread across different abstraction levels The book begins with an overview of the evolution of multiprocessor architectures for embedded applications and discusses techniques for autonomous power management of system-level parameters. It addresses the use of existing open-source (and

free) tools originating from several application domains—such as traffic modeling, graph theory, parallel computing and network simulation. In addition, the authors cover other important topics associated with multi-core embedded systems, such as: Architectures and interconnects Embedded design methodologies Mapping of applications

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 has 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.